REVISED DRAFT
ENVIRONMENTAL IMPACT REPORT

THE INSTITUTE GOLF COURSE

City of Morgan Hill

December 2003

Appendix A

Land Conservation Agreement

NO FEE

LAND CONSERVATION AGREEMENT

This is an agreement between the County of Santa Clara, State of California (hereinafter called "County"), and JAMES WALTER BOGLE, J. E. BOGLE, J. E. BOGLE TRUSTEE, MARSHALL BOGLE, DIANE BOGLE GOODRICH, CHARLES E. BOGLE, BENEFICIARY UNDER MARTHA BOGLE TRUST (hereinafter called "Owner").

822-04-1/2/3

WHEREAS, Owner possesses certain real property located within the County of Santa Clara, State of California, which is presently devoted to agricultural use and is described in Exhibit A attached hereto and made a part hereof; and

545.07AC

WHEREAS, the property is located in an agricultural preserve heretofore established by County; and

WHEREAS, both Owner and County desire to limit the use of the property to agricultural and compatible uses; and

WHEREAS, the parties have determined that the highest and best use for the property during the term of this agreement, or any renewal thereof, shall be for agricultural purposes.

NOW, THEREFORE, County and Owner agree as follows:

1. AGREEMENT SUBJECT TO CALIFORNIA LAND CONSERVATION ACT OF 1965

This agreement is entered into pursuant to Chapter 7 (commencing with Section 51200) of Part 1, Division 1, Title 5 of the Government Code, which is known as the California Land Conservation Act of 1965. This agreement is subject to all of the provisions of this Act including any amendments thereto which may be enacted from time to time which are specifically applicable to agreements under Article 3.5 of Chapter 7.

2. RESTRICTION ON USE OF PROPERTY

During the term of this agreement, and any and all renewals thereof, the property described in Exhibit A shall not be used by Owner, or Owner's successors in interest, for any purpose other than the production of agricultural commodities for commercial purposes and uses compatible thereto. A list of all such compatible uses is set forth in Exhibit B, attached hereto and by this reference incorporated herein. County, by uniform rule adopted by the Board of Supervisors of County, may from time to time during the term of this agreement and all renewals thereof, add to the list of

68,109

compatible uses which shall be uniform throughout the agricultural preserve in which the property in Exhibit A is located; provided, however, County may not during the term of this agreement or any renewal thereof, without the prior written consent of Owner, remove any of the compatible uses for the subject property which are set forth in Exhibit B. The provisions of this agreement and any uniform rule supplementing the list of compatible uses are not intended to limit or supersede the planning and zoning powers of County.

3. TERM OF AGREEMENT

This agreement shall become effective on the date of execution and shall remain in full force and effect for an initial term of ten years. The initial term of ten years shall be measured commencing as of the first day of January next succeeding the date of execution if the date of execution is between March 2 and December 31. The initial term of ten years shall be measured commencing as of the first day of January of the year of execution if the date of execution is between January 1 and March 1. Each succeeding first day of January shall be deemed to be the annual renewal date of this agreement. This agreement shall be renewed on each succeeding January 1 and one additional year shall be added automatically to the initial term unless notice of nonrenewal is given as provided in paragraph 4.

4. NOTICE OF NONRENEWAL

(a) If either party desires in any year not to renew this agreement, that party shall serve written notice of nonrenewal upon the other party in advance of the annual renewal date of this agreement. Unless such written notice of nonrenewal is served by Owner at least 90 days prior to the renewal date, or by County at least 60 days prior to the renewal date, this agreement shall be considered renewed as provided in paragraph 3 above.

(b) If either party serves written notice of nonrenewal in any year within the time limits of (a) above, this agreement shall remain in effect for the balance of the period remaining since the original execution or the last renewal of this agreement, as the case may be.

5. NO COMPENSATION

Owner shall not receive any payment from County in consideration of the obligations imposed under this agreement, it being recognized and agreed that the consideration for the execution of this agreement is the substantial benefit to be derived therefrom, and the advantage that may accrue to Owner as a result of the effect upon the assessed value of the property on account of the restrictions on the use of the property contained herein.

6. SUCCESSORS IN INTEREST

This agreement and the restrictions imposed hereunder shall run with the property described in Exhibit A and shall be binding upon the heirs, executors, administrators, trustees, successors and assigns of Owner. This agreement shall also be transferred from County to any succeeding city or county acquiring jurisdiction over the property described in Exhibit A. On the completion of annexation proceedings by a city, that city shall succeed to all rights, duties and powers of the County under this agreement for that portion of the property described in Exhibit A annexed to the city. The territory described in Exhibit A is not / is within one mile of an incorporated city in the County of Santa Clara on the date of execution of this agreement.

7. DIVISION OF LAND

This agreement is divisible in the event the property described in Exhibit A is divided. Owner agrees to submit a proposed division to County for its approval, and County shall, as a condition of its approval of the division, require the execution by Owner of an agreement identical to this agreement on each parcel created by the division. Owner agrees to execute such agreement.

8. CONDEMNATION

When any action in eminent domain for the condemnation of the fee title of any land described in Exhibit A is filed or when such land is acquired in lieu of eminent domain for a public improvement by a public agency or person, or whenever there is any such action or acquisition by the federal government, or any person, instrumentality or agency acting under authority or power of the federal government, this agreement becomes null and void as to the land

actually being condemned or so acquired as of the date the action is filed or so acquired.

9. CANCELLATION

This agreement may be canceled by the mutual agreement of the parties hereto and the approval of the State of California in the manner provided in this paragraph. It is understood by the parties hereto that the existence of an opportunity for another use of the property shall not be sufficient reason for the cancellation of this agreement. A potential alternative use of the property may be considered only if there is no proximate nonrestricted land suitable for the use to which it is proposed that this property be put. The parties further understand that the uneconomic character of an existing agricultural use shall not be sufficient reason for cancellation of this agreement, but may be considered only if there is no other reasonable or comparable agricultural use to which the land may be put.

(a) Upon the written request of Owner to cancel this agreement, the Board of Supervisors of the County of Santa Clara may adopt a resolution consenting to such request. Prior to the adoption of a resolution consenting to the request of the landowner to cancel this agreement, the Board of Supervisors of County shall hold a public hearing on the matter. Notice of the hearing shall be mailed to each and every owner of property under agreement within the agricultural preserve in which the property described in Exhibit A is located, and shall be published pursuant to Section 6061 of the Government Code. If at the hearing, or prior thereto, the owners of 51 percent of the acreage under agreement in the agricultural preserve protest the cancellation of this agreement, the Board of Supervisors shall not consent to cancel this agreement.

(b) If the Board of Supervisors adopts a resolution consenting to the request of Owner to cancel this agreement, the parties shall request that the cancellation be approved by the State Director of Agriculture upon the recommendation of the State Board of Agriculture. The State Board of Agriculture may recommend and the State Director of Agriculture may approve the cancellation only if they find: (1) The cancellation is not

inconsistent with the purposes of the California Land Conservation Act of 1965; and (2) the cancellation is in the public interest.

(c) The provisions of subparagraph (b) of this paragraph 9 relating to the State Board of Agriculture and the Director of Agriculture shall be applicable only if both the State Board and the State Director consent to act as described herein. If either the State Board or the State Director fail or refuse to act within 60 days after being requested to do so, the Board of Supervisors of the County of Santa Clara shall act in the place and stead of the State Board and State Director and shall make all findings and decisions required by subparagraph (b).

10. LIABILITY OF OWNER UPON CANCELLATION

(a) Upon cancellation of this agreement, and as soon thereafter as the property to which it relates is reassessed by Assessor, Owner shall pay to the County Treasurer, as deferred taxes, an amount equal to 50 percent of the new equalized assessed valuation of the property; provided, however, if after the date this agreement was initially entered into the publicly announced County ratio of assessed to full cash value is changed, the percentage payment shall be changed so no greater percent of full cash value will be paid than would have been paid had there been no change in ratio. It is agreed by the parties hereto that the publicly announced County ratio at the time this agreement is executed is 25 percent of full cash value.

(b) If the State Board of Agriculture recommends that it is in the public interest to do so, and the State Director of Agriculture so finds, the Director may waive any such payment or any portion thereof, or may make such payment or portion thereof, contingent upon the future use made of the property and its economic return to Owner for a period of time not to exceed the unexpired term of the agreement had it not been canceled, provided: (i) the cancellation is caused by a nonvoluntary transfer or change in the use which may be made of the property and the property is not immediately suitable, nor will be immediately used, for a purpose which produces a greater economic return to Owner; and (ii) County has recommended to the State Board of Agriculture

that no such payment be required or that the deferment of such payment or portion thereof be allowed, and the board has determined it is in the best interests of the public conservation of agricultural land that such payment be either deferred or not required.

(c) The provisions of subparagraph (b) of this paragraph 10 relating to the State Board of Agriculture and the Director of Agriculture shall be applicable only if the State Board and the State Director both consent to act as described herein. If either the State Board or the State Director fail or refuse to act within 60 days after being requested to do so, the Board of Supervisors of the County of Santa Clara shall act in the place and stead of the State Board and the State Director and shall make all findings and decisions required by subparagraph (b).

11. NOTICES

All notices required or permitted by this agreement, including notice of a change of address, shall be in writing and given by personal delivery or sent by United States Mail addressed to the party intended to be notified. Notice shall be deemed given as of the date of delivery in person or as of the date when deposited in any post office or any post office box regularly maintained by the United States Government.

Notice to the County shall be addressed:

Clerk of the Board of Supervisors
County of Santa Clara
70 West Hedding Street
San Jose, California 95110

Notice to Owner shall be addressed:

Name James Walter Bogle & J. E. Bogle
Address Rt. 2, Box 93, Masten Ave.
City & State Gilroy, California
Zip Code _____

BOOK 8450 PG 610

IN WITNESS WHEREOF the parties hereto have caused this agreement to be executed: by Owner on November 29, 1968 and by County on FEB 25 1969.

COUNTY OF SANTA CLARA

Chairman, Board of Supervisors

ATTEST: JEAN PULLAN, Clerk
Board of Supervisors

APPROVED AS TO FORM

Chief Assistant County Counsel

Owner

STATE OF CALIFORNIA
COUNTY OF SANTA CLARA

On FEB 25 1969 before me Marilyn B. Ott personally appeared Big Sunshine and Joan Pullan, known to me to be the Chairman and Clerk of the Board of Supervisors of the County of Santa Clara, State of California, respectively, and known to me to be the persons who executed the within instrument on behalf of said County, and acknowledged to me that said County of Santa Clara authorized execution of the same.

Notary Public

MARILYN B. OTT
NOTARY PUBLIC
Santa Clara County, Calif.
MY COMMISSION EXPIRES MARCH 3, 1969

WMS:rd
9-18-68

BOOK 8450 PG 611

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CLARA)

On this _____ day of _____, before me, the undersigned, a Notary Public in and for the State of California with principal office in the County of Santa Clara, residing therein, duly commissioned and sworn, personally appeared _____ known to me to be the _____ of _____ _____, the corporation that executed the within instrument, and known to me to be the person who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same pursuant to its By-Laws or a resolution of the Board of Directors.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this Certificate first above written.

_____
Notary Public in and for the
State of California

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CLARA)

On this 29th day of November, before me, the undersigned, a Notary Public in and for the State of California with principal office in the County of Santa Clara, residing therein, duly commissioned and sworn, personally appeared JAMES WALTER BOGLE, J. E. BOGLE, J. E. BOGLE TRUSTEE and MARSHALL BOGLE, DIANE BOGLE GOODRICH, CHARLES E. BOGLE, BENEFICIARY UNDER MARTHA BOGLE TRUST, known to me to be the persons described in, whose names are subscribed to and who executed the within instrument, and acknowledged that they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this Certificate first above written.

Francis N. Crawford
Notary Public in and for the
State of California
Commission expires 7/22/69

FRANCIS N. CRAWFORD
NOTARY PUBLIC - CALIFORNIA
PRINCIPAL OFFICE IN
SANTA CLARA COUNTY

BOOK 8450 PG 612

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CLARA)

On this 3rd day of January, 1969, before me, PHYLLIS J. TICE, a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared James Ellis Boyle, known to me to be the person described in and whose name is subscribed to the attached instrument, and acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year in this certificate first above written.

PHYLLIS J. TICE
NOTARY PUBLIC
Santa Clara County, Calif.
My commission expires Aug. 15, 1972

Phyllis J. Tice
PHYLLIS J. TICE Notary Public in and for the County of Santa Clara, State of California.

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CLARA)

On this _____ day of _____ 19____, before me, _____, a Notary Public in and for the said County and State, residing therein, dully commissioned and sworn, personally appeared _____ _____, known to me to be the Chairman of the Board of Supervisors of the County of Santa Clara that executed the within agreement and acknowledged to me that said County of Santa Clara did execute the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this Certificate first above written.

_____
NOTARY PUBLIC in and for said County and State

My Commission Expires _____

EXHIBIT A

REAL PROPERTY

BOOK 8450 PAGE 613

All those certain parcels of land situated in the County of Santa Clara, State of California, described as follows:

PARCEL NO. 1

Lots 224, 225, 226, 234, 235, 236, 237-A, 244, 245, and 246, as shown on that certain Map entitled, "San Martin Rancho Map No. 2", filed for record January 27, 1893 in book "O" of Maps, page 38 and 39, Santa Clara County Records.

PARCEL NO. 2

Portions of Lot 227-A, as shown upon that certain Map entitled, "San Martin Rancho Map No. 2", which map was filed for record in the office of the Recorder of the County of Santa Clara, State of California, on January 27, 1893 in Volume "O" of Maps, pages 38 and 39 and more particularly described as follows:

Commencing at an underground granite momument set at the intersection of the center line of Middle Avenue with the center line of Foothill Avenue, as shown upon the Map above referred to and running thence along the line between Lots 226 and 227-A, N.66° 11'E. 21 chains to the common corner for Lots 226,227-A236 and 237-A, as shown upon the above Map; thence at right angles along the line between Lots 227-A and 237-A, S.23° 49' E.11.59 chains to the common corner for Lots 227-A, 227-B, 237-A and 237-B, as shown on the above Map; thence at right angles S. 66° 11" W. 21 chains to a point in the center line of Foothill Avenue where the prolongation Southwesterly of the line between Lots 227-A and 227-B would intersect the center line of said Foothill Avenue and distant N.23° 49'W. 4.41 chains from the common corner for Lots 227-A and 228-B in said center line as shown on said Map; thence at right angles along the center line of said Foothill Avenue, N. 28° 49'W. 11.59 chains to the point of commencement.

Containing 24.34 acres of land, more or less.

68.109

EXHIBIT B

BOOK 8450 PG 614

LAND CONSERVATION AGREEMENT

COMPATIBLE USES

The following is a list of land uses determined to be compatible with the agricultural use of the land subject to this agreement:

1. The drying, packing or other processing of an agricultural commodity usually performed on the premises where it is produced but not including slaughter houses, fertilizer yards, bone yards or plants for the reduction of animal or vegetable matter.

2. Structures necessary and incidental to the agricultural use of the land.

3. The holding of nonproducing land for future agricultural use.

4. The holding of nonproducing mineral resource areas for future use.

5. The maintenance of land in its natural state for the purpose of preserving open space for recreation or plant or animal preserves.

6. Single family dwellings incidental to the agricultural use of the land for the residence of the owner, and the family of the owner.

Single family dwellings incidental to the agricultural use of the land for the residence of the lessee of the land and the family of the lessee.

Owner or lessee shall be construed to include:

(a) stockholders in family corporations

(b) beneficiaries of family trusts and estates

(c) owners of undivided partial interests in the fee

(d) joint tenants

7. Dwellings for persons employed by owner or lessee in the agricultural use of the land.

8. Temporary farm labor camps incidental and necessary to the gathering of the crops grown on the land.

9. The construction and maintenance of a stand or shelter for the sale of agricultural commodities produced on the land.

10. An aircraft landing strip incidental to the agricultural use of the land.

11. The erection, construction, alteration or maintenance of gas, electric, water or communication utility facilities.

12. The erection, construction, alteration or maintenance of radio, television or microwave antennas, transmitters and related facilities.

13. Public or private hunting of wildlife or fishing.

14. Public or private hunting clubs and accessory structures.

15. Public or private rifle and pistol practice range, trap or skeet field, archery range or other similar use.

16. Public or private riding or hiking trails.

17. Riding academy, stables and the boarding of horses or other livestock but not including an animal hospital or kennel.

18. Oil and gas well drilling, including the installation and use of such equipment, structure and facilities as are necessary or convenient for oil and gas drilling and producing operations customarily required or incidental to usual oil field practice, including the initial separation of oil, gas and water and the storage, handling, recycling and transportation of such oil, gas and water from the premises.

3577011

BOOK 8450 PG604

FILED FOR RECORD
AT REQUEST OF
BOARD OF SUPERVISORS
FEB 28 11 18 AM '69
OFFICIAL RECORDS
SANTA CLARA COUNTY
GEORGE E. FOWLER
RECORDER

NO FEE

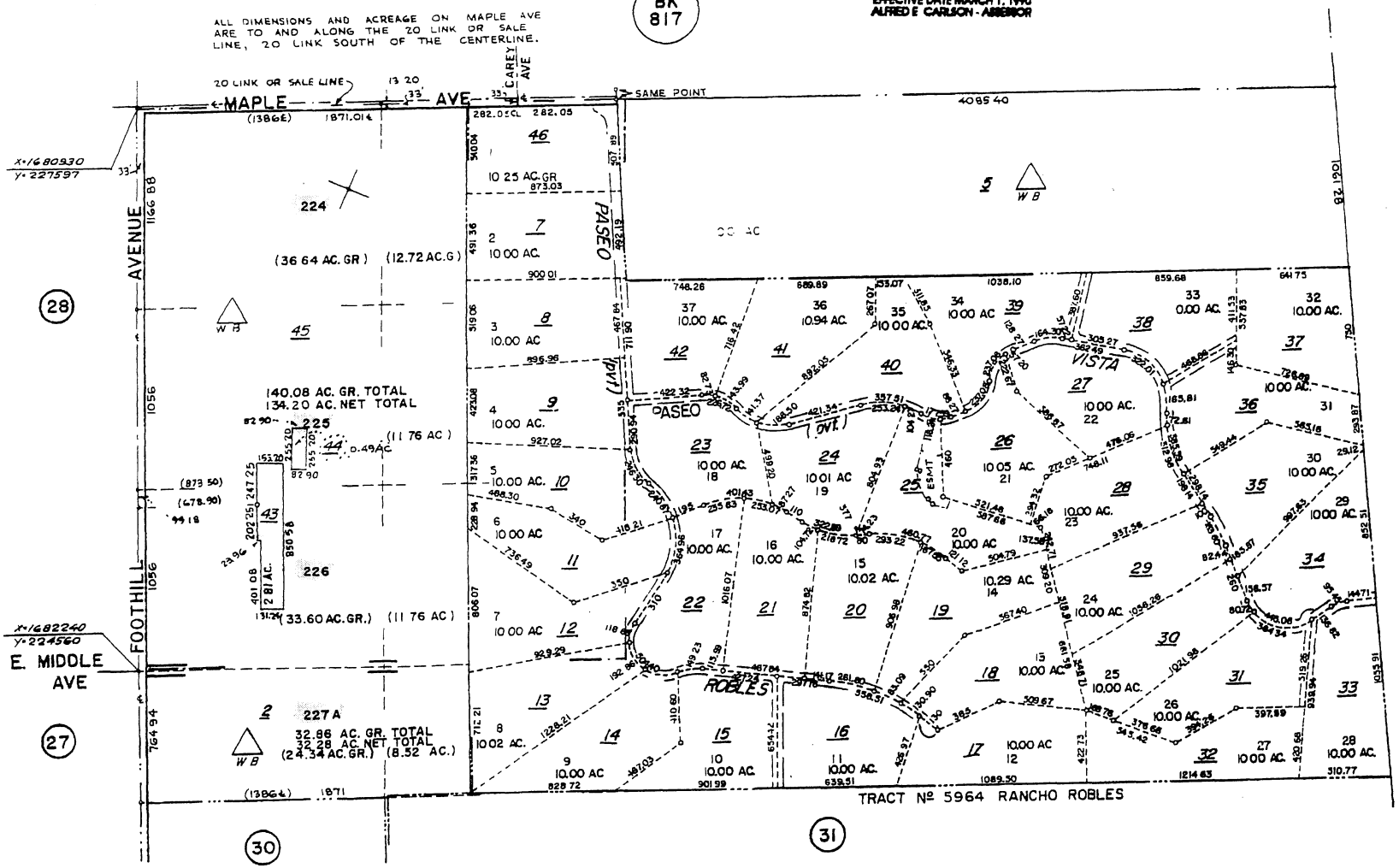
OFFICE OF COUNTY ASSESSOR SANTA CLARA COUNTY, CALIFORNIA

BOOK	PAGE
825	29

COMPILED IN CONFORMANCE WITH SEC. 327
OF THE REVENUE & TAXATION CODE
EFFECTIVE DATE MARCH 1, 1990
ALFRED E CARLSON - ASSESSOR

BK 817

ALL DIMENSIONS AND ACREAGE ON MAPLE AVE ARE TO AND ALONG THE 20 LINK OR SALE LINE, 20 LINK SOUTH OF THE CENTERLINE.



SAN MARTIN RANCH MAP Nº 2

Appendix B

Geology and Soils

B-1 Landscape Appraisal, Kleinfelder, Inc.
B-2 Geotechnical Investigation of Soil Berms, Kleinfelder Inc.

Appendix B-1

Landscape Appraisal, Kleinfelder, Inc.

KLEINFELDER

12-191601/001

LANDSCAPE APPRAISAL
MORGAN HILL MATH CAMPUS
MORGAN HILL, CALIFORNIA

For: American Institute of Mathematics
P.O. Box 50097
Palo Alto, CA 94303

Attention: Mr. Stephen R. Sorenson

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THIS DOCUMENT WAS PREPARED FOR USE ONLY BY THE AMERICAN INSTITUTE OF MATHEMATICS, ONLY FOR THE PURPOSES STATED, AND WITHIN A REASONABLE TIME FROM ITS ISSUANCE. PLEASE READ THE "LIMITATIONS" SECTION OF THIS REPORT.

January 20, 1995

KLEINFELDER

January 20, 1995
File: 12-191601/001
Doc.: 138GI95

American Institute of Mathematics
P.O. Box 50097
Palo Alto, CA 94303

Attention: Mr. Stephen R. Sorenson

Subject: **Landscape Appraisal For The Proposed Morgan Hill Math Campus To Be Located In Morgan Hill, California.**

Gentlemen:

We are pleased to submit our landscape appraisal report for the above subject project. The accompanying report provides the results of our field investigation, laboratory testing, and analyses. Recommendations are presented herein which are based on the test results and our field investigation. A discussion is included regarding the nature of the on-site soils and the amendment needs for golf course development.

We appreciate the opportunity of providing our services to you on this project. If any questions should arise regarding the interpretation of the contents of this report, please do not hesitate to contact us for clarification.

Respectfully Submitted,
KLEINFELDER, INC.

Daniel J. Peluso, CE
Project Engineer

Christina J. Kennedy, RG
Area Manager

cc: Addressee (4)

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LANDSCAPE APPRAISAL
MORGAN HILL MATH CAMPUS
MORGAN HILL, CALIFORNIA

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LANDSCAPE APPRAISAL
MORGAN HILL MATH CAMPUS
MORGAN HILL, CALIFORNIA

I. INTRODUCTION

This report presents the results of our landscape appraisal for the proposed Morgan Hill Math Campus to be located at the southeast corner of Maple Avenue and Foothill Avenue in the City of Morgan Hill, California. The approximate location of the project site is shown on the Site Vicinity Map, Plate 1.

We understand that the proposed project will consist of developing the property for a regulation 18 hole golf course and conference center. We were provided with a site topographic map which was prepared by Garcia and Henry, Inc.

II. SCOPE OF SERVICES

The Scope of Services performed for this investigation consisted of a review of previous soil science and geotechnical literature pertaining to the subject site vicinity in our files, a site reconnaissance by a registered engineer from our office, subsurface exploration, laboratory testing, analyses of field and laboratory data, and preparation of this report. In addition, we had a discussion with an experienced golf course contractor, Mr. Dale Siemens of Daylen, Inc., to gain his insights on grading and soil amending programs for golf courses in this area. The data obtained and analyses performed were for the purpose of providing an evaluation of the surficial soils for the proposed golf course landscaping.

Geotechnical engineering services and environmental services such as chemical analysis of the soil and groundwater were not included in our Scope of Services.

III. GEOLOGY

A. Geologic Setting

The San Francisco Bay Area lies within the Coast Range geomorphic province, a more or less discontinuous series of northwest trending mountain ranges, ridges, and intervening valleys characterized by intense, complex folding and faulting. The general geologic framework of the San Francisco Bay Region is shown in studies by Schlocker (1971).

The project site is located towards the southern end of the Santa Clara Valley on the broad alluvial plain bordering the southern edge of San Francisco Bay. The site is essentially level, and is not crossed by any creeks or drainages. Reference to geologic mapping by Rogers and Williams (1974) shows the site and surrounding area to be underlain by older alluvial fan deposits. The studies by Rogers and Williams (1974) further indicated that the alluvium underlying the general site area is on the order of 500 or more feet in thickness, and that the depth to groundwater is on the order of 60 to 100 feet below the ground surface.

Studies by Limerinos and others (1973) indicate that the site is <u>not</u> within an area that would be subject to flooding during a 100 year storm event due to over-topping of Corralitos Creek which traverses the northern portion of the subject property and flows toward the southwest. More recent studies by the Santa Clara Valley Water District (1986) indicate that the site is <u>not</u> within

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an area that will be subjected to flooding during a 100-year storm event. The nearest flooding is predicted to be approximately 1,500 feet to the west, in the vicinity of the intersection of Tennant Creek and Corralitos Creek.

B. Faulting and Seismicity

The San Francisco Bay area is considered by geologists and seismologists to be one of the most seismically active regions in the United States. On the basis of current technology, as well as historical evidence, it is reasonable to assume that the project area will be subjected to the effects of at least one large to severe earthquake (magnitude 7 to 8+) that could cause considerable ground shaking at the site. Further, it is anticipated that the subject site will periodically experience ground accelerations as the result of small to moderate magnitude earthquakes occurring in the area.

Based on our analysis of published and unpublished data for the active and potentially active faults, and the geographic relationship between the subject property and area faults, it is reasonable to conclude that the San Andreas, Hayward and Calaveras faults have the greatest potential for impacting development at the site. Reference to studies by Rogers and Williams (1974) indicate that the San Andreas and Calaveras faults, are located approximately 12 miles southwest and 1-1/2 miles northeast of the site, respectively.

In addition, the State of California (1982) does not show any faults bisecting the site or immediately adjacent areas, and does not include the site in any State Special Fault Study Zones.

Due to the magnitude of the proposed development, a detailed geotechnical and geologic hazards assessment should be performed on the property.

IV. SITE INVESTIGATION

A. Site and Project Description

The project site is located on the southeast corner of Maple Avenue and Foothill Avenue, which is situated in the east portion of the City of Morgan Hill, California. The roughly rectangular parcel is approximately 194 acres. The property is bounded on the north by Maple Avenue, on the west by Foothill Avenue, and on the south and east by rural residential and agricultural property. The majority of the topography on the west side of the property is nearly level to gently sloping. The eastern side of the property is situated on moderate to steep slopes. The ground elevations on the property range from approximately 327 feet to approximately 524 feet above Mean Sea Level (see Site Plan, Plate 2). Corralitos Creek is in the north portion of the site and flows toward the west. Surface water runoff generally flows to the southwest. The property is currently being used primarily for agricultural purposes. There are also several large buildings on the flat portions of the site which we understand are being used for storage and maintenance. In the southwest corner of the property is the former Flying Lady Restaurant and Hill Country Golf Course.

The building area for the proposed golf course will essentially be in the lower flat-land areas and portions of the adjacent hillside areas. We estimate approximately 120 acres will be used for the golf course. We understand that the existing Flying Lady restaurant building will remain on the site and will be upgraded to serve as a conference center and restaurant. We assume that the existing golf course areas, being that they are not regulation size, will be regraded and incorporated into the future regulation golf course.

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KLEINFELDER 2160 Oakland Road, Suite B, San Jose, CA 95131-1571 (408) 432-8952

B. Field Investigation

Our field investigation consisted of a surface reconnaissance and subsurface exploration. Nine test pits were excavated on the subject property on November 23, 1994. The test pits were excavated using a rubber tire-mounted backhoe equipped with a 12-inch wide bucket. The test pits were each excavated to a depth ranging from 3 to 5 feet below the existing site grades.

Bulk soil samples were obtained from the pits from various depths. The test pits were backfilled with the soil cuttings at the completion of excavating. The approximate locations of our test pits are shown on the Site Plan, Plate 2.

The soil materials encountered in our test pits were visually classified in general accordance with the Unified Soil Classification System (ASTM D2487) by an engineer from our firm. A key for classification of the soils is presented in Appendix A on the Test Pit Log Legend, Plate A1. The logs of the test pits are presented on Plate A2.

C. Soil Testing

Representative soil samples were obtained from the test pits at selected depths appropriate to this soil investigation. The obtained samples were returned to Soil & Plant Laboratory, Inc., for further evaluation and appropriate testing. For the purpose of evaluating the site soils for landscaping needs, they recommended a package of tests known as "A05". This recommended series of tests consisted of the following combination of testing packages:

A01 Fertility Package - fertility determined by pH, salinity, nitrate nitrogen, ammonium nitrogen, phosphate phosphorus, potassium, calcium, and magnesium analyses.

A02 Agricultural Suitability Package - Tests included pH, salinity, boron, sodium, potassium, calcium and magnesium analyses. This analysis determines potential hazards from salinity, sodium, boron, and impaired soil structure.

A03 Landscape Appraisal - Tests included pH, salinity, organic matter, and particle size distribution. This analysis classifies soil as to type and permits anticipation of potential irrigation and drainage problems.

The laboratory test results are presented in Appendix B.

D. Subsurface Soil Conditions

The ground surface in the subject area was generally covered with grasses and weeds at the time of our field operation. The near-surface soils encountered at the site generally consisted of 2 to 5 feet of native alluvium described as fat clay with a high expansion potential. This clay was underlain in some of the pits by sandy lean clay and silty sand with a low to moderate expansion potential. In Pits 5 and 6, we encountered some fill soils which were part of the grading that has taken place on the site already.

A more detailed description of the soils encountered is presented on the boring logs contained in Appendix A of this report.

The lab tests indicated the following:

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KLEINFELDER 2160 Oakland Road, Suite B, San Jose, CA 95131-1571 (408) 432-8952

1. Particle size distributions indicate the soils are clays, with the exception of the sample from Pit 2 at three feet, which is a clay loam.

2. Organic matter levels are low in all samples.

3. Infiltration rates are estimated to be very slow at about 0.15 inch per hour.

4. The site soils are generally slightly alkaline, with a few exceptions.

5. Available nitrogen levels are all low.

A complete discussion of the test results by Jim West, a soil scientist with Soil & Plant Laboratory is included in Appendix B.

E. USDA Soil Survey Summary

The soil series that have been mapped on the subject property by the USDA Soil Conservation Service are noted below with a brief description. The distribution of the soil types is shown on Plate 3, USDA Soil Map.

The following seven soil types are generally found on the flat-lying areas of the subject property:

CrA - **Cropley clay, 0 to 2 percent slopes**; Well-drained clays underlain by alluvium from mixed sources; High plasticity index (30-40) (CH); pH 6.6-8.4; Corrosivity to uncoated steel high; slow permeability; high water holding capacity; slow intake rate; fertility is high; effective rooting depth is very deep, runoff is very slow and the hazard of erosion is none to slight.

CrC - **Cropley clay, 2 to 9 percent slopes**; This soil is similar to Cropley clay, 0 to 2 percent slopes; some gravely clay in the surface layer; runoff is slow to medium and the hazard of erosion is slight to moderate.

RaA - **Rincon clay loam, 0 to 2 percent slopes;** This well-drained soil is on broad fans; moderately expansive clay [plasticity index 20-30 (CL)] overlying highly expansive clay [plasticity index 30-40 (CH)]; pH 6.6-7.8; Corrosivity to uncoated steel moderate; moderately slow permeability; high water holding capacity; moderate intake rate; fertility is high; effective rooting depth is very deep, but somewhat restricted by the clay subsoil.

RaC2 - **Rincon clay loam, 2 to 9 percent slopes;** This soil is similar to Rincon clay loam, 0 to 2 percent slopes; some areas with gravely clay loam surface layer; runoff is slow to medium and the hazard of erosion is slight to moderate.

ZeC3 - **Zamora and Cropley soils, 2 to 9 percent slopes, severely eroded**; These soils are on fans and toe sloes; Moderately expansive clay [plasticity index 15-20 (CL)]; pH 6.6-7.3; Corrosivity to uncoated steel moderate; Slopes are mostly short and run toward deeply cut channels; These soils have been damaged by severe gully and sheet erosion; This soil is similar in nature to Cropley clay, 0 to 2 percent slopes.

PoA - **Pleasanton loam, 0 to 2 percent slopes**; Loam or gravely loam over gravely clay loam; This well-drained soil is on broad, old fans; Moderately expansive clay/loam [plasticity index 10-20 (ML or CL)]; pH 6.1-7.3; Corrosivity to uncoated steel moderate; high water holding capacity; moderate intake rate; permeability in the subsoil is moderately slow; fertility is high; effective rooting depth is very deep; runoff is very slow and the hazard of erosion is none to slight;

LrA - **Los Robles clay loam, 0 to 2 percent slopes**; Clay loam over gravely clay loam; This well-drained soil is on smooth fans; Moderately expansive clay [plasticity index 10-20 (CL or ML)]; pH 6.6-7.3; Corrosivity to uncoated steel moderate; high water holding capacity; moderate intake rate; permeability in the subsoil is moderately slow; fertility is high; effective rooting depth is very deep; runoff is very slow and the hazard of erosion is none to slight;

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The following two soil types are generally found on the sloping areas of the subject property:

CmE - **Climara stony clay, 15 to 50 percent slopes**; The climara series consists of 1-1/2 to 3-1/2 feet of well-drained stony clays underlain by metamorphosed basic igneous rock; Highly expansive clay [plasticity index 30-35 (CH)]; pH 6.6-8.4; Corrosivity to uncoated steel high; permeability is slow; runoff is medium to rapid, and the hazard of erosion is moderate to high; fertility is moderate; effective rooting depth is moderately deep.

ClD - **Climara stony clay, 9 to 30 percent slopes**; This soil is similar to the Climara stony clay, 15 to 50 percent slopes, but it has less than 0.01 percent stones on the surface; runoff is medium and the hazard of erosion is moderate.

F. Groundwater

Free groundwater was not encountered in any of the test pits. Reference to studies by Rogers and Williams (1974) indicate that first groundwater is encountered at approximately 60 to 100 feet below the ground surface. However, seasonal fluctuations in the groundwater level may occur due to variations in rainfall, temperature, pumping from wells, and possibly as the result of other factors that were not evident at the time of our investigation.

V. CONCLUSIONS AND RECOMMENDATIONS

Based upon the data collected during this investigation (see Appendix B for lab test results and recommendations), it is our opinion that the property may be developed into a golf course as presently planned. The following recommendations presented in this report should be considered by the project golf course designers in the design and construction of the project. The following are our conclusions regarding the landscaping aspects of the project.

1. The following are summarized recommendations by Soil & Plant Laboratory for amending the site soils:

    a. Trees and shrubs should be selected with a tolerance for a potentially wet soil environment due to the slow infiltration rate and high water holding capacity of the site soils.

    b. The addition of organic matter will substantially improve the physical characteristics of the soil. Depending on the nature of the organic matter used, further amending is recommended by adding treble superphosphate, potassium sulfate and gypsum. In addition, they recommended the addition of sulfur in the area of Pits 6 and 7.

    c. A complete discussion of the recommendations by Soil & Plant Laboratory is included in Appendix B.

2. The test results of the soil samples collected generally indicate that the soil is suitable for development of the proposed golf course, if properly amended.

3. The soil and plant lab's conclusions indicate that extensive soil amendments will be required for development. However, from our discussion with Mr. Dale Siemens of Daylen, Inc., the recommended amendments are generally not cost effective for as large of an area as a golf course and represent the maximum degree of amendment that could be used to amend the soil for landscaping purposes. It is our understanding that golf

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course contractors in this area generally just add enough amendment to adjust the pH to near neutral and add some organic material. Although this approach is less than that recommended by the lab, it will likely result in a turf that is probably not perfect, but is adequate.

3. Mr. Siemens of Daylen, Inc., also indicated that the grading of the golf coarse generally will cost on the order of $1 to $2 per cubic yard of soil. This will only involve moving soil around to the proper grades. For a project such as this, with flat-land and hillside areas, it is our opinion that grading on the hillside areas will require more compactive effort than flat areas. This will increase the cost to probably between $5 and $10 per cubic yard. Seeding should cost on the order of $1,000 per acre and amending the soil should cost on the order of $1,000 to $1,500 per acre.

4. The test results contained herein should be considered as a preliminary assessment of the soil amendment needs to develop the golf course. An experienced golf course architect should make a final determination on soil amendments, based on the test results contained herein and on further soil sampling and testing that he or she feels is necessary.

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VI. ADDITIONAL SERVICES AND LIMITATIONS

A. Additional Services

We should be allowed to review the landscaping amendment program recommended by the project golf course architect. In addition, we recommend that a geologic hazards assessment, geotechnical study be performed prior to finalizing the development plans. It may also be necessary to perform an environmental assessment of the existing developed areas, such as the large maintenance/storage buildings in the central portion of the site. We are available for further consultation with regard to the geologic, geotechnical and environmental aspects of the development.

B. Limitations

Recommendations contained in this report are for the proposed site landscaping improvements as described in this report. Our recommendations are based upon field observations, data from nine test pits, laboratory tests, and our present knowledge of the proposed development. It is possible that subsurface conditions could vary between and beyond the points explored. If soil and groundwater conditions are encountered during construction which differ from those described herein, our firm should be notified immediately in order that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction change from that described in this report, our recommendations should also be reviewed.

Our firm has prepared this report for exclusive use of the American Institute of Mathematics in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by our firm during the construction phase in order to evaluate compliance with our recommendations. If we are not retained for these services, the client agrees to assume Kleinfelder's responsibility for any potential claims that may arise during or after construction.

This report is issued with the understanding that the client chooses the risk he wishes to bear by the expenditures involved with the construction alternatives and scheduling that is chosen. It is the client's responsibility to see that all parties to the project including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety including the Additional Services and Limitations section.

****

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REFERENCES

California, State of, (1982); "Special Studies Zone Map," Gilroy 7.5 Minute Quadrangle.

Limerinos, J.T., Lee, K.W., and Lee, P.E., (1973); "Flood Prone Areas in the San Francisco Bay region, California," U. S. Geological Survey Water Resources Investigation 37-73.

Rogers, T.H. and Williams, J.W., (1974); "Geologic Map of Santa Clara County, California," California Divisions of Mines and Geology, Special Report 107.

Schlocker, J., (1971); "Generalized Geologic Map of the San Francisco Bay Region, California," U.S. Geological Survey Open File Report.

Santa Clara Valley Flood Control District, (1986); "Maps of Flood Control Facilities and Limits of 1% Flooding."

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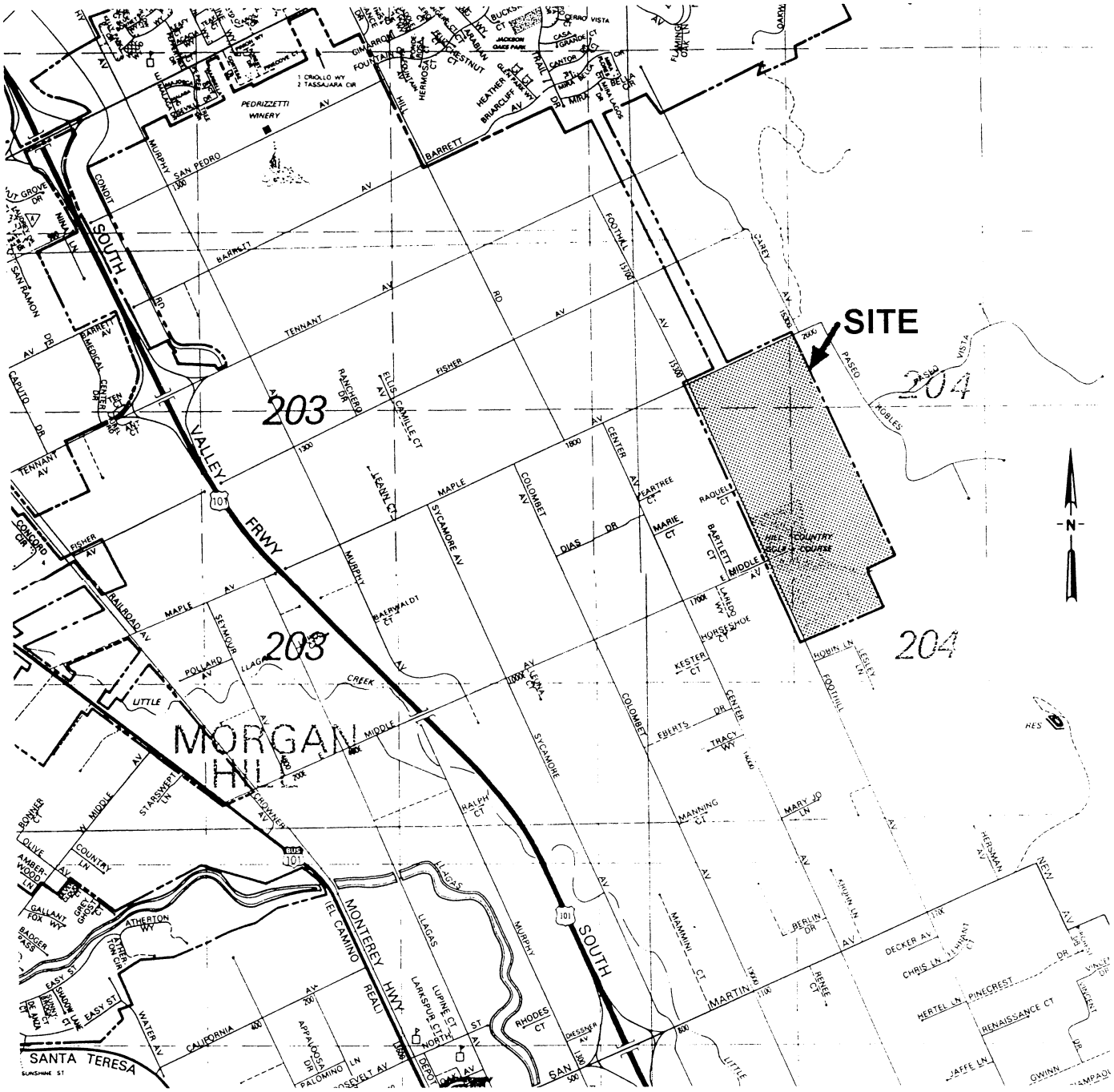
PLATES



Base: Thomas Bros. Maps Scale: 1 inch = 1/2 mile

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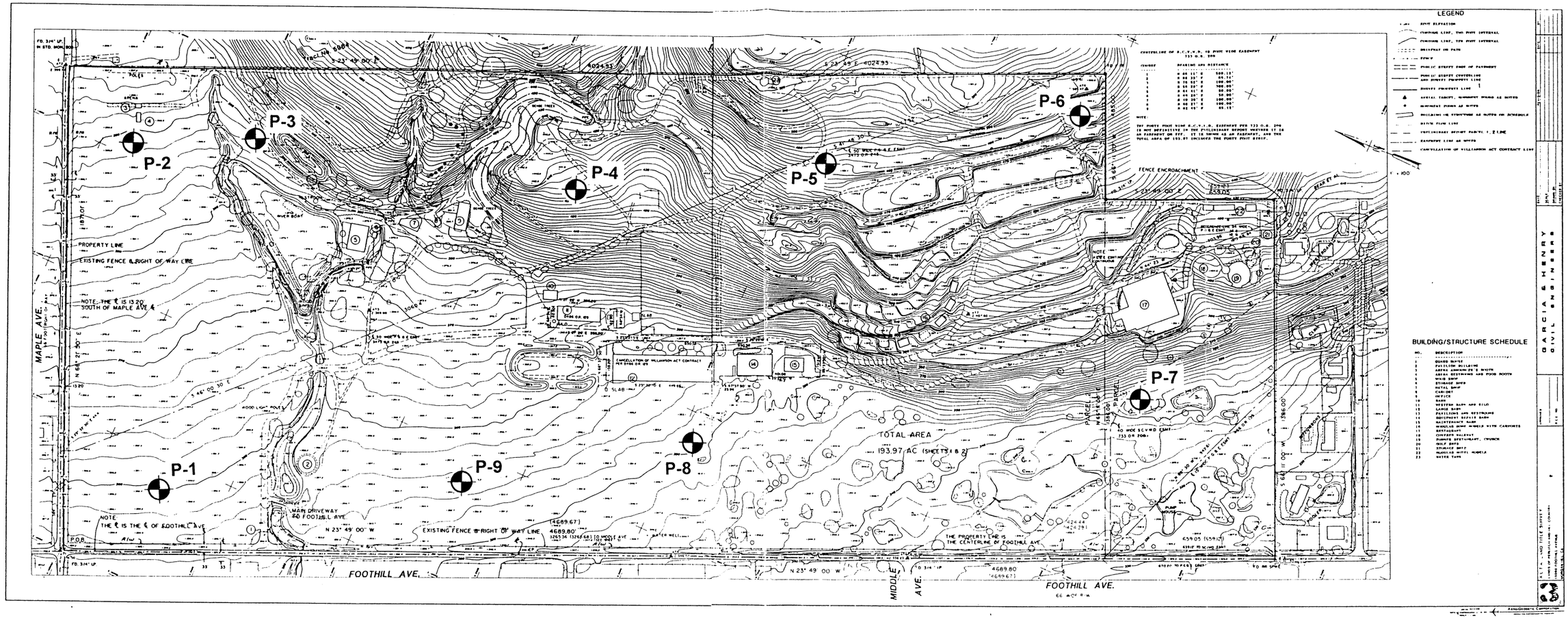
SITE VICINITY MAP
Morgan Hill Math Campus
Morgan Hill, California

PLATE **1**

PROJECT NO. **12-191601/001** **1/95**



P-2 Approximate Location of Test Pit

Base: Topographic survey by Garcia & Henry, Inc., flown on 11-14-94

Note: The pit locations should be considered approximate. The topo map was not available at the time of our field work.

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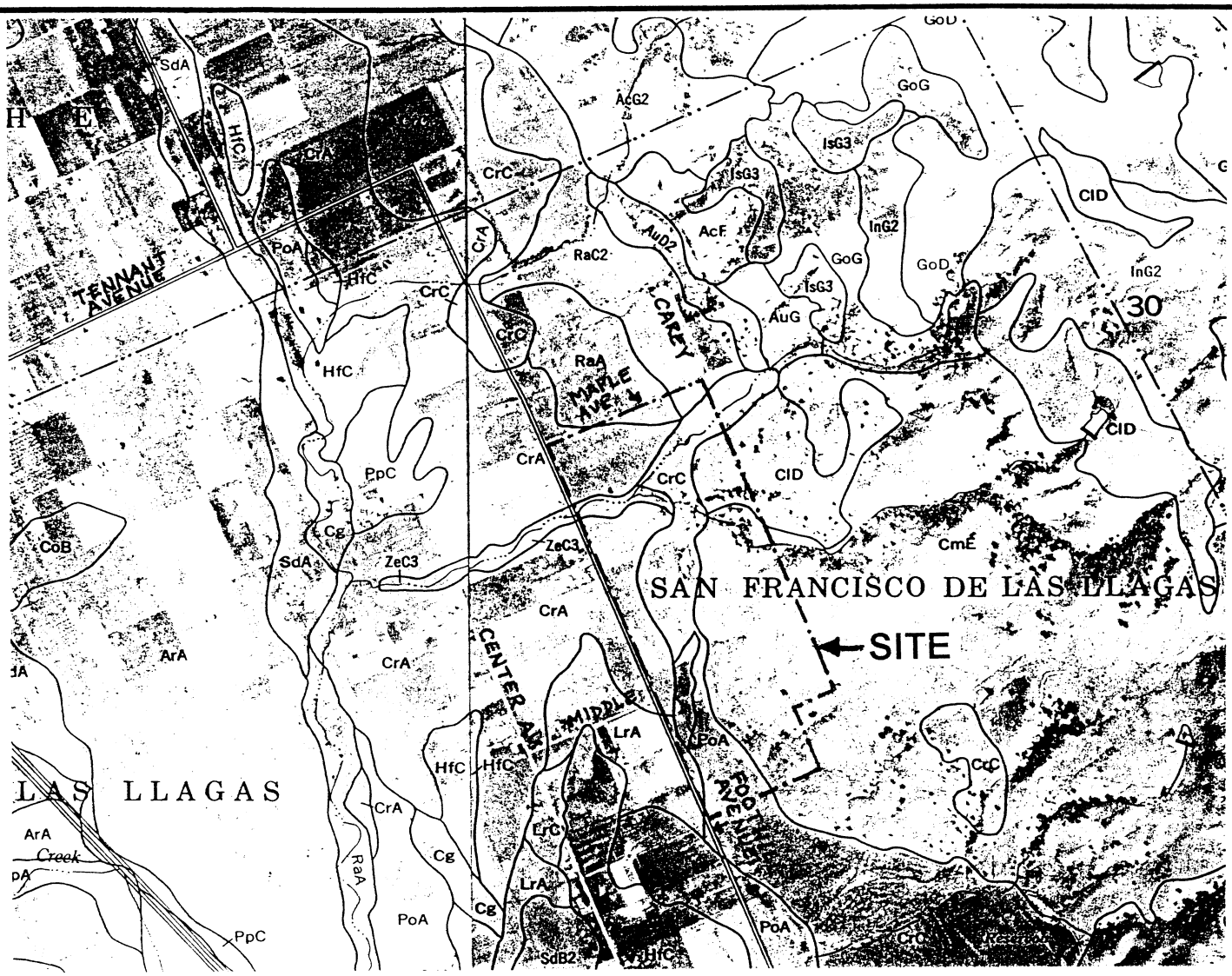
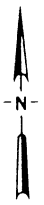
USDA SOIL MAP
Morgan Hill Math Campus
Morgan Hill, California

PLATE **2**



USDA Soil Conservation Service; Soil types mapped on the subject property

CrA -	Cropley clay, 0 to 2 percent slopes
CrC -	Cropley clay, 2 to 9 percent slopes
RaA -	Rincon clay loam, 0 to 2 percent slopes
RaC2 -	Rincon clay loam, 2 to 9 percent slopes
ZeC3 -	Zamora and Cropley soils, 2 to 9 percent slopes, severely eroded
PoA -	Pleasanton loam, 0 to 2 percent slopes
LrA -	Los Robles clay loam, 0 to 2 percent slopes
CmE -	Climara stony clay, 15 to 50 percent slopes
ClD -	Climara stony clay, 9 to 30 percent slopes



Scale: 1 inch = 2,000 feet

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USDA SOIL MAP
Morgan Hill Math Campus
Morgan Hill, California

PLATE **3**

PROJECT NO. 12-191601/001 1/95

APPENDIX A

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	ID	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	G W		Well-graded gravels or gravel sand mixtures, little or no fines.
		G P		Poorly-graded gravels or gravel sand mixture, little or no fines.
		G M		Silty gravels, gravel-sand-silt mixtures.
		G C		Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	S W		Well-graded sands or gravelly sands, little or no fines.
		S P		Poorly-graded sands or gravelly sands, little or no fines.
		S M		Silty sands, sand, and silt mixtures.
		S C		Clayey sands, and clay mixtures.

MAJOR DIVISIONS		LTR	ID	DESCRIPTION
FINE GRAINED SOILS	SILTS AND CLAYS LL < 50	M L		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		C L		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		O L		Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS LL > 50	M H		Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts.
		C H		Inorganic clays of high plasticity, fat clays.
		O H		Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		P t		Peat and other highly organic soils.

Standard Penetration Split Spoon Sampler, 2.0 inch O.D., 1.4 inch I.D.

Modified California Sampler, 2.5 inch O.D., 2.0 inch I.D.

Shelby Tube Sampler, 3.0 inch I.D.

Approximate water level first observed in boring

Approximate water level observed in boring following drilling

Pen = Pocket penetrometer reading, in tsf

TV:Su = Torvane shear strength, in tsf

NOTES: Blow counts represent the number of blows of a 140-pound hammer falling 30 inches required to drive a sampler through the last 12 inches of an 18-inch penetration, unless otherwise noted.

The lines separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

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PROJECT NO. 12-191601/001 1/95

TEST PIT LOG LEGEND

Morgan Hill Math Campus
Morgan Hill, California

PLATE A-1

APPENDIX A
PLATE A2
TEST PIT LOGS

Pit P1 **0 to 5 feet**	Dark grayish brown Fat CLAY (CH), stiff, highly expansive, organics in upper 6"-12", minor fine sand, trace gravel, moist. (Alluvium)
Pit P2 **0 to 2 feet**	Dark grayish brown Fat CLAY (CH), rootlets in top 6 to 12", minor fine sand and gravel, moist. (Alluvium)
2 to 4 feet	Dark yellow brown Silty SAND (SM) fine to medium sand, minor gravel, moist. (Alluvium)
Pit P3 **0 to 3 feet**	Dark grayish brown to black Fat CLAY (CH), rootlets 6-12", minor sand and gravel, occasional cobble and boulder size to 18", moist. (Alluvium)
Pit P4 **0 to 2 feet**	Dark grayish fat CLAY (CH), rootlets 6", moist. (Alluvium)
2 to 4 feet	Olive Sandy CLAY (CL-CH), abundant white and orange mineralization (Caliche and Fe02), moist. (Alluvium)
Pit P5 **0 to 3 feet**	Dark grayish brown Fat CLAY (CH) and dark brown Lean CLAY (CL), mixed, minor sand and gravel, moist. (FILL)
Pit P6 **0 to 3 feet**	Dark grayish brown Fat CLAY (CH) and dark brown Lean CLAY (CL), mixed, minor sand and gravel, moist. (FILL)
3 to 5 feet	Pale yellow to light brown Silty SAND (SM), medium to fine grain, moist. (Weathered Bedrock)
Pit P7 **0 to 4 feet**	Dark grayish brown Fat CLAY (CH), stiff, highly expansive, organics in upper 6"-12", minor fine sand, trace gravel, blocky texture, moist. (Alluvium)
Pit P8 **0 to 4 feet**	Dark grayish brown Fat CLAY (CH), stiff, highly expansive, organics in upper 6"-12", minor fine sand, trace gravel, blocky texture, moist. (Alluvium)
Pit P9 **0 to 2 feet**	Dark grayish brown Fat CLAY (CH), stiff, highly expansive, organics in upper 6"-12", minor fine sand, trace gravel, moist. (Alluvium)
2 to 4 feet	Dark brown, Sandy Lean CLAY (CL), stiff, moderately expansive, fine sand, some gravel, moist. (Alluvium)

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APPENDIX B

APPENDIX B

SOIL TEST RESULTS AND DISCUSSION

The laboratory testing program was directed toward a quantitative and qualitative evaluation of some of the physical and mechanical properties of the soils underlying the site for purposes of determining landscaping needs of the site soils.

The laboratory tests contained herein were performed by Soil & Plant Laboratory, Inc., which specializes in testing related to agricultural and landscaping applications.

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SANTA CLARA OFFICE
December 2, 1994
Lab No. 75900

KLEINFELDER
2160 Oakland Road, Suite B
San Jose, CA 95131

Attn: Daniel Peluso

RE: MORGAN HILL MATH CAMPUS

BACKGROUND

Samples received reportedly represent site soils where a new golf course development is proposed.

ANALYTICAL RESULTS

Particle size data show clay classifications by USDA standards for all samples with the exception of subsoil from P2 which is a clay loam. Only from P2 and P4 were surface and subsoils received and in both cases the subsoil shows higher silt and lower clay than in the topsoil. Organic matter levels are low in all samples examined. Infiltration rates for these soils are estimated to be very slow at about 0.15 inch per hour. The addition of organic matter would be very beneficial relative to maintaining a better degree of soil porosity which would encourage rapid deep root establishment.

The other factor which shows some variability as a function of soil depth is the reaction which is slightly acidic in the surface soils at P2 and P4 and become slightly to strongly alkaline in those subsoils. The site soils are generally slightly to moderately alkaline but show no excess of lime. The only soils where lime content is undesirably high and is accompanied by an undesirably high pH are the subsoil from P4 and surface soil from P6. Surface soil at P7 is more alkaline than ideal but there is no excess of lime present there. All samples show safely low boron and soluble sodium is adequately balanced by calcium and magnesium. Soluble constituents are generally quite low and the addition of some gypsum may benefit soil structure.

Available nitrogen levels are all low. Phosphorus and potassium are all very deficient. Magnesium tends to be moderately excessive and this is resulting in a significant degree of imbalance with the only fair calcium levels. The addition of gypsum will also help improve this condition.

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DISCUSSION

Because of the soil's slow infiltration rate and high water holding capacity it will be particularly important that trees and shrubs be selected with a tolerance to a potentially wet soil environment.

The soil's physical characteristics can be substantially improved upon by the incorporation of organic matter. This is most often derived from redwood or fir sawdust or fir bark. Fertilizer additives noted below are based upon using one of these relatively inert materials. Another option which might be considered would be to derive the organic matter from composted yard debris which is available from some of the landfills. If this option is considered then phosphorus and potassium additives should probably be reduced substantially to compensate for the fertility value of the compost. The gypsum rate would not change.

The following materials are suggested for uniform application and incorporation to obtain a homogeneously blended soil 6 inches in depth:

AM'T./ACRE	
175 - 225 cubic yards	Nitrogen Stabilized Organic Amendment
600 pounds	Treble Superphosphate (0-48-0)
800 pounds	Potassium Sulfate (0-0-50)
2 tons	Agricultural Gypsum

If the soils can be differentiated at the site then ideally the amendment program should be altered slightly to include soil sulfur. This would apply to the soil represented by P6 where the rate should be 1000 pounds per acre and P7 where the rate should be 600 pounds per acre.

The hydroseed mixture should contain the following:

AM'T./ACRE	
275 pounds	16-6-8
300 pounds	Ureaform 38-0-0

The ureaform is a slow release nitrogen product which should maintain adequate nitrogen availbility for 60-90 days. Postplant fertilization may rely primarily upon a nitrogen only fertilizer applied as necessary to obtain the desired color and rate of

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growth. Because of the soil's inherent excess of magnesium, potassium should also be periodically supplemented. As an initial guideline potassium sulfate could be scheduled for application at 4 month intervals at a rate of 200 pounds per acre.

Jim West

JIM WEST

pn

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COMPLETE SOIL
EVALUATION
(AO5)

Santa Clara Office
Lab No. 75900
MORGAN HILL MATH CAMPUS
Job No.: 12-1916-01

Samples Taken: Samples Rec'd: 11/23/94

am le #	Half Sat%/ TEC	-Parts Per Million Parts Dry Soil- NO3 N	NH4 N	PO4 P	K	Ca	Mg	pH/ Qual Lime	----Saturation Extract Values------ ECe	Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	Cl me/l	SAR	Sample Description & Log Number
1	28	10	4	5	90	2480	2770	7.0	0.2	1.2	0.7	0.7	0.1	0.10		0.7	P1 0.5'
	357		0.2	0.2	0.2	0.5	4.0	None									0.9094-A38857 25 4
2	29	11	5	11	140	3430	2160	6.9	0.3	1.3	0.8	1.1	0.1	0.08		1.1	P2 0.5'
	355		0.3	0.3	0.3	0.7	3.2	None									0.9094-A38858 25 4
3	27	7	6	10	130	3020	1800	7.5	0.3	1.3	1.0	0.9	0.0	0.14		0.8	P2 3.0'
	303		0.2	0.3	0.3	0.6	3.0	Low									0.9494-A38859 25 4
4	47	8	7	5	80	4960	3200	7.0	0.2	0.9	0.5	1.2	0.1	0.20		1.4	P3 0.5'
	524		0.2	0.1	0.1	0.6	2.9	None									1.0294-A38860 25 4

Sam ple #	Org %	---Gravel-- Coarse 5-12	Fine 2-5	Percent of Sample Passing 2 mm Screen ---------Sand---------- Very Coarse 1-2	Coarse 0.5-1	Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification	Sample Description & Log Number
1	1.2	1.1	2.6	3.2	4.2	23.2	21.2	48.2	clay	P1 0.5'
2	1.2	1.1	3.1	3.2	4.6	24.8	20.4	47.0	clay	P2 0.5'
3	0.3	0.7	2.2	2.6	4.8	29.2	28.8	34.6	clay loam	P2 3.0'
4	1.2	4.4	1.5	1.4	2.0	17.2	16.8	62.6	clay	P3 0.5'

11/30/94

alf Saturation %=approximate field moisture capacity. Salinity = ECe(dS/m at 25 degree C). Gravel fraction expressed as percent y weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters. SAR = Sodium Adsorption Ratio. ufficiency factor (1.0=sufficient for average crops) below each nutrient element. N factor based on 200 ppm constant feed. TEC (listed below Half Sat. when requested) = Estimated Total Exchangeable Cations in milliequivalents per kilogram (meq/kg)

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COMPLETE SOIL
EVALUATION
(A05)

Santa Clara Office
Lab No. 75900
MORGAN HILL MATH CAMPUS
Job No.: 12-1916-01

Samples Taken: Samples Rec'd: 11/23/94

am le #	Half Sat%/ TEC	-Parts Per Million Parts Dry Soil- NO3 N	NH4 N	PO4 P	K	Ca	Mg	pH/ Qual Lime	----Saturation Extract Values------ ECe	Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	Cl me/l	SAR	Sample Description & Log Number
5	29	6	6	2	50	4540	2100	6.7	0.2	1.2	0.7	0.8	0.1	0.16		0.8	P4 0.5'
	404		0.2	0.1	0.1	0.8	2.9	None									0.8494-A38861 25 4
6	36	10	4	8	140	3250	2160	8.2	0.3	1.2	1.3	1.0	0.0	0.08		0.9	P4 3.0'
	345		0.2	0.2	0.3	0.6	2.9	High									1.0494-A38862 25 4
7	40	14	5	5	80	4550	3180	7.5	0.4	1.8	1.7	0.8	0.0	0.05		0.6	P5 0.5'
	492		0.2	0.1	0.1	0.6	3.1	None									0.9894-A38863 25 4
8	32	11	9	4	70	6700	1350	8.1	0.3	1.9	0.9	0.6	0.1	0.10		0.5	P6 1.0'
	448		0.3	0.1	0.1	1.0	1.5	High									0.8894-A38864 25 4

Sam ple #	Org %	---Gravel-- Coarse 5-12	Fine 2-5	Percent of Sample Passing 2 mm Screen ---------Sand---------- Very Coarse 1-2	Coarse 0.5-1	Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification	Sample Description & Log Number
5	1.0	3.7	2.2	1.6	2.8	20.2	22.8	52.6	clay	P4 0.5'
6	0.1	2.3	3.5	3.6	4.0	15.0	30.8	46.6	clay	P4 3.0'
7	1.3	1.0	2.3	1.8	2.2	17.6	19.8	58.6	clay	P5 0.5'
8	1.1	4.3	2.5	3.6	3.2	17.8	24.4	51.0	clay	P6 1.0'

11/30/94

lalf Saturation %=approximate field moisture capacity. Salinity = ECe(dS/m at 25 degree C). Gravel fraction expressed as percent y weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters. SAR = Sodium Adsorption Ratio. ufficiency factor (1.0=sufficient for average crops) below each nutrient element. N factor based on 200 ppm constant feed.
TEC (listed below Half Sat. when requested) = Estimated Total Exchangeable Cations in milliequivalents per kilogram (meq/kg)

Soil and Plant Laboratory, Inc.

P.O. Box 6566, Orange, California 92613-6566/(714) 282-8777/FAX (714) 282-8575
P.O. Box 153, Santa Clara, California 95052-0153/(408) 727-0330/FAX (408) 727-5125
P.O. Box 1648, Bellevue, Washington 98008-1648/(206) 746-6665/FAX (206) 562-9531

KLEINFELDER
2160 Oakland Road, Suite B
San Jose, CA 95131

COMPLETE SOIL
EVALUATION
(AO5)

Santa Clara Office
Lab No. 75900
MORGAN HILL MATH CAMPUS
Job No.: 12-1916-01

Samples Taken: Samples Rec'd: 11/23/94

Sample #	Half Sat%/ TEC	-Parts Per Million Parts Dry Soil- NO3 N	NH4 N	PO4 P	K	Ca	Mg	pH/ Qual Lime	----Saturation Extract Values------ ECe	Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	Cl me/l	SAR	Sample Description & Log Number
9	41	13	6	7	60	2440	3880	7.9	0.8	1.1	2.2	4.0	0.1	0.08		3.1	P7 1.0'
	455		0.2	0.1	0.1	0.3	4.0	None									1.0294-A38865 25 4
10	31	10	7	11	100	2850	2660	7.6	0.3	1.1	0.8	1.3	0.0	0.05		1.3	P9 1.0'
	369		0.3	0.3	0.2	0.5	3.6	None									0.9494-A38866 25 4

Sample #	Org %	---Gravel-- Coarse 5-12	Fine 2-5	Percent of Sample Passing 2 mm Screen ---------Sand---------- Very Coarse 1-2	Coarse 0.5-1	Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification	Sample Description & Log Number
9	2.0	0.6	1.5	1.8	2.4	18.0	20.8	57.0	clay	P7 1.0'
10	1.0	0.6	1.5	1.6	3.8	23.8	21.8	49.0	clay	P9 1.0'

11/30/94

Half Saturation %=approximate field moisture capacity. Salinity = ECe(dS/m at 25 degree C). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters. SAR = Sodium Adsorption Ratio. Sufficiency factor (1.0=sufficient for average crops) below each nutrient element. N factor based on 200 ppm constant feed.
TEC (listed below Half Sat. when requested) = Estimated Total Exchangeable Cations in milliequivalents per kilogram (meq/kg)

Appendix B-2

Geotechnical Investigation of Soil Berms, Kleinfelder Inc..

KLEINFELDER
An employee owned company

July 7, 2003
File No. 27134/GEO

Mr. Randy Long
RCL Ecology
329 Mount Palomar Place
Clayton, California 94517
RCLIML@juno.com

SUBJECT: Revised Geotechnical Investigation of Soil Berms at the Institute Golf Course in Morgan Hill, California

Dear Mr. Long:

This revised letter summarizes the results of our geotechnical investigation of the soil berms at the Institute Golf Course in Morgan Hill, California. This letter supercedes our previous letter of May 5, 2003. The purposes of the geotechnical investigation were to explore and evaluate the surface and subsurface soils and groundwater conditions at the site, and to provide a geologic review and engineering evaluation of the project site. The scope of services, as outlined in our proposal of February 14, 2003 (Document SJ03P032), consisted of site reconnaissance, field exploration, laboratory testing, engineering analyses, and preparation of this letter report. This investigation was authorized by Mr. Stephen R. Sorenson, Manager of the Institute, LCC on February 19, 2003. Our work has been coordinated with Mr. Randy Long of RCL Ecology in Clayton, California.

PROPOSED PROJECT

The consultants for the site are currently in the processes of preparing an Environmental Impact Report (EIR) for the site. As part of this process, a geotechnical evaluation of the existing soil berms is needed. Because of the preliminary nature of the work, design details are not available at this time.

The project description above is based on the information available to us at this time. If the project conditions or description differ, we should be notified to review the applicability of our conclusions.

SITE DESCRIPTION

The project site is located on the southeast corner of Maple Avenue and Foothill Avenue, which is situated in the east portion of the City of Morgan Hill, California. A Site Vicinity Map and a Site Plan have been included as Plate 1 and Plate 2. The roughly rectangular parcel is approximately 194 acres. The property is bounded on the north by Maple Avenue, on the west by Foothill Avenue, and on the south and east by rural residential and agricultural property.

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The property is nestled in the foothills of the valley and rises in topography from the west along Foothill Boulevard to the east. The majority of the topography on the west side of the property is nearly level to gently sloping. The eastern side of the property is situated on moderate to steep slopes. The ground elevations on the property range from approximately 327 feet to approximately 524 feet above Mean Sea Level. Corralitos Creek is in the north portion of the site and flows toward the west. Surface water runoff generally flows to the southwest. There are also several lake water features associated with the course.

The property development currently includes an 18-hole golf course, a vacant restaurant building, and several support buildings. In addition, concrete flatwork paths and gravel roads cross the site. There are also several large buildings on the flat portions of the site that we understand are being used for storage and maintenance. In the southwest corner of the property is the former Flying Lady Restaurant. A site aerial photograph is included on Plate 3.

GEOLOGY

Regional

The Morgan Hill area lies within the Coast Ranges Geomorphic Province, a discontinuous series of northwest-southeast trending mountain ranges, ridges, and intervening valleys characterized by complex folding and faulting. The general geologic framework of the Central Coast Area of California is illustrated in studies by Page (1966), included as the Regional Geologic Map (Plate 4), as well as in studies by Jennings and Strand (1958). A Geologic Map has also been included as Plate 5.

The Coast Ranges province terminates on the east where strata dip beneath alluvium of the Great Valley; on the west by the Pacific Ocean with mountains rising sharply from uplifted and terraced, wave-cut coast; on the north by South Fork Mountain, which has the characteristic trend of the Coast Ranges, and on the south by the Transverse Ranges. The Coast Ranges are composed of thick late Mesozoic and Cenozoic sedimentary strata. The northern and southern ranges are separated by a structural depression containing the San Francisco Bay.

The Coast Ranges are subparallel to the active San Andreas fault. This right-lateral strike-slip fault extends from the Gulf of California, in Mexico, to Cape Mendocino, off the coast of Humboldt County in northern California and forms a portion of the boundary between two global tectonic plates. In this portion of the Coast Ranges Province, the Pacific plate moves north relative to the North American plate, which is located east of the transform boundary. Deformation along this plate boundary in the San Francisco and Monterey Bay areas is distributed across a wide fault zone, which includes the San Andreas, Hayward, Calaveras, and San Gregorio faults. Together, these and other faults are referred to as the San Andreas fault system. The general trend (about N30-40W) of the faults within this system is responsible for the strong northwest-southeast structural grain of most geologic and geomorphic features in the Coast Ranges Province. A Regional Fault Map has been included as Plate 6.

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Area and Site Geology

The Institute Golf Course site is located in the southern part of the Santa Clara Valley, California. The valley is part of a northwest-southeast trending structural depression in the central Coast Ranges between the San Andreas fault to the west and the Calaveras fault to the east. This portion of the Santa Clara Valley, unlike the portion of the valley north of Santa Teresa, drains to the south into the Pajaro River, eventually reaching the Pacific Ocean at Monterey Bay. The main drainage system in the vicinity of the project site is Corralitos Creek, which flows from the foothills east of the site to Llagas Creek and discharges to Pajaro River at the San Benito County line.

The earth materials underlying the west approximately one-half of the project site, mapped by Wentworth et al., (1999), are Holocene age (less than 11,000 years old) alluvial fan deposits (QHf2 on the Geologic Map). The Alluvial fan deposits are described as brown gravelly sand and sandy and clayey gravel, grading upward to sandy and silty clay, moderately dense to dense, coarser near the fan heads and upstream, deposited by flooding streams where they emerge from constrained channels of the uplands; include terrace deposits within some upland valleys; merge downslope into flood plain and basin deposits.

The fans in the Morgan Hill area are subdivided into:

- Qhf1 Younger -- morphologically distinct young fans that overlie larger Holocene or older deposits; locally distinguished.
- Qhf2 Older -- The principal Holocene fans and associated terraces.

Studies by Rogers and Williams (1974) indicated that the alluvium underlying the general site area is on the order of 500 or more feet in thickness, and that the depth to groundwater is on the order of 60 to 100 feet below the ground surface.

The east approximately one-half of the project site is covered by landslide deposits (Qls on the Geologic Map). Wentworth et al., (1999) indicates that the landslide deposits are Quaternary in age and describes the materials as locally derived bedrock materials that range from rubble to nearly intact rock displaced downslope by slumping and sliding. Based on the degree of stream incision and absence of distinctive geomorphic features the landslide deposit is inferred to be Pleistocene age (greater than 11,000 years old) and therefore is not considered active. However, care must be exercised during development of the area to not reactivate sections of the landslide mass.

Studies by Limerinos and others (1973) indicate that the site is not within an area that would be subject to flooding during a 100-year storm event due to over-topping of Corralitos Creek, which traverses the northern portion of the subject property and flows toward the southwest. More recent studies by the Santa Clara Valley Water District (1986) indicate that the site is not within an area that will be subjected to flooding during a 100-year storm event. However, work by ESRI and FEMA (Copyright ESRI, June 4, 1999) indicates that a portion of the Corralitos Creek near the west property line of the site is subject to 100-year flood events (ESRI and FEMA Flood Prone Areas, Plate 7).

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Faulting and Seismicity

The San Francisco Bay area is considered by geologists and seismologists to be one of the most seismically active regions in the United States. On the basis of current technology, as well as historical evidence, it is reasonable to assume that the project area will be subjected to the effects of at least one large to severe earthquake (magnitude 7 to 8+) that could cause considerable ground shaking at the site. Further, it is anticipated that the subject site will periodically experience ground accelerations as the result of small to moderate magnitude earthquakes occurring in the area.

Based on our analysis of published and unpublished data for the active and potentially active faults, and the geographic relationship between the subject property and area faults, it is reasonable to conclude that the San Andreas, Sargent and Calaveras faults have the greatest potential for impacting development at the site. Reference to studies by Rogers and Williams (1974) indicate that the San Andreas, Sargent and Calaveras faults, are located approximately 12 miles southwest, 8½ miles southwest, and 1½ miles northeast of the site, respectively. The State of California (1982) does not show any faults bisecting the site or immediately adjacent areas, and does not include the site in any of the State Earthquake Fault Zones.

The "Morgan Hill" earthquake was of magnitude M_L6.2 and epicentered 7½ miles northwest of the project site (Bennett and others, ed, 1984). The earthquake produced about VII shaking on the Modified Mercalli Intensity Scale with a peak horizontal ground acceleration of 0.63g measured at the Anderson Reservoir. It occurred at 1:15 PST on 24 April 1984, the consequence of sudden rupture along a 30-kilometer segment of the historically active Calaveras fault. This moderate earthquake:

- Was the third damaging earthquake (M ~6) to strike the San Francisco Bay region since 1979 and the largest event in the region since 1911.
- Caused damage estimated at $8 million, but no loss of life or serious injury.
- Produced many significant records of ground and structural shaking, including an unprecedented 1.3g horizontal acceleration.
- Produced no evidence of premonitory activity and little, if any, surface rupture.

FIELD INVESTIGATION

Our field investigation was performed on March 5, 2003 and consisted of drilling 6 boreholes at the approximate locations shown on the Site Plan, Plate 2. Borings B-1 through B-6 were drilled using a truck-mounted drill rig equipped with 6-inch diameter, hollow stem augers to depths of approximately 14 to 24 feet below existing ground surface. Exploration GeoServices of San Jose, California was subcontracted to drill the soil borings. A geologist of Kleinfelder observed the drilling operation, classified the encountered soils, prepared the boring logs, and collected soils samples for laboratory inspection and testing.

Upon completion of the borings, the borings were grouted per requirements of the Santa Clara Valley Water District. Cuttings from the borings were left on site.

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Relatively undisturbed samples were taken at the direction of the field geologist during drilling. Relatively undisturbed samples of the subsurface materials were obtained using a Modified California (MC) sampler with a 2.0-inch inside diameter and a 2.5-inch outside diameter. The MC sampler was driven 18 inches using a 140-pound hammer falling 30 inches, and blow counts for successive 6-inch penetration intervals were recorded; the blow counts corresponding to the last 12 inches of penetration were reported on the boring logs. After the sampler was withdrawn from the borehole, the samples were removed, sealed to minimize moisture loss, and returned to our laboratory.

Soil classifications were made in the field from auger cuttings and samples, and were re-evaluated in the laboratory after further examination and testing. The soils were classified in accordance with the Unified Soil Classification System presented on Plate A-1, Boring Log Legend.

Sample classifications, blow counts recorded during sampling, and other related information were recorded on the soil boring logs. The boring logs for borings B-1 through B-6 are presented on Plates A-2 through A-7

The locations of the borings were estimated by our engineer based on rough measurements from the limits of existing landmarks. Elevations of the borings are roughly estimated from United State Geological Survey (USGS) topographic map of the Gilroy quadrangle. As such, the locations and elevations of the borings should be considered approximate.

LABORATORY TESTING

The laboratory index tests performed included determination of dry density and natural moisture content, and Atterberg Limits. Engineering property tests included unconfined compressive and direct shear strength. Most of the results of the laboratory tests performed in our laboratory are presented on the boring logs. Graphic presentation of the Atterberg limits, unconfined compression, and direct shear tests are presented on Plate B-1 through B-5.

SUBSURFACE CONDITIONS

Based on our borings, the slope on the north side of the creek and south of the lake is composed of moderate to highly expansive gravelly and sandy fat clay fill. The fill is generally very stiff to hard and extends to depths of about 7 to 14 feet below the existing ground surface. Underlying the clayey soil, we encountered stiff to very stiff gravelly and sandy lean clay, medium dense clayey sand, and dense clayey gravel to the maximum depth explored, about 24 feet.

In the berms along Foothill Avenue, we encountered stiff to very stiff sandy lean clay and dense clayey gravel fill to depths of about 7.5 to 13.5 feet below the ground surface. Underlying the fill, we encountered very stiff fat clay with variable amounts of sand in borings B-4 and B-5. The fat clay was underlain by very stiff to hard sandy lean clay in B-4 to the maximum depth explored, about 20 feet. The fat clay was underlain by medium dense to very dense silty sand to the maximum depth explored in B-5. The clayey fill was underlain by very stiff lean clay to the maximum depth explored in boring B-6, about 15 feet.

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During this investigation groundwater was not encountered in the six borings advanced. The groundwater level may be highly influenced by the amount of water in the creek, lakes, and other water features.

The above is a general description of soil and groundwater conditions encountered in the six borings drilled at the site for this investigation. A more detailed description of the soil and groundwater conditions encountered is presented on the Logs of Borings, Plates A-2 through A-7.

Soil and groundwater conditions can deviate from those conditions encountered at the boring locations. If significant variation in the subsurface conditions is encountered during construction, it may be necessary for Kleinfelder to review the recommendations presented herein, and recommend adjustments as necessary.

GEOTECHNICAL EVALUATION

In general, landslides caused by earthquakes and instability (weak soil, overly steep slope, excess weight, or high groundwater) may occur wherever existing or proposed slopes are not strong enough to support themselves.

A stability analysis using the limit equilibrium method was performed to evaluate the factor of safety for slope failure under static and seismic conditions. The slope stability analysis was performed using computer code XSTABL, developed by Interactive Software Designs, Inc. The lowest factors of safety for local (shallow) as well as entire slope failures were searched using Janbu's method. The slope stability analysis was performed for clay soil slope with an inclination for 2:1 (horizontal to vertical) as interpreted to be representative of the subsurface conditions within the area. A detailed topographic map was not available to us. In the analyses, the computer program was allowed to search for the critical failure plane corresponding to the lowest safety factor. Design parameter input consisted of geometry of the slopes, and the unit weight and shear strength properties of existing materials.

Based on the boring information, groundwater is generally deeper than 25 feet. The lake water feature north of the creek slope is shallow, generally less than 2 feet deep, and is fully lined with concrete. Given these conditions, we have analyzed the slopes with a groundwater table 25 feet below the ground surface.

The material properties used in the slope stability analyses were derived from our laboratory testing results including direct shear tests and unconfined compression tests. A summary of the values used in our slope stability analyses is summarized in Table 1.

Table 1- Material Properties used in Slope Stability Analysis

Material Type	Wet Unit Weight (pounds per cubic foot, pcf)	Cohesion (pounds per square foot, psf)	Friction Angle (degrees)
Sandy Clay	120	420	19

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The potential effects of earthquake ground shaking on the computed factors of safety were evaluated by applying a pseudo-static seismic load in the slope stability analyses. The pseudo-static seismic coefficient used in our analyses was selected based on an evaluation of estimated mean peak ground acceleration at the site, corresponding to the maximum probable earthquake that could occur at the site as a result of potential earthquakes on the active faults near the site as discussed in the "Faulting and Seismicity" section of this report. The maximum probable earthquake is defined as the potential ground acceleration that has a 10 percent chance of exceedance at the site during a 50-year period. Based on the proximity of the nearest active faults and estimates of maximum probable earthquakes, it is our opinion that seismic coefficient value of 0.15 is appropriate for this study. We have based our analysis on Seed (1979) as discussed in the Division of Mines and Geology Special Publication 117.

The results of the slope stability analyses are summarized in Table 2. The calculated factors of safety (F.O.S.) equal or exceed the minimum requirements of 1.5 for static and 1.15 for pseudo-static analysis. The calculated factors of safety are shown in the Table 2.

Table 2 - Calculated Factors of Safety for Slope Stability

Static F.O.S.	Pseudo-static F.O.S.
3.8	2.6

Based on the results of our analysis, the subject slopes at the golf course are stable.

However, we did observe some erosion of the toe of the slope adjacent to the creek. If left unchecked, the erosion could result in further deterioration of the slope. We recommend that during the creek revegetation design portion of this project considerations should be given to stabilizing the slope through armoring with erosion protection measures such as erosion-resistant matting and planting, riprap, etc.

In the unusual event that Lake G were to flood and drain toward the creek, additional erosion of the embankment should be expected. However, it is our opinion that the creek embankment would not undergo a slope failure but would erode if protective measures such as those discussed above were not implemented.

LIMITATIONS

The services provided under this contract as described in this report include professional opinions and judgments based on the data collected. These services have been performed according to generally accepted geotechnical engineering practices that exist in the San Francisco Bay Area at the time the report was written. No warranty is expressed or implied. This report is issued with the understanding that the owner chooses the risk he wishes to bear by the expenditures involved with the construction alternatives and scheduling that is chosen.

The boring logs do not provide a warranty as to the conditions which may exist at the entire site. The extent and nature of subsurface soil and groundwater variations may not become evident until construction begins. It is possible that variations in soil conditions between borings could exist

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between or beyond the points of exploration or that groundwater elevations may change, both of which may require additional studies, consultation, and possible design revisions. If conditions are encountered in the field during construction which differ from those described in this report, our firm should be contacted immediately to provide any necessary revisions to these recommendations.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on-site and off-site) or other factors may change over time, and additional work may be required.

CLOSURE

We appreciate the opportunity of providing our services to you on this project and trust this report meets your needs at this time. If you have any questions concerning the information presented, please contact this office at (408) 436-1155.

Sincerely,

KLEINFELDER, INC.

REGISTERED PROFESSIONAL ENGINEER
CATHERINE HAYNES ELLIS
No. 58987
Exp. 6/30/07
CIVIL
STATE OF CALIFORNIA

Catherine H. Ellis, C.E.
Project Manager

Chalerm "Beeson" Liang, C.E., G.E.
Geosciences Group Manager

Attachments

Plate 1	Vicinity Map
Plate 2	Site Plan
Plate 3	Site Aerial Photograph
Plate 4	Regional Geologic Map
Plate 5	Geologic Map
Plate 6	Regional Fault Map
Plate 7	ESRI and FEMA Flood Prone Areas
Plate A-1	Boring Log Legend
Plate A-2	Log of Boring B-1
Plate A-3	Log of Boring B-2
Plate A-4	Log of Boring B-3
Plate A-5	Log of Boring B-4
Plate A-6	Log of Boring B-5
Plate A-7	Log of Boring B-6
Plate B-1	Atterberg Limits
Plate B-2 Through Plate B-3	Unconfined Compression
Plate B-4	Direct Shear
References	

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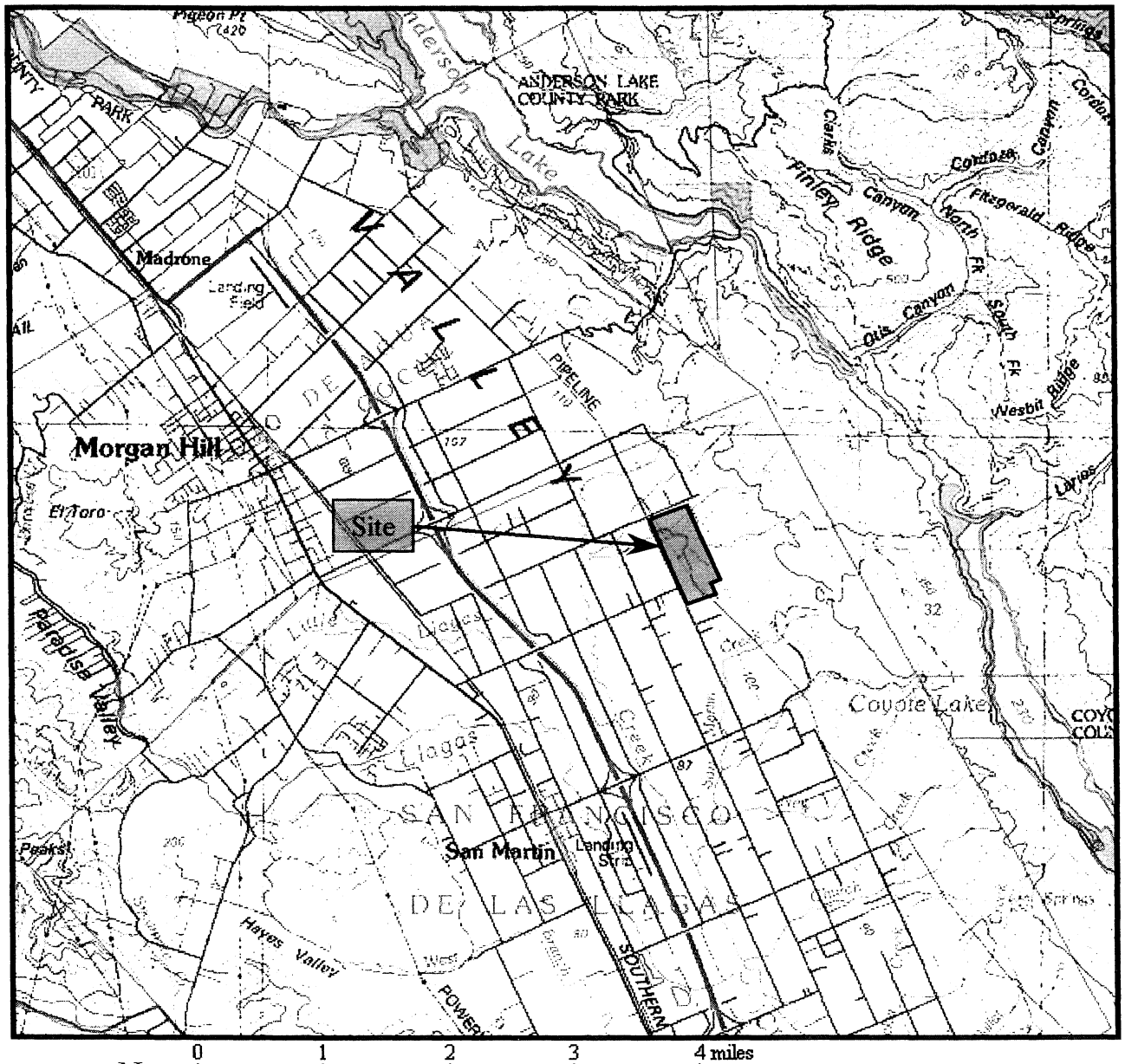
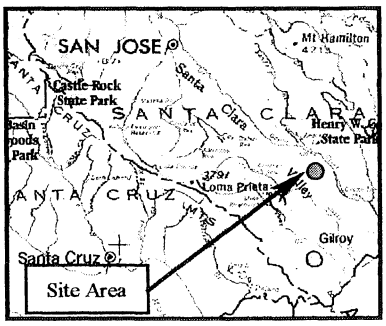


N

0 1 2 3 4 miles

0 1 2 3 4 5 6 7 km



Base: U.S. Geological Survey, Gilroy 7½-minute quadrangle

Original in Color

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Compiled by: P. Holland	Date: 4/29/03
Reviewed by: M. Clark	Revision date:

Site Vicinity Map

Institute Golf Course
Maple and Foothill Avenues
Morgan Hill, California

PROJECT NO.: 27134

PLATE 1

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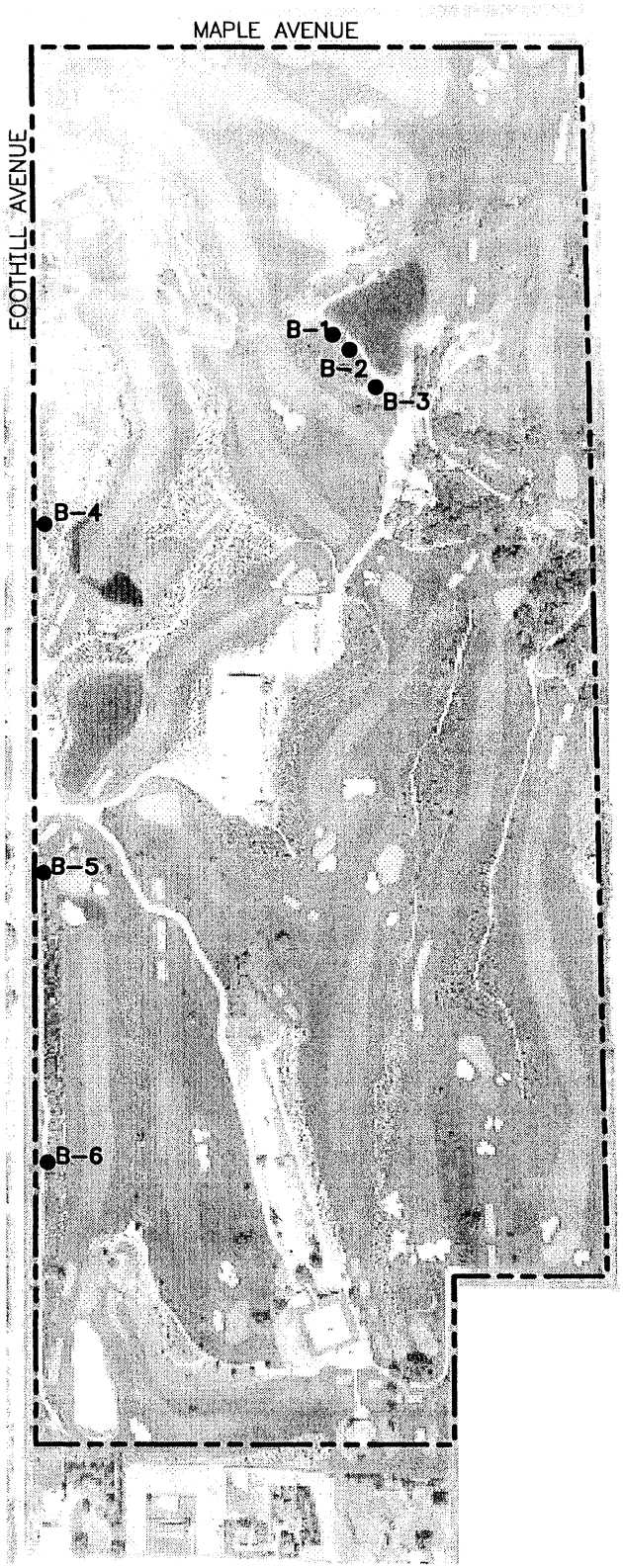

LEGEND

PROPERTY BOUNDARY

SOIL BORING
(by Kleinfelder, 2003)

NOTE: Locations are approximate.

N

600 300 0 600
APPROXIMATE SCALE (feet)

REFERENCE:
March 14, 2003, email from RCL Ecology.

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DRAFTED BY: L. Sue	CHECKED BY: C. Ellis
DATE: 04-28-03	REVISION DATE:

SITE PLAN

INSTITUTE GOLF COURSE
MAPLE AVENUE AND FOOTHILL AVENUE
MORGAN HILL, CALIFORNIA

PROJECT NO. 27134-GEO

PLATE 2

ATTACHED XREFS: XRef: TB_A-portrait

CAD FILE: D:_PROJECTS\27134\GEO\SITEPLAN.dwg LAYOUT: SITE PLAN
PLOTTED: 28 Apr 2003, 2:34pm

Appx. Scale (mile) 0 0.1 0.2 0.3 0.4 0.5

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Site Aerial Photograph

Institute Golf Course
Maple and Foothill Avenues
Morgan Hill, California

PLATE 3

Compiled by: P. Holland	Date: 4/29/03
Reviewed by: M. Clark	Revision date:

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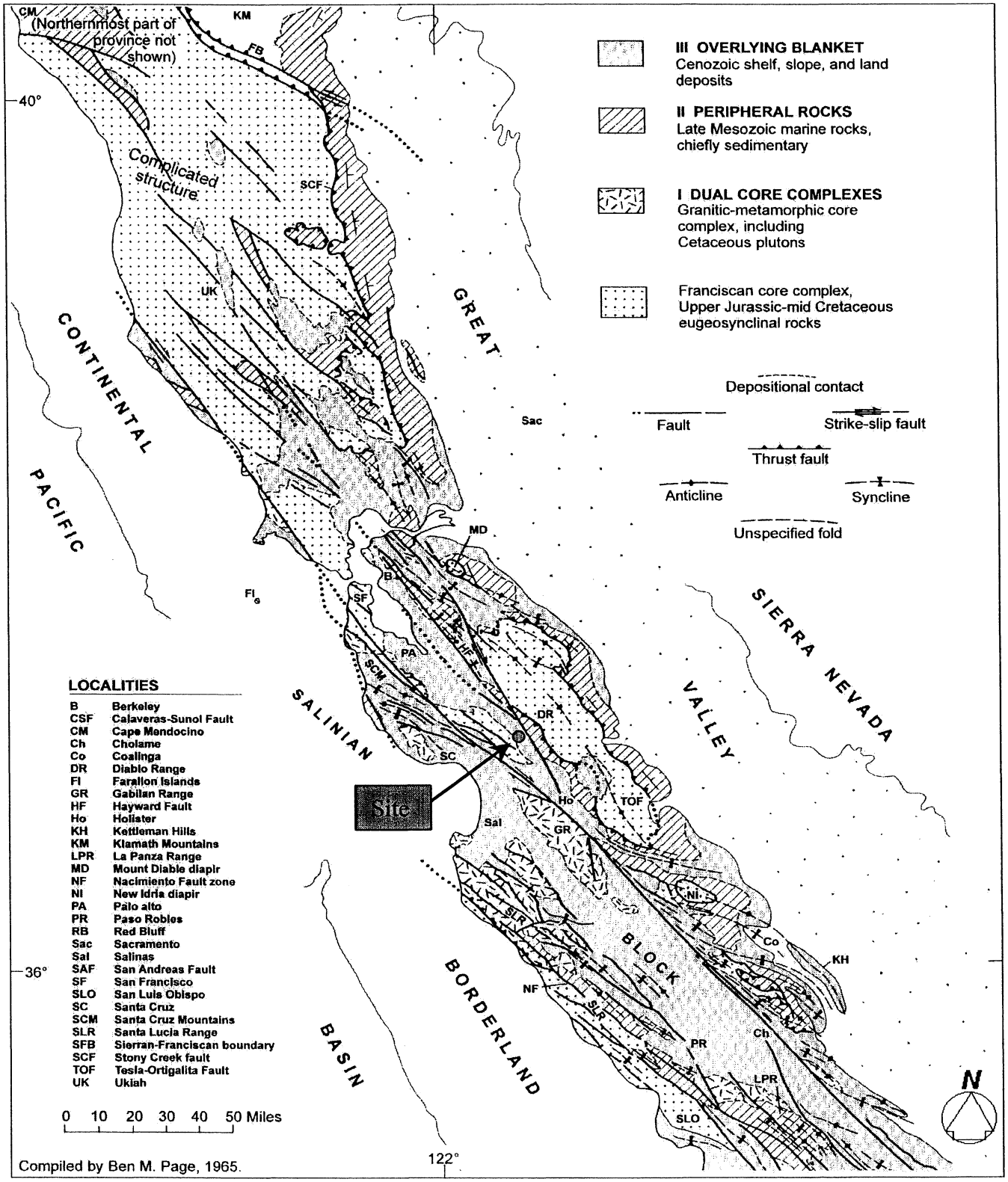

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Compiled by: P. Holland
Reviewed by: M. Clark
Revision date:

Regional Geologic Map

Institute Golf Course
Maple and Foothill Avenues
Morgan Hill, California

PROJECT NO.: 27134

PLATE 4

Library file: L:\2003\library\projects\27134*.ppt

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Scale
(thousand feet)
0 1 2 3 4 5

N

Base: Wentworth, C.M., Blake, M.C., McLaughlin, R.J., and Graymer, R.W., 1999, Preliminary geologic map of the San Jose 30 X 60-minute quadrangle, California: a digital database: U.S. Geological Survey, Open-File Report OF-98-795, scale 1:100000.

Explanation
(of nearby geologic units)

Qls Landslide deposits
Qhf2 Older alluvial fan deposits (Holocene)
Qof Alluvial fan deposits (mid to upper Pleistocene)
Qpf Alluvial fan deposits (upper Pleistocene)
QTp Packwood gravels (Pleist? And Pliocene)
Tba Basalt (Pliocene)

Original in Color

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Geologic Map
Institute Golf Course
Maple and Foothill Avenues
Morgan Hill, California

PLATE 5

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Reviewed by: M. Clark	Revision date:	

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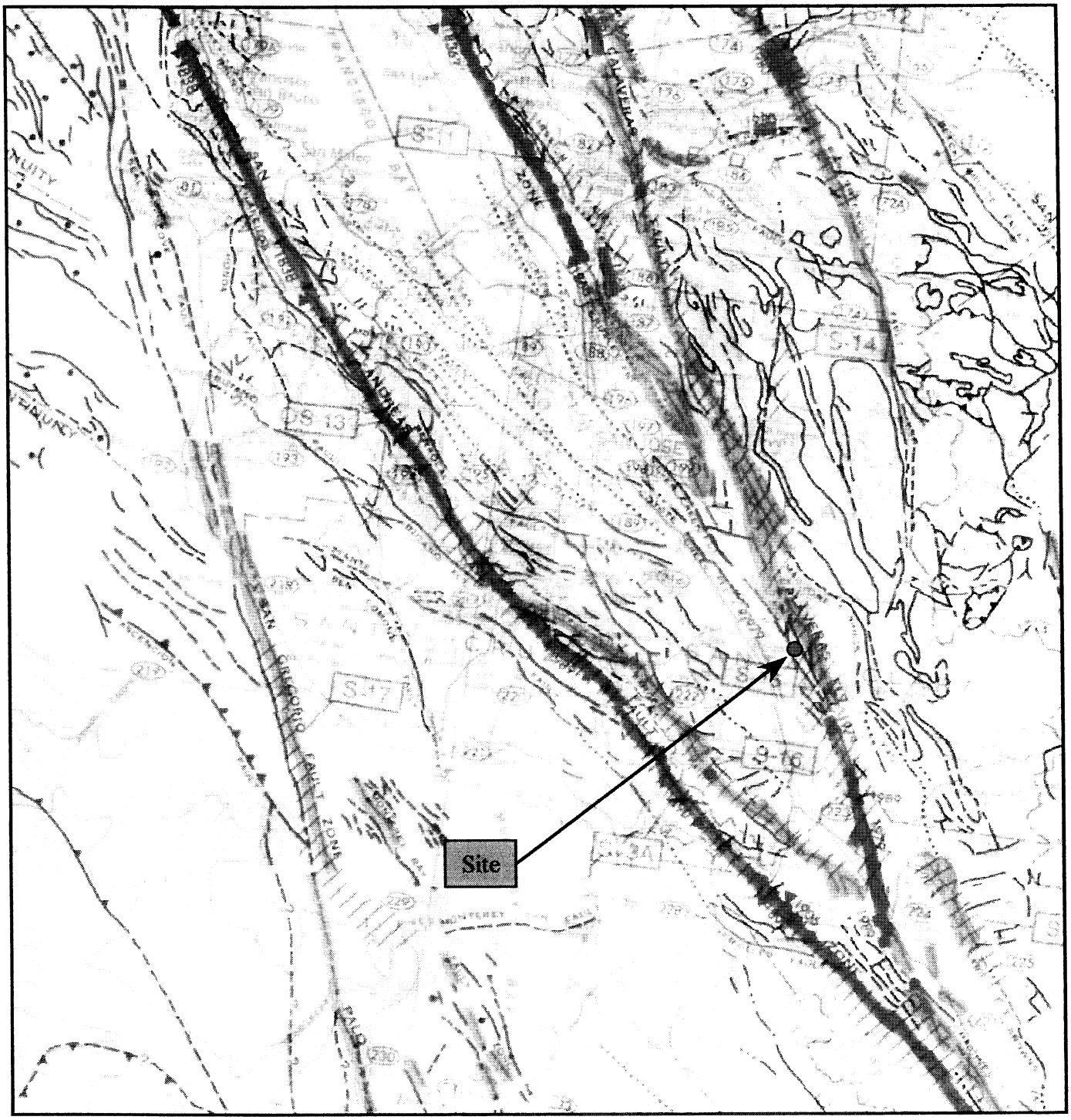

Reference:

Jennings, C.W., 1994, Fault activity map of California and adjacent area, with locations and ages or Recent volcanic eruptions; California geologic data map series, map no. 6, Department of Conservation, Division of Mines and Geology

SCALE 1 : 750,000
(1 INCH EQUALS APPROXIMATELY 12 MILES)

0 10 20 30 40 MILES

0 10 20 30 40 50 KILOMETERS

N

Original in Color

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Regional Fault Map

Institute Golf Course
Maple and Foothill Avenues
Morgan Hill, California

PLATE 6

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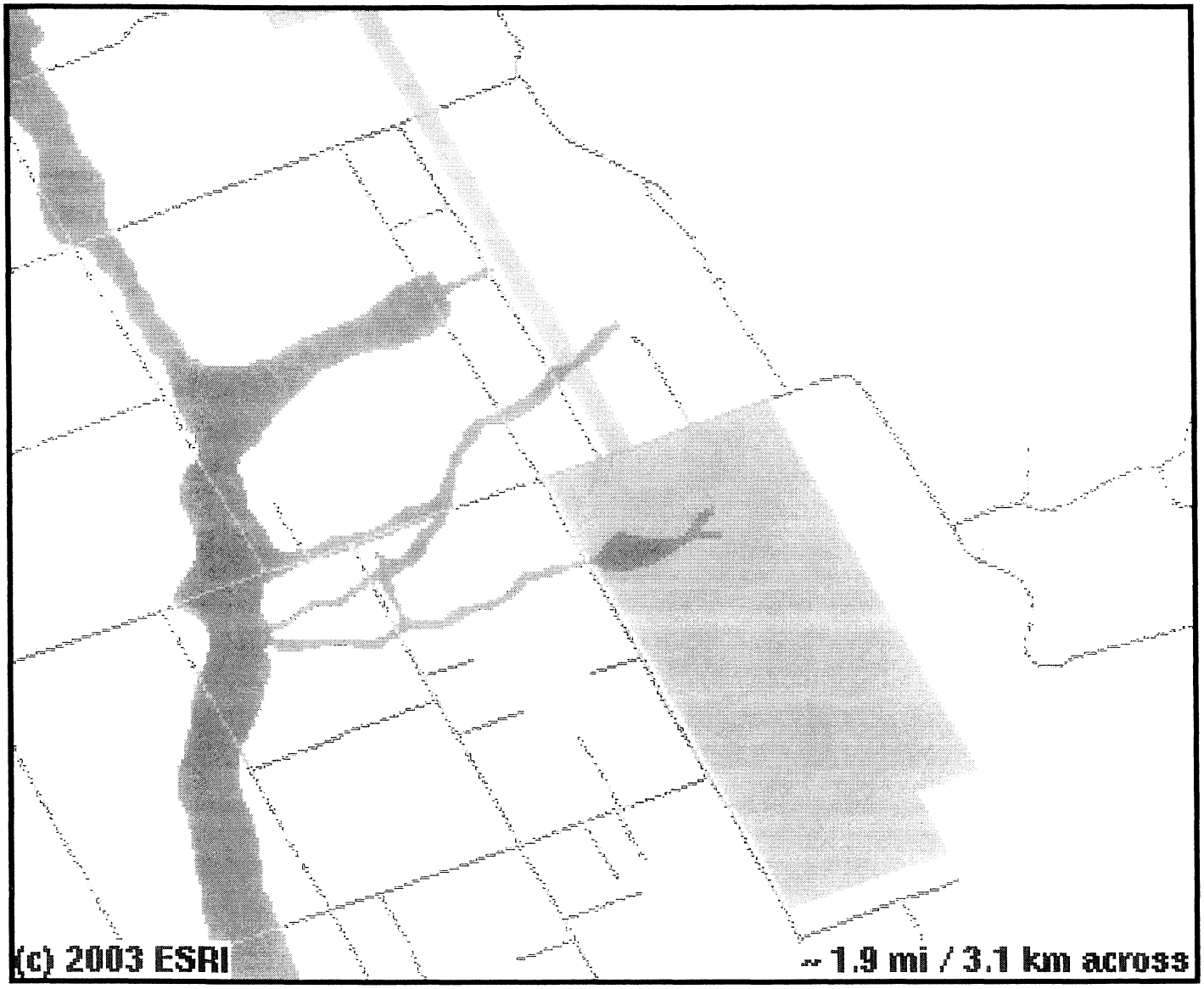

N

100-year flood prone area

City of Morgan Hill

Source: ESRI and FEMA, U.S Flood Hazard Areas
http://www.esri.com/hazards.html

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June 4, 1999

Original in Color

KLEINFELDER
1362 Ridder Park Drive
San José, California 95131
Ph. (408) 436-1155 Fax. (408) 436-1771

Compiled by: P. Holland	Date: 4/29/03
Reviewed by: M. Clark	Revision date:

ESRI and FEMA Flood Prone Areas

Institute Golf Course
Maple and Foothill Avenues
Morgan Hill, California

PROJECT NO.: 27134

PLATE 7

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UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	ID	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY	GW		Well-graded gravels or gravel with sand, little or no fines.
		GP		Poorly-graded gravels or gravel with sand, little or no fines.
		GM		Silty gravels, silty gravel with sand mixture.
		GC		Clayey gravels, clayey gravel with sand mixture.
	SAND AND SANDY	SW		Well-graded sands or gravelly sands, little or no fines.
		SP		Poorly-graded sands or gravelly sands, little or no fines.
		SM		Silty sand.
		SC		Clayey sand.

MAJOR DIVISIONS		LTR	ID	DESCRIPTION
FINE GRAINED SOILS	SILTS AND CLAYS	ML		Inorganic silts and very fine sands, rock flour or clayey silts with slight plasticity.
		CL		Inorganic lean clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
		OL		Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS	MH		Inorganic elastic silts, micaceoius or diatomaceous or silty soils.
		CH		Inorganic fat clays (high plasticity).
		OH		Organic clays of medium high to high plasticity.
HIGHLY ORGANIC SOILS		Pt		Peat and other highly organic soils.

Standard Penetration Split Spoon Sampler 2.0 inch, 1.4 inch I.D.

Modified California Sampler 2.5 inch O.D., 2.0 inch I.D.

Bulk Sample

California Sampler, 3.0 inch O.D., 2.5 inch I.D.

Shelby Tube 3.0 inch O.D.

0800, 5/31 — Approximate water level first observed in boring. Time recorded in reference to a 24 hour clock.

0800, 5/31 — Approximate water level observed in boring following drilling

PEN — Pocket Pentrometer reading, in tsf

TV:Su — Torvane shear strength, in ksf

LL	LIQUID LIMIT	TX	TRIAXIAL SHEAR
PI	PLASTICITY INDEX	CONSOL	CONSOLIDATION
%-#200	SIEVE ANALYSIS (#200 SCREEN)	R-Value	RESISTANCE VALUE
DS	DIRECT SHEAR	SE	SAND EQUIVALENT
C	COHESION (PSF)	EI	EXPANSION EQUIVLANT
PHI	FRCITION ANGLE	FS	FREE SWELL (U.S.B.R.)

Notes: Blow counts represent the number of blows a 140-pound hammer falling 30 inches required to drive a sampler through the last 12 inches of an 18 inch penetration, unless otherwise noted.

The lines separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

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PROJECT NO. 27134/geo

BORING LOG LEGEND

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-1

5/5/2003 4:52:03 PM

Date Completed:	**3/5/03**	*Sampler:*	**Modified California 2.5 inch O.D., 2.0 inch I.D.**
Logged By:	**P. Holland**		
Total Depth:	**20.0 ft**		
Hammer Wt:	**140 lbs., 30" drop**	*Method:*	**6" Hollow Stem Auger**

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: **Estimated 470 feet (Above MSL)**
								GRAVELLY FAT CLAY WITH SAND (CH)- very dark brown, moist, very stiff, fine to coarse sand, fine gravel (fill)
5	■	42	102	22			3.3	
								GRAVELLY LEAN CLAY (CL)- dark brown, moist, stiff, fine angular volcanic gravel
10	■	44					3.3	
15	■	66	107	19			3.8	-red-gray
	■	36				Passing -#200=38%		**CLAYEY SAND (SC)**- red-gray, moist, medium dense, fine sand, some fine gravel, caliche layer at 19 feet
20								Bottom of boring No free groundwater encountered Boring backfilled with grout
25								
30								

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PROJECT NO. 27134/geo

LOG OF BORING NO. B1

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-2

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5/5/2003 12:19:40 PM

Date Completed:	3/5/03	*Sampler:*	Modified California 2.5 inch O.D., 2.0 inch I.D.
Logged By:	P. Holland		
Total Depth:	24.0 ft		
Hammer Wt:	140 lbs., 30" drop	*Method:*	6" Hollow Stem Auger

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: Estimated 468 feet (Above MSL)
								GRAVELLY FAT CLAY WITH SAND (CH)- very dark brown, moist, hard, fine to coarse sand, fine to coarse subangular gravel, mostly volcanics, some chert (fill)
5	■	46				LL=63; PI=44	4.5	
10	■	32				D.S. phi = 19 deg., C = 420 psf (see plate B-4)	3.0	-very stiff, less sand and gravel
15	■	46				Passing -#200=40%		**GRAVELLY FAT CLAY WITH SAND (CH)**- red-gray, moist, very stiff, fine to coarse sand, fine to coarse gravel, some serpentine gravel
								CLAYEY SAND WITH GRAVEL (SC)- red-gray, moist, dense, fine to coarse sand, fine coarse gravel
20	■	43						**SANDY LEAN CLAY WITH GRAVEL (CL)**- red-gray, moist, very stiff
	■	50/6"						**CLAYEY GRAVEL (GC)**- red-brown, moist, very dense, fine to coarse angular basalt gravel
25								Bottom of boring No free groundwater encountered Boring backfilled with grout
30								

KLEINFELDER

PROJECT NO. 27134/geo

LOG OF BORING NO. B2

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-3

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Date Completed:	3/5/03	*Sampler:*	Modified California 2.5 inch O.D., 2.0 inch I.D.
Logged By:	P. Holland		
Total Depth:	14.0 ft		
Hammer Wt:	140 lbs., 30" drop	*Method:*	6" Hollow Stem Auger

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: **Estimated 466 feet (Above MSL)**
								SANDY FAT CLAY WITH GRAVEL (CH)- very dark brown, moist, very stiff, fine to coarse sand, fine gravel (fill)
5	■	23	99	22	5.36 @ 2.5%		3.0	-hard
10	■	44						
	■	>50						**CLAYEY GRAVEL (GC)**- red-brown, moist, very dense, fine to coarse angular basalt gravel
15								Bottom of boring No free groundwater encountered Boring backfilled with grout
20								
25								
30								

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PROJECT NO. 27134/geo

LOG OF BORING NO. B3

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-4

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5/5/2003 4:08:15 PM

Date Completed:	3/5/03	*Sampler:*	Modified California 2.5 inch O.D., 2.0 inch I.D.
Logged By:	P. Holland		
Total Depth:	20.0 ft		
Hammer Wt:	140 lbs., 30" drop	*Method:*	6" Hollow Stem Auger

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: **Estimated 353 feet (Above MSL)**
5	■	20				LL=38; PI=19	1.5	**SANDY LEAN CLAY (CL)**- yellow-brown, moist, very stiff, trace fine to coarse sand, trace fine gravel (fill)
10	■	23					2.0	**FAT CLAY (CH)**- very dark brown, moist, very stiff, some fine to coarse sand, some fine gravel
15	■	47	104	19		Passing -#200=57%		**SANDY LEAN CLAY (CL)**- red-gray, moist, hard, fine to coarse sand, trace fine gravel
20	■	25						-very stiff
25								Bottom of boring No free groundwater encountered Boring backfilled with grout
30								

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PROJECT NO. 27134/geo

LOG OF BORING NO. B4

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-5

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5/6/2003 1:55:14 PM

Date Completed:	3/5/03	*Sampler:*	Modified California 2.5 inch O.D., 2.0 inch I.D.
Logged By:	P. Holland		
Total Depth:	24.0 ft		
Hammer Wt:	140 lbs., 30" drop	*Method:*	6" Hollow Stem Auger

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: **Estimated 345 feet (Above MSL)**
								SANDY LEAN CLAY (CL)- dark brown, moist, stiff (fill)
5	■	16	105	21	1.83 @ 10.2%		2.0	
10	■	26	106	21			1.5	
15	■	51						**SANDY FAT CLAY (CH)**- dark brown, moist, very stiff to hard
20	■	42						**SILTY SAND (SM)**- yellow-brown, moist, medium dense to dense, fine sand
	■	50/5"	105	13				-very dense
25								Bottom of boring No free groundwater encountered Boring backfilled with grout
30								

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PROJECT NO. 27134/geo

LOG OF BORING NO. B5

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-6

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Date Completed:	3/5/03	*Sampler:*	Modified California 2.5 inch O.D., 2.0 inch I.D.
Logged By:	P. Holland		
Total Depth:	15.0 ft		
Hammer Wt:	140 lbs., 30" drop	*Method:*	6" Hollow Stem Auger

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. Strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: **Estimated 336 feet (Above MSL)**
								CLAYEY GRAVEL (GC)- dark brown to yellow-brown, moist, dense, fine to coarse basalt gravel
5	■	38				Passing -#200=39%		
10	■	25						
	■	35						**LEAN CLAY WITH GRAVEL (CL)**- dark brown to yellow-brown, moist, very stiff, fine to coarse gravel
15								Bottom of broing No free groundwater encountered Boring backfilled with grout
20								
25								
30								

KLEINFELDER

PROJECT NO. 27134/geo

LOG OF BORING NO. B6

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

PLATE

A-7

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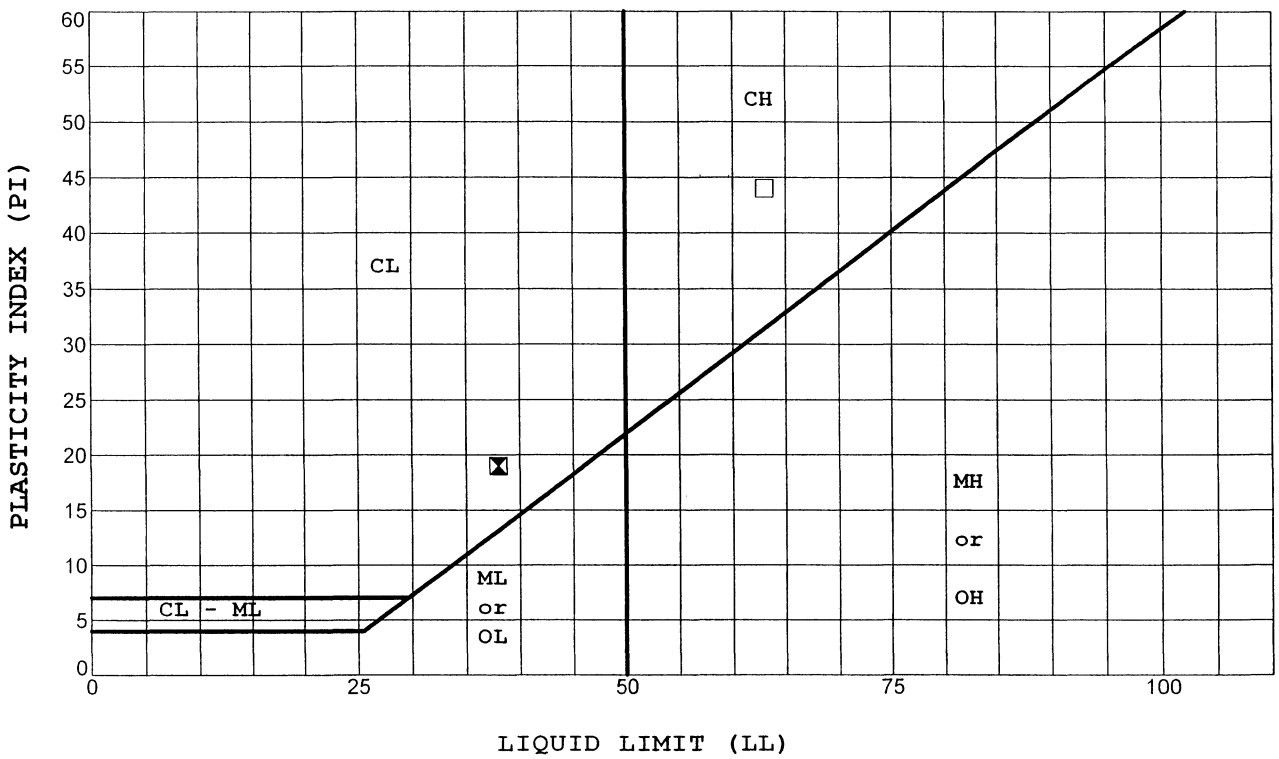

Symbol	Boring	Depth (ft)	LL	PL	PI	Sample Description
□	B2	5.0	63	19	44	Dark Brown Gravelly Fat Clay (CH)
☒	B4	5.0	38	19	19	Yellow-brown Sandy Lean Clay (CL)

Unified Soil Classification

Fine Grained Soil Groups

Symbol	LL < 50	Symbol	LL > 50
ML	Inorganic clayey silts to very fine sands of slight plasticity	MH	Inorganic silts and clayey silts of high plasticity
CL	Inorganic clays of low to medium plasticity	CH	Inorganic clays of high plasticity
OL	Organic silts and organic silty clays of low plasticity	OH	Organic clays of medium to high plasticity, organic silts

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PROJECT NO. 27134/geo

Institute Golf

Foothill Avenue and Maple Avenue

Morgan Hill, CA

PLASTICITY CHART

PLATE

B-1

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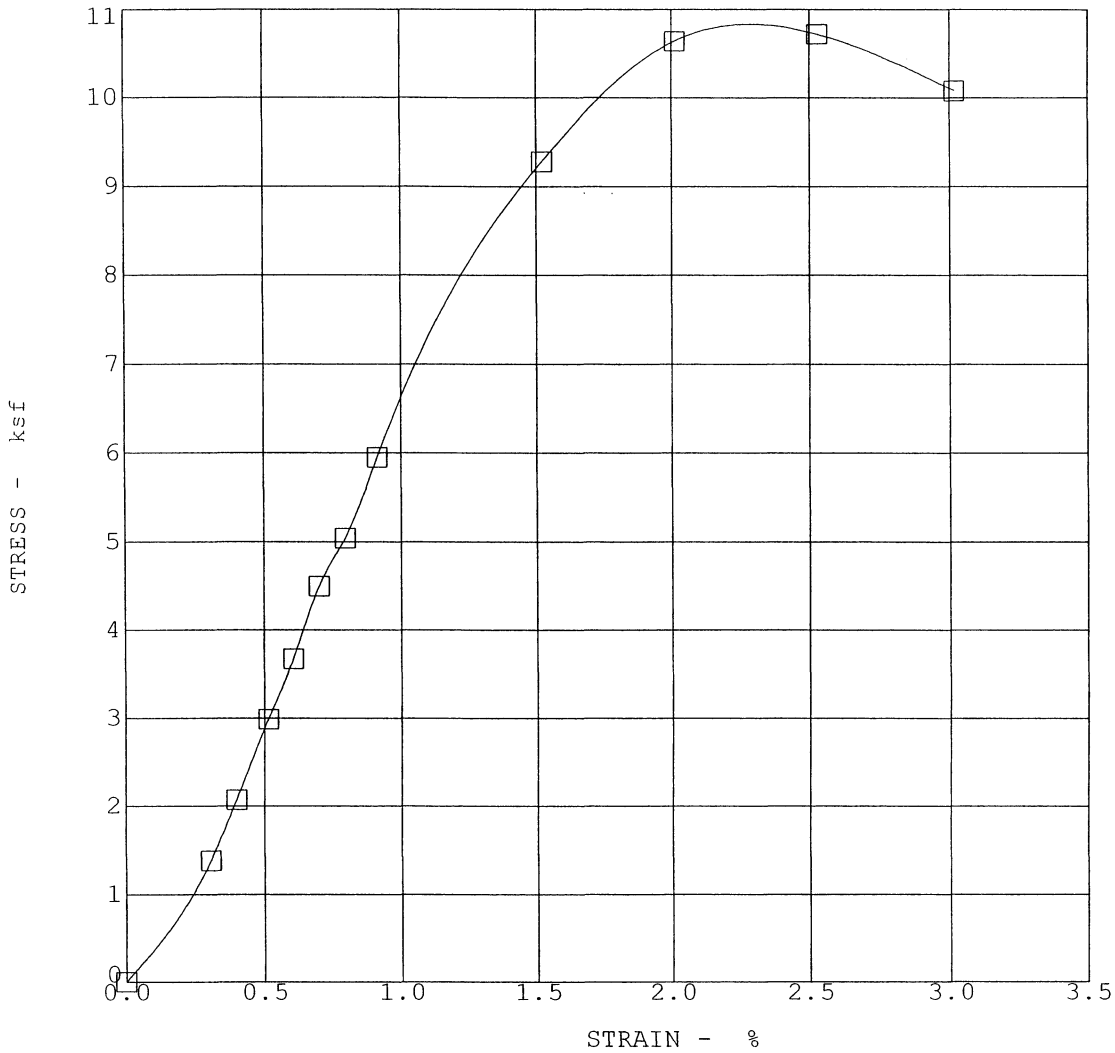

BORING NO.	B3	**DRY DENSITY - pcf**	99
DEPTH - ft	6	**WATER CONTENT - %**	22
SOIL DESCRIPTION	Dark Brown Sandy Fat Clay with Gravel (CH)		

MAX. UC STRENGTH= 10.72 ksf At 2.5 % STRAIN

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PROJECT NO. **27134/geo** *Completed:*

Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

UNCONFINED COMPRESSION TEST

PLATE

B-2

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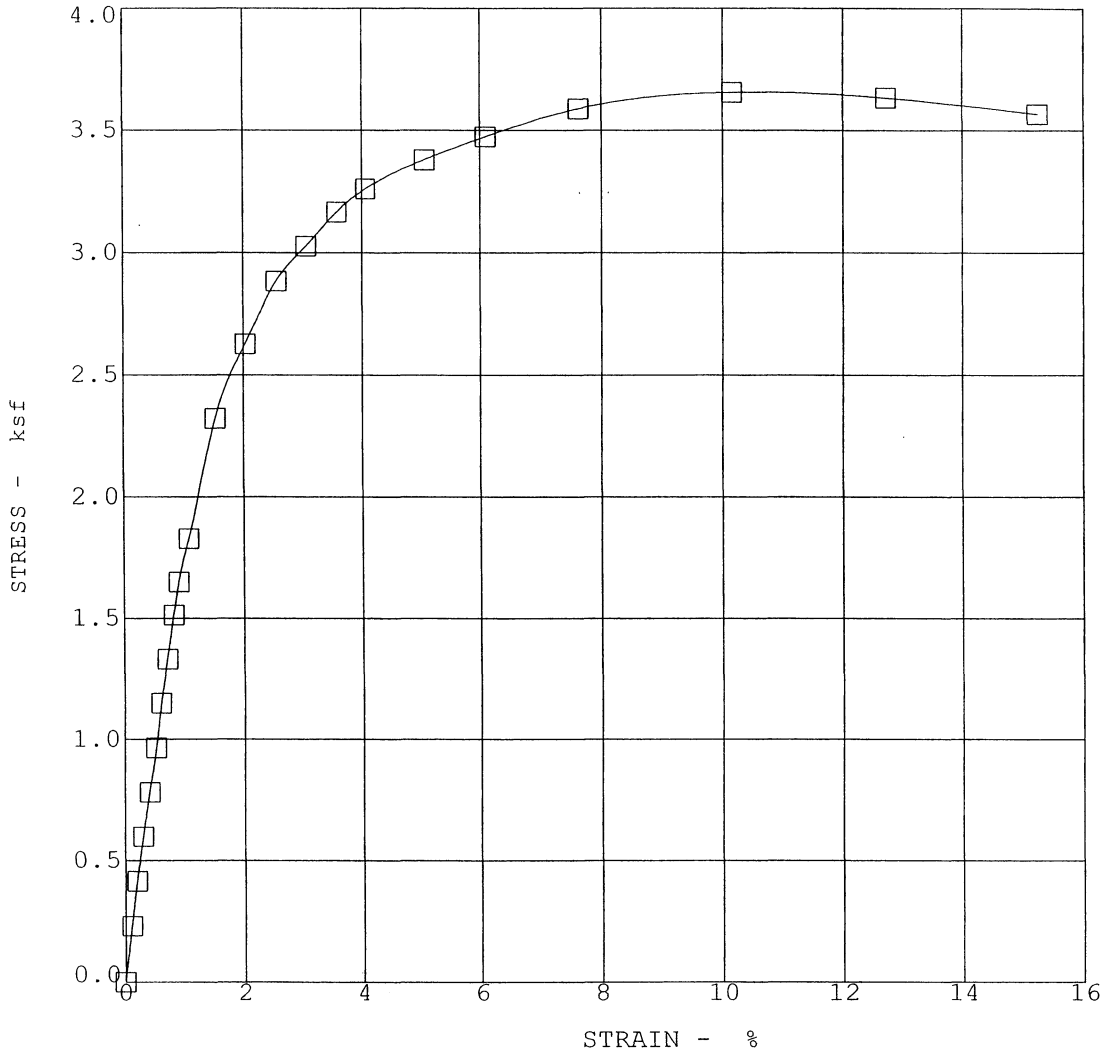

BORING NO.	B5	**DRY DENSITY - pcf**	105
DEPTH - ft	6	**WATER CONTENT - %**	21
SOIL DESCRIPTION	Dark Brown Sandy Fat Clay (CH)		

MAX. UC STRENGTH= 3.66 ksf At 10.2 % STRAIN

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Institute Golf
Foothill Avenue and Maple Avenue
Morgan Hill, CA

UNCONFINED COMPRESSION TEST

PLATE

B-3

PROJECT NO. **27134/geo** *Completed:*

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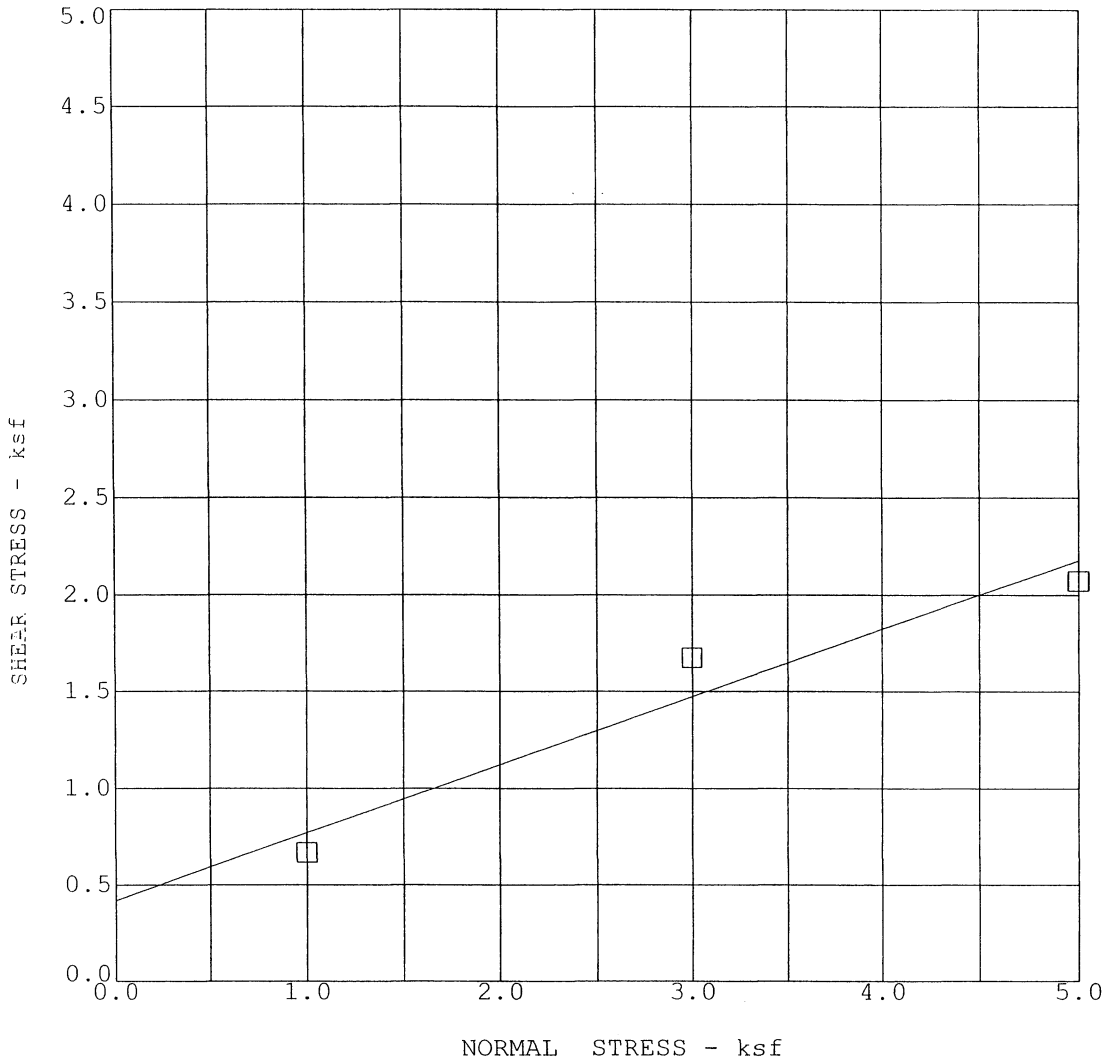

TEST TYPE: CD/DRY/STAGED

RATE OF SHEAR: .0048 in/min.

BORING NO: B-2

DEPTH: 11.0 ft

SOIL DESCRIPTION: Dark Brown Gravelly Fat Clay With Sand (CH)

DRY DENSITY - pcf	95.77708		
INITIAL WATER CONTENT - %	27.4		
FINAL WATER CONTENT - %	27.4		
NORMAL STRESS - psf	1000	3000	5000
MAXIMUM SHEAR - psf	667	1676	2072

FRICTION ANGLE = 19 deg.

COHESION= 0.42 ksf

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PROJECT NO. 27134-GEO

Institute Golf Course
Foothill Avenue and Maple Avenue
Morgan Hill, CA
DIRECT SHEAR TEST

PLATE

B-4

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Appendix C

Vegetation and Wildlife

C-1 Institute Golf Course DEIR Biological Resources Section, H.T. Harvey and Associates Inc.
C-2 Focused Surveys for Special Status Plants, RCL Ecology
C-3 CRF Focused Survey, Sycamore Associates
C-4 Institute Golf Course DEIR - Applicant's Response, The Institute, LLC
C-5 Citywide Burrowing Owl Mitigation Plan, City of Morgan Hill
C-6 Institute Golf Course DEIR Clarification of Onsite and Offsite Mitigation Measures, United States Fish and Wildlife Service

Appendix C-1

Institute Golf Course DEIR Biological Resources Section,
H.T. Harvey and Associates Inc.

INSTITUTE GOLF COURSE
DRAFT ENVIRONMENTAL IMPACT REPORT
BIOLOGICAL RESOURCES SECTION

Prepared by:

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August 1, 2001 (revised December 9, 2003) Project No. 1808-01

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ENVIRONMENTAL SETTING

PROJECT DESCRIPTION

The Institute Golf Course currently occupies approximately 150 acres of the 192-acre parcel defined by the property boundary (Figure 1). The project site is located in Morgan Hill, California and a portion of the site was the former Hill Country Golf Course. The project site also supported a restaurant, hotel, propeller shop, aircraft museum, totem pole shop, daycare center and church. In April 1997, the City of Morgan Hill issued a grading permit to the project applicant for the reconstruction of the existing golf course and the construction of a new access road and irrigation pond. The approved grading plan included the movement of up to 105,000 cubic yards of material on approximately 40 acres of the site. The actual grading exceeded 500,000 cubic yards and included the 192-acre project site. The golf course was renovated and golf course play began.

The City of Morgan Hill as the lead agency, is only evaluating the effects from the use of the existing golf course and the renovation of the Flying Lady Restaurant. Therefore, the impacts to sensitive biotic resources in the project area is limited to those that would be caused by playing rounds of golf, maintenance and management of the golf course and the renovation of the restaurant for its use as the headquarters of the American Institute of Mathematics, and the renovation and use of other structures on the project site as golf course and mathematic institute facilities. However, pre-grading conditions are evaluated and discussed in the Environmental Setting (below) so that the potential cumulative effects of the golf course construction, use, management and maintenance to biotic resources can be determined.

Pre-grading Conditions

According to a 1996 aerial photo (Figure 2), the former golf course occupied less than 25% (approximately 48 acres) of the property whereas the existing course occupies 150 acres. The same aerial photo reveals a landscape dominated by a combination of agriculture, non-native grassland, ruderal and woodland habitats, in addition to the golf course and associated development (the Flying-Lady restaurant, parking, etc). Aside from the hangar, the abandoned restaurant building, the residence on the property, the church building, and two barns, little remains of the original site facilities and landscape features (Figures 2 and 3).

As late as 1996, three ponds occupying no more than 3 acres existed on the former golf course. These ponds correspond approximately to artificial water bodies mapped on the USGS Gilroy quadrangle map updated in 1981; the ponds did not appear on the original quadrangle of 1955. The same map was used by the U. S. Fish & Wildlife Service (USFWS) to map wetland resources sometime after 1981, though the ponds were not identified as wetland resources in that effort. Therefore, the ponds were probably not regarded as regulated resources while they were serving their original purpose and were regularly maintained. However, there was a cessation of maintenance of the ponds after the original golf course was closed (in the 1990's), and they likely developed some wildlife values and functions. It is possible they may have served as habitat for

special-status wildlife species and could therefore have been under the jurisdiction of the California Department of Fish and Game (CDFG). The U. S. Army Corps of Engineers (USACE) may also have had discretionary authority over the ponds, although they may not have been abandoned long enough to meet jurisdictional criteria; the issue of such jurisdiction would have required a wetland delineation to be confirmed at that time.

The ponds have since been filled, and been replaced with approximately 4.78 acres of irrigation ponds and artificial creeks in other areas of the property, none of which are regulated by the USACE in their current condition. However, the presence of California red-legged frogs and California tiger salamanders in these ponds, may give CDFG jurisdiction over the ponds.

The woodlands present on site in 1996 appear somewhat reduced when one compares aerial photos (Figure 2); some of the original trees were apparently removed during golf course development. Two tributaries occupy the watershed on site and feed into Little Llagas Creek downstream. One tributary, located behind the residence, was dammed before the USGS even mapped the area in 1955, and is reflected as such on the quadrangle (Figure 4). This dam has long since been opened to allow flows out of the watershed, and converge with the drainage traversing the property to the north. This latter drainage becomes completely dry during the summer, unlike the dammed tributary that has a well developed riparian habitat and perennial flows. A series of culverts (7), a box culvert, three sediment traps, and a spillway can all be found within these tributaries on site. It is expected that most or all of these structures predate the golf course and provide evidence of greater flows once emerging from the watershed. Considering the current infestation by invasive, non-native upland plant species in the northern drainage, it appears there has been a cessation in recent years of the flows that these structures (some quite large) were designed to accommodate. Further evidence of the cessation in flows is demonstrated by the approximately 100 feet of the northern drainage which was previously graded during agricultural activities prior to 1996, and has since been covered with golf course sod; the USGS quadrangle depicts this drainage as formerly being continuous. The result is a conspicuously interrupted tributary watercourse, which apparently has yet to be subject to erosion from flows emerging from this drainage (See Figure 2). Aside from this previous impact however, the tributaries on site only seem to have been impacted by grading of golf course contours to just within the top-of-bank in areas, and possible dumping of yard waste and gravel in other areas.

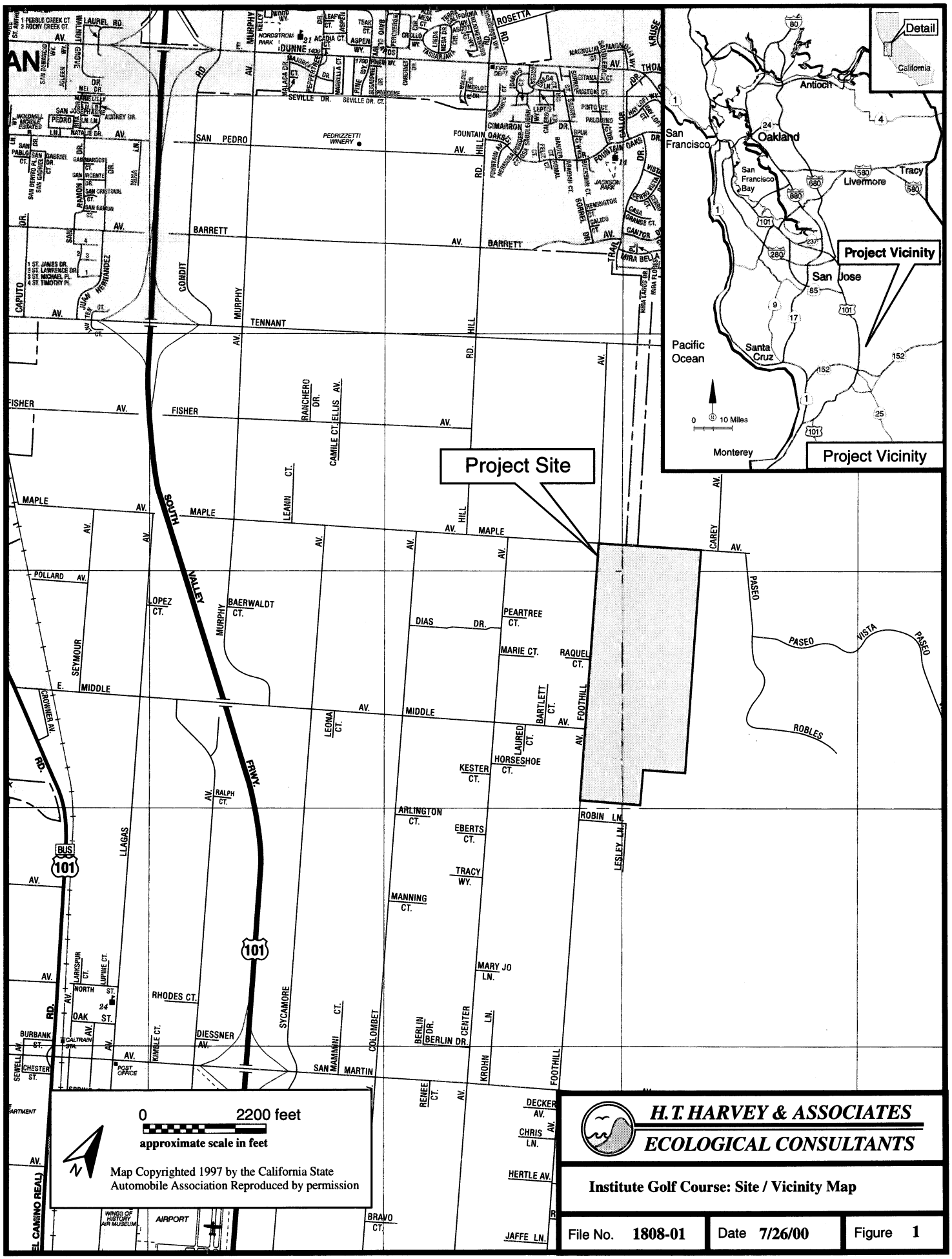
A wetland resource which appears to have been created since at least 1996, is the wetland drainage occurring immediately upstream of the large spillway on site. The installation of the spillway caused sedimentation to occur upstream prior to golf course development. The same area in the 1996 aerial photo only depicts a remnant tributary water course (Figure 2) in this location. Though some evidence of a gravelly substrate remains in this area of the drainage, deep fine upland soils were observed within this drainage suggesting plowing may have also occurred across this drainage in the past. The only evidence of an impact resulting from the current golf course development is that grading of golf course contours occurred below the top-of-bank along the length of this wetland drainage. The aerial photos provide poor detail of these and other wetland areas on site, therefore it is difficult to determine the precise extent and quality of these resources before the golf course development, and adequately assess any associated impacts.

Approximately 80 acres of the eastern half of the property is underlain by soil that is derived from metamorphosed basic igneous rock (serpentine). The Climara series soils mapped on site contain up to 15% inclusions of this material. Since serpentine soils host numerous endemic and associated special-status plant species in Santa Clara County, especially in the foothills east of Morgan Hill, many of these have been regarded as potentially occurring on site. In addition, most of the soils on site have the potential to be moderately alkaline, a characteristic that a host of other special status species are associated with. Most of the area where the Climara soils occur on site have been graded and covered with golf course sod. Therefore any serpentine rock outcrops, serpentine gravelly soils, and any populations of serpentine endemic species that may have been present, have since been displaced; serpentine boulders are being used for ornamental purposes, however, and serpentine material is evident within all areas of undisturbed Climara soils throughout the site. The presence of undisturbed Climara soils remaining in and around the watershed on site as well as the potential alkalinity of the soils in the various ruderal areas indicates that consideration of many special-status species may occur on site.

GENERAL PROJECT AREA DESCRIPTION

The project site is part of the Coyote Valley floodplain and consists of a golf course, an abandoned restaurant building, a residence, a maintenance building and undeveloped land. The uplands of this floodplain serve as watershed to Llagas Creek, (Figure 1). The site drains to Corralitos Creek within the property boundaries. Corralitos Creek flows to Little Llagas Creek and then on to Llagas Creek, approximately two miles from the project site.

The project site is underlain by nine phases of five soil series and one undifferentiated group including: Climara clay 9-30% slopes, Climara stony clay 15-50% slopes, Cropley clay 0-2% and 2-9% slopes, Los Robles clay loam 0-2% slopes, and Pleasanton loam 0-2% slopes, Rincon clay loam 0-2% and 2-9% slopes, and Zamora and Cropley soils undifferentiated and forming 2-9% severely eroded slopes (See Figure 4) (Soil Conservation Service, 1968). The Climara series consists of well drained, neutral to moderately alkaline, soils underlain by calcareous, metamorphosed, basic, igneous rock. The Cropley series consists of well-drained, neutral, to mildly alkaline, soils underlain by mixed sedimentary alluvium. The Rincon series consists of well-drained, neutral to moderately alkaline soils underlain by old sedimentary alluvium. The Los Robles series consists of well-drained, slightly acid to neutral soils underlain by basic igneous rock alluvium. The Pleasanton series consists of well-drained, slightly acid to neutral soils underlain by old gravelly sedimentary alluvium. The Zamora series consists of well-drained, neutral soil underlain by alluvium of mixed origin. Of these, the Climara series is reported to contain up to 15% inclusions of serpentine-based Montara rocky clay loam. This soil type occupies approximately 80 acres of the eastern half of the site, and in which serpentine material was observed to be well incorporated into the undisturbed areas of this soil on site. In addition, large serpentine boulders and riprap were observed in both the riparian and artificial drainages (and the seep area) on site. All such course, serpentine materials existed on site prior to the development (Kevin Robins, personal communication, 4/24/01), suggesting a greater proportion of serpentine bedrock and soil parent material exists on site than documented by the SCS. The Cropley clay forming 0-2% slopes is the only soil on site with a hydric component where inclusions of the Clear Lake series are forming depressions; this phase occupies approximately 48 acres of the western half of the site, and existing graded depressions (and



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Institute Golf Course: Site / Vicinity Map

File No. 1808-01	Date 7/26/00	Figure 1

1996 USGS Digital Orthophoto Quarter Quadrangle

Scale: 1"= 500'

Recent Aerial Photograph

Scale: 1"= 500'

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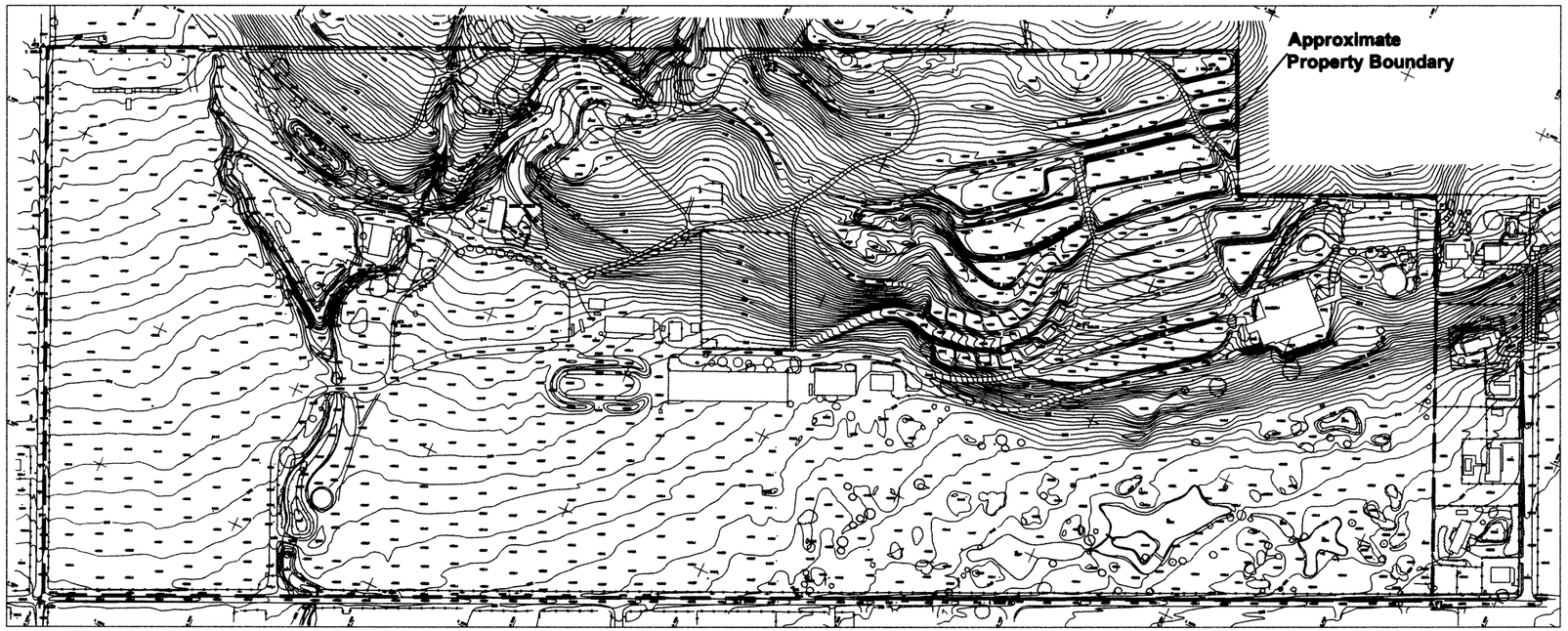
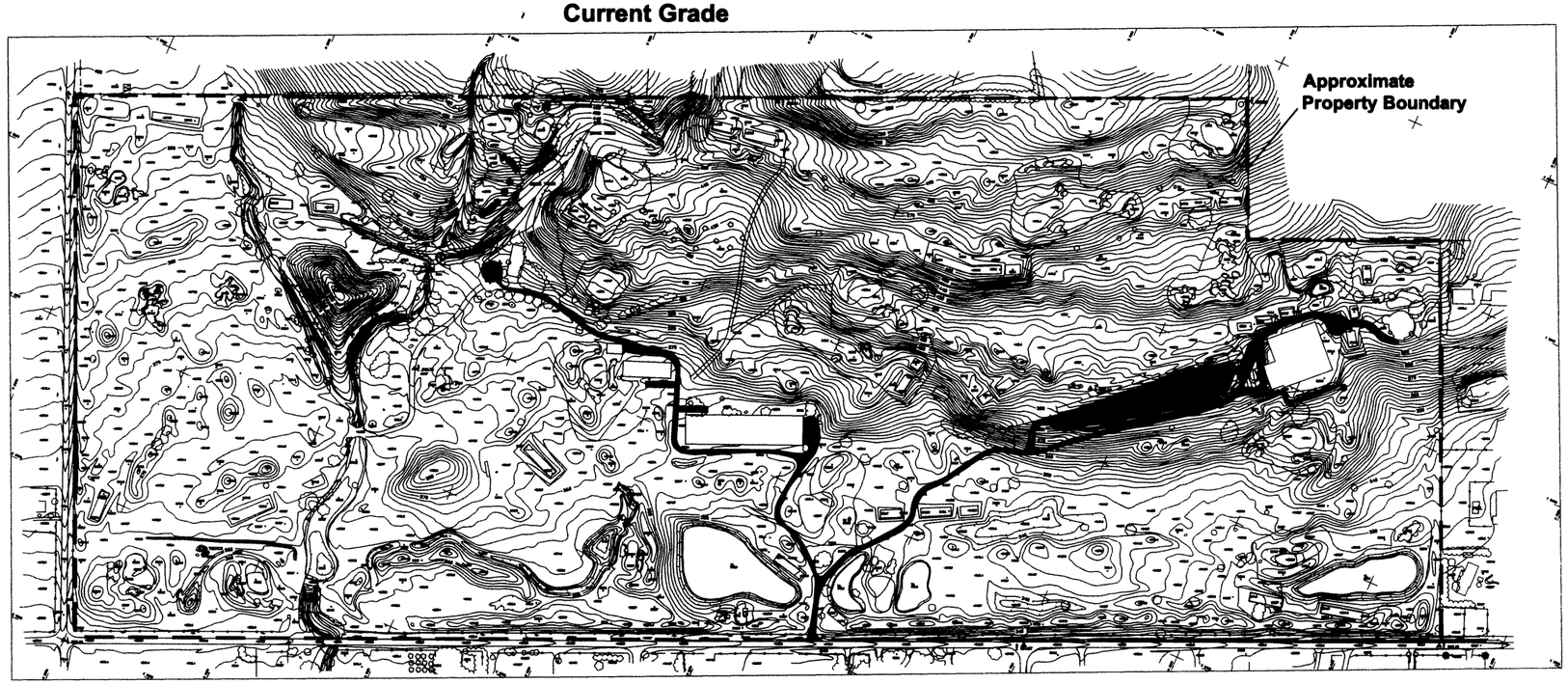
Institute Golf Course:
Historic and Recent Aerial Photographs

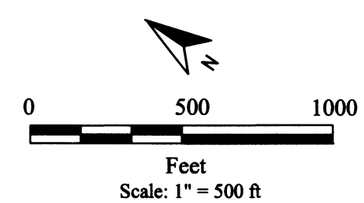
File No. 1808-03	Date 9/19/03	Figure 2

Pre-Existing Grade



Current Grade





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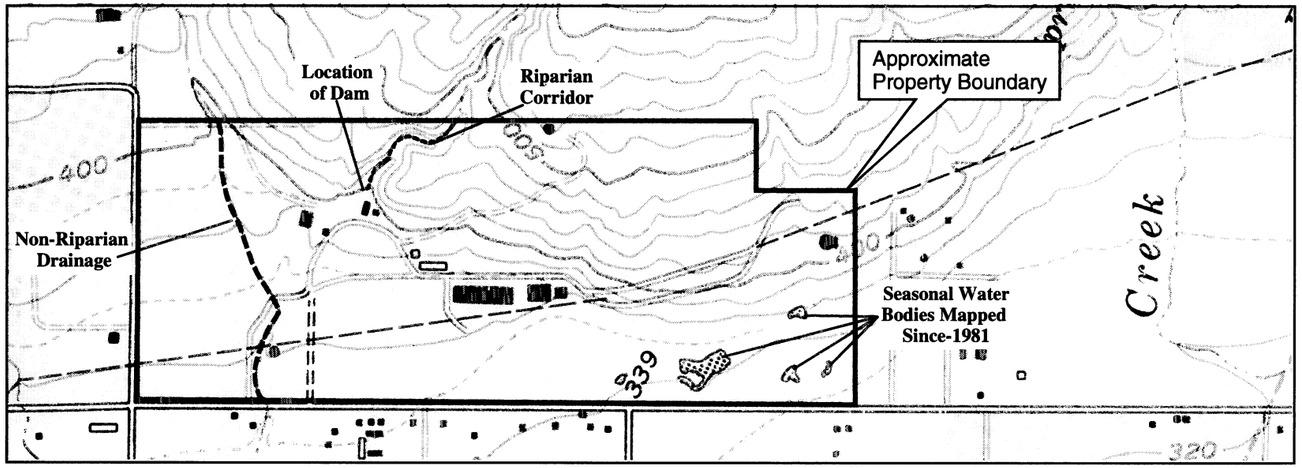
Institute Golf Course:
Pre-Existing & Current Grade Plan Views

File No. 1808-01	Date 7/26/01	Figure 3

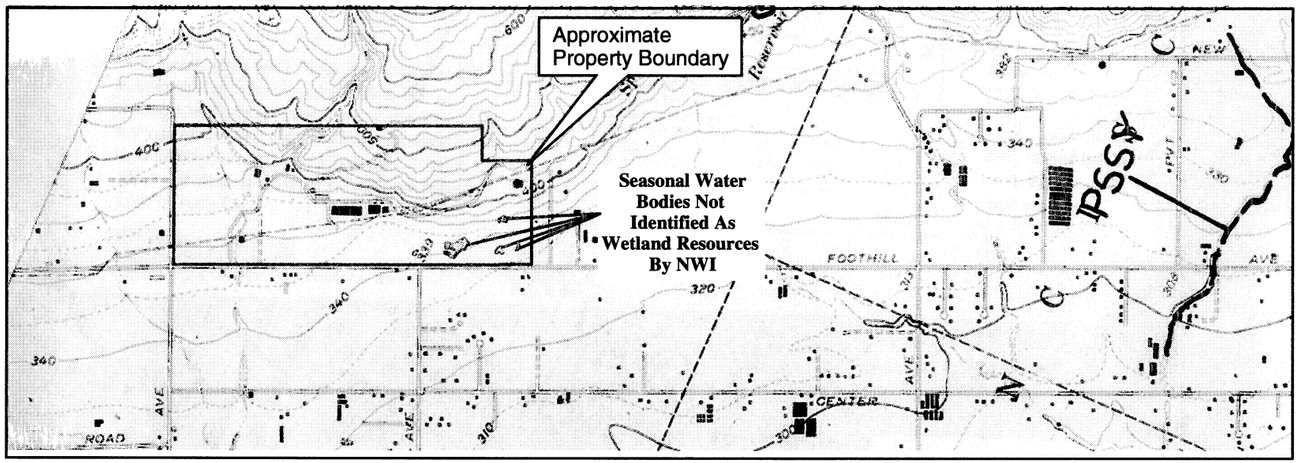
former ponds) demonstrate the tendency of this soil to pond long enough to create hydric conditions (SCS 1968).

Most of the project site is characterized as belonging to the Central California Coastal Valley Resource Area, which was historically dominated by annual grasslands, marsh habitat, and woodlands, on both flood and alluvial plains. The remaining undeveloped portions of this resource area are used as orchards, rangeland, pasture, and in oat-hay production. The average annual precipitation in this portion of the resource area is 16-20 inches and the average annual temperature is 58-60 degrees (SCS 1968).



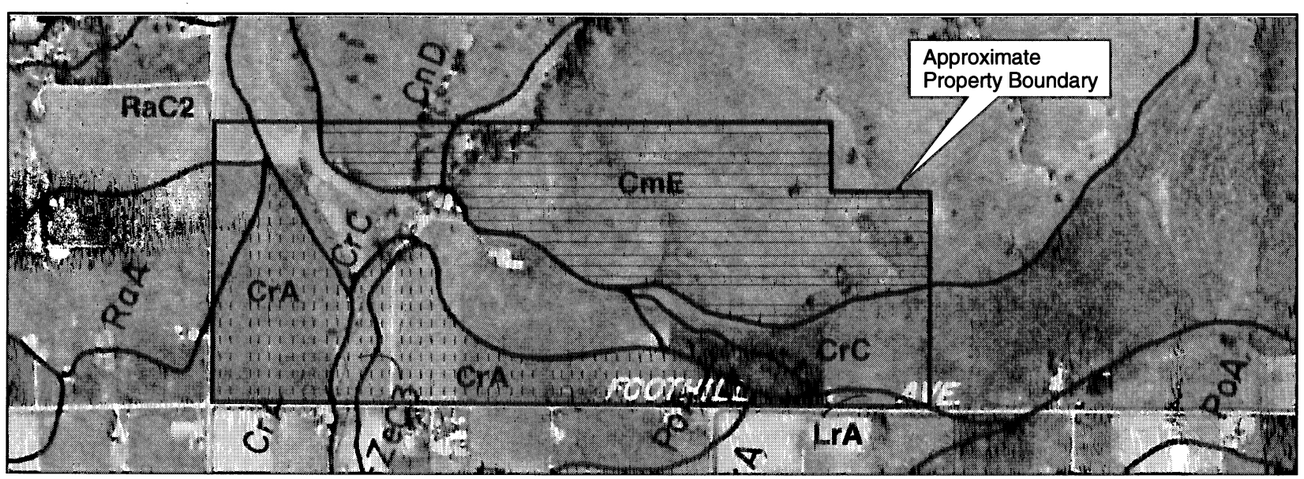
Scale: 1"= 1000'

USGS Quadrangle Map
California Santa Clara Co.
7.5 Minute Series
Gilroy Quad, 1955
Photorevised 1981



Scale: 1"= 2000'

U.S. Department of the Interior
National Wetlands Inventory Map
Gilroy, California
Based on 1981 Photorevised
USGS Gilroy Quad Map



Legend

CrC Cropley Clay, 2—9% Slopes
CnD Climara Clay, 90—30% Slopes
CmE Climara Stony Clay, 15—50% Slopes
PoA Pleasanton Loam, 0—2% Slopes
LrA Los Robles Clay Loam, 0—2% Slopes
ZeC3 Zamora and Cropley Soils, 2—9% Slopes, Severely Eroded
CrA Cropley Clay, 0—2% Slopes
RaA Rincon Clay Loam, 0—2% Slopes
RaC2 Rincon Clay Loam,

Hydric Component

Serpentine Inclusions

Scale: 1"= 1000'

U.S. Department of Agrilculture
Soils Map
County of Santa Clara, Sheet # 54, 1958

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Institute Golf Course:
USGS, & NWI, & Soils Maps

File No. 1808-01	Date 7/26/01	Figure 4

BIOTIC SURVEYS

Reconnaissance-level field surveys to identify and map biotic habitats, evaluate botanical and wildlife resources, and assess the suitability of the study area to support special-status plant and animal species were conducted for the entire Institute Golf Course property. Where appropriate, the plant communities on site have been named according to Holland's system of classification (1986). Survey personnel included a wetland and plant ecologist (Andrew Dilworth, B.S.), wildlife biologists (David Johnston, Ph.D.), and herpetologist (Jeff Wilkinson, Ph.D.). Lists of the vascular plant species observed and vertebrate species expected to occur on the project site during field surveys are provided in Appendices A and B, respectively.

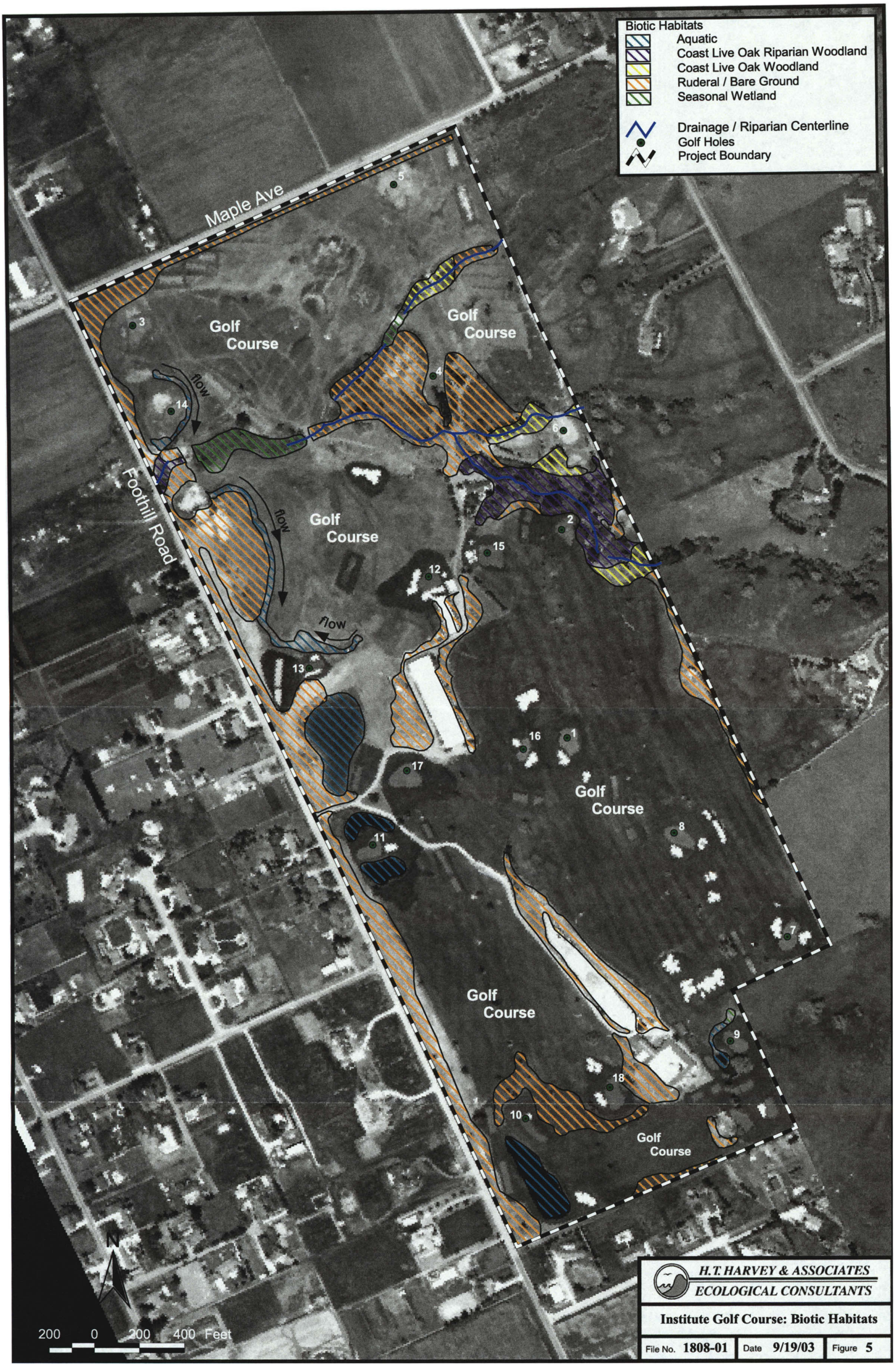
BIOTIC HABITATS

Reconnaissance-level surveys were conducted on July 26, 27, and 28 of 2000 and on April 24, 2001 throughout the golf course and remaining natural areas on site. This discussion of habitats is, therefore, based on the existing conditions during the survey period; due to intensive development and management of the golf course that appears to be ongoing, current conditions may be significantly different then those at the time of the surveys. Six biotic habitats were identified on the project site: developed, coast live oak riparian woodland, coast live oak woodland, ruderal, aquatic, and seasonal wetland (Figure 5). Though two creeks corresponding to blue-line stream courses have been mapped by the USGS within the project site (Figure 4), flows sufficient to warrant riparian classification of the habitats forming the watershed occur in only one of these. The watershed portion of the property therefore has a single riparian corridor which converges with a wooded drainage, as well as a secondary drainage not mapped by the USGS. Habitats were mapped with the aid of a recent aerial photo (scale 1 inch = 314 feet, enlarged). Table 1 summarizes the size of these habitats. All plant species observed on site are listed in Appendix A.

Table 1. Acreage summary of habitats found at the Institute Golf Course, Morgan Hill, California.

Habitat Type	Acres	Percent of Total
Developed (golf course) [1]	152	80%
Ruderal[2]	26.69	14%
Coast live oak riparian woodland	3.37	1.76%
Coast live oak woodland	2.25	1.2%
Aquatic[3]	4.78	2.5%
Seasonal Wetlands	1.37	0.24%
TOTAL	**190.46 acres**	**100%**

[1]Includes ornamental habitat.
[2]Includes bare ground and areas of non-native grassland.
[3]Includes artificial standing and flowing waters.


Biotic Habitats
Aquatic
Coast Live Oak Riparian Woodland
Coast Live Oak Woodland
Ruderal / Bare Ground
Seasonal Wetland
Drainage / Riparian Centerline
Golf Holes
Project Boundary
Maple Ave
Foothill Road
Golf Course
flow
1
2
3
4
5
6
7
8
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11
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200 0 200 400 Feet
H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS
Institute Golf Course: Biotic Habitats
File No. 1808-01
Date 9/19/03
Figure 5

Developed Vegetation. Approximately 80% of the project site has been developed as golf course, with numerous sand traps, stands of exotic pines (*Pinus* sp.), ornamental plum trees (*Prunus* sp.), and other ornamental trees both scattered and concentrated across the landscape including redwood (*Sequoia sempervirens*), eucalyptus (*Eucalyptus* spp.), and acacia (*Acacia* spp.). The golf course is intensively maintained, and mowed in its entirety on a daily basis.

Wildlife. The manicured golf course provides lower quality wildlife habitat than adjacent non-native grasslands, because regular mowing and intensive use of pesticides removes most otherwise potential food such as invertebrates and grass seeds. Despite the disturbance, developed areas, other than the golf course, provide foraging and, in some cases, nesting habitat for a number of wildlife species. California ground squirrels, (*Spermophilus beecheyi*) and Botta's pocket gophers (*Thomomys bottae*) were present in 2000, but infrequent in some peripheral areas near the greens and in adjacent areas with non-native grasslands. Other small mammals such as the non-native house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), broad-footed mole (*Scapanus latimanus*), western harvest mouse (*Reithrodontomys megalotis*), and desert cottontail (*Sylvilagus audubonii*) may also occasionally forage at the periphery of the golf course adjacent to intact grassland habitat. Reptile species common to this habitat type include the western fence lizard (*Scleroperous occidentalis*) and gopher snake (*Pituophus melanoleucus).* Birds that nest or roost in riparian or ornamental vegetation around these developed habitats, such as the California Towhee (*Pipilo crissalis*), Mourning Dove (*Zenaida macroura*), House Finch (*Carpodacus mexicanus*), Lesser Goldfinch (*Carduelis psaltria*), and Western Scrub-Jay (*Aphelocoma californica*), forage within the developed habitats. Raptors such as the White-tailed Kite (*Elanus caeruleus*), Red-shouldered Hawk (*Buteo lineatus*), Red-tailed Hawk (*Buteo jamaicensis*), and American Kestrel (*Falco sparverius*), as well as the Loggerhead Shrike (*Lanius ludovicianus*), may forage in these habitats as well. During winter, sparrows and finches may forage in the developed areas. Numerous buildings and water towers provide nesting sites for the Rock Dove (*Columba livia*), Black Phoebe (*Sayornis nigricans*), Cliff Swallow (*Petrochelidon pyrrhonota*), Barn Swallow (*Hirundo rustica*), Northern Rough-winged Swallow (*Stelgidopteryx serripennis*), and White-throated Swift (*Aeronautes saxatilis*). Additionally, these structures provide potential roosting habitat for several species of bats, such as Yuma bat (*Myotis yumanensis*), California bat (*M. californicus*), big brown bat (*Eptesicus fuscus*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*) and Mexican free-tailed bat (*Tadarida brasiliensis*).

Coast Live Oak Riparian Woodland

Vegetation. The riparian corridor on site is dominated by coast live oak (*Quercus agrifolia*) riparian woodland that occurs between the residence on site and the eastern property boundary (Figure 5). This habitat does have the appearance of forest in places, though the sometimes-high canopy is more attributable to the topography of the watershed. Despite the steep gradient throughout much of the watershed, pools do occur along the creek, and water continues to flow through the summer. Beyond the slopes and banks of this corridor, the trees sometime assume the appearance of oak savanna before the golf course begins. A dam is located at the bottom of the creek corridor, though it has not been used to impound water for some time; a single, large culvert has been placed in the creek course at the top of the watershed where an access road crosses the creek.

In addition to the coast live oaks that dominate this riparian corridor, California sycamore (*Platanus racemosa*), valley oak (*Quercus lobata*), and California walnut (*Juglans californica*) are all common between the banks. Numerous seedling and sapling oaks are sprouting within the canopy. The understory is mostly shady and is dominated by ripgut brome (*Bromus diandrus*), and creeping wild rye (*Elymus triticoides*). Forbs, including torilis (*Torilis nodosa*) and greater periwinkle (*Vinca major*), form abundant understory, particularly near the residence at the bottom of the main corridor. Poison oak (*Toxicodendron diversilobum*) and California blackberry (*Rubus ursinus*) were found to be abundant throughout the riparian corridor, sometimes forming thickets.

Wildlife. Although not extensive and somewhat isolated, the on-site riparian habitat is multilayered (i.e., ground covers, shrubs, small trees, and large oaks) and a diverse group of wildlife can inhabit this area. Amphibians and reptiles, such as the slender salamander (*Batrachoseps attenuatus*), Pacific treefrog (*Hyla regilla*), western toad (*Bufo boreas*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), as well as species found in moist woodlands such as the ringneck snake (*Diadophus punctatus*common), are often found in riparian sites such as found on the project site. Several California red-legged frogs (5 sub-adults and several confirmed tadpoles) were observed in the creek immediately below the crossing. Predators such as gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*) may visit this area to feed on a variety of small rodents. These prey species include California mouse (*Peromyscus californicus*), deer mouse (*P. maniculatus*), possibly the non-native house mouse (*Mus musculus*), and brush rabbit (*Sylvilagus bachmani*). The oaks provide food sources for many animals such as the observed Oak Titmouse (*Baeolophus inornatus*), Acorn Woodpecker (*Melanerpes formicivorus*), California Quail (*Callipepla californica*), Pacific-slope Flycatcher (*Empidonax difficilis*), and Steller's Jay (*Cyanocitta stelleri*). Other birds, such as the Red-breasted Sapsucker (*Sphyrapicus ruber*), forage here in the winter and neotropical migrants such as Cassin's Vireo (*Vireo cassini*) are expected to forage in the coast live oaks during migration and the Bewick's Wren (*Thryomanes bewickii*) and Spotted Towhee (*Pipilo maculatus*) were observed foraging in the understory.

The abundance of small birds and mammals in oak woodlands supports large numbers of avian and mammalian predators. A Cooper's Hawk (*Accipiter cooperii*) was observed foraging on the site and other predators, such as the Red-shouldered Hawk (*Buteo lineatus*), Sharp-shinned Hawk (*Accipiter striatus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*) may also prey on smaller vertebrates in this habitat.

Coast Live Oak Woodland

Vegetation. Remnant coast live oak woodland occurs in the non-riparian drainages on site. In addition to coast live oaks, valley oaks and various ornamental species predating the golf course occur within and around these drainages including acacia, eucalyptus, redwood, and English elm (*Ulmus minor*). Other trees, including many old oak volunteers and other planted natives, are also scattered throughout the site, yet the distribution of these trees has been reduced such that they no longer warrant classification as woodland. The current overall density of original trees across the site is somewhat reduced compared to the conditions in 1996, as portrayed in Figure 2.

Areas where various annual grasses and noxious weeds have infested portions of the drainages have been described as ruderal habitat and are discussed below.

Wildlife. Vertebrate wildlife occurring in this habitat comprises species fairly tolerant of human disturbances. Because this habitat is also not particularly multilayered (i.e., ground covers, shrubs, small trees, and large oaks), and trees are both isolated and mixed with less productive non-native trees, the wildlife found here is limited. Nonetheless, birds that possibly nest in this disturbed habitat include the American Robin, Mourning Dove, Western Scrub-Jay, Steller's Jay, California Towhee, Chestnut-backed Chickadee and Bushtit. Townsend's Warbler and Northern Flicker are winter visitors to this habitat. Commonly occurring reptiles, such as the western fence lizard and gopher snake may find cover in this habitat. There was no evidence of burrowing mammals, such as Botta's pocket gopher (*Thomomys bottae*), but this habitat may attract and recruit small numbers of rodents from adjacent, more productive, habitats. A few larger mammals, such as the Virginia opossum, raccoon, striped skunk (*Mephitis mephitis*), feral cat (*Felis catus*), and black-tailed deer (*Odocoileus hemionus columbianus*) are also expected to occasionally visit this habitat.

Ruderal / Non-Native Grassland

Vegetation. Ruderal habitat is the most abundant natural habitat on site (Figure 5). Areas of non-native grassland and bare ground have been regarded as ruderal habitat for the purposes of this survey considering the ongoing disturbance of these areas, and/or their origin due to previous disturbances (previous farming and range uses). This habitat occurs primarily along the boundaries of the project area (especially the western fence line), within and adjacent to the riparian habitat, and as islands surrounding structures, parking lots, etc. Most of the non-native grassland is adjacent to and between the drainages and the riparian corridor.

No plant species dominates any of the ruderal or non-native grassland areas on site, though many species are common to locally abundant throughout. Such species include grasses such as wild oats (*Avena* spp.) and various bromes (*Bromus* spp.), and forbs such as yellow star thistle (*Centauria solstitialis*), milk thistle (*Silybum marianum*), black mustard (*Brassica nigra*), milkweed (*Asclepias fascicularis*), and bristly ox tongue (*Picris echioides*). Many of the ruderal forbs (yellow star thistle, bristly ox tongue) were found to have completely infested portions of both the drainages on site.

Wildlife. Vertebrates found in ruderal areas include many of those species found in developed habitats, and many species using the adjacent grasslands and agricultural fields likely forage in and move through the ruderal habitat. Common wildlife species include western fence lizards, Ring-necked Pheasants (*Phasianus colchicus*), Killdeer (*Charadrius vociferus*), House Finches, Western Meadowlarks, Red-winged Blackbirds (*Agelaius phoeniceus*), American Goldfinches (*Carduelis tristis*), Mourning Doves, house mice (*Mus musculus*), desert cottontails (*Sylvilagus audubonii*), black-tailed hares, and California ground squirrels. Loggerhead Shrikes (*Lanius ludovicianus*), a California species of special concern, also forage and may breed within this habitat. The on-site ruderal habitat includes wetlands that provide potential breeding habitat for the Song Sparrow (*Melospiza melodia)* and Common Yellowthroat (*Geothlypis trichas).*

Aquatic Vegetation. Aquatic habitat within the riparian corridor on site is currently limited to a low flow connecting a few pools within the riparian woodland habitat (Figure 5). The centerline of the creek is sufficiently shady that little to no emergent vegetation was found therein. Other hydrophytic species such as watercress (*Rorripa nasturtium-aquatica*), rabbitsfoot grass (*Polypogon* spp.), and algae were only occasional along the watercourse, where gaps in the canopy provided enough light. The remaining drainages are completely dry except for saturated conditions in the freshwater marsh habitat along the course of the main drainage.

The developed areas contain numerous artificial flowing and standing water bodies that are almost entirely devoid of vegetation. These include two artificial creeks and associated collection ponds, in the northern half of the site, and five artificial ponds in the southern half of the site; a limited number of cattails (*Typha* sp.) have become established in only one of the ponds. A sixth pond is currently under construction and is located between the two branches of Corallitos Creek. This pond is proposed to be used for fishing and will be stocked with largemouth bass (*Micropterus salmoides*). With the exception of the pond in the southeast corner of the site which is spring-fed, all water bodies are pump-fed and/or aerated, and appear to be treated with herbicide (and possibly pesticide), presumably to inhibit algae growth. The two artificial creeks are lined with both concrete and/or serpentine and igneous riprap, as is the channel and pond associated with the spring. The northernmost artificial creek was not flowing during the initial survey, though its collection pond was full and appears to overflow occasionally through a pipe into the bottom of the main tributary, resulting in some erosion at its outfall. In the absence of treated waters flowing through this artificial creek, various species including Italian rye (*Lolium multiflorum*), sow thistle (*Sonchus* sp.), and pimpernel (*Anagallis arvensis*) are present, though they appear to be suffering the effects of herbicide, either applied or associated with the formerly flowing waters. The remaining water bodies are concrete and PVC lined with sand layered over the PVC. The former ponds were filled during development of the golf course as depicted in the comparison of aerial photos in Figure 2; it is not known how the waters in those ponds might have been perched. This is discussed further under Regulated Habitats and Resources.

Wildlife. Aquatic habitat within the riparian corridor on site provides breeding habitat for amphibians, such as the observed Pacific tree frog and the federally-listed California red-legged frog. This creek appears hydrologically isolated from bodies of water with predatory species, such as the bullfrog, and the ponds occurring along this creek are therefore productive breeding areas for the red-legged frog.

Because the manmade creeks and ponds are almost entirely devoid of emergent vegetation, the overall value to most wildlife is limited. However, submerged aquatic plants, including algae species, provide the basis for food chains that support invertebrates and amphibian larvae of the western toad, Pacific tree frog, California tiger salamander (*Ambystoma californiense*), and California red-legged frog. Shorebirds, such as the Black-necked Stilt (*Himantopus mexicanus*), Greater Yellowlegs (*Tringa melanoleuca*) and Spotted Sandpiper (*Actitis macularia*) forage on prey along the edges of these ponds. Waterfowl such as the Mallard (*Anas platyrhynchos*) and American Coot (*Fulica americana*) forage on the open water, and other wildlife, such as the raccoon (*Procyon lotor*) and Virginia opossum (*Didelphis virginianus*), forage along the

perimeter of these ponds and artificial creeks. The Red-winged Blackbird (*Agelaius phoeniceus*) may visit the cattails, but at the time of the surveillance-level survey, the emergent vegetation clump was probably not large enough to provide breeding habitat for blackbirds.

Seasonal Wetlands

Vegetation. Potential wetlands occur in three separate locations across the golf course (Figure 5). These can be classified as wetland drainage and spring-fed wetland and total 1.37 acres. While the hydrology associated with each of these wetlands is distinct, all potential wetlands on site can be regarded as seasonal.

Wetland drainage habitat occurs at two locations within the non-riparian drainages on the north end of the site and is characterized by the presence of abundant hydrophytes where water collects along the drainage course during the winter. The dominant species observed in the wetland drainage areas on site include cattails, cocklebur (*Xanthium strumarium*), Italian rye, and clustered dock (*Rumex conglomeratus*); the area dominated by cattails is insufficient in size and development to be regarded as freshwater marsh.

The spring-fed wetland is located in the vicinity of golf hole 9. This wetland occurs as a spring that feeds a narrow channel around which golf course contours are graded, and leads to an adjacent concrete-lined collection pond. Portions of the channel appear to be concrete lined to prevent erosion, but is otherwise overlain with soil and serpentine material. Serpentine riprap and boulders have also been placed upstream, in a depression connected to the spring-fed channel. This serpentine material reportedly originated from elsewhere on site (Kevin Robins, Pers. Comm.).

At the time of the survey, the vegetation at the mouth of the spring and along the channel includes mostly annual rabbitsfoot grass (*Polypogon monspeliensis*), bird's foot trefoil (*Lotus corniculatus*) and upland weeds such as sow thistle and yellow-star thistle; little to no vegetation occurred along the concrete lined pond. This spring and channel are subject to regular maintenance which otherwise has the potential to develop vegetation associated with serpentine seeps, considering the influence of serpentine materials and perennial flows associated with this area.

Wildlife. Because of the disturbance associated with these wetlands, the wildlife species present in these habitats are primarily common, widespread species, or species more typically associated with adjacent ruderal or developed habitats. Pacific tree frogs, Western toads, Western fence lizards (*Sceloporus occidentalis*), gopher snakes (*Pituophis melanoleucus*), and common garter snakes (*Thamnophis sirtalis*) may occur here. Birds such as the Song Sparrow (*Melospiza melodia*) may nest in this habitat and other birds, such as the California Towhee (*Pipilo crissalis*), Mourning Dove (*Zenaida macroura*), House Finch (*Carpodacus mexicanus*), Lesser Goldfinch (*Carduelis psaltria*), and Western Scrub-Jay (*Aphelocoma californica*), forage within these habitats. In areas where these habitats are drier during the summer, mammals expected to be present include the California vole (*Microtus californicus*), western harvest mouse and desert cottontail (*Sylvilagus audubonii*). Raptors such as the White-tailed Kite (*Elanus caeruleus*),

Red-shouldered Hawk (*Buteo lineatus*), and American Kestrel (*Falco sparverius*), as well as the Loggerhead Shrike (*Lanius ludovicianus*), may forage in these habitats as well.

SPECIAL-STATUS PLANT AND WILDLIFE SPECIES

Information concerning threatened, endangered, or other special-status species that may occur in the area was collected from several sources and reviewed by H. T. Harvey & Associates' biologists. The sources consulted included the CDFG's Natural Diversity Data Base (CNDDB 2001), California Wildlife Habitat Relationships species notes (CDFG 1988, 1990a, 1990b), and miscellaneous information available through the USFWS, CDFG, and technical publications. The California Native Plant Society (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994) and *The Jepson Manual* (Hickman 1993) supplied information regarding the distribution and habitats of vascular plants in the vicinity.

A search of published accounts of special-status species was conducted for the USGS Gilroy quadrangle, in which the project site occurs, and for the eight surrounding quadrangles including Gilroy Hot Springs, Mount Sizer, Chittenden, Mount Madonna, Watsonville East, San Felipe, and Mississippi Creek using the CDFG Rarefind reports (CNDDB 2001). All species listed as occurring in Santa Clara County and present on CNPS Lists 1A, 1B, 2, or 4 were reviewed.

Special-Status Species Regulations Overview

Federal and state endangered species legislation gives several plant and animal species known to occur in the vicinity of the project site special status. In addition, state resource agencies and professional organizations, whose lists are recognized by agencies when reviewing environmental documents, have identified as sensitive some species occurring in the vicinity of the project site. Such species are referred to collectively as "species of special-status."

Provisions of the federal Endangered Species Act (FESA) protect federally-listed threatened and endangered species and their habitats from unlawful take. "Take" under FESA includes activities such as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any of the specifically enumerated conduct." The U.S. Fish and Wildlife Service's (USFWS) regulations define harm to include some types of "significant habitat modification or degradation." The U.S. Supreme Court ruled on June 29, 1995, that "harm" may include habitat modification "...where it actually kills or injuries wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." Activities that may result in "take" of individuals are regulated by the USFWS. The USFWS produced an updated list of candidate species on February 28, 1996 (61 Fed. Reg. 7596). In addition, the USFWS discontinued the designation of Category 2 and Category 3 species. Candidate species are now species regarded by USFWS as candidates for addition to the "List of Endangered and Threatened Wildlife and Plants." Candidate species are not afforded any legal protection under FESA although many of these species are protected by other federal and state laws. Candidate species typically receive special attention from federal and state agencies during the environmental review process.

Provisions of California's Endangered Species Act (CESA) protect state-listed threatened and endangered species. CDFG regulates activities that may result in "take" of individuals (i.e., "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill"). Habitat degradation or modification is not expressly included in the definition of "take" under the California Fish and Game Code. The CDFG, however, has interpreted "take" to include the "killing of a member of a species which is the proximate result of habitat modification.... "

The CDFG has also produced three lists of "species of special concern" that serve as "watch lists." Species on these lists either are of limited distribution or the extent of their habitats has been reduced substantially, such that threat to their populations may be imminent. Thus, their populations should be monitored. They may receive special attention during environmental review, but do not have statutory protection under CESA although many of these species are protected under other state and federal laws.

Vascular plants listed as rare or endangered by the California Native Plant Society (Skinner and Pavlik 1994), but which have no designated status under state endangered species legislation, are defined as follows:

- List 1B. Plants rare, threatened, or endangered in California and elsewhere.
- List 2. Plants rare, threatened, or endangered in California, but more numerous elsewhere.
- List 3. Plants about which we need more information – A review list.
- List 4. Plants of limited distribution – A watch list.

Special-Status Plant Surveys

Reconnaissance level surveys were conducted on July 26, 27, and 28 of 2000 throughout golf course and natural areas on site. A query of the California Natural Diversity Database (CNDDB 2001) was performed to identify special-status plant species potentially occurring on site and in the project vicinity. Habitats specified in the query included aquatic, freshwater marsh, artificial flowing waters, artificial standing waters, cismontane woodland, riparian woodland, and valley and foothill grasslands. These habitats were chosen for the similarity of their constituent species to those on site, as well as the proximity of the site to such habitats. In addition, the California Native Plant Society Inventory (CNPS 1994) was used to identify and assess additional species occurring in similar habitats throughout Santa Clara County.

A total of 53 special-status plant species were identified in these queries, of which 21 were regarded as potentially occurring under the existing conditions on site (Table 2). Of these, 8 species are serpentine endemic plants, 6 are often associated with serpentine habitats, and the remaining 7 occur in grasslands and/or alkaline environments. Surveys were conducted during the blooming season for all 21 of those species by RCL Ecology in March-November 2002 and none of the species was found. Based on those surveys these 21 species are all considered absent.

The serpentine habitat on site has proven to be in greater proportion than accounted for by the soil survey. This is supported by observations of serpentine gravelly soils in the undisturbed

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Federal or State Endangered Species			
Tiburon Indian paintbrush (*Castilleja affinis* ssp. *neglecta*)	FE, ST, CNPS 1B	Valley and foothill grasslands with serpentine soils	Suitable serpentine soils occur within the valley and foothill grassland habitat of the project site. Therefore, blooming season surveys are warranted.
Coyote ceanothus (*Ceanothus ferrisae*)	FE, CNPS 1B	Chaparral, coastal scrub, and valley and foothill grassland habitats with serpentinite soils	Suitable soils with serpentinite material occur within the valley and foothill grassland habitat of the project site. Surveys are warranted within the January to March blooming period.
Santa Clara Valley dudleya (*Dudleya setchellii*)	FE, CNPS 1B	Valley and foothill grassland habitat underlain with serpentine soils	Potentially suitable habitat occurs on site due to the serpentine substrate. Blooming season surveys are warranted.
Metcalf canyon jewelflower (*Streptanthus albidus* ssp. *albidus*)	FE, CNPS 1B	valley and foothill grasslands underlain with serpentine soils	Potentially suitable habitat occurs with the valley and foothill grasslands on site due to the serpentine substrate. Therefore, blooming season surveys are warranted.
Bay Checkerspot Butterfly (*Euphydryas editha bayensis*)	FT	Serpentine grasslands with *Plantago erecta* and/or *Castilleja* spp.	No host food plants were detected and the project site cannot currently support a breeding population. Although serpentine grassland was presumably more extensive prior to the development of the golf course, it is also unlikely that a bay checkerspot butterfly population occurred on the project site in the past. Known populations in the Mt. Hamilton Range occur at higher elevations. Presumed absent.
California Red-legged Frog (*Rana aurora draytonii*)	FT, CSSC	Streams, freshwater pools and ponds with overhanging vegetation.	Observed in all of the ponds on the project site in September 2003.
Federal or State Proposed Endangered or Threatened Species or Candidate Species			

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
California Tiger Salamander *(Ambystoma californiense)*	FC, CSSC	Vernal or temporary pools in annual grasslands or open woodlands.	The ponds provide potential habitat for this species, and one larval salamander was found in a pond on-site on 19 September 2001 by Mark Jennings. Refugia (rodent burrows) are very few to absent on site but may be present off-site. It is assumed that the ponds on the site provided habitat for this species in the past and may be used presently by a remnant population.
California Species of Special Concern			
Foothill Yellow-legged Frog (*Rana boylii*)	CSSC	Rocky streams in open areas with riffles and cobble-sized stones in coast ranges.	Nearest record is 5.7 miles east of north east in the Coyote Creek drainage above Coyote Lake. Habitat on the site is marginal because it is generally too shaded and not open enough to provide typical habitat. Not known to occur in the vicinity of the project site. Presumed absent.
Western Pond Turtle *(Clemmys marmoreal)*	CSSC	Permanent or nearly permanent water in a variety of habitats.	No suitable breeding habitat on site. However, observed in one pond during a focused survey for California red-legged frogs by Mark Jennings on 19 September 2001.
Willow Flycatcher (*Empidonax traillii*)	CSSC	Low, wet, brushy habitats, often near water.	Possibly occurs rarely on migration, but such occurrences very unlikely to involve listed races.
Northern Harrier *(Circus cyaneus)*	CSSC	Forages in marshes, grasslands, and ruderal habitats; nests in extensive marshes and wet fields.	Marginally suitable foraging habitat present over wetlands but expected to only occasionally occur on the site; no suitable nesting habitat on-site.
Sharp-shinned Hawk (*Accipiter striatus*)	CSSC	Nests in woodlands, forages in many habitats in winter and migration.	Migrant and winter visitor. Not expected to breed on site.
Cooper's Hawk (*Accipiter cooperii*)	CSSC	Nests in woodlands, forages in many habitats in winter and migration.	Observed foraging on the site. Potentially suitable breeding habitat present in dense coast live oak trees on the site.

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Golden Eagle (*Aquila chrysaetos*)	CSSC	Breeds on cliffs or in large trees or electrical towers, forages in open areas.	Marginally suitable foraging habitat; no suitable nesting habitat on-site.
Merlin (*Falco columbarius*)	CSSC	Uses many habitats in winter and migration.	Expected to forage on the site during migration and winter. Does not nest in California.
Burrowing Owl (*Athene cunicularia*)	CSSC	Flat grasslands and ruderal habitats, particularly in the presence of California ground squirrels.	No Burrowing Owls were observed on the project site during reconnaissance-level surveys. However, ground squirrels and burrows were present on the site in 2000.
Merlin (*Falco columbarius*)	CSSC	Uses many habitats in winter and migration.	Expected to be an occasional forager during migration and winter.
Vaux's Swift (*Chaetura vauxi*)	CSSC	Nests in snags in coastal coniferous forests or, occasionally, in chimneys; forages aerially.	Possibly an occasional migrant. No suitable nesting habitat on the site.
Loggerhead Shrike (*Lanius ludovicianus*)	CSSC	Nests in tall shrubs and dense trees, forages in grasslands, marshes, and ruderal habitats.	Observed foraging on the project site. Potentially suitable nesting habitat present in trees and shrubs in ruderal and ornamental vegetation.
California Horned Lark (*Eremophila alpestris actia*)	CSSC	Short-grass prairie, annual grasslands, coastal plains, and open fields.	No suitable habitat on-site; presumed absent.
California Yellow Warbler (*Dendroica petechia brewsteri*)	CSSC	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods.	On-site riparian habitat is not extensive and does not provide breeding habitat for this species. Possibly an occasional visitor.
Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)	CSSC	Breeds primarily in fresh and brackish marshes in tall grass, tules, willows; uses salt marshes more in winter.	No suitable habitat on site. Project is outside of range. Presumed absent.
Yellow-breasted Chat (*Icteria virens*)	CSSC	Breeds in riparian habitats having dense understory vegetation, such as willow and blackberry.	On-site riparian habitat is not extensive and does not provide breeding habitat for this species, but may occur rarely during migration.
Tricolored Blackbird (*Agelaius tricolor*)	CSSC	Breeds near freshwater in dense emergent vegetation.	No suitable nesting habitat on site. May occasionally forage on-site, primarily during non-breeding season.

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	CSSC	Roosts in caves and mine tunnels in a variety of habitats.	Expected to forage over site rarely, if at all; Not observed on the site but potential roosting sites present in attics of buildings.
California Mastiff Bat (*Eumops perotis californicus*)	CSSC	Forages over many habitats; requires tall cliffs or buildings for roosting sites.	No suitable roosting habitat and no records of this species in Santa Clara County. Presumed absent.
Pallid Bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in buildings, rocky outcrops and rocky crevices in mines and caves.	No known roosts within 5 miles of the project site; potential roosting sites present but only marginal foraging habitat on the site.
San Francisco Dusky-footed Woodrat (*Neotoma fuscipes annectens*)	CSSC	Found in a variety of hardwood forest habitats, primarily oak woodland, chaparral, and some brushlands.	Not observed in the potential habitat on the site. This species is sensitive to development, mostly due to feral cats, and is presumed absent from the site.
State Protected Species or CNPS Species			
alkali milk-vetch (*Astragalus tener* var. *tener*)	CNPS 1B	Vernally mesic meadows and subalkaline flats in valley and foothill grasslands	Suitable habitat may have been present on site prior to development. However, no suitable habitat is currently present on site. No surveys needed.
San Joaquin spearscale (*Atriplex joaquiniana*)	CNPS 1B	Chenopod scrub, meadow, and valley and foothill grassland habitat, particularly in areas with alkaline substrates	Potentially suitable alkaline substrates exist within valley and foothill grassland on site. Blooming season surveys conducted with negative results; considered absent.
Mexican mosquito fern (*Azolla mexicana*)	CNPS 4	Marshes and swamps with ponding or slow moving water	Both the natural, aquatic habitat and wetlands and the artificial ponds could provide suitable habitat for Mexican mosquito fern. Blooming season surveys conducted with negative results; considered absent.
big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)	CNPS 1B	Cismontane woodland and valley and foothill grassland habitats, below 1400 meters, often on serpentine or otherwise rocky substrate	The rocky, serpentine soils within the valley and foothill grassland and cismontane woodland habitats on site provide suitable conditions for big-scale balsamroot. Blooming season surveys conducted with negative results; considered absent.

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Oakland star-tulip (*Calochortus umbellatus*)	CNPS 4	Broadleaved upland forests, chaparral, lower montane coniferous forests, and valley and foothill grassland habitats, often in areas with serpentine substrates	Potentially suitable valley and foothill grassland habitat with serpentine substrates occurs on site. Blooming season surveys conducted with negative results; considered absent.
Mount Hamilton thistle (*Cirsium fontinale* var. *campylon*)	CNPS 1B	Serpentine seeps in chaparral, cismontane woodland, and valley and foothill grassland habitats	Due to the presence of serpentine soil within the project site, the natural aquatic habitat, spring-fed wetlands, and artificial creeks within the site could provide suitable habitat. Blooming season surveys conducted with negative results; considered absent.
Brewer's clarkia (*Clarkia breweri*)	CNPS 4	Chaparral, cismontane woodland, and coastal scrub areas with serpentinite soils	Potentially suitable cismontane woodland and valley and foothill grassland habitats with serpentine substrates occur on site. Blooming season surveys conducted with negative results; considered absent.
Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*)	CNPS 1B	Cismontane woodlands, particularly on slopes and in drainages	Potentially suitable slopes and drainages exist within cismontane woodland habitat occur on site. Blooming season surveys conducted with negative results; considered absent.
Jepson's wooly sunflower (*Eriophyllum jepsonii*)	CNPS 4	Chaparral, coastal scrub, and cismontane woodland habitats on dry, rocky slopes, sometimes on serpentine soils	Potentially suitable cismontane woodland habitat occurs on site. Blooming season surveys conducted with negative results; considered absent.
San Francisco wallflower (*Erysimum franciscanum*)	CNPS 4	Coastal dunes, coastal scrub, and valley and foothill grassland habitats, in areas with serpentine or granitic substrates	Potentially suitable valley and foothill grassland habitat with serpentine substrates occurs on site. Blooming season surveys conducted with negative results; considered absent.
fragrant fritillary (*Fritillaria liliacea*)	CNPS 1B	Coastal prairie, coastal scrub, and valley and foothill grassland habitats, often on serpentine substrates	Suitable valley and foothill grassland habitat with serpentine substrates occurs on site. Blooming season surveys conducted with negative results; considered absent.

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Congdon's tarplant (*Hemizonia parryi* ssp. *congdonii*)	CNPS 1B	Valley and foothill grassland habitat, particularly areas with alkaline substrates, and in sumps or disturbed areas where water collects	Potentially suitable valley and foothill grassland habitat with alkaline substrates is present on the project site. The natural, aquatic habitat and wetlands could also provide suitable habitat. Blooming season surveys conducted with negative results; considered absent.
wooly-headed lessingia (*Lessingia hololeuca*)	CNPS 3	Coastal scrub, lower montane coniferous forest, and valley and foothill grassland habitats, often on clay or serpentine substrates	Potentially suitable valley and foothill grassland habitat with both clay and serpentine substrates occurs on site. Blooming season surveys conducted with negative results; considered absent.
smooth lessingia (*Lessingia micradenia* var. *glabrata*)	CNPS 1B	Chaparral habitat with serpentinite soils, often along roadsides	The presence of serpentine soils and the disturbed nature of the project site mean that potentially suitable chaparral habitat may occur. Blooming season surveys conducted with negative results; considered absent.
serpentine linanthus (*Linanthus ambiguus*)	CNPS 4	Cismontane woodland, coastal scrub, and valley and foothill grassland habitats, particularly areas with serpentine substrates	Suitable cismontane woodland and valley and foothill grassland habitats with serpentine substrates occur on site. Blooming season surveys conducted with negative results; considered absent.
Gairdner's yampah (*Perideridea gairdneri* ssp. *gairdneri*)	CNPS 4	Under mesic conditions in broadleaved upland forest, chaparral, and valley and foothill grassland habitats and in vernal pools	Potentially suitable valley and foothill grassland habitat occurs on site, particularly in and near the seasonal wetlands on the project site. Blooming season surveys conducted with negative results; considered absent.
slender-leaved pondweed (*Potamogeton filiformis*)	CNPS 2	Shallow, freshwater marshes and swamps	Suitable habitat may have been present on site prior to development. However, no suitable habitat is currently present on site. No surveys needed. Blooming season surveys conducted with negative results; considered absent.

Table 2. Potential Occurrence of Special-Status Species Before and After Development of the Institute Golf Course, Morgan Hill, California.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Lobb's aquatic buttercup (*Ranunculus lobbii*)	CNPS 4	Under mesic conditions in cismontane woodlands, North Coast coniferous forests, and valley and foothill grasslands and vernal pools	Suitable valley and foothill grassland habitat with serpentine substrates occurs on site, especially near the seasonal wetlands. Blooming season surveys conducted with negative results; considered absent.
most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*)	CNPS 1B	Chaparral and valley and foothill grasslands, particularly those area with serpentine substrates	Serpentine soils are known to exist within the valley and foothill grassland habitat on the project site. Blooming season surveys conducted with negative results; considered absent.
White-tailed Kite *(Elanus caeruleus)*	SP	Nests in tall shrubs and trees, forages in grasslands, marshes, and ruderal habitats.	Marginal foraging habitat and potentially suitable nesting habitat present in ornamental and riparian trees on the project site.
Ringtail (*Bassariscus astutus*)	SP	Found in a variety of woodland types, often near water.	Unlikely to occur on the project site due to disturbance. Presumed absent.

SPECIAL-STATUS SPECIES CODE DESIGNATIONS

FE = Federally listed Endangered
SE = State listed Endangered
ST = State listed Threatened
CNPS 1B = Plants rare, threatened, or endangered in California and elsewhere
CNPS 2 = Plants rare, threatened, or endangered in California, but more numerous elsewhere
CNPS 3 = Plants about which we need more information - A review list
CNPS 4 = Plants of limited distribution - A watch list

areas on site, and the abundance of serpentine riprap and boulders within the drainages and as utilized in artificial water bodies. The significant grading of golf contours in this soil and the steep topography formed by these soils on site also accounts for the increased proportion of serpentine material at the surface. Despite the extensive development of native habitats into golf course, sufficient habitat remains on site for all of the species considered, including the serpentine endemics (Table 2). Undisturbed serpentine soils supporting many of the special-status species considered here also occur in abundance within the immediate vicinity of the project site.

The remaining species considered but rejected were dismissed as potentially occurring due to the absence of suitable habitat and/or microhabitat on site, and/or they have been regarded as either extirpated from Santa Clara County, the most recent occurrences are historic, or they are considered extinct. Sensitive habitats identified in the CNDDB query include sycamore alluvial woodland and serpentine bunchgrass. It is presumed that the sycamore alluvial woodland was absent before the site was developed, though the serpentine bunchgrass may have occurred on site and still potentially exists in the remaining natural areas.

The remaining plant species considered but rejected in this assessment include: alkali milk vetch (*Astragalus tener* var. *tener*), Sharsmith's onion (*Allium sharsmithae*), Santa Cruz manzanita (*Arctostaphylos andersonii*), heartscale (*Atriplex cordulata*), Santa Cruz Mountain pussypaws (*Calyptridium parryi* var. *hesseae*), robust spineflower (*Chorizanthe robusta* var. *robusta*), Mt. Hamilton coreopsis (*Coreopsis hamiltonii*), hospital canyon larkspur (*Delphinium californicum* ssp. *interius*), western leatherwood (*Dirca occidentalis*), Brandegee's eriastrum (*Eriastrum brandegeae*), c lay-loving b uckwheat (*Eriogonum argillosum*), Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*), talus fritillary (*Fritillaria falcata*), serpentine bedstraw (*Galium andrewsii* ssp. *gatense*), Santa Cruz tarplant (*Holocarpha macradenia*), Contra Costa goldfields (*Lasthenia conjugens*), delta tule-pea (*Lathyrus jepsonii* var. *jepsonii*), large-flowered linanthus (*Linanthus grandiflorus*), Hall's bush mallow (*Malacothamnus hallii*), San Antonio Hills monardella (*Monardella antonina* ssp. *antonina*), Santa Cruz Mountains beardtongue (*Penstemon rattanii* var. *kleei*), Mt. Diablo phacelia (*Phacelia phacelioides*), hairless popcorn-flower (*Plagiobothrys glaber*), hooked popcorn flower (*Plagiobothrys uncinatus*), slender-leaved pondweed (*Potamogeton filiformis*), rock sanicle (*Sanicula saxatilis*), rayless ragwort (*Senecio aphanactis*), maple-leaved checkerbloom (*Sidalcea malachroides*), Mt Hamilton jewelflower (*Streptanthus callistus*), showy indian clover (*Trifolium amoenum*), and caper-fruited tropidocarpum (*Tropidocarpum capparideum*). No future surveys are warranted for any of these species.

Federal or State Endangered or Threatened Species

Surveys were conducted during the blooming season for all 21 of the species listed below by RCL E cology i n M arch-November 2002 and none of the species was found. Based on those surveys the following 21 species are all considered absent.

Tiburon Paint Brush (*Castilleja affinis* ssp. *neglecta*). Federal Listing Status: Endangered; State Listing Status: Threatened; CNPS List 1B. This hemi-parasitic perennial herb occurs in valley and foothill grasslands with serpentine soils. The blooming period extends from April

through June. The range of this species includes Marin, Napa, and Santa Clara counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has one occurrence from 1999 within the quadrangle search area, in the Kirby Canyon area, north of Morgan Hill (CNDDB 2000). Suitable serpentine soils occur within the valley and foothill grassland (ruderal) habitat of the project site.

Coyote Ceanothus (*Ceanothus ferrisae*). Federal Listing Status: Endangered; State-Listing Status: None; CNPS List 1B. This evergreen shrub occurs in chaparral, coastal scrub, and valley and foothill grasslands with serpentinite soils. The blooming period extends from January through March. The range of this species includes only Santa Clara County (Skinner and Pavlik 1994). The CDFG Rarefind Database has four occurrence records within the Morgan Hill quadrangle with observation dates ranging from 1987 to 1992. Three of these occurrences are near Anderson Dam, while the last occurrence is just off of Llagas Road. Suitable soils with serpentinite material occur within the valley and foothill grassland (ruderal) habitat of the project site.

Santa Clara Valley Dudleya (*Dudleya setchellii*). Federal Listing Status: Endangered; State Listing Status: None; CNPS List 1B. This perennial herb occurs in valley and foothill grasslands underlain with serpentine soils. The blooming period extends from May to June. The range of this species includes only Santa Clara County. The CDFG Rarefind Database reports many nearby populations of this species in Santa Clara County, within the Gilroy, Morgan Hill, Santa Teresa Hills, Mount Madonna and Mount Sizer quadrangles (CNDDB 2000). Two of the of these occurrences located nearest to the project site are presumed extant and are located in the Mount Sizer quadrangle and the Gilroy and Mount Madonna quadrangles. The occurrence from the Mount Sizer quadrangle is near Mud Lake, east of Morgan Hill, and was last confirmed in 1989. The occurrence from the Gilroy and Mount Madonna quadrangles is southwest of the project site near Highland Avenue and Turlock Avenue; this occurrence was last confirmed in 1992. Potentially suitable habitat occurs on site due to the serpentine substrate.

Metcalf Canyon Jewelflower (*Streptanthus albidus* ssp. *albidus*). Federal Listing Status: Endangered; State Listing Status: None; CNPS List 1B. This annual herb occurs in valley and foothill grasslands underlain with serpentine soils. The blooming period extends from April through July. The range of this species includes only Santa Clara County (Skinner and Pavlik 1994). The CDFG Rarefind Database reports six occurrences within the quadrangle search area ranging in age from 1937 to 1991 (CNDDB 2000). The four most recent of these occurrences are reported in or south of Metcalfe Canyon, in the Morgan Hill quadrangle, and are all presumed extant. Potentially suitable habitat occurs with the valley and foothill grasslands (ruderal habitat) on site due to the serpentine substrate.

CNPS Listed Species

San Joaquin Spearscale (*Atriplex joaquiniana*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This annual herb occurs in chenopod scrub, meadows, and valley and foothill grasslands, particularly those with alkaline substrates. The blooming period extends from April through September. The range of this species includes Alameda, Contra Costa, Colusa, Glenn, Merced, Napa, Sacramento, San Benito, Santa Clara, San Joaquin, Solano,

Tulare, and Yolo counties (Skinner and Pavlik 1994). The CDFG Rarefind Database reports a single, historic occurrence within the quadrangle search area, a 1938 record, near Hollister Airport (CNDDB 2000). Suitable alkaline substrates exist within valley and foothill grassland (ruderal habitat) on site.

Mexican Mosquito Fern (*Azolla mexicana*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This annual/perennial herb occurs in marshes and swamps with ponding or slow moving water. The fertile period is in August. The range of this species includes Santa Clara County and eight other counties, and five or more regions throughout the western United States. (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, both the natural drainages and wetlands and the artificial ponds could provide suitable habitat for Mexican mosquito fern.

Big-Scale Balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This perennial herb occurs below 1400 meters in cismontane woodland and valley and foothill grasslands, often on serpentine or otherwise rocky substrate. The blooming period extends from March through June. The range of this species includes Alameda, Butte, Mariposa, Napa, Placer, Santa Clara, and Tehama counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has a single record for this species within the quadrangle search area (CNDDB 2000). This record is within the Gilroy quadrangle, west of Coyote Lake Dam; the occurrence is presumed to be extant and was last observed in 1990. The rocky, serpentine soils within the valley and foothill grassland (ruderal) and oak woodland habitats on site provide suitable conditions for big-scale balsamroot.

Oakland Star-Tulip (*Calochortus umbellatus*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This perennial bulbiferous herb occurs in broadleaved upland forests, chaparral, lower montane coniferous forests, and valley and foothill grasslands, often in those with serpentine substrates. The blooming period extends from March through May. The range of this species has been reduced to Alameda, Contra Costa, Marin, Santa Clara, and San Mateo counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable valley and foothill grassland (ruderal) habitat with serpentine substrates occurs on site.

Mount Hamilton Thistle (*Cirsium fontinale* var. *campylon*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This perennial herb occurs in serpentine seeps in chaparral, cismontane woodland, and valley and foothill grassland habitats. The blooming period extends from April to October. The range of this species includes Alameda, Santa Clara, and Stanislaus counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has twenty-one occurrence records within the Morgan Hill quadrangle with observation dates ranging from 1983 to 1998 (CNDDB 2000). Due to the presence of serpentine soil within the project site, the natural drainages, spring-fed wetlands, and artificial creeks within the site could provide suitable habitat for Mount Hamilton thistle.

Brewer's Clarkia (*Clarkia breweri*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This annual herb occurs in chaparral, cismontane woodland, and coastal scrub areas with serpentinite soils. The blooming period extends from April through May. The range of this species includes Alameda, Fresno, Merced, Monterey, San Benito, Santa Clara, and Stanislaus counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable oak woodland and valley and foothill grassland (ruderal) habitats with serpentine substrates occur on site.

Santa Clara Red Ribbons (*Clarkia concinna* ssp. *automixa*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This annual herb occurs in cismontane woodlands, particularly on slopes and in drainages. The blooming period extends from April through July. The range of this species includes Alameda and Santa Clara counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable slopes and drainages within oak woodland habitat occur on site.

Jepson's Woolly Sunflower (*Eriophyllum jepsonii*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. Jepson's woolly sunflower occurs in chaparral, coastal scrub, and cismontane woodland habitats on dry, rocky slopes, sometimes on serpentine soils. This perennial member of the sunflower family (Asteraceae) flowers from April through June. Jepson's woolly sunflower is known from Alameda, Contra Costa, Kern, San Benito, Santa Clara, Stanislaus, and Ventura counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000).

San Francisco Wallflower (*Erysimum franciscanum*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This perennial herb occurs in coastal dunes, coastal scrub, and valley and foothill grasslands with serpentine or granitic substrates. The blooming period extends from March to June. The range of this species includes Marin, Santa Clara, Santa Cruz, San Francisco, San Mateo, and Sonoma counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable valley and foothill grassland (ruderal) habitat with serpentine substrates occurs on site.

Fragrant Fritillary (*Fritillaria liliacea*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This perennial bulbiferous herb occurs in coastal prairie, coastal scrub, and valley and foothill grasslands, often on those with serpentine substrates. The blooming period extends from February through April. The range of this species includes ten (10) counties including San Mateo and Santa Clara counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has three records for this species within the Morgan Hill quadrangle, all from 1989 and presumed extant (CNDDB 2000). These three records are all south to southeast of Metcalfe Canyon near the Metcalfe VABM marker. Suitable valley and foothill grassland (ruderal) habitat with serpentine substrates occurs on site.

Congdon's Tarplant (*Hemizonia parryi* ssp. *congdonii*). Federal Listing Status: Species of Special Concern; State Listing Status: None; CNPS List 1B. This annual herb occurs in

valley and foothill grasslands, particularly those with alkaline substrates, and in sumps or disturbed areas where water collects. The blooming period extends from June through November. The range of this species has been reduced to Monterey, San Luis Obispo, and possibly Santa Clara counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has a single, historic record for this species within the quadrangle search area (CNDDB 2000), a 1909 collection from near Kellys Lake, in the Watsonville East quadrangle. Suitable valley and foothill (ruderal) grassland habitat with alkaline substrates is present on the project site. Additionally, the natural drainages and wetlands could also provide suitable habitat.

Woolly-Headed Lessingia (*Lessingia hololeuca*). Federal listing status: None; State listing status: None; CNPS List 3. This annual herb occurs in coastal scrub, lower montane coniferous forest, and valley and foothill grasslands, often on clay or serpentine substrates. The blooming period extends from June to October. The range of this species includes nine counties including Santa Clara County (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable valley and foothill grassland (ruderal) habitat with both clay and serpentine substrates occurs on site.

Smooth Lessingia (*Lessingia macradenia* var. *glabrata*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This annual herb occurs in chaparral habitat with serpentinite soils often along roadsides. The blooming period extends from August to November. The range of this species includes only Santa Clara County (Skinner and Pavlik 1994). The CDFG Rarefind Database has seven records of occurrences within the quadrangle search area, from 1936 to 1988 (CNDDB 2000). The presence of serpentine soils and the disturbed nature of the project site mean that potentially suitable chaparral habitat may occur on site.

Serpentine Linanthus (*Linanthus ambiguus*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This annual herb occurs in cismontane woodland, coastal scrub, and valley and foothill grasslands, particularly those with serpentine substrates. The blooming period extends from March through June. The range of this species includes Santa Clara and eight other counties within the San Francisco region (Skinner and Pavlik 1994). T he C DFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable cismontane woodland and valley and foothill grassland (ruderal) habitats with serpentine substrates occur on site.

Gairdner's Yampah (*Perideridia gairdneri* ssp. *gairdneri*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This perennial herb occurs in broadleaved upland forest, chaparral, valley and foothill grasslands, and vernal pools, particularly under mesic conditions. The blooming period extends from June through October. The range of this species currently includes seventeen counties including Santa Clara and possibly San Mateo counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable valley and foothill grassland (ruderal) habitat occurs on site, particularly in and near the seasonal wetlands on the project site.

Lobb's Aquatic Buttercup (*Ranunculus lobbii*). Federal Listing Status: None; State Listing Status: None; CNPS List 4. This aquatic annual herb occurs in cismontane woodlands, North Coast coniferous forests, valley and foothill grasslands, and vernal pools, particularly under mesic conditions. The blooming period extends from March through May. The range of this species includes Alameda, Contra Costa, Mendocino, Marin, Napa, Santa Clara, Solano, and Sonoma counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has no records for this species within the quadrangle search area (CNDDB 2000). However, suitable valley and foothill grassland (ruderal) habitat with serpentine substrates occurs on site.

Most Beautiful Jewelflower (*Streptanthus albidus* ssp. *peramoenus*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This annual herb occurs in chaparral and valley and foothill grasslands, particularly those with serpentine substrates. The blooming period extends from March through June. The range of this species includes Alameda, Contra Costa, and Santa Clara counties (Skinner and Pavlik 1994). The CDFG Rarefind Database has ten records for most beautiful jewel-flower within the quadrangle search area from 1988 to 1998 (CNDDB 2000). The records for two occurrences closest to the project site are within the Gilroy and Mount Madonna quadrangles. Both occurrences are from 1992 and are presumed extant. One occurrence is reported at Highland Avenue west of Turlock Avenue, while the second is reported near the east end of the Chesbro Reservoir. Serpentine soils are known to exist within the valley and foothill grassland (ruderal) habitat on the project site.

Special-Status Animal Species

Reconnaissance-level field surveys were conducted over the entire Institute Golf Course project site on July 26 and 27, 2000 by Dr. Dave Johnston, a wildlife biologist. Dr. Johnston and a herpetologist, Dr. Jeff Wilkinson conducted an additional survey on April 24, 2001 to evaluate habitat for special-status wildlife species. In addition a focused survey by Dr. Mark Jennings was conducted on September 19, 2001 to verify the reported occurrence of California red-legged frogs on-site.

No suitable habitat exists for, and/or the project site is outside the known distribution of, several animal species. These include the steelhead rainbow trout (*Oncorhynchus mykiss*), Chinook salmon (*Oncorhynchus tshawytscha*), Bay checkerspot butterfly (*Euphydroayas editha bayensis*), Bald Eagle (*Haliaeetus leucocephalus*) and California mastiff bat (*Eumops perotis californicus*). These species are not expected to occur on the project site and would thus not be affected by the project.

Some special-status wildlife species may only be occasional visitors, migrants, or transients. These species include the Sharp-shinned Hawk (*Accipiter striatus*), Ferruginous Hawk (*Buteo regalis*), Golden Eagle (Aquila chrysaetos), Prairie Falcon (*Falco mexicanus*), Merlin (*Falco columbarius*), American Peregrine Falcon (*Falco peregrinus anatum*), Vaux's Swift (*Chaetura vauxi*), Willow Flycatcher (*Empidonax traillii*), Yellow-breasted Chat (*Icteria virens*), California Yellow Warbler (*Dendroica petechia brewsteri*), California Horned Lark (*Eremophila alpestris actia*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), and ringtail (*Bassariscus astutus*). The project will have no effect on the breeding success of any of these

species, although it might result in a small reduction of foraging and/or roosting habitat available to them regionally.

Several special-status species are known to breed, or potentially could breed, on the site. These include the California red-legged frog (*Rana aurora draytonii*), California tiger salamander (*Ambystoma californiense*), Western pond turtle (*Clemmys marmorata*), White-tailed Kite (*Elanus caeruleus*), Cooper's Hawk (*Accipiter cooperii*), Burrowing Owl (*Athene cunicularia*), Loggerhead Shrike (*Lanius ludovicianus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and pallid bat (*Antrozous pallidus*). These species, as well as other species for which agencies have expressed particular concern, are discussed in greater detail below.

Federal or State Endangered or Threatened Species

California Red-legged Frog (*Rana aurora draytonii*). Federal Status: Threatened; State Status: Species of Special Concern. The California red-legged frog is a member of the family Ranidae within the order Anura, and is one of two subspecies of the red-legged frog (*Rana aurora*) (USFWS 2000). The *draytonii* subspecies was included as a Category 1 candidate species in the U.S. Fish and Wildlife Service's Annual Notice of Review in November 21, 1991 (USFWS 1991). On June 24, 1996, the California red-legged frog was officially listed as a Threatened species under the auspices of the FESA (USFWS 1996) based largely on a significant range reduction and continued threats to surviving populations (Miller 1994). Factors related to declines in populations of red-legged frogs include the degradation or loss of habitat attributed to agricultural practices, introduced plants and animals, livestock grazing, mining, water diversions and impoundments, water quality, recreation activities, timber harvesting, and urbanization (USFWS 2000). In the Central Valley of California alone, more than 90 percent of the historic wetlands have been lost or altered because of agricultural and urban development (Dahl 1990).

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), with adults obtaining a length of 3.4 to 5.4 inches from the tip of the snout to the rear of the vent (Jennings and Hayes 1994a). Juvenile frogs are 1.5 to 3.4 inches from the tip of the snout to the rear of the vent and have the same coloration as adults except that the dorsolateral folds are normally yellow or orange colored, especially in very young individuals (Stebbins 1985). Larval frogs range from 0.6 to 3.1 inches in length.

California red-legged frogs have been observed in a number of aquatic and terrestrial habitats throughout their historic range. Larvae, juveniles, and adult frogs occur in natural lagoons, dune ponds, pools in or next to streams, streams, marshlands, sag ponds, and springs, as well as human-created stock ponds, secondary and tertiary sewage treatment ponds, wells, canals, golf course ponds, irrigation ponds, sand and gravel pits containing water, and large reservoirs (Storer 1925, Jennings 1988). The key to the presence of California red-legged frogs in these habitats is the presence of perennial, or near perennial, water and the general lack of introduced aquatic predators such as crayfish (*Pacifastacus leniusculus* and *Procambarus clarkii*), bullfrogs, green sunfish, bluegill (*L. macrochirus*) and centrarchid fishes such as largemouth bass (*Micropterus salmoides*).

If water at least several inches in depth is present and introduced aquatic predators are rare or absent, California red-legged frogs may be present. If the aquatic habitat favors introduced aquatic predators, then red-legged frogs will probably disappear from that particular site unless there is a nearby breeding site available that excludes the introduced predators. The habitats observed to contain the largest densities of red-legged frogs are associated with pools at least 27 inches deep with overhanging willows and an intermixed fringe of cattails (*Typha latifolia*), tules or sedges (Hayes and Jennings 1988). The continued survival of red-legged frogs in all aquatic habitats seems to be based on the existence of ponds, springs or pools that are apart from perennial streams. Such habitats provide the continued basis for successful reproduction and recruitment into nearby drainages that may lose frog populations due to stochastic events such as extreme flooding or droughts.

In addition to aquatic habitats, juvenile and adult California red-legged frogs use areas of riparian vegetation within a few yards of water. This species also uses small mammal burrows in or under vegetation, willow root wads, and the undersides of old boards and other debris within the riparian zone (Jennings, pers. obs.). Juvenile frogs are often observed sunning in the warm, surface-water layer associated with floating and submerged vegetation (Hayes and Tennant 1985). Adult frogs are mainly nocturnal and sit on stream banks or low hanging limbs of willow trees above pools where they can detect small mammal prey (Hayes and Tennant 1985, Jennings and Hayes 1994a).

The draft USFWS recovery plan for the California red-legged frog identifies eight "recovery units" that delineate geographic areas where recovery efforts to delist the frog will occur (USFWS 2000). To facilitate recovery, core areas were defined within the recovery units to focus conservation actions (U.S. Fish and Wildlife 2000). These areas represent the areas where restoration is most feasible, reestablishment efforts are most likely to be successful, and natural recolonization is expected (U.S. Fish and Wildlife 2000). Activities within the core recovery areas will focus on; "1) protecting existing populations by reducing threats; 2) restoring and creating habitat that will be protected and managed in perpetuity; 3) surveying and monitoring populations and conducting research on the biology and threats of the subspecies; and 4) reestablishing populations of the subspecies within its historic range" (USFWS 2000).

On April 24, 2001 Dr. Jeff Wilkinson and Dr. David Johnston observed California red-legged frogs in the natural creek along the northern edge of the project site. Both sub-adults and larvae were observed at the two ponds within the riparian habitat. Additionally a male red-legged frog was heard calling and larvae were observed at the manmade pond in the southeastern corner of the project site. All ponds along the western edge of the project site had western toad and/or Pacific treefrog larvae. A subsequent survey by Mark Jenning in September 2003 found red-legged frog juveniles and adults (50 total) in all ponds and the seep on the site. In summary the project site supports a population at present.

Federal or State Candidate Species

California Tiger Salamander (*Ambystoma californiense*). Federal listing status: Candidate; State listing status: Species of Special Concern. The California tiger salamander, once thought a subspecies of the tiger salamander, is medium size among California salamanders with

a total length up to 8.5 inches (20.7 cm). The species has disappeared from a significant portion of its range due to habitat loss attributed to agricultural practices and urbanization, and the introduction of non-native aquatic predators (e.g. bluegill [*Lepomis macrochirus*], largemouth bass [*Micropterus salmoides*], mosquitofish, and bullfrogs). The California tiger salamander's current range includes the Great Central Valley of California and adjacent foothill districts as well as the coastal grasslands from the vicinity of San Francisco Bay south at least to Santa Barbara County.

The California tiger salamander's preferred breeding habitat is pond environments persisting a minimum of three to four months on an annual basis. Examples of such environments include vernal and ephemeral pools, and human-made ponds surrounded by uplands that contain small mammal burrows. The species will use permanent ponds provided that aquatic vertebrate predators are not present. These ponds provide breeding and larval habitat while burrows excavated by small mammals such as California ground squirrels and Botta's pocket gophers support juvenile and adult salamanders in upland habitats.

On September 19, 2001, Dr. Mark Jennings observed a California tiger salamander, still in metamorphosis, entering the approximate 24-inch overflow culvert at the southern end of the pond on the southwestern section of the site. This indicates that California tiger salamanders are at least utilizing this pond for breeding. There are no or very few rodent burrows present on-site to provide critical aestivation habitat. Therefore, it is assumed that the salamanders breeding in this pond are aestivating off-site. It is not known if a breeding population of the California tiger salamander occurred on the site prior to grading.

California Species of Special Concern and State Protected

Western Pond Turtle (*Clemmys marmorata*). Federal listing status: None; State listing status: Species of Special Concern. The western pond turtle is a medium-sized brown or olive-colored aquatic turtle, and is found west of the Sierra Nevada crest and deserts and south to northern Baja California. Pond turtles are normally found in and along riparian areas, although gravid females have been reported up to a mile away from water in search of appropriate nest sites. The preferred habitat for these turtles includes ponds or slow-moving water with numerous basking sites (logs, rocks, etc.), food sources (plants, aquatic invertebrates, and carrion), and few predators (raccoons, introduced fishes, and bullfrogs). Juvenile and adult turtles are commonly seen basking in the sun at appropriate sites, although they are extremely wary animals and often dive into the water at any perception of danger. Pond turtles have been commonly observed moving long distances to reach isolated stock ponds and other aquatic habitats. Adults breed in the spring and early summer (March - July). Typically, the female excavates a nest in hard-packed clay soil in open habitats (usually on south-facing slopes) within a few hundred yards of a watercourse; however, nests have been located up to 0.4 miles from water. The female then lays from 1 to 15 eggs, which are left to incubate for three to four months. During the summer, they may aestivate in leaf duff, well away from riparian areas. No suitable breeding habitat is present on site but pond turtles may occur on site as they move through the area to reach nearby suitable aquatic habitats. One western pond turtle was observed by Dr. Mark Jennings on September 19, 2001 at the pond on the northeastern section of the project site.

White-tailed Kite (*Elanus caeruleus*). Federal listing status: None; State listing status: Protected. This species prefers habitats with low ground cover and variable tree growth. Kite nests are built near the tops of oaks, willows, or other dense broad-leafed deciduous trees in partially cleared or cultivated fields, grassy foothills, marsh, riparian, woodland, and savannah. Kites prey primarily on small rodents (especially the California vole), but also feed on birds, insects, reptiles, and amphibians. When prey is abundant these birds may rear two broods in a single breeding season. Although this species was considered endangered in the state of California, the fully protected kite is now fairly common. White-tailed Kites have been observed in the project vicinity, and suitable breeding habitat exists in many of the trees on the site.

Cooper's Hawk (*Accipiter cooperii*). Federal listing status: None; State listing status: Species of Special Concern. The Cooper's Hawk is medium-sized, preys on a variety of bird species and occasionally takes small mammals and reptiles. Breeding pairs in California usually select nest sites within dense stands of live oak woodland, riparian habitats, or other wooded areas. However, pairs may also nest in sparsely wooded areas and, especially in recent decades, nesting pairs have been found breeding in suburban areas and parks in the San Francisco Bay area and elsewhere. A Cooper's Hawk was observed foraging on the site in 2000 and this species has been recorded in the vicinity of the site primarily during migration and winter. Potential breeding habitat for this species occurs in the dense coast live oak trees along the riparian habitat.

Burrowing Owl (*Athene cunicularia*). Federal listing status: None; State listing status: Species of Special Concern. The Burrowing Owl is a small, terrestrial owl of open country. Burrowing Owls favor flat, open grassland or gentle slopes and sparse scrubland ecosystems. These owls prefer annual and perennial grasslands, typically with sparse or nonexistent tree or shrub canopies. In California, Burrowing Owls are found in close association with California ground squirrels. Owls use ground squirrels burrows for shelter and nesting.

As habitat areas become surrounded by human developments and are increasingly fragmented and isolated within developed environments, they become increasingly inhospitable to breeding Burrowing Owls. Burrowing Owl populations are thought to be declining throughout much of their range in the United States (Rich 1984) and in Canada (Ratcliff 1986, Johnsgard 1988). Loss of habitat (Zarn 1974) and campaigns against the burrowing mammals upon which Burrowing Owls depend for nesting habitat (Butts 1973, Zarn 1974) are suspected causes of this decline. In California, the Burrowing Owl has been designated as a Species of Special Concern due to diminishing habitats and concurrent population declines (CDFG 1995).

Although California ground squirrels and their burrows were observed in 2000, no Burrowing Owls were observed during reconnaissance-level surveys. During the 2001 reconnaissance-level survey, no ground squirrels or ground squirrel burrows were observed on the project site. Burrowing Owls are known to occur in the Morgan Hill area but it is unknown if this species bred or otherwise occurred on the project site in previous years. Because habitat for Burrowing Owls was observed during the 2000 survey, they could occur on-site.

Loggerhead Shrike (*Lanius ludovicianus*). Federal listing status: None; State Listing Status: Species of Special Concern. The Loggerhead Shrike is a predatory passerine that

forages in grasslands or ruderal habitats for small reptiles, mammals, birds, and insects and nests in small trees and shrubs. In approximately the last 20 years, populations of the Loggerhead Shrike in eastern North America have declined significantly. Although Loggerhead Shrikes are still considered a fairly common species in much of California, the piecemeal loss of grasslands has caused local declines in many areas, and the species as a whole is declining somewhat in the state.

Loggerhead Shrikes were observed foraging on the project site in 2001. Suitable nesting substrate for this species, dense trees and tall shrubs with an understory of herbaceous vegetation, occurs along the periphery of the project site.

Pallid Bat (*Antrozous pallidus*). Federal listing status: None; State listing status: Species of Special Concern. Pallid bats are pale to light brown in color, and, at about 24 grams, the Pacific race is one of the state's largest bats. Coastal colonies commonly roost in deep crevices in rocky outcroppings, in buildings, under bridges, and in hollow trees. Colonies can range from a few individuals to over a hundred. Some female/young colonies use their day roost for their nursery as well as a hibernacula while other colonies migrate locally on a seasonal basis. Although crevices are important for day roosts, night roosts often include open buildings, porches, garages, highway bridges, and mines. Pallid bats prefer foraging on terrestrial arthropods in dry open grasslands near water and rocky outcroppings or old structures. They may also occur in oak woodlands and at the edge of redwood forests along the coast. Because most of the project site is developed as greens for the golf course, foraging habitat on the site is only marginal. However, optimal foraging habitat occurs adjacent to the site, and roosting habitat occurs in the larger oaks and in some buildings on the site. A maternity colony could occur on this site.

Townsend's big-eared bat (*Corynorhinus townsendii*). Federal listing status: none; State listing status: Species of Special Concern. California has two subspecies, *C. t. townsendii* and *C.t. pallescens*, and intergrades occur at the boundaries of the two subspecies. Townsend's big-eared bat is a colonial species and females aggregates in the spring at nursery sites known as maternity colonies. Although *Coryhorhinus townsendii* is usually a cave dwelling species, many colonies are found in anthropogenic structures such as the attics of buildings or old abandoned mines. Radiotracking studies suggest that movement from a colonial roost during the maternity season is confined to within 15 km of the nursery. This species is easily disturbed while roosting in buildings, and females are known to completely abandoned their young when disturbed. Although no records exist for this species within 15 km, potential roosting habitat for this species occurs in the old Flying Lady Restaurant building and possibly other structures. This species could roost and possibly breed on the project site.

REGULATED HABITATS AND RESOURCES

Waters of the United States

Regulations Overview. Areas meeting the regulatory definition of "Waters of the U.S." (jurisdictional waters) are subject to the jurisdiction of the USACE under provisions of Section

404 of the Clean Water Act (1972) and Section 10 of the Rivers and Harbors Act (1899). These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U.S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands (termed Special Aquatic Sites) adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3). Wetlands on non-agricultural lands are identified using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987).

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

Construction activities within jurisdictional waters are regulated by the USACE. The placement of fill into such waters must be in compliance with permit requirements of the USACE. No USACE permit will be effective in the absence of state water quality certification pursuant to Section 401 of the Clean Water Act. The State Water Resources Control Board is the state agency (together with the Regional Water Quality Control Boards [RWQCB]) charged with implementing water quality certification in California.

Survey Results. USACE potentially regulated areas on site include the seasonal wetlands (including the wetland drainages and spring-fed wetland), and the tributary waters of the riparian corridor and drainages on site (Figure 6). The seasonal wetlands occupy approximately 1.37 acres, while the total length of tributary waters measures approximately 3,234 linear feet; it was not possible to map and determine the acreage of tributary waters with the materials available at time of the survey. The remaining area of the project site (approx 188 acres) did not meet the regulatory definition of jurisdictional waters. This includes all of the irrigation ponds, the pond collecting spring water, and the artificial creeks with their associated ponds.

Habitats Regulated Under Fish and Game Code Section 1600 *et seq.*

Activities that result in the diversion or obstruction of the natural flow of a stream, or substantially change its bed, channel or bank, or utilize any materials (including vegetation) from the streambed require that the project applicant enter into a Streambed Alteration Agreement with CDFG, under sections 1600-1603 of the California Fish and Game Code. The CDFG potentially extends the definition of stream to include "intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blue-line streams mapped on USGS quads, and watercourses with subsurface flows. Canals, aqueducts, irrigation ditches, and other means of water conveyance can also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife" (CDFG 1994).

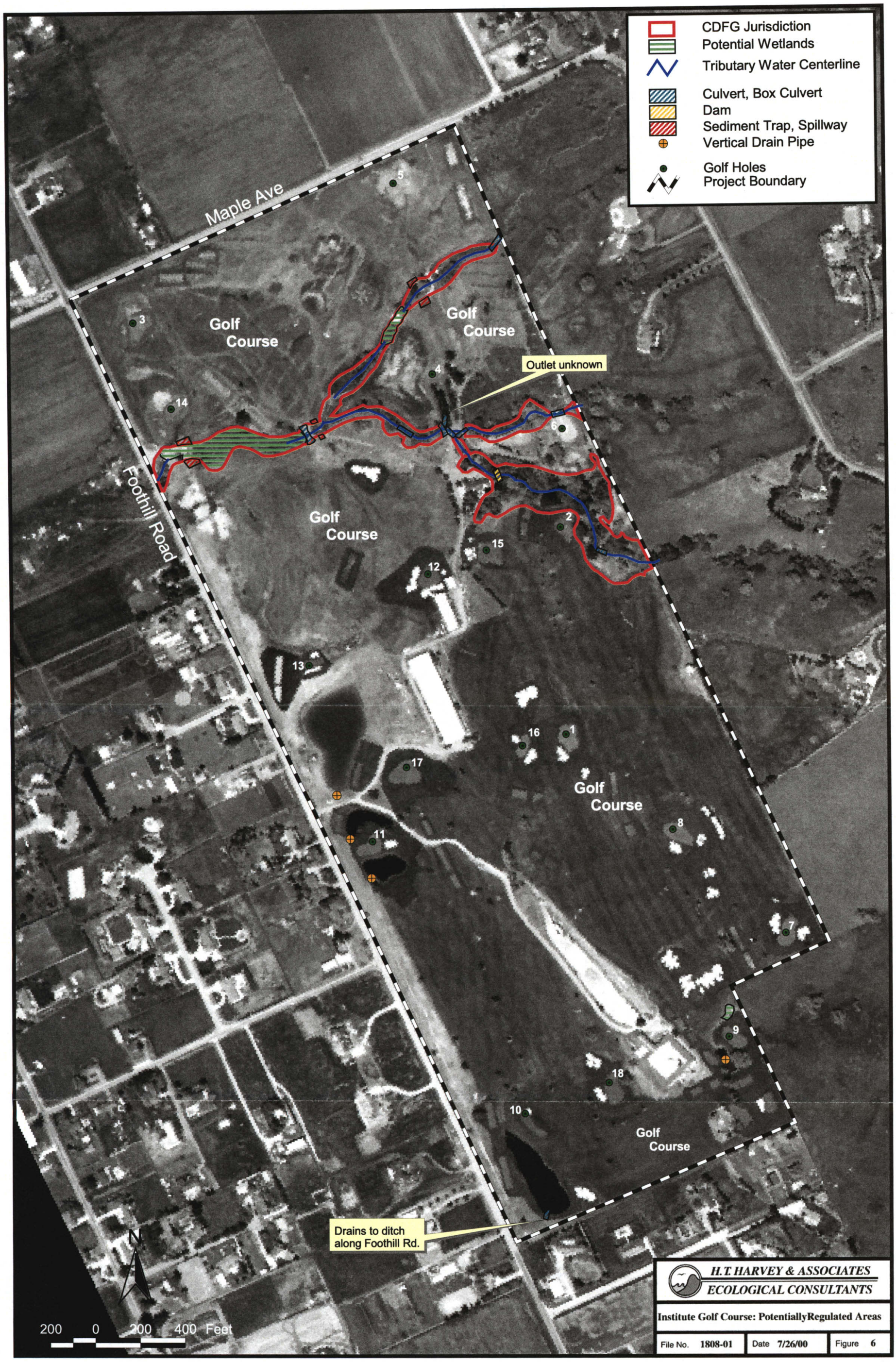
Survey Results. The bed and banks of both drainages, and the riparian corridor on site have been identified as USGS blue-line streams throughout most of their lengths, and as such are subject to the regulatory jurisdiction of the CDFG (Figure 6). The boundary of this jurisdiction

could extend to include contiguous riparian and woodland tree canopy extending beyond the top-of-bank. The total area of CDFG jurisdiction on site could therefore be approximately 9.72 acres. It should be noted that most areas along the riparian corridor and drainages on site have been developed as golf course without the benefit of any setback (typically 100 feet) from these areas.

Ordinance-Size Trees

The City of Morgan Hill Restrictions on Removal of Significant Trees (Morgan Hill Code, sections 12.32.010 through 12.32.150) serves to protect non-indigenous trees having a trunk circumference measuring 40 inches or more (13 inches in diameter) and indigenous trees having a circumference measuring 18 inches or more (6 inches in diameter) at 4.5 feet above the natural grade of slope. A tree removal permit is required from the City of Morgan Hill for the removal of ordinance-sized trees. In addition, the City of Morgan Hill requires, prior to the issuance of any approval or permit for construction of any improvement of the building site, that all trees on the project site be inventoried and categorized according to size, species, and location.

Survey Results. A formal tree survey was not conducted prior to golf course development. Several hundred original trees exist on site, most of which are native and likely to be of ordinance size.


CDFG Jurisdiction
Potential Wetlands
Tributary Water Centerline
Culvert, Box Culvert
Dam
Sediment Trap, Spillway
Vertical Drain Pipe
Golf Holes
Project Boundary
Maple Ave
Foothill Road
Golf Course
Outlet unknown
Drains to ditch along Foothill Rd.
1
2
3
4
5
6
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9
10
11
12
13
14
15
16
17
18
200 0 200 400 Feet
H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS
Institute Golf Course: PotentiallyRegulated Areas
File No. 1808-01
Date 7/26/00
Figure 6

IMPACTS AND MITIGATION

Development of the project site has resulted in conversion of most of the property's open space into golf course. While this previous development has had a number of impacts on the project site's biological resources, ***only those impacts resulting from the continued use of the golf course and renovation of the restaurant building are to be described in this section***. Few of these impacts can be regarded as significant. The California Environmental Quality Act (CEQA) and the CEQA Guidelines provide guidance in evaluating project impacts and determining which impacts will be significant. CEQA defines "significant effect on the environment" as "a substantial adverse change in the physical conditions which exist in the area affected by the proposed project." Under CEQA Guidelines section 15065, a project's effects on biotic resources are deemed significant where the project would:

- "substantially reduce the habitat of a fish or wildlife species"
- "cause a fish or wildlife population to drop below self-sustaining levels"
- "threaten to eliminate a plant or animal community"
- "reduce the number or restrict the range of a rare or endangered plant or animal"

In addition to the significance criteria discussed above, removal or disturbance of nesting raptors, as discussed in Fish and Game Code section 3503.5, will be considered significant. Finally, in addition to the section 15065 criteria that trigger mandatory findings of significance, Appendix G of the CEQA Guidelines provides a checklist of other potential impacts to consider when analyzing the significance of project effects. The impacts listed in Appendix G may or may not be significant, depending on the level of the impact. For biological resources, these impacts include whether the project would:

- "have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service"
- "have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service"
- "have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act"
- "interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites"
- "conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance"

- "conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan"

EFFECTS FOUND TO BE LESS-THAN-SIGNIFICANT

Impacts to Habitat for Certain Special-Status Animal Species

No suitable habitat exists for, and/or the project site is outside the known distribution of, several animal species. These include the steelhead rainbow trout, Chinook salmon, Bay checkerspot butterfly, Bald Eagle and California mastiff bat. These species are not expected to occur on the project site and would thus not be affected by the project.

Some special-status species of wildlife may only be occasional visitors, migrants, or transients. These species include the Sharp-shinned Hawk, Ferruginous Hawk, Golden Eagle, Prairie Falcon, Merlin, American Peregrine Falcon, Vaux's Swift, Willow Flycatcher, Yellow-breasted Chat, California Yellow Warbler, California Horned Lark, and San Francisco dusky-footed woodrat. The project will have no effect on the breeding success of any of these species, although it will result in a small reduction of foraging and/or roosting habitat available to them regionally. Due to the abundance of similar habitats regionally, however, the project is expected to have a less-than-significant impact on these species that do not breed on the site.

Several special-status animal species could potentially breed on, or adjacent to, the site, although it is unlikely since habitat on site is marginal. Of these the Cooper's Hawk and White-tailed Hawk might breed occasionally in small numbers on the site, if they breed there at all. Likewise, the Loggerhead Shrike, is expected to breed in the general vicinity off site, is a fairly common breeder with stable populations in central California. Because the habitat on the site is marginal and represents a small fraction of the available breeding habitat for these species in the region, and because all of these species are fairly common breeders elsewhere in central California, project development will have a less-than-significant impact on these species (*however, see Potential Impacts to Nesting Raptors*).

Foraging habitat on the site for the pallid bat and Townsend's big-eared bat is marginal because the site does not support large populations of insects. Therefore, the loss of this foraging habitat will have a less-than-significant impact of these species (*however, see Potential Impacts to Bats*).

Playing golf, golf course pedestrian and vehicle access, golf cart traffic, normal driving range use, and routine golf course uses will have no significant effect on Burrowing Owls. Normal golf course maintenance, including landscaping, mowing, fertilizing, and irrigation will have no significant effect on Burrowing Owls (but see *Potentially Significant Effects*, below).

Impacts to Special-status Plant Species

Habitat suitable for special-status plant species mainly occurs in the natural areas on the project

site. However, recent surveys indicate that all of the special status plants are absent from the site. Therefore, there is no potential for significant impacts.

EFFECTS FOUND TO BE LESS-THAN-SIGNIFICANT WITH MITIGATION INCORPORATION

Impacts Associated with Encroachment Into Riparian Setback Areas

Riparian areas in central California support a rich and diverse wildlife component. Wildlife use of these habitats is adversely affected by the close proximity of human activity and the placement of structures. The quality of the riparian habitat and type of structures or activities adjacent to it determines the overall effect on wildlife use. In general, the greater the amount of human activity and the closer that activity occurs to riparian areas, the greater the potential for negative impacts to wildlife use.

Therefore, it is generally desirable to minimize human activities adjacent to riparian habitats. This reduction in human use has led to the development of the setback or buffer concept along riparian areas as an attempt to reduce impacts to riparian areas. While empirical evidence exists to support the hypothesis that wildlife values of the riparian corridor can be compromised by adjacent human activity, little empirical data presently exists for the establishment of a precise setback area. Nonetheless, riparian setbacks of 100 feet are often recommended by CDFG as appropriate for streams with high quality riparian habitat. These setbacks are typically measured from either the top of bank or the outer edge of riparian vegetation, whichever is greater.

Though the City of Morgan Hill has no policy requiring a setback, the extent of golf course maintenance and use adjacent to the CDFG jurisdictional drainages and the riparian corridor constitutes a significant impact, warranting some setbacks. The golf course is immediately adjacent to these areas along most of their lengths. This includes approximately 4,240 feet along the lower quality drainages, and 1,413 feet along the riparian corridor. Since the riparian habitat and drainages offer different wildlife values, however, it is recommended that only a 25-foot setback be established along the drainages with low-quality riparian habitat, and a 100-foot setback be established along most of the length of the remaining riparian corridor that is well vegetated and of higher quality. The following mitigation measures will reduce this impact to a less-than-significant level.

Mitigation 1. Native Riparian Buffer Planting in Setback Area. The setback area should be established as a riparian buffer planting zone with native trees and shrubs. The landscape plans should be reviewed and approved by a qualified botanist or restoration biologist.

Riparian setback areas should be planted with native trees, shrubs, and other plants compatible with the adjacent riparian corridor. The planting of native species within the setback area would protect and enhance the existing riparian corridor. Species that could be planted include native willows and oaks.

Mitigation 2. Avoid Landscaping With Invasive Exotic Species. Invasive, exotic species should not be used in the landscaping within or adjacent to the riparian corridor or setback area. Examples of some of the more invasive species include: tree of heaven (*Ailanthus altissima*), pampas grass (*Cortaderia jubata*), periwinkle (*Vinca major*), and English ivy (*Hedera helix*).

Mitigation 3. Avoid Artificial Lighting Intrusion into the Riparian Corridor. Lighting within the setback areas should be avoided. Lighting associated with the proposed project should be designed, sited and shielded to minimize light and glare impacts to wildlife within the riparian corridor.

Mitigation 4. Minimize Human Disturbance within the Riparian Corridor. Human access should be restricted within the riparian corridor. Physical barriers should include either split rail fence or other suitable structures that are effective at restricting access to golfers. Informational signs explaining the sensitivity of Riparian Corridors should be posted particularly near potentially suitable access points.

Impacts to California Red-legged Frogs and Their Habitat

The operation of the golf course is expected to affect California red-legged frogs in several ways. First, the operation could result in the incidental "take" of red-legged frogs. Because breeding areas are immediately adjacent to the maintained turf (greens and rough), individuals could be killed as a result of the operation of vehicles or by foot traffic, particularly at night (as well as early morning and late evening) when frogs are most apt to forage and/or disperse. Secondly, the accidental introduction of or colonization of the site by bullfrogs or the intentional introduction of large mouth bass (*Micropterus salmoides*) may result in the loss of significant numbers of frogs through predation and/or disease. The proposed stock pond located between the two branches of Corralitos Creek could become a biological sink for the on-site population of red-legged frogs if frogs attempt breeding there. Additionally, any introduction of another aquatic species (e.g., large mouth bass) could introduce a disease into the immediate watershed. Thirdly, the operation of the golf course could result in impacts to frogs or the loss of breeding habitat via run-off contaminated with pesticides and/or herbicides from the manicured greens. Any further grading of areas adjacent to breeding areas could both directly and indirectly affect red-legged frogs harming individuals and further degradation of habitat. These impacts would be significant.

Because the California red-legged frog breeds on the site, and impacts may occur during the golf course operation, the golf course owner(s) will need to formally consult with the USFWS to obtain a biological opinion that the project will not jeopardize the continued existence of the species and then be issued an incidental take permit. In order to conform to the Federal Endangered Species Act, formal consultation can take the form of a Section 7 (via a Federal action) or a Section 10 (Habitat Conservation Plan).

Applicant Proposed Mitigation

The project applicant proposed mitigation measures for the California red-legged frog, California tiger salamander and western pond turtle in a March 3, 2003 letter to the City of Morgan Hill. The following is our assessment of the adequacy of key elements of those mitigation measures.

The applicant proposed aquatic habitat buffers that are widest where they are furthest away from active play areas and are substantially narrower adjacent to active play areas and have average buffer widths of only 50 feet. We do not consider these buffer widths to be adequate to protect the sensitive species in those areas where they require the greatest protection (adjacent to active play areas); therefore, the applicant's proposed buffer mitigation measure is not sufficient. The applicant also proposed to control bullfrogs and predatory fish by destroying floating bullfrog egg masses, gigging bullfrogs and seining predatory fish. This will not effectively insure that bullfrogs and predatory fish will be fully eradicated from the aquatic habitats of the project site. It is necessary to annually drain ponds during the late summer to insure bullfrog eradication. Unless supplemented by either one of the mitigation packages described below these applicant proposed measures are inadequate to mitigate impacts to red-legged frogs to a less-than-significant level.

Two mitigation measure packages, either of which alone would reduce the impacts to this species to a less-than-significant level, are described below.

Mitigation Measure Package I.

Mitigation 1. Provide a Buffer Zone. A buffer (an undisturbed area that protects habitat from human activities) of 200 feet should be maintained from the water's edge of individual breeding ponds and from the centerline of all creeks. No human disturbance, landscaping, irrigation, turf areas or lighting should be placed within the buffer area. No vehicles or other equipment, including lawn mowers, should operate within the buffer zone. Additionally, if any nocturnal maintenance activities occur on the site, an exclusion fence must be installed 200 feet from the water's edge and maintained to avoid "take" of red-legged frogs from vehicular activities since frogs may range widely from aquatic habitat at night. Additionally, mitigation 2 and 3 should be implemented.

Mitigation 2. Manage Non-Native Predator Species (primarily the bullfrog and large mouth bass). Bullfrogs and large mouth bass are non-native predators that reduce the long-term viability of a red-legged frog population. Although Jennings only found one bullfrog in September 2003, and no other non-native predators were detected on the project site, a non-native predator management plan that operates for the life of the golf course operation should be implemented. The main components of this plan are to: 1) monitor all ponds for bullfrogs and other non-native predators on an annual basis, and 2) dry out any ponds that contain bullfrogs for two to three weeks in late September/early October on an annual basis. The timing of the draw down will be phased to ensure that red-legged frogs will continue to have available suitable wet areas. This draining of the ponds disrupts the two-year development cycle of the bullfrog and should

substantially reduce or eliminate successful reproduction by bullfrogs in this region of the ranch. If large mouth bass (*Micropterus salmoides*) are planted in the man-made "fishing pond" (dry and under construction during the reconnaissance-level surveys), then an exclusion fence approved by a qualified herpetologist should be constructed around the pond to prevent red-legged frogs from entering this body of water. Furthermore, a qualified ichthyologist or herpetologist should inspect any shipments of fish into the "fishing pond" to insure pathogenic (causing disease) or other unwanted pest species are not introduced into the area.

Mitigation 3. Maintain Water Quality of Breeding Ponds/Establish Vegetated Shelves Around Ponds. Water quality should be monitored monthly for the duration of the golf course operation by qualified personnel to ensure that golf course run-off does not impact breeding habitat for the red-legged frog. The water quality parameters to be sampled shall be in accordance with monitoring requirements established by the Regional Water Quality Control Board and, at a minimum, shall include nitrate, ammonia, total kjehdahl nitrogen, total dissolved solids, oil and grease (parking lot runoff only), and all landscaping chemicals used by the golf course.

Shallow water shelves shall be constructed and vegetated with native emergent vegetation around the perimeter of ponds A, B, C, D and E. Native emergent vegetation shall be established on at least 50% of the perimeter of each pond and should be approximately 5-10 feet in width. These vegetated shelves will provide refugia and breeding habitat for the red-legged frogs. This vegetation will also provide some biological filtering of run-off water. All parking lot drains and all subdrains beneath tees and greens that discharge into the ponds shall include filtration or other treatment measures to minimize the potential for direct discharge of golf course chemicals or other surface runoff contaminants. If any further grading occurs, silt fences, hay bales, or other structures should be installed to ensure that run-off from the operations does not flow directly into these breeding areas.

Mitigation Measure Package II.

Mitigation 1. Implement USFWS Mitigation Recommendations. Implement all mitigation measures included in the USFWS letter of July 15, 2003 (Appendix C) to reduce impacts to the California red-legged frog.

Mitigation 2. Predator Control/Water Quality. Implement Mitigation 2 (Manage Non-Native Predator Species (primarily the bullfrog and largemouth bass) and Mitigation 3 (Maintain Water Quality of Breeding Ponds/Establish Vegetated Shelves Around Ponds) from Mitigation Package 1 above.

Mitigation 3. Vegetated Buffers Around Ponds. All ponds on site shall have a buffer around the pond perimeter of at least 10 feet in width, consisting of un-

maintained dense grasses. This buffer will not be mowed, nor will any chemicals or fertilizers be applied. This buffer is significantly narrower than the buffer cited under Mitigation Package 1 because Mitigation Package 2 also provides for substantial additional habitat benefits under Mitigation 1 (Implement USFWS Mitigation Recommendations) that compensate for smaller buffer areas.

Impacts to California Tiger Salamanders and Their Habitat

The operation of the golf course is expected to affect California tiger salamanders in ways similar to the effects on California red-legged frogs discussed above. For example, impacts would include incidental "take" of tiger salamanders during normal golf course operations, increased predation or disease by introduced bullfrogs and/or large mouth bass, contamination of breeding ponds from golf course run-off, and further loss of individuals and habitat from future grading of areas adjacent to breeding areas. In addition, the eradication of ground squirrels and gophers on-site would greatly diminish the available upland aestivation habitat required by the salamanders. These impacts would be significant.

The discussion provided above under **Impacts to California Red-legged Frog and their Habitat** regarding the applicant's proposed mitigation package is also applicable to the California tiger salamander.
Two mitigation measure packages, either of which would reduce the impacts to this species to a less-than-significant level, are described below.

Mitigation Measure Package I.

Mitigation 1. Provide a Buffer Zone. A buffer of 200 feet should be maintained from the water's edge of individual breeding ponds (same as Mitigation 1 for California red-legged frogs). Additionally, large woody debris or stones should be placed within this buffer to encourage burrow construction by ground squirrels and/or gophers to improve upland aestivation habitat for salamanders. Additionally, mitigation 2 and 3 should be implemented.

Mitigation 2. Manage Non-Native Predator Species (primarily the bullfrog and large mouth bass). A non-native predator management plan that is in place for the life of the golf course operation should be implemented (same as Mitigation 2 for California red-legged frogs).

Mitigation 3. Maintain Water Quality of Breeding Ponds. The water quality measures outlined for the California red-legged frog (Mitigation 3) should also be performed for tiger salamanders.

Mitigation Package II.

Mitigation Package II as described above under California red-legged frog would also provide adequate mitigation for the California tiger salamander.

Impacts to Western Pond Turtles.

Although no western pond turtle breeding habitat is present on site, one western pond turtle was found during focused red-legged frog surveys conducted by Dr. Mark Jennings on September 9, 2001. Therefore the operation of the golf course could affect individual western pond turtles in ways similar to the effects on California red-legged frogs and California tiger salamanders discussed above. For example, impacts would include incidental "take" of western pond turtles during normal golf course operations and increased predation or disease by introduced bullfrogs and/or large mouth bass. These impacts would be significant.

The discussion provided above under **Impacts to California Red-legged Frog and their Habitat** regarding the applicant's proposed mitigation package is also applicable to the western pond turtle.

Two mitigation measure packages, either of which would reduce the impacts to this species to a less-than-significant level, are described below.

Mitigation Measure Package I.

> **Mitigation 1. Provide a Buffer Zone.** A buffer of 200 feet should be maintained from the water's edge of all ponds (similar to Mitigation 1 for California red-legged frogs). Additionally, mitigation 2 and 3 should be implemented.
>
> **Mitigation 2. Manage Non-Native Predator Species (primarily the bullfrog and large mouth bass).** A non-native predator management plan that is in place for the life of the golf course operation should be implemented (same as Mitigation 2 for California red-legged frogs).
>
> **Mitigation 3. Maintain Water Quality of Breeding Ponds.** The water quality measures outlined for the California red-legged frog (Mitigation 3) should also be performed for western pond turtles.

Mitigation Measure Package II.

> Mitigation Package II as described above under California red-legged frog would also provide adequate mitigation for western pond turtles.

Potential Impacts To Burrowing Owls And Their Burrows, Nests, Eggs, Or Young

Raptors (birds of prey) and their nests are protected by both federal and state laws and regulations, including the Migratory Bird Treaty Act and California Fish and Game Code sections 3503 and 3503.5. California Fish and Game Code makes it unlawful to take (*i.e.*, to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill"), possess, or destroy birds, their nests, or their eggs. Burrowing Owl habitat was present on site during the surveys conducted in 2000. Therefore, if Burrowing Owls are present at the time of construction,

care must be exercised to avoid taking owls. Additionally, if nesting Burrowing Owls are present at the time of construction, disturbance could result in the loss of fertile eggs or nestlings, or lead to nest abandonment. Any take of Burrowing Owls, destruction of nests, eggs, or young, or any activities resulting in nest abandonment or other causes of diminished reproduction are considered "take" by the CDFG, and constitute a significant impact. Therefore, construction activities such as tree removal, site grading, etc., which remove habitat used by a nesting Burrowing Owl on (or immediately adjacent to; see below) the construction site or that destroy occupied burrows would constitute a significant impact.

Rodent and sciurid control using certain poisons or mechanical control techniques has the potential for unlawful take of Burrowing Owls. Likewise, use of insecticides, rodenticides, pesticides, and other chemical applications may result in unintended take of owls, by both direct and indirect toxicity, and through secondary effects. Further, certain golf course maintenance activities may result in take of owls (or nests, which are also protected; see below). Filling mammal burrows or other potential Burrowing Owl refugia (*e.g.*, eroded sections beneath asphalt or sidewalks), replacing sod, or use of impermeable ground coverings (*e.g.*, weed barriers, artificial turf, etc.) all have the potential to take owls or nests. Take is considered a significant impact, and would thereby require mitigation

The CDFG provides consistent guidelines concerning impact assessment and mitigation measures for Burrowing Owls. However, certain acceptable alternatives exist for assessing and mitigating project effects on Burrowing Owls, and alternatives can be approved pending consultation with the CDFG. We provide both the generalized recommendation of the CDFG, followed by the City of Morgan Hill Interim Burrowing Owl Mitigation Policy.

The CDFG generally recommends the following mitigation when habitats occupied by Burrowing Owls, or those known to have been occupied in the past three years are impacted in any way. The full level of mitigation that may be required by the CDFG can be determined only after consultation.

Mitigation 1 (avoidance of occupied habitat) is the preferred mitigation measure. If strict avoidance is not feasible, implementation of Mitigation 2, in conjunction with Mitigation 3, will reduce potential impacts to a less-than-significant level.

Mitigation 1. Avoidance. If past surveys or pre-construction surveys confirm that Burrowing Owls occupied the site historically or continue to occupy the site, then avoidance of impacts to the habitat used by these owls is considered the preferred mitigation method. Avoidance allows the use of the site by owls to continue uninterrupted and unaffected.

Mitigation 2. Preconstruction Surveys and Buffer Zones. In conformance with federal and state regulations protecting raptors against all forms of take, pre-construction surveys for Burrowing Owls should be conducted by a qualified ornithologist prior to any soil-altering activity or economic development occurring within the project area and a surrounding area of potential effect. The pre-construction surveys should be conducted per CDFG guidelines, and are required regardless of the time of year in which work occurs. If no Burrowing Owls are found, and it is known that no owls have used the site within three years, then no further

mitigation would be warranted pursuant to current CDFG guidelines. If owls are located on or immediately adjacent to the site (*i.e.*, within 75m from 1 February – 31 August, and within 50m from 1 September – 31 January), a construction-free buffer zone around the active burrow must be established as determined by the ornithologist and in consultation with CDFG. No activities, including grading or other construction work or evictions of owls, should proceed that may disturb owls, pending review by the CDFG If owls are resident during the non-nesting season (1 September – 31 January), a qualified ornithologist, in consultation with CDFG, may evict the owls to avoid the loss of any individuals. This action requires consultation with and authorization by the CDFG, and may also require that the applicant enter a formal Mitigation Agreement (Mitigation 3). If owls are resident during the nesting season (1 February – 31 August), eviction is likely not possible, and will probably not be authorized by the CDFG. Typically, construction proposed within the required 75m radius around nesting burrows must be delayed until 1 September. Regardless of the time of year when Burrowing Owls are observed on the site, implementation of Mitigation 3 would be necessary.

Mitigation 3. Off-Site Compensation. If Burrowing Owls have occupied the site within 3 years, or currently occupy the site, then habitat compensation to offset habitat loss should be implemented. Compensatory habitat replacement may be on- or off-site, and the suitability of any proposed mitigation site may be confirmed only in consultation with CDFG. This mitigation typically involves evicting the owls from the project site to ensure against take, and setting aside and managing replacement areas for Burrowing Owls. Burrowing Owls may not be evicted from the site during the breeding season, and the CDFG must authorize the use of eviction beforehand.

CDFG-approved mitigation lands are acquired at a ratio of 6.5 acres/pair or individual owl (if only an individual is observed). Total mitigation acreage, in concurrence with CDFG, would depend upon the extent of use of the site by Burrowing Owls. The project developers could identify and set aside the mitigation land prior to site work. Alternatively, they can execute a Mitigation Agreement with escrow funds to mitigate impacts. Funds would be expended towards the acquisition and long-term management of a mitigation site. Currently, mitigation fees requested by CDFG cover land acquisition, an endowment for long-term management of each preserve, preserve set-up costs, and a transaction fee per project applicant.

The City of Morgan Hill has developed its own Interim Burrowing Owl Mitigation Policy, which prescribes specific mitigation measures for projects affecting Burrowing Owl habitats within the city limits. These measures may be required by the city in order to mitigate for Burrowing Owls, but do not necessarily coincide with the mitigation requirements of the CDFG. Additionally, we are unaware that the CDFG has acknowledged that this approach acceptably mitigates impacts to Burrowing Owls pursuant to CEQA. The City of Morgan Hill Interim Burrowing Owl Mitigation Policy states that:

A) Prior to any activity that alters or disrupts surface soils in areas of open grassland, agricultural lands, ruderal sites, sites with bare soil and or piles of rubble and vacant lots, a reconnaissance level survey shall be conducted by a qualified ornithologist to determine whether or not potential burrowing owl habitat occurs on the site.

B) If potential burrowing owl habitat is identified, a peak breeding season survey shall be conducted on the site in accordance with the following guidelines.

1. The assessment shall consist of a total of four site visits on separate days (per CDFG protocols). Surveys shall be conducted 2 hours before to 1 hour after sunset, or 1 hour before to 2 hours after sunrise.

2. Surveys shall be conducted during the peak nesting season, April 15 to July 15, unless the protocol identified in B.3 is followed. Mitigation for owls and/or habitat when surveys are conducted during the above referenced dates shall be as follows:
   (a) If burrowing owls are present or have been known to occupy the site within the last three years, mitigation for lost habitat shall be at a ratio of 1:1 (taken to mitigation).
   (b) If no owls are detected and have not been known to occupy the site within the last three years, potential habitat shall be replaced at a ratio of 1:0.5 (taken to mitigation).

3. If surveys are conducted outside the peak nesting season (between July 16 and April 14), mitigation shall be as follows:
   (a) If owls are present or have been known to occupy the site within the last three years, mitigation for lost habitat shall be at a ratio of 1:1 (taken to mitigation).
   (b) If owls are not present, potential habitat shall be replaced at a 1:1 (taken to mitigation) ratio.

C) Habitat replacement may be either on-site or off-site upon approval of the CDFG. For off-site mitigation, the applicant shall enter into a Mitigation Agreement (MA) with the CDFG. Land for off-site mitigation shall be obtained within 18 months of project approval unless an extension is granted by the CDFG. (Currently, the MA requires a letter-of-credit or escrow account adequate to cover costs of mitigation and provides a prescribed interval to secure the required mitigation site. If the project sponsor defaults on the MA, the security deposit is remitted to the CDFG for their use in securing a site. The CDFG currently estimates that $10,000 per acre, $20,000 for initial site protection and enhancement and $40,000 to establish an endowment to fund long-term site management is adequate to fulfill off-site mitigation requirements).

D) After project approval, in addition to the habitat survey, the applicant shall conduct a preconstruction survey to avoid the take of individual burrowing owls. The preconstruction survey shall be conducted not more than 30 days prior to construction to assure take avoidance of burrowing owls. If owls are observed during the preconstruction survey, no impacts to the owls or their habitat will be allowed during the nesting season (February 1 to August 31).

1. If there are construction activities during the breeding season, and if burrowing owls are observed on, or within 250 feet of the project site during preconstruction surveys, a 250-foot protective buffer shall be established and monitored.

2. If preconstruction surveys are conducted during the non-breeding season and burrowing owls are observed on the site, the owls may be relocated upon approval of the CDFG once mitigation has been provided.

The CDFG has requirements for Burrowing Owl mitigation that do not correspond directly with those proposed by the City of Morgan Hill. Both will have to be contacted, and an agreement reached on adequate mitigation. Given the degraded quality of the Burrowing Owl habitat on site, and the regular use of the site as a golf course, we recommend that if no owls are present (and it is not determined that owls previously used the site) prior to construction or at the time of maintenance activities, then no further mitigation is necessary.

Potential Impacts to Nesting Raptors

Raptors (e.g., eagles, hawks, and owls) and their nests are protected under both federal and state laws and regulations. The federal Migratory Bird Treaty Act (16 U.S.C. § 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. Birds of prey are protected in California under Fish and Game Code section 3503.5. Section 3503.5 states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered a "taking" by the CDFG. Any loss of fertile raptor eggs or nesting raptors, or any activities resulting in raptor nest abandonment, would constitute a significant impact. Construction activities such as site grading, tree removal, etc., that disturb a nesting raptor on-site or immediately adjacent to the construction zone would constitute a significant impact.

Several raptors, including special-status species such as Northern Harrier and Cooper's Hawk, have been observed in the general vicinity and may breed on or adjacent to the site. Therefore, the mitigation measures described below should be implemented to reduce the adverse environmental effects of the proposed project on any raptors nesting within the project site or immediately adjacent to the site. If fully implemented, these measures are expected to reduce the potential project-related environmental effects on nesting raptors to a less-than-significant level.

Mitigation 1. Avoidance. Avoid nesting season construction within 250 feet of any potential nesting sites. Demolition and construction shall be scheduled to avoid the nesting season to the extent feasible. The nesting season for most raptors in the South San Francisco Bay area extends from January through August.

Mitigation 2. Preconstruction/Predisturbance Surveys. If it is not possible to schedule demolition and construction between August and January, then preconstruction surveys for nesting raptors should be conducted by a qualified ornithologist or wildlife biologist to ensure that no raptor nests will be disturbed during project implementation. This survey will be conducted no more than 14 days prior to the initiation of demolition/construction activities during the early part of the breeding season (January through April) and no more than 30 days prior to the initiation of these activities during the late part of the breeding season (May through August). During this survey, the qualified biologist will inspect all trees and other likely habitat in and immediately adjacent to the impact areas for raptor nests. If an active raptor nest is found close enough to the construction/demolition area to be disturbed by these activities, the ornithologist, in consultation with CDFG, will determine the extent of a construction-free buffer zone to be established around the nest.

Potential Disturbance of Nesting Swallows During Construction

Cliff Swallows (*Petrochelidon pyrrhonota*) and Barn Swallows (*Hirundo rustica*), among the many species protected by the federal Migratory Bird Treaty Act, nest on several of the buildings on the site. Although no large colonies were noted during 2000 or 2001 surveys, nests were found on most of the buildings, and in particular, the large abandoned restaurant. The project could potentially have significant impacts to nests of these species if any structures to which the nests are attached are renovated or demolished, causing the loss of nests with eggs or young, or if construction occurs close enough to active nests to cause the abandonment of nests with young. Implementation of the following mitigation measures is expected to reduce project impacts to nesting Barn and Cliff Swallows to less-than-significant levels.

Mitigation 1. Avoid nesting season construction. Construction or renovation on any building should be scheduled to avoid the nesting season. The CDFG recognizes the period between 15 February and 1 September as swallow nesting season in the South San Francisco Bay Area. If it is not possible to schedule construction to occur between September and mid-February, then one of the following procedures is required:

Mitigation 2. Remove nests before February 15. Remove all old nests in areas that would be disrupted by the proposed work before swallows return to the nesting site. Once the birds return, removal must be repeated at a frequency necessary to prevent nest completion or until project construction is complete.

Mitigation 3. Preconstruction Surveys. Preconstruction surveys for nesting swallows should be conducted within 48 hours of any construction or renovation to ensure that they are not utilizing areas to be disturbed.

Mitigation 4. Obtain a permit to destroy occupied nests. Intact swallow nests are assumed to be occupied between February 15 and September 1. If preconstruction surveys find nesting swallows, it may be possible to obtain a permit to destroy occupied nests. To remove/destroy occupied swallow nests, a permit must be obtained from the U.S. Fish & Wildlife Service Division of Animal Damage Control. Such a permit requires compelling justification that the

work is essential to public safety. Any eggs removed from nests would require incubation by an approved wildlife rescue group (current cost is approximately $200 per swallow raised).

Potential Impacts to Bats

The mostly-abandoned Flying Lady Restaurant building comprises large spaces, both in the attic and in the basement areas that could provide maternity roosting habitat for the pallid bat and the Townsend's big-eared bat. The pallid bat is also known to roost in tree cavities, and both species could roost in other abandoned or occupied buildings, such as those found on site. Since being classified as California species of special concern in 1984, researchers and resource managers at the Western Bat Working Group (1998) concluded that numbers of both subspecies of these bats occurring in coastal California have continued to decline substantially in recent years. Although no determination has been provided as to causes for these declines, loss of habitat, pesticides, and eviction from man-made structures leading to the loss of individuals are suspect. Removing buildings or large oaks with cavities could potentially result in the direct loss of colonies of either species, including the direct loss of a maternity colony of either species. The direct loss of individuals in a hibernacula could eliminate an entire colony due to the loss of the pregnant females. These potential impacts would be significant. Implementation of Mitigation 1, and Mitigation 2 or 3 as warranted, would reduce these potential impacts to a less-than-significant level.

Mitigation 1. Predemolition Surveys and Buffer Zones. A predemolition/preconstruction survey for roosting bats should be conducted between three and 15 days prior to any removal or renovation of buildings, particularly those with closed areas such as an attic space, or trees ≥12 inches in diameter at 4.5 feet above grade. The survey should be conducted by a qualified bat biologist (i.e., a biologist holding a CDFG collection permit and a Memorandum of Understanding with CDFG allowing the biologist to handle and collect bats). No activities that would result in disturbance to active roosts would proceed prior to the completed surveys. If no active roosts are found, then no further action would be warranted. If a maternity roost is present, a qualified bat biologist would determine the extent of construction-free zones around active nurseries since these species are known to abandon young when disturbed. If either a maternity roost or hibernacula is present, Mitigation 2 or 3 should be implemented. CDFG should also be notified of any active nurseries within the construction zone.

Mitigation 2. Avoidance. If active maternity roosts or hibernacula are found, the project could be redesigned to avoid the loss of the building or tree occupied by the roost.

Mitigation 3. Exclude Bats Prior to Demolition of Roosts. If an active maternity roost is located and the project cannot be redesigned to avoid removal of the occupied tree or structure, demolition of that tree or structure should commence before maternity colonies form (i.e., prior to March 1) or after young are volant (flying) (i.e., after July 31). The disturbance-free buffer zones described in Mitigation 1 should be observed during the maternity roost season (March 1 - July 31).

If a non-breeding bat hibernacula is found in a structure or tree scheduled to be razed, the individuals should be safely evicted, under the direction of a qualified bat biologist (as

determined by a Memorandum of Understanding with CDFG), by opening the roosting area to allow airflow through the cavity. Demolition should then follow no less than the following day (i.e., there should be no less than one night between initial disturbance for airflow and the demolition. This action should allow bats to leave during dark hours, thus increasing their chance of finding new roosts with a minimum of potential predation during daylight. Trees with roosts that need to be removed should first be disturbed at dusk, just prior to removal that same evening, to allow bats to escape during the darker hours.

Potential Impacts to Special-Status Species by Degradation of Water Quality

The proposed project would collect storm run-off from developed areas of the site and convey flows to Corralitos Creek, which flows into Little Llagas Creek and then Llagas Creek, approximately two miles from the project site. Llagas Creek provides habitat for known populations of the western pond turtle, a California species of special concern and the central coast steelhead (a federally-listed species). If the water quality within Llagas Creek is degraded by this project during high flows, it may affect these wildlife species.

Implementation of Mitigation 1 and 2 would reduce potential project impacts on water quality and thereby to associated special-status species to a less-than-significant level. The implementation of all these measures to protect water quality will prevent direct and off-site effect on wildlife and special-status species in by avoiding or minimizing introduction of silt and contaminants into the aquatic system.

Mitigation 1. Minimize Degradation of Water Quality During Construction. No debris, soil, silt, sand, bark, slash, sawdust, cement, concrete, washings, petroleum products or other organic or earthen material shall be allowed to enter into or be placed where it may be washed by rainfall or run-off into stream waters.

To prevent storm water pollution and minimize potential sedimentation during any future grading, construction or building renovation the following specific measure or their equivalent will be implemented:

- restricting grading to the dry season (April - October) or using best management practices for wet season erosion control;
- using silt fencing to retain sediment on the project site;
- providing temporary cover of disturbed soil surfaces to help control erosion during construction; and,
- providing permanent cover to stabilize the disturbed soil surfaces after construction has been completed.

Construction activities and post-construction monitoring will be required to conform to the requirements of the General National Pollution Discharge Elimination System (NPDES) Construction Activity Storm Water Permit administered by the Regional Water Quality Control Board. This program is designed to maintain water quality in waterways and will incorporate measures described in Mitigation 1.

Prior to construction grading, the applicant will file a Notice of Intent to comply with the General Permit and prepare a Stormwater Pollution Prevention Plan (SWPPP) which addresses measures that will be included in the project to minimize and control construction and post-construction run-off. The SWPPP will be reviewed and approved by the City of Morgan Hill.

The SWPPP will preclude non-storm water discharges to the storm-water system and perform monitoring of discharges to the storm-water system. It will detail construction Best Management Practices that will include stabilized construction entrances, exits and/or wash racks, use of erosion control devices including straw bales, silt fences, fiber rolls, rock bag barriers, and storm drain inlet protection to minimize contamination of stormwater run-off. The project will comply with the City of Morgan Hill Grading Ordinance, including erosion- and dust-control during site preparation as well as any requirements for keeping adjacent streets free of dirt and mud during construction. The project grading plans will conform to the drainage and erosion control standards adopted by the City of Morgan Hill.

Mitigation 2. Minimize Degradation of Water Quality During On-going Maintenance and Grading Activities. The project design will include features to minimize non-point source pollutants entering Corralitos Creek and thence Llagas Creek. Such features could include the placement of vegetated swales where possible, and the installation of oil absorbing materials (e.g. "fossil filters") in the inlets of on-site catch basins.

Post-construction monitoring will be required to conform to the requirements of the General NPDES Construction Activity Storm Water Permit administered by the Regional Water Quality Control Board. For post-construction run-off impacts addressed in the SWPPP, the project will implement regular maintenance activities (i.e., sweeping, cleaning storm water inlets, litter control) at the site to prevent soil, grease, and litter from accumulating on the project site and contaminating surface run-off. Storm water catch basins will be stenciled to discourage illegal dumping. This program is designed to maintain water quality in waterways and will incorporate measures as described in Mitigation 1.

PROJECT IMPACTS THAT CANNOT BE MITIGATED TO A LESS-THAN-SIGNIFICANT LEVEL

The adoption and successful implementation of the mitigation measures identified in this report should mitigate project impacts to biotic resources to a less-than-significant level. Therefore, if these mitigations are implemented, there would be no significant unavoidable impacts from the project.

SECONDARY IMPACTS

If habitats on site are not restored to pregrading conditions then secondary impacts will result. The secondary impacts that have resulted from the site development and use include impacts to special-status plant and animal habitats, and aquatic habitats; this assessment was limited to those species and habitats for which information about their pregrading condition was available. Impacts to these can only be regarded as less than significant if mitigation is incorporated. Additional impacts to potential wetlands, ordinance-sized trees, and riparian/drainage setback areas are also expected to have occurred on site. These impacts can only be regarded as less than significant with mitigation incorporation. A secondary impact assessment was not done for other species and habitats for which pregrading information was not available (e.g western pond turtles). These impacts and associated mitigation measures are discussed in the following section.

LESS THAN SIGNIFICANT ENVIRONMENTAL EFFECTS

Loss of Habitat for Special-Status Plant Species

Approximately 80 acres of the property are underlain by Climara soils that have been observed to have greater proportions of serpentine inclusions than expected, and potentially supports many endemic, threatened or endangered special-status plant species. However, surveys showed that none of the species potentially present occur on the site.

SIGNIFICANT ENVIRONMENTAL EFFECTS

Loss of Riparian Habitat

The loss of riparian habitat due to prior grading or other development activities within CDFG jurisdiction (within areas of canopy contiguous with riparian habitat) should be replaced at a ratio of 3:1. The amount of this habitat loss that has already occurred is estimated to be 0.5 acres based on the comparison of watershed signatures in the aerial photos (Figure 2). Since these construction impacts have already occurred redesign and avoidance measures cannot be instituted. The following mitigation measure should be implemented integrally with the mitigation measures for encroachments into the riparian setbacks.

Riparian Setback Planting Mitigation. At least 1.5 acres of native trees and shrubs, appropriate for planting along the creeks and drainages of the site, will be planted within the riparian buffers to be established on the site (see **Impacts Associated with Encroachment into Riparian Setback Areas**).

Loss of Ordinance-Size Trees

It is expected that as many as 50 ordinance-sized trees may have been removed during golf course development, considering the greater number of trees evident in the 1996 aerial photo

(Figure 2), and the relatively small size requirements of the Morgan Hill Tree Ordinance. It is assumed that most of the trees removed were native oaks that are valuable to wildlife, providing nesting, roosting, and foraging habitat. The loss of native trees and or other ordinance-sized trees as part of the golf course construction, maintenance and use is thus a significant impact. Since most of the impacts have already occurred, redesign and avoidance measures cannot be instituted, leaving replacement as the only mitigation measure to reduce this impact to a less-than-significant level.

Replacement Mitigation. The following steps should be taken to mitigate for lost ordinance-size trees:

(a) Location of appropriate planting sites. Appropriate on site locations should be identified for planting on site by a qualified botanist or arborist. The proposed riparian setback area offers a potentially suitable site for the planting of native tree species. Mitigation for the removal of non-native, ordinance species could be incorporated into the landscaping plan for the proposed development or they could also be mitigated for with native plantings in the riparian setback area.

(b) Replacement ratio for lost trees. Lost native trees greater than 6 inches diameter-at-breast height should be replaced at a 5:1 ratio. This ratio will be necessary to compensate for the habitat values lost while replaced trees are maturing. Planting stock should be collected locally. Planting should be conducted from November to January using small nursery stock. The replacement trees should be installed in an environment suitable for their establishment and growth. These trees should be irrigated and maintained for a period of not less than three years. The mitigation site should be protected from future disturbance and the restoration effort should be monitored for five years.

Loss of California Red-legged Frog Habitat/Aquatic Habitat

It is estimated that approximately 3 acres of former golf course irrigation ponds were filled between golf holes 10 and 17 to construct the current golf course. Given the population that has re-established on site, the ponds likely harbored populations of California red-legged frogs in the past as well. The loss of that breeding habitat was a significant impact. Appropriate mitigation should include either improving the potential on-site breeding habitat in the ponds (Mitigations 1, 2, 3 and 5) in order to expand the existing red-legged frog population or providing an off-site conservation easement for California red-legged frogs (Mitigations 2, 3, 4 and 5).

Mitigation 1. Compensation by Establishment of On-site Breeding Areas. The project could restore and expand the presumed former breeding ponds and broaden the band of setbacks for the creek and ponds. The broadening of the setback surrounding the creek and ponds will increase the potential for adult and juvenile red-legged frogs to disperse and forage along a corridor between the creek and the southeastern and the westernmost ponds. Because approximately 3 acres of potential breeding ponds were lost, at least 9 acres of breeding ponds should be restored for red-legged frog habitat. Potential breeding habitat must include emergent aquatic vegetation to provide substrates for egg laying and associated upland habitat for foraging. The upland habitat should be a buffer (an undisturbed area that protects habitat from human activities) of 200 feet that is maintained from the water's edge of individual breeding ponds and from the

centerline of the creek. No human disturbance, landscaping, irrigation, turf areas or lighting should be placed within the buffer area. No vehicles or other equipment including lawn mowers, should operate within the buffer zone. Additionally, if any nocturnal maintenance activities occur on the site, an exclusion fence must be installed and maintained to avoid "take" of red-legged frogs from vehicular activities. Additionally, mitigation 2 and 3 should be implemented.

Mitigation 2. Manage Non-Native Predator Species (primarily the bullfrog). Bullfrogs are non-native predators that reduce the long-term viability of a red-legged frog population. Small numbers (one) of bullfrogs were detected by Jennings in September 2003 on the project site, and a non-native predator management plan that operates for the life of the golf course operation should be implemented. The main components of this plan are to: 1) monitor all ponds for bullfrogs and other non-native predators on an annual basis, and 2) draw down any ponds that contain bullfrogs for two to three weeks in late September/early October. The timing of drawn down will be phased to ensure that red-legged frogs will continue to have available suitable wet areas. This draining of the ponds disrupts the two-year development cycle of the bullfrog and should substantially reduce or eliminate successful reproduction by bullfrogs in this region of the ranch.

Mitigation 3. Maintain Water Quality of Breeding Ponds. Water quality should be monitored for the duration of the golf course operation by qualified personnel to ensure that golf course run-off does not impact breeding habitat for the red-legged frog. The water quality parameters to be sampled shall be in accordance with monitoring requirements established by the Regional Water Quality Control Board and, at a minimum, shall include nitrate, ammonia, total kjehdahl nitrogen, total dissolved solids, oil and grease (parking lot runoff only), and all landscaping chemicals used by the golf course. Emergent vegetation (e.g. cattails) established around pond edges will provide at least some biological filtering of run-off water and reduce the inflow of this run-off. All parking lot drains and all subdrains beneath tees and greens that discharge into the ponds shall include filtration or other treatment measures to minimize the potential for direct discharge of golf course chemicals or other surface runoff contaminants.

Mitigation 4. Conservation Easement for Red-legged Frogs. The project applicant could establish a conservation easement for red-legged frogs at a "to-be-determined" location. The final configuration of the easement (at least 51 acres of suitable red-legged frog habitat) will depend on the final mitigation design, which will be developed in conjunction with the USFWS. This easement will be in perpetuity. A conservation easement may be purchased as a part of a larger mitigation bank. The Shea Homes mitigation bank is an example. Shea Homes operates a red-legged frog mitigation bank of 654 acres in nearby Alameda County, and they may be contacted at 25 Metro Drive, Suite 300, San Jose, CA 95110; phone: (408) 914-3172. Otherwise, the owner(s) may work with a land trust, preferably in the Mt. Hamilton Range Mountains to the east, or the owner(s) could develop their own off-site mitigation easement. Any and all easements must have a legal commitment, be guaranteed management for the purposes of maintaining a California red-legged frog population, and be approved by the USFWS.

Mitigation 5. Obtain and Comply With Permits, Certifications, Or Agreements From USACE, RWQCB, USFWS, and CDFG. The applicant will need to apply for and receive

permits, certifications and agreements from several resource agencies (see *Direct Loss of Seasonal Wetland/Seasonal Drainage Channel and Aquatic Habitat*, above). In addition to obtaining authorization from the USACE, RWQCB, and CDFG, the project applicant will need to formally consult with the USFWS to obtain a biological opinion that the continued operation of the golf course will not jeopardize the continued existence of the species and then be issued an incidental take permit. This formal consultation can take the form of a Section 7 (via a Federal action) or a Section 10 (Habitat Conservation Plan). Discussions with the USFWS will determine the appropriate vehicle to process this request.

Loss of California Tiger Salamander Aestivation/Breeding Habitat

It is estimated that approximately 3 acres of former golf course irrigation ponds were filled between golf holes 10 and 17 to construct the current golf course. Given the observation of a metamorphosing California tiger salamander individual on site, it is likely that the site previously harbored a population of California tiger salamanders by providing both breeding and upland aestivation habitat. Also, individuals of a remnant of this population are probably coming from off-site aestivation habitat to use the ponds as breeding sites. The loss of these aestivation and breeding habitats were a significant impact. Appropriate mitigation should include either improving the potential on-site aestivation and breeding habitats on the westernmost ponds (Mitigations 1, 2, and 3) in order to expand the existing tiger salamander population or providing an off-site conservation easement for California tiger salamanders (Mitigation 4).

Mitigation 1. Compensation by Establishment of On-site Breeding and Aestivation Habitat. The project could restore and expand the presumed former breeding ponds and broaden the band of setbacks for the potential breeding ponds. The broadening of the setback surrounding the potential breeding ponds will increase the potential for adult and juvenile tiger salamanders to disperse and forage around the breeding ponds. Because approximately 3 acres of potential breeding ponds were lost, at least 3 acres of breeding ponds should be restored for tiger salamander breeding habitat. Potential upland aestivation habitat must be provided around the breeding ponds. The upland habitat should be a buffer (an undisturbed area that protects habitat from human activities) of 200 feet that is maintained from the water's edge of individual breeding ponds. Additionally, large woody debris and/or stones should be placed within this buffer to encourage burrow construction by ground squirrels and/or gophers. No rodenticides should be used to kill any ground squirrels and/or gophers in the buffer area. No human disturbance, landscaping, irrigation, turf areas or lighting should be placed within the buffer area. No vehicles or other equipment including lawn mowers, should operate within the buffer zone. Additionally, if any nocturnal maintenance activities occur on the site, an exclusion fence must be installed and maintained to avoid "take" of tiger salamanders from vehicular activities. Additionally, mitigation 2 and 3 should be implemented.

Mitigation 2. Manage Non-Native Predator Species (primarily the bullfrog). Bullfrogs are non-native predators that reduce the long-term viability of a California tiger salamander population. A non-native predator management plan that operates for the life of the golf course operation should be implemented. The main components of this plan are to: 1) monitor all ponds for bullfrogs and other non-native predators on an annual basis, and 2) draw down any ponds that contain bullfrogs for two to three weeks in late September/early October. The timing of drawn

down will be phased to ensure that tiger salamanders will continue to have available suitable wet areas. This draining of the ponds disrupts the two-year development cycle of the bullfrog and should substantially reduce or eliminate successful reproduction by bullfrogs in this region of the ranch.

Mitigation 3. Maintain Water Quality of Breeding Ponds. Water quality should be monitored for the duration of the golf course operation by qualified personnel to ensure that golf course run-off does not impact breeding habitat for the tiger salamanders. The water quality parameters to be sampled shall be in accordance with monitoring requirements established by the Regional Water Quality Control Board and, at a minimum, shall include nitrate, ammonia, total kjehdahl nitrogen, total dissolved solids, oil and grease (parking lot runoff only), and all landscaping chemicals used by the golf course. Emergent vegetation (e.g. cattails) established around pond edges will provide at least some biological filtering of run-off water and reduce the inflow of this run-off. All parking lot drains and all subdrains beneath tees and greens that discharge into the ponds shall include filtration or other treatment measures to minimize the potential for direct discharge of golf course chemicals or other surface runoff contaminants.

Mitigation 4. Conservation Easement for California Tiger Salamanders. The project applicant could establish a conservation easement for tiger salamanders at a "to-be-determined" location. The final configuration of the easement (at least 3 acres of ponds) and associated upland aestivation habitat will depend on the final mitigation design, which will be developed in conjunction with the CDFG. This easement will be in perpetuity. A conservation easement may be purchased as a part of a larger mitigation bank. Otherwise, the owner(s) may work with a land trust, preferably in the Mt. Hamilton Range Mountains to the east, or the owner(s) could develop their own off-site mitigation easement. Any and all easements must have a legal commitment, be guaranteed management for the purposes of maintaining a California tiger salamander population, and be approved by the CDFG.

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PERSONS CONTACTED

Kevin Robins

APPENDIX A.
PLANTS OF INSTITUTE GOLF COURSE PROJECT AREA

Appendix A. Vascular Plants Observed at the Institute Golf Course, Morgan Hill, California		
FAMILY NAME	**SCIENTIFIC NAME**	**COMMON NAME**
Amaranthaceae	*Amaranthus* sp.	pigweed
Anacardiaceae	*Schinus molle*	peruvian pepper tree
Apiaceae	*Anthriscus caucalis*	bur-chervil
	Conium maculatum	poison hemlock
	Foeniculum vulgare	sweet fennel
	Torilis arvensis	torilis
	Toxicodendron diversilobum	poison oak
Apocynaceae	*Nerium oleander*	oleander
Arecaceae	*Washingtonia filifera*	California fan palm
Asteraceae	*Baccharis pilularis*	coyote brush
	Baccharis salicifolia	mule-fat
	Carduus pycnocephalus	Italian thistle
	Centaurea solstitialis	yellow star-thistle
	Chamomilla suaveolens	pineapple weed
	Chicorea endiva	endive
	Cirsium vulgare	bull thistle
	Conyza canadensis	horseweed
	Gnaphalium luteo-album	weedy cudweed
	Heterotheca grandiflora	telegraph weed
	Lactuca sp.	wild lettuce
	Picris echioides	bristly ox-tongue
	Silybum marianum	milk thistle
	Sonchus asper	prickly sow thistle
	Tragopogon porrifolius	salsify
	Xanthium spinosum	spiny cocklebur
	Xanthium strumarium	common cocklebur
Brassicaceae	*Brassica nigra*	black mustard
	Brassica rapa	field mustard
	Raphanus sativus	wild radish
	Rorippa nasturtium-aquaticum	water cress
	Sisymbrium officinale	hedge mustard
Caprifoliaceae	*Sambucus mexicana*	mexican elderberry
Chenopodiaceae	*Atriplex* sp.	saltbush
Cyperaceae	*Cyperus sp.*	nutsedge
Equisetaceae	*Equisetum sp.*	horsetail
Fabaceae	*Acacia sp.*	acacia
	Lotus corniculatus	birdfoot trefoil
	Robinia pseudoacacia	black locust
	Trifolium fragiferum	strawberry clover
	Vicia benghalensis	purple vetch
Fagaceae	*Quercus agrifolia*	coast live oak

Appendix A. Vascular Plants Observed at the Institute Golf Course, Morgan Hill, California

FAMILY NAME	SCIENTIFIC NAME	COMMON NAME
	Quercus lobata	valley oak
Geraniaceae	*Erodium botrys*	long-beaked filaree
	Erodium cicutarium	red-stemmed filaree
	Erodium moschatum	white-stemmed filaree
	Geranium dissectum	cut-leaved geranium
Juglandaceae	*Juglans hindsii*	California black walnut
	Juglans regia	English walnut
Lamiaceae	*Marrubium vulgare*	horehound
Lythraceae	*Lythrum hyssopifolium*	hyssop loosestrife
Malvaceae	*Malva nicaeensis*	bull mallow
	Malva parviflora	cheeseweed
Onagraceae	*Epilobium canum*	willow herb
	Epilobium brachycarpum	willow herb
Oxalidaceae	*Oxalis pes-caprae*	Bermuda buttercup
Plataginaceae	*Plantago lanceolata*	English plantain
Platanaceae	*Platanus racemosa*	western sycamore
Poaceae	*Avena barbata*	wild oats
	Avena fatua	wild oats
	Bromus diandrus	ripgut grass
	Bromus hordaceus	soft chess
	Cynodon dactylon	Bermuda grass
	Elymus triticoides	creeping wild-rye
	Hordeum murinum	foxtail barley
	Hordeum sp.	cultivated barley
	Lolium multiflorum	Italian ryegrass
	Phalaris aquatica	Harding grass
	Polypogon monspeliensis	rabbitfoot grass
Polygonaceae	*Polygonum sp.*	knotweed
	Rumex conglomeratus	clustered dock
Primulaceae	*Anagallis arvensis*	scarlet pimpernel
Rosaceae	*Rubus discolor*	Himalayan blackberry
Salicaceae	*Populus fremontii*	Fremont's cottonwood
	Salix sp.	willow
Taxodiaceae	*Sequoia sempervirens*	coast redwood
Typhaceae	*Typha spp.*	cattails
Ulmaceae	*Ulmus minor*	English elm
Verbenaceae	*Verbena sp.*	vervain

The species are arranged alphabetically by family name for all vascular plants encountered during the plant survey. Plants are also listed alphabetically within each family. In some cases it was not possible to accurately identify a particular plant to the species level due to the absence of specific anatomic structures required for identification.

APPENDIX B.
WILDLIFE SPECIES OF THE INSTITUTE GOLF COURSE PROJECT AREA

Appendix B. Wildlife species predicted to occur on the Institute Golf Course, Morgan Hill, California.		
Common Name	**Scientific Name**	**Status**
CLASS: AMPHIBIA		
ORDER: CAUDATA (Salamanders)		
FAMILY: AMBYSTOMATIDAE (Mole Salamanders)		
California tiger Salamander	*Ambystoma californiense*	**CSSC**
FAMILY: PLETHODONTIDAE (Lungless Salamanders)		
California Slender Salamander	*Batrachoseps attenuatus*	
Arboreal Salamander	*Aneides lugubris*	
ORDER: SALIENTIA (Frogs and Toads)		
FAMILY: BUFONIDAE (True Toads)		
Western Toad	*Bufo boreas*	
FAMILY: HYLIDAE (Treefrogs and Relatives)		
Pacific Treefrog	*Hyla regilla*	
FAMILY: RANIDAE (True Frogs)		
California red-legged frog	*Rana aurora draytonii*	**FT**
Bullfrog	*Rana catesbeiana*	
CLASS: REPTILIA		
ORDER: TESTUDINATA (Turtles)		
FAMILY: EMYDIDAE (Pond and Marsh Turtles)		
Western Pond Turtle	*Clemmys marmorata*	**CSSC**
ORDER: SQUAMATA (Lizards and Snakes)		
SUBORDER: SAURIA (Lizards)		
FAMILY: IGUANIDAE (Iguanids)		
Western Fence Lizard	*Sceloporus occidentalis*	
FAMILY: SCINCIDAE (Skinks)		
Western Skink	*Eumeces skiltonianus*	
FAMILY: ANGUIDAE (Alligator Lizards and Relatives)		
Southern Alligator Lizard	*Elgaria multicarinata*	
FAMILY: COLUBRIDAE (Colubrids)		
Racer	*Coluber constrictor*	
Gopher Snake	*Pituophis melanoleucus*	
Common Kingsnake	*Lampropeltis getula*	
Common Garter Snake	*Thamnophis sirtalis*	
Western Terrestrial Garter Snake	*Thamnophis elegens*	
Western Aquatic Garter Snake	*Thamnophis atratus*	
FAMILY: VIPERIDAE (Vipers)		
Western Rattlesnake	*Crotalus viridis*	
CLASS: AVES		
ORDER: CICONIIFORMES (Herons, Storks, Ibises, and Relatives)		
FAMILY: ARDEIDAE (Herons and Bitterns)		
Great Blue Heron	*Ardea herodias*	
Great Egret	*Ardea alba*	
Snowy Egret	*Egretta thula*	
Green Heron	*Butorides striatus*	
Black-crowned Night Heron	*Nycticorax nycticorax*	
FAMILY: CATHARTIDAE (New World Vultures)		
Turkey Vulture	*Cathartes aura*	
ORDER: FALCONIFORMES (Vultures, Hawks, and Falcons)		

Appendix B. Wildlife species predicted to occur on the Institute Golf Course, Morgan Hill, California.		
Common Name	**Scientific Name**	**Status**
FAMILY: ACCIPITRIDAE (Hawks, Old World Vultures, and Harriers)		
White-tailed Kite	*Elanus caeruleus*	**SP**
Northern Harrier	*Circus cyaneus*	**CSSC**
Sharp-shinned hawk	*Accipiter striatus*	**CSSC**
Cooper's Hawk	*Accipiter cooperii*	**CSSC**
Red-shouldered Hawk	*Buteo lineatus*	
Red-tailed Hawk	*Buteo jamaicensis*	
Ferruginous Hawk	*Buteo regalis*	**CSSC**
Golden Eagle	*Aquila chrysaetos*	**CSSC, SP**
FAMILY: FALCONIDAE (Caracaras and Falcons)		
American Kestrel	*Falco sparverius*	
Merlin	*Falco columbarius*	**CSSC**
American Peregrine Falcon	*Falco peregrinus anatum*	**FE, SE, SP**
Prairie Falcon	*Falco mexicanus*	**CSSC**
ORDER: GALLIFORMES (Megapodes, Currassows, Pheasants, and Relatives)		
FAMILY: PHASIANIDAE (Old World Quails, Pheasants, and Relatives)		
Ring-necked Pheasant	*Phasianus colchicus*	
Wild Turkey	*Meleagris gallopavo*	
FAMILY: ODONTOPHORIDAE (New World Quails)		
California Quail	*Callipepla californica*	
ORDER: CHARADRIIFORMES (Shorebirds, Gulls, and Relatives)		
FAMILY: CHARADRIIDAE (Plovers and Relatives)		
Semipalmated Plover	*Charadrius semipalmatus*	
Killdeer	*Charadrius vociferus*	
FAMILY: RECURVIROSTRIDAE (Avocets and Stilts)		
Black-necked Stilt	*Himantopus mexicanus*	
American Avocet	*Recurvirostra americana*	
FAMILY: SCOLOPACIDAE (Sandpipers and Relatives)		
Greater Yellowlegs	*Tringa melanoleuca*	
Lesser Yellowlegs	*Tringa flavipes*	
Western Sandpiper	*Calidris mauri*	
Least Sandpiper	*Calidris minutilla*	
Spotted Sandpiper	*Actitis macularia*	
FAMILY: LARIDAE (Gulls and Terns)		
Ring-billed Gull	*Larus delawarensis*	
California Gull	*Larus californicus*	**CSSC**
Herring Gull	*Larus argentatus*	
ORDER: COLUMBIFORMES (Pigeons and Doves)		
FAMILY: COLUMBIDAE (Pigeons and Doves)		
Rock Dove	*Columba livia*	
Band-tailed Pigeon	*Columba fasciata*	
Mourning Dove	*Zenaida macroura*	
ORDER: STRIGIFORMES (Owls)		
FAMILY: TYTONIDAE (Barn Owls)		
Barn Owl	*Tyto alba*	
FAMILY: STRIGIDAE (Typical Owls)		
Western Screech Owl	*Otus kennicottii*	
Great Horned Owl	*Bubo virginianus*	
Burrowing Owl	*Athene cunicularia*	**CSSC**

Appendix B. Wildlife species predicted to occur on the Institute Golf Course, Morgan Hill, California.

Common Name	Scientific Name	Status
ORDER: APODIFORMES (Swifts and Hummingbirds)		
FAMILY: APODIDAE (Swifts)		
Vaux's Swift	*Chaetura vauxi*	CSSC
White-throated Swift	*Aeronautes saxatalis*	
FAMILY: TROCHILIDAE (Hummingbirds)		
Anna's Hummingbird	*Calypte anna*	
Rufous Hummingbird	*Selasphorus rufus*	
Allen's Hummingbird	*Selasphorus sasin*	
ORDER: PICIFORMES (Woodpeckers and Relatives)		
FAMILY: PICIDAE (Woodpeckers)		
Acorn Woodpecker	*Melanerpes formicivorous*	
Red-breasted Sapsucker	*Sphyrapicus ruber*	
Nuttall's Woodpecker	*Picoides nuttallii*	
Downy Woodpecker	*Picoides pubescens*	
Northern Flicker	*Colaptes auratus*	
ORDER: PASSERIFORMES (Perching Birds)		
FAMILY: TYRANNIDAE (Tyrant Flycatchers)		
Western Wood-Pewee	*Contopus sordidulus*	
Willow Flycatcher	*Empidonax traillii*	SE
Pacific-slope Flycatcher	*Empidonax difficilis*	
Black Phoebe	*Sayornis nigricans*	
Say's Phoebe	*Sayornis saya*	
Western Kingbird	*Tyrannus verticalis*	
FAMILY: LANIIDAE (Shrikes)		
Loggerhead Shrike	*Lanius ludovicianus*	CSSC
FAMILY: VIREONIDAE (Typical Vireos)		
Hutton's Vireo	*Vireo huttoni*	
FAMILY: CORVIDAE (Jays, Magpies, and Crows)		
Steller's Jay	*Cyanocitta stelleri*	
Western Scrub-jay	*Aphelocoma californica*	
Yellow-billed Magpie	*Pica nuttalli*	
American Crow	*Corvus brachyrhynchos*	
Common Raven	*Corvus corax*	
FAMILY: MONARCHIDAE (Monarch Flycatchers)		
Western Bluebird	*Sialia mexicana*	
Swainson's Thrush	*Catharus ustulatus*	
Hermit Thrush	*Catharus guttatus*	
American Robin	*Turdus migratorius*	
FAMILY: ALAUDIDAE (Larks)		
California Horned Lark	*Eremophila alpestris actia*	CSSC
FAMILY: HIRUNDINIDAE (Swallows)		
Tree Swallow	*Tachycineta bicolor*	
Violet-green Swallow	*Tachycineta thalassina*	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	
Barn Swallow	*Hirundo rustica*	
Cliff Swallow	*Petrochelidon pyrrhonota*	
FAMILY: PARIDAE (Titmice)		
Chestnut-backed Chickadee	*Poecile rufescens*	
FAMILY: AEGITHALIDAE (Bushtit)		
Bushtit	*Psaltriparus minimus*	

Appendix B. Wildlife species predicted to occur on the Institute Golf Course, Morgan Hill, California.		
Common Name	**Scientific Name**	**Status**
FAMILY: SITTIDAE (Nuthatches)		
White-breasted Nuthatch	*Sitta carolinensis*	
FAMILY: TROGLODYTIDAE (Wrens)		
Bewick's Wren	*Thryomanes bewickii*	
House Wren	*Troglodytes aedon*	
FAMILY: REGULIDAE (Kinglets)		
Ruby-crowned Kinglet	*Regulus calendula*	
FAMILY: MIMIDAE (Mockingbirds and Thrashers)		
Northern Mockingbird	*Mimus polyglottos*	
California Thrasher	*Toxostoma redivivum*	
FAMILY: STURNIDAE (Starlings)		
European Starling	*Sturnus vulgaris*	
FAMILY: MOTACILLIDAE (Wagtails and Pipits)		
American Pipit	*Anthus rubescens*	
FAMILY: BOMBYCILLIDAE (Waxwings)		
Cedar Waxwing	*Bombycilla cedrorum*	
FAMILY: PARULIDAE (Wood Warblers)		
Orange-crowned Warbler	*Vermivora celata*	
Nashville Warbler	*Vermivora ruficapilla*	
Yellow Warbler	*Dendroica petechia*	**CSSC**
Yellow-rumped Warbler	*Dendroica coronata*	
Townsend's Warbler	*Dendroica townsendi*	
Common Yellowthroat (Saltmarsh subspecies)	*Geothlypis trichas* (*sinuosa*)	**CSSC**
Wilson's Warbler	*Wilsonia pusilla*	
FAMILY: EMBERIZIDAE (Emberizines)		
Spotted Towhee	*Pipilo maculatus*	
California Towhee	*Pipilo crissalis*	
Rufous-crowned Sparrow	*Aimophila ruficeps*	
Lark Sparrow	*Chondestes grammacus*	
Savannah Sparrow	*Passerculus sandwichensis*	
Grasshopper Sparrow	*Ammodramus savannarum*	
Fox Sparrow	*Passerella iliaca*	
Song Sparrow	*Melospiza melodia*	
White-crowned Sparrow	*Zonotrichia leucophrys*	
Golden-crowned Sparrow	*Zonotrichia atricapilla*	
Lincoln's Sparrow	*Melospiza lincolnii*	
Dark-eyed Junco	*Junco hyemalis*	
FAMILY: CARDINALIDAE (Cardinals, Grosbeaks, and Relatives)		
Lazuli Bunting	*Passerina amoena*	
Black-headed Grosbeak	*Pheucticus melanocephalus*	
FAMILY: ICTERIDAE (Icterines)		
Red-winged Blackbird	*Agelaius phoeniceus*	
Tricolored Blackbird	*Agelaius tricolor*	**CSSC**
Brewer's Blackbird	*Euphagus cyanocephalus*	
Western Meadowlark	*Sturnella neglecta*	
Brown-headed Cowbird	*Molothrus ater*	
Bullock's Oriole	*Icterus bullockii*	
FAMILY: FRINGILLIDAE (Finches)		
Purple Finch	*Carpodacus purpureus*	
House Finch	*Carpodacus mexicanus*	

Appendix B. Wildlife species predicted to occur on the Institute Golf Course, Morgan Hill, California.

Common Name	Scientific Name	Status
Pine Siskin	*Carduelis pinus*	
Lesser Goldfinch	*Carduelis psaltria*	
American Goldfinch	*Carduelis tristis*	
FAMILY: PASSERIDAE (Weaver Finches)		
House Sparrow	*Passer domesticus*	
CLASS: MAMMALIA		
ORDER: MARSUPIALIA (Opossums, Kangaroos, and Relatives)		
FAMILY: DIDELPHIDAE (Opossums)		
Virginia Opossum	*Didelphis virginiana*	
ORDER: INSECTIVORA (Shrews and Moles)		
FAMILY: SORICIDAE (Shrews)		
Vagrant Shrew	*Sorex vagrans*	
Ornate Shrew	*Sorex ornatus*	
Trowbridge's Shrew	*Sorex trowbridgii*	
FAMILY: TALPIDAE (Moles)		
Broad-footed Mole	*Scapanus latimanus*	
ORDER: CHIROPTERA (Bats)		
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)		
Yuma Myotis	*Myotis yumanensis*	
Long-eared Myotis	*Myotis evotis*	
California Myotis	*Myotis californicus*	
Western Pipistrelle	*Pipistrellus hesperus*	
Big Brown Bat	*Eptesicus fuscus*	
Hoary Bat	*Lasiurus cinereus*	
Townsend's Big-eared Bat	*Corynorhinus townsendii townsendii*	CSSC
FAMILY: ANTROZOIDAE (Pallid Bat)		
Pallid Bat	*Antrozous pallidus*	CSSC
FAMILY: MOLOSSIDAE (Free-tailed Bat)		
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	
ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)		
FAMILY: LEPORIDAE (Rabbits and Hares)		
Brush Rabbit	*Sylvilagus bachmani*	
Desert Cottontail	*Sylvilagus audubonii*	
Black-tailed Hare	*Lepus californicus*	
ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)		
FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)		
California Ground Squirrel	*Spermophilus beecheyi*	
FAMILY: GEOMYIDAE (Pocket Gophers)		
Botta's Pocket Gopher	*Thomomys bottae*	
FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)		
Western Harvest Mouse	*Reithrodontomys megalotis*	
California Mouse	*Peromyscus californicus*	
Deer Mouse	*Peromyscus maniculatus*	
San Francisco Dusky-footed Woodrat	*Neotoma fuscipes annectens*	CSSC
California Vole	*Microtus californicus*	
FAMILY: MURIDAE (Old World Rats and Mice)		
Black Rat	*Rattus rattus*	
Norway Rat	*Rattus norvegicus*	
House Mouse	*Mus musculus*	

Appendix B. Wildlife species predicted to occur on the Institute Golf Course, Morgan Hill, California.		
Common Name	**Scientific Name**	**Status**
ORDER: CARNIVORA (Carnivores)		
FAMILY: CANIDAE (Foxes, Wolves, and Relatives)		
Coyote	*Canis latrans*	
Red Fox	*Vulpes vulpes*	
Gray Fox	*Urocyon cinereoargenteus*	
FAMILY: PROCYONIDAE (Raccoons and Relatives)		
Ringtail	*Bassariscus astutus*	**SP**
Raccoon	*Procyon lotor*	
FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)		
Long-tailed Weasel	*Mustela frenata*	
Striped Skunk	*Mephitis mephitis*	
FAMILY: FELIDAE (Cats)		
Bobcat	*Lynx rufus*	
ORDER: ARTIODACTYLA		
FAMILY: SUIDAE (Pigs)		
Wild Pig	*Sus scrofa*	
FAMILY: CERVIDAE (Deer, Elk, and Relatives)		
Black-tailed Deer	*Odocoileus hemionus columbianus*	

SPECIAL STATUS SPECIES CODE DESIGNATIONS

FE = Federally listed Endangered
FT = Federally listed Threatened
SE = State listed Endangered
ST = State listed Threatened
FPE = Federally Proposed Endangered
FPT = Federally Proposed Threatened
FPD = Federally Proposed for Delisting
SCE = State Candidate Endangered
SCT = State Candidate Threatened
FC = Federal Candidate. Sufficient biological information to support a proposal to list the species as Endangered or Threatened
CSSC = California Species of Special Concern
SP = State Protected Species
ESU = Evolutionarily Significant Unit

APPENDIX C.
USFWS LETTER OF JULY 15, 2003

United States Department of the Interior
Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

PLANNING DEPT.
JUL 17 2003
CITY OF MORGAN HILL

IN REPLY REFER TO:
1-1-03-TA-2369

JUL 15 2003

Mr. Jim Rowe
City of Morgan Hill
Planning Department
17555 Peak Avenue
Morgan Hill, California 95037

Subject: Institute Golf Course Draft EIR Clarification of Offsite and Onsite Mitigation Measures, Santa Clara County, California

Dear Mr. Rowe:

This letter details mitigation the applicant will conduct to offset effects of serpentine soil and California red-legged frog (*Rana aurora draytonii*) (red-legged frog) and California tiger salamander (*Ambystoma californiense*) (tiger salamander) habitat lost during the 1997 reconstruction of the pre-existing 9-hole golf course to an 18-hole course, which was completed without proper environmental review. We submitted a letter to the City of Morgan Hill during the formal comment period for the Draft EIR, however, at that time, the applicant and the Fish and Wildlife Service (Service) had not completed discussions regarding the subject mitigation. This letter is based on discussions and tentative agreement between the applicant and the Service.

Serpentine Soil Impacts

The subject property has approximately 80 acres of soil containing serpentine inclusions. Soils with serpentine inclusions may support serpentine soil dependant plants and animals, many of which are federally listed species, such as the endangered coyote ceanothus (*Ceanothus ferrisae*) and Santa Clara Valley dudleya (*Dudleya setchellii*), and the threatened bay checkerspot butterfly (*Euphydryas editha bayensis*). Santa Clara Valley dudleya has been observed less than a mile from the project site and the bay checkerspot butterfly has been observed within 2 miles of the golf course (California Department of Fish and Game, Natural Diversity Database). By 1997, much of this serpentine soil habitat had been graded by the previous owners, to accommodate a housing project which was never built. Of the total serpentine soil area, a total of 25.5 acres was graded by the applicant and converted to turf. Rare plant and animal surveys were not conducted prior to the 1997 reconstruction by the applicant. However, these species could have occurred on-site and the conditions are currently such that their growth will no longer be supported on most of the site.

We have evaluated the quality of serpentine habitat lost and determined that the applicant should mitigate for this loss by purchasing habitat off-site at a two to one ratio. The applicant should purchase 51 acres of currently unprotected serpentine soil habitat and fund its management as habitat for serpentine-dependant species in perpetuity. The Service and the applicant have coordinated with staff from the Santa Clara Valley Transportation Authority (VTA) who are currently pursuing a purchase of about 1,500 acres, which includes serpentine soil habitat, for use as mitigation. Although VTA and other public and private entities plan to utilize much of this habitat as mitigation for their past and future projects, 35 acres would remain which function as serpentine soil and red-legged frog habitat and could be used as mitigation for other projects. Due to the quality of this mitigation habitat and its importance for protection, if the applicant agrees to purchase and manage this remaining acreage, the Service would agree to accept this acreage as sufficient compensation for serpentine soil habitat impacted by the applicant. If the applicant chooses to purchase serpentine soil habitat elsewhere, it may be appropriate for the applicant to compensate with a total of 51 acres.

California Red-legged Frog and California Tiger Salamander Habitat Impacts
Surveys for red-legged frogs and tiger salamanders were not conducted prior to the 1997 reconstruction. However, judging from aerial photography taken pre-1997 and because the applicant did not alter very much the riparian corridor within which they are now found, it is very likely that red-legged frogs were present on the project site prior to 1997. In 2001, a California Department of Fish and Game biologist identified larvae and sub-adult red-legged frogs in Corralitos Creek within the project site. All of the ponds on-site offer either breeding or summer refugia habitat for the species. Since no long-term monitoring occurred pre-1997 or since 1997, we cannot say with certainty how well red-legged frogs currently on the site are surviving with the reconfiguration of ponds on-site or with other typical golf course stresses, such as fertilizer use, golfer foot and cart traffic, and invasion of bullfrogs.

Prior to being graded and converted to turf by the applicant, the uplands between aquatic sites would have functioned as foraging and dispersal habitat. Existing conditions do not provide appropriate upland refugia for foraging and dispersing red-legged frogs either in the turf, which is routinely mowed and fertilized, or in the narrow bands of tall, non-native trees. Although some red-legged frog habitat was destroyed prior to 1997, we have reviewed aerial photography and counted only habitat within 500 feet of Corralitos Creek and determined that the applicant destroyed 25.6 acres of red-legged frog upland foraging and dispersal habitat.

We also have evaluated the quality of red-legged frog habitat lost and determined that the applicant should mitigate for the loss by purchasing habitat off-site in a two to one ratio. The applicant should purchase 51.2 acres of currently unprotected red-legged frog upland habitat and fund its management as habitat for the red-legged frog in perpetuity. If the applicant purchases the 35 acres described above which support both serpentine species and red-legged frog, the applicant may receive red-legged frog credit. However, the applicant would remain responsible for fulfilling the additional 16.2 acre red-legged frog habitat obligation. Surplus red-legged frog acres likely will be available through the purchase of the Castle and Cooke property being led by

VTA. We encourage the applicant to coordinate closely with VTA and the other involved parties to partake in this preservation opportunity.

In September 2001, Dr. Mark Jennings observed a metamorphosing tiger salamander entering a culvert near a pond at the southwestern corner of the project site. The species is known to currently occupy the project site and likely occupied the site prior to 1997 as well. The tiger salamander was officially proposed for listing as a threatened species on May 23, 2003 (68 **FR** 28647). Although the Act does not afford the tiger salamander the same protections provided to federally listed animals, we are monitoring their status and acknowledge that the measures taken to compensate for destroyed red-legged frog habitat will partially compensate for effects which occurred to tiger salamander habitat as well.

On-site, the applicant should set back fairways to restore the riparian corridor along Corralitos Creek and its tributaries. A riparian buffer shall be planted and maintained on each side of the creek and be an average of 70 feet and a minimum of 30 feet wide, measured from the centerline of the creek. The buffer widths shall be as depicted in the enclosed Exhibit A.

During discussions with the Service regarding the golf course's need for incidental take coverage of listed species, the applicant informed the Service that they would be discussing with the U.S. Army Corps of Engineers (Corps), a design plan for the addition of a bridge or culvert on the golf course. The applicant hopes that the Corps would serve as a Federal nexus at that point to initiate section 7 consultation with the Service on listed species issues at the site. At the time of section 7 consultation, we expect to work with the applicant further to identify ways of avoiding and minimizing effects to listed species resulting from the ongoing use and maintenance of the golf course.

In summary, the Service believes that the measures described above appropriately compensate for the loss of habitat which occurred from the 1997 reconstruction. The Service will work with the applicant to facilitate the purchase of 35 acres of serpentine soil habitat and 51.2 acres of red-legged frog habitat on the Castle and Cooke property, or any other area which adequately compensates for the project's impacts.

If you have further questions regarding this letter, please contact Valary Bloom or Dan Buford at (916) 414-6625.

Sincerely,

Doug Weinrich

Doug Weinrich
Acting Chief, Endangered Species Program

Enclosure
cc:

CDFG, Monterey, CA, (Attn: Dave Johnston)
Caltrans, District 4, Oakland, CA (Attn: Margaret Gabil)

← Z

Exhibit A- Riparian Buffer

The outermost extent of the riparian buffer is depicted by the (outermost) solid line. Where no outer solid line is present along the southernmost tributary, the outermost extent of the buffer is depicted by the outermost dashed line.

Appendix C-2

Focused Surveys for Special Status Plants,
RCL Ecology

RCL ECOLOGY

MAR 1 6 2003
OF MORGAN HILL

November 27, 2002

Jim Rowe
Planning Department
City of Morgan Hill
17555 Peak Avenue
Morgan Hill, CA 95037-4128

Re: Institute Golf Course EIR-Report of Focused Surveys for Special-Status Plants

Dear Jim:

I am enclosing four copies of the report of focused surveys for 21 special-status plants on the Institute Golf Course. As you will recall, the earlier reconnaissance-level surveys (H.T. Harvey and Associates, 2002) were limited to only a portion of the blooming season (July 2000 and April 2001). Therefore, they could not rule out the presence of these species, and called for focused surveys during the entire spring-fall season to cover the blooming period of each plant. The Institute elected to contract with RCL Ecology to complete the surveys so that the study results could be included in the EIR. These surveys have just now been concluded. Although 14 additional species were recorded, none of the special-status plants were observed during the study, and are therefore, considered to be absent from the site. The report describes the project site, plant habitats, methods used, and provides further information on survey results.

Please call me at 925-672-0563 if you have any questions or require further information.

Sincerely,

Randy

Randall C. Long

cc. David Moser, Ebbin, Moser, and Skaggs

329 Mt. Palomar Pl. • Clayton, CA 94517
Office: 925-672-0563 • Cell: 925-408-8449
Fax: 925-672-2559 • Email: rcliml@juno.com

REPORT OF SURVEYS FOR SPECIAL-STATUS PLANTS

Institute Golf Course,
Morgan Hill, CA

November 2000

Prepared For:

The Institute LLC
14830 Foothill Ave.
Morgan Hill, CA 95037

Prepared By:

RCL Ecology
329 Mt. Palomar Place
Clayton, CA 94517
925-672-0563

I. INTRODUCTION

RCL Ecology conducted focused surveys for 21 special-status plants previously thought to have potential to occur within portions of the Institute Golf Course (H.T. Harvey and Associates, 2001). As the earlier reconnaissance-level surveys (July 2000 and April 2001) were limited to only a portion of the blooming periods of the special-status species, they could not rule out their presence, and called for focused surveys during the entire spring-fall season to cover the blooming period of each of the plants. In coordination with the City of Morgan Hill (personal communication with Jim Rowe), and the City's EIR consultant (Demitri Loukas, David J. Powers and Associates), the Institute elected to contract with RCL Ecology to complete the surveys so that the study results could be included in the EIR process. These surveys, covering the entire spring, summer, and fall blooming species, identified 14 additional common species, but found no occurrence of the special-status plants, and therefore, RCL Ecology assumes that they do not occur within the project area. This report describes the project site, plant habitats, methods used, and provides further information on survey results.

II. PROJECT LOCATION

The Institute Golf Course is located approximately 1.5-miles east of Highway 101 at the southern end of the City of Morgan Hill, California. The site is bound by Maple Avenue on the north, Foothill Avenue on the west, and residential lots on the south and east. The area corresponds to un-sectioned portions of Township 9 south, Range 3 east, of the "Gilroy, California" 7.5-minute topographic quadrangle, U.S. Department of the Interior, Geological Survey (Figure 1 – *Site and Vicinity*).

III. METHODS

RCL Ecology surveys followed the guidelines approved by the California Native Plant Society and the California Department of Fish and Game (Nelson, 1994). These guidelines recommend that (1) surveys be conducted at the appropriate time of the year (i.e. blooming periods) for proper identification, and (2) that surveys by floristic, that is, all species are recorded and identified to a taxonomic level to ensure that the specimen is not a special-status species. To ensure that all possible special-status species were addressed, RCL Ecology reviewed the H.T. Harvey and Associates report as well as the California National Diversity Data Base (CNDD) Rare Find computer program for special-status plant occurrences within the Gilroy and surrounding quadrangles (Morgan Hill, Mount Madonna, Gilroy, Mount Sizer, Santa Teresa Hills, Chittenden, and Watsonville East).

RCL Ecology biologist Randall Long performed the field studies during the months of March-November 2002, by walking meandering transects through the various habitats and recording all species observed (Appendix A-*List of Plant Species Observed in the Project Area*). All plants that could not readily be identified were collected for later identification under microscope by plant ecologist Michael Long. Scientific names used in this report follow The Jepson Manual.

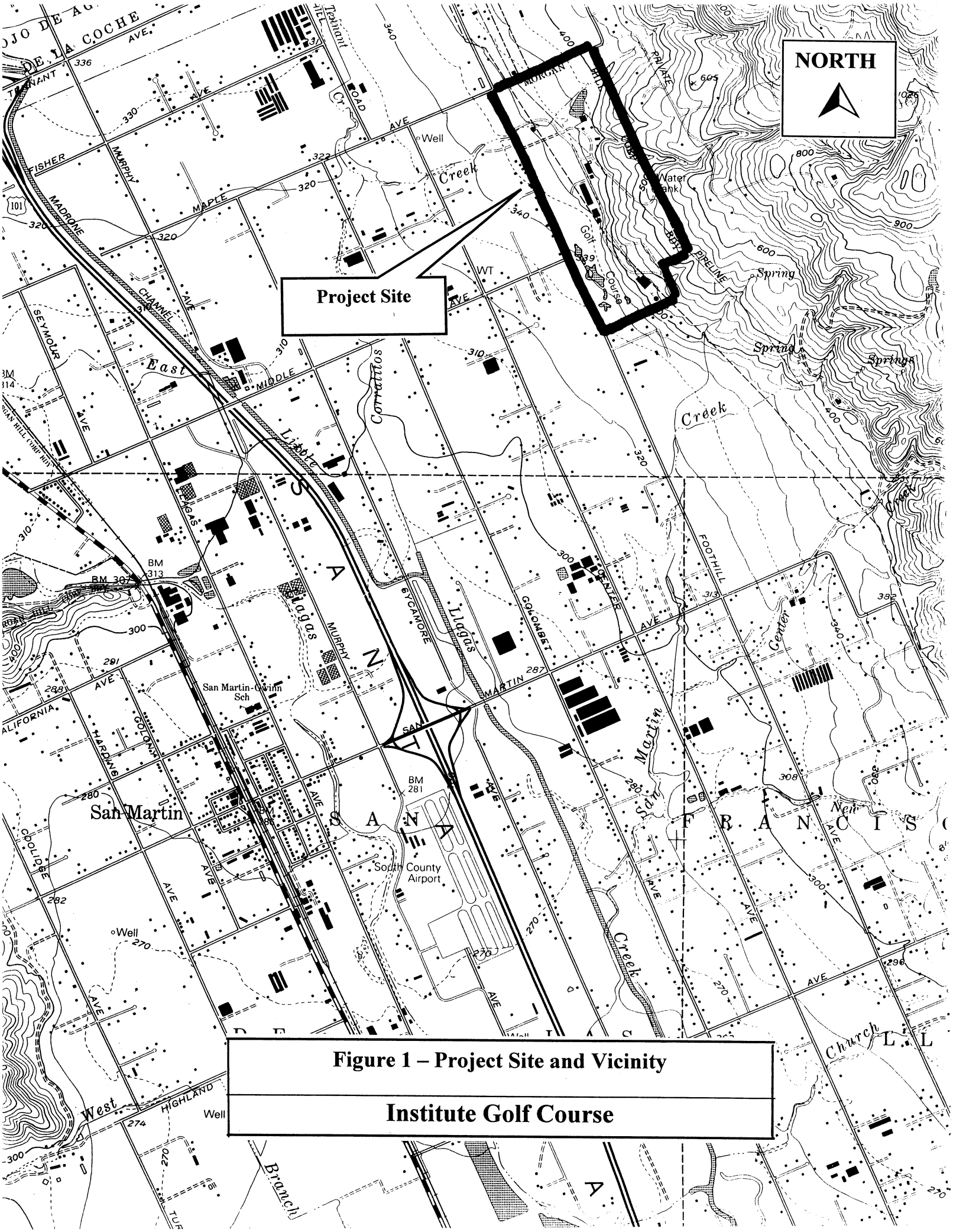

Figure 1 – Project Site and Vicinity

Institute Golf Course

IV. VEGETATIVE TYPES

The primary non-golf course vegetative types occurring on the property consist of ruderal/non-native grassland, coast live oak riparian woodland, riparian drainage/ seasonal wetland and upland woodland.

Ruderal/non-native grassland

This type occurs in small, scattered areas such as along fence lines, adjacent to buildings, parking lots, and other features on the site. Common grasses in these areas are wild oat (*Avena fatua*), soft chess (*Bromus hordaceus*), and Italian ryegrass (*Lolium multiflorum*). Common ruderal forbs include star thistle *(Centaurea solstitialis),* bristly ox-tongue *(Picris echioides*), and bull thistle (*Cirsium vulgare*). Currently, the majority of these areas are used for stockpiling materials used in maintenance or landscaping the golf course. These uses, such as sod nursery, rock storage, and storage of tree planting stock, keep the areas in a nearly continual state of disturbance as materials are transferred to and from the sites. Most other portions are mowed for weed control.

Coast live oak riparian woodland

This area occurs along the western portions of Corralitos Creek and two adjacent tributaries with the largest, most intact section occurring within the main stem of the creek from the eastern boundary of the property to just below the residence. This portion consists of a well-developed overstory of coast live oak (*Quercus agrifolia*), California sycamore (*Plantanus racemosa*), valley oak (*Quercus lobata*), California black walnut (*Juglans californica var. hindsii*); and a thick understory of saplings of these species as well as shrubs such as poison oak (*Toxicodendron diversilobum*), and Himalayan blackberry (*Rubus discolor*). The shaded forest floor also supports several species of forbs such torilis (*Torilis nodosa*), heart-podded hoary cress (*Cardaria draba*), and greater periwinkle (*Vinca major*).

While it appears that this vegetative type originally formed a continuous riparian corridor along the main stem and northern tributaries, management actions predating the golf course, removed several sections of riparian cover within the upper tributaries as well as most of the riparian downstream (RCL Ecology/ Rana Resources, 2002).

Riparian drainage/ seasonal wetland

This area, from the convergence of Corralitos Creek and tributaries, downstream to the western boundary of the property, is composed of scattered, discontinuous sections of native, and introduced trees and shrubs with larger sections devoid of any woody riparian vegetation. Introduced trees and shrubs along this reach include English elm (*Ulmus minor*), blue gum eucalyptus (*Eucalyptus globulus*), Peruvian/ California pepper tree (*Schinus molle*), Acacia (*Acacia* sp.), almond (*Prunus dulcis*) and oleander (*Nerium oleander*). Understory grasses include creeping wild-rye (*Elymus triticoides*), Bermuda

grass (*Cynodon dactylon*), cultivated barley (*Hordeum* sp.), and timothy, (*Phleum pratense*). Common forbs include poison hemlock (*Conium maculatum*), virgate tarweed (*Holocarpha virgata ssp. virgata*), and sweet fennel (*Foeniculum vulgare*).

A seasonal wetland is located within the lower portion of the drainage just above the concrete drop structure. Cluster dock (*Rumex conglomeratus*), willow dock (*Rumex salicifolius*), and horehound (*Marrubium vulgare*) are predominate in this area.

Upland woodland

Dense stands of both planted coniferous and deciduous trees line the fairways and property boundaries. These stands consisting of coast redwood (*Sequoia sempervirens*), Monterey pine (*Pinus radiata*), Colorado blue spruce (*Picea pungens*), Douglas fir (*Pseudotsuga menziesii*), coast live oak, interior live oak (*Quercus wislizeni*), purple-leaved plum (*Prunus cerasifera atropurpurea*), and cypress (*Cupressus sp.*), are heavily mulched, which combined with close spacing, precludes most understory vegetation.

V. RESULTS OF SURVEY

Although 14 additional common species (Appendix A) were identified, no special-status species were observed during the focused surveys. Prior to conversion to golf course, the approximate 192-acre site had a long history of disturbance for a variety of intensive uses such as hay-farming, amusements, hotel, restaurant, parking lots, grading for residential development, airplane runway, airplane hanger, and various shops for wood working and welding, etc. (RCL Ecology/ Rana Resources, 2002). Therefore, even though only approximately 150 acres are in actual golf course, most of the remaining acreage not only retains the signs of past disturbance, but also is currently intensively managed in support of golf course maintenance and improvement. Due to the previous disturbance, current intensive uses, the small amount of suitable habitat remaining, and negative results of focused surveys, RCL Ecology concludes that none of the special-status plants shown below occur within the project area.

VI. SPECIES DESCRIPTIONS

A list of the special-status plants, their status, habitats, and blooming periods is shown below.

Table 1 – Special-Status Plants Considered for Occurrence Within the Project Site

NAME	STATUS	HABITAT	BLOOMING PERIOD
Tiburon Indian paintbrush *Castilleja affinis ssp. neglecta*)	FE, ST, CNPS 1B	Valley and foothill grasslands with serpentine soils	April-June
Coyote ceanothus (*Ceanothus ferrisae*)	FE, CNPS 1B	Valley and foothill grasslands With serpentine soils	Jan-March
Santa Clara dudleya *(Dudleya setchellii)*	FE, CNPS 1B	Valley and foothill grassland with serpentine soils	May-June

Metcalf canyon jewelflower (*Streptanthus albidus ssp. albidus*)	FE, CNPS 1B	Valley and foothill grassland with serpentine soils	April-July
Wooly-headed lessingia (*Lessingia hololeuca*)	CNPS 3	Coastal scrub, lower montane coniferous forest, valley and foothill grasslands	June-October
Smooth lessingia (*Lessengia micradenia var. glabrata*)	CNPS 1B	Chaparral habitat with serpentine soils, often along roadsides	Aug-Nov
Serpentine linanthus *(Linanthus amgbigus*)	CNPS 4	Cismontane woodland, coastal scrub, valley and foothill grassland w/serpentine soils	Mar-May
Gairdner's yampah (*Perideridea gairdneri ssp gairdneri)*	CNPS 4	Mesic conditions in upland forest, chaparral, valley and foothill grasslands and vernal pools	June-October
Lobb's aquatic buttercup (*Ranunculus lobbii*)	CNPS 4	Mesic habitat in cismontane woodlands, north coast coniferous forests, valley and foothill grasslands and vernal pools	Mar-May
Most beautiful jewelflower (*Streptanthus albidus ssp. peramoenus*)	CNPS 1B	Chaparral, valley and foothill grasslands w/serpentine soils	Apr-June
San Joaquin spearscale (*Atriplex joaquiniana*)	CNPS 1B	Chenopod scrub, valley and foothill grassland with alkaline soils	Apr-September
Mexican mosquito fern (*Azolla mexicana)*	CNPS 4	Marshes and swamps with ponding or slow moving water.	August
Big-scale balsamroot (Balsamorhiza macrolepsis var. macrolepsis)	CNPS 1B	Cismontane woodland, valley and foothill grasslands below 1,400 meters on alkaline soils	Mar-June
Oakland star-tulip (*Calochortus umbellatus*)	CNPS 4	Broadleaved upland forests, valley and foothill grasslands lower montane forests, often on serpentine substrates	Mar-May
Mount Hamilton thistle *(Cirsium fontinale var. campylon*)	CNPS 1B	Serpentine seeps in chaparral, cismontane woodland, valley and foothill grasslands	Apr-October
Brewer's clarkia (*Clarkia breweri*)	CNPS 4	Chaparral, cismontane woodland	Apr-May
Santa Clara red ribbons (*Clarkia concinna ssp. automixa*)	CNPS 1B	Cismontane woodland on slopes and drainages	Apr-July
Jepson's wooly sunflower (*Eriophyllum jepsonii)*	CNPS 4	Chaparral, coastal scrub, and cismontane woodlands on dry rocky slopes	Apr-June
San Francisco wallflower (*Erysimum franciscanum*)	CNPS 4	Coastal dunes, coastal scrub, valley and foothill grasslands with serpentine substrates	Mar-June
Fragrant fritillary (*Fritillaria liliacea*)	CNPS 1B	Coastal prairie, coastal scrub, valley and foothill grasslands on serpentine substrates	Feb-April
Congdon's tarplant *(Hemizonia* parryi ssp. congdonii)	CNPS 1B	Valley and foothill grasslands with alkaline soils in depressions	June-Nov

Key:

Federally listed-Endangered
State listed-Threatened
California Native Plant Society:
1B – Plants rare, threatened, or endangered on California and elsewhere
3 - Plants about which more information is needed, a review list
4 - Plants of limited distribution, a watch list.

VII. PERSONAL COMMUNICATION AND REFERENCES CITED

Personal communication between Randy Long and Demetri Loukas (David J. Powers and Associates), regarding the status of focused plant surveys, June 5, 2002.

Personal communication between Randy Long and Jim Rowe, City of Morgan Hill, regarding the status of focused plant surveys, August 13, 2002.

H.T. Harvey and Associates 2001. *Institute Golf Course Draft Environmental Impact Report, Biological Resources Section.*

Nelson, J.R., 19994. *Guidelines for Assessing Effects of Proposed Developments on Rare Plants and Plant Communities*, In M.W. Skinner and B.M. Pavlik, California Native Plant Society's' *Inventory of Rare Plants and Endangered Vascular Plants of California*, Special Publication No. 1, Fifth Edition, February 1994.

Hickman, J.C., ed. 1993. *The Jepson Manual, Higher Plants of California*. University of California Press.

RCL Ecology/ Rana Resources, 2002. *Analysis of Pre-and Post Development Habitat Conditions for Special-Status Amphibians and Reptiles at the Institute Golf Course.*

VIII. APPENDIX

Figure 1 – Project Site and Vicinity

Appendix A – Plant Species Observed on the Project Site

APPENDIX A – PLANT SPECIES OBSERVED IN THE PROJECT AREA

FAMILY NAME	SCIENTIFIC NAME	COMMON NAME
Amaranthaceae	*Amaranthus* sp.	pigweed
Anacardiaceae	*Schinus molle*	peruvian/Calif. pepper tree
Apiaceae	*Conium maculatum*	poison hemlock
	Foeniculum vulgare	sweet fennel
	Torilis arvensis	torilis
	Toxicodendron diversilobum	poison oak
Apocynaceae	*Nerium oleander*	oleander
Arecaceae	*Washingtonia filifera*	California fan palm
Asteraceae	*Baccharis pilularis*	coyote brush
	Centaurea solstitialils	yellow star-thistle
	Chicorea endiva	endive
	Cirsium vulgare	bull thistle
	Conyza canadensis	horseweed
	Holocarpha virgata ssp. *virgata* *	virgate tarweed
	Picris echioides	bristly ox-tongue
	Tragopogon porrifolius	salisfy
	Xanthium spinosum	spiny cockelbur
	Xanthium strumarium	common cockelbur
Brassicaceae	*Brassica nigra*	black mustard
	Raphanus sativus	wild radish
	Cardaria draba	heart-podded hoary cress
Caprifoliaceae	*Sambucus mexicanus*	Mexican elderberry
Cupressaceae	*Cupressus* sp. *	cypress
Cyperaceae	*Cyperus* sp.	nutsedge
Equisetaceae	*Equisetum* sp.	horsetail
Fabaceae	*Acacia* sp.	acacia
	Lotus corniculatus	birdfoot trefoil
	Robinia pseudoacacia	black locust
	Vicia benghalensis	purple vetch
Fagaceae	*Quercus agrifolia*	coast live oak
	Quercus wislizeni *	interior live oak
	Quercus lobata	valley oak
Geraniaceae	*Eriodium botrys*	long-beaked filaree
	Geranium dissectum	cut-leaved geranium
Juglandaceae	*Juglans californica* var. *hindsii*	California black walnut
	Juglans regia	English walnut
Lamiaceae	*Marrubium vulgare*	horehound
	Stachys ajugoides var. *rigida* *	hedge nettle

Liliaceae	*Triteleia laxa* *	Ithuriel's spear
Malavaceae	*Malva nicaeenis*	bull mallow
Onagraceae	*Epilobium canum*	willow herb
	Epilobium canum var. *latifolium* *	California fushia
Pinaceae	*Pinus radiata* *	Monterey pine
	Pseudotsuga menziesii *	Douglas fir
	Picea pungens *	Colorado blue spruce
Platanaceae	*Platanus racemosa*	western sycamore
Poaceae	*Avena fatua*	wild oats
	Bromus diandrus	ripgut grass
	Bromus hordaceous	soft chess
	Cynodon dactylon	Burmuda grass
	Elymus triticoides	creeping wild-rye
	Hordeum murinum	foxtail barley
	Hordeum sp	cultivated barley
	Lolium multiflorum	Italian ryegrass
	Phleum pratense *	timothy
	Polypogon monspeliensis	rabbitfoot grass
Polygonaceae	*Rumex conglomeratus*	clustered dock
	Rumex salicifolius *	willow dock
Rosaceae	*Prunus cerasifera atropurpurea* *	purple-leaved plum
	Prunus dulcis *	almond
	Rubus discolor	Himalyan blackberry
Salicacae	*Populus fremontii*	Fremont cottonwood
	Salix sp.	willow
Solanaceae	*Solanum douglasii* *	Douglas nightshade
Taxodiaceae	*Sequoia sempervirens*	coast redwood
Ulmaceae	*Ulmus minor*	English elm
Verbenaceae	*Verbena* sp.	vervain

* Denotes new species

Appendix C-3

CRF Focused Survey,
Sycamore Associates

SYCAMORE ASSOCIATES LLC

2099 Mt. Diablo Blvd., Ste. 204 - Walnut Creek, California 94596 - 925-279-0580 - fax: 925-279-0581 - e-mail:sycamore@sycllc.com

MEMO

Date: September 21, 2001
To: Institute Golf Course Project File
From: Randy Long
Subject: CRF Focused Survey

On September 19, 2001, Mark Jennings, Ph.D., conducted a focused survey of certain ponds on the golf course in order to verify the previously reported occurrence of the California red-legged frog (*Rana aurora draytonii*) (CRF) on the property. Accompanying Dr. Jennings were client representatives Kevin Robins and Juan Altamirano, and Sycamore Associates biologist Randy Long. Survey methods were in accordance with the U.S. Fish and Wildlife Service *Interim Guidance on Site Assessment and Field Surveys for California Red-legged Frog* (USFS, 1997). The night survey was conducted between the hours of 7:30 and 9:00 PM., and included the spring pond in the southeastern section, pond number 3 in the southwestern section, and pond number 4 in the northeastern of the site.

Survey Results:

Spring pond

One adult CRF was observed in the water at the southern end of the pond. No other amphibians were observed. The pond contains neither emergent vegetation nor bank vegetation but does have a waterfall-like cluster of large rocks at the northern end.

Pond no. 3

No CRF were observed. Numerous adult western toads (*Bufo boreas*) and at least one bullfrog (*Rana catesbeiana*) were observed in the southern part of the pond. Neither of these species is of special-status category. A California tiger salamander (*Ambystoma californiense*) (CTS), still in metamorphosis, was observed entering the approximate 24-inch overflow culvert at the southern end of the pond. The culvert outlets into a drainage ditch adjacent to Foothill Road. The CTS is a State of California Special Concern. The pond contains neither emergent nor bank vegetation.

Pond no 4

No CRF were observed. A western pond turtle, a State of California Special Concern species, was observed near the southern end of the pond. The pond contains neither emergent nor bank vegetation.

Based on the positive verification of CRF on the property, no further CRF focused surveys are planned.

Appendix C-4

Institute Golf Course DEIR - Applicant's Response,
The Institute, LLC

The Institute, LLC
14830 Foothill Avenue
Morgan Hill, CA 95038
(408) 487-4620

March 3, 2003

Mr. Jim Rowe
Community Development Department
City of Morgan Hill
17555 Peak Ave.
Morgan Hill, CA 95 037

RE: Institute Golf Course Draft EIR – Applicant's Response

Dear Jim:

Following are the applicant's comments in response to the Draft EIR that furnish detailed information as to the applicant's proposed mitigation. The enclosed appendix includes the applicant's studies and related information in support of this mitigation for use in preparing the final EIR. We believe that the incorporation of this information will result in reducing all impacts to less-than-significant.

Applicant's' Studies

After review of the City's consultant's reports - *Draft Environmental Impact Report, Biological Resources Section* (H.T. Harvey and Associates, 2001), and *Hydrology and Water Quality* (Questa Engineering Corporation, 2001), the applicant had concerns with the assumptions from which conclusions and proposed mitigation were drawn. Therefore, the Institute LLC contracted for further studies and a comprehensive analysis of the issues and proposed mitigation. These studies – *Ground Water Environmental Data Report,* (Sycamore Associates/Aquifer Sciences, 2002) (Appendix A), *Surface Water Hydrology* (Sycamore Associates/Mattern and Associates, 2002) (Appendix B), *Analysis of Pre-Post Development Habitat Conditions for Special Status Amphibians and Reptiles at the Institute Golf Course,* (RCL Ecology and Rana Resources, 2002) (Appendix C), and *Preliminary Wetland Delineation of Corralitos Creek,* (RCL Ecology, 2003) (Appendix F), support the applicants response to the assumed issues as discussed in the applicants' comments.

Although the studies conducted in 2002 were made available, they were not considered during preparation of the Draft EIR, and therefore, are brought forward for use in preparing the final EIR. These studies show that in several cases, previous assumptions were misconceived and therefore, the mitigation was not indicated. In some cases, the construction of the golf course actually removed or reduced potential effects instead of the presumption to the contrary. Other study results show that while some mitigation was required, it had already been accomplished. In other cases, studies showed that some mitigation while warranted can be accomplished in an alternate manner not as restrictive to project objectives and is therefore proposed as a

substitute. Specific examples of study results in comparison to previous assumptions are discussed below.

Groundwater/Surface Water:

Groundwater. The Questa Engineering study presumes that there is a decline in the groundwater table due to water usage at the golf course. The new information based on sampling of 183 wells, versus only 31 in the Questa analysis, shows no downward trend after five years of golf course pumping.

Water quality. The Questa Engineering study presumes runoff from nitrates in fertilizer application, as well as pesticide and herbicides, will pollute golf course waters. Actual sampling of waters documented no increase in nitrate concentrations as well as no pesticide or herbicide runoff.

Flooding. The Questa Engineering report presumes onsite and offsite flooding potential due to golf course construction. The new information found that the new construction resulted in lower peak flows, better detention onsite for peak flows, and an overall reduction in flooding potential over the previous condition.

Habitat and Related Items:

Loss of Aquatic Habitat. The H.T. Harvey and Associates study presumed that golf course reconstruction resulted in significant negative effects on potential aquatic habitat for the California red-legged frog. The new analysis found that the original lakes were of poor water quality, and likely too shallow and intermittent to have provided breeding habitat for the frog or other special-status amphibians and reptiles, whereas the newly constructed deep, permanent lakes would provide this habitat.

Riparian Habitat. The H.T. Harvey and Associates study presumed that areas along Corralitos Creek devoid of riparian habitat were a result of golf course grading. The current study analyzed aerial photos and found that these areas were a result of the actions of previous owners dating at least as far back as 1956.

Loss of Upland Trees. The H.T. Harvey and Associates report presumes that large amounts of trees were removed from upland areas during golf course construction. Aerial photo analysis shows only scattered upland trees were present, and most were preserved. Additionally, the planting of over 11,000 large-sized trees has already more than compensated for the few that were removed.

Overall Habitat Condition for Special-status Species - The earlier presumption of negative construction effects on habitat was not born out by the current studies that show an increase in aquatic, aestivation, and dispersal habitat over past conditions.

Applicant's Proposed Mitigation

Our response in this section takes four forms.

1) The applicant agrees to perform the mitigation suggested in the DEIR. In the final EIR, these mitigations should be listed as "Mitigation Measures Proposed by the Project".

2) The applicant proposes alternative mitigation. In the final EIR, these should also be listed as "Mitigation Measures Proposed by the Project".

3) The applicant disagrees that a significant impact has occurred, or will occur, so the mitigation (suggested by the DEIR) is not indicated. Or the applicant has performed additional studies that indicate that the mitigation (suggested in the DEIR) is not indicated.

4). That certain sections should be deleted, as they are inappropriate for CEQA analysis.

Detailed comments, beginning with Section 1, page 1 of the Draft EIR are enclosed. If The City needs assistance with incorporating this information into the final EIR, please call me.

Sincerely,

S/ *Stephen Sorenson*
Stephen Sorenson

APPLICANT'S PROPOSED MITIGATION AND/OR CHANGES REQUIRED

In this section, we address the issues termed "Significant Unmitigated Impacts" and clarify situations where the applicant agrees to implement the proposed mitigation, or proposes changes due to the results of the above studies, for inclusion in the final EIR.

DEIR Section I – Project Description

Consistency with Adopted Plans and Policies

Morgan Hill General Plan (9-14)

The Draft EIR states that the project will be inconsistent with several policies in the General Plan. All of these items are addressed in the following section "Applicants Proposed Mitigations". By either offering alternative mitigation, or agreeing to abide by the proposed mitigation, each of these items are reduced to 'less-than-significant', thereby bringing the project into compliance with the policies in the General Plan.

Change Needed – Rewrite the "Consistency" statements on pages 9-14, as well as the statement under "Conclusion" on page 1, to state that the mitigation items proposed by the project (discussed below) result in reducing the impact on these policies to 'less-than-significant', and therefore, the project is consistent with the General Plan.

Section II – Environmental Setting, Impacts, and Mitigation Measures

Geology and Soils (Pgs 22-23

The mitigation measure calls for a geotechnical report of the berm along Foothill Ave. and the berm on the south side of Lake G, to determine their stability.

This mitigation measure is proposed by the applicant who contracted with Kleinfelder Inc. to perform the geotechnical analysis of the two berms in February, 2003. Their report will be available shortly, and will be furnished to the City for inclusion in the final EIR.

Change Needed – Change to "Mitigation Measure Proposed by the Project".

California red-legged, California tiger Salamander, and western pond turtle (Pgs. 49-51

Except for proposed alternative mitigation regarding buffers and predator control, the applicant proposes the stated mitigation for all three species.

Predator control - The applicant proposes equivalent mitigation for predator control by destroying bullfrog egg masses, "gigging" adult frogs, and seining to remove predatory fish, in lieu of draining the lake. Additionally, no fish stocking is being proposed.

Buffers - As there is no empirical data to justify a uniform 200-feet wide buffer, the applicant proposes equivalent mitigation of maintaining buffers of undulating and varying width against the lake and creek waters. This method is preferred, as it will mimic natural conditions and is typical of the onsite buffers currently adjoining occupied habitats. This method of site-specific variation in buffer width is also in keeping with the Santa Clara County Guidelines for Golf Course Construction (Appendix D), providing for both species habitat requirements as well as those features required per the golf course design (Appendix I).

The above alternative mitigation has been recommended by Dr. Mark R. Jennings, Ph.D. herpetologist/fisheries biologist, who will lead a long-term research and monitoring study designed to expand populations of each of these species (Appendix E),

Change Needed – Change to "Alternative Mitigation Measure being proposed by the Project".

Hydrology and Water Quality (Pgs. 52-71

On-Site and Off-Site Flooding (Pgs. 65-66)

The applicant commissioned a detailed hydrology and hydraulic analysis per the proposed mitigation (pg. 65). This study by Civil Engineer David Mattern, (Sycamore/Mattern and Associates, 2002), resulted in the following findings that were furnished to the City and the City's consultant in June of 2002 (Appendix B).

The Mattern and Associates study Drainage Analysis, applied a hydraulic model (HEC 2) to five separate watersheds including the area within the golf course, the watershed above the golf course, and the two watersheds associated with San Martin Creek. The analysis concluded that there was adequate capacity within Corralitos Creek to convey the 100-year storm event (page 8), that grading changes in adjacent areas resulted in lower peak flow volumes than existed previously, and that these changes, along with the created lakes that provide increased capacity to detain peak flows, act together to actually reduce the potential for flooding both on site and off site over prior conditions (pages 6-8). It also concluded that the current drainage configuration is probably closer to the historic natural drainage pattern (page 8).

The applicant also agreed to commission a detailed geotechnical analysis to verify the soil-structural stability of the berms. This study by certified civil engineers from Kleinfelder, Inc., is currently in progress. Results will be furnished to the City as soon as available.

Change Needed – Change to "Mitigation Measures Proposed by Project". The drainage study resulted in reduction of on-site and off-site flooding to "less than significant".

Soil Erosion (Pgs. 66-67)

The applicant proposes the mitigation as specified, with a correction in the second to last paragraph changing the word "construction" to "grading".

Change Needed – Change to "Mitigation Measure Proposed by the Project".

Water Quality (Pg. 67)

With the exception of buffer widths, the applicant agrees to the mitigation measures as specified. In lieu of uniform sizes of buffers, the applicant proposes undulating buffer of varying widths against the water features, with the use of grass and rock buffers along short portions where larger plantings would interfere with play.

Change Needed – Change to "Mitigation Measure Being Proposed by the Project" with alternative equivalent mitigation for variation in buffer widths and type."

Nitrogen Loading (Pgs 67-68

As a result of the Aquifer Sciences study (Sycamore Associates/Aquifer Sciences, 2002), the applicant is proposing alternative mitigation regarding nitrogen loading. Highlights from the Aquifer Sciences study are discussed below.

Questa estimated that turf fertilization would result in an increase in groundwater nitrate concentration to a level of 123 mg/L (page 18), a significant increase over the current average of 68 mg/L (page 6). Based on the updated information, the Aquifer Sciences report estimates that the concentration of nitrate in water percolating to groundwater beneath the site would be approximately 56 mg/ and therefore would not significantly impact groundwater quality (page 18).

Questa estimated that the nitrogen demand for turf fertilization at approximately 10,323 pounds per year (page 16) and that the amount of nitrogen in the irrigation water is 20,382 pounds. Therefore, they reasoned that there was no need for added fertilizer application. Based on the updated information, the Aquifer Sciences report estimates that the actual nitrogen demand is approximately 10,400 to 10,900 pounds per year, and as the amount of nitrogen in the irrigation water is actually only approximately 7,900 pounds, it would only provide about 72 to 77 % of the nitrogen required. Therefore, the nitrogen content of the irrigation water is not sufficient to completely meet fertilization requirements (page 14). As no over-allocation of nitrogen has been detected, there is no need for the proposed nitrogen control plan.

The Application of fertilizers is already controlled by scientific studies. The applicant has an on-going program of analyzing plant tissue samples, soil samples, and water samples. Based on the lab results of these tests, the applicant applies only the amount of nitrogen required by the soil and the plant. This process minimizes the nitrogen that is available to get into the surface water and ground water.

To determine if the applicant's scientific process is working, the applicant contracted with Aquifer Sciences to analyze the water in the ponds on site. No pesticides or herbicides were found in the water on site, and the nitrogen content was similar to that of the ground water.

Based on these studies and the current practices at the site, the applicant does not agree that any impact related to nitrogen loading has occurred or will occur. As alternative mitigation, the applicant proposes monthly monitoring of grass tissue and water quality of the lake and creek waters to monitor for nitrogen, and other pollutant levels, and to provide this information to the City and appropriate agencies. The applicant also proposes an undulating buffer of variable width along the Corralitos Creek corridor to provide both dispersal habitat for the special-status species as well as additional filter protection against any potential pollutant runoff (Appendix E).

Change Needed – Change to incorporate the above as "Mitigation Being Proposed by the Project"

Pesticides and Herbicides (Pgs 68-69)

The applicant proposes to prepare a golf course Chemical Application Management Plan (CHAMP) documenting the ongoing adherence to all of the standard conditions referenced in the Draft EIR.

Change Needed – Change to incorporate the above as "Mitigation Being Proposed by the Project".

Construction Activities (Pgs. 70-71)

The applicant filed a Notice of Intent (NOI) with the Central Coast RWQCB, obtaining coverage under the State General Permit for discharge of stormwater associated with construction, and prepared a detailed erosion control plan including best management practices (BMPs) for the development of the golf course. The applicants' representatives met onsite with staff from the Central Coast RWQCB on February 6, 2003, for guidance in preparing the Stormwater Pollution Prevention plan (SWPPP) for construction activity associated with the conversion of the restaurant, as well as to prepare a National Pollution Discharge Elimination System (NPDES) permit for stormwater discharge into the Foothill Ave. drainage.

Change Needed – Insert the above statement in lieu of the paragraph on page 71 that begins with "In this instance". Delete that paragraph as well as the bulleted items following. The above statement is the "Alternative mitigation proposed by the applicant".

"Conclusion" (Pg. 71) -

Change Needed – Re-write this section to state that applicant's alternative mitigation is incorporated. Also, delete "*Additionally, the project proponent proposes to modify some of the grading to change the potential for off-site flooding*". No such grading is proposed or warranted as discussed under "On-site and Offsite Flooding" above.

Water Supply

Irrigation Water Supply (Pgs. 73-76)

The second 'bulleted' item under "Groundwater Resource Depletion", states that the concern for groundwater depletion through golf course pumping could be reduced to less-than-significant, by completing a "detailed groundwater investigation to confirm that the proposed pumping of groundwater for golf course irrigation will not cause a significant decline in the water table at neighboring properties". The applicant's study, performed by Aquifer Sciences, confirmed that "Based on the data, there is no discernible declining trend in groundwater levels for the aquifer" (Appendix A, Aquifer Sciences, pg. 16).

Change Needed – Insert the above on page 75 as mitigation proposed and accomplished by the applicant, resulting in the reduction of the irrigation water supply issue to less-than-significant.

Domestic Water Supply (Pgs. 74-75)

The applicant currently supplies bottled water for drinking and cooking. For a permanent solution to the drinking water issue, the applicant proposes to either install a new well for drinking water purposes or to install a water treatment system during construction of the Institute of Mathematics.

Change Needed – Include the above as "Mitigation Being Proposed by the Project".

Fire Protection Water Supply (Pgs. 73-74)

As stated in the Draft EIR, pg. 73, the Santa Clara County Fire Department has determined that the on-site fire/irrigation water supply is sufficient for the existing golf course use.

Change Needed – Include the above as "Mitigation Being Proposed by the Project".

Noise Impacts

Construction Noise (Pgs. 80-81).

The applicant proposes to abide by the City of Morgan Hill Noise Ordinance relating to taking appropriate mitigation measures to reduce noise effects. Thereby, reducing noise impacts to 'less-than-than significant'.

Change Needed – Include the above as "Mitigation Being Proposed by the Project".

Hazardous Materials

AsbestosContaining Materials (Pgs. 84-85)

The applicant proposes to abide by the mitigation item on page 85, thereby reducing the issue to 'less-than-significant'.

Change Needed – Include the above referenced mitigation item as "Mitigation Proposed by the Project", thereby reducing the impact to 'less-than-significant'.

Above Ground Storage Tank (Pgs. 84-85)

The applicant proposes to abide by the mitigation item on page 85, thereby reducing the issue to 'less than significant'

Change Needed – Include the above referenced mitigation item as "Mitigation Proposed by the Project", thereby reducing the impact to 'less than significant'.

Air Quality

Construction-Related Impacts

Dust Generation (Pgs. 88-89)

The applicant proposes to abide by the mitigation items shown on page 89, thereby reducing the dust impact to 'less-than-significant'.

Change Needed – Include the referenced mitigation items as "Mitigation Proposed by the Project", thereby reducing the impact to 'less than significant'.

Odor Impacts (Pgs. 88-89)

The applicant proposes to remove existing grass 'clippings' from the site and to establish an onsite area for composing of future vegetative materials, thereby reducing the impact to 'less than significant'.

Change Needed – Include the above statement as "Mitigation Proposed by the Project", thereby reducing the impact to 'less than significant'.

Section III – Secondary Impacts (Page 96)

The applicant's legal counsel has advised that that this section should be deleted as it is inappropriate according to CEQA regulations for "secondary impacts" to address any but current or future foreseeable indirect effects as also implied in the first paragraph on page 96.

However, as the DEIR raised assumptions of significant impacts on habitats for special-status species from the past action of redeveloping the original golf course and the expanded area, the applicant contracted with RCL Ecology, in collaboration with herpetologist Mark R. Jennings, Ph.D. (Rana Resources), for an in-depth analysis of pre-grading conditions to determine the various land uses present at the time of conversion, whether those uses would have been compatible with the habitats required, and to compare pre-and post-development conditions to determine the net affect of golf course development on habitats utilized by the species. As subsequent wildlife surveys (Sycamore Associates/Rana Resources [2001]) not only verified occurrence of California red-legged frog but also found the presence of two additional special-status species- California tiger salamander (*Ambystoma californiense*) and western pond turtle (*Clemmys marmorata*) on the site, their habitat conditions were included in the analysis.

This study, *Analysis of Pre-Post-Development Habitat Conditions for Special-Status Amphibians and Reptiles at the Institute Golf Course* (RCL Ecology/ Rana Resources, 2002) is included as Appendix)

.

A summary of the main points arising from these studies is outlined below.

Permits from the California Department of Fish and Game (CDFG) (Pgs. 14, 99, 103, 104. 105).

The applicant had received a 1603 permit (Lake of Streambed Alteration Agreement) from CDFG for the original grading work adjacent to Corralitos Creek. No additional permit was, or is required from CDFG (Appendix G).

Loss of Potential Waters of the U.S., California Red-legged Frog Habitat/Aquatic Habitat, and California Tiger Salamander Aestivation /Breeding Habitat (Draft EIR pgs. 96-101).

The previous ponds on the original golf course were shallow (less than two feet deep), and only intermittently filled by pumping (Steve Sorenson, 2002) and drainage from the restaurant air conditioning units (Julie Belanger, 2002). The USFWS map (1993) also shows these features as intermittent waters. Therefore, it cannot be assumed these intermittent waters could have served as breeding habitat for the CRF, CTS, or WPT. In contrast, when the area was redeveloped, these ponds were not "filled", but merely reconfigured and converted to deep permanent waters providing breeding and rearing habitats for all three species. This increased the lake acreage total from approximately 3.0, to 3.3 acres (combination of current lakes A, B, C, and D)(Table 1). The reconfigured lakes are deeper, ranging from about 17 to 32 feet deep. They are lined with

a PVC material, and the banks are grouted within about 12 feet of the surface to reduce erosion potential. The lakes are kept full during the golf season, and lowered somewhat to detain winter runoff. The spring-fed pond, originally surrounded by a parking area, was enhanced by removal of the parking apron during redevelopment. Therefore, the conversion had a positive significant effect, versus negative, and no mitigation was, or is required.

In regard to the assumed "0.46-acre seasonal wetland" at the "dump site (last paragraph page 96), analysis of 1994 aerial photo shows no wetland feature at that location, and the previous gently sloping topography indicates no depression in that area prior to grading. Evidently, the earlier survey (H.T. Harvey and Associates, 2001) presumed seasonal wetland occurrence due to the abundance of piles of wet grass 'plugs' and other debris that was dumped on top of a leaking pump (Steve Sorenson). The pump has since been fixed and the area has reverted to dry land. A 2003 preliminary wetland delineation of the site showed no evidence of a seasonal wetland feature in that area (Appendix F).

Ordinance –Size Trees (Pgs. 99-100 & 102)

Prior to development, Tree Health Professionals, a certified arborist consulting firm, surveyed the area to advise on ordinance-sized trees to be preserved, or removed due to poor health (Appendix H). Due to an approximate two-year period of non-operation of the golf course in the early 1990s, many trees were in poor health and needed to be removed (Juan Altamirano). Therefore, the perception of 50 ordinance-size trees being removed likely does not consider this. Regardless, the planting of hundreds of large size trees within the 7.5 acres of woodlands created in this area, more than compensates for trees removed, without the need for further mitigation.

Riparian areas (Pgs. 99 & 101)

It is clear from aerial photo interpretation that the areas of discontinuous riparian vegetation along Corralitos Creek and tributaries date back to at least 1956, and were not caused by golf course construction. Additionally, the width of riparian vegetation along the main stem and tributaries is nearly identical with that shown after conversion. While there is an occasional tree missing along the edges in the upper reaches, it is evident that there was no significant impact to riparian vegetation or CRF aestivation, foraging, or dispersal habitat within the riparian corridor due of golf course conversion. More than adequate compensation for the few trees removed, will be provided by proposed riparian area plantings outlined in the golf course habitat improvement plan. The plan calls for planting native riparian trees and shrubs to fill in, as well as to widen the riparian corridor to create additional CRF and WPT habitat within the entire onsite drainage.

Conclusion

The addition of new permanent lakes in the expanded area, increase in type and quantity of lakes in the redeveloped area, combined with establishment of over 34 acres of upland

dispersal corridors through the planting of thousands of trees, together has resulted in a net gain over past habitat conditions as shown in Table 1 below.

Change Needed – Rewrite Section III to delete the previous assumptions and perceived mitigation, incorporation the study results above. This section needs to focus solely on the description of indirect effects, if any, resulting from current and proposed actions, not past action, per the definition of the analysis discussed above.

Table 1 – Acres of CRF, CTS, & WPT Habitat Pre-and Post-Development

Redeveloped Area	Lakes	Woodland
Pre-Existing	3.0	0.0
Post Development	3.3	7.5
Created	0.3	7.5
Expanded Area		
Pre-Existing	1.6	7.9
Post-Development	1.7	27.0
Created	0.1	19.1
Total Lakes Currently	**5.0**	
Total Woodland Currently		**34.5**

Section IV – Cumulative Impacts (Pgs. 106-108)

Change Needed – Rewrite this section to state the mitigation proposed by the project in Section II reduces the significance of the issues on page 108 to 'less-than-significant'.

Section V. Alternatives (Pgs. 109-114

Change Needed – Rewrite this section and the "Reduced Impact Alternative" to show that the mitigation proposed by the project reduces all impacts to 'less-than-significant'.

Section VI – Significant Unavoidable Impacts of the Project

Change Needed – Rewrite this section to state that due to the "Mitigation Proposed by the Project" there will be no significant unavoidable impacts.

Personal Communication:

Steve Sorenson, Golf Course General Manager since 1995.
Juan Altamirano, Golf Course Maintenance Supervisor since 1982.
Julie Berlanger, Daugher of previous landowner. Lived onsite until 1994.

Appendix

Appendix A	*Ground Water Environmental Data Report*, (Sycamore Associates/Aquifer Sciences, 2002.
Appendix B	*Surface Water Hydrology* (Sycamore Associates/Mattern and Associates, 2002.
Appendix C	*Analysis of Pre-Post Development Habitat Conditions for Special-Status Amphibians and Reptiles at the Institute Golf Course,* (RCL Ecology/ Rana Resources, 2002).
Appendix D	*Santa Clara County Guidelines for Golf Course Construction.* Santa Clara County Planning Office, 1996.
Appendix E	*Proposed Alternative Mitigation for the California Red-legged Frog, California Tiger Salamander, and Western Pond Turtle.* Letter to Jim Rowe, City of Morgan Hill from Mark Jennings, 2003.
Appendix F	*Preliminary Wetland Delineation of Corralitos Creek.* RCL Ecology, 2003.
Appendix G	Permits – Agency permits for original construction.
Appendix H	Arborist's Report. Tree Health Professionals, Inc. 1997.
Appendix I	Golf Course Architectural Design. Letter from Neal Meagher to Steve Sorenson, December 13, 2002.

Appendix C-5

Citywide Burrowing Owl Mitigation Plan,
City of Morgan Hill

CITYWIDE BURROWING OWL HABITAT MITIGATION PLAN

JUNE 2003

CITY OF MORGAN HILL

CITYWIDE BURROWING OWL HABITAT MITIGATION PLAN

JUNE 2003

City Council

Mayor Dennis Kennedy
Mayor Pro Tem Hedy Chang
Councilmember Larry Carr
Councilmember Greg Sellers
Councilmember Steve Tate

Task Force

Bob Benich, Planning Commission
Craig Breon / Kelly Crowley, Santa Clara County Audubon Society
Joe Mueller, Planning Commission
Dick Oliver, Dividend Homes
Martha Schauss, California Department of Fish and Game

Staff

Ed Tewes, City Manager
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Anthony Eulo, Assistant to the City Manager
David Bischoff, Director of Community Development
Jim Ashcraft, Director of Public Works

Consultants

Jack Barclay, Albion Environmental
Tom Roberts, Environmental Science Associates

CITY OF MORGAN HILL

SECTION I. INTRODUCTION

BACKGROUND

In April 1999, the City of Morgan Hill Redevelopment Agency (Agency) amended its redevelopment plan and adopted, in conjunction with the City of Morgan Hill (City), the Final Program Environmental Impact Report (EIR) for the redevelopment plan amendment. As part of the EIR, and through subsequent discussions with the California Department of Fish and Game (CDFG), the City and Agency agreed to prepare a citywide burrowing owl mitigation plan (Plan). The purpose of the Plan is to evaluate impacts to burrowing owls from City development and present a comprehensive program to mitigate those impacts instead of addressing such impacts on a project-by-project basis. The City contracted with Albion Environmental, Inc. to prepare a citywide plan that includes the following elements from the original agreement to prepare a plan.

1. Survey the City of Morgan Hill for current nest sites, potential habitat areas and nest sites known to have been used historically in order to assess impacts.
2. Based on General Plan build-out, determine cumulative impacts to burrowing owls.
3. Develop a mitigation plan to offset habitat loss and other impacts to burrowing owls.

Problem Statement

The interim mitigation measures that have been used since the City committed to prepare a citywide plan have been based on the presence of "potential habitat." The interim mitigation measures provided that replacement habitat ratios (i.e., mitigation) were based on the presence of owls within the last three years. The City's working definition limited habitat to any site with underground burrows made by fossorial mammals, or manmade openings that provided nesting places for owls.

Using such a definition of habitat may not reflect burrowing owls actual use of the environment, because owls forage in areas without burrows, nor may it allow for the biological phenomenon of animals re-occupying habitat. Therefore, an impact assessment based on the above definition may not fully account for all actual impacts to the species. Mitigation measures based on such a definition may not completely mitigate all the effects of development on burrowing owls, e.g., from noise, lighting, traffic, increased predation or loss of prey base. Burrowing owls use habitat without burrows and locations where there may be no records of owls present so the loss of such habitat affects owls and should be addressed in mitigation measures.

On the other hand, not all losses of owl habitat need to be mitigated because burrowing owls apparently did not occur in all seemingly suitable or potential habitat in Morgan Hill, and clearly do not do so at present. The limited biological evidence available about

burrowing owls in Morgan Hill since the time the EIR was certified and the agreement reached with CDFG suggests that burrowing owls remain at low numbers in potential and actual habitat.

The City will honor its commitment to prepare a burrowing owl mitigation plan as an alternative to project-by-project analysis and mitigation. However, because so little habitat is currently occupied by owls in Morgan Hill, it may be difficult to establish a specific nexus for future impacts, even if the current interim standards were made permanent. A more practical approach is to propose actions which establish a credible amount of "preserve lands" that could support a self-sustaining population. This Plan provides such an approach by managing a stipulated amount of owl habitat, with strong incentives for this habitat to be in or close to Morgan Hill.

This Plan is premised on the following two assumptions:

1. All development – both that which eliminates actual habitat and nearby development that does not result in a loss of owl habitat – affects burrowing owl populations to some degree and;

2. Mitigating impacts is most logically addressed by managing a fixed amount of habitat capable of supporting owls.

This strategy—a specific amount of suitable land preserved with costs fairly spread over more development projects than just those with defined owl habitat—addresses both assumptions.

PROJECT TEAM

This plan was prepared by a Consultant Team consisting of Albion Environmental, Inc. and Environmental Science Associates, Inc. working directly with City of Morgan Hill Redevelopment Agency staff. In order to obtain input from affected interests, the City convened an Advisory Committee to review the Plan's provisions throughout the plan development process. The Advisory Committee consisted of two representatives from the Morgan Hill Planning Commission, one representative of the real estate development community in Morgan Hill, one representative of the California Department of Fish and Game and one representative from the Santa Clara Valley Audubon Society.

PROJECT AREA DESCRIPTION

This plan covers the City of Morgan Hill in Santa Clara County, California. The Plan area encompasses all areas within the City Limits, which is a total of 7,289 acres. The City Limits have irregular boundaries that extend to the base of the eastern foothills of the Santa Cruz Mountains and to the base of the Diablo Range foothills to the north and east.

REGULATORY CONTEXT

The issuance of any discretionary permit by the City of Morgan Hill constitutes an action that according to California law must usually be analyzed for its environmental consequences. When those consequences are deemed to be significant, adequate mitigation must usually be provided to reduce the level of significance, or a clear statement of overriding considerations made with an explanation why mitigation is not feasible.

The CEQA Guidelines (Section 15206) specify that a project shall be deemed to be of statewide, regional or area-wide significance if it would substantially affect habitats for rare and endangered species. The CEQA Guidelines 15380 further provide that an animal species may be treated as "rare" even if it is not on an official list if it exists in such small numbers throughout a significant part of its range that it may become endangered if its environment worsens.

This plan is intended to comply with the requirements of CEQA by evaluating the effects of development according to the General Plan to burrowing owls, including direct, indirect and cumulative effects. It also contains a program of habitat maintenance to mitigate those effects. In this way it will replace future individual project environmental review of impacts to burrowing owls and individual project mitigation measures with a comprehensive program to mitigate all future effects. Even though this Plan contains a program to mitigate impacts, all future projects shall still be required to perform preconstruction surveys prior to initial ground clearing to avoid "take" of burrowing owls.

The CEQA Guidelines define mitigation to include:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

This Plan is intended to satisfy the requirements of CEQA by avoiding certain impacts and compensating for the effects of others by providing substitute environments.

PROPOSED ACTION

Development according to the Morgan Hill General Plan (July 2001) make up the proposed action that this Plan addresses. The General Plan has a 20-year horizon.

BURROWING OWL REGULATORY STATUS

Federal Status. The burrowing owl is a migratory species protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. 21).

State Status. Burrowing owls and their nests are protected by Sections 2000, 3503, 3503.5 and 3800 of the California Fish and Game Code that prohibit the take, possession, or destruction of birds, their nests or eggs. Avoiding violation of the take provisions of these laws generally requires that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle (February 1 to August 31). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered "take" and is potentially punishable by fines.

BURROWING OWL POPULATION ESTIMATES AND TRENDS

Burrowing owls have been declining throughout their range in the western United States and Canada during the last 60 years (Bent 1938, Grinnell and Miller 1944, James and Ethier 1989, Zarn 1974, James and Espie 1997). The decline of burrowing owl populations throughout the western United States has been attributed to habitat destruction, particularly grassland conversion, and the eradication and control of burrowing mammals (Haug et al. 1993, Zarn 1974). Because of declining populations, burrowing owls were designated a California Species of Special Concern in 1978 (Remsen 1978).

California. The Institute for Bird Populations completed a census of California's burrowing owl population (exclusive of the Modoc Plateau and Mojave Desert) from 1991-1993 (DeSante and Ruhlen 1995). They estimated a population of 9,266 breeding pairs of burrowing owls in California with 71 percent of the state's population located in the Imperial Valley. They reported that burrowing owls had been extirpated as a breeding species during the last 10-15 years from several counties (DeSante and Ruhlen 1995).

South San Francisco Bay. Generally, burrowing owls occurred in colonies in the extensive low grasslands immediately upland of south bay marshes (i.e., bay lands). DeSante et al. (1997) estimated there were 873 pairs of owls in central California (i.e., Outer Coast, San Francisco Bay, Central Valley) in the early 1990s with 153 of these pairs in the San Francisco Bay Area. They concluded that there had been approximately fifty-percent declines in both the numbers of breeding owls and the number of breeding groups in the Bay Area from the period 1986-90 to 1991. The burrowing owl population in the entire south San Francisco Bay area was probably in the neighborhood of 1000 pairs in 1970 and by 1980 perhaps only 250 pairs remained.

Santa Clara County. There were between 120 and 141 pairs of burrowing owls known in Santa Clara County in 1997. (This number was compiled from various unpublished local sources.) Most of these owls occurred at 12 locations where there was more than one pair. At least 10 of these locations could be termed colonies averaging five or more pairs.

Morgan Hill. Information about the numbers and distribution of burrowing owls in Morgan Hill over the last 20 years consists of various owl survey reports for individual development projects and anecdotal accounts about owls from various observers (most of these reports describe the absence of owls on the subject parcel). The absence of a comprehensive body of information about historical burrowing owl numbers in Morgan Hill could mean that owls were few and scattered or that they were common, but no one recorded their numbers and distribution throughout the city.

The California Natural Diversity Database contained no records of nesting burrowing owls in Morgan Hill as of July 2001, although records of owls nesting at two locations in 2000 (see below) were submitted. Various development project survey reports describe at least three nest sites (and possibly more) in the Morgan Hill Ranch area in 1995. A list of all known burrowing owl breeding locations in Santa Clara County in 1997 included 2-5 breeding pairs in Morgan Hill. Regardless of what the recent owl breeding population may have been, it is generally acknowledged that burrowing owl numbers have declined in Morgan Hill over the last ten years.

Albion biologists recorded two nesting pairs of owls in Morgan Hill during field surveys in June and July 2000. One of these pairs raised four juveniles and the other pair a single juvenile for a total of nine owls observed. It is important to point out that these surveys were conducted without access to most potential breeding habitat, so other breeding pairs could have been missed. It must also be stressed that these surveys did not constitute a comprehensive census and the results should not be taken to conclude that the breeding population in Morgan Hill was limited to two pairs in 2000.

Albion biologists visited the two locations where nesting owls were observed in 2000 on four separate dates in June and July 2001. Only one adult owl was observed at one site and no owls were seen at the other site. Biologists also surveyed for owls while evaluating several potential preserve land sites during evening hours when local burrowing owls should have been visible, but none were observed. An anecdotal report to the Santa Clara Valley Audubon Society identified two burrowing owls at another location in the southwest part of Morgan Hill during late July 2001. There was no information indicating if these were adult or juvenile owls.

Albion biologists surveyed 10 sites in Morgan Hill for nesting burrowing owls during the 2002 nesting season. The sites surveyed included the two sites where burrowing owls were recorded nesting in 2000 and the site where burrowing owls were independently reported in 2000 to the Santa Clara Valley Audubon Society. No burrowing owls were observed at any of the sites surveyed.

In August 2002 a biologist conducting burrowing owl preconstruction surveys at the water storage tank construction site north of the intersection of Dewitt and Edmonson avenues reported burrowing owl sign at six or seven burrows near the construction area. However, no owls were observed during four separate surveys.

On March 28, 2003 one burrowing owl was observed at one of the sites where nesting owls were recorded in 2000. This was a brief daytime incidental sighting and not the result of a focused survey. Not enough time was available to spend at the site to determine whether or not this owl had a mate.

SECTION II: EFFECTS OF PROPOSED ACTION ON BURROWING OWLS

Development in the City of Morgan Hill is expected to impact burrowing owls in several ways. Owls can be *directly* affected by inadvertent direct mortality during development of occupied habitat and by the displacement of individuals from occupied habitat. Burrowing owls are *indirectly* impacted through the loss of foraging and nesting habitat. Taken together, these factors will have an overall negative effect on the maintenance of even a minimal local burrowing owl population, and raise the possibility of its local extirpation. This section describes anticipated impacts to burrowing owls, their habitat, and their continued presence as an aspect of the natural resources of Morgan Hill.

Whatever the actual amount of habitat lost during the life of the General Plan, it would only be one component of the effect of development on owls. This Plan is also intended to mitigate the effects of City activities that are not directly related to the build-out of vacant lands. Such activities include highway and road construction and maintenance or construction in utility corridors that could affect owls and destroy owl habitat, and subtler but sometimes equally destructive effects of traffic, noise, domestic pets, weed and rodent control, lighting, inadvertent predator perches such as power poles, loss of foraging areas and separation of owls and islands of suitable habitat (fragmentation).

ANTICIPATED DEVELOPMENT AND THE ASSOCIATED LOSS OF OWL HABITAT

Burrowing owl habitat will be lost during development predicted and enabled by the Morgan Hill General Plan. Certain figures are available from the City's *Vacant and Developed Land Inventory*: for example, of the 21,700 acres in the Morgan Hill Planning Area, 3,400 (15.6%) are currently developed for nonresdential uses and 2,601 acres are developed for residential uses, for a total of 6001 or (27.6%). A total of 6,971 acres is designated for nonresidential development and 4,998 for residential development, which would bring the total of developed acres to 11,969 or 55% of the Planning Area.

There is not, however, any quantifiable source of information to develop a numerical estimate of the amount of *owl habitat* that will be impacted by future development. Furthermore, if there was such information it would be at best an rough estimate subject to the influences of fluctuating economic forces and because the timing of development on given parcels and the amount of habitat on them are largely unpredictable. An additional problem with prediction is the changing quality of the habitat itself, which depends upon management practices and plant succession. Therefore, this Plan does not attempt to quantify future owl habitat loss. As will be discussed later (Section III), it *does* attempt to quantify the amount and location of habitat necessary to support a small population of owls in Morgan Hill.

Population impacts associated with loss of habitat

It is reasonable to predict that development of vacant lands in Morgan Hill and the associated impacts to owl habitat could contribute to a continued decline of the South San Francisco Bay area burrowing owl population. While the overall effect on the owl population can be predicted, the rate of effect cannot, because the rate of habitat loss and decline of owl numbers is influenced by the actual rate of development, which will vary with economic and demographic factors. Furthermore, the local owl population is affected by forces from outside Morgan Hill. While one cannot rigorously "tease apart" these cumulative effects, the overall effect, likely population decline, is the same.

Since there are no conservation measures currently in effect for the long-term conservation of owl habitat in the South San Francisco Bay, and land development in neighboring municipalities is driven by the same socioeconomic forces operating in Morgan Hill, it is reasonable to assume that South Bay area owl habitat will continue to decline. Unabated, the loss of habitat (most importantly, the loss of breeding pairs of owls) in Morgan Hill and the decreasing availability of replacement individuals from elsewhere has reduced the number of breeding owls to a critically low number.

EVALUATING IMPACTS NOT ASSOCIATED WITH LOSS OF OWL HABITAT

As stated above, the development mitigated by this Plan is the unpredictable projected build-out of vacant land and the associated loss of owl habitat in Morgan Hill. However, the Plan shall also consider *indirect* impacts to the owl population from developing land that does not currently contain owl habitat. This development may not result in a direct, immediate and measurable impact, but this Plan considers *indirect* and *cumulative* impacts as well. For example, under CEQA analysis principles, a redevelopment plan EIR would evaluate not only the development of vacant lots but the indirect impacts on a community's infrastructure and public facilities, and the new pressures such development would have on housing densities elsewhere and induced growth in a surrounding area. Cumulative impacts are similar to indirect impacts but result from the aggregate effects of impacts from a collection of individual actions. In CEQA parlance, "cumulatively considerable effects" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, other current projects, and probable future projects. (CEQA Section 21083(b).)

Put another way, if *only* currently suitable burrowing owl habitat were included in the impact analysis, the owl might still be unable to survive, because the small habitat islands would no longer support a viable population.

Burrowing Owl Status

The following summary is included here to provide background for the discussion that follows. Please refer to Section I for a complete discussion of burrowing owl status.

Burrowing owls were once an abundant, permanent resident in flat, low elevation grassland habitat throughout California (Grinnell and Miller 1944). Early naturalists noted owl declines in

developing parts of the state from ground squirrel eradication and conversion of grassland habitat for agriculture and residential uses. However, there were no quantitative data describing California burrowing owl numbers and distribution until a statewide census was completed in 1991-1993 (DeSante and Ruhlen 1995). This census (actually a sample rather than a count) estimated the California owl population (exclusive of the Mojave Desert and northeastern California, where owls occurred in very low densities) at 9,266 breeding pairs. The census showed for the first time that burrowing owls were not uniformly distributed throughout California, but that 71% of the state's population occurred on 2% of the land area in the Imperial Valley. The Central Valley contained 24% of the state's population and the San Francisco Bay area 1%.

Using information on owl numbers from the 1980's, the census showed that there had been significant declines in California owl numbers in the last 10-15 years and owls had disappeared or declined to very small numbers in several parts of the state. Recent estimates of the owl population in the San Francisco Bay area range from 153 pairs (DeSante et al. 1997) to 167 pairs (DeSante and Ruhlen 1995). They concluded that there had been a 50% decline in Bay area owl numbers since the 1980's. The Santa Clara County owl population, estimated at between 120 to 141 breeding pairs in 1997 (Table I-1) comprised roughly three-quarters of the entire Bay area population.

Habitat and non-Habitat Related Factors Contributing to Burrowing Owl Declines in the San Francisco Bay.

Population declines of California burrowing owls are generally attributed to the loss of habitat and control of burrowing rodents causing reduced burrow availability (Bent 1938, DeSante et al. 1997, Remsen 1978, James and Espie 1997). However, beyond a certain level of urban development, effects from other aspects of human activity, such as vehicle collisions and the introduction of non-native predators (Haug et al. 1993), augment the effects of habitat loss alone.

Development, the human alteration of the landscape in it myriad forms, can both negatively and positively affect burrowing owls depending upon its combined effects on burrowing owl habitat and its habitat elements (e.g., burrows, ground squirrels, prey availability, vegetation structure). This subsection explains examples of both types of effects of "development" on burrowing owls.

To state the process succinctly: under certain circumstances burrowing owl numbers can increase after human alteration (i.e., development) of the landscape (Botelho and Arrowood 1996, Courser 1979, Ligon 1963, Millsap and Bear 2000, Millsap and Bear 1997, Wesemann and Rowe 1987), but beyond a certain development intensity owl numbers decline, sometimes faster than the rate of habitat loss.

The beneficial aspect of development in its early stages is the conversion of habitats not used by burrowing owls (e.g., woodland or wetland) into owl habitat (e.g., grassland). An excellent example of this comes from Florida where the burrowing owl's range and numbers initially increased because of development, in this case forest clearing which created more owl habitat. A study of the distribution and abundance of burrowing owls in Cape Carol, Florida where "development" ranged from 0.5% to 72% of available land area, showed that owls increased up to the point where development occupied about 60% of the landscape (Wesemann and Rowe

1987). Beyond this level, owl numbers declined. The researchers attributed the increase in owl density (up to the 60% level) to increased prey abundance on "developed" lots (i.e., residential lots containing vegetation) as compared to "vacant" lots that contained little vegetation and supported fewer native prey species. They pointed out that above 60% development, owl densities declined *even though prey abundance continued to increase*. The authors concluded that there had to be other factors affecting owls above that level. Beyond the 60% development level, they considered that owl declines were due to increased human disturbance; burrow destruction, harassment by pets, collisions with automobiles and reduced open space.

This phenomenon—the adaptability of owls to highly human-altered environments *up to a point*- is why there are still owls in the south San Francisco Bay.

As the Florida research suggests, there are limits to the benefits (to owls) of living in human-altered environments. These limits are determined by the type and extent of alteration of the environment and whether the resultant landscape contains the habitat elements owls require (i.e., burrows, foraging habitat and an available prey base). Generally, beyond some threshold of development (Wesemann and Rowe 1987, Crigan and Horak 1987) detriments of continued urban development outweigh benefits and owl populations decline.

The decline of burrowing owl numbers in central California (DeSante el al. 1997) suggests that this threshold has been passed. DeSante et al. (1997) stated that loss of habitat was the probable cause, but they also stated that other factors may have contributed to owl population declines. It seems clear that without a regional or statewide program of habitat conservation future "development" will negatively impact burrowing owls, regardless of whether such development directly impacts habitat or not. As development continues, the cumulative effect on the burrowing owl is likely to be disproportionately more negative than simply the loss of habitat. (This may have already occurred in Morgan Hill and explain why the owl population is critically small.) Information from owl population trends in recent decades and other areas support this conclusion.

Types of Effects from Human Development Unrelated to Habitat Loss

The relationship between a species and its habitat, and the current habitat nexus between loss of habitat and decline of a species as interpreted by CEQA, is of course valid. But the more general principle--that some wildlife populations can decline and disappear from factors unrelated to habitat loss alone -- is equally valid for species like the burrowing owl. Examples of this category of effects are considered below.

Direct Owl Mortality

Predation. The location of owl nest burrows in flat, open areas makes this species susceptible to ground predators (Martin 1973) and human activity. The increase of feral animals in urbanized areas is well documented by studies of sensitive and listed species' declines in urban and suburban environments (Atkinson 1996, California Department of Fish and Game 1994a, Ebenhard 1989, Hubbs 1951, Lewis and Golightly 1993). Domestic dogs and cats and red fox have been identified in several reports as burrowing owl predators (Feeney pers. comm., Department of Fish and Game 1994b, Green and Anthony 1993, Haug et al. 1993, Johnson 1985, Martin 1973, Thomsen 1971). Large dogs from adjacent residential areas have been documented

harassing owls during the nesting season, with documented impacts resulting from these encounters. This results in an increase in predation over natural levels and with effects, at a minimum, an increase in depletion of the owl's energy reserves (Thomsen 1971).

Vehicle mortality. Several researchers report collisions with motor vehicles as a major cause of burrowing owl mortality (Bent 1938, Haug et al. 1993, Zarn 1974, Hjeertaas 1997). Haug et al. (1993) cited several reports of collisions comprising between 25% and 60% of observed owl mortality. Johnson (1985) reported that the highest mortality in young owls in the residential/urbanized Davis, CA area was due to the combined effects of collisions with vehicles and predation by feral cats. Coulombe (1971) reported owls being frequently seen in car headlights, usually at a height of 10 meters or less. Thomsen (1971) reported owls hovering during diurnal foraging at heights exposing them to collision or the stress of near misses. Burrowing owls forage on roads and paved surfaces because pavement affords owls unrestricted visibility of and access to invertebrates and mammals crossing bare pavement. An increase in the amount of paved surface and volume of vehicle traffic in an urbanized landscape can raise the incidence of burrowing owl collisions with motor vehicles.

Indirect Effects – Reduced Fitness

The sum of various indirect, negative effects on a species is to reduce the animal's survival and reproductive potential, which together make up its "fitness," and the species' long-term chances of survival. Several factors can lead to reduced fitness including the following.

Reduced biological diversity and productivity. The fitness of a wildlife population (i.e., its survival and reproductive potential) can be adversely affected when the ecosystem it occupies is simplified by the elimination or conversion of native and naturalized plant and animal communities that comes with urbanization. The conversion of native and naturalized plant communities to agriculture re-directs the land's primary biological productivity to the production of non-native plants and animals. This is not necessarily detrimental to burrowing owls because they can persist and even thrive in such circumstances, as evidenced by their high densities in the highly agriculturalized Imperial Valley (Colombe 1971, DeSante and Ruhlen 1995).

Assuming burrows are present, the extent to which owls persist or thrive in human-altered landscapes depends upon the converted landscape's productivity of insects and small mammals in structurally suitable plant communities (i.e., grasslands) where they are available to burrowing owls. Burrowing owls will be negatively impacted and their numbers decline if the conversion or modification of the landscape does any of the following:

- Reduces primary biological productivity which occurs when the surface of the ground is paved or covered by structures,
- Converts an increasing proportion of the landscape to ornamental plant communities that do not produce burrowing owl prey species, or
- Alters the structure of plant communities to types unusable to owls.

Each of these effects occur during the types of development that characterize the Morgan Hill suburban/urban landscape and each impact burrowing owls by reducing biological diversity and productivity.

Ground squirrel control and the loss of burrows. Burrowing owls are dependent upon burrowing mammals to excavate burrows that owls use for shelter, escape from predators and nesting. Ground squirrel control such as poisoning, shooting, trapping and disking for fire control, while not causing a reduction of habitat area, affects burrowing owls in two ways: by eliminating the source of burrows or by maintaining without burrows land that would otherwise be suitable owl nesting habitat. This affects burrowing owls by reducing the acreage of land in the landscape that dispersing owls can use for short-term occupancy (e.g., dispersing juveniles or wintering areas) or for colonization and eventual reproduction. Such land would be classified as owl foraging habitat according to most definitions of foraging habitat, but its biological value to burrowing owls would be reduced because of the absence of burrows. A greater proportion of the landscape where burrowing mammals and burrows are controlled reduces the resident burrowing owl population's survival and reproductive potential outside of the land area containing ground squirrels and burrows.

Mitigating for Habitat and non-Habitat Related Impacts

The two central assertions of this subsection are that, beyond a certain level of urban development:

1. Local owl population declines and/or extinction can be an induced impact from factors separate from habitat loss alone and not immediately apparent nor routinely considered in environmental analysis reports, and;

2. Because there is a nexus between intense development and owl declines, simple mitigation for loss of occupied, or even suitable habitat alone does not provide adequate compensation.

It should be noted, however, that although increased urban development may cause further decline in the burrowing owl population, Morgan Hill can manage owl habitat preserves in an attempt to reverse this trend. The methods or processes for accomplishing this are described in the next section. The fundamental premise of this Plan is that creating and managing owl habitat preserves made up of large parcels in proximity to each other can create living environments that can mitigate for impacts associated with continued urban development.

SECTION III: MEASURES TO MINIMIZE AND MITIGATE TAKE OF BURROWING OWLS AND OWL HABITAT

This Plan has established that development according to the General Plan may affect burrowing owls by the loss of an unpredictable amount of burrowing owl habitat and cause other indirect and cumulative impacts to burrowing owls (Section II). The purpose of this Section is to describe the program to mitigate these impacts.

Certain CEQA-defined forms of mitigation--such as avoiding the impact altogether, rectifying the impact by repairing, rehabilitating or restoring the impacted environment, and reducing or eliminating the impact over time--are largely impracticable in Morgan Hill. It must be assumed that most land now vacant or undeveloped will not "avoid" development and that, once developed, such lands offer limited potential for rehabilitation or restoration. Other mitigation measures pursuant to CEQA (Guidelines Section 15370) and appropriate for this Plan are to:

1. Minimize impacts by limiting the degree or magnitude of the impact.
2. Compensate for the impact by replacing or providing substitute resources or environments.

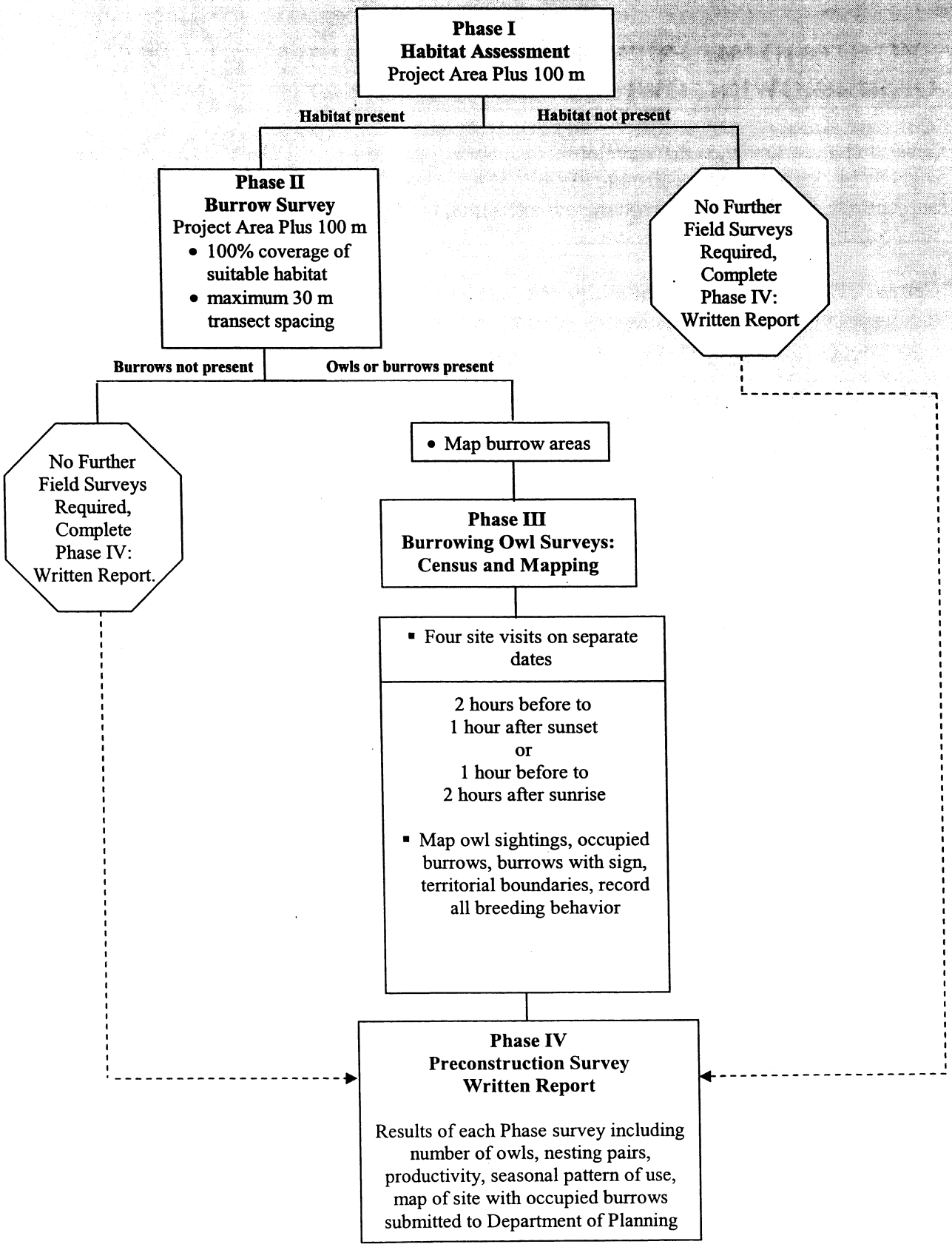
The text that follows elaborates these general measures into Plan-specific actions. In some cases the direction, and the City's commitment, is clear and unequivocal. Examples include the commitment to manage a stated amount of burrowing owl habitat at the start of the Program (described later in this section) and the requirement for routine preconstruction surveys of all lands to be developed, the latter action to ensure that no owls are entombed in their burrows during clearing and grading. In other cases, there are equally strong commitments to a more flexible goal, e.g., the management of a certain number of acres of burrowing owl habitat in the future, without necessarily stipulating at this time the precise location or identity of all such lands.

MEASURES TO AVOID OWL MORTALITY

Direct impacts to burrowing owls (mortality or take[1]) during clearing and grading of lands subject to regulation by this plan shall be avoided by ensuring that owls are absent from such lands. This includes lands that are below 600 feet elevation above sea level that support any grassland and/or mixed herbaceous vegetation upon which an activity is proposed that is defined as a "project" by the California Environmental Quality Act (CEQA) and is not statutorily nor categorically exempt from CEQA. All subject lands to be developed in Morgan Hill's City Limits will be surveyed for burrowing owls according to the Preconstruction Survey

[1] California Fish and Game Code 86 defines "take" to mean hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.

Burrowing Owl Preconstruction Survey Protocol



Methodology (Figure III-1) prior to the City issuing a grading permit or building permit if no grading is required. It is the responsibility of each project proponent to have a Burrowing Owl Preconstruction Survey and owl eviction (if necessary) completed on their land proposed for development. Burrowing Owl Preconstruction Surveys shall be completed on all lands no more than 30 days before initial ground disturbance.

Preconstruction Survey Methodology

A Burrowing Owl Preconstruction Survey consists of a field survey of the subject parcel by a Qualified Burrowing Owl Biologist[2] no more than 30 days before scheduled ground disturbing activity. A Preconstruction Survey is a four-Phase event consisting of the following:

Phase I Habitat Assessment
Phase II Burrow Survey
Phase III Owl Survey
Phase IV Written Report

The number of Phases that have to be completed and the level of effort required for a given parcel depend upon the results of the Phase I Habitat Assessment and Phase II Burrow Survey. For example, Phase II is completed only if there is burrowing owl habitat present on the site. Phase III is completed only if there are burrows present on the site. The first of four Phase III owl surveys can be conducted concurrently with the Phase I and Phase II surveys. Phase IV, consisting of a written report of survey findings, is required for all surveys. Figure III-1 depicts the Burrowing Owl Preconstruction Survey protocol.

The progressive requirements of the preconstruction survey protocol, based upon results of each Phase of the survey, are:

1. Phase I Habitat Assessment results:
   No habitat present. Prepare report, Phase IV.
   Habitat present. Proceed to Phase II.
2. Phase II Burrow Survey results:
   Burrows not present. Prepare report, Phase IV.
   Burrows present. Proceed to Phase III.
3. Phase III Owl Survey results:
   Owls present. Prepare report, Phase IV.
   Owls not present, complete four surveys on separate dates. Prepare report, Phase IV.

If owls are present after the Phase III survey is completed, the permit issued by the City shall require that owls be excluded as described below.

[2] See definition in Appendix I.

Owl Exclusion and Passive Owl Relocation

The practice of excluding owls and passively relocating them applies to lands proposed for development and, of course, only to lands found occupied according to the Preconstruction Survey Phase III results. This Plan provides for excluding and/or passively relocating owls from lands to be developed only from September 1 through January 31 (the non-nesting season[3]). Because burrowing owl nests are protected by California Fish and Game Code (§3503 and §3503.5) the City shall not allow owl exclusion or relocation procedures on lands proposed for development during the nesting season, which generally runs from February 1 through August 31, unless specifically authorized by CDFG.[4]

Owl exclusions and passive relocations shall be supervised or conducted by a qualified burrowing owl biologist who is experienced with the exclusion and passive relocation procedures using one-way devices. Owls shall be excluded from the subject land using one of two options, depending on how much of a given site will be developed:

1. If the entire site is to be developed, owls shall be excluded from burrows on-site and forced to find burrows off-site.

- Owls shall only be excluded from September 1 through January 31 which is *outside* the nesting season, thereby avoiding affecting nesting owls and active nest burrows.
- The exclusion procedure shall be initiated no less than two weeks before initial ground disturbance is scheduled to begin.
- The subject site shall be surveyed by a qualified burrowing owl biologist experienced at conducting owl surveys to determine all burrow locations.
- Following this, owls shall be evicted from burrows using one-way devices in place for a minimum of 48 hours after which all burrow entrances shall be destroyed.
- Grading shall take place within one week of burrow closure. The site shall be monitored twice per week for owl use and open burrows until grading takes place. Owls shall be evicted and open burrow entrances destroyed until ground clearing takes place.
- If owls persist in reoccupying the site, the eviction procedure shall be repeated.
- A qualified burrowing owl biologist shall be present during initial ground clearing.

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[3] Burrowing owl mitigation activities shall be carried out from September 1 to January 31, which is before the nesting season in this part of California. The Burrowing Consortium Mitigation Guidelines (1993) and the CDFG Staff Report on Burrowing Owl Mitigation (1995) state that the timing of nesting activity may vary with latitude and climatic conditions so this time frame *should be adjusted accordingly*. Experience monitoring and managing an owl colony in the Santa Clara Valley for 12 years suggests that mitigation activities can be conducted well into March, e.g., one year owls nested successfully in an artificial burrow installed on March 15 (Barclay 1998). Landowners wishing to exclude or passively relocate burrowing owls during February shall submit a site-specific request and justification to the CDFG.

[4] Only under special circumstances will the CDFG consider approving excluding or relocating owls during the nesting season. A biologist experienced in burrowing owl reproductive behavior will document through personal observation whether or not the subject owls are engaged in reproductive behavior. The City will submit a report describing the behavior of the subject birds with its request to exclude or passively relocate the owls to CDFG.

- A report summarizing owl evictions and burrow closures shall be submitted to CDFG within 15 days of completing evictions and burrow closures.

The purpose of this procedure is to evict, without harm or disrupting breeding behavior, all owls from burrows on the subject site and prevent them from continuing to occupy burrows on the site.

2. If development plans include preserving occupied owl habitat on the site owls can be passively relocated according to the procedures summarized below:

- Resident owls shall be passively relocated only from September 1 through January 31, i.e., *outside* the nesting season.
- A qualified burrowing owl biologist, with experience in burrowing owl relocation techniques shall be retained to undertake this procedure.
- Where feasible, artificial burrows shall be built within 300 feet of originally occupied nest site(s) (see Appendix 2 for references on artificial burrow design and construction procedures).
- New burrows shall be built no less than 3 weeks before construction is scheduled to begin.
- Owls shall be excluded from all burrows using one-way devices in place for at least 48 hours.
- Burrows shall be destroyed after owls have been excluded.
- Grading shall take place within one week. The site shall be monitored twice per week for owl use and open burrows until clearing and grading takes place. Owls shall be evicted and open burrow entrances destroyed until ground clearing takes place.
- If owls persist in reoccupying the site, the passive relocation/eviction procedure shall be repeated.
- The eviction procedure shall be repeated if owls move back onto the site.
- A qualified burrowing owl biologist shall be present during initial ground clearing.
- Artificial burrows shall be monitored for owl use once every two weeks for two months.
- A report summarizing owl evictions and burrow closures shall be submitted to CDFG within 15 days of completing evictions and burrow closures.

As a general policy, this Plan does not include actively relocating owls (trapping and physically moving owls to an alternate site) from developed sites. Active Relocation has not consistently resulted in establishing owls at relocation sites for more than one breeding season (Delevoryas 1997, Feeney 1997; see also discussion of relocation under Site Fidelity in Section I). This Plan emphasizes long-term habitat conservation and applies funds to create and maintain as much habitat as possible for dispersing owls to find and colonize through natural dispersion. However, this Plan recognizes that there may be some exceptional circumstances where actively relocating burrowing owls from a development site to a specific relocation site may be a desirable management practice. For example, active relocation might be a preferred technique to get breeding owls established on outlying, unoccupied preserve lands. Any proposal to use active relocation must be submitted to CDFG for approval. Each request must be accompanied by a plan that thoroughly describes the timetable, techniques and experience of the biologists that will be employed to carry out an active relocation.

Clearing and Grading Restrictions Relative to Preconstruction Surveys

All clearing and grading on applicable lands approved for development in the City shall be authorized by the Community Development Department. The Department shall review the results of the Preconstruction Survey and issue authorization for clearing and grading on each parcel to be developed. Authorizations shall include a time period within which clearing and grading must take place. If clearing and grading is not completed within the authorized time period, the authorization and grading permit or clearance shall expire and the Preconstruction Survey must be repeated. Applicants who do not comply with the Preconstruction Survey and clearing and grading requirements shall be subject to twice the prevailing mitigation fee and other fines (see discussion of funding in Section IV).

Listed below are the possible outcomes of burrowing owl Preconstruction Surveys and their effects on clearing and grading.

Results of Preconstruction Survey	Clearing and Grading[5] Restrictions
Phase I, No burrowing owl habitat present	No restrictions for one year.
Phase II, Habitat present	
No burrows present	Clearing and grading approved and completed within 30 days of completing Phase II survey
Phase III, Habitat and burrows present	
No owls present	Clearing and grading approved and completed within 30 days of closing all burrows to entry by owls
Owls present	Clearing and grading approved and completed within 7 days after eviction of all owls between September 1 and March 1.

Weed Abatement, Fire and Ground Squirrel Control Practices

Weed abatement, fire control and ground squirrel control are land management practices designed to provide landowner and community benefits normally considered uncontroversial and environmentally benign, or at least involving minimal impacts. However, because of the burrowing owl's habitat requirements and niche in the urban landscape, these activities can cause direct mortality to adult and juvenile owls underground in burrows.

[5] Clearing includes the use of machinery to remove vegetation and results in disturbing the soil surface and destroying the integrity of burrow entrances. Grading includes any activity that results in leveling or otherwise modifying the soil surface. Clearing and grading includes discing, plowing, tilling, scraping, or blading the vegetation and soil surface. Clearing does not include mowing as long as the activity does not modify the soil surface or destroy burrow entrances.

The preconstruction measures described above apply to undeveloped lands that are approved for development and whose impacts to habitat are ultimately mitigated by the provisions of this Plan. That is, a preconstruction survey and owl eviction (if required) are partial mitigation because they are measures to *avoid* owl mortality immediately before undeveloped land is developed. The Plan recognizes that undeveloped land can contribute to the goals of the Plan by providing burrowing owl nesting and foraging habitat for indeterminate periods before such lands are developed. This Plan accordingly proposes some modifications of ongoing land management "standard practices" for the control of weeds and ground squirrels throughout the City's jurisdiction. Such practices will avoid inadvertent owl mortality and promote owl habitat for as long as possible before these lands are developed.

Weed abatement is the removal of weedy, ruderal vegetation on private and public open lands, primarily to reduce the danger of fire and to meet aesthetic goals of landowners and municipalities. Abatement methods include mowing, discing (tilling under weeds with a plow or disc to the depth of approximately 4 to 10 inches), or spraying with herbicides. Discing is a common weed abatement method and is the one most likely to result in owl mortality. Discing is conducted in the spring and summer, usually between March and July, a period during which owls are nesting.

Ground squirrel control entails killing California ground squirrels and may include filling the burrows they dig. The practice is designed to eliminate ground squirrels in places where they or their burrows pose a safety risk or where burrows interfere with other lands uses such as golf courses, lawns, athletic fields and water canal levees. Methods to kill squirrels are numerous and typically include above-ground poison bait stations, below-ground gases placed in the burrows, and mechanical killing traps placed in burrows. Burrowing owls may be killed directly by poisons, traps or gases or may die underground when burrows are filled. Ground squirrel control also affects burrowing owls by reducing burrow availability.

Weed Abatement Prescription. To minimize burrowing owl habitat loss on private lands which will eventually (but not imminently) be developed, and to maintain the highest owl population levels possible in the interim period when Preserve Lands are being acquired and restored, the City shall adopt an ordinance placing appropriate restrictions on discing. Although mowing, rather than discing, encourages more owls on such land, the presence of owls will not be an obstacle to development at the time the landowner wishes to develop the land. Should owls colonize a parcel, they will be evicted or passively relocated following the procedures described above.

The City will no longer disc City-owned or managed lands on the valley floor. The City, or its contractors, will control weeds regularly through mowing, grazing or controlled burning to maintain vegetation below 6 inches in height, a height beneficial to owls and adequate to reduce fire danger. Management practices for weed abatement, fire and ground squirrel control on public and private lands managed as Preserve Lands are described in more detail in *Ecological Characteristics of Burrowing Owl Management Areas* (below).

Ground Squirrel Control Prescription. The policy adopted by this Plan is that ground squirrels shall not be eradicated on undeveloped City-owned lands on the valley floor, but can be controlled under certain circumstances. The City is planning to abstain from controlling ground squirrels on City-owned or managed lands on the valley floor unless there is a demonstrated health risk from disease, or when populations exceed 50 animals per acre, a density higher than normally encountered in natural settings (Marsh 1985) and one which is usually induced by an artificial food source.

MEASURES TO MINIMIZE LOSS OF OWL HABITAT

Landscape Management

In some types of conservation planning "landscape management" is used to minimize habitat loss. Frequently, this becomes a form of environmental micro-management where small-scale habitat conditions and micro-habitats are maintained for the benefit of the subject species. For example, a plan for the Swainson's hawk (*Buteo swainsoni*) might stipulate the protection of large trees even in suburban landscapes, since the species can occasionally use such sites for nesting.

The planning team considered such an approach for burrowing owls in Morgan Hill, since owls persist on relatively small parcels of habitat containing the right combination of surrounding habitat conditions. Small-scale landscape activities such as installing artificial burrows, or maintaining habitat on the margins of parking lots do offer benefits by increasing nesting and foraging habitat. However, the costs to the City of managing and/or monitoring significant amounts of such lands exceed overall benefits to Citywide owl habitat conservation. Furthermore, there is no long-term accountability that such management or landscape features will remain in suitable condition unless the land is placed in a Burrowing Owl Habitat Management Agreement. The Plan's mitigation strategy therefore does not emphasize small-scale landscaping activities as a reliable means of creating or maintaining a significant amount of owl habitat. However, the Plan shall consider on-site habitat management of occupied burrowing owl habitat on a case-by-case basis.

On-site Habitat Compensation Lands. The amount of land proposed for development but where owl habitat will be preserved on-site after development cannot be predicted because the choice to select this option shall be up to individual landowners. As mentioned earlier, a landowner might reduce his development fee obligation and negotiate a Burrowing Owl Habitat Management Agreement on a portion of a parcel that is occupied by burrowing owls. In this case, the loss of owl habitat can be partly mitigated by maintaining occupied burrowing owl habitat on an undeveloped portion of a parcel proposed for development. For acreage to qualify as on-site mitigation it must meet the following conditions:

- The management agreement formally places the land in the Owl Plan Preserve System as a Subject Parcel (see Appendices 1 and 3).

- Have verifiable[6] records of burrowing owls occurring on the site during the nesting season within the last three years (i.e., "occupied habitat") within the Morgan Hill City Limits.

- Be approved by the Owl Plan Administrator

Each request for on-site mitigation credit must be accompanied by a management plan documenting the above conditions. The decision as to whether proposed acreage qualifies as on-site mitigation and qualifies for development fee adjustment shall be made by the Owl Plan Administrator and shall be subject to appeal to the City Council. See also the discussion in Section IV.

MEASURES TO MITIGATE IMPACTS TO OWL HABITAT

Mitigation Strategy: the Preserve Lands Concept

The preceding subsection discussed measures to minimize impacts by limiting the degree or magnitude of certain actions to avoid direct impacts to owls (i.e., take). By definition, the proposed action (development according to the General Plan) cannot be reduced to a less-than-significant level under CEQA without additional mitigation by *compensating* for impacts. Compensation for the purpose of this Plan means creating and maintaining new habitat (i.e., providing substitute resources or environments according to CEQA) to make up for the loss of habitat and other indirect and cumulative impacts from development in Morgan Hill.

Hypothetically, compensation could range far afield from Morgan Hill, and take the form of enhancing owl habitat conservation and the chances of the species' persistence in other parts of its range. The planning team's first priority was to preserve owl habitat and owls in the vicinity of Morgan Hill. Therefore, the team first explored the feasibility of achieving the Plan's entire habitat preservation goal within the Morgan Hill Sphere of Influence before looking elsewhere. After evaluating the availability of candidate lands in the City and the cost of land purchased to make up any deficit, the team concluded that most of the goal could be reached in or near Morgan Hill.

This type of contextual examination of compensation--placing compensation within a biologically defensible framework - is this Plan's "Conservation Strategy" that will make mitigation according to this Plan potentially more effective than project-by-project mitigation. The Conservation Strategy is further described below in terms of its *Conservation Goal* - amount of preserved owl habitat comprising the Preserve Lands - and *Preserve Design* - the geographic distribution of Preserve Lands.

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[6] A verifiable record of a burrowing owl occurring on a site may consist of indisputable photographic evidence of a burrowing owl or burrowing owl sign at an identifiable location on an identifiable date. It may also consist of a written description of the sighting of burrowing owls or burrowing owl sign at a given location and date by a wildlife professional or written corroboration of the presence of burrowing owls or owl sign by two individuals with demonstrated experience at identifying burrowing owls. The City will make the final determination of what constitutes a verifiable burrowing owl record.

Conservation Goal: 1,000 "Acre-Points" of Preserve Lands

The Planning Team initially considered defining the Plan's mitigation goal in terms of a total acreage of burrowing owl habitat that by most measures would be sufficient to support the number of owl breeding pairs thought to have occurred in Morgan Hill in the mid- to early-1990s.

The feasibility (and ultimately the credibility) of this or any other habitat conservation plan depends on either identifying specific areas that will become part of the preserve *or* demonstrating that enough habitat productivity will be available during the implementation phase to provide adequate compensation. Frequently the latter approach is preferred by conservation planners, and was selected by the Planning Team, for three reasons:

1. Overly detailed planning limits the flexibility of the Plan.
2. Conservation or management agreements for preserve parcels may not be acquired until adequate funds are generated by the funding mechanism. Any particular parcel identified as a candidate at the outset of the plan may not be available, since enough money may not be accumulated to pay for management agreements at the outset.
3. Many landowners would object to having their property identified as environmental mitigation land.

This Plan therefore pledges a total commitment of 1,000 *acre-points* of owl habitat. The units are discussed in the sections below and fully defined in Appendix 1. The commitment is to obtain the acre-points proportional to development under the Morgan Hill General Plan, so that the number of points bears the same proportion to the 1,000 acre-point goal as newly developed acres bear to the total amount of new development envisioned in General Plan build out. As a practical matter, Plan implementation as measured by acre-points shall be allowed two years to "catch up" to the developed acre total in order to allow an adequate amount of time for the Plan Administrator to identify and secure the additional habitat.

For example, if 8% of the total development authorized under the General Plan occurred in the year 2006, the program shall have a proportional number of acre-points (i.e., 80 acre-points since 80 = 0.08 X 1,000 acre-points) added to the existing Preserve Land acreage by the end of 2008. This flexibility, however, is subject to the minimum acreage requirements discussed under *Additional Plan Provisions* in Chapter IV.

Deriving the Acre-Points – How Much Habitat is Needed?

The minimum habitat acreage required by a burrowing owl or pair of nesting owls is a figure that is not available in the scientific literature. First, such a figure is difficult to measure in nature and second; it would be expected to vary widely depending upon habitat conditions, especially prey availability, which in turn is influenced by numerous ecological factors that vary seasonally and locally. Finally, burrowing owls are not exclusive in their use of the environment so even if a

figure describing how much habitat a breeding pair needs were available, this figure would not necessarily have to be multiplied by the number of pairs to arrive at a figure necessary to support that number of pairs.

The planning team began with information from a study of burrowing owl movements using radio telemetry in Saskatchewan (Haug and Oliphant 1990) to understand the scale of minimum habitat requirements. This threshold enables us to understand the magnitude of habitat used by owls rather than yielding a exact habitat requirement figure. The magnitude of owl habitat use is based on estimates of burrowing owl home ranges and estimates of the distances burrowing owls travel to forage. Estimates of home ranges using radio telemetry varied widely; from 35 to 1,200 acres with an average of 595 acres (Haug and Oliphant 1990). A circular home range of 595 acres has a radius of 0.54 miles. Radio-tracking data in this study showed that 95 percent of radio-tagged owl movements were within 0.4 miles of the owls' nest burrow (Haug and Oliphant 1990).

In California, Rosenberg (2000) noted that burrows tend to cluster in certain areas (because burrows often occur in clusters), suggesting that suitable nesting habitat might be better used as the determining factor in management, and that foraging radius is a measure of activity, and not necessarily a foraging requirement. Closer to Morgan Hill, examples of much smaller acreages (smaller than the 595 acre figure above) supporting owls has proven successful. At San Jose Airport, 350 acres of habitat are occupied by a population that has increased from 11 pairs to over 30 in the past decade (Barclay, unpublished data). From a regulatory standpoint, CDFG has set 6.5 acres per owl pair as a minimum figure for mitigation. It must be emphasized that this figure does not reflect how much habitat owls use or need in nature.

This Plan is proposing to manage an unspecified number of acres of burrowing owl habitat following a scoring system that prioritizes the preservation of occupied habitat and land surrounding occupied owl habitat in and near Morgan Hill. Given the owl's precarious population status in Morgan Hill such a system will increase the owl's chances for persistence in Morgan Hill by creating incentives to preserve recently occupied sites. The Planning Team considers this approach more effective towards the species' local conservation than simply defining the Plan's goals in terms of a given number of acres of owl habitat. (If owls were more common in Morgan Hill the acreage approach would be appropriate.)

The land that will be preserved in Burrowing Owl Habitat Management Agreements or management agreements as mitigation for the effects of development are the *Preserve Lands*. The Plan's intention is to mitigate impacts to burrowing owls from future development. Maintaining a given number of owls or a minimum sustainable population, or managing the "recovery" of burrowing owls in the Santa Clara Valley is beyond the scope of responsibility of the City or this Plan. However, the process of proposing an appropriate amount of mitigation acreage raises the question of how many owls the acreage can support. Again, the Plan's goal is not to support a given number of owls, but the mitigation acreage proposed should be biologically defensible; thus a discussion of the number of owls it is capable of supporting is appropriate.

The carrying capacity of 100 acres of burrowing owl habitat was used as a basis for the acre-point system (e.g., 100 acres at 10 points each would be 1,000 acre-points). The full acre-point system is explained in Appendix 1. It can be estimated using owl densities reported in the literature. As discussed above, burrowing owl territories, home ranges and densities are highly variable and greatly influenced by local environmental conditions such as prey availability, habitat conditions, and burrow density. Burrowing owls do not have exclusive home ranges and since their territories are very small compared to their home ranges, home range figures cannot be used to derive carrying capacity of a given land area. Therefore, of the three measures of a burrowing owl's area requirements, densities are the most appropriate to use to estimate the carrying capacity of 100 acres.

The following table lists several owl densities reported in the literature converted to yield a range of carrying capacities for 100 acres of owl habitat. It is important to consider that none of these examples represent land intentionally managed to optimize owl habitat conditions or maximize burrowing owl numbers. From this information, it appears that 100 acres of land managed to maintain *optimum* habitat conditions for burrowing owls (especially parcel size, vegetation height and burrow availability) should be in the range sufficient to support an owl population of a least 6-8 pairs.

Table III-1. Owl densities from different parts of the species range.

Author and location	Reported burrowing owl density	Carrying capacity per 100 acres
DeSante and Ruhlen 1995, California		
Average in low elevation areas	11.9 pairs/100 km²	0.05 pairs or 0.1 owls
Imperial Valley	236.8 pairs/100 km²	0.9 pairs or 1.8 owls
Coulomb 1971, California		
Imperial Valley	12-13 owls/sq. mile	2 owls
Dense area in Imperial Valley	22-23 owls/sq. mile	3.5 owls
Butts 1973, Oklahoma		
Prairie dog town	1 owl/4.8 acres	21 owls
Outside prairie dog town	1 adult/5,683 acres	0.02 adults
Winchell 1994, Southern California	31 owls/sq. mile	4.8 owls
Trulio 1994, Moffett Airfield, Sunnyvale	43 owls/sq. mile	6.7 owls
Barclay (in press and unpublished data), San José International Airport		
Total airport area	40 pairs/1050 acres	3.8 pairs
Total airport owl habitat	31 pairs/355 acres	8.7 pairs

Preserve Design

The planning team developed the acre-point system to achieve the Plan's Conservation Goal of preserving burrowing owl habitat. The system addresses the geographic location of owl habitat preserve lands and the habitat(s) on and around them. The Conservation Goal is defined by the aggregate acre-point value of all preserve lands.

The location of Preserve Lands in relation to recently occupied habitat in Morgan Hill is the central feature of the Plan's Preserve Lands scoring system. Focusing preservation efforts near occupied habitat is as much common sense as it is conservation biology. Encouraging owls in new areas (or restoring formerly occupied habitat to accommodate them) is a perfectly acceptable alternative, but is a lower priority.

In order to assure that Preserve Lands are managed to maintain suitable burrowing owl habitat and to provide nesting opportunities for burrowing owls, at least 5%[7] of the area of any preserve parcel or group of parcels within ½ mile of each other shall include California ground squirrel burrows or artificial burrows suitable for occupancy by burrowing owls. All burrowing owl preserve lands shall consist of less than 15 percent slope unless it can be proven that such lands are or have been occupied by burrowing owls, i.e., there have been burrowing owl sightings or the presence of burrowing owl sign within the previous three years.

The purpose of the scoring system is twofold. First, it allows flexibility for the attainment of the Plan's "Preserve Lands" goal (i.e., the goal is expressed as a number of points which may be met through a variety of parcel types and sizes) and second, it contains incentives for the preservation/management of owl habitat close to recently occupied habitat in Morgan Hill. The point system is fully described in Appendix 1.

Preserve Land Categories

Three categories of lands that could be used to achieve the Conservation Goal are:

- Publicly managed land where owl habitat can be created and maintained
- Portions of privately owned land dedicated to owl habitat management
- Land to be acquired by the City and maintained as owl habitat.

Ecological Characteristics of Preserve Lands. Preserve Lands that will be productive owl habitat and qualify and function as mitigation must meet several habitat-related requirements. Obviously these requirements will be automatically met by any site that is occupied by burrowing owls. For unoccupied habitat, the function of the habitat and the value according to the Points System are measured by its proximity to occupied habitat and owl habitat elements, most importantly the presence of ground squirrels.

[7] The 5% area that is required to contain ground squirrel burrows is measured by calculating the area of a polygon drawn around the outermost ground squirrel burrows in a contiguous parcel containing burrowing owl habitat.

Second, the arrangement of preserve parcels in the landscape is important. Value of a site is not directly proportionate to its size because very small sites (even down to an acre) can be very valuable if they contain owl nest burrows. Small parcels assume proportionately greater value based on their proximity to occupied sites and whether or not they are secured in a Burrowing Owl Habitat Management Agreement. Recognizing that habitat around occupied sites is important and that owls use of the environment is not directly related to land ownership, the scoring system creates value for habitat that is not in a Burrowing Owl Habitat Management Agreement as long as it is near occupied sites. Habitat value on a preserved area changes depending on the habitat features on surrounding but unpreserved acreage.

Third, the structure of the vegetation on Preserve Lands is essential to their value of providing resourses that owls need. The lands should be open and dominated by grassland and herbaceous plants with no trees or shrubs. The vegetation shall be maintained no taller than 6 inches, and consist of nonnative grasses, native grasses, forbs, short annual or perennial flowers, or low-growing ground cover. Preserve Lands shall be managed to reduce infestations of noxious weeds such as yellow starthistle (*Centaurea solstitialis*). Ground squirrels shall not be controlled on Preserve Lands.

Given the burrowing owl's ability to use various types of human-altered habitats in the urban landscape, there are many potential opportunities for managing land not currently containing owl habitat and restoring them to productive habitat. These include:

- parks with unirrigated grasslands
- managed parks with unmanaged buffer areas
- unirrigated, unmanaged agricultural fields
- underground reservoir sites
- areas around groundwater recharge basins and above-ground reservoirs
- unirrigated out-of-play areas around the margins of golf courses
- airport infields and approach zones
- utility corridors
- closed landfills
- open space required (through zoning or development agreement) on large development projects

Preserve Lands Evaluation. The Planning Team conducted a *Preserve Lands Evaluation* of candidate lands that could be used to make up the habitat conservation goal. The areas evaluated are listed in Table III-2.

The planning team evaluated 19 sites in Morgan Hill and nearby Santa Clara County for their potential to contribute to burrowing owl habitat Preserve Lands. This evaluation included a visual estimate of the percent of the subject land that could reasonably be managed as owl habitat. Portions of parks with developed recreational facilities and/or riparian vegetation were not classified as having owl habitat restoration potential on those portions.

A biologist familiar with burrowing owl natural history and habitat requirements conducted the Preserve Lands evaluations during August 2001. Sixteen candidates comprising approximately 1400 acres were inspected. After the evaluation there were 14 sites comprising 402 acres (about 30% of the total area evaluated) that were considered suitable for restoring owl habitat. Six of these areas comprising 20 acres occur in the Morgan Hill Urban Growth Boundary. Each candidate was evaluated for existing or potential owl habitat and several other attributes. Table III-2 lists the areas evaluated and prioritizes them based on the presence of burrowing owls, proximity to recently occupied habitat and location in relation to Morgan Hill.

Table III-2 (which does not distinguish between publicly-owned and private land) shows that there is ample undeveloped land on the sites evaluated to meet the Preserve Lands goal. However, not all of these lands will actually be available to the City.

Because of high land values, opportunities to purchase Preserve Lands will be limited. An affordable amount of owl habitat in Morgan Hill would have to be so small in relation to the entire Preserve Lands goal that it would have an unacceptable cost to benefit ratio. The Plan allows the City to obtain Preserve Lands outside the City limits, and potentially outside the Santa Clara Valley entirely.

The information in Table III-2 was gathered to test the availability and suitability of a sample of lands to contribute to the Preserve Lands goal. It is not a comprehensive inventory of all suitable lands, nor is it a list of specific parcels to be managed for owls. This Plan has not been written to provide parcel-by-parcel direction on the makeup of Preserve Lands.

Whatever the specifics, the Plan guarantees that an appropriate amount of habitat is protected and that sufficient funds are collected to manage that habitat.

Table III-2. Candidate Preserve Lands Evaluation. The information below is not intended to be a comprehensive list of potential owl Preserve Lands. These locations were evaluated to test the feasibility and availability of sufficient acreage to meet the Conservation Goal.

Name of Area	Approx. total acreage	Approx. acreage suitable for owl habitat management	Owl habitat management recommendations
Priority 1. Owls present within last two years, area is in Morgan Hill			
El Toro School	5	1	Mowing, install artificial burrows (3) in fenced retention basin
Cochrane Road, East of Hwy. 101	8	8	Maintain current mowing regime, fencing optional
Sunset Avenue	15	15	Maintain current livestock grazing regime
		Subtotal 24	
Priority 2. Owls not present, but suitable grassland and burrows present			
SCVWD San Pedro Ponds	30	25	Mowing, install artificial burrows if necessary
South County Airport	250	100	Continue current mowing, install artificial burrows
Grazing land at Foothill and San Martin	100	100	Grazing or mowing, evaluate burrow availability
Coyote Creek golf drive exit/on-ramps	50	50	Install artificial burrows, maintain mowing
Butterfield Blvd. drainage	10	10	Mow and install artificial burrows and fencing
		Subtotal 285	
Priority 3. Owls not present, suitable grassland without burrows present			
Malaguerra Park and Coyote Creek Park	300	30	Remove abandoned orchard trees and mow vegetation
Private golf course	200	2	Install artificial burrows in out-of-play area along Foothill and Maple Avenues
High School site	120	120	Install artificial burrows
Condit Road sports fields	40	1	Install artificial burrows and fencing in unirrigated areas
Coyote Creek golf course	300	20	Mow unirrigated out-of-play areas and install artificial burrows
Coyote Valley golf driving range	15	10	Mow unirrigated area and install artificial burrows
Murphy Lane	7	7	Install artificial burrows
Model Airplane Skypark	?	?	Mow unirrigated areas, install artificial burrows
		Subtotal 183	
Priority 4. Other areas evaluated			
Railroad and Maple Ave.	30	30	Corn crop present, establish grassland habitat
Silvera Park	?	?	Marginally suitable habitat, scattered trees
Easy Street	5	0	No suitable-size habitat patches present
		Subtotal 30	
		Total 522	

SECTION IV: IMPLEMENTATION OF AND FUNDING FOR THE BURROWING OWL MITIGATION PLAN

In Section II, the Plan described the effects of the proposed action on burrowing owls; Section III described the program to compensate for these impacts by setting aside 1,000 acre-points of Preserve Lands. Section IV details, to the extent practicable, the specifics of monitoring and reporting on mitigation activities throughout the life of the Plan. This section also describes methods of funding the Plan and lists additional Plan provisions, especially actions to be taken in response to changing conditions.

In brief, the City of Morgan Hill shall issue a request for proposals to secure a contractor that will carry out the following actions to implement this Plan:

- Secure agreements to protect burrowing owl habitat (the Preserve Lands) according to the scoring system described in the previous section.
- Maintain Preserve Lands to support suitable burrowing owl nesting and foraging habitat in accordance with the stated goals.
- Prepare an annual report listing the Preserve Lands points accumulated and the current status and habitat condition of Preserve Lands.

In the text that follows, the planning team recognized that overly specific direction can be counter-productive to those whose responsibility it will be to carry out the Plan. However, since it has implication for CEQA review of projects--the Plan may be considered by the City as mitigation for some projects under CEQA review--there must be clear implementing and monitoring mandates for accountability. Thus, Section IV outlines a monitoring program, funding options, and attempts to create a system for dealing with uncertainties that are likely to arise (see Additional Plan Provisions).

PROGRAM ADMINISTRATION AND IMPLEMENTATION SCHEDULE

The City shall be responsible for administering the contract for preserve land management. Nearly all of the Plan's direct implementation activities will be completed by the contractor hired to administer the Plan. Table IV-1 summarizes the Plan's major implementation activities.

Table IV-1 Implementation Schedule for Administrative Activities to be Completed by City Departments		
Activity	***Responsible City Entity***	***Deadline***
Establish Mitigation Fee	Finance Environmental Programs	7/30/03
Issue RFP for Plan Administrator	Environmental Programs	7/30/03
Execute Contract for Administrator	Environmental Programs	10/30/03
Report on Annual Development	Community Development	6/30/04 and annually thereafter
Report on Annual Preserve Lands Point Balance	Contractor	6/30/04 and annually thereafter
Report on Annual Fund Balance as an Element to the City's Annual Financial Reporting	Finance	12/31/04 and annually thereafter

MONITORING PROGRAM

The Morgan Hill Burrowing Owl Mitigation Plan monitoring program serves to document compliance with plan goals. Its product is a regular (annual) report of the progress towards achieving the goal of mitigating effects of development on burrowing owls. This shall be measured by the cumulative annual acre-points value of all Preserve Lands.

Monitoring Owl Preserve Lands

Each Plan year the Plan's Contracted Administrator shall have all Preserve Lands evaluated by a Qualified Burrowing Owl Biologist between May 15 and July 15. The Administrator shall prepare an annual report before the end of the calendar year summarizing the habitat conditions on all Preserve Lands. The report shall be submitted to the City Planning Commission and the CDFG. The following information shall be recorded during the annual inspection of each unit of the Preserve Lands (Subject Parcels) and reported in the Plan:

- The average effective height[1] (Green and Anthony 1989) of the vegetation on the Preserve Lands;
- The proportion of the Preserve Land containing ground squirrel burrows suitable for burrowing owls;

[1] Effective Height is the height at which 90% of the horizontal extent of a white board is obscured by vegetation when viewed 1 meter from the ground at a distance of 10 meters. Green, G. A. and R. G. Anthony 1989. Nesting success and habitat relationships of burrowing owls in the Columbia Basin, Oregon. The Condor 91:347-354.

- The presence or absence of ground squirrels;
- The number of burrowing owls observed and the locations where they were observed. The report shall include an estimate of the number of breeding pairs and juvenile owls produced on each unit of the Preserve Lands.
- The acre-point value of each unit of Preserve Lands.
- A map showing the Preserve Land areas (Subject Parcels) and the acre-point value assigned to each.
- A tabular display showing total percentage of authorized development which has occurred, total acre- points required to mitigate to date, and any amount in deficit.
- For any amount in deficit, the deadline for deficit elimination.

The points/acre score for a given parcel can change annually depending upon whether or not habitat conditions suitable for burrowing owls are maintained on the parcel (see Scoring System). The points value can decrease if the habitat conditions fall below acceptable thresholds, e.g., the vegetation becomes too tall or burrow availability falls below 5% of a parcel or group of parcels within ½ mile. Alternately, the points value can increase if the habitat conditions substantially improve the suitability of the land as owl habitat.

The original points/acre value for a given parcel based on the presence or absence of burrowing owls (i.e., occupied habitat) shall remain in effect for that parcel as long as suitable burrowing owl habitat conditions are maintained on the parcel and it remains part of the Preserve Lands program.

FUNDING

Definitions

Enhancement costs are one-time expenditures. They include, for example, exclusionary fencing and artificial burrow construction. The Plan assumes that no lands will be purchased in fee title by the City.

Maintenance costs are yearly costs and may include biannual mowing, fence repair, and feral animal trapping as needed.

Development Fees

Based on an initial cost analysis (see Appendix 3), original enhancement of the Preserve Lands will cost an average of $4,300 per acre. If at full program operations, 100 acres are assumed to be in Preserve Land status, the initial enhancement total will therefore be $430,000. If this one-time expense is "mortgaged" over the life of the Plan, its yearly cost would be $25,295.

Maintaining the Preserve Lands will cost, at a base year 2003 estimate, approximately $980 per acre per year in hard costs. Since the number of acres preserved will grow over time, the annual costs of preserve maintenance will start at a minimal level and grow annually. Plan

administration, including monitoring, reporting, surveying, and contract administration, is estimated to cost $10,000 per year.

A fee on all residential and nonresidential development needs to be assessed to account for these program costs. For residential development, it is assumed that approximately 200 units will be developed per year. Nonresidential development is assumed to be 30 acres per year based on the General Plan. In order to calculate a commonly-based fee for both residential and nonresidential development, it is assumed that the average housing density is seven units per acre. Therefore, the nonresidential mitigation fee, which will be calculated on a per-acre basis, should be seven times the residential per-unit fee.

Calculating a development fee to pay for the program divides the yearly number of residential and nonresidential "units" (200 + 210 = 410) into the average annual program cost of $61,236, for a unit fee of $149.

Therefore, the development fee cost per per residential unit for maintaining owl habitat as open space would be $149; for every acre of commercial development, $1,045 ($149 X 7). Any fee structure approved by the City shall be adjusted annually for inflation from the baseline year (first implementation year) of the Plan. Other changes to the fee structure shall be considered by the City as future estimates of the Plan's implementation costs are determined. In addition to relying on development fees to fund preserve enhancement and maintenance, the Planning Commission and City staff shall explore additional options to add valuable owl habitat lands to the preserve using a transfer development credits (TDCs) process. In addition, the Planning Commission will evaluate how to amend the residential growth control system to further complement Plan implementation.

If the City deems it suitable as lead agency under CEQA, the development fee and associated attainment of the conservation goal would constitute sufficient mitigation for burrowing owl impacts in the General Plan area, including management, administration, and monitoring but excluding the costs of surveys and passive relocation where owls are actually present, which remain the responsibility of the individual landowner. These actions would reduce impacts on owls to a less-than-significant level.

ADDITIONAL PLAN PROVISIONS

1. As described in Section III, the program shall acquire acre-points at the same rate development is authorized by the City. Under the assumptions used to calculate development fees, this rate is 200 residential units and 30 nonresidential acres developed per year for 17 years. For example, if 8% of the total development envisioned in the General Plan has been permitted and developed in a given year, the program should have 80 additional acre-points (0.08 X 1,000 acre-points) under owl management within two years.

If the program falls more than 50 points behind the pace of development (allowing for the two-year delay discussed in Chapter III,) the Plan shall be deemed in default and shall not be considered by the City as adequate for subsequent CEQA mitigation until the shortfall is eliminated. Inadequate funding of the program shall not be considered a justification for default.

2. The acre-point system is designed to encourage the protection of owl habitat that has been most recently occupied as this habitat is assumed to be the most viable and valuable. Because of the high point values that occupied lands have, it may be possible to achieve the acre-point system's goals while preserving relatively few acres of habitat. Therefore, in order to ensure that at least 50 acres of habitat are protected, the program must have a minimum of 25 acres under owl management by the time 50% of anticipated development occurs and a minimum of 50 acres when 100% has occurred. Acre points in excess of 1,000 may be "banked" to compensate for development that exceeds anticipated levels during the planning period.

3. After five years, the plan's 1,000 acre-points goal and the City's progress towards attaining the 1,000 acre points shall be evaluated. At that time, changes that will improve the Plan's effectiveness at supplying burrowing owl habitat shall be considered for implementation.

4. Five years after the Plan is approved, the status of burrowing owls on all Preserve Lands shall be evaluated. This review shall be based on the annual evaluations of all Preserve Lands. Any lands in the program for more than five consecutive years that have shown no owl occupancy may be dropped from the program. At this point, other lands of equal value shall be substituted as funding becomes available to do so without regard to the acre-point system.

5. If at the end of 10 years after Plan approval no owls are present on any Preserve Lands for at least three consecutive years (i.e., the time that defines occupied habitat), the City is freed from the obligation to maintain the Preserve Lands as owl habitat. All Plan funds shall continue to be collected through 2020 (for the life of the current Morgan Hill General Plan) to be used for owl conservation elsewhere within the species' range in California in consultation with CDFG and without regard to the acre-point system.

   If any owls are present on any Preserve Lands, the program shall be considered successful and the City shall ensure that reasonable funding is available to support the perpetual maintainance of Preserve Lands.

   If at the end of 10 years the program is considered successful, but more owls have been evicted from developed lands than are present on Preserve Lands, the Plan shall be still deemed successful *unless the number of adults owls evicted is twice as great as the number on Preserve Lands.* In this event, 150 acre-points shall be added to the acre-point goal of 1,000 for each adult owl evicted greater than the number present on Preserve Lands.

6. In the event the burrowing owl is listed under the California Endangered Species Act this Plan may serve as the starting point for application for a permit for the "take" of the species pursuant to Section 2081 of the Fish and Game Code. Should the owl be listed under the Federal Endangered Species Act the City may request the Service evaluate the adequacy of the Plan as a Habitat Conservation Plan for the owl.

7. By November 1, 2003, The City shall take appropriate action to secure the early protection and owl habitat management for the areas of El Toro School and the Edmundson water tank site, as described in Appendix 4 attached hereto, provided the City can obtain the consent of the property owners to take such action.

8. The City recognizes that the implementation of the Plan is constrained by statutory fee adoption requirements, and therefore, prior to the effective date of such fees, shall give affected property owners the choice of complying with the Plan, including the fee requirements, or complying with the interim mitigation measures which the City has been applying since adoption of the 1999 Ojo de Agua Environmental Impact Report.

9. The City shall acquire, dedicate or secure agreements for two hundred and fifty (250) acre-points of Preserve Land within eighteen (18) months of the Plan's adoption.

APPENDIX 1: DEFINITIONS AND PRESERVE LANDS SCORING SYSTEM

The preserve land scoring system is based on a combination of the size and habitat quality of the parcels with Burrowing Owl Habitat Management Agreements (PART I – SUBJECT PARCEL INTRINSIC VALUE) and the size and habitat quality of surrounding parcels within 0.5 mi of parcels with Burrowing Owl Habitat Management Agreements (PART II – ADDITIVE VALUES).

DEFINITIONS

Additive value. The sum of the points/acre scores of all parcels within 0.5 miles of a subject parcel

Burrowing Owl Habitat Management Agreement. A legal document that stipulates allowable land uses and management practices on a parcel of real estate.

Contiguous habitat. Includes physiognomically similar habitat intersected by roads or streets, by not by residential or commercial development.

Habitat types

- *Disced or row crops.* Real property where the soil is plowed, tilled, broken into or turned over by machinery annually for any purpose.
- *Irrigated grassland.* Real property where water is applied for the purpose of growing short grasses that are mowed to maintain them at less than four inches average height. Examples include recreational fields, golf courses and turf farms.
- *Unirrigated grassland.* Real property supporting grassland and/or mixed herbaceous vegetation where water is not applied for the purpose of growing short grasses or agricultural products.

Intrinsic value. The points/acre score of a parcel of real property with a Burrowing Owl Habitat Management Agreement or management agreement for the purpose of maintaining burrowing owl habitat. The Intrinsic value score of a parcel is derived by multiplying the number of acres of the parcel by the points/acre value.

Occupied habitat. Occupied burrowing owl habitat includes real property where burrowing owls or burrowing owl sign such as regurgitated pellets, excrement, molted feathers or prey remains have been recorded within the last three years (CBOC 1997, CDFG 1995).

Qualified Burrowing Owl Biologist. A Qualified Burrowing Owl Biologist is one with a minimum of a bachelor's degree in wildlife or vertebrate biology or equivalent field of study, who has conducted and prepared a written report on a least three burrowing owl habitat assessments and/or burrowing owl surveys in California in the past five years following the procedures in the California Burrowing Owl Consortium's Burrowing Owl Survey Protocol and Mitigation Guidelines (California Burrowing Owl Consortium 1997).

Parcel. Real property defined by legal property boundaries.

Subject Parcel. A parcel of real estate with a Burrowing Owl Habitat Management Agreement for the purpose of maintaining burrowing owl habitat in fulfillment of the Morgan Hill Burrowing Owl Mitigation Plan. All subject parcels comprise the Preserve Lands.

SECTION 1: SCORING FOR PARCELS IN OR NEAR MORGAN HILL

METHODOLOGY

The acre-point value of a given parcel of land consists of the Intrinsic Value of that parcel and the Additive Value of other parcels within 0.5 mile of the subject parcel. Only parcels under direct City control or with Burrowing Owl Habitat Management Agreements[1] (called "Subject Parcels" or "Preserve Lands') are evaluated in Part I below followed by an evaluation of surrounding parcels and habitat types in Part II. If two or more parcels with Burrowing Owl Habitat Management Agreements occur within 0.5 mile of each other, then only one of them is designated a subject parcel for the purpose of scoring according to this points system. Another parcel(s) with a Burrowing Owl Habitat Management Agreement within 0.5 mile of another contributes to the acre-points total, but only as additive value and not as a subject parcel.

The statements in Part I of the dichotomous key below are applied to each subject parcel to be scored. Scores for a parcel are derived by multiplying the acreage of the parcel by the acre-points value. For example, the first three acres of a subject parcel occupied by burrowing owls are worth 50 points per acre and each additional acre is worth 20 points per acre. The value of a parcel that is not occupied by burrowing owls depends upon the type of habitat present. For example, non-irrigated grasslands occupied by ground squirrels are worth 20 points per acre compared to non-irrigated grasslands not occupied by ground squirrels that are worth 15 points per acre. If the subject parcel is not occupied by burrowing owls but is within 0.5 mile of occupied habitat then the subject parcel's score is multiplied by 1.2 (i.e., a 20% bonus).

The statements in Part II are applied to all lands within 0.5 mile of a subject parcel. Acre-points scores are determined by the type of habitat or land use on parcels within 0.5 mile. The cumulative values of lands within 0.5 mile of a subject parcel constitute the Additive Values which are added to the Intrinsic Value to arrive at the total value of a subject parcel.

PART I – INTRINSIC VALUE	
Intrinsic Value Score (2a, 2b, 3b, 4a, or 4b)	
Occupied Habitat Bonus (5a)	
PART I TOTAL	
PART II – ADDITIVE VALUE	
8a. Unirrigated with ground squirrels and with conservation agreement.	
8b. Unirrigated with ground squirrels and without conservation agreement.	
9a. Unirrigated without ground squirrels and with conservation agreement.	
9b. Unirrigated without ground squirrels and without conservation agreement.	
11a. Irrigated with conservation agreement.	
11b. Irrigated without conservation agreement.	
12a. Disced land or row crops.	
PART II TOTAL	
PRESERVE LAND VALUE (PART I + PART II)	

[1] The Burrowing Owl Habitat Management Agreement formally places land in Owl Plan Preserve Land status as a Subject Parcel. A Management Agreement is the instrument used for parcels not under the City's direct ownership (e.g., County or private land). Conservation easements were not used in this Plan because they are generally executed in perpetuity, which limits the program's ability to trade non-occupied owl lands for better (i.e., occupied) lands if they become available. A sample Burrowing Owl Management Agreement is shown in Appendix 4.

PART I – INTRINSIC VALUE

1a. The parcel is occupied by burrowing owls ..... (2)
1b The parcel is not occupied by burrowing owls ..... (3)

2a. The parcel is 3 acres or greater in size.
Intrinsic Value = 150 + ((Parcel Acres – 3) x 20) ..... (5)
2b. The parcel is less than 3 acres in size.
Intrinsic Value = Parcel Acres x 50 ..... (5)

3a. The parcel is unirrigated. ..... (4)
3b. The parcel is irrigated.
Intrinsic Value = Parcel Acres x 10 ..... (5)

4a. Ground squirrels are present on the parcel.
Intrinsic Value = Parcel Acres x 20 ..... (5)
4b. Ground squirrels are not present on the parcel.
Intrinsic Value = Parcel Acres x 15 ..... (5)

5a. Habitat occupied by burrowing owls occurs within 0.5 miles of the parcel.
Intrinsic Value = Intrinsic Value x 1.20 ..... GO TO PART II – ADDITIVE VALUE
5b. Habitat occupied by burrowing owls does not occur within 0.5 miles of the parcel.
Intrinsic Value does not change ..... GO TO PART II – ADDITIVE VALUE

PART II – ADDITIVE VALUE

6a. Unirrigated habitat occurs within 0.5 miles of the parcel ..... (7)
6b. Unirrigated habitat does not occur within 0.5 miles of the parcel ..... (10)

7a. Ground squirrels are present on the unirrigated habitat ..... (8)
7b. Ground squirrels are not present on the unirrigated habitat ..... (9)

8a. The unirrigated habitat is under a Burrowing Owl Habitat Management Agreement.
Additive Value = 15 x Acres ..... (10)
8b. The unirrigated habitat is not under a Burrowing Owl Habitat Management Agreement.
Additive Value = 5 x Acres ..... (10)

9a. The unirrigated habitat is under a Burrowing Owl Habitat Management Agreement.
Additive Value = 12 x Acres ..... (10)
9b. The unirrigated habitat is not under a Burrowing Owl Habitat Management Agreement.
Additive Value = 4 x Acres ..... (10)

10a. Irrigated habitat occurs within 0.5 miles of the parcel ..... (11)
10b. Irrigated habitat does not occur within 0.5 miles of the parcel ..... (12)

11a. The irrigated habitat is under a Burrowing Owl Habitat Management Agreement.
Additive Value = 9 x Acres ..... (12)
11b. The irrigated habitat is not under a Burrowing Owl Habitat Management Agreement.
Additive Value = 3 x Acres ..... (12)

12a. Disced land or row crops occur within 0.5 miles of the parcel.
Additive Value = 2 x Acres ..... END

12b. Disced land or row crops do not occur within 0.5 miles of the parcel..... END

SECTION 2: PRESERVE LAND SCORING FOR PARCELS MORE THAN FIVE MILES FROM MORGAN HILL BUT WITHIN SANTA CLARA VALLEY

A. Use the key from SECTION 1.

B. The point values calculated from SECTION 1 **are multiplied by 0.5** (this is for parcels evaluated beyond five miles of Morgan Hill but still in Santa Clara Valley).

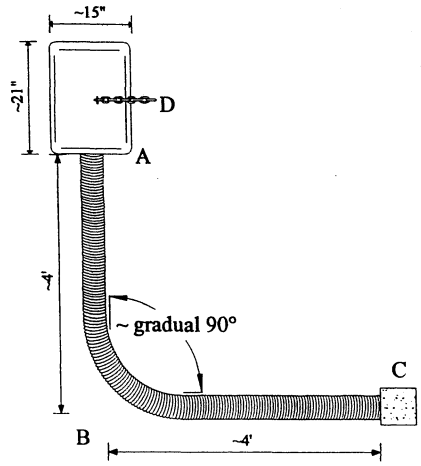
SECTION 3: PRESERVE LAND SCORING FOR PARCELS ELSEWHERE IN CALIFORNIA.

A. Use the key from SECTION 1.

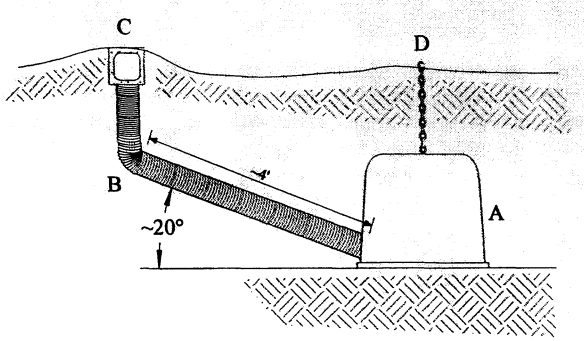
B. The point values calculated from SECTION 1: **are multiplied by 0.25**

Appendix 2
ARTIFICIAL BURROWING OWL BURROW DESIGN

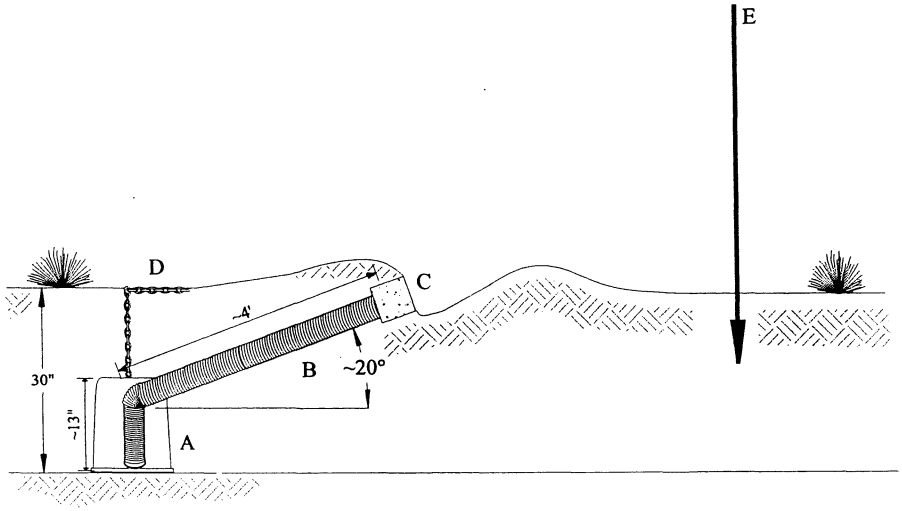
Prepared by: Albion Environmental, Inc., 1414 Soquel Avenue, No. 205
Santa Cruz, CA 95062 (831) 469-9128



TOP VIEW



FRONT VIEW



A - plastic irrigation valve box
B - 4" diameter perforated corrugated plastic pipe
C - 6" square hollow concrete block
D - chain or plastic rope marking location of nesting chamber on ground surface
E - 5' - 6' perch post (optional)

APPENDIX 3: INITIAL COST ANALYSIS

Assumptions

The Plan costs for enhancing (original cost) and maintaining (yearly program cost) are calculated below. They assume that there are 100 ac. in the program, and that these acres are managed in blocks of 5 ac. each. Such an assumption is necessary in order to calculate costs at a reasonable level of complexity. Further,we assume that 40% of the sites will need to be fenced, and that each 5 ac site will have one artificial burrow installed. Other costs are based on quoted rates from contractors.

Habitat Enhancement Costs

Fencing Cost	
Total Fencing Cost	$224,011
Number of Total Acres	100
Fencing Cost Per Acre of Total Reserve	$2,240

Artificial Burrow Construction

No. Burrows/acre	0.2
Materials/burrow	$25
Equipment/burrow	$25
Operator/burrow	$250
Total Cost/burrow	$300
Cost/acre	$60

Legal Fees/acre	**$2,000**
Enhancement Cost/acre	$4,300
Total Enhancement Costs (100 acres)	$430,011
Annualized Enhancement Costs	$25,295

Average preserve area (acres)	5
Number of preserve areas	20
Area of a Preserve Area (ft2)	217800
length of side	467
Perimeter length	1867
Total preserve area perimter	37335
Percent of preserve areas fenced	40
Total length of fencing	14934
Cost/Linear Foot	$15
Total Fencing Cost	$224,011

Legal fees estimated to be 10,000 per each reserve of 5 acres

Annual Plan Administration Costs	$10,000	10000	To pay for preserve land management, owl surveys, and reporting

Habitat Maintenance Costs

Mowing	
No. mowings/year	2
Mowing rate (hours/acre)	2
Unit cost (per hour)	$136
Cost/acre	$544

Fence Repair/Burrow Maintenance

Maintenance events/year	2
Hours per acre	8
Hourly rate	$25
Cost/acre	$400

Exotic Species Trapping

Events per year	2
Hours per event	0.4
Hourly rate	$45
Cost/acre	$36

Sum of Maintenance Costs/acre	$980
Percentage of Acres Requiring Active Maintenance	50%
Total Number of Acres	100
Number of Acres Added Per Year Requiring Active Main.	2.9
Year 1 Maintenance Costs and Administration	$12,882
Year 2 Maintenance Costs and Administration	$15,765
Year 3 Maintenance Costs and Administration	$18,647
Year 4 Maintenance Costs and Administration	$21,529
Year 5 Maintenance Costs and Administration	$24,412
Year 6 Maintenance Costs and Administration	$27,294
Year 7 Maintenance Costs and Administration	$30,176
Year 8 Maintenance Costs and Administration	$33,059
Year 9 Maintenance Costs and Administration	$35,941
Year 10 Maintenance Costs and Administration	$38,824
Year 11 Maintenance Costs and Administration	$41,706
Year 12 Maintenance Costs and Administration	$44,588
Year 13 Maintenance Costs and Administration	$47,471
Year 14 Maintenance Costs and Administration	$50,353
Year 15 Maintenance Costs and Administration	$53,235
Year 16 Maintenance Costs and Administration	$56,118
Year 17 Maintenance Costs and Administration	$59,000
Total Maintenance Costs and Administration	$611,000
Annualized Maintenance Costs and Administration	$35,941

Fee Calculation

Cost Summary

Annualized Enhancement Costs	$25,295
Annualized Maintenance and Administration Costs	$35,941
Total Average Annual Costs	$61,236

Development Pacing

Average Residential Units Constructed Per Year	200 units
Average Nonresidential Land Developed Per Year	30 acres
Assume Average of 7 Units Per Acre	
Nonresidential Equivalent "Units"	210 units
Total "Units"	410

Mitigation Fee Calculation

Total Average Annual Costs	$61,236
Total "Development Units"	410
Cost Per Residential Unit	**$149**
Cost Per Acre of Nonresidential Development	**$1,045**

APPENDIX 4: AREAS OF INITIAL SPECIAL CONCERN

Additional Plan Provision #7, found on page IV-6, requires the City to take appropriate actions to secure the early protection and owl habitat management for the areas of El Toro School and the Edmundson water tank site. These two sites were selected as they have been known to contain an owl or owls within the past year.

The El Toro School is a public elementary school located at 455 E. Main Avenue. An owl has taken up residence in and around a detention basin located on the northwest corner of the school property.

The Edmundson water tank site is a parcel of land that the City has purchased in order to construct a four million gallon water tank. It is located in an unincorporated section of the County on the west edge of Morgan Hill. The parcel is between Dewitt Avenue and Sunset Avenue and is approximately in the middle of the area bounded by Spring Avenue and Edmundson Avenue.

Appendix C-6

Institute Golf Course DEIR,
United States Fish and Wildlife Service

United States Department of the Interior
Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

PLANNING DEPT.
JUL 17 2003
CITY OF MORGAN HILL

IN REPLY REFER TO:
1-1-03-TA-2369

JUL 15 2003

Mr. Jim Rowe
City of Morgan Hill
Planning Department
17555 Peak Avenue
Morgan Hill, California 95037

Subject: Institute Golf Course Draft EIR Clarification of Offsite and Onsite Mitigation Measures, Santa Clara County, California

Dear Mr. Rowe:

This letter details mitigation the applicant will conduct to offset effects of serpentine soil and California red-legged frog (*Rana aurora draytonii*) (red-legged frog) and California tiger salamander (*Ambystoma californiense*) (tiger salamander) habitat lost during the 1997 reconstruction of the pre-existing 9-hole golf course to an 18-hole course, which was completed without proper environmental review. We submitted a letter to the City of Morgan Hill during the formal comment period for the Draft EIR, however, at that time, the applicant and the Fish and Wildlife Service (Service) had not completed discussions regarding the subject mitigation. This letter is based on discussions and tentative agreement between the applicant and the Service.

Serpentine Soil Impacts
The subject property has approximately 80 acres of soil containing serpentine inclusions. Soils with serpentine inclusions may support serpentine soil dependant plants and animals, many of which are federally listed species, such as the endangered coyote ceanothus (*Ceanothus ferrisae*) and Santa Clara Valley dudleya (*Dudleya setchellii*), and the threatened bay checkerspot butterfly (*Euphydryas editha bayensis*). Santa Clara Valley dudleya has been observed less than a mile from the project site and the bay checkerspot butterfly has been observed within 2 miles of the golf course (California Department of Fish and Game, Natural Diversity Database). By 1997, much of this serpentine soil habitat had been graded by the previous owners, to accommodate a housing project which was never built. Of the total serpentine soil area, a total of 25.5 acres was graded by the applicant and converted to turf. Rare plant and animal surveys were not conducted prior to the 1997 reconstruction by the applicant. However, these species could have occurred on-site and the conditions are currently such that their growth will no longer be supported on most of the site.

We have evaluated the quality of serpentine habitat lost and determined that the applicant should mitigate for this loss by purchasing habitat off-site at a two to one ratio. The applicant should purchase 51 acres of currently unprotected serpentine soil habitat and fund its management as habitat for serpentine-dependant species in perpetuity. The Service and the applicant have coordinated with staff from the Santa Clara Valley Transportation Authority (VTA) who are currently pursuing a purchase of about 1,500 acres, which includes serpentine soil habitat, for use as mitigation. Although VTA and other public and private entities plan to utilize much of this habitat as mitigation for their past and future projects, 35 acres would remain which function as serpentine soil and red-legged frog habitat and could be used as mitigation for other projects. Due to the quality of this mitigation habitat and its importance for protection, if the applicant agrees to purchase and manage this remaining acreage, the Service would agree to accept this acreage as sufficient compensation for serpentine soil habitat impacted by the applicant. If the applicant chooses to purchase serpentine soil habitat elsewhere, it may be appropriate for the applicant to compensate with a total of 51 acres.

California Red-legged Frog and California Tiger Salamander Habitat Impacts
Surveys for red-legged frogs and tiger salamanders were not conducted prior to the 1997 reconstruction. However, judging from aerial photography taken pre-1997 and because the applicant did not alter very much the riparian corridor within which they are now found, it is very likely that red-legged frogs were present on the project site prior to 1997. In 2001, a California Department of Fish and Game biologist identified larvae and sub-adult red-legged frogs in Corralitos Creek within the project site. All of the ponds on-site offer either breeding or summer refugia habitat for the species. Since no long-term monitoring occurred pre-1997 or since 1997, we cannot say with certainty how well red-legged frogs currently on the site are surviving with the reconfiguration of ponds on-site or with other typical golf course stresses, such as fertilizer use, golfer foot and cart traffic, and invasion of bullfrogs.

Prior to being graded and converted to turf by the applicant, the uplands between aquatic sites would have functioned as foraging and dispersal habitat. Existing conditions do not provide appropriate upland refugia for foraging and dispersing red-legged frogs either in the turf, which is routinely mowed and fertilized, or in the narrow bands of tall, non-native trees. Although some red-legged frog habitat was destroyed prior to 1997, we have reviewed aerial photography and counted only habitat within 500 feet of Corralitos Creek and determined that the applicant destroyed 25.6 acres of red-legged frog upland foraging and dispersal habitat.

We also have evaluated the quality of red-legged frog habitat lost and determined that the applicant should mitigate for the loss by purchasing habitat off-site in a two to one ratio. The applicant should purchase 51.2 acres of currently unprotected red-legged frog upland habitat and fund its management as habitat for the red-legged frog in perpetuity. If the applicant purchases the 35 acres described above which support both serpentine species and red-legged frog, the applicant may receive red-legged frog credit. However, the applicant would remain responsible for fulfilling the additional 16.2 acre red-legged frog habitat obligation. Surplus red-legged frog acres likely will be available through the purchase of the Castle and Cooke property being led by

VTA. We encourage the applicant to coordinate closely with VTA and the other involved parties to partake in this preservation opportunity.

In September 2001, Dr. Mark Jennings observed a metamorphosing tiger salamander entering a culvert near a pond at the southwestern corner of the project site. The species is known to currently occupy the project site and likely occupied the site prior to 1997 as well. The tiger salamander was officially proposed for listing as a threatened species on May 23, 2003 (68 **FR** 28647). Although the Act does not afford the tiger salamander the same protections provided to federally listed animals, we are monitoring their status and acknowledge that the measures taken to compensate for destroyed red-legged frog habitat will partially compensate for effects which occurred to tiger salamander habitat as well.

On-site, the applicant should set back fairways to restore the riparian corridor along Corralitos Creek and its tributaries. A riparian buffer shall be planted and maintained on each side of the creek and be an average of 70 feet and a minimum of 30 feet wide, measured from the centerline of the creek. The buffer widths shall be as depicted in the enclosed Exhibit A.

During discussions with the Service regarding the golf course's need for incidental take coverage of listed species, the applicant informed the Service that they would be discussing with the U.S. Army Corps of Engineers (Corps), a design plan for the addition of a bridge or culvert on the golf course. The applicant hopes that the Corps would serve as a Federal nexus at that point to initiate section 7 consultation with the Service on listed species issues at the site. At the time of section 7 consultation, we expect to work with the applicant further to identify ways of avoiding and minimizing effects to listed species resulting from the ongoing use and maintenance of the golf course.

In summary, the Service believes that the measures described above appropriately compensate for the loss of habitat which occurred from the 1997 reconstruction. The Service will work with the applicant to facilitate the purchase of 35 acres of serpentine soil habitat and 51.2 acres of red-legged frog habitat on the Castle and Cooke property, or any other area which adequately compensates for the project's impacts.

If you have further questions regarding this letter, please contact Valary Bloom or Dan Buford at (916) 414-6625.

Sincerely,

Doug Weinrich

Doug Weinrich
Acting Chief, Endangered Species Program

Enclosure
cc:

CDFG, Monterey, CA, (Attn: Dave Johnston)
Caltrans, District 4, Oakland, CA (Attn: Margaret Gabil)

Appendix D

Hydrology, Water Quality, and Water Supply

Institute Golf Course

Environmental Impact Report - Hydrology, Water Quality, and Water Supply Sections

Prepared for

David J. Powers and Associates
1885 The Alameda, Suite 204
San Jose, CA 95126

Project #200056

Prepared by

Questa Engineering Corporation
1220 Brickyard Cove Road, Suite 206
Point Richmond, California 94801
(510) 236-6114

October 2003

Norman N. Hantzsche, P.E.

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HYDROLOGY AND WATER QUALITY

The following section describes existing conditions and the potential impacts to storm drainage, flood control, and water quality; appropriate mitigations are proposed to address identified significant or potentially significant impacts. The analysis was prepared by Questa Engineering Corporation, based on: (1) site reconnaissance inspection of the project site and vicinity; (2) review and analysis of various background information for the proposed Institute Golf Course, including existing topography, golf course layout/grassing plan, turf tissue sample data, water use records, golf course lake system plans, wash-recycle system plans; (3) review of as-built and post-construction technical evaluations of the project supplied by the applicant, including as-built drainage plan, hydrologic-drainage analysis, geotechnical investigation, groundwater environmental data report, and Storm Water Pollution Prevention Plan; (4) compilation and review of various background hydrologic, soils and geologic data for the project site and vicinity; (5) personal communication with and review of correspondence from local residents, other consultant team members, and staff of the City of Morgan Hill, Santa Clara Valley Water District and the Central Coast Regional Water Quality Control Board; and review.

1. SETTING

a. Topography and Climate

The Institute Golf Course development is an 18-hole course located in the City of Morgan Hill, Santa Clara County, California. The golf course site occupies an area of 193.7 acres at the eastern edge of Morgan Hill, bounded on the west by Foothill Avenue, on the north by Maple Avenue, and on the south and east by rural residential development, grazing and open space land. Elevations on the project site range from approximately 325 feet above mean sea level (msl) in the lower elevations along Foothill Avenue to approximately 530 feet msl in the higher elevations on the east side of the property. The land slopes down generally in an east to west direction. In the upper elevations the natural ground slope is approximately 20 percent; in the lower elevations the ground slope decreases to less than 5 percent.

The climate of the region is characterized as Mediterranean, with wet winters and dry summers. The region's "rainy" season extends between the winter months of November and April, with relatively dry conditions for the remainder of the year. Average annual rainfall in the project area is estimated to be approximately 20 inches[1]. Temperatures may range from below freezing in the winter to above 100 degrees Fahrenheit during the summer months.

b. Regional Surface Hydrology

The project site is located in the Llagas Creek watershed, which drains southerly through Santa Clara County, joins the Pajaro River near Gilroy, and ultimately discharges to the Pacific Ocean near Watsonville at the border between Monterey and Santa Cruz Counties. Llagas Creek drains a total

[1] Santa Clara Valley Water District, Storm Design Guidelines, Mean Annual Precipitation Map, April 1990.

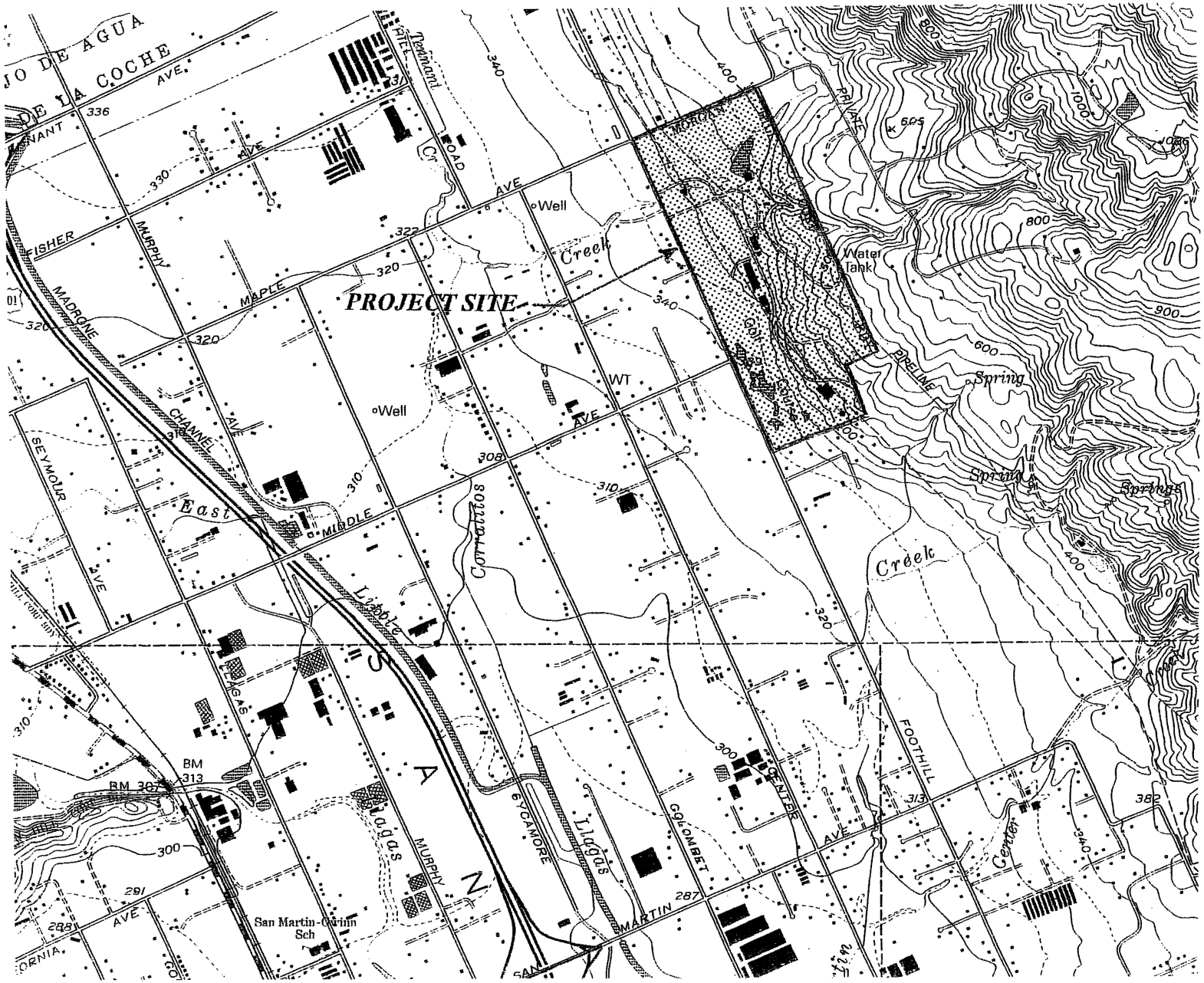
watershed area of approximately 200 square miles in southern Santa Clara County (**Figure H1**). The project site lies at the base of the foothills that form the eastern side of the watershed, and drains locally to Corralitos Creek and San Martin Creek, which are seasonal tributaries of Llagas Creek. Land uses in the eastern side of the Llagas Creek watershed include primarily irrigated agriculture, grazing, and rural residential-suburban development. Chaparral-covered hills dominate the steep upper watershed, where slopes commonly exceed 30 percent.

c. Site Drainage Characteristics

The northern half of the project site is drained by Corralitos Creek, which runs east-to-west through the site. Three branches of Corralitos Creek join together on the project site. The total drainage area of Corraltios Creek above and including the project site, for pre-development conditions, is approximately 686 acres. At Foothill Avenue, where it leaves the property, Corralitos Creek is contained in a concrete box culvert, which measures approximately 12-feet wide by 8-feet high. Approximately 150 feet upstream (on the project site) there is a concrete drop structure that extends across the creek; it was apparently installed some time in the past to stabilize and protect the creek channel against erosion. The creek channel in this reach appears reasonably stable and vegetated. However, there is evidence of erosion on the northern streambank immediately downstream of the concrete drop structure, which is a potential threat to the stability of the structure. A small part of the project site (approximately 1 acre) along the northern property boundary drains toward the intersection of Maple Avenue and Foothill Avenue, where it crosses under Foothill Avenue in a 12-inch corrugated metal pipe culvert (cmp).

There are no defined drainage channels on the southern half of the project site where the runoff drains generally via overland flow through the golf course and a series of lakes, having a total surface area of about 4 acres, before reaching the roadside drainage ditch on Foothill Avenue. In the pre-development condition the 40-acre golf course was located in this area, and also included several small lakes, with a total surface area of about 3 acres. The total drainage area comprising the southern portion of the site in the pre-development conditions amounted to roughly 128 acres. This includes a contributing watershed area above the project site of approximately 34 acres, most of which is open grassland.

Available maps (J.R. Garcia/Civil Engineer, 1972) indicate that, in the pre-project conditions, runoff from approximately 44 acres in the center of the property, including the majority of the buildings and paved areas, was collected and drained in a northerly direction to Corralitos Creek via a storm drain system (see **Figure H2**). This storm drain was removed as part of the expansion of the golf course, and approximately 24 of the 44 acres have been rerouted into Lakes D and E which outlet to the Foothill Avenue drainage ditch, instead of to Corralitos Creek. Now, the drainage area in the southern part of the site totals approximately 172 acres (including the additional 44 acres in the center), and all runoff is routed to a series of five interconnected on-site lakes, which have overflow/outfall pipes to the drainage ditch along the east side of Foothill Avenue (see **Figure H3**). There is an 18-inch diameter outflow pipe from Lake D adjacent to the main entrance gate (which also receives flow from Lake E). There is a 24-inch diameter outflow pipe from Lake A located at the southwest corner of the property; this also collects and discharges flow from Lakes B and C. The



Date:	6 / 28 / 2001
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LOCATION MAP
INSTITUTE GOLF COURSE
MORGAN HILL, CALIFORNIA

FIGURE
H1

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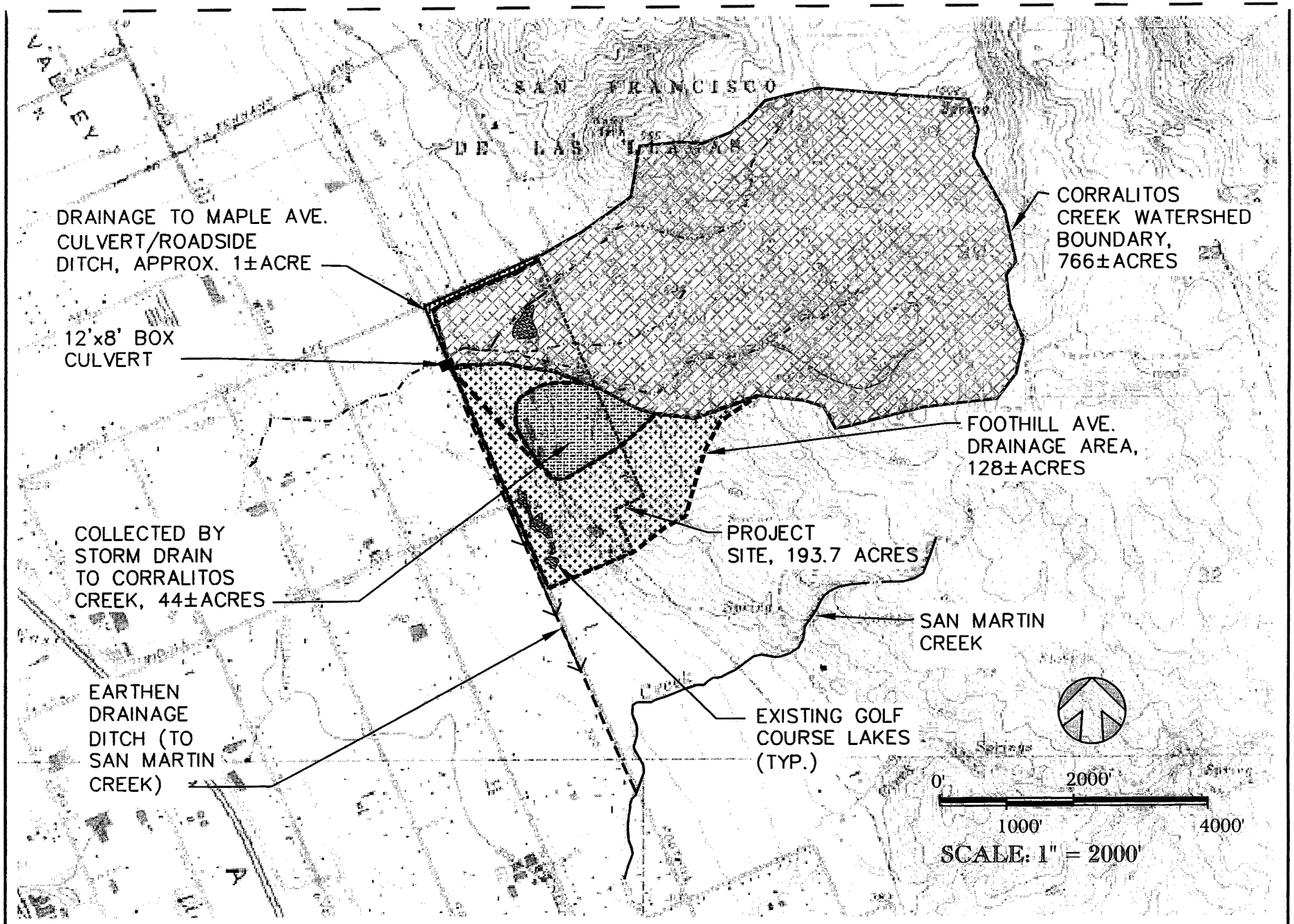

Date: 10 / 22 / 03	QUESTA ENGINEERING CORP. Civil Environmental & Water Resources	**PRE-DEVELOPMENT HYDROLOGY CONDITIONS INSTITUTE GOLF COURSE**	FIGURE
Drawn: L.I. / J.Mc.	(510) 236-6114 FAX (510) 236-2423 questa@questaec.com	MORGAN HILL, CALIFORNIA	H2
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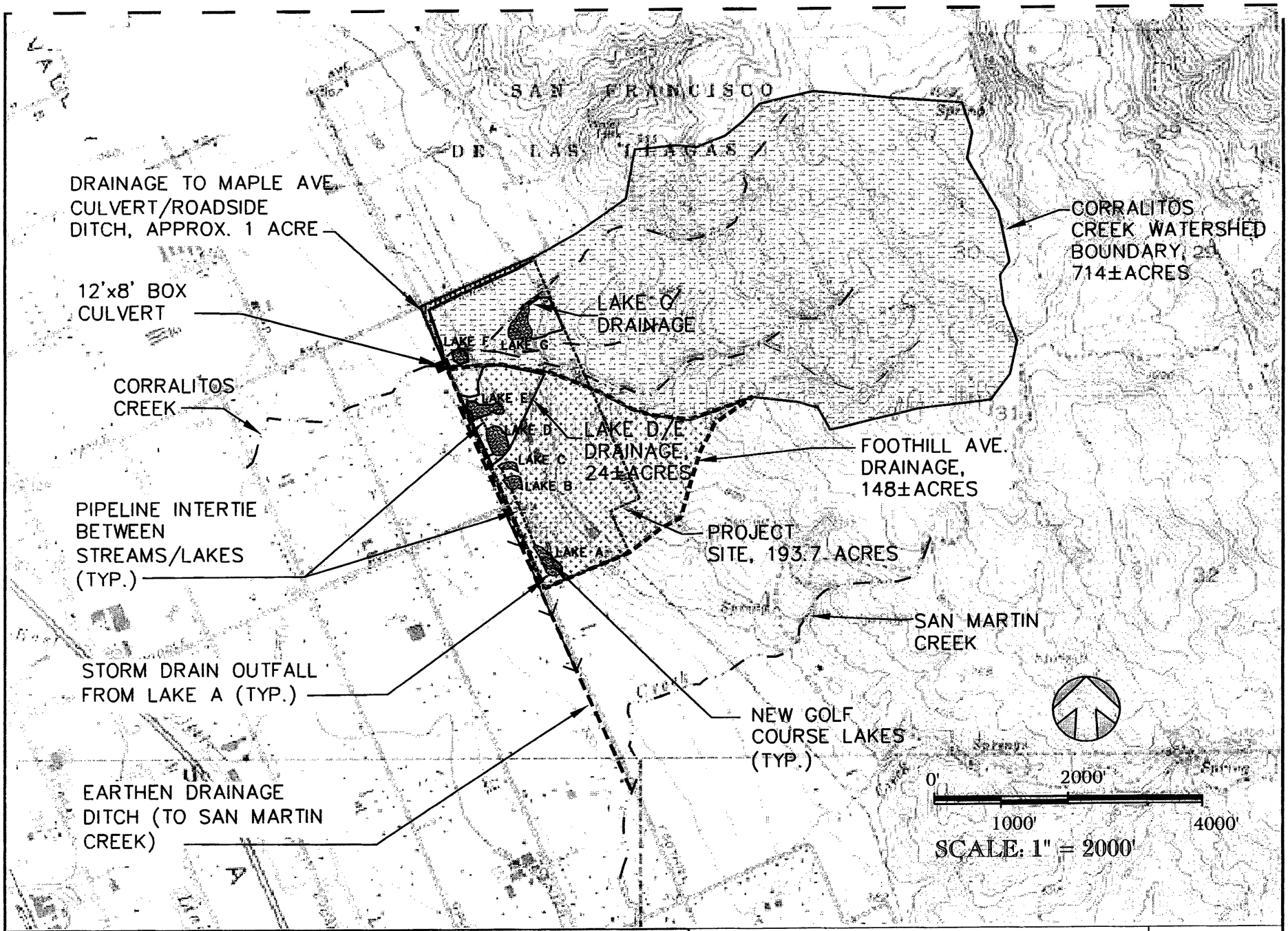

Date: 10 / 22 / 2003	QUESTA ENGINEERING CORP. Civil Environmental & Water Resources	**POST-DEVELOPMENT HYDROLOGY CONDITIONS INSTITUTE GOLF COURSE**	FIGURE
Drawn: L.I. / J.Mc.	(510) 236-6114 FAX (510) 236-2423 questa@questaec.com	MORGAN HILL, CALIFORNIA	H3
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drainage analysis report by Mattern & Associates[2] states that the water level in Lake D is lowered in the winter rainy season to retain all runoff, and, therefore, 24 acres draining in this lake should not be considered part of the new watershed. However, there is no supporting information to verify the capacity provided for winter storm runoff in Lake D. Also, evidence from an aerial photo of the golf course provided by the applicant, dated December 22, 1999, shows Lake D to be in a "full" condition at the start of the winter rainy season, with no indication that the water level was drawn down to provide capacity for winter runoff.

The drainage ditch on Foothill Avenue is an earthen channel, approximately 2-feet deep by 6-feet wide along the frontage of the project site. The channel drains in a southerly direction along Foothill Avenue, at an average slope of 0.0074, until it reaches San Martin Creek, which is located about 3,500 feet south of the southeast corner of the project site (**Figure H2**). This drainage crosses under Robin Lane in two 12"x21" elliptical cmps, and crosses through several other private driveway culverts. Near San Martin Creek, the channel increases in size to about 3.5-feet deep and 8-feet wide. Based on the cross-section dimensions and channel slope, the capacity of this roadside drainage channel is estimated to be about 30 cubic feet per second (cfs) at the project site, about 24 cfs at the Robin Lane culverts, and about 34 cfs near its confluence with San Martin Creek. There are two 42-inch cmps that convey San Martin Creek under Foothill Avenue.

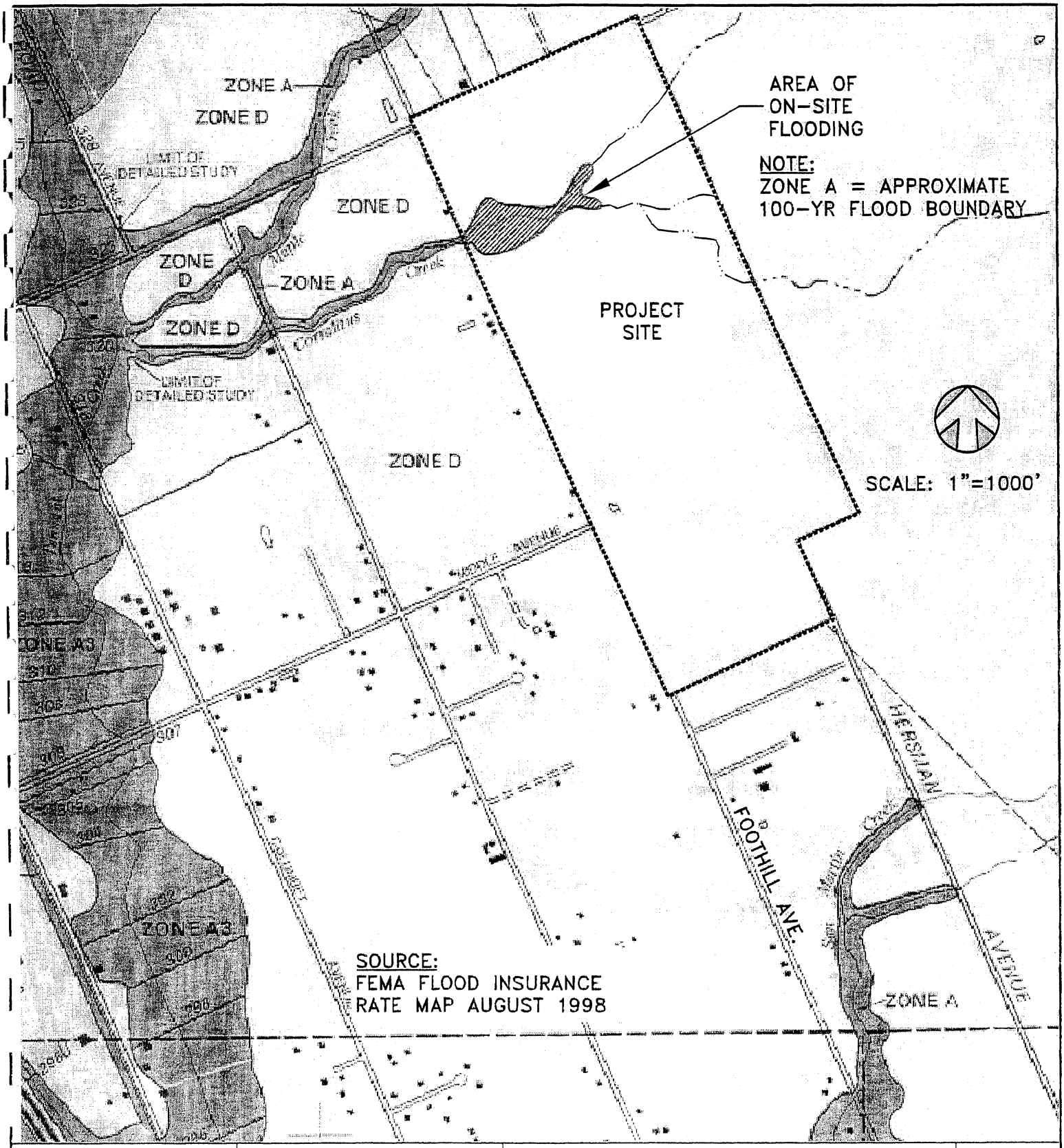
d. Flooding

A portion of the project site is mapped in the by FEMA as being within the 100-yr floodplain of Corralitos Creek (FEMA, Flood Insurance Rate Maps for City of Morgan Hill, December 1998). The flood-prone area encompasses an area of approximately 5 acres in and adjacent to the creek channel in the reach immediately upstream of the concrete box culvert at Foothill Avenue (**Figure H4**). The flooding appears to be associated with backwater conditions due to the constriction of flow by the Foothill Avenue box culvert. The FEMA Flood Insurance Rate Maps for Santa Clara County (December 1998) also indicate that Foothill Avenue at San Martin Creek is within flood hazard Zone A, which designates a region prone to the flooding hazards of the 100-year flood. During a site inspection in early June 2001, we found the two 42-inch cmps at this location to be under water, apparently due to a blockage of some type in the culvert or immediately downstream.

e. Soils

According to the Soil Survey of Eastern Santa Clara Area, California published by the United States Department of Agriculture Soil Conservation Service (USDA) in September 1974, the predominant soils on the project site are well drained clays of the Cropley Series in the lower elevations, and stony clays of the Climara Series in the steeper (upper) portions of the site (**Figure H5**). The Cropley soils are relatively deep soils that develop on alluvial fans. They are characterized by slow to moderate runoff, and have slight to moderate erosion hazards. The Climara soils are relatively shallow soils (20 to 40 inches deep) over igneous bedrock. These soils are slowly permeable with moderate to rapid runoff, and a moderate hazard of erosion. There are also small bands of more coarse-textured loams and clay loams of the Zamora and Pleasanton Series on the site. The Zamora soils occur along

[2] Drainage Analysis - Institute Golf Course, Morgan Hill, May 24, 2002, prepared by Mattern and Associates.



Date: 7 / 11 / 2001	QUESTA Civil Environmental & Water Resources	**100-YR FLOOD ZONES**	FIGURE
Drawn: L.I.		**INSTITUTE GOLF COURSE**	H4
Appr'd: N.H.		MORGAN HILL, CALIFORNIA	
Proj. No: 20056	P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807		

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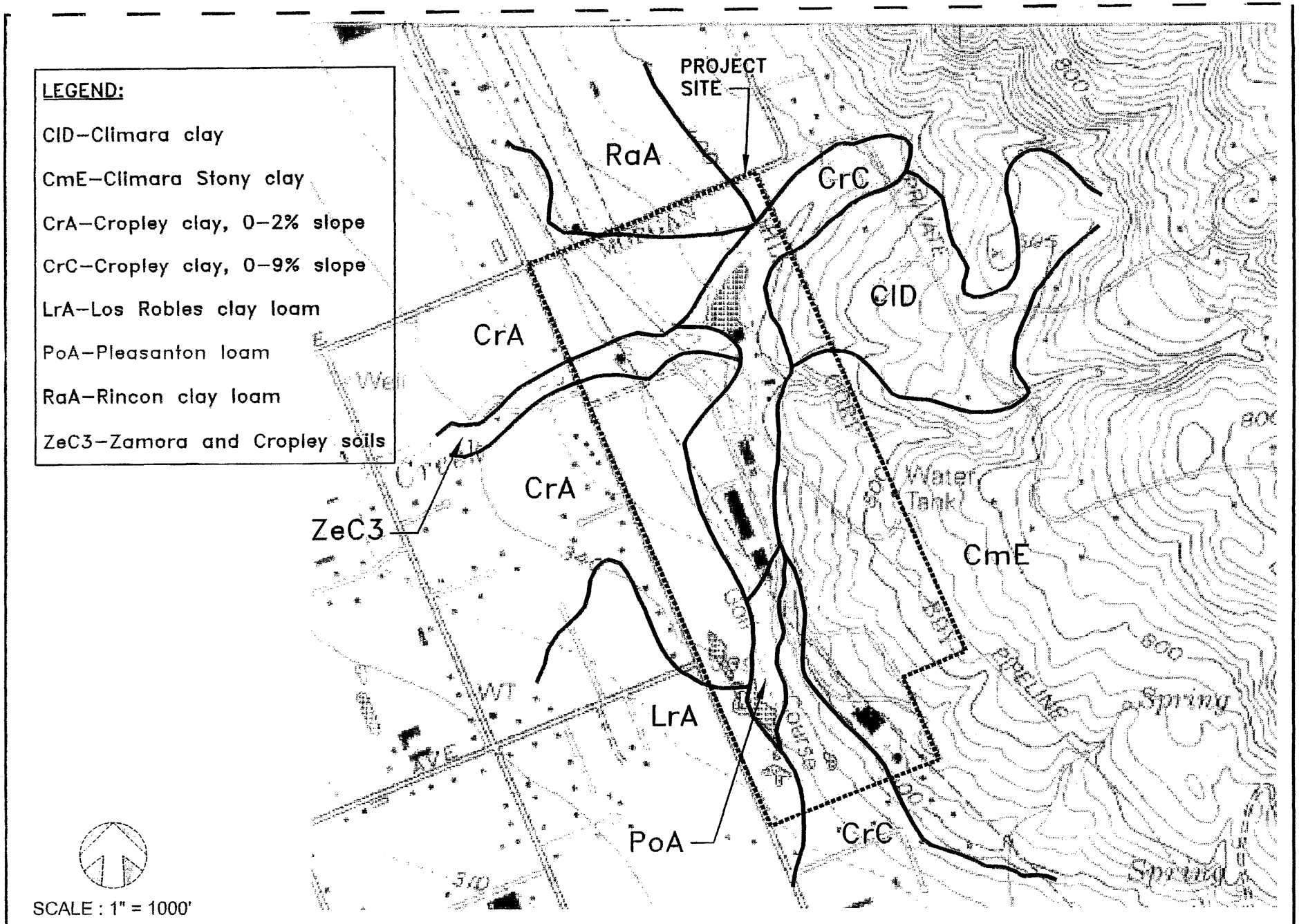

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SOIL MAP
INSTITUTE GOLF COURSE
MORGAN HILL, CALIFORNIA

FIGURE
H5

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the Corralitos Creek channel and are indicative of areas eroded by gullying. An area of Pleasanton soils is mapped in the southeastern portion of the site; these soils are well drained loams that occur over gravelly sedimentary alluvium.

f. Surface Water Quality

The type of pollutants produced by an area is highly variable and dependant upon the land use, rainfall intensity, and periods of dry weather prior to rainfall events. Currently, runoff from the project site and from the residential and agricultural properties bordering the project site collects in roadside ditches and creek channels and eventually makes its way to either Corralitos Creek to the west or to San Martin Creek to the south.

According to the Non-Point Source Division of the SCVWD, there is no available surface water quality information for Corralitos Creek or San Martin Creek, and data for Llagas Creek downstream of the project site is also very limited.

Given the current land uses in the project vicinity, the quality of the storm water runoff reaching Corralitos Creek and San Martin Creek is expected to be typical of mixed rural residential and agricultural watersheds. Water collected in the storm drainage system can be expected to contain varying amounts of non-point source pollutants associated with low-density suburban uses (i.e., roadway/street contaminants, litter, residential maintenance/landscaping supplies, etc.) and agricultural activities (i.e., pesticides, herbicides, insecticides, sediment from exposed soils, fertilizers, etc.). Excessive irrigation and precipitation can carry these non-point pollutants into downstream drainages.

Rapid runoff during storms, particularly during the first rainfall event of the season or after an extended dry period, may generate "slugs" of polluted water which quickly pass through the storm drain system. Runoff in the wetter months may cause higher suspended sediment concentrations and turbidity as a result of erosion. Consequently, this runoff tends to be higher in concentrations of bacteria, trace metals, and nutrients. During dry weather, the quality of surface runoff may be affected by spills or leakage of chemicals, wash down of pavements, and leakage from sanitary sewers.

g. Stormwater Regulations

The existing storm water program (Phase I) of the National Pollutant Discharge Elimination System (NPDES) requires municipalities serving greater than 100,000 persons to obtain a NPDES storm water permit (final rule, November 1990). Phase II NPDES storm water regulations, finalized in October, 1999, expanded the national program to smaller municipalities with a population of 10,000 or more and construction sites that disturb greater than one acre of land; however, these requirements have not yet taken effect. As of 2003, the City of Morgan Hill is required to comply with the National Clean Water Act regulations regarding the reduction of non-point source pollutants from storm water discharges within the City. At a minimum, this includes the following six measures aimed at reducing the discharge of stormwater pollutants for protection of water quality:

- Public education and outreach;
- Public involvement;
- Illicit discharge detection and elimination;
- Construction site runoff control for sites greater than one acre;
- Post-construction storm water management in new development and redevelopment;
- Pollution prevention and good housekeeping of municipal operations.

Projects started within the City prior to 2003, such as the proposed project, involving five acres or more of soil disturbance are required to submit an application (Notice of Intent) for coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activity and to comply with the provisions of the General Permit, which requires the following:

1. Develop and implement a Storm Water Pollution Prevention Plan (SWPPP), which specifies Best Management Practices (BMPs) that will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters.

2. Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the nation.

3. Perform inspections of all BMPs.

According to information supplied by the project applicant, a Notice of Intent for project construction was filed in January 2000, approximately two years after initiating site grading activities. There is no information indicating that the applicant prepared the required SWPPP or complied with other provisions of the General Stormwater Permit during the construction of the golf course. As such the project construction was conducted in violation of the Clean Water Act and the California Water Code.

In April 2003 the applicant prepared a Stormwater Pollution Prevention Plan (SWPPP) for the project[3]. The stated purpose of the SWPPP is to cover the "...ongoing golf course maintenance, minor alterations of vegetation and facilities, and reconstruction of the "Flying Lady" restaurant into the Institute of Mathematics facility." The SWPPP was submitted to the Central Coast Regional Water Quality Control Board (RWQCB) for review. The SWPPP was found by the RWQCB to be deficient and issued two Notices of Violation to the applicant. Amendments to the SWPPP were made by the applicant and submitted to the RWQCB in September and October 2003.

h. Groundwater

The project site is located along the eastern edge of the Llagas Groundwater Basin, which serves as a principal source of domestic and agricultural water supply for the region. The groundwater basin is "unconfined" in the project area, meaning that the groundwater is recharged directly from the

[3] Long, Randall C. (RCL Ecology), "Stormwater Pollution Prevention Plan (SWPPP) - Institute Golf Course," April 22, 2003.

downward percolation of rainfall, stream infiltration, irrigation seepage, and other waters released into the ground. The groundwater levels are estimated to be approximately 50 to 100-feet deep beneath the project site (along Foothill Avenue), and the general direction of groundwater flow is southerly toward Gilroy. There are three high yielding wells on the project site that draw water from this groundwater basin and serve as the source of irrigation water for the golf course. Domestic water supply is also currently obtained from a fourth on-site well. However, due to excessive nitrate concentrations in the well water (see discussion below), in 2001 the applicant applied to the Santa Clara County Health Department for a well drilling permit to install a new well for the domestic supply. To date no new well has been installed, and the applicant indicates that bottled water is supplied for drinking water. Other residences in the vicinity obtain their domestic water supply from the groundwater basin.

The Santa Clara Valley Water District (SCVWD) has management responsibilities for the groundwater basin and operates a series of recharge facilities to augment natural rainfall-recharge processes. These artificial recharge facilities include the Main Avenue Ponds, Madrone Channel, Church Ponds, and San Pedro Ponds at Hill Road. The SCVD also monitors and maintains records on groundwater levels in the basin.

Water quality conditions in the Llagas Groundwater Basin are also monitored by the SCVWD through sampling of private and municipal water wells. The District has data for approximately 250 wells. Data for 31 wells in the vicinity of the project site were obtained and reviewed. These data show the groundwater to be of suitable quality with respect to most drinking water parameters, with the exception of nitrate. The groundwater quality data in the project vicinity indicate elevated concentrations of nitrate that severely restricts its suitability for domestic or municipal uses. For the 31 wells reviewed, the nitrate concentration was found to range from 1 mg/L to 103 mg/L, with the average being about 68 mg/L. For comparison, the drinking water standard (Title 22, California Code of Regulations) is 45 mg/L. Only three of the wells had a nitrate concentration below 45 mg/L. A few of the data are more than 10 years old; but most of the data have been collected since 1998. The one well with several years of sampling data indicates a distinct increase in nitrate concentration over the past 13 years, from 26 mg/L to 49 mg/L. Additionally, in March 2002 analysis of water samples from the four on-site wells showed nitrate concentrations ranging from 47 to 85 mg/L, consistent with the SCVWD findings. Because of the existing high concentrations of nitrate in the groundwater, the SCVWD is very concerned about increased nitrate loading in the Llagas basin area from fertilizers, wastewater discharges or other sources.

i. Proposed Project Description

The Institute Golf Course project site encompass a total area of 193.7 acres. The site formerly included a small (40-acre) golf course that the applicant has been enlarged to a championship-sized 18-hole course with maintenance facilities and a series of lakes. The project also includes plans for renovation of the existing 58,946-square foot restaurant building on the site (former Flying Lady restaurant) for its use as the headquarters of the American Institute of Mathematics, and the renovation and use of other structures on the project site as golf course and mathematic institute facilities. Plans for the project include as-built topographic and drainage facilities map by Ourada

Engineering[4], soils report and geotechnical investigation report by Kleinfelder, Inc., conceptual golf course layout and grassing plan, Drainage Analysis by Mattern & Associates, Groundwater Environmental Data Report by Aquifer Sciences, Inc., and the previously noted Storm Water Pollution Prevention Plan. The golf course is operating without an approved domestic water supply in violation of regulations[5] established under the California Safe Drinking Water Act, and no plans have been provided by the applicant for the provision of a domestic water supply for the project. The applicant has stated that bottled water is supplied for drinking water purposes.

Grading. Earthwork and grading has already occurred for the development of the golf course on the project site. Grading was done to form the tees and greens, and there was also considerable cut and fill required to contour the fairways throughout the site, to form "mounds" between or alongside fairways, and to create or expand the several on-site lakes. The grading also included the construction of a large earthen berm along the western edge of the site bordering Foothill Avenue. No grading was required for the potential clubhouse or maintenance building, since these were pre-existing. A post-construction geotechnical investigation of this earthen berm was completed by Kleinfelder, Inc., dated July 7, 2003[6]. Grading to create the golf course is estimated to have been in excess of 500,000 cubic yards.

The soil landscape has been rearranged as a result of the site grading operations. Tees and putting greens have been modified with sandy imported materials, soil amendments, and subsurface drainage works. The As-built Drainage Plan shows the location and size of surface and subsurface drain pipes that have been installed throughout the golf course; the drains range from 4 to 24 inches in diameter. Grading of the golf course fairways and rough may have involved importation of soil, and a fertilization program; but no details are available on what was done. **Table H1** summarizes the approximate breakdown of the land uses on the site in the developed condition, as determined from the various background materials provided by the applicant.

Table H1
Land Use Summary for Institute Golf Course

Land Use	Acres
Buildings and Roads	4.0
Tees and Greens	6.0
Sand Traps	3.0
Lakes and Streams	6.3
Fairways	47.0
Rough	75.0
Sub-total	**141.3**
Remainder (Native)	54.0
TOTAL	**193.7**

[4] AS-Built Drainage Plan, Institute Golf Course, 14830 Foothill Ave., Morgan Hill, Ourada Engineering, August 18, 2003.
[5] California Code of Regulations, Title 22, Article 3.
[6] Revised Geotechnical Investigation of Soil Berms at the Institute Golf Course, Morgan Hill, California. Kleinfelder, Inc., July 7, 2003.

Drainage Facilities. The project has altered the existing hydrology of the site though the expansion of the lake system and elimination of the former storm drain system for the central building and parking area that discharged to Corralitos Creek. According to as-built topography and site observations, the project has also included alteration of the a portion of a branch of Corralitos Creek, which has been "turfed over" to form part of the golf course playing surface on hole #3. According to the August 18, 2003, "As-built Drainage Plan" for the golf course prepared by Ourada Engineering, the golf course drainage system includes a network of numerous surface and subsurface drains that lead generally to outfalls at Corralitos Creek or to the six golf course lakes (Lakes A through F) in the area along Foothill Avenue. Lakes A, B and C are connected, and have a 24-inch diameter outfall (from Lake A) to the roadside drainage ditch on Foothill Avenue. Lake E drains to Lake D, which has an 18-inch diameter outfall to the Foothill Avenue drainage ditch. Lake F is located on the north side of Corralitos Creek and has a gated 6-inch diameter outfall pipe that terminates on the north bank of the creek. Lake G is located in the northeastern corner of the site and collects runoff from about 8 acres of golf course; it has a 6-inch outfall pipe to Corralitos Creek.

Existing storm drainage facilities in the project area are located along Foothill Road. The existing drainage ditches and culverts which border the project site and serve the existing road and surrounding properties will remain in place; no provisions have been made to upgrade them to accept any changes in runoff from the golf course.

A post-construction hydrologic and the hydraulic analysis of the project and associated watershed was completed by Mattern & Associates, dated May 24, 2002. The drainage analysis utilizes the U.S. Army Corps of Engineers' HEC-1 rainfall runoff model to calculate runoff peaks and volumes for the 2-, 5-, 10-, 25-, 50-, and 100-year storms for pre-project and project conditions. The work also included a hydraulic analysis of Corralitos Creek, using the Corps of Engineers' HEC-2 model to determine the flood elevations and the extent of flooding in the area upstream of Foothill Avenue. The methodology, assumptions and results of the drainage analysis by Mattern & Associates are reviewed in the Impacts Section of this report.

Ancillary Golf Course Facilities. The golf course includes two design/operational features that relate specifically to hydrology and water quality. These include: (1) the use of a wastewater treatment-recycle system for the wash water from vehicle cleaning areas; and (2) lake system for detention and treatment of runoff flows.

- **Wastewater Treatment-Recycle System.** The project facilities include a wastewater treatment-recycle system (NOVACHEM) located in the maintenance area to clean mowers and other equipment that may be contaminated with golf course chemicals, oils and grease. This is a total recycle system that incorporates various treatment processes (e.g., high-pressure sprayers, degreasers, settling, filtration, physical-chemical adsorption) to collect the equipment rinse water, cleanse it and recycle it for continual use.

- **Lake System.** The golf course includes a series of six lakes (A through G) that serve as golf course amenities as well as the equalizing reservoir (Lake D) for the irrigation system. The former 40-acre golf course on the site also had several small lakes; the new golf course lakes

have been enlarged and deepened from what previously existed. According to the lake system plans by Waterscapers[7] (1998), all of the lakes were to have been lined with a 20 mil thickness PVC membrane. However, the as-built lakes do not appear to conform to the Waterscapers' plans in many respects, and construction documentation is lacking that would confirm if and how the lakes were lined. Five of the lakes (A through F) are located along the lower portion of the site adjacent to Foothill Avenue and receive golf course runoff. Lakes A through E discharge runoff to Foothill Avenue, via overflow pipes at Lake A and Lake D; Lake F is located on the north side of Corralitos Creek and has a gated 6-inch diameter outfall pipe that terminates on the north bank of the creek. Lake G is a large, deep existing man-made lake situated between two branches of Corralitos Creek in the northeastern portion of the site. It collects runoff from about 8 acres of the golf course. It has a small 6-inch diameter overflow-discharge pipe to Corralitos Creek. Irrigation water for the golf course is pumped into Lake D from three on-site wells (#1, #2, and #3), and from there it is pumped into the golf course irrigation system.

The applicant provided copies of unsigned plans [8] [9]for water treatment and re-circulation systems for Lakes A through E and G. Treatment was to have included aeration, utilizing an activated oxygen (ozonation) system and diffusers installed on the bottom of the lakes. Lake G is also reported to have a Gravel Bed Biological Filter system located in the bottom of the lake, intended to provide enhanced nitrogen removal. Based on site inspection and discussions with the maintenance supervisor, the plans for lake water treatment were never implemented. Instead, the lakes simply act as wet detention basins for collection and treatment of runoff water, potentially via sedimentation, vegetative uptake and bacterial decomposition. The lakes are raked to remove vegetation, which reduces their effectiveness for water quality treatment. Based on observations October 1, 2003, all of the lakes are unusually high in water clarity, with no evidence of any algal growth in the water. The applicant has not disclosed that any chemicals are added to the lakes for algae or water quality control.

2. IMPACTS AND MITIGATIONS

a. Significance Criteria

According to CEQA Guidelines, implementation of the proposed project would normally be considered to have significant adverse impacts with respect to hydrology and water quality if it would:

- Be subject to flood hazards and/or increase flooding hazards downstream, or
- Increase runoff flow or discharge of stormwater flow to adjacent creek,
- Cause substantial degradation of surface or groundwater quality, or

[7] Water Feature Shop Drawings for the Institute Golf Course, Morgan Hill, California, Waterscapers, September 4, 1998.
[8] Waterscapers.
[9] Existing Golf Course Lake "G" Water Circulation System Flows, Aquatic Environments, Inc., November 16, 2000.

- Cause substantial interference with groundwater recharge.

b. On-Site Flooding

A portion of the project site is mapped within the 100-yr flood plain of Corralitos Creek, immediately upstream of Foothill Avenue. Golf course improvements are located in or adjacent to in this area and are potentially subject to potential inundation damage from flooding.

Impact H1. On-site Flooding. A small portion of the golf course is within the 100-yr floodplain of Corralitos Creek and improvements in this area are potentially subject to damage from inundation which, in turn, could result in discharge of sediments and pollutants to Corralitos Creek. However, hydrologic and hydraulic analysis has confirmed that the structures potentially at risk (Lake F and adjacent roadway) are located above the 100-year flood elevation in this area. This is a less-than-significant impact.

According to the published FEMA map and the As-built Drainage Plan for the golf course (Ourada & Associates, August 2003), the only area of the project site potentially subject to flooding is the creek riparian zone immediately adjacent Lake F and the adjacent roadway that forms the north bank of Corralitos Creek, immediately upstream of Foothill Avenue. Based on the mapping information, the apparent cause of flooding in this area is the constriction posed by the concrete box culvert at Foothill Avenue. Field observations during site reconnaissance inspections show that, while the roadway is immediately adjacent to the high water bank of the Corralitos Creek, the roadway surface is approximately the same elevation as Foothill Avenue in this area. It also appears that the roadway is a pre-existing farm road is in a stable condition. Lake F is located on the north side of the road. The Drainage Analysis report completed by the applicant's consultant (Mattern & Associates) included hydraulic modeling of this section of Corralitos Creek to determine the 100-year flood elevation. According to the analysis the 100-year flood elevation in this area was determined to be 350 feet (above mean sea level), as compared with a roadway surface of 354.7 feet (msl). The analysis shows that the flood flow will be contained within the riparian area and will not flood the roadway or Lake F. Therefore, the threat of inundation damage to the roadway and the golf course lake is a less-than-significant impact.

Review of the As-built Drainage Plans, field reconnaissance and discussions with the golf course maintenance superintendent shows that an area of the golf course itself is subject to onsite flooding due to an inadequate drainage system. The area of concern is the section of the #3 fairway in the approach to the green. The golf course has been graded to create a low depression in this area, which depends on several catch basins located in the fairway, with the outfall consisting of two 6-inch diameter drain pipes that lead to Corralitos Creek. The contributing drainage area includes approximately 14 acres of golf course, extending roughly from the #3 green to the #5 green. The drainage system is seriously undersized and causes frequent flooding of a section of the #3 fairway. The flooding is shallow and does not constitute a public safety hazard. However, this deficiency in the drainage system poses potential water quality impacts from frequent saturation of the maintained turf. This is addressed as a water quality issue under **Impact H5**.

Mitigation Measure H1. On-site Flooding. No mitigation measures are required.

c. Off-site Drainage and Flooding.

The development of the golf course has resulted in the conversion of land surface conditions and re-configuration of the drainage patterns and runoff at the project site. This modification to the site drainage conditions results in changes in runoff to the downstream receiving streams which include (a) Corraltios Creek on the northern half of the site and (b) the local roadside drainage ditch at Foothill Avenue and San Martin Creek on the southern half of the site.

Impact H2. Off-site Drainage and Flooding. The project will decrease the amount of site runoff to Corralitos Creek and increase the runoff to the Foothill Avenue drainage and San Martin Creek (to the south) as a result of the re-configuration of on-site drainage patterns. The Foothill Avenue drainage and San Martin Creek are presently subject to flooding problems due to inadequate capacity, and the increased runoff from the project will exacerbate the existing problems. This is a significant impact.

The key factors affecting rainfall-runoff rates are the land use conditions, the storm intensity, and the contributing drainage area. Following is a review of the project with respect to these factors and resulting changes in site runoff.

Land Use Conditions. Rainfall-runoff rates vary depending on land use conditions. The runoff coefficient, a unitless parameter that expresses the fraction of rainfall volume that is actually converted into storm runoff volume, varies according to the absorption characteristics of the land surface. The construction of buildings, roads, parking areas and other impervious surfaces increases runoff as compared to natural grass and woodland conditions; however, in this case the pre-project conditions included approximately the same impervious area as the proposed project (4 acres). The development of the golf course playing surfaces (i.e., tees, greens and rough areas) can reduce the runoff coefficient as compared with natural conditions depending on such factors as the soil conditions, ground slope, size and location of rough and natural buffer areas, and how the turf is maintained. The greens, tees, and sand traps (about 9 acres) are very effective in absorbing and slowing the rate of runoff. However, this is offset to a large extent by the addition of numerous surface and subsurface drains, and by the expansion of the lakes (along the western side of the project), which have the effect of reducing the land area available for rainfall absorption/infiltration. Overall the golf course has not been developed with any particular attention to minimizing the site runoff; e.g., many sections of closely mowed fairways extend virtually to the water line of the on-site lakes and drainage channels. Also, the slopes on large portions of the golf course are relatively steep, reducing the benefit of the maintained turf in terms of slowing the rate of runoff. On balance, the conversion of the site to a golf course and changes in drainage network is estimated to have little effect on the overall runoff coefficient for the site as compared to pre-development conditions.

Storm Intensity. The storm intensity (i.e., inches of rainfall per hour for a given storm frequency) is not affected by the development of the project except to the extent that the runoff travel time (i.e., "time of concentration") across the site is changed. The post-construction drainage analysis for the project recognizes there have been changes in the project site storm drainage network, but not to the extent that it would have changed the "time of concentration" and design storm intensity as

compared with pre-development conditions. This is consistent with observations from our field inspection of the site and review of the golf course layout and as-built drainage maps.

Drainage Area. The last, and in this case the most important, factor affecting storm runoff rates is the contributing drainage area. The overall drainage area of the project site (193.7 acres) has not changed; however, a significant amount of site runoff has been redirected from one drainage basin to another (north to south), resulting in a decrease in runoff to Corralitos Creek and an increase in runoff to the Foothill Avenue drainage and San Martin Creek. This redirection of runoff involves approximately 24 acres in the center portion of the project site (Maintenance Building area), which historically was drained to Corralitos Creek via a storm drain system; it is now re-routed to Foothill Avenue via Lake D on the south side of the golf course. This change in site drainage patterns results in a substantial increase in the amount of water discharged to the Foothill Avenue drainage during storm runoff events. This impact is significant since the drainage ditch along Foothill Avenue is limited in capacity and, to the south of the site at San Martin Creek (where the drainage ultimately flows), Foothill Avenue is subject to flooding at the 100-yr event. The applicant contends that Lake D acts as a complete retention system, such that no runoff from the 24 acres in question ever reach Foothill Avenue.

Local Flooding Observations. Interviews with neighbors in the project area indicate that in the winter of 1999 (subsequent to the changes in the golf course) the water flooded the Foothill Avenue drainage ditch fronting the project site and flowed under the road surface (within the sub-base) onto properties on the west side of Foothill Avenue, south of the project entrance road. The project applicant has indicated that drainage problems at Foothill Avenue on the north side of the project entrance road were due to an undersized driveway culvert that has since been replaced. However, this would not explain the flooding and drainage problem that occurred on the south side of the entrance road culvert.

Applicant's Drainage Analysis. A post-construction hydrologic and the hydraulic analysis of the project and associated watershed was completed by Mattern & Associates, dated May 24, 2002. The drainage analysis utilizes the U.S. Army Corps of Engineers' HEC-1 rainfall runoff model to calculate runoff peaks and volumes for the 2-, 5-, 10-, 25-, 50-, and 100-year storms for pre-project and project conditions. The work also included a hydraulic analysis of Corralitos Creek, using the Corps of Engineers' HEC-2 model to determine the flood elevations and the extent of flooding in the area upstream of Foothill Avenue.

Two separate watershed areas are modeled in the analysis: (a) Corralitos Creek with a current watershed of approximately 714 acres; and (b) Foothill Avenue Drainage (tributary to San Martin Creek), with a current watershed of approximately 147 acres. The analysis does not include any runoff from the 32 acres of the golf course that drain to Lakes D and E (Foothill Avenue drainage), and Lake G (Corralitos Creek watershed), based on the assumption that these lakes are operated for complete retention of all rainfall and runoff from that drain into them. Mattern & Associates concludes that the result of the project is a reduction in the peak runoff to Corralitos Creek and to the Foothill Avenue drainage and San Martin Creek. The calculations are presented in **Table H-2**.

In reviewing the modeling by Mattern & Associates, we have found that the work was completed with a suitable standard of care and that the assumptions concerning soil, rainfall, intensity, and runoff transformations are adequate. The analysis generally predicts that transforming the project site into a well maintained turf grass will increase infiltration and reduce the rate of runoff as compared with non-turfed conditions. This is in agreement with our assessment of the effect of the change in land use conditions as discussed previously. However, there are shortcomings in the analysis of the Foothill Avenue drainage related to assumptions for both the existing (developed) condition and pre-project conditions for watershed area conditions that affect the results presented in Table H-2 and the conclusions reached by Mattern & Associates that the project has decreased the peak runoff from the site to Foothill Avenue. Following is a review of the drainage analysis for the two separate watershed areas.

1. **Corralitos Creek.** The hydrologic models for Corralitos Creek indicate that the watershed has been reduced in size by approximately 52 acres as a result of the golf course expansion. This is due to redirection of runoff from the center portion of the site (around and above the Maintenance Building area) toward Foothill Avenue instead of Corralitos Creek; also deleted are 8 acres that drain into Lake G, which is assumed to have no outflow to Corralitos Creek. The infiltration rate in the model has also been increased to reflect that fact that the planting of turf grass for the golf course has generally improved soil infiltration and reduced the rate of runoff as compared with pre-development conditions. We generally concur with the assumptions and analysis and believe that the models provide a reasonable estimate of changes in runoff peaks. As shown in **Table H-2**, the hydrologic modeling indicates that under the developed golf course condition there is a reduction in peak runoff for all recurrence intervals, from 2-yr to 100-yr events. At the 100-yr event, the reduction in flows in Corralitos Creek is estimated to be approximately 40 cubic feet per second (cfs).

   The one point of disagreement has to do with the assumption to delete from the project conditions model the 8 acres of golf course area that are collected in Lake G. The lake is equipped with an outfall pipe to the creek and no calculations are provided to establish the lowered water level conditions that need to be maintained in this lake during the winter rainy season to assure that no overflow occurs. While the amount of runoff from the 8 acres during storm conditions would not be sufficient to change the overall conclusion that post-development flows will be reduced by the project, nevertheless, the model assumptions are only correct if the water level in Lake G is lowered during the winter to a specific level related to accommodate all runoff. Additional calculations and a specific lake water level management plan is required.

2. **Foothill Avenue Drainage (San Martin Creek Watershed).** The hydrologic models for the portion of the project site that drain to Foothill Avenue and San Marin Creek account for the fact that approximately 20 acres of area have been added to the drainage area through the development of the golf course. This is due to the re-routing of the storm drain from the vicinity of the Maintenance Building that formerly discharged to Corralitos Creek. The analysis also assumes, however, that 24 acres of the area that formerly drained to Corralitos Creek is now captured by Lakes D and E, and that these lakes act as a total retention system for all rainfall and runoff during the winter rainy season. The net result of the analysis, as

shown in **Table H-2**, is a slight reduction in the peak runoff to Foothill Avenue and San Martin Creek for all recurrence intervals, 2-yr to 100-yr events. At the 100-yr storm event the peak flow in the drainage along Foothill Avenue is estimated to decrease from by about 2 cfs (96 cfs to 94 cfs) as a result of the project. There are two significant shortcomings in this analysis and conclusion, as discussed below.

Overestimation of Pre-Development Runoff Flows. The first issue has to do with the assumptions related to the pre-project conditions. The model by Mattern does not account for the existence of approximately 3 acres of golf course lakes that were part of the former golf course. These lakes appear prominently on the current USGS quadrangle map, as well as civil drawings of the site by J. R. Garcia (1972), and the 1992 aerial photograph of the site included with the Mattern report. The lakes were all located in the southwestern portion of the site in the area that drains to Foothill Avenue. Mattern's model does not account for detention storage effects provided by these lakes for the pre-development conditions. However, in the project conditions, Mattern includes and accounts for the detention effects of the new lakes (A,B, and C) in this area, which cover approximately 1.7 acres. In the model of project conditions, it is solely the detention effects of these lakes that are responsible for the projected decrease in peak runoff, in spite of the addition of nearly 20 acres of additional drainage area. Had the pre-development conditions also accounted for the 3 acres of lakes that formerly existed, the pre-development peak flow estimates would have been lower than indicated by Mattern, due to flow attenuation effects of the former lakes. Consequently, the model overestimates the pre-development peak flows, which is then used as a basis for concluding, incorrectly, that the peak runoff from the project at Foothill Avenue and San Martin Creek will be reduced by the project. In fact, a more accurate model of the pre-development conditions, including the effects of the lakes, would reveal that the flows from the project will be increased by the project on Foothill Avenue, and will exacerbate existing drainage and flooding problems. This is a significant impact on off-site drainage conditions.

Stormwater Retention by Lakes D and E. A second issue has to do with the assumption by Mattern that all runoff from a 24-acre drainage area that collects in Lakes D and E is assumed to be fully retained, and thus excluded from the runoff models for either Corralitos Creek or the Foothill Avenue-San Martin Creek drainage. Under the description of the project conditions model, it is stated that Lake D is operated as a retention lake from which there is no overflow to the drainage along Foothill Avenue. However, site observations and applicant-supplied drainage plans indicate that Lake D has an 18-inch diameter overflow that drains to a poorly defined roadside ditch just south of the project entrance. This is also the area where local residents reported flooding problems in the winter of 1999.

While it is possible that Lake D could potentially be operated as a retention lake, neither the Mattern report nor any other information supplied by the applicant demonstrates a plan for doing this. There are no supporting calculations, operating criteria or other documentation to verify that sufficient retention capacity is provided in Lake D during the winter months to assure 100-percent retention of all runoff from the contributing 24-acre drainage area. In fact, there is contrary evidence from an aerial photo of the golf course provided by the applicant, dated December 22, 1999, that shows Lake D to be in a "full" condition at the start

of the winter rainy season, and no indication that the water level was drawn down to provide capacity for winter runoff.

The amount of retention storage required to validate Mattern's assumption can be approximated based on capturing rainfall-runoff from a 60-day wet weather period. This would be similar to the approach used in the model by Mattern to estimate retention of runoff in a pond located in the Corralitos Creek watershed above the project site. According to Rantz (1971)[10], the total 100-yr rainfall for a over 60-day period is estimated to be about 22.6 inches for the project area. Assuming that approximately 50 percent of the rainfall accumulates in Lake D as runoff over this 60-day period (Mattern estimated 80% in their analysis), the total volume of runoff to Lake D from the contributing area of 24 acre-acre would be approximately 22.6 acre-feet. Lake D has a surface area of approximately 1.8 acres; therefore, the lake water level should be lowered by 12 to 15 feet in the winter months to accommodate the estimated 100-year winter season runoff. Without this level of drawdown in Lake D, runoff to Foothill Avenue drainage could occur during peak runoff events and exacerbate the drainage problems in this area. This is a significant impact.

The above-described shortcomings of the applicant's hydrological analysis along with the observed drainage problems during a relatively normal rainfall year (1999) confirm the conclusions of the EIR analysis that the project will have a significant impact on local flooding at Foothill Avenue that will affect neighboring properties as well as the roadway itself. Farther to the south along Foothill Avenue, the increase in runoff will also contribute to more frequent and more extensive flooding at Robin Lane and at San Martin Creek, where there is an existing mapped 100-yr flood hazard zone affecting Foothill Avenue.

Mitigation Measure H2. Off-site Drainage and Flooding. In order to mitigate the localized and downstream flooding problems at Foothill Avenue caused or exacerbated by the project the applicant shall re-design the drainage system for the golf course to reduce the peak runoff flows to levels that are equal to or less than pre-development conditions. This shall require the following measures:

- Redesign Lakes A, B, C to provide increased stormwater detention capability in order to assure that the peak runoff flow from this area of the site does not exceed pre-development conditions; this shall include a revised hydrologic analysis of pre-development conditions that adequately accounts for the detention effects of the lakes that were part of the former 40-acre golf course;

- Eliminate the outflow pipe from Lake D to the Foothill Avenue drainage and develop a plan for operation of Lakes D and E as a complete stormwater retention system; this shall include supporting calculation and operating criteria and other information to verify that the lake has the capacity and will be operated to contain the 100-year, 60-day runoff from the contributing drainage area.

[10] Mean Annual Precipitation and Precipitation Depth-Duration-Frequency Data for the San Francisco Bay Region, California, S.E. Rantz, 1971, U.S. Geological Open-file Report.

A revised drainage analysis for the project site, including detention and retention basin analysis, shall be subject to review and approval by the Santa Clara Valley Water District and the City of Morgan Hill.

Implementation of the above mitigation will reduce the off-site flooding impacts to a less-than-significant level.

Table H2
Runoff Estimates by Mattern & Associates
for
Pre-Development and Post-Development Conditions
Institute Golf Course[1]

	Corralitos Creek Watershed[2]		Foothill Avenue Drainage[3] (San Marin Creek Watershed)	
	Pre-Development	**Post-Development**	**Pre-Development**	**Post-Development**
Drainage Area (acres)	766.4	714.4	128.1	147.7
Estimated Peak Runoff (cfs)				
2-yr	173	158	35	30
5-yr	264	242	52	43
10-yr	324	297	63	52
25-yr	397	364	77	66
50-yr	450	413	87	81
100-yr	502	461	96	94

[1] *Peak flows estimated using U.S. Army Corps of Engineers' HEC-1 model; drainage areas include contributing watershed area above project site. Not included in computations are drainage areas to Lake D (6.9 acres), Lake E (17.5 acres), and Lake G (8.0 acres), which are assumed to be 100% retained.*

[2] *At Foothill Avenue box culvert*

[3] *At southeast corner of Project Site*

d. Soil Erosion

Construction of the golf course and facilities has involved substantial earthwork for the roads, drainage pipelines, trenches, lakes, and general site grading. Grading exposes surface and sub-surface soils to the erosional forces of runoff. The golf course has already been constructed; however, additional grading activity is anticipated as part of on-going golf course maintenance work

and also in connection with implementation of identified mitigation measures. Consequently, the threat of construction-related erosion remains.

Impact H3. Soil Erosion. The completion of the grading work for the project could increase soil erosion during the construction period and in connection with on-going course maintenance. This is a potentially significant impact.

The lower portions of the project site are gently sloping with relatively low erosion hazard. However, large portions of the golf course are located in relatively steep upland areas where erosion hazards are moderate to high. Also, portions of the golf course facilities encroach upon the riparian corridor of the Corralitos Creek channel that runs through the northern side of the project site. The close proximity of construction activities to the creek channel increases the risk of erosion and sedimentation impact on the creek environment. There is currently evidence of streambank erosion immediately downstream of the concrete grade control structure on Corralitos Creek. Although the majority of golf course construction has been completed, additional work is likely to be required that may involve grading activity and the associated risks of soil erosion.

Soil erosion can cause numerous types of impacts. Eroded soil contains nitrogen, phosphorus, and other nutrients. When carried into water bodies, these nutrients can stimulate algae growth that reduce water clarity, deplete oxygen and create odors. Accumulated sediments can also lead to the obstruction of drainage facilities (e.g., culverts) increasing the potential for overtopping and localized flooding. The greatest soil erosion hazard would exist during and immediately following construction. The completed project should cause minimal erosion and sediment discharges to downstream water bodies, due to the addition and maintenance of turf grass and other landscaping in areas of soil disturbance.

Mitigation Measure H3. Soil Erosion. Erosion and sedimentation impacts from the construction of the golf course and support facilities are expected to be confined predominantly to the construction phase of the project; however, it is anticipated that on-going maintenance of the golf course will also include excavating, drainage and grading work from time to time. Construction-related erosion and sedimentation shall be mitigated by the implementation of the following measures:

- The project applicant must apply for and obtain the applicable state permits under the National Pollutant Discharge Elimination System (NPDES), as required by the State Water Resources Control Board for any project involving the grading of more than five acres; this includes the preparation of and compliance with the provisions of a Storm Water Pollution Prevention Plan.

- The applicant shall prepare an Erosion Control Plan for review and approval by the City of Morgan Hill and the Central Coast RWQCB. This may included as a part of the Stormwater Pollution Prevention Plan.

- Erosion control measures shall be established in conformance with the Santa Clara County Grading Ordinance, RWQCB regulations, and local guidelines for non-point source runoff

Best Management Practices for golf course construction. The Erosion Control Plan should include measures such as: (1) use of silt fencing and temporary sedimentation basins to retain sediment on the project site; (2) protecting all finished graded slopes from erosion through re-vegetation, drainage diversion, and other appropriate methods; and (3) protecting any downstream storm drainage inlets from sedimentation.

- Golf course construction shall not occur during the winter rainy season (October 15 to April 15), without written approval from the City Engineer for the City of Morgan Hill.

- Inspection should be conducted by City and construction personnel during the construction period to ensure that the erosion control techniques are performing as designed. Erosion control features should be checked after major winter storm events.

- Following completion of golf course construction, the roadside drainage ditches and stream channels that border and run through the project site shall be inspected for accumulated sediment. The applicant shall be responsible for the clearing of accumulated debris and sediment within these channels prior to winter rains.

- Following construction, a program should be established for insuring maintenance of culverts, drain inlets, energy dissipaters, etc., and for erosion control during maintenance grading activities in conformance with the Santa Clara County Grading Ordinance, RWQCB regulations, and Non-Point Source Program Best Management Practices.[11]

Implementation of the above mitigation will reduce the potential soil erosion impacts of the project to a less-than-significant level.

f. Water Quality

Ongoing operation and maintenance of the golf course could have impacts on the quality of surface runoff from the project area. There are four sources of non-point source pollution from the proposed golf course and facilities: (1) golf course parking and maintenance facilities; (2) nitrogen loading from application of turf fertilizers; (3) pesticide and herbicide use; and, (4) construction activities.

Impact H4. Golf Course Facilities Non-Point Source Runoff Pollutants. Development and maintenance of golf course facilities will result in a net increase in the amount of non-point source pollutants delivered directly to Corralitos Creek and downstream to San Martin Creek and Llagas Creek. This is a potentially significant impact.

On-going operation and maintenance of the golf course on the project site will involve vehicle activity on roads and parking areas, as well as equipment maintenance and washing, as part of the normal day-to-day operations. Runoff from these vehicle areas can be expected to contain non-point source pollutants comparable to that from urban areas. The type of pollutants contained in

[11] Santa Clara County, Planning Department, Santa Clara County Environmental/Design Guidelines & Standard Development Requirements for Golf Courses, July 23, 1996.

street/parking lot runoff include oil and grease, heavy metals, other petroleum derivatives coming from engine drippings, and wearing of tires, brake linings and asphalt pavement. General litter and debris can also be anticipated, as well as paint and solvent residue associated with maintenance activities. If washed directly into the local drainages, these surface contaminants could be detectable downstream in Corralitos Creek and San Martin Creek, and ultimately in Llagas Creek.

The golf course operations include two features that will reduce the potential for discharge of surface pollutants. These include: (1) the use of a wastewater treatment-recycle system (NOVACHEM) for the wash water from vehicle cleaning areas; and (2) routing of site runoff through a system of onsite lakes (i.e., wet detention lakes) where, with proper design, pollutant removal can occur via sedimentation, vegetative uptake, and bacterial decomposition. Documents provided by the applicant indicate that a lake water filtration and recirculation system (including aeration and ozonation) was originally planned; however, this has been deleted from the project design. The NOVACHEM system and the onsite lakes are beneficial water quality control measures, but they do not address all of the potential surface runoff pollution issues posed by the golf course. Specifically:

- The wash-recycle system is generally for maintenance equipment (e.g., mowers); runoff from parking areas and from other vehicle maintenance and washing areas is not addressed.

- During runoff periods, treatment through the lake system will be limited in capturing and removing surface runoff pollutants washed from the golf course due to the lack of suitable buffer areas around the lakes. All of the lakes are constructed with "sharp" edges, devoid of any vegetation. According to the applicant's consultant (*Randy Long, personal email communication*), the golf course maintenance crews routinely rake the edges of the lakes for the specific purpose of removing lakeside vegetation and algae.

As designed, the golf course drainage system eliminates one of the primary benefits of the stream and lake riparian zones, which is to provide filtering and removal of pollutants that may be carried into the stream with runoff from adjacent lands. The mechanism of pollutant removal in riparian buffer areas occurs as particulate matter is trapped during passage of runoff flow through dense, fine herbaceous vegetation, through uptake of some soluble pollutants by plants, and by incorporation of certain pollutants, particularly metals, in the soil. There are other measures (BMPs) commonly applied to intercept and capture pollutants from vehicle areas (e.g., stormwater interceptors, grassed-infiltration swales, etc.) that are also not incorporated in the project design.

Mitigation Measure H4. Golf Course Facilities Non-Point Source Runoff Pollutants. The following mitigation measures shall be incorporated to reduce the surface runoff impacts to a level of insignificance.

- Provide containment dikes around maintenance areas, and possibly, provide roofing over them where the potential for oil, grease and fuel spillage is high.

- Provide oil/grease separators for the parking area drainage system;

- Monitor the grounds to control litter and other debris that could be washed into the on-course lakes or drainages (i.e., street sweeping, oil spill clean-up, etc.);

- Modify the golf course design along all branches of Corralitos Creek to provide a minimum buffer distance of 50 feet (from the centerline of the Creek) of native grasses and non-maintained rough for capture and treatment of surface runoff pollutants, and a similar buffer of 10-feet around any of the on-site lakes-streams which discharge stormwater from site;

- Adopt and implement as part of on-going site operations, all applicable measures identified under Mitigation Measure H3 - Soil Erosion and H7 - Construction Pollution Activity Impacts.

Impact H5. Nitrogen Loading from Golf Course Fertilizers. The use of fertilizers and local groundwater for maintenance and irrigation of the golf course turf grass will increase nitrate-nitrogen levels in local groundwater above already high levels, and will also result in potentially higher nutrient loading to downstream surface waters, including Corralitos Creek, San Martin Creek and Llagas Creek. This is a significant impact.

Nitrogen is the primary component of turf grass fertilizer and is present at high concentrations in the local groundwater that will be used for turf irrigation. Nitrogen poses potential surface and groundwater quality concerns to the extent that excess nitrogen is applied to the turf grass beyond that which is utilized by the vegetation.

Golf Course Fertilizer Loading. Golf course greens are fertilized regularly and other areas are fertilized on an as-needed basis. The average yearly nitrogen application rates assumed are 1 lb/ 1,000 ft^2 on rough, 3 lbs/1,000 on fairways, and 5 lbs/1,000 ft^2 on tees and greens. The rough areas may undergo a one-time fertilization during construction. For the proposed golf course, which has approximately 128 acres of turf grass, the distribution and annual rates of fertilizer application are estimated to be as follows:

Golf Course Area	Rate	Total lbs. N
Tees and Greens	6 ac @ 5 lbs/1,000 ft^2 =	1,307
Fairways	47 ac @ 3 lbs/1,000 ft^2 =	6,142
Rough Areas	75 ac @ 1 lb/1,000 ft^2 =	3,267
	TOTAL	**10,716 lbs/yr**

Our review of information supplied by the applicant regarding current fertilizer use on the golf course, indicates that the amount of nitrogen applied to the tees and fairways (on an annual basis) is within the estimates presented above. No information was supplied regarding fertilizer use on the greens and rough areas; however, based on this information it is reasonable to assume that nitrogen fertilizer applied to these areas is also consistent with the above assumptions, which reflect normal use rates for golf course turf. The applicant has not prepared a management plan that indicates how

the nitrogen application rates are determined and monitored to meet minimum turf requirements while also protecting against excessive loading to groundwater.

Irrigation Water. Based on water use data supplied by the applicant, the estimated average annual water demand for golf course irrigation is approximately 491 acre-feet per acre per year, which equates to about 3.85 acre-feet per acre per year for the 128 acres of irrigated turf and associated landscaping (see groundwater production data, **Table WS1**, in Water Supply section). All of the water is obtained from water wells on the site. Based on well water monitoring data provided by the Santa Clara County Water District, the average groundwater nitrate concentration in the project vicinity is approximately 66 mg/L, or 15 mg/L as nitrogen. Additionally, in March 2002, the applicant obtained water samples for the four onsite wells on the project site and had the samples analyzed for nitrate. The results were similar to the SCVWD data for other wells in the project vicinity.

Reported nitrate concentrations for the project site wells were:

Well No.	Nitrate Concentration (mg/L)
1	47
2	49
3	54
4	85

The applicant also obtained several water samples from the golf course lakes, spring and pond near the 7th green, and had these analyzed for nitrate, total kjeldahl nitrogen (TKN) and other constituents. One set of samples was taken on March 12, 2002, during a rainy period; the other samples were taken in August and September 2003, during the dry, irrigation season. One sample was also taken directly from the irrigation system and from the bottom of Lake D in September 2003. The nitrate and TKN results for these various sampling points displayed in **Table H3**.

Table H3
Nitrate and TKN Sample Results
Institute Golf Course Lakes, Spring and Irrigation System
(mg/L)

Sampling Location	3/12/02		8/6/03		8/21/03		9/4/03		9/23/03	
	NO_3*	TKN	NO_3*	TKN	NO_3*	TKN	NO_3*	TKN	NO_3*	TKN
Lake A	2.6	2.4	1.5	3.2	ND	3.3	5.3	-	-	-
Lake B	ND	2.7	ND	2.8	ND	-	-	-	-	-
Lake C	ND	4.3	ND	4.3	ND	-	ND	-	-	-
Lake D Surface	26	0.39	19	ND	16	0.72	24	-	-	-
Bottom	-	-	-	-	-	-	-	-	17	-
Lake E	ND	0.72	0.9	2.0	-	-	8.4	-	-	-
Lake F	ND	1.9	0.98	2.1	-	-	ND	-	-	-
Lake G	ND	0.49	ND	0.83	ND	-	-	-	-	-
Spring	31	ND	-	-	-	-	34	-	-	-
Spring Pond	1.6	11	-	-	-	-	-	-	-	-
Irrigation System	-	-	-	-	-	-	-	-	19	-

* *NO_3 measured as nitrate.*

Lake D serves as the irrigation reservoir for the golf course. Water is pumped into the upper portion of the lake from Wells 1 2, and 3, and withdrawn by the irrigation pumps from near the bottom of the lake. Based on the nitrate sampling results for Lake D and directly from the irrigation system, there is an apparent significant nitrate reduction (about 60%) that occurs in Lake D. According to the applicant's data, the average nitrate concentration for Wells 1, 2, and 3 is about 50 mg/L, and the average for samples taken from Lake D and the irrigation system is about 20 mg/L. The nitrate reduction is most likely attributable to denitrification in the deeper, anoxic zones of Lake D, which is estimated to be more than 30-feet deep. The volume of the lake is estimated to be on the order of about 9 million gallons, which should provide roughly 20 days of residence time at the average irrigation flow, estimated to be about 437,500 gpd (see Water Supply section, **Table WS-1**). Given these conditions, the apparent nitrate reduction of 60% is not unreasonable. However, the nitrate removal in the lake appears to be happenstance, as the applicant has not supplied any design or operating information indicating how the process can be controlled to achieve consistent results. Moreover, although the results are promising, the sampling data obtained thus far are insufficient to

confirm the level of nitrate reduction that can be maintained throughout the year and over time. Accordingly, for purposes of project analysis, it can be concluded that significant reduction of well water nitrate concentrations to levels as low as 20 mg/L via detention in Lake D is possible, but this is not assured. Therefore, the average nitrate concentration of golf course irrigation water is expected to be in the range of 20 to 50 mg/L. Expressed as nitrate-nitrogen, the range would be about 4.5 to 11.3 mg-N/L.

Assuming that the irrigation water is applied to the golf course (and associated landscaping) at the reported rate of about 491 acre-feet per year, the yearly nitrogen loading to the golf course from irrigation water would be in the range of approximately 6,000 to 15,000 pounds. This means that the nitrogen content in the irrigation water would satisfy a substantial portion, and possibly all, of the projected total fertilizer requirement (10,716 lbs/year) for the golf course. The applicant has not indicated any plan to account for the nitrogen fertilizer value of the irrigation water.

Groundwater Impacts. As the primary component of turf grass fertilizer, nitrogen poses potential groundwater quality concerns to the extent that the nitrogen applied to the golf course exceeds the amount required or utilized by the vegetation. Nitrogen losses to subsoils and groundwater are in the form of nitrate which can contribute to human health problems (associated with drinking water) and general degradation of water quality. Nitrogen loss to groundwater occurs once nitrogen that is not taken up by the plants, absorbed by the soil, or volatilized has seeped past the root zone of the turf grass, and slowly migrates to groundwater. The long-term effect of nitrate on groundwater quality can be estimated as the weighted average, or combined effect, of percolating rainfall, seepage losses from irrigation water, and fertilizer leachate, and can be evaluated through a simplified chemical/water mass balance as presented here.

The formula used to calculate the combined nitrate-nitrogen percolate concentration (N_C) is :

$$N_C = N_L + N_w / (8.34)(R + S)$$

where:

N_C	=	resultant nitrate concentration in groundwater beneath the site (in mg-N/L)
R	=	annual on-site rainfall-recharge (in million gallons)
S	=	annual seepage losses from irrigation (in million gallons)
N_L	=	fertilizer nitrogen leached (lbs/year)
N_w	=	irrigation water nitrogen seepage losses (lbs/year)
8.34	=	units conversion factor

The estimated annual on-site rainfall-recharge at the site is approximately 3.0 inches (0.25 feet), which is based on an average annual rainfall of 20 inches, total yearly runoff of 20 percent of rainfall (or 4 inches), and actual evapotranspiration of 13 inches per year[12]. Seepage losses are the result of inefficiencies in the irrigation system (common to all irrigation systems), plus excess water that may

[12] Elford, C Robert and John E. Stilz (U.S. Weather Bureau), The Climate of Santa Clara and Santa Cruz Counties, February 1967.

be supplied from time to time to control mineral/salt build-up in the soil. Seepage losses are assumed to be about 20% of the estimated 491 acre-feet of irrigation water applied annually, or about 98 acre-feet/year. Under good turf fertilizer management practices, about 90 percent (9,644 lbs.) of the applied fertilizer nitrogen will go to plant uptake and denitrification in the soil; the remaining 10 percent (1,072 lbs.) would be expected to leach downward to the groundwater[13]. As previously discussed, the local groundwater used for irrigation contains high levels of nitrate, even after losses through the irrigation storage Lake D, and this source of nitrogen should be considered when planning nitrogen fertilizer applications. The turf grass can be expected to utilize some of the excess nitrogen supplied by the irrigation water; but because of the already high concentration of nitrate in the irrigation water, a significant fraction will leach past the root zone along with the irrigation "seepage losses" or with percolating rainfall. Passage through the subsoils beneath the site can be expected to reduce the nitrate concentration in the percolating water, where it will undergo some amount of reduction (20 to 40%) as a result of denitrification in the fine-textured soils. To be conservative and because no fertilizer-nitrogen management plan has been prepared for the golf course, the analysis here assumes that the nitrogen fertilizer application rates are not adjusted to account for nitrogen supplied via irrigation with the high-nitrate groundwater, and that about half of the nitrogen in the irrigation supply is lost through the combination of plant uptake and denitrification in the soil during deep percolation; the balance of the irrigation-water nitrate is assumed to reach the groundwater.

Substituting the assumed and calculated values:

<u>For irrigation nitrate concentration of 4.5 mg-N/L:</u>

N_C = (1,072 + 3,003)/(8.34)(15.8+32.0) = <u>10.22 mg-N/L</u> or 45.3 mg/l, NO_3[14]

<u>For irrigation nitrate concentration of 11.3 mg-N/L:</u>

N_C = (1,072 + 7,539)/(8.34)(15.8+32.0) = <u>21.6 mg-N/L</u> or 95.7 mg/l, NO_3

where:

N_C	=	resultant nitrate concentration in groundwater, mg-N/L
R	=	million gallons per year rainfall-recharge
	=	(0.25 ft) (193.7 ac) (325,851 gallons/ac-ft) = 15.8 million gallons
S	=	seepage losses = (491 acre-feet/year)(0.20)(325,851 gallons/ac-ft)
	=	32.0 million gallons
N_L	=	fertilizer nitrogen leached = (10,716 lbs/yr) (0.1) = 1,072 lbs/year.

[13] Brauen, Dr. Stanton E. and Dr. Gwen K. Stahnke, "Leaching of Nitrate from Sand Putting Greens," in <u>U.S.G.A. Green Section Record</u>, January/February 1995.

[14] **Note**: 1 mg/l NO_3 as N = 4.43 mg/l NO_3 as NO_3.

N_w	=	irrigation water nitrogen seepage losses (lbs/year): @ 4.5 mg-N/L
	=	(0.5) (6,005 lbs/yr) = 3,003 lbs/year; @ 11.3 mg-N/L
	=	(0.5)(15,078 lbs/yr) = 7,539 lbs/yr
8.34	=	units conversion factor

The above approach can also be used to estimate the pre-project conditions relative to groundwater nitrate impacts. Historically, the project site had a small golf course on about 20 percent of the site (approximately 40 acres). At different times there were other incidental nitrogen sources, including a leachfield system, domestic animals, and possibly some livestock. A portion of the site was historically dry-farmed (oat hay), but this would have involved little if any nitrogen fertilizer application. The possible nitrogen contribution from these other sources is estimated to be adequately covered by the very generous fertilizer assumptions for the former golf course. Irrigation water was obtained from the onsite wells, and there were also several lakes. Although the former golf course was not irrigated, fertilized, and maintained as intensively as the new golf course, it could have been. Under the assumption of comparable golf course management practices and the other previously stated assumptions, the estimated nitrate loading from the project site for a 40-acre golf course can be determined by adjusting the fertilizer and irrigation nitrate contribution, and the irrigation water volume, by a factor of 0.31 (40 acres/128 acres = 0.31) to reflect the reduced turf area. The calculations for pre-project conditions are taken as follows:

<u>For irrigation nitrate concentration of 4.5 mg-N/L:</u>

$$N_C = (0.31)(1{,}072 + 3{,}003)/(8.34)(0.31\text{x}15.8+32.0)$$
$$= \underline{4.1 \text{ mg-N/L}} \text{ or } 18.7 \text{ mg/l, } NO_3$$

<u>For irrigation nitrate concentration of 11.3 mg-N/L:</u>

$$N_C = (0.31)(1{,}072 + 7{,}539)/(8.34)(0.31\text{x}15.8+32.0)$$
$$= \underline{8.67 \text{ mg-N/L}} \text{ or } 38.4 \text{ mg/l, } NO_3$$

These calculations show a resultant nitrate concentration from the project that will be at or above the drinking water standard of 45 mg/L, and potentially as high as twice the drinking water standard. This will represent a significant increase over the historical nitrate contribution from the project site, assuming a well-irrigated/fertilized 40-acre golf course, which is estimated to produce a resultant nitrate concentration in percolate in the range of 18.7 to 38.4 mg/L. Consequently, the project, with a resultant nitrate concentration of 45 to 96 mg/L, can be expected to contribute to a measurable long-term rise in groundwater-nitrate concentration immediately beneath the golf course. This poses a significant impact to the Llagas Groundwater Basin, which already has elevated nitrate concentrations in the project vicinity.

Surface Water Impacts. A variety of factors control nitrogen transport from turf areas to surface waters, including climate, rainfall intensity and duration, soil texture, management practices, plant uptake ability, volatilization, and soil moisture conditions.

The primary concern is that the nitrogen fertilizer will be transported by surface runoff from the area of application before it is absorbed and utilized by the vegetation. The majority of nitrogen that is transported to surface water sources consists of sediment-bound nitrogen[15]. The increased nitrogen delivered to a surface water body can serve as a nutrient enrichment, causing stimulation of aquatic plant growth and, possibly, increased eutrophication of the water body.

Management factors such as application rates, timing of application, the form of application, and amount of irrigation all contribute to nitrogen's ability to move from the area of application into ground water or surface waters. Irrigation and subsequent soil moisture levels should be monitored and kept as low as possible to reduce the likelihood of seepage losses. The amount and timing of fertilizer applications is important to maximize plant uptake and minimize the potential for surface runoff. The amount of irrigation and resulting soil moisture levels are important to reduce potential leaching of nitrogen. The applicant has supplied information documenting that tissue sampling for nitrogen content has been conducted in the initial development of the golf course turf areas; however, other information regarding plans or practices to minimize the amount of nitrogen loading (and potential losses to the environment) are lacking.

The golf course has been laid out such that some of the fairways encroach closely upon the riparian corridor of Corralitos Creek, one section of natural stream channel has been covered entirely with turfgrass to become part of the golf course playing surface, numerous golf course drains (from fairways, tees and greens) discharge directly to or adjacent to the Corralitos Creek channel, and other portions of the managed turf drain directly into the on-site lakes without benefit of any filtering or buffer area.

Specific areas of concern include:

- All of the on-site lakes are provided with outfall lines to either Corralitos Creek or to the roadside ditch along Foothill Avenue, which drains eventually to San Martin Creek.

- Where the golf course drains directly to the stream channels (rather than through the lake system), in many cases no buffer has been provided between the edge of the turf and the edge of the stream bank. In one instance (north side of Corralitos Creek at Hole #3) a side tributary has been converted to turf grass, such that the stream flows directly over and through areas where golf course chemicals are applied.

- Several golf course drains from tees, greens and fairway sections discharge directly to the stream channel, again acting as a direct conveyance for golf course chemicals. An example of this is the sub-drain for the 6th Green. Another example is the drainage system for the northwestern corner of the golf course, which has several catch basins situated in a depression in the #3 Fariway, which is frequently flooded because of inadequate capacity in the storm drain. The outfall lines consist of a two 6-inch diameter pipes, which is insufficient for a drainage area of approximately 14 acres. Flooding of the fairways increases the potential for

[15] Balogh, James and Walker, William ed., "Golf Course Management and Construction - Environmental Issues". Lewis Publishers, Chelsea, Michigan, 1992.

leaching of golf course chemicals from the grass, which is routed for direct discharge to the streambank of Corralitos Creek.

As shown in **Table H3**, sampling of the various golf course lakes in wet and dry weather conditions has shown nitrate concentrations ranging from non-detectable to 26 mg/L, and TKN concentrations typically in the range of 2 to 4 mg/L. The higher concentrations are above levels normally found streams in the area. No sampling results are available for the golf course drains that discharge directly to or adjacent to stream channels. Nitrate-nitrogen and organic nitrogen leaving the project site by these routes presents an unnecessary nutrient addition to downstream receiving waters. These features of the golf course pose a threat of excess nitrogen discharge to surface waters that could be avoided through changes in the design that are consistent with Best Management Practices for golf courses and non-point source runoff control.

Mitigation Measure H5. Nitrogen Loading from Golf Course Fertilizer. The following management practices are recommended for consideration to minimize the transport of nitrate from fertilizers and irrigation waters from the golf course into local ground water and surface waters.

- The applicant shall prepare a nitrogen control plan which incorporates the following: (a) determination of appropriate nitrogen application rates based upon site specific soil testing and plant requirements; and (b) annual accounting of nitrogen application rates to the golf course, including both fertilizer applications and nitrogen content of irrigation water. The nitrogen control plan shall include sufficient technical analysis, including monitoring data from the initial operation of the golf course, to demonstrate that the fertilizer and irrigation water applications to the golf course will not exacerbate the existing groundwater-nitrate problems in the project vicinity. Specifically, the nitrate loading from all sources shall be demonstrated to not exceed the estimated nitrate loading that would occur from pre-project conditions – i.e., a 40-acre golf course. The applicant shall submit the nitrogen control plan, including comparison to pre-project nitrate loading estimates, to the Santa Clara Valley Water District (SCVWD) and the Central Coast RWQCB for review and approval, and shall obtain and comply with recommendations provided by these agencies. Additionally, any changes to the fertilizer program shall be submitted to these agencies for review and approval.

- Nitrogen fertilizer application rates should be adjusted to account for the nitrate levels in the groundwater-irrigation supply, based upon and verified through routine monitoring of irrigation waters. The irrigation water monitoring program shall be in accordance with requirements established by the SCVWD and the RWQCB; at a minimum, the monitoring should include sampling for nitrate and total kjeldahl nitrogen no less than monthly;

- Application rates of fertilizers should be determined based on irrigation rates and site-specific soil conditions and turf requirements. A soil monitoring program should be implemented to determine appropriate application rates, in accordance with recommendations provided by the SCVWD.

- The nitrogen fertilizer should be slow release or less soluble form, whenever possible.

- Irrigation of the golf course should be limited to the calculated evapotranspiration rate, plus mineral dilution requirement. Excessive irrigation should be avoided. This will reduce potential leaching of nitrogen to the subsoil as well as reduce potential surface runoff from irrigation application.

- The timing of fertilizer application should coincide with the period of greatest plant uptake and avoid periods of potential rainfall-runoff events.

- The overall amount of maintained turf shall be reduced, as needed, in order to minimize the total fertilizer requirements.

- Modify the golf course design as specified in **Mitigation H4,** including the provision of a minimum buffer distance of 50 feet (from creek centerline) of native grasses and non-maintained rough along all branches of Corralitos Creek, within which fertilizers will not be applied.

- Modify the design of the all sub-drains from tees and greens the discharge to Corralitos Creek to provide a minimum 25-foot vegetated buffer between the outfall point and the creek channel;

- Modify the golf course on Hole #3 to eliminate the turf covering the tributary drainage channel on the north side of Corralitos Creek near Lake G, and reestablish natural channel conditions, maintaining a minimum 50-foot buffer between the turf grass and the centerline of the creek channel;

- Modify the drainage system and/or golf course design in the northwestern portion of the site to eliminate the flooding of the fairway catch basins; provide a minimum 10-foot vegetative buffer around the catch basins, as well as appropriate energy dissipater and a minimum 25-foot vegetated buffer between the outfall and the creek channel.

Impact H6. Pesticide Use. The application of pesticides/herbicides on the golf course could result in releases to Corralitos Creek or other downstream receiving waters; this is considered a potentially significant impact.

The demand for turf grass of high quality and uniform playing surface on golf courses often requires intensive management to control pests. Pesticides are used to control or reduce the adverse effects of pests including harmful insects, unwanted plants, and pathogenic organisms (Note: the term "pesticides" includes insecticides, herbicides, fungicides, rodenticides, etc.). Turf grass diseases are a significant problem on golf courses, even under good management conditions[16]. Close mowing, high rates of nutrient application, intense irrigation, and moist conditions favor the occurrence of infectious diseases.

[16] Balogh, James and Walker, William ed., "Golf Course Management and Construction - Environmental Issues". Lewis Publishers, Chelsea, Michigan, 1992.

Pesticides are applied selectively and much less frequently than fertilizers - usually no more than once or twice per year. The pesticides and herbicides typically used on golf courses are neither highly mobile nor persistent; they dissipate rapidly as a result of volatilization, photodegradation, microbial action, hydrolysis, and soil absorption. Information supplied by the applicant indicates that the golf course has a "Pesticide Program" for the greens, which includes the application of a variety of fungicides throughout the year, with the greatest amount applied during the summer months (June through August). The information is presented in the form of a month-by-month listing of chemicals, quantities, and costs. A review of the pesticides listed indicates that they are all common chemicals used for turf maintenance, and are generally very insoluble and short-lived pesticides. These are desirable characteristics from the standpoint of minimizing impacts on the environment. However, it is not clear if this information represents the full extent of pesticide use on the golf course. Also, it is not clear from this listing of chemicals how the material is applied and what precautions are taken to protect against wash-off of pesticides into the on-site lakes and drainage system and adjacent creek and riparian areas. The applicant has not prepared an overall management plan for chemical use on the golf course.

Surface Water Impacts. A threat to water quality from pesticides/herbicide use on the golf course at the project site would most likely occur in the event of: (a) a significant rainfall event immediately following chemical application; (b) spillage in the area where the chemicals are handled and/or stored; or (c) drainage of leachate from golf course sub-drains under tees and greens that discharge directly to or immediately adjacent to streams. There could be a potentially significant impact on the surface water quality of on-site drainages and downstream in Corralitos Creek, San Martin Creek and Llagas Creek if either of the above events under (a) or (b) were to occur. The threat of pesticide runoff to surface waters is greatest from the areas of the golf course where the fairways immediately abut the Corralitos Creek channel, and from the system of golf course lakes that provide an avenue for direct discharge of unfiltered golf course runoff to the roadside drainage ditch along Foothill Avenue, which is tributary to San Martin Creek.

The potential for adverse impacts from the direct discharge from sub-drains is an ongoing threat. The greens are the most intensively managed parts of a golf course, and they are constructed with highly permeable sandy soils to promote vertical drainage; these conditions are not conducive to retention of pesticides or other chemicals. Therefore, the discharge from these sub-drains has a high probability of containing pesticide residue. During a field review of the project site on October 1, 2003, near the end of the summer dry season, several sub-drains were found to be flowing, including the drain from Green #6 which discharges directly to the adjacent stream channel of Corralitos Creek. During the wet season, the discharge from these drains will be greater, as well as more frequent or potentially continuous.

The applicant obtained water samples from the onsite lakes in March 2002 and again in August and September 2003. All sample results indicated non-detectable concentrations for the following pesticide analyses (reporting limit in parentheses)

- Organochlorine (0.024-2.1 ug/L)
- Organonitrogen (1.0 ug/L)

- Organophosphorous (2.0 ug/L)
- Carbamate and Urea (4.0 – 10 ug/L)
- Chlorinated Herbicides (0.11-1.1 ug/L)

The fact that no pesticides were detected in these samples is favorable and worthwhile information. However, it does not diminish the concern regarding potential threats to surface waters from pesticide residue that may be carried from the golf course into Corralitos Creek. Specifically, the sampling data are limited by the fact that:

1. One set of samples was obtained toward the end of the normal winter rainy season when dilution from rainfall and runoff would be greatest; the other samples were obtained at the end of summer when there is no runoff except and soil absorption is greatest.

2. There is no indication of what type of golf course pesticide applications were made in the days, weeks, or months preceding the sampling.

3. No samples were taken from the numerous golf course drains that discharge directly to or adjacent to the Corralitos Creek channel, or the section of creek channel that has been converted to playing surface on Hole #3.

4. The number of samples was small and represents only "snapshot" of the golf course operations.

Because of these limitations, the sampling results do not alter the analysis and findings of potential impacts to surface water quality posed by the golf course operations.

Groundwater Impacts. Pesticide movement to groundwater is generally associated with the following conditions:

- Coarse alluvial soils which may have interbedded fine grain materials;

- Excessive quantities of irrigation water or other sources;

- Unconfined aquifers with a depth to water table less than thirty feet;

- Extensive or concentrated pesticide applications to the soils occurring over many years, and;

- Pesticides which are highly persistent and mobile in the soil-water systems.

Most of the proposed golf course is located on soils having low permeability, and the depth to groundwater in the project area is greater than 50 feet. In addition, the golf course irrigation is planned to be controlled by an automated system that is specifically designed to prevent excessive watering and minimize runoff from the site. If the irrigation system is operated efficiently and water use is held to a minimum, the amount of excess irrigation water lost to groundwater will also be minimal. This will significantly reduce the potential for pesticides to be transported to groundwater.

Pesticide use on golf courses is relatively small compared with agricultural operations. Usually pesticide application is conducted only once or twice per year. The pesticides commonly used on golf courses are not very persistent. They breakdown or decompose quickly through several mechanisms such as photodegradation, soil adsorption, hydrolysis, and volatilization (i.e., evaporation). Residues are usually undetectable one to two weeks after application. Therefore, pesticide use on the golf course can be managed to avoid creation of any adverse impact on groundwater quality. However, there is insufficient evidence that the project applicant has developed and adopted a pesticide management plan to protect against possible impacts to groundwater quality. This is considered a potentially significant impact.

Mitigation Measure H6. Pesticide Use. The applicant shall prepare a Chemical Application Management Plan (CHAMP). This plan should detail the procedures to construct, operate and maintain the golf course. The CHAMP should provide technical public disclosure regarding pesticides, fertilizers and other chemicals to be used on the golf course, as well as methods of application and handling. In addition to the measures incorporated in the proposed golf course layout and design, the following provisions should be considered for inclusion in the CHAMP:

- Drought, pest, and disease resistant grass species should be selected.[17]
- Pesticides should be handled, applied, and disposed of by a licensed (State-certified) spray technician.
- Only approved and legal chemicals should be used. All county, state, and federal guidelines must be strictly adhered to regarding storage, handling, and application of pesticides.
- Advanced technology/monitoring equipment should be used to insure minimal application of pesticides, herbicides, and fertilizers. This equipment should be maintained and in proper calibration.
- A controlled and designated area/facility should be used for the proper mixing and loading of pesticides into application equipment. The facility should consist of an impermeable pad with controlled and contained drainage, and should be at least 50 feet from open ditches, lakes or other water bodies. Rinse water should be properly stored and hauled for disposal at an approved facility.
- Selection of pesticides should be based on the ability to achieve treatment goals and criteria to minimize off-site movement. Selection of less toxic, less mobile, and less persistent pesticides should be a priority management criterion.
- Pesticide applications should be carefully timed and combined with other pest management practices; pests should be accurately identified and pesticide applications made only when necessary, using the least amount required.

[17] Santa Clara County, Planning Department, Santa Clara County Environmental/Design Guidelines and Standard Development Requirements for Golf Courses, July 23, 1996.

- Pesticides should not be applied when soil moisture is high during the rainy season. Applications should be restricted prior to any anticipated late or early season storm events to preclude potential impacts from runoff.

- Irrigation applications should be consistent with turf grass evapotranspiration requirements. Over-watering should be avoided.

- Modify golf course design in accordance with Mitigation Measures H4 and H5 to provide enhanced vegetative buffer areas for retention of pesticide residue.

Additionally, the CHAMP should include a plan and commitment by the golf course owners/operators to provide on-going monitoring of water quality within the stream channels (Corralitos Creek) that flows through the project and within the on-site lakes that have outfalls to the local drainage channel along Foothill Avenue. It is recommended that a monitoring and reporting program be established by the RWQCB to enforce this requirement. At a minimum, the water quality sampling should include monthly sampling of the golf course lakes and stream/drainage channels (above and below the project site) during the rainy season. Sampling should include nutrients (nitrate and phosphorous) as well as all pesticides used for golf course maintenance. These data should be reported to the City of Morgan Hill, the Santa Clara Valley Water District, and the Central Coast RWQCB on an annual basis. See also Mitigation Measure H8 regarding lake water quality monitoring.

The CHAMP shall subject to review and approval by the City of Morgan Hill, the SCVWD, and the Central Coast RWQCB.

Implementation of the above mitigation will reduce the pesticide use impacts to a less-than-significant level.

Impact H7. Construction Activities. Construction of the golf course could result in an increase in non-point source pollutants delivered to Corralitos Creek or San Martin Creek. This is a potentially significant impact.

Construction of the project may have already resulted in the use and discharge of non-point source pollutants from the use of heavy equipment and construction vehicles. Any further construction work on the golf course will increase the potential for discharge of construction-related non-point source pollutants. Such activities would likely include the use of toxic materials (e.g. paint, fuel, motor oil, etc.), which may enter Corralitos Creek or San Martin Creek. Most toxic construction materials will be in relatively small-quantity containers (i.e., 55 gallons, or less) and may be dispensed into smaller containers for use. Toxic materials, such as gasoline or diesel fuel, may be transported in larger tank trucks on the project site. The toxic materials handling will most likely occur in open locations or at temporary facilities without provisions for spill containment and control.

According to information supplied by the applicant, an NPDES stormwater discharge application was filed with the State Water Resources Control Board in January 2000, after considerable construction work had already been conducted on the site. However, there is no evidence that the required Stormwater Pollution Prevention Plan was ever prepared or implemented in the course of project construction. As a result, discharge of toxic materials and consequent water quality impacts to local drainages and to Corralitos Creek and San Martin Creek may have already occurred or may be threatened. This is a potentially significant impact.

In April 2003 the applicant prepared a Stormwater Pollution Prevention Plan (SWPPP) for the project[18]. The stated purpose of the SWPPP is to cover the "...ongoing golf course maintenance, minor alterations of vegetation and facilities, and reconstruction of the "Flying Lady" restaurant into the Institute of Mathematics facility." The SWPPP was submitted to the Central Coast RWQCB for review. By letter of August 22, 2003, the RWQCB issued a Notice of Violation to the applicant, advising them of nine (9) deficiencies in the SWPPP, relating to such items as drainage calculations, pre- and post-construction BMPs, erosion and sediment control BMPs, and management of non-stormwater discharges from lakes. An amendment was submitted by the applicant on September 6, 2003, addressing most, but not all, of the deficiencies identified by the RWQCB. By letter of September 18, 2003, the RWQCB issued a second Notice of Violation regarding the SWPPP. The three deficiencies not addressed in the applicant's September 6th amendment included drainage calculations, impervious surface-runoff changes, and erosion and sediment control BMP details. On October 2, 2003, the applicant responded to the RWQCB with additional information per the September 18th Notice of Violation.

Based on the fact that the applicant has now prepared a SWPPP, and that the SWPPP has been submitted to and reviewed by the RWQCB, the project has been brought into compliance with the basic NPDES requirements for stormwater discharges. The SWPPP includes various erosion and pollution control measures required to be implemented and monitored during any additional construction activities on the site. Compliance with provisions of the SWPPP will be required and will be verified through periodic inspections, monitoring, and submission of an annual monitoring report. Additionally, the SWPPP will remain in effect for post-construction maintenance and management of stormwater and non-stormwater discharges from the lakes. As such, the compliance with the terms and specific conditions of the SWPPP will reduce the impact from construction activities to a less-than-significant level.

Mitigation Measure H7. Construction Pollution Activities. No mitigation measures are required.

Impact H8. Lake Water Quality Management and Discharges. Discharge of water from the golf course lakes to Corralitos Creek or to the drainage along Foothill Avenue may include surface runoff pollutants from the golf course and associated project facilities, as well as other chemicals used for maintenance of lake water quality. Depending upon the chemicals used and their concentrations, this could pose a potentially significant impact to the water quality and beneficial uses of Corralitos Creek, San Martin Creek and Llagas Creek.

[18] Long, Randall C. (RCL Ecology), "Stormwater Pollution Prevention Plan (SWPPP) - Institute Golf Course," April 22, 2003.

All of the golf course lakes, except the spring-fed pond near the 7th green, are equipped with overflow pipes that discharge directly to Corralitos Creek (Lakes F and G), or to the Foothill Avenue drainage ditch that leads to San Martin Creek (Lakes D/E and Lakes A/B/C). All of the lakes collect runoff from golf course turf areas, and some collect other site runoff, e.g., from streets and parking areas, maintenance area, and other site landscaping. The water quality impacts of surface runoff from golf course maintenance facilities is covered under Impact H4. The impact associated with lake water quality is addressed as a separate issue here due to the fact that the lakes constitute "landscape pool drainage" subject to regulation under the Central Coast RWQCB "Order No. 01-119, NPDES No. CAG993001 – Waste Discharge Requirements, General Permit for Discharges with Low Threat to Water Quality". In order to obtain coverage under this General Permit, the discharges from the lakes must meet the following criteria:

- Pollutant concentrations in the discharge do not (a) cause, (b) have a reasonable potential to cause, or (c) contribute to an excursion above and applicable water quality objectives, including prohibitions of discharge.

- The discharge does not include water added for the purpose of diluting pollutant

- Pollutant concentrations in the discharge will not cause or contribute to degradation of water quality or impair beneficial uses of receiving waters.

With proper management and implementation of the various water quality mitigation measures identified in this report, the golf course lakes should be able to meet the above criteria for coverage under this General Permit. In order to obtain coverage the applicant is required to submit to the following to the RWQCB:

- Notice of Intent (NOI) and first year's annual fee;

- List of chemicals (including Material Safety Data Sheets) added to the water, and their concentrations;

- Analytical test results for various constituents, including metals, chlorine, pH, nitrate, turbidity, total dissolved solids.

- Other information deemed necessary by the RWQCB

Once issued, the permit includes various prohibitions, effluent limitations, receiving water limitations, plus monitoring and reporting provisions that may be customized for particular projects by the RWQCB.

The applicant has sampled the lake water quality for nitrate, TKN and for various pesticides. Additional sampling and analysis would be required to verify eligibility for coverage under this General Permit. Also, the applicant would be required to identify the chemicals used for lake water quality management. Originally, the applicant provided plans for an aeration/filtration/ozonation system for water quality control. This system was never implemented. The applicant has not

indicated that chemicals are used for algae or water quality control; raking of weeds from the edges of the lakes has been explained as the method of maintaining water quality (Randy Long, personal communication). However, this does not seem to be a plausible explanation for the unusually high level of water clarity and lack of algae observed in all of the lakes (except the spring-fed pond) during a field inspection on October 1, 2003. Additional information on lake water quality is needed to explain the unnatural conditions in the lakes to verify that discharges from the lakes do not pose a hazard to downstream receiving waters. This is a potentially significant impact.

Mitigation Measure H8. Lake Water Quality Management and Discharges. The applicant shall apply for and obtain an NPDES "General Permit for Discharges with Low Threat to Water Quality" from the Central Coast RWQCB for all of the onsite lakes, except where they are designed and operated to assure no discharge. This shall require the submittal of standard information required by the General Information, in addition to other information as may be required by the RWQCB. For the lakes that are proposed as complete retention lakes (D, E, and G), the applicant shall develop and submit an operations plan, including supporting calculations, operating criteria, and other information as may be deemed necessary by the RWQCB, to verify that the lakes have capacity for and will be operated to contain the 100-year, 60-day runoff from the contributing drainage area. The applicant shall also include identification of any chemicals added to the lakes for water quality control or other reasons, as provided by Application Requirement 1b (1) in the General Permit. The applicant shall also comply with all provisions of the General Permit, including monitoring and reporting provisions established by the RWQCB. Implementation of this mitigation measure will reduce impacts associated with lake water quality management and discharges to a less-than-significant level.

g. Groundwater Recharge.

The project site lies within the Llagas Groundwater Basin, which is a primary source of water supply for the region. The groundwater basin is "unconfined" in the project area, meaning that the groundwater is recharged directly from the downward percolation of rainfall, stream infiltration, irrigation seepage and other waters released into the ground. Therefore, changes in land surface conditions and activities have the potential to impact the replenishment or recharge of the groundwater basin.

Impact H9. Changes to Groundwater Recharge. The development of the golf course has altered the land use conditions at the site through expansion of the amount of area devoted to irrigated turf and ancillary golf course features and facilities. However, the changes are insufficient to create any measurable impacts on groundwater recharge characteristics. Therefore, the impact on groundwater recharge is considered a less-than-significant impact.

As discussed under Impact H2 (Off-site Drainage and Flooding), the development of the golf course has resulted in a change in the direction and pattern of site drainage and runoff which has impacts on the local drainage conditions along Foothill Avenue. However, there has been no substantial change in the overall rate of runoff (as estimated by the runoff "coefficient"). The amount of impervious surface remains roughly the same as for pre-development conditions, with a slight increase of a few acres due to the creation of additional lined lakes, which obstruct the infiltration of rainfall into the

ground beneath the lakes. This is balanced by the improved surface infiltration characteristics of the tees and greens on the golf course. The net result is no substantial interference with groundwater recharge to the Llagas Groundwater Basin.

Mitigation Measure H9. Changes to Groundwater Recharge. No mitigation measures are required.

WATER SUPPLY

The following section describes existing conditions and the potential impacts associated with the water supply facilities for the project; appropriate mitigations are proposed to address identified significant or potentially significant impacts. The analysis was prepared by Questa Engineering Corporation, based on: (1) site reconnaissance inspection of the project site and vicinity; (2) review and analysis of various background information for the proposed Institute Golf Course, including topographic and physical site information, golf course layout/grassing plan and water use records; (3) compilation and review of various background hydrologic, soils and geologic data for the project site and vicinity;(4) groundwater basin information and analysis provided by Aquifer Sciences, Inc., on behalf of the project applicant[19]; and (5) personal communication with local residents, other consultant team members, and staff of the City of Morgan Hill, Santa Clara Valley Water District, Santa Clara County Health Department and the Central Coast Regional Water Quality Control Board.

1. SETTING

a. Water Source

Water supply for the project site and for other properties in the vicinity is obtained mainly from groundwater. As described in the Hydrology-Water Quality Section, the project site is located along the eastern edge of the Llagas Groundwater Basin, which serves as a principal source of domestic and agricultural water supply for the region. The groundwater basin is "unconfined" in the project area, meaning that the groundwater is recharged directly from the downward percolation of rainfall, stream infiltration, irrigation seepage and other waters released into the ground. The groundwater levels are estimated to be approximately100-feet deep beneath the project site (along Foothill Avenue), and the general direction of groundwater flow is southerly toward Gilroy. According to the State Department of Water Resources (*"California's Ground Water, Bulletin No. 118"*, September, 1975), the ground water in the basin occurs in older and younger alluvium, having an estimated saturated thickness ranging from about 20 to 200 feet. Well yields are reported to average about 400 gallons per minute (gpm).

There are three high yielding wells on the project site that draw water from the Llagas Groundwater Basin and serve as the source of irrigation water for the golf course. Domestic water supply is also currently obtained from a fourth on-site well. In 2001, the applicant applied to the Santa Clara County Health Department for a well drilling permit to install a new well for the domestic supply (*personal communication, Suzanne Muzzio, Santa Clara County Health Department, July, 2001*); however, the well was not installed.

[19] "Groundwater Environmental Data Report, 14830 Foothill Avenue, Morgan Hill, California," Aquifer Sciences, Inc., May 24, 2002.

b. Water Quality

Based on data provided by the Santa Clara Valley Water District (SCVWD), water quality conditions in the Llagas Groundwater Basin show the groundwater to be of suitable quality for irrigation use without limitations. The groundwater quality is also within acceptable limits for most drinking water parameters, with the exception of nitrate concentration. Nitrate is a primary drinking water parameter, and the groundwater quality data in the project vicinity indicate elevated concentrations of nitrate that exceed the drinking water limit of 45 mg/L (Title 22, California Code of Regulations). Data from SCVWD for 31 wells in the immediate project vicinity show nitrate concentrations to be in the range of 1 mg/L to 103 mg/L, with the average being about 68 mg/L. Only three of the wells had a nitrate concentration below 45 mg/L. A few of the data are more than 10 years old; but most of the data have been collected since 1998. The one well with several years of sampling data indicates a distinct increase in nitrate concentration over the past 13 years, from 26 mg/L to 49 mg/L.

Additionally, as discussed in the Water Quality Section of this report, in March 2002, the applicant obtained water samples for the four onsite wells on the project site and had the samples for nitrate indicated, showing results similar to the SCVWD data for other wells in the project vicinity. The reported nitrate concentration for Well #4, the domestic supply well, was 85 mg/L, nearly twice the drinking water limit.

c. Water Demand

Water demand for the project includes: (1) irrigation for the golf course turf; (2) domestic supply for the maintenance staff, golf course visitors and for the proposed restaurant; and (3) fire protection supply.

1. Irrigation. Based on data supplied by the applicant, water demand for golf course irrigation is estimated to average approximately 437,500 gpd, which equates to about 3.83 acre-feet per acre per year, for the estimated 128 acres of irrigated turf grass. Water records provided by the applicant for the project for the period of January 1999 - December 2001 are summarized in **Table WS1**. According to the applicant, golf course irrigation water is supplied from Wells #1, #2, and #3.

Table WS1
Groundwater Production Data
January 1999 - December 2001

Month	Well #1 (gallons)	Well #2 (gallons)	Well #3 (gallons)	Well #4 (gallons)	Monthly Total (gallons)
Jan. - June 1999	52,742,000	9,560,700	4,451,000	0	66,753,700
July 1999	13,273,000	9,402,800	2,554,600	0	25,230,400
August 1999	10,271,000	9,970,400	150,700	0	20,392,100
September 1999	17,977,000	17,884,400	166,800	0	36,028,200
October 1999	4,503,000	9,502,400	98,200	0	14,103,600
November 1999	1,329,000	1,438,100	0	21,900	2,789,000
December 1999	6,015,000	0	0	7,300	6,022,300
January 2000	1,017,000	0	0	4,900	1,021,900
February 2000	0	0	0	4,500	4,500
March 2000	7,650,000	0	0	13,700	7,663,700
April 2000	10,724,000	0	0	9,500	10,733,500
May 2000	16,015,000	1,203,700	1,004,800	13,900	18,237,400
June 2000	19,517,000	15,849,000	5,354,800	23,500	40,744,300
July 2000	11,756,000	8,807,800	4,679,100	17,300	25,260,200
August 2000	10,584,000	8,905,500	848,900	20,700	20,359,100
September 2000	11,056,000	4,092,500	0	19,800	15,168,300
October 2000	3,098,000	5,268,000	0	15,900	8,381,900
November 2000	0	1,964,600	0	16,800	1,981,400
December 2000	0	1,459,700	0	18,400	1,478,100
January 2001	0	1,792,100	0	17,400	1,809,500
February 2001	0	402,000	100	15,500	417,700
March 2001	3,521,000	6,064,700	300	18,800	9,604,800
April 2001	1,616,000	7,005,300	0	17,600	8,638,900
May 2001	13,002,000	3,569,600	0	21,600	16,593,200
June 2001	14,487,000	11,578,200	4,508,300	3,800	30,577,300
July 2001	9,486,000	8,229,000	3,540,600	0	21,255,600
August 2001	17,167,000	9,664,500	5,167,800	25,000	32,024,300
September 2001	13,147,000	8,569,200	0	136,400	21,852,600
October 2001	6,908,000	5,655,700	1,500	84,500	12,649,700
November 2001	76,000	2,066,900	0	26,200	2,169,100
December 2001	0	69,800	0	14,900	84,700
Monthly Average	7,692,694	4,721,575	903,542	16,383	13,334,194
Daily Average	252,680	155,080	29,678	538	437,984

2. Domestic Use. According to the applicant, water use for domestic purposes is obtained from Well #4. Data in **Table WS1** indicate an average water use of 538 gpd for domestic purposes during the period of January 1999 - December 2001. However, no specific estimates have been developed

for the daily domestic water needs of the project under full operation, which is highly dependent on the number of visitors served by the golf course and other facilities. Based on experience at other golf courses in the region, the total daily domestic water demand is likely to be in the range of 4,000 to 5,000 gallons.

3. Fire Protection Supply. An on-site water supply will be required for fire protection purposes. The specific amount of fire protection supply to be provided is normally determined by the City Fire Marshall. The required supply is commonly determined in accordance with guidelines of the National Fire Protection Agency, Section 1142 - Water Supplies for Suburban and Rural Fire Fighting (1999 Edition). The fire protection requirement is determined on a case-by-case basis, taking into account various factors, including: (1) occupancy hazard; (2) type of construction; (3) hazards to other buildings; and (4) size of the structure. The fire protection water supply for the existing golf course uses the same water supply as the irrigation system. The fire/irrigation water supply is stored in Lake D adjacent to Foothill Avenue, immediately north of the main entrance. The pump station for the fire/irrigation system is located between the Lake D and Foothill Avenue. In the event of a fire, the fire department will override the irrigation system with a special key and all on-site resources will be devoted to fire protection. The Santa Clara County Fire Department has determined that the on-site fire/irrigation water supply is sufficient for the existing golf course use. It is not known at this time if there is capacity in the supply to meet the additional fire protection requirements for the proposed headquarters of the American Institute of Mathematics. The fire department has indicated that the proposed building will require an adjusted fire flow of 1,625 gallons per minute (gpm) at 20 pounds per square inch (psi) residual pressure[20]

d. Regulation of Groundwater

Use of groundwater in the project area is regulated by the SCVWD through the levying of charges that are based on the recorded amount of groundwater pumping by individual users. The groundwater charges are levied to support the water district's activities in the protection and augmentation of water supplies within various zones of the district. According to the District Groundwater Charge Act, the district is authorized to utilize the revenue from the pumping charges for the following purposes:

1. To pay the costs of constructing, maintaining and operating facilities which will import water into the district which will benefit such zone or zones, including payments made under any contract between the district and the State of California, the United States of America, or any public, private or municipal utility.

2. To pay the costs of purchasing water for importation into such zone or zones, including payments made under contract to the State of California, the United States of America, or any public, private or municipal utility.

[20] Santa Clara County Fire Department, Development Review Comments for the Proposed Remodel of the Existing Flying Lady Restaurant Building, February 13, 2002

3. To pay the costs of constructing, maintaining, and operating facilities that will conserve or distribute water within such zone or zones, including facilities for groundwater recharge, surface distribution and the purification and treatment of such water.

4. To pay the principal or interest of any bonded indebtedness or other obligations incurred by the district on behalf of such zone or zones for any of the purposes set forth in paragraphs 1, 2, and 3 of this section.

Records from the SCVWD indicate that the applicant has been paying the required charges for groundwater pumping at the project site.

2. IMPACTS AND MITIGATION

a. Significance Criteria

According to CEQA Guidelines, implementation of the proposed project would normally be considered to have significant adverse impacts with respect to water supply if:

- The project would substantially increase the consumption of limited potable water supplies;

- The project water demand exceeds the capacity of the water supply or infrastructure system and would require a substantial expansion of the water supply, treatment or distribution facilities; and

- The project substantially depletes groundwater resources or contributes to groundwater overdraft.

b. Adequacy of Water Supply

The project requires a substantial amount of non-potable water for golf course irrigation, a supply of potable water for the employees and guests at the golf course and proposed clubhouse facilities, and a secure standby supply of water for fire protection. All water for the project comes from on-site water wells; there is no existing public water service or any plan to provide public water to the site.

<u>Impact WS1. Irrigation Water Supply.</u> The golf course irrigation demand, which is estimated to average approximately 437,500 gallons per day (year-round), is obtained from a series of three existing on-site water wells that have demonstrated capacity to supply the required irrigation water. This is considered a less-than-significant impact.

Water demand for golf course irrigation is estimated to be approximately 437,500 gpd, which equates to about 3.83 acre-feet per acre per year for the 128 acres of irrigated turf grass. There are three existing on-site wells that have been used to supply the required irrigation water during the initial development of the golf course. The production rates vary among the three wells; however,

based on water records from the applicant, the combined yield of the three wells is sufficient to meet the irrigation demand. The production from these wells is typical of irrigation wells in the Llagas Groundwater Basin, which supports numerous high-yield irrigation wells. Other wells may be developed on the site in the future, if necessary to replace or augment the supply from the three existing wells. However, there is no plan or apparent need to seek water from other off-site sources to meet the golf course irrigation needs. According to the applicant, the golf course utilizes a modern automated system for monitoring and scheduling irrigation for water use efficiency.

Mitigation Measure WS1. Irrigation Water Supply. No mitigation is necessary.

Impact WS2. Domestic Water Supply. The project does not have an acceptable source of potable water required to meet the domestic uses of the employees and visitors to the golf course and the proposed clubhouse-restaurant. This is a significant impact.

According to the applicant, the domestic water supply for the golf course is provided by onsite Well #4. Based on water production data for this well, there appears to be an ample amount of groundwater to meet the estimated quantity of water required for domestic supply for the project facilities; however, the quality of groundwater is unacceptable. Groundwater data indicate that the nitrate concentration in Well #4 is 85 mg/L, which significantly exceeds the State Drinking Water Standard (Title 22) of 45 mg/L. The three irrigation wells also have nitrate concentrations above the drinking water limit, and recent and historic data for the other wells in the project vicinity indicate that groundwater nitrate levels in the area are increasing. Additionally, the environmental analysis of the water quality impacts of the golf course indicates that the project will contribute to an increase in the groundwater nitrate concentration in the groundwater beneath the site.

Nitrate is a primary drinking water parameter that can have serious health effects at high concentrations. It is not amenable to removal by conventional water treatment methods. Based on the estimated number of employees and visitors to be served, the project will be required to obtain a water supply permit from the Santa Clara County Health Department, and possibly from the State Department of Health Services, which will require demonstration that the potable water supply meets all applicable drinking water standards. Due to the high groundwater-nitrate concentration in the area and the projected water quality impacts from the golf course operations, the applicant has not demonstrated that the project can provide a potable water supply from on-site well water that complies with State Drinking Water Standards. Additionally, there is no plan to extend public water to the site to meet domestic water needs. The applicant has presented no plan for domestic water supply. Accordingly, the project is infeasible from the standpoint of domestic water supply. This is a significant impact.

Mitigation Measure WS2. Domestic Water Supply. In order to provide a suitable supply of domestic water for the project the applicant shall do one of the following: (1) apply for and obtain approval for connection to an approved public water system, including the completion of any required environmental review for water system extension; (2) apply for and obtain a permit to operate a public water supply system (non-transient-non-community); this shall include a comprehensive investigation and analysis of the hydrogeology and groundwater quality on the site to verify that a supply of domestic water of acceptable quality (per Title 22 Drinking Water Standards)

can be provided for the life of the project; the results of this analysis shall be subject to review and approval by the State Department of Health Services and the Santa Clara County Health Department; or (3) modify the project to eliminate the need for provision of a public water supply; a "public water supply" is defined by Title 22 as "... a system for the provision of piped water to the public for human consumption that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." If the last option is selected, mitigation of the high groundwater-nitrate concentrations shall still require that the applicant supply a safe and suitable drinking water supply that complies with all applicable drinking water quality limits. However, this could be met by the applicant through the inclusion of a water treatment system or importation of certified potable water that would not necessarily be acceptable for a "public water system".

Implementation of the above mitigation will reduce the domestic water supply impact of the project to a less-than-significant level.

Impact WS3. Fire Protection Water Supply. The project facilities do not include an adequate fire protection water supply. This is a significant impact.

An on-site water supply will be required for fire protection purposes. The specific amount of fire protection supply to be provided is normally determined by the City Fire Marshall. The required supply is commonly determined in accordance with guidelines of the National Fire Protection Agency, Section 1142 - Water Supplies for Suburban and Rural Fire Fighting (1999 Edition). The Santa Clara County Fire Department has determined that the on-site fire/irrigation water supply is sufficient for the existing golf course use. It is not known at this time if there is capacity in the supply to meet the additional fire protection requirements for the proposed headquarters of the American Institute of Mathematics. The fire department has indicated that the proposed building will require an adjusted fire flow of 1,625 gallons per minute (gpm) at 20 pounds per square inch (psi) residual pressure[21]. This is a potentially significant impact.

Mitigation Measure WS3. Fire Protection Water Supply. The applicant shall provide evidence to the satisfaction of the Santa Clara Valley Fire Department that the project has sufficient fire flow capacity for the American Institute of Mathematics building. This is anticipated to include an adjusted fire flow of 1,625 gpm at 20 psi residual pressure.

c. Groundwater Resource Depletion

The project will require a substantial amount of water for turf grass irrigation, all of which will be extracted from the groundwater basin beneath the site. Other properties surrounding the project site also rely upon the same groundwater basin for domestic and agricultural water supplies.

Impact WS4. Groundwater Depletion. The pumping of groundwater for golf course irrigation will substantially increase the amount of water extracted from this region of the

[21] Santa Clara County Fire Department, Development Review Comments for the Proposed Remodel of the Existing Flying Lady Restaurant Building, February 13, 2002

Llagas Groundwater Basin as compared with pre-development conditions, and will greatly exceed the amount of groundwater recharge that occurs locally. The net result will be a decline in the groundwater levels beneath the project site and potentially existing water wells serving neighboring properties. This is a potentially significant impact.

The estimated irrigation water demand for the project, based on water production records supplied by the applicant, is approximately 490 acre-feet per year. Approximately 20 percent of this water (roughly 100 acre-feet per year) is estimated to percolate back to the groundwater as "irrigation seepage losses." Additionally, rainfall recharge of the groundwater basin from within the project site boundaries is estimated to average approximately 0.25 acre-feet per acre per year, or roughly 50 acre-feet total. The net result is a deficit of approximately 340 acre-feet. Averaged over the 194-acre project site, this amounts to a "mining" of the groundwater in storage at the rate of about 1.75 acre-feet per acre per year. Accounting for the fact that, the void space in the alluvial aquifer material is typically no greater than about 25 to 30%, the actual drop in the water table locally could theoretically be as much as 5 to 7 feet annually (e.g., 1.75 feet/0.30 void space = 5.8 feet), if the groundwater is not recharged laterally from surrounding parts of the basin. In fact, however, the groundwater does readily flow laterally across the basin to "fill" depressions caused by excessive pumping. Thus, the actual impact of the groundwater pumping by the project is likely to be a gradual decline of the water table over a broad area encompassing the project site and surrounding areas.

The area affected and the amount of decline in the water table cannot be estimated confidently without a detailed groundwater investigation of the project vicinity. Such an investigation would require an inventory of existing water wells, pumping rates, water level fluctuations and gradients, aquifer characteristics (e.g., transmissivity and storativity) and recharge rates. From this information, a groundwater budget and hydraulic model could be developed to project the change in groundwater conditions caused by the pumping of groundwater for golf course irrigation. However, lacking this information, it is still safe to conclude, based on the magnitude of the groundwater extraction deficit represented by the project (340 acre-feet per year), that groundwater levels at neighboring properties surrounding the project site will decline, and that the decline will be accentuated in low rainfall and drought years. At a minimum, this will increase the electrical costs for pumping water from deeper depths as the water table drops. Some property owners may have to deepen their existing wells or drill new wells. It is also possible that the drawdown of the water table at the project site will cause changes in groundwater flow that will alter the water quality at some of the neighboring wells. These all represent potentially significant impacts of the project.

The applicant has submitted a "Groundwater Environmental Data Report" (dated May 24, 2002) prepared by Aquifer Sciences, Inc., which includes groundwater level data for existing water wells in the project area. The authors of the report contend there has been no discernible impact on groundwater levels that could be attributed to the operation of the golf course irrigation wells during the initial few years of pumping. We have reviewed the data and disagree with the interpretations and conclusions of the Aquifer Sciences' report for the reasons described below.

Aquifer Sciences obtained and plotted groundwater level data for five wells located in the project vicinity. The well locations and hydrograph (i.e., water level vs. time) data are provided in **Attachment A**. Aquifer Sciences concluded that the hydrograph for the well nearest the golf course

(Well 25P001, near the intersection of Foothill and Maple Ave.) showed no noticeable "before and after" water level differences as compared with other wells in the Llagas Basin located much farther away from the golf course. Careful review of the data does not support this conclusion. Summarized below for each well are the "before and after" water level differences and the corresponding distance from the golf course.

Well No.	Approx. Distance from Golf Course (miles)	Water Levels (elevation, feet)			Water Level Difference (1997-2001) (feet)
		Before		After	
		Fall 1997	Fall 1998	Fall 2001	
25P001	0.1	270	275	250	20
26P001	1.0	300	300	285	15
35P013	1.5	295	295	284	11
34G002	2.0	298	298	288	10

Although the project is subject to payment of charges levied by the SCVWD for the pumping of groundwater, these charges go toward the overall protection and augmentation of the Llagas Groundwater Basin; they do not necessarily include any measures to mitigate localized influence of groundwater extraction between adjoining properties. Additional measures are necessary to minimize the potential adverse localized groundwater drawdown effects, as are anticipated to occur from the proposed project. This can be achieved by reducing the irrigation demand to a level that is in balance with the local recharge received by the groundwater basin. Provided in **Table WS2** is an approximation of the local water balance, encompassing the project site and the contributing watershed area that lies above (east) of the site - an area of approximately 800 acres. The water balance accounts for water demand and recharge for the project, as well as for the contributing watershed area to the east of the site. The water demand in the upper watershed is estimated to be about 0.5 acre-feet per year per parcel for the approximately 30 rural residential parcels in this area. Shown for comparison are two scenarios: (1) the project as proposed; and (2) a reduced golf course size, with an irrigation demand that is in balance with the estimated local groundwater recharge conditions. The latter scenario is presented to indicate how the project could be modified to mitigate adverse localized groundwater drawdown effects.

Table WS2
Water Balance Estimate for Proposed Project and Reduced Golf Course Size

Item	*Proposed Project*	*Reduced Golf Course Size*	
Irrigated Turf (acres)	128	60	55
Estimated Water Demand			
▪ Turf Irrigation (@3.83 ac-ft/ac-yr)	(-490)	(-230)	(-210)
▪ Domestic Water (@ 4500 gpd)	(-5.0)	(-5.0)	(-5.0)
▪ Residential Use in Upper Watershed (30 lots @ 0.5 ac-ft/yr lot)	(-15.0)	(-15.0)	(-15.0)
Total Estimated Water Demand (ac-ft/ac-yr)	**(-582.5)**	**(-250.0)**	**(-230.0)**
Estimated Local Groundwater Recharge			
▪ Rainfall-Recharge (800 ac @ 0.25 ac-ft/ac-yr)	+200.0	+200.0	+200.0
▪ Irrigation Seepage Losses (@ 20% of irrigation use)	+98.0	+46.0	+42.0
Total Estimated Local Groundwater Recharge	**+298.0**	**+246.0**	**+242.0**
NET GROUNDWATER DEFICIT	**(-212.0)**	**(-4.0)**	**+12.0 (surplus)**

Mitigation Measure WS4. Groundwater Depletion. The applicant shall mitigate the effects of the golf course irrigation on groundwater resources in the project vicinity implementing one of the following measures:

- Reduce the amount of irrigated turf within the golf course to a maximum of approximately 55 to 60 acres, or otherwise reduce the irrigation water demand by about 50%. The as-built golf course currently has approximately 128 acres of irrigated turf, including tees, greens, fairways and rough. This is a relatively large amount for an 18-hole golf course. There are examples of golf courses recently constructed in the region with as little as 50 acres of irrigated turf. Reduction of the maintained turf areas would bring the water demand into an approximate balance with the local groundwater recharge conditions, thereby reducing the potential effect on groundwater levels by an equivalent

amount. Reduction of the amount of turf would also reduce the fertilizer requirements and the associated groundwater-nitrate impact of the project.

- Complete a detailed groundwater investigation to confirm that the proposed pumping of groundwater for golf course irrigation will not cause a significant decline in the water table at neighboring properties. The scope of this investigation should include an inventory of existing water wells, pumping rates, water level fluctuations and gradients, aquifer characteristics (e.g., transmissivity and storativity) and recharge rates. From this information, a groundwater budget and hydraulic model should be developed to estimate the change in groundwater conditions caused by the pumping of groundwater for golf course irrigation and the associated effects on other groundwater supplies in the immediate project area. The scope of work and the results of the this investigation shall be subject to review and approval by the Santa Clara Valley Water District.

Implementation of the one of the above measures will reduce the potential groundwater depletion impacts of project to a less-than-significant level.

Appendix E

Cultural Resources

CULTURAL RESOURCE EVALUATION FOR THE INSTITUTE PROJECT IN THE CITY OF MORGAN HILL

CITY OF MORGAN HILL
JUN 13 1996
PLANNING DEPT.

FOR
AMERICAN INSTITUTE OF MATHEMATICS
P. O. BOX 50097
PALO ALTO, CA 94303
#60800-96-17

BY
ARCHAEOLOGICAL RESOURCE MANAGEMENT
496 N. FIFTH STREET
SAN JOSE, CA 95112 (408) 295-1373
ROBERT CARTIER, PRINCIPAL
LYNNE ECKERT
JON REDDINGTON

JUNE 1996

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archaeological sites in the region of the project area, and indiscriminate distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to ensure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archaeologists.

THE PRINCIPAL INVESTIGATOR

ABSTRACT

Archaeological research was carried out for 170 acres of land for the Institute Project located on Maple Avenue in the City of Morgan Hill, Santa Clara County. The archival research revealed that there are no recorded prehistoric or historic archaeological sites within a half mile of the project area. The surface survey identified an intermittent creek with a nearby house site in the subject area. In general, regions along creeks have been known to be sensitive for buried prehistoric resources. Based on the potential for buried prehistoric sites in the vicinity of the intermittent creek, it is recommended that earthmoving activities in this sensitive area be monitored by a qualified archaeologist.

REQUEST FOR ARCHAEOLOGICAL EVALUATION

The archaeological evaluation was carried out to determine the presence or absence of any significant cultural resources. Archaeological services were requested in June 1996 in order to provide a cultural resource report of the project. This report meets the requirements of CEQA (California Environmental Quality Act).

QUALIFICATIONS OF ARCHAEOLOGICAL RESOURCE MANAGEMENT

Archaeological Resource Management has been specifically engaged in cultural resource management projects in central California since 1977. The firm is owned and operated by Dr. Robert Cartier, the Principal Investigator. Dr. Cartier holds a Ph.D. in Anthropology, and is certified by the Society of Professional Archaeologists (SOPA) for conducting cultural resource investigations as well as other specialized work in archaeology.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

The subject area consists of 170 acres of land on the southeast corner of Maple Avenue and Foothill Avenue in the City of Morgan Hill, Santa Clara County. On the USGS 7.5 minute quadrangle of Gilroy, the Universal Transverse Mercator Grid (UTMG) centerpoint of the project area is 625383/4108402. The elevation ranges from 330 feet to 540 feet MSL, and the nearest sources of fresh water is an intermittent creek which runs through the east side of the project area.

The proposed project consists of the construction of a research institute campus with the necessary grading, trenching, and earth moving activities.

METHODOLOGY

The methodology used in this investigation consisted of an archival search, a surface reconnaissance, and a written report of the findings with appropriate recommendations. The archival research is conducted by transferring the study location to a state archaeological office which maintains all records of archaeological investigations. This is done in order to learn if any archaeological sites or surveys have been recorded within a mile of the subject area. Each archival search with the state is given a file number for verification. The surface reconnaissance portion of the evaluation is done to determine if traces of historic or prehistoric materials exist within the study area. This survey is conducted by a field archaeologist who examines exposed soils for cultural material. The archaeologist is looking for early ceramics, Native American cooking debris, and artifacts of stone, bone, and shell. A report is written containing the archival information, record search number, the survey findings, and appropriate recommendations. A copy of this evaluation is sent to the state archaeological office by requirements of state procedure.

ARCHIVAL BACKGROUND

Prior to reconnoitering the subject area, a study of the maps and records at the Northwest Information Center of the California Archaeological Site Inventory was conducted and given the file number of 60800-96-17. This research into the records at the Northwest Information Center was done to determine if any known archaeological or historical resources were reported in or around the subject area. The archival search revealed that there are no recorded sites, prehistoric or historic, in the project area. There also were no previous cultural resource surveys reported within the subject area; however, the subject area has an intermittent creek on the east side of the project area where subsurface prehistoric deposits may exist. Creeks leave alluvium soil deposition which often covers ground surfaces. In the past, many prehistoric sites have been identified below the surface along creeks in the Santa Clara Valley.

SURFACE RECONNAISSANCE

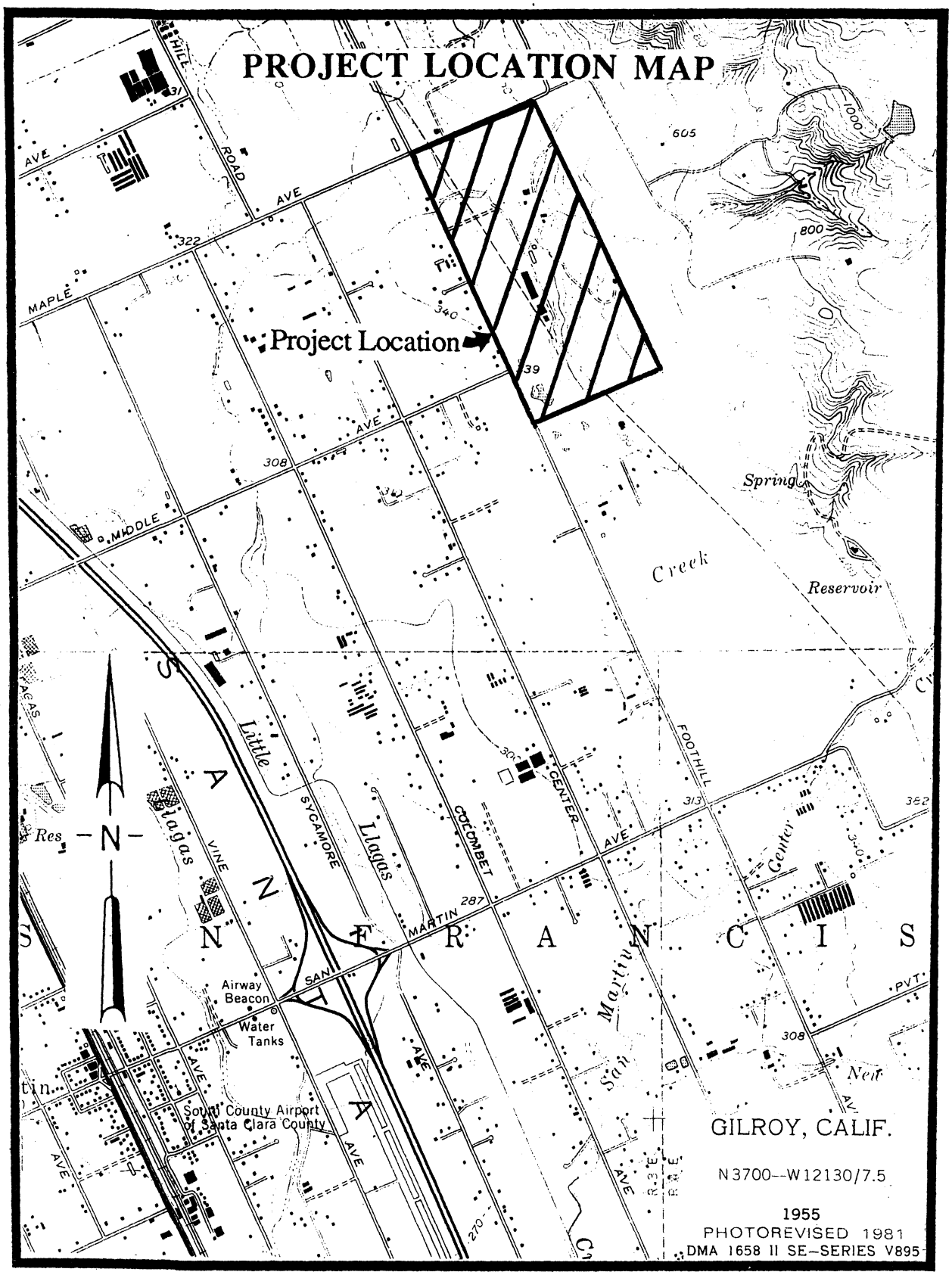
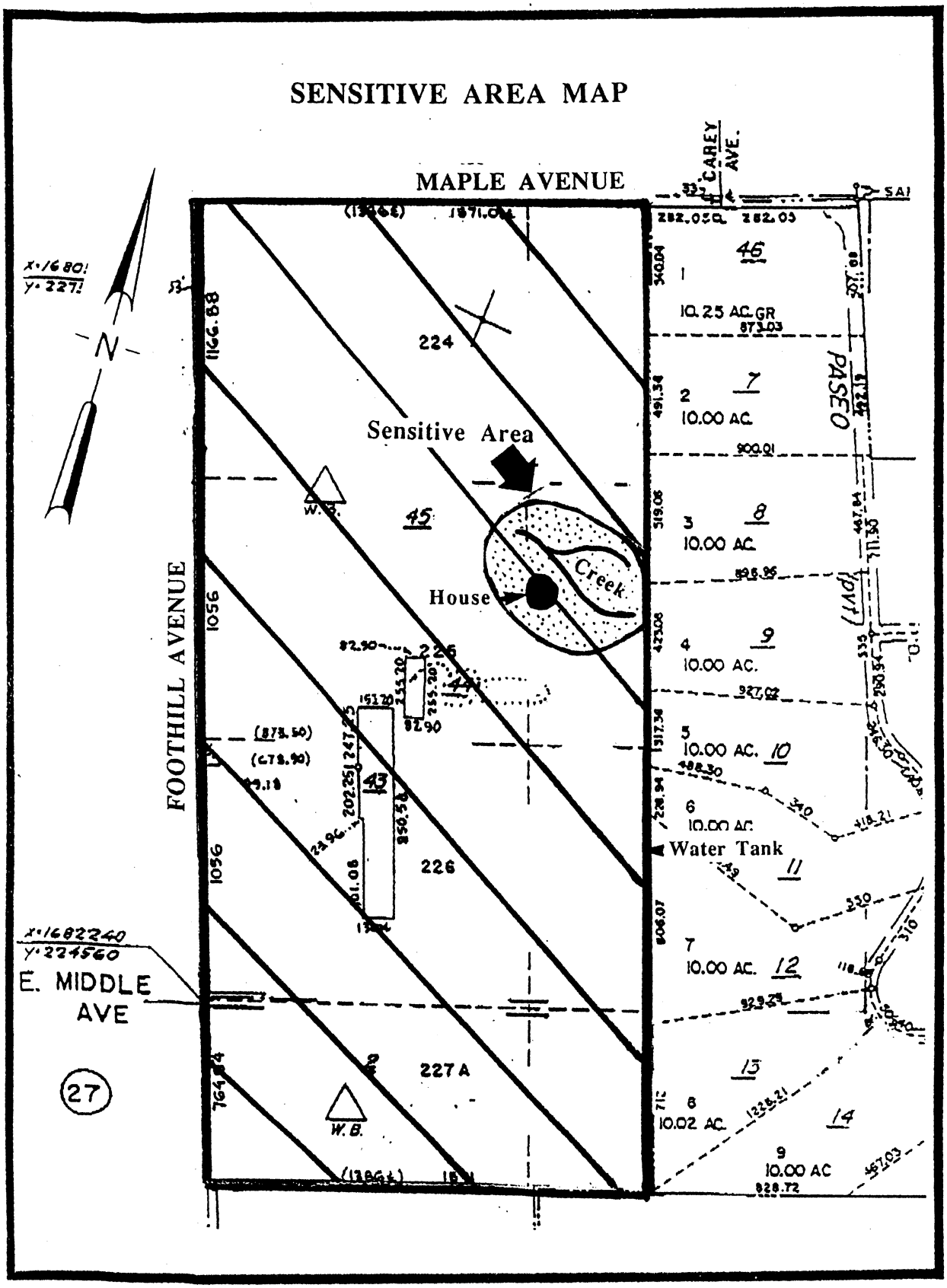
A "general surface reconnaissance" was conducted by a field archaeologist on all open land surfaces in the subject area. A "controlled intuitive reconnaissance" was performed in places where burrowing animals, exposed banks and inclines, and other activities had revealed subsurface stratigraphy and soil contents. The Institute Project area consists of 170 acres located in an agricultural/light residential area. Approximately half of the project area is flatland and the other half is a rolling hillside. The majority of the flatland was used to farm alfalfa, and the remaining flatland was covered with an abandoned golf course, a large metal hanger building, a metal silo, a large wooden barn, and an asphalt road. There was a collection of old wooden wagons along the driveway off of Foothill Avenue. Most of the wagons were fragmented and in poor condition. The southern half of the hillside was highly disturbed, and terraced above the Flying Lady Restaurant, the golf shop, the club house, and the large asphalt parking area. There was a large round wooden water tank located in the northeast corner of the terraced area.

There is a house site located at the base of the foothills situated adjacent to a small seasonal creek. The house appears to have been built in the 1970's. The area surrounding the house is covered with a concrete patio, asphalt paving, a driveway, and heavy landscaping. In the area just northwest of the house site, a large man-made pond is present. The surrounding area around the pond is graded and is highly disturbed. The house site area is sensitive for subsurface prehistoric cultural material due to its environmental setting; although no prehistoric artifacts were observed in the field during the survey. The vegetation around the seasonal creek and just north of the creek included a moderate scatter of mature oak trees and a few mature sycamore trees. There is a fair amount of introduced vegetation in the creek area of the project.

The entire hill side area was covered in dense dry grasses which made visibility poor. The visibility in the flatland area was also poor due to dense alfalfa, an asphalt road, and developed areas. The boundaries of the project area were clearly marked by fence lines. There was good accessibility to the entire project area. The exposed soils ranged from a medium brown to a dark brown friable silty loam with gravel. Rock type present included a majority of basalt with some sandstone and a small amount of Franciscan chert. The Flying Lady Restaurant and complex is known to feature historic aviation as its theme. The structures themselves lack historic significance except for their contents which includes historic aviation material. There were no prehistoric materials noted during the field survey, but the area along the creek is likely to contain subsurface prehistoric material (see Sensitive Area Map).

CONCLUSION AND RECOMMENDATIONS

Based upon the archival research and the surface reconnaissance, it is concluded that prehistoric cultural materials may potentially exist in limited portions of the project area. The lands along creeks are generally known to be sensitive for buried prehistoric sites. Therefore, it is recommended that a qualified archaeologist monitor during earthmoving construction activities in the sensitive area (see Sensitive Area Map).


PROJECT LOCATION MAP
Project Location
HILL ROAD
MAPLE AVE
MIDDLE AVE
SYCAMORE
COLUMBET
CENTER
FOOTHILL
SAN MARTIN AVE
VINE
Little Llagas
Llagas
Creek
Spring
Reservoir
Center
San Martin
Airway Beacon
Water Tanks
South County Airport of Santa Clara County
N
GILROY, CALIF.
N3700--W12130/7.5
1955
PHOTOREVISED 1981
DMA 1658 II SE-SERIES V895

SENSITIVE AREA MAP