

Environmental Assessment (EA)

**Kehoe Dairy Freestall Barn Additions
and New Manure Holding Pond**

Point Reyes National Seashore, Marin County

Point Reyes National Seashore

National Park Service

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Abstract

This is an Environmental Assessment (EA) for the Kehoe Dairy Freestall Barn Additions and New Manure Holding Pond at Point Reyes National Seashore (PRNS). The purpose and need of the project is to: 1) expand the existing freestall barn to house additional cows in order to avoid degradation of the year- round pasture area by unsheltered cows in winter months, and also to improve overall dairy cow health and milk production; and 2) improve manure management in order to reduce risk of water quality impacts (sediment and nutrients from animal waste) to Kehoe Creek, and thereby also to improve the quality of aquatic habitat. The project features include construction of an addition to the freestall barn, a new freestanding calf barn east of the freestall barn, a new storage building, and a new manure holding pond. Other project features include improvements to the dairy's stormwater management system, and restoration and revegetation of the year-round pasture area.

The EA evaluates two alternatives, which include no action and the preferred action. Additional alternatives were not evaluated due to the severe topographic and physical limitations of the site, and because of operational considerations. Since no other feasible project alternatives are available, evaluation of additional alternatives is not warranted. The following potential impact topics are analyzed: natural resources, including vegetation, water resources, soils, topography, air quality, special-status species, and wildlife; cultural resources; visual quality; noise; public health and safety; and public services and utilities.

Alternative 2 (preferred action) has important site-specific benefits to the water quality and aquatic habitats in Kehoe Creek, and is also beneficial to the local economy. Alternative 2 would have minimal or no impact on vegetation, air quality, soils, topography, cultural resources, visual quality, human health and safety, noise, and public facilities and services. While Alternative 2 would result in potential impacts to special-status wildlife species, these impacts can be fully mitigated by incorporated measures.

Although these potential impacts associated with Alternative 2 would be avoided altogether under Alternative 1 (no action), water quality impacts to Kehoe Creek, and consequent impacts to aquatic habitats, would continue unabated under Alternative 1. For these reasons, Alternative 1 is not preferred from an environmental perspective. Alternative 2 is the preferred alternative because it results in important benefits to water quality and aquatic wildlife habitat while having otherwise minimal or readily mitigable impacts.

The project requires consultation with the U.S. Fish and Wildlife Service for potential impacts to critical habitat for California red-legged frog. The new manure pond would be constructed near an ephemeral stream and would encroach upon the 300-foot stream setback zone protected by the Fish and Wildlife Service for upland movement and dispersal of the red-legged frog. No other consultations with federal or state agencies are contemplated. Marin County will review grading and drainage plans.

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1. Purpose and Need/Introduction

1.1 Overview

This Environmental Assessment (EA) has been prepared to assist the National Park Service (NPS) with planning and decision making and to determine whether an Environmental Impact Statement (EIS) is required for the proposed additions to the freestall barn and the construction of a new manure holding pond at the J Ranch (Kehoe Dairy), Point Reyes National Seashore (PRNS).

The purpose and need of the project is as follows:

- Expand the existing freestall barn to house additional cows in order to avoid degradation of year-round pasture area, and also to improve overall dairy cow health and milk production.
- Improve manure management in order to reduce risk of water quality impacts (sediment and nutrients from animal waste) to Kehoe Creek.

To fulfill the project purpose and need, Kehoe Dairy proposes to construct a free-standing addition to the west side of the existing freestall barn. In addition, an enclosed calf area will be constructed adjacent to the east side of the barn. The freestall addition will accommodate 150 or more additional cows under shelter, which will avoid the necessity of keeping unsheltered cows in the pasture area west of Pierce Point Road during winter months. This will improve manure management by minimizing the number of cows depositing waste in the pasture area under wet conditions, thus avoiding the consequent entrainment of nutrients in stormwater runoff discharged to Kehoe Creek. Revegetation and stabilization of this pasture is also proposed in order reduce soil erosion and transport of sediment to Kehoe Creek.

In order to accommodate the increased generation of animal waste under shelter, an additional manure holding pond is proposed to be constructed on the property. This pond will be sized such that the total storage capacity of the dairy's manure holding ponds will accommodate 100 percent of the manured water generated, as well as stormwater runoff, with no overflow. In addition, the efficiency of the manure management system will be increased by providing further separation of the manured water collection system from the clean stormwater drainage system at the dairy complex. This will reduce flows of clean stormwater into the manure holding ponds, thus effectively increasing the capacity of the ponds to hold wastewater.

1.2 Environmental Compliance

As a federal facility, the Point Reyes National Seashore is subject to the provisions of the National Environmental Policy Act (NEPA), the basic national charter for environmental protection. NEPA requires an interdisciplinary study of the impacts associated with federal actions. For the PRNS, these requirements were initially met with the preparation of the *PRNS/Golden Gate National Recreation Area Management Plan and Environmental Analysis*

(NPS 1980). Because the proposed project involves new construction, an EA has been prepared to address site-specific impacts to determine whether further environmental review is necessary.

The following regulations are also applicable to the project:

Americans with Disabilities Act, PL 101-336, 104 Stat. 327, 42 USC §12101. This act states that all new construction and programs will be accessible to individuals with disabilities. Additionally, National Park Service Special Directive 83-3 states that accessibility will be proportional to the degree of development (i.e., areas of intense development such as visitor centers, museums, drive-in campgrounds, etc., will be entirely accessible, and areas of lesser development such as backcountry trails and walk-in campgrounds may have fewer accessibility features). The project would be constructed in conformance with this act.

Architectural Barriers Act of 1968, PL 90-480, 82 Stat. 178, 42 USC §1451 et seq. This act establishes standards for design/construction or alteration of buildings to ensure that physically disabled persons have ready access to and use of such buildings. The act excludes historic structures from the standards until they are altered. The project would be constructed in conformance with this act.

Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA)(40 CFR 1500-1508). The Council on Environmental Quality (CEQ) regulations for implementing NEPA establish the procedures by which federal agencies fulfill their obligations under the NEPA process. The CEQ regulations ascertain the requirements for environmental assessments and environmental impact statements that document that NEPA process. The CEQ regulations also define such key terms as “cumulative impact,” “mitigation” and “significantly” to ensure consistent application of these terms in environmental documents. This environmental analysis was prepared as directed in the CEQ regulations.

National Environmental Policy Act (NEPA) of 1970, PL 91-190, 83 Stat. 852, 42 USC §4341 et seq. The NEPA process is intended to help public officials make decisions that are based on an understanding of environmental consequences and to take actions that project, restore, and enhance the environment. Regulations implementing NEPA are set forth by the Council on Environmental Quality. The NEPA process guides the overall planning for this project.

Natural Resources Legislation

Clean Air Act, as amended, PL Chapter 360, 69 Stat. 322, 42 USC §7401 et seq. Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. This project would be consistent with this act.

Federal Water Pollution Control Act (commonly referred to as the Clean Water Act) of 1977, 33 USC §1251 et seq. The Clean Water Act provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation’s waters. Section 404 of the Act

prohibits the discharge of fill material into navigable waters of the United States, including wetlands, except as permitted under separate regulations by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency. This project does not involve filling of wetlands and therefore would be consistent with this act.

Clean Water Act Amendments of 1987. The 1987 amendments to the Act required that the Environmental Protection Agency establish regulations for the issuance of municipal and industrial stormwater discharge permits as part of the National Pollutant Discharge Elimination System (NPDES). The final Environmental Protection Agency regulations were published in November 1990. These regulations apply to any construction activities that disturb more than five acres of land. This project would result in the disturbance of less than five acres and therefore would not be subject to the NPDES regulations on stormwater discharges related to construction activity. However, Best Management Practices (BMPs) for erosion control will be implemented during project construction.

Endangered Species Act of 1973, as amended, PL 93-205, 87 Stat. 884, 16 USC §1531 et seq. The Endangered Species Act protects threatened and endangered species, as listed by the U.S. Fish and Wildlife Service (USFWS), from unauthorized take, and directs federal agencies to ensure that their actions do not jeopardize the continued existence of such species. Section 7 of the Act defines federal agency responsibilities for consultation with the U.S. Fish and Wildlife Service and requires preparation of a Biological Assessment to identify any threatened or endangered species that is likely to be affected by the proposed action. The National Park Service initiated and maintains informal consultation with the U.S. Fish and Wildlife Service. See Appendix D for correspondence with the USFWS and a copy of the biological evaluation prepared for this project.

Cultural Resources Legislation

Archaeological Resources Protection Act of 1979, PL 96-95, 93 Stat. 172, 16 USC §470aa et seq., and 43 CFR 7, subparts A and B, 36 CFR. This act secures the protection of archaeological resources on public or Indian lands and fosters increased cooperation and exchange of information between private, government, and professional communities in order to facilitate the enforcement and education of present and future generations. It regulates excavation and collection on public and Indian lands. It requires notification of Indian tribes who may consider a site of religious or cultural importance prior to issuing a permit. The act was amended in 1988 to require the development of plans for surveying public lands for archaeological resources and systems for reporting incidents of reported violations. Since there are no known archaeological resources in the project vicinity, the project is consistent with this act.

National Historic Preservation Act of 1966, as amended, PL 89-665, 80 Stat. 915, 16 USC §470 et seq., and 36 CFR 18, 60, 61, 68, 79, 800. The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places. The Advisory Council on Historic

Preservation has developed implementation regulations (36 CFR 800) which allow agencies to develop agreements for consideration of these historic properties. A letter to the State Historic Preservation Officer, who has authority for administering the Act in California, is contained in Appendix E.

Executive Orders

Executive Order 11593: Protection and Enhancement of the Cultural Environment. This Executive Order instructs all federal agencies to support the preservation of cultural properties. It directs them to identify and nominate cultural properties under their jurisdiction to the National Register of Historic Places and to “exercise caution...to assure that any federally-owned property that might qualify for nomination is not inadvertently transferred, sold, demolished, or substantially altered.” This project is consistent with this Executive Order.

Executive Order 11988: Floodplain Management. This Executive Order (EO) requires federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains, and to avoid development in floodplains whenever there is a practical alternative. If a proposed action is found to be in an applicable regulatory floodplain, the agency shall prepare a floodplain assessment, known as a Statement of Findings. Since there are no floodplain areas within the project site, a Statement of Findings is not required for this project.

Executive Order 11593: Protection of Wetlands. This EO established the protection of wetlands and riparian systems as the official policy of the federal government. It requires all federal agencies to consider wetland protection as an important part of their policies and to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Should adverse impacts on wetlands be identified, a Wetland Statement of Findings must be prepared and included in subsequent compliance (such as an Environmental Assessment or Environmental Impact Statement) for the specific project. For this project, no wetlands will be adversely affected, so no Wetland Statement of Findings is required.

Executive Order 11593: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This Executive Order requires all federal agencies to incorporate environmental justice into their mission statements by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. This project is consistent with this Executive Order.

Executive Order 12902: Energy Efficiency and Water Conservation. This EO directs each agency involved in the construction of a new facility to design and construct it to use energy efficiently, conserve water, and employ renewable energy technologies. The requirements for this Executive Order would be met during the design phase of the project.

Executive Order 13112: Invasive Species. This Executive Order prevents the introduction of invasive species and directs federal agencies to not authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species. This project is consistent with this Executive Order.

Coastal Zone Management Act. The purpose of this act is to protect coastal environments. While the act transfers regulatory authority to the states and excludes federal installations from the definition of the “coastal zone,” it requires that federal actions be consistent with the state coastal management plans developed under the Act. Activities taking place within the coastal zone under the definition established by the California Coastal Management Plan require a federal consistency determination. The project will be reviewed for consistency with the coastal plan.

1.3 Relationship to Other Plans and Projects

In the *General Management Plan (GMP), Point Reyes National Seashore* (NPS 1980), the Kehoe Dairy is located within a Special Use Zone (Pastoral Land). This subzone was established to permit the continued use of existing ranchlands for ranching and dairying. These are lands upon which activities are permitted other than preservation and visitor use. One of the natural resources management objectives in the GMP is to monitor grazing and improve range management practices in the pastoral zone in cooperation with the ranchers and the Natural Resources Conservation Service.

The *Statement for Management for Point Reyes National Seashore* (NPS 1993) discusses dairy and beef cattle operations. Management concerns listed in the Statement for Management include grazing standards, pollution control, stock dams, loafing barns, and silage pits, among other things.

The overall goal of the *Range Management Guidelines, Point Reyes National Seashore* (NPS 1993) is to administer the grazed rangelands in PRNS and the Northern District of Golden Gate National Recreation Area in a manner that will provide environmental protection and restoration to those lands, make available public recreational opportunities, and maintain a visually aesthetic pastoral scene while simultaneously permitting ranchers to continue their traditional and viable agricultural operations. Specific resource goals include protection of waterbodies from fecal and chemical contamination, minimizing soil erosion associated with ranching activities to prevent soil loss and to protect surface water from increased sediment loads, and protection of significant natural resources in the pastoral zone with special attention to streams, stream banks, wetlands, and riparian habitat.

The *Marin Countywide Plan* (1994) identifies the project site as being located in a Coastal Recreation Corridor. Through this plan, the County supports continuation of agricultural operations and agricultural land uses within the “pastoral zone” of Point Reyes National Seashore and Golden Gate National Recreation Area.

The *Marin County Local Coastal Program, Unit 2* discusses agriculture and encourages the continuation of this industry in the Coastal Zone. Although the portion of Kehoe Ranch located west of Pierce Point Road is located within the Coastal Zone, the areas west of the road, including the proposed barn additions and new manure pond, are outside the Coastal Zone.

Marin County Code Title 22 (Zoning). The proposed project is consistent with the Coastal Open Space (C-O-A) zoning that allows conducting a dairy operation on 50 or more acres (Chapter 22.57.130). The objectives of this zoning district are to assure the promotion of agriculture, the preservation of scenic beauty, and the maintenance of such land in permanent open space.

1.4 Issues and Impact Topics

This document evaluates two alternatives and the impacts associated with each. Evaluation of the project site has identified the following issues of potential concern and provides the basis for the analysis of alternatives: natural resources, including vegetation, water resources, soils, topography, air quality, special-status species, and wildlife; cultural resources; visual quality; noise; public health and safety; and public services and utilities. These issues were developed from internal NPS review and public discussion on the project.

1.5 Reports Filed

All reports regarding this project will be filed and available at the Headquarters, Point Reyes National Seashore. This includes the biological survey report, the PRNS Hazardous Waste Plan, and the Marin County grading and building permits.

2. Alternatives, including the Proposed Action

2.0 Alternatives Considered in this Analysis

Two alternatives have been considered. These include No Action and one alternative for the location of the proposed project elements. Additional alternatives and options were initially considered for the barn additions and expansion of manure pond capacity, but were rejected or dismissed due to the severe topographic and physical limitations of the site and/or operational constraints. These alternatives and options are discussed subsequently in Sections 2.4 and 2.5.

2.1 Overview of Project Components

The Kehoe Dairy is located at 6150 Pierce Point Road on the Point Reyes Peninsula in western Marin County, California (APN 109-040-001). The dairy includes a total of 1,263 acres extending from the Pacific Ocean in the west to Tomales Bay in the east. The property is bisected in a north-south direction by Pierce Point Road which runs immediately west of the main dairy complex. See project location maps in Appendix A. The project area includes the entire area leased by the Kehoe Dairy from the NPS.

The various elements of the proposed project are listed below, and described in detail in the following paragraphs:

1. Construction of a free-standing addition to the west side of the existing freestall barn (and removal of the existing horse barn and calf lean-to shed).
2. Construction of a free-standing calf barn on the east side of the existing freestall barn, along with a new concrete apron and extension of the adjacent level calf enclosure to the east.
3. Construction of a new storage building.
4. Improvements to the dairy's stormwater drainage system.
5. Construction of an additional manure holding pond.
6. Restoration and revegetation of the year-round pasture area west of Pierce Point Road.

Western Addition to Freestall Barn. The freestanding addition on the west side of the freestall barn will provide protected housing for 150 cows and 100 percent containment of animal waste. Since the terrain at the site of the western barn addition slopes upward to the west, excavation and grading will be required to produce the required foundation grades. To make room for the barn addition, the existing horse barn and lean-to calf shed located to the west of the existing barn will be removed.

New Calf Barn and Adjacent Fill Area. On the east side of the existing freestall barn, a new freestanding calf barn will house calves displaced by removal of the lean-to calf shed for the western barn addition, described above. A new concrete apron will be constructed to the east and north of the calf barn. In addition, the area of open level calf enclosure adjacent to the east will be extended eastward approximately 100 feet by placing engineered fill on the downslope area that currently exists in this area.

New Storage Building. To replace the storage space lost by the removal of the old horse barn, a new storage building will be constructed to the west of the proposed western barn addition. The existing fuel tank stand which encroaches on the footprint of the new storage building will be moved to another location nearby.

Drainage Improvements at Dairy Complex. Clean surface runoff and roof drainage will be collected in roof gutters and underground storm drains and diverted around the barn complex. This will result in less clean stormwater entering the manure holding ponds, thus effectively increasing the usable capacity of those ponds to hold animal waste.

New Manure Holding Pond. The proposed new manure holding pond is located approximately 1,000 feet east of the dairy complex on the facing hillside across Kehoe Creek. The additional pond is needed to meet the increased capacity requirements resulting from the additional animal waste that will be generated by 150 additional cows housed in the new freestall barn addition. The pond will have a storage capacity of 11 acre-feet and a surface area of 1.33 acres.

Restoration and Revegetation of Degraded Areas. The pasture area on the west side of Pierce Point Road that is currently used to keep cattle year-round, including the wet winter months, is largely degraded by intensive animal use. Once the western addition to the freestall barn is completed, this area will be restored and reseeded with annual grasses.

The improvements to the dairy complex itself (i.e., freestall barn addition, calf barn, storage building, drainage improvements) are scheduled to be undertaken in the fall of 2003, prior to the rainy season. It is anticipated that the new manure holding pond would be constructed in the summer of 2004, and that the restoration and revegetation of degraded areas would occur in the fall of 2004, prior to the rainy season.

2.2 Alternative 1: No Action

Under the No Action alternative, there would be no additions to the freestall barn. As such, approximately 150 cows would continue to spend winters in the pasture area west of Pierce Point Road, resulting in continued risk of water quality degradation in Kehoe Creek and downstream aquatic habitat. In addition, the cows would be exposed to inclement weather with adverse effects on their health and milk production, as well as the overall viability of the dairy. While there may be opportunities for limited restoration and drainage improvements under the No Action alternative, as long as there is insufficient shelter capacity to accommodate the entire

herd, there will continue to be degradation of the pasture area during winter months with consequent risks to water quality from sediment and nutrients carried in stormwater runoff to Kehoe Creek.

2.3 Alternative 2 (Preferred): Construct freestall barn additions and new manure holding pond.

Western Addition to Freestall Barn

The freestanding addition on the west side of the freestall barn will measure 60 feet in width by 300 feet in length for an approximate total floor area of 18,000 square feet. (See Appendix B for site plans and building profiles.) The barn addition will provide protected housing for 150 cows and 100 percent containment of animal waste. Since the terrain at the site of the western barn addition slopes upward to the west, excavation and grading will be required to produce the required foundation grades (the excavated material will be used as fill on the eastern hillside as described below under “New Calf Barn”). To make room for the barn addition, the existing horse barn and lean-to calf shed located to the west of the existing barn will be removed.

New Calf Barn and Adjacent Fill Area

On the east side of the existing freestall barn, a new freestanding calf barn measuring 40 feet in width and 140 feet in length will be constructed. This barn will house calves displaced by removal of the lean-to calf shed for the western barn addition, described above. A new concrete apron will be constructed to the east and north of the calf barn. In addition, the area of open level calf enclosure adjacent to the east will be extended eastward approximately 100 feet by placing engineered fill on the downslope area that currently exists in this area. The fill material will be obtained from the excavation for the western barn addition described above. This will result in finished slopes of no greater than 2:1 (horizontal:vertical), which will conform with Marin County code requirements. The overall earthwork quantity in the barn area will total approximately 3,400 cubic yards, which will be balanced between excavation and fill areas on either side of the barn. Standard measures for temporary and permanent erosion control and slope stabilization will be employed as specified in the Erosion Control Plan for the project.

New Storage Building

To replace the storage space lost by the removal of the old horse barn, a new storage building will be constructed to the west of the proposed western barn addition. The new storage building will measure 25 feet by 100 feet and will be located above and parallel to the cut slope for the western barn addition. The existing fuel tank stand which encroaches on the footprint of the new storage building will be moved to another location nearby. The storage building will have monoslope roof and will be about 14 feet high on the western side and about 12.5 feet high on the eastern or downslope side of the roof. The building exterior will consist of metal siding in a board-and-batten pattern which will be painted red. The exterior texture and color are intended to be similar to the existing horse barn which will be removed. Sliding doors for equipment and

vehicles will be placed on the west and south facades, and will have the same surface treatment. The roof will consist of unpainted corrugated metal, and will be similar in slope, texture and color to the roofs on the existing freestall barn and planned western barn addition.

Drainage Improvements at Dairy Complex

As noted, clean surface runoff and roof drainage will be collected in roof gutters and underground storm drains and diverted around the barn complex. The clean stormwater will be conveyed to two existing v-ditches commencing at the northeast and southeast corners of the barn complex and conveyed to Kehoe Creek to the east. Rock armoring will be installed at the upstream ends of both v-ditches near the top of the eastern sideslope of the ridge. No downstream alterations will be made to these drainage ditches, and no new drainage ditches are proposed.

New Manure Holding Pond

The proposed new manure holding pond is located approximately 1,000 feet east of the dairy complex on the facing hillside across Kehoe Creek. The additional pond is needed to meet the increased capacity requirements resulting from the animal waste that will be collected from 150 additional cows housed in the new freestall barn addition. (Although the overall size of the herd will not increase, the waste from these 150 cows is currently deposited directly to the year-round pasture area west of Pierce Point Road and does not enter the manure management system.) The pond will have a storage capacity of 11 acre-feet and a surface area of 1.33 acres. The material excavated for the pond will total approximately 13,800 cubic yards and will be used entirely in the construction of the containment levees required on the downslope edges of the pond, with the levee heights ranging from 0 to 20 feet. The addition of the pond will bring the overall waste storage capacity at the dairy to approximately 19 acre-feet, which will provide sufficient capacity to store the accumulated waste, as well as runoff from the 10-year wet winter and from the 25-year, 24-hour storm, in accordance with regulatory requirements. (For detailed hydrological calculations, see the report by Erickson Engineering in Appendix C.)

The new pond will be the fourth in a system of manure holding ponds serving the dairy. Operationally, the manured water initially drains from the dairy to a primary holding pond and a small overflow pond, both located downslope to the northeast. As solids settle, the wastewater is pumped into tanker trucks or temporary irrigation lines for dispersal over dry grassland areas elsewhere on the ranch. When wastewater accumulation in the primary pond exceeds the rate of withdrawal for land application, excess flows are pumped across Kehoe Creek via a system of surface-laid liquid transfer pipes to the existing third pond located approximately 1,300 feet away on the opposite hillside. As levels in the primary pond recede, wastewater from the third pond is released and drains by gravity through the same transfer pipes back to the primary pond where it is pumped out for dispersal. With the addition of the proposed fourth pond, wastewater will be routed from the third pond to the new pond before being released back to the primary pond. These liquid transfers will be accomplished through the existing piping system, with the exception of short sections of pipe to provide system connections to the new pond. The holding ponds operate as an integrated manure management system designed to avoid discharges or

overflows of wastewater and to prevent water quality impacts to nearby watercourses and aquatic resources.

Restoration and Revegetation of Degraded Areas

The pasture area on the west side of Pierce Point Road that is currently used to keep cattle year-round is largely by intensive animal use. Once the western addition to the freestall barn is completed, this area will be restored and reseeded with annual grasses. Once vegetation is well established and the area is stabilized, seasonal grazing would occur in late spring and early summer when the forage value of this area would be high. The restoration of the degraded areas will be implemented in accordance with the recommendations of a qualified agronomist.

2.4 Alternative Considered but Rejected

Manure Pond Alternative

One other alternative for increasing the manured water storage capacity for the dairy was initially considered. This alternative consisted of enlarging the existing manure pond upslope and east of the proposed pond location. This alternative was discarded due to the significant impacts to the existing wetland habitat along the margins of the pond that would result from pond enlargement. In addition, this alternative would pose substantial operational difficulties arising from the necessity of keeping the pond off-line while it is being enlarged. As such, no further consideration of the pond enlargement alternative is warranted.

2.5 Other Project Options Initially Considered but Dismissed

The following additional options for the project elements were considered in the initial planning stages but were dismissed as being infeasible due to physical or operational constraints. These options are briefly discussed below.

Optional Location for Freestall Barn

The dairy complex is located on a ridge top, and the project is confined by relatively steep downslopes and Kehoe Creek to the north and east, and existing dairy facilities and Pierce Point Road to the south and west. As such, there is not a sufficient amount of level land available on the east side of Pierce Point Road, adjacent to the main dairy complex, where the freestall barn could be relocated. It might be possible to locate all or a portion of the freestall barn on the west side of Pierce Point Road; however, this option would not be operationally feasible due to the distances that would be required for cows to travel back and forth to the milking barn. In addition, the construction of a new freestall barn on the west side of Pierce Point Road would be highly visible to visitors, whereas the proposed barn additions would be largely hidden from public view. Thus there is no feasible alternative location for the freestall barn and its proposed additions, other than the existing/proposed location.

Optional Location for Manure Pond Expansion

The potential locations for a new or expanded manure holding pond are also limited by topography and operational considerations. The possible expansion of the existing two manure ponds on the south side of Kehoe Creek, adjacent to and downslope of the main dairy complex, was briefly considered. However, pond expansion at this location is physically constrained on the north by the creek itself and on the south by a steep hillside. In addition, these ponds are located within the designated 300-foot setback zone along Kehoe Creek which is protected by the U.S. Fish and Wildlife Service as a migration and dispersal corridor for the federally-threatened California red-legged frog. Pond expansion within the 300-foot setback area would adversely affect the migration habitat of the red-legged frog. In addition, ponds adjacent to the creek would be subject to potential overflow due to flooding along the creek. As such, further consideration of potential pond locations along Kehoe Creek was not warranted.

While there may be locations elsewhere on the ranch which could be physically suitable for a new manure pond, they would be located at greater distances from the dairy than the proposed location and thus would require longer distances to pump the manured water. Thus there are no feasible alternative locations for the proposed new manure holding pond.

The proposed location for the new manure pond on the hillside opposite the dairy complex is the only location in the vicinity where slopes are not too steep, and where the operational objective of receiving overflow by gravity from the existing manure pond upslope to the north can be achieved. In addition, the proposed pond site consists entirely of annual grassland where construction would have no significant effects on biological or other resources.

3. Affected Environment

3.1 Project Site Description

The Kehoe Dairy complex is located on a relatively small ridgetop area bounded on the north and east by downslopes trending toward Kehoe Creek several hundred feet away. The complex is bisected in a north-south direction by Pierce Point Road, with most of the barns, dwellings and other structures located on the east side of the highway, with only a large hay barn, a calf barn, and the year-round cow pasture located on the west side. The dairy complex sits at the center of a 1,263-acre ranch extending from the Pacific Ocean in the west to Tomales Bay in the east. It is bounded on the north by the non-operating Pierce Ranch, on the southwest by the I Ranch (McClure Dairy) and on the southeast by the K Ranch. The dairy complex sits at an elevation of 167 feet while the highest point on the ranch is about 645 feet.

The J Ranch was established in the 1860s and the Kehoe's have operated the dairy since 1922, shipping their milk directly to Clover Stornetta Farms. Most of the original dairy structures, such as the original house, dairy, hay barn, and calf shed have been replaced by newer buildings. Only the horse barn and workshop remain from the old ranch, and both are in poor condition. Other existing buildings include four residences, the freestall barn, milking barn, hay barn, workshop, calf lean-to shed, and various outbuildings and structures.

Approximately 40 acres of pasture near the dairy complex are used as feeding and exercise areas for dairy cows. The portion of pasture used for year-round use on the west side of Pierce Point Road has become degraded by intensive animal use. The remainder of the ranch is largely used for seasonal grazing and silage production, although portions of the property consist of inaccessible terrain or are covered with unusable brush.

The proposed barn additions and new storage building would be located in the central area of the dairy complex, adjacent to the existing freestall barn. The proposed new manure holding pond would be located on the facing hillside east of Kehoe Creek, approximately 1,000 feet from the dairy complex.

3.2 Use Permit and Lease Status

The Kehoe family has an agricultural lease/permit with PRNS to operate the dairy. The lease has renewal clauses and is reviewed every five years. Currently, the dairy is operating on a year-to-year lease with PRNS.

3.3 Current Facilities and Improvements

The dairy operation consists of the following structures and facilities:

Housing. The current main residence was constructed in 1964, with five additional single-family houses constructed since, and a modular home added in 2001. Four of the dwellings are occupied by members of the Kehoe family, and three units are for housing employees. The original ranch house no longer exists.

Barns and Other Structures. The dairy complex includes the freestall barn, milking barn, old horse barn (used for storage), hay barn, calf barn, workshops, lean-to calf shed, fuel tank stand, water wells, various sheds and outbuildings, silage storage area, and corrals. Some of the buildings, such as the old horse barn and shop, date from the 1860s, with the remaining structures having been added during the intervening years.

Manure Management Facilities. Solid waste from the freestall barn and other feeding areas is stockpiled to the north of the barn, and the dry material is spread onto the fields annually in the late summer and fall. The liquid waste is conveyed to a series of three holding ponds. The manured water initially drains from the dairy to a 0.43-acre primary holding pond and a small 0.09-acre overflow pond, both located downslope to the northeast of the freestall barn. As sediment settles, the decanted wastewater is pumped into tanker trucks or temporary irrigation lines for dispersal over dry grassland areas elsewhere on the 1,263-acre ranch. The wastewater is applied to the pastures at accepted agronomic rates for forage production purposes. As stored wastewater volumes approach the capacity of the primary and overflow ponds, excess flows are pumped across Kehoe Creek via a system of surface-laid liquid transfer pipes to a third 0.9-acre pond located approximately 1,300 feet away on the opposite hillside. As levels in the primary pond recede, wastewater from the third pond is released and drains by gravity through the same transfer pipes back to the primary pond where it is pumped out for dispersal. All of the ponds are clay-lined to prevent seepage and all are dredged annually to remove accumulated waste and sediments, and to restore storage capacity.

3.4 Utilities

Electrical service to Kehoe Dairy is provided by Pacific Gas & Electric Company (PG&E), and telephone service is provided by Pacific Bell. As no natural gas service is available, and the dairy relies butane and electric power for heating. There is no municipal water supply or sanitary sewer service available at the Kehoe Dairy. Potable water for domestic use is supplied by two on-site wells, and non-potable water for the dairy operation is piped down from a spring-fed stock pond located approximately 2,000 feet to the northeast. Domestic wastewater is disposed of through septic systems connected to each residence. Animal waste disposal is described in Section 3.3 above.

3.5 Geology, Topography, and Soils

The site is underlain by Pliocene Era (2-5 million years old) Wilson Grove formation bedrock consisting of siltstone, mudstone, sandstone, and shale that has been subjected to weathering and decomposition. The barn construction site sits on the eastern flank of a gentle hilltop ridge crest at 0-15% slope, and the new holding pond site is on a hillside with a slope of 5-15% slope. There is no evidence of seepage, soil creep, or landslide-type instability at either construction site.

Since the geologically active San Andreas Fault Zone is located about two miles to the east in Tomales Bay, it is likely that the proposed improvements would be subject to ground shaking during the life of the project. Due to the absence of known earthquake faults in the immediate vicinity, the probability of surface rupture is low. Similarly, there is a low probability of seismically-induced effects such as liquefaction, lateral spreading or lurching due to the moderately cohesive well-drained nature of surficial material at the site.

The soils at both work sites consist of Kehoe loam (9-15% slopes). This deep, moderately well-drained soil has moderate water holding capacity and high erosion potential on unprotected slopes. Plasticity is low to moderate indicating low to moderate potential for soils expansion.

3.6 Vegetation

The freestall barn is located near the center of the dairy complex which is devoid of vegetation due to intensive use by cattle and equipment throughout the year. Several ornamental landscape species occur around the residences on the perimeter of the dairy complex.

The proposed manure holding pond is located in non-native grassland that is used for cattle grazing. Kehoe Creek, a perennial creek which runs between the dairy complex and the new manure pond location, supports a narrow band of riparian scrub consisting primarily of willows. An ephemeral stream, which runs downslope just west of the holding pond site to Kehoe Creek, also supports a narrow band of riparian scrub, with northern coastal scrub appearing on the sides of the ravine. (For a detailed description of vegetation in the project vicinity, see the biological survey report in Appendix D.)

3.7 Water Resources

The primary water source for non-potable water on the Kehoe Dairy is an existing stock pond located at the upstream end of Kehoe Creek approximately 2,000 feet northwest of the dairy complex. Water piped down from this pond provides for all the non-potable water requirements of the dairy operation. Potable water for domestic and dairy use is obtained from two domestic wells located near Pierce Point Road within the dairy complex.

Runoff from the dairy complex and the year-round pasture area contains nutrient and sediment loads that reach Kehoe Creek and pose a risk of ongoing water quality impact. Water quality data obtained from monitoring conducted in Kehoe Creek near the dairy complex indicates elevated levels of contaminants.

3.8 Historic and Cultural Resources

Founded by Oscar and James Shafter, the dairy ranches of Point Reyes were once acknowledged as the most important in California and were famous for their quality product. The J Ranch (Kehoe), the northernmost Shafter ranch, was settled in the 1860s, and the Kehoe family has operated a dairy there since 1922. Most of the original structures have been replaced with modern buildings. Only the horse barn and workshop remain from the old ranch, and both are in poor condition. The horse barn, while retaining some of the original roofline, has been altered a great deal and has no integrity. The old workshop, moved to its present site from another area on the ranch, has no apparent historic integrity. In the document *Ranching on the Point Reyes Peninsula*, it states the following regarding the significance of the J Ranch:

“J Ranch is a significant part of the Shafter’s and Howard A to Z ranch enterprise and the dairy industry in Marin County. However, the structures at the J Ranch retain no historic integrity or significance. The old Pierce Point Road along the ridgeline to the east of the ranch complex is significant as an original transportation route of Point Reyes.”

The land within the PRNS boundaries containing historically significant dairy ranches has been determined to be eligible for listing on the National Register of Historic Places as a rural historic landscape district. The entire Point Reyes Peninsula, including the Kehoe Ranch, is included in the potential district. The Point Reyes National Seashore is currently preparing a Cultural Landscape Report which will contain guidelines for maintaining the character of the historic landscape and physical structures on the ranches.

With respect to prehistoric archaeological resources, the PRNS archaeological base map indicates that there are no recorded archaeological sites in the vicinity of the project site. An intensive site survey was conducted by the PRNS Archaeologist in 2001 as part of the Archaeological Clearance Survey for the project. The survey found no surface evidence of archaeological resources within the project boundaries.

3.9 Wildlife

Within the dairy complex, structures such as the horse barn provide potential roosting habitat for various bird and bat species. Evidence of previous nesting activity by either barn swallows or black phoebe was observed in the barn. No evidence of bat use was observed in any of the structures in the dairy complex. The ornamental landscaping associated with the dairy residences may provide perching and roosting sites for a small number of avian species, such as Anna’s

hummingbird. However, ornamental plants provide poor quality habitat for most wildlife species, which are unlikely to use this habitat except for temporary cover and resting.

The non-native grassland habitat of the new manure pond site provides habitat for various wildlife species including lizards, salamanders, birds (e.g., California quail, mourning dove, meadowlark), and mammals such (e.g., California vole, deer mouse, Botta's pocket gopher, California ground squirrel, black-tailed jackrabbit, and black-tailed deer). Small rodents attract raptors such as owls, red-tailed hawks, northern harriers, and white-shouldered kites, among others. The grassland habitat also provides movement corridors for medium and large mammals such as raccoon, skunk, and black-tailed deer.

The riparian corridors along Kehoe Creek and its ephemeral tributary to the northeast provide habitat for a variety of bird species, as well as mammals such as raccoon and striped skunk. The creek is unsuitable for many of the fish species in the region due to its dense canopy and shallow water. (For a detailed description of wildlife, see the biological survey report contained in Appendix D.)

3.10 Special-Status Species

The biological survey report for the project identified eight special-status plant species that could potentially occur at that project site. (The "project site" is defined as those areas subject to ground disturbance as a result of the proposed barn expansion and construction of the new manure pond.) A full listing of special-status plant species, along with the status and likelihood of occurrence of each, is presented in Appendix B of the biological survey report. The survey report (in Appendix D) indicates that no suitable habitat occurs at the project site to support any of the eight special-status plant species.

A total of 22 special-status wildlife species have been recorded in the region which have the potential to be present at the project site. Of these, four bird species are considered to have high to moderate potential to occur on the site. These include: barn swallows and black phoebe, which both have high potential for nesting in the horse barn; and western meadowlark and California horned lark, which have moderate potential for ground nesting in the grasslands of the proposed holding pond site. (Nesting birds are protected under the Migratory Bird Treaty Act.) A full listing of special-status wildlife species, along with the status and likelihood of occurrence of each, is presented in Appendix B of the biological survey report.

The California red-legged frog (*Rana aurora draytonii*)(CRLF) is the only federally-listed (as threatened) species with potential to occur in the vicinity of the project site. Potential breeding habitat occurs at the large stock pond located approximately 2,000 feet northwest of the dairy complex, and at Kehoe Marsh, located on Kehoe Creek approximately one-half mile to the south. In the project vicinity, Kehoe Creek and the nearby ephemeral stream provide movement and dispersal corridors for the CRLF. The entire Point Reyes peninsula has been designated as "critical habitat" for the CRLF by the US Fish and Wildlife Service (USFWS). Upland habitat areas within 300 feet of the banks of breeding ponds and streams are protected under the critical

habitat designation. The areas of ground disturbance associated with the proposed barn expansion and the construction of the new manure holding pond are more than 300 feet from Kehoe Creek. However, the grading for the new manure holding pond would extend to approximately 70 feet from the ephemeral stream.

Potential habitat for the western burrowing owl (*Athene cunicularia hypugaea*), a federal and state species of concern, occurs in the grassland area of the proposed manure pond site. An essential element of burrowing owl habitat is the existence of burrows dug by small mammals such as ground squirrels. Although the grassland area contains short grasses suitable for nesting and foraging by the burrowing owl, no ground squirrel burrows are present in the area of the proposed pond. In addition, the grassland area is actively grazed by cattle that could damage nests and nestlings. As such, the site of the proposed holding pond is not considered suitable habitat for the burrowing owl.

The structures of the dairy complex provide potential habitat for several protected bat species, including big brown bat, little brown bat, Yuma myotis, Brazilian free-tailed bat, pallid bat, and others. However, based on the structure of the buildings, no potential roosting habitat for bats occurs within the project site. The biological field survey found no evidence of bat activity at the dairy complex.

3.11 Recreation

In 2000, PRNS had over 2 million visitors. Recreational use in the pastoral zones occurs mainly on roads and trails. Each month, over 27,800 visitors traveled along Pierce Point Road. Major destinations include McClure's Beach (over 8,000 visitors), Kehoe Beach (nearly 7,000 visitors), Abbotts Lagoon (over 5,500 visitors), and Pierce Point Ranch (nearly 7,000 visitors.) Visitation has been quite stable over the past 10 years, so these figures would be representative of current conditions.

4. Environmental Consequences

4.1 Impact Analysis

This section describes the probable consequences (or impacts) of each alternative on the resources of the project area. The discussion of each impact topic begins with a description of the methods applied in the analysis. The impacts are characterized as to type of impact (i.e., adverse or beneficial) and intensity of impact (i.e., none, negligible, or significant). Impacts are also characterized in terms of duration (i.e., short-term or long-term), with examples of short-term impacts including temporary noise, dust, and soil disturbance associated with construction activities, and long-term impacts referring to more-or-less permanent impacts such as loss of wildlife habitat. As appropriate, the impact discussions describe measures proposed to be incorporated into the project to avoid or reduce impacts to less-than-significant levels.

Cumulative impacts associated with each impact topic are also assessed. Cumulative impacts are defined as effects on the environment that result from the incremental impacts of an action when added to other past, present, or reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The analysis of cumulative impacts considers the combined impact of this project and other actions in the Northern District of Point Reyes National Seashore, including the pastoral zone. A comprehensive list of reasonably foreseeable actions is provided in Appendix E. Most of these projects are located in the Olema Valley or other relatively distant locations and are unlikely to add to cumulative effects resulting from the proposed action. The only other project in relatively close proximity is the McClure Ranch located two miles to the south, where a new 80,000 square-foot freestall barn, improvements to the manure management system, a new residence, and related enhancements were constructed in 2003. Since this is the only foreseeable project which could contribute cumulatively to any impacts associated with the project, the cumulative impact discussions for each impact topic address only the combined effects of the project and the McClure Ranch project.

A glossary of terms used in the following evaluation is provided in Appendix F.

4.2 Alternative 1: No Action

4.2.1 Impacts on Natural Resources

Vegetation

Methodology. Vegetation in the project area was surveyed by Wildlife Research Associates, who conducted a reconnaissance-level survey of the site on October 15, 2002. Dominant plant species and vegetation communities were recorded. Impacts were assessed based on the extent and nature of the vegetation affected by the project.

Impact Analysis. Impacts to vegetation would be limited to those associated with activities already occurring on site. Some pasture restoration is likely to occur, which would represent a beneficial effect.

- *Cumulative Impact:* Since impacts to vegetation associated with the McClure Dairy project will be reduced to less-than-significant levels with incorporated measures, and since no impacts would result from the no action alternative, there would be no cumulative impact to vegetation.
- *Conclusion:* No new impacts to vegetation would occur under this alternative. Based on the above discussion of potential impacts to vegetation, there would be no long-term impairment to vegetation.

Water Resources

Methodology. Information on water resources and water quality as based on water quality data obtained from monitoring conducted in Kehoe Creek near the ranch complex. The characterization of impacts to water resources was based on assessment of effects of dairy operational changes upon the quality of stormwater discharges to Kehoe Creek.

Impact Analysis. The risk of water quality impacts would remain. The year round use of the pasture area near Kehoe Creek would continue to generate stormwater runoff with entrained sediments and nutrients that would continue to pose a risk of water quality impact in Kehoe Creek. However, since the risk of water quality impacts would not increase under this alternative, there would be no significant impact.

- *Cumulative Impact:* With the enhancements to the manure management system planned at McClure Dairy, water quality in the general area should improve. However, since the McClure and Kehoe Dairies are located in different watersheds, the water quality in Kehoe Creek would not benefit cumulatively from these improvements.
- *Conclusion:* No new impacts to water resources would occur under this alternative. Based on the above discussion of potential impacts to water resources, there would be no long-term impairment to water resources.

Air Quality

Methodology. The evaluation of potential air quality impacts was based on consideration of new air pollutant generation involved in the alternative, and on the measures to be incorporated into the alternative to minimize generation of air pollutants.

Impact Analysis. Impacts would be limited to those associated with activities already occurring on site.

- *Cumulative Impact:* Although there may be a slight increase in dust generation associated with construction at the McClure Dairy, the cumulative impacts to air quality would not be significant.
- *Conclusion:* No impacts to air quality would occur under this alternative. Based on the above discussion of potential impacts to air quality, there would be no long-term impairment to air quality.

Wildlife

Methodology. Wildlife habitats in the project area were surveyed by Wildlife Research Associates, which conducted a reconnaissance-level survey of the site on October 15, 2002. Dominant wildlife habitats were recorded. Impacts were assessed based on the extent and nature of the wildlife habitat affected by the project.

Impact Analysis. The potential for negative impacts to wildlife due to ongoing impacts to water quality in downstream reaches of Kehoe Creek would remain. However, since the risk of water quality impacts would not increase under this alternative, likewise there would be no new significant impacts to wildlife.

- *Cumulative Impact:* With the enhancements to the manure management system planned at McClure Dairy, the water quality in the aquatic habitat of Abbotts Lagoon would improve. However, since the McClure and Kehoe Dairies are located in different watersheds, the water quality and aquatic habitats in Kehoe Creek would not benefit cumulatively from these improvements.
- *Conclusion:* No new impacts to wildlife would occur under the no action alternative. Based on the above discussion of potential impacts to wildlife, there would be no long-term impairment to wildlife habitat.

Special-Status Species

Methodology. Information on special-status plant species was compiled by Wildlife Research Associates through review of the *California Natural Diversity Data Base* (CNDDB, 2002) for the Tomales 7.5-minute topographic quadrangle, the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plant of California* (Skinner and Pavlik, 1999), the California Department of Fish and Game's (CDFG) *Special Plants List* (CDFG, 2002a), and the U.S. Fish and Wildlife Service list of special-status plants (USFWS, 2002). No focused surveys for special-status plant species were conducted for purposes of this assessment. The potential for special-status plants to occur on the project site, and the corresponding potential for impacts, was determined through the identification of vegetation communities on the site and their ability to support special-status plants known to occur in the area.

A list of special-status wildlife species known or expected to occur on the site was compiled through a review of the CNDDB (CNDDB, 2002), the CDFG's *Special Animals List* (CDFG,

2002b), the publication *State and Federally Listed Endangered and Threatened Animals of California* (CDFG, 2002c), and the U.S. Fish and Wildlife Service list of special-status animals (USFWS, 2002). No focused surveys for special-status wildlife species were conducted for purposes of this assessment. The potential for special-status wildlife to occur on the project site, and the corresponding potential for impacts, was determined through the identification of wildlife habitats on the site and their ability to support special-status wildlife species known to occur in the area.

Impact Analysis. Water quality problems related to ongoing nutrient and sediment generation would continue to affect California red-legged frog breeding habitat in downstream reaches of Kehoe Creek. However, since the risk of water quality impacts would not increase under this alternative, likewise there would be no new significant impacts to California red-legged frog breeding habitat.

- *Cumulative Impact:* With the enhancements to the manure management system planned at McClure Dairy, the water quality in the red-legged frog breeding habitat of Abbotts Lagoon would improve. However, since the McClure and Kehoe Dairies are located in different watersheds, the red-legged frog breeding habitats in Kehoe Creek would not benefit cumulatively from these improvements.
- *Conclusion:* No new impacts to red-legged frog habitat would occur under the no action alternative. Based on the above discussion of potential impacts to special-status species, there would be no long-term impairment to red-legged frog habitat.

Soils

Methodology. The evaluation of potential impacts to soils was based on the proposed grading involved in the alternative, and proposed erosion control and slope stabilization measures to be incorporated in the alternative.

Impact Analysis. The potential for soil erosion at the year-round pastures would remain. However, since the potential for soil erosion would not increase under this alternative, there would be no significant impact.

- *Cumulative Impact:* Although there may be a slight increase in soil erosion associated with construction at the McClure Dairy, the cumulative impacts to soils would not be significant.
- *Conclusion:* No new erosion and sedimentation impacts would occur under this alternative. Based on the above discussion of potential impacts to soils, there would be no long-term impairment due to soil erosion.

Topography

Methodology. The evaluation of the impact to topography was based on review of topographic changes reflected in project grading plans, and determining the significance of these terrain modifications in terms of location and proposed slope stabilization measures.

Impact Analysis. No new impacts would occur since there would be no change in topography.

- *Cumulative Impact:* Although there will be terrain alteration involved with construction at the McClure Dairy, the cumulative impacts to topography would not be significant.
- *Conclusion:* No impacts to topography would occur under this alternative. Based on the above discussion of potential impacts to topography, there would be no long-term impairment to topography.

Cumulative Impact: Although the construction activities at McClure Dairy would result in some residual impacts, when taken together with the absence of new impacts associated with the no action alternative, there would be no cumulatively significant impact.

Conclusion: Under the no action alternative, impacts to water resources would continue to occur. Nutrient and sediment loading of Kehoe Creek would continue and the risk of water quality impairment would remain. Some limited restoration and enhancement activities could occur. However, no new impacts to natural resources would occur under this alternative. Based on the above discussion of potential impacts to natural resources, there would be no long-term impairment to natural resources.

4.2.2 Impacts on Cultural Resources

Methodology. The evaluation of impacts to historic resources was based on the document *Ranching on the Point Reyes Peninsula* (PRNS, 1994), and correspondence from the State Office of Historic Preservation (SHPO), dated April 3, 1995, regarding the determination of eligibility for Point Reyes dairy ranches to be listed on the National Register of Historic Places. The findings and conclusions of these documents with respect to the Kehoe Dairy is summarized under 'Affected Environment' above.

With respect to impacts to prehistoric archaeological resources, the PRNS archaeological base map was consulted to identify any recorded archaeological sites in the vicinity of the project site. In addition, an intensive site survey of the Kehoe Dairy which was conducted by the PRNS Archaeologist in 2001 as part of the Archaeological Clearance Survey for the project.

Impact Analysis. There would be no direct impact on archaeological resources or historic structures or the historic landscape.

- *Cumulative Impact:* Since there would be no significant impacts associated with the McClure Dairy project, and no impacts resulting from the no action alternative, there would be no cumulative impact to cultural resources.
- *Conclusion:* No impacts to cultural resources would occur under the no action alternative. Based on the above discussion of potential impacts to cultural resources, there would be no long-term impairment to cultural resources.

4.2.3 Impacts on Visual Quality

Methodology. The assessment of potential impacts to visual resources was based on comparison of the alternative with baseline visual conditions. Determinations of impact were made in consideration of the nature and magnitude of the visual changes proposed, and the visual quality and general visibility of the affected area.

Impact Analysis. The dairy operations are visible from Pierce Point Road and other locations in Point Reyes National Seashore. No changes would occur. Areas heavily impacted by cows would continue to be visible.

- *Cumulative Impact:* Since the visual impacts associated with construction of the new McClure Dairy barn would be less-than-significant, and since no visual impacts result from the no action alternative, there would be no cumulative impact on visual quality.
- *Conclusion:* No impacts to visual quality would occur under the no action alternative. Based on the above discussion of potential impacts to visual quality, there would be no long-term impairment to visual quality.

4.2.4 Impacts on Human Health and Safety

Methodology. The evaluation of potential impacts to human health and safety was based on the conformance of the alternative with: public health regulations applicable to wastewater disposal; building codes and seismic safety requirements; regulations governing the handling, storage and disposal of hazardous materials; and other applicable laws and regulations.

Impact Analysis. There would be no direct impacts to human health and safety.

- *Cumulative Impact:* Since the McClure Dairy project would not result in significant impacts to human health and safety, and since the no action alternative would result in no health and safety impacts, there would be no cumulative impact on human health and safety.
- *Conclusion:* No impacts to human health and safety would occur under the no action alternative. There would be no long-term impacts to human health and safety.

4.2.5 Noise Impacts

Methodology. The evaluation of potential noise impacts was based on a comparison of existing noise sources with new noise sources included in the alternative, and in consideration of the likely presence of sensitive noise receptors (i.e., park visitors and off-site residences) that would be affected by changes in noise levels.

Impact Analysis. Noise is currently generated by use of heavy equipment, pumps, and dairy-related truck and automobile traffic. Noise levels would continue to be at the same levels.

- *Cumulative Impact:* The construction of the McClure Dairy improvements would involve short-term construction noise. However, since that activity would be two miles from the Kehoe Dairy, and since the no action alternative would result in no new noise, there would be no cumulative impact with respect to noise.
- *Conclusion:* No noise impacts would occur under the no action alternative. There would be no long-term impacts related to noise.

4.2.6 Impacts on Public Facilities and Services

Methodology. The evaluation of potential impacts to public facilities and services was based on consideration of the increased demand for service involved in the alternative, and the availability of sufficient service capacity to accommodate the alternative.

Impact Analysis

Water Supply. There are no public water supplies to the dairy or its residences. Water supply and amount of use would be unchanged.

- *Cumulative Impact:* Increased water supplies required for the enhancements to the McClure Dairy manure management system would be drawn from a separate watershed and would not affect the Kehoe Dairy water supply. Since the no action alternative would involve no increase in water consumption, there would be no cumulative impact on water supply.
- *Conclusion:* No impacts to water supply would occur under the no action alternative. There would be no long-term impact to public water supplies.

Roadways and Public Transportation. Public roadways and transportation would not be affected.

- *Cumulative Impact:* The McClure Dairy construction project would result in a short-term increase in traffic by construction vehicles and equipment. Since the no action alternative

would generate no new traffic, there would be no cumulative impact on roadways and public transportation.

- *Conclusion:* No impacts to roadways and public transportation would occur under the no action alternative. There would be no long-term impact to roadways and public transportation.

Energy Consumption. Energy consumption would remain at current levels.

- *Cumulative Impact:* The improvements to the McClure Dairy would result in increased energy consumption both during the construction and operational phases. Since the no action alternative would result in no increased use of energy, there would be no cumulative impact on energy consumption.
- *Conclusion:* No impacts to energy consumption would occur under the no action alternative. There would be no long-term impact to energy resources.

Police Protection. No change in police protection services would be needed.

- *Cumulative Impact:* The McClure Dairy improvements would not result in significant impacts to police protection services. Since the no action alternative would result in no increase in demand for police service, there would be no cumulative impact on police protection services.
- *Conclusion:* No impacts to police protection services would occur under the no action alternative. There would be no long-term impact to police protection services.

Fire Protection. No change in fire protection services would be needed

- *Cumulative Impact:* The McClure Dairy improvements would not result in significant impacts to fire protection services. Since the no action alternative would result in no increase in demand for fire protection, there would be no cumulative impact on police protection services.
- *Conclusion:* No impacts to fire protection services would occur under the no action alternative. There would be no long-term impact to fire protection services.

Schools. No change in enrollment in local schools would occur.

- *Cumulative Impact:* The McClure Dairy improvements include one new residence which could result in additional school enrollment. Since the no action alternative results in no additional school enrollment, there would be no cumulative impact on schools.
- *Conclusion:* No impacts to schools would occur under the no action alternative. There would be no long-term impact to schools.

Other Governmental Services. No new or increased levels of governmental services would be needed.

- *Cumulative Impact:* The McClure Dairy is not anticipated to result in increased levels of governmental services. Since the no action alternative would result in no increase in demand for governmental services, there would be no cumulative impact on governmental services.
- *Conclusion:* No impacts to governmental services would occur under the no action alternative. There would be no long-term impact to governmental services.

Utilities. There would be no increase in demand for electric power or telephone service under the no action alternative.

- *Cumulative Impact:* The McClure Dairy improvements would not result in a significant in demand for utilities service. Since the no action alternative would result in no increase in demand for utilities service, there would be no cumulative impact on police protection services.
- *Conclusion:* No impacts to utilities would occur under the no action alternative. There would be no long-term impact to utilities.

Cumulative Impact: The cumulative effect of the McClure Dairy project on public services and utilities, when considered with the effects of no action alternative, would not be significant.

Conclusion: No impacts to public services and utilities would occur under the no action alternative. There would be no long-term impact to public services and utilities.

4.2.7 Impacts on Local Economy

The number of dairies in Marin County is continuing to decline. In order to stay in business, existing operations must be efficient, productive, and good stewards of the land. Without the planned additions to the freestall barn, it would be more difficult for Kehoe Dairy to remain competitive. For example, having cows unsheltered in wet winters creates stressful conditions for the high-producing Holstein cows as they lose weight and have reduced reproductive capability. Without the barn additions, some feed would continue to be lost to wet weather spoilage or from being blown off the feeding truck. Given the declining milk prices and current feed costs, the Kehoe Dairy operation would remain less than optimally efficient.

- *Cumulative Impact:* The improvements at the McClure Dairy would have a beneficial effect on the dairy industry and the local economy generally. This could be somewhat offset by the no action alternative, which could contribute to the overall decline of the dairy industry in Marin County. The cumulative effect would likely be neutral or slightly beneficial.

- *Conclusion:* Negative impacts to the local economy would occur under this alternative. The Kehoe Dairy provides employment and supports the agricultural industry in Marin County. There could be a long-term impact to the local economy.

4.3 Alternative 2 (Preferred): Construct freestall barn additions and new manure holding pond

4.3.1 Impacts on Natural Resources

Vegetation

Methodology

Vegetation in the project area was surveyed by Wildlife Research Associates, who conducted a reconnaissance-level survey of the site on October 15, 2002. Dominant plant species and vegetation communities were recorded. Impacts were assessed based on the extent and nature of the vegetation affected by the project.

Impact Analysis

Expansion of the freestall barn and construction of the new manure holding pond would disturb approximately 4.0 acres of ground, of which approximately 1.1 acres would be at the barn site and 2.9 acres would be at the new manure pond site. The barn site is highly disturbed due to intensive cattle usage, and includes no vegetation. The barn is approximately 300 feet from Kehoe Creek at its nearest point.

The site of the new manure pond consists entirely of non-native grasslands. Kehoe Creek is located downslope 500 feet to the southeast and an ephemeral tributary is located approximately 70 feet from the bottom of the fill slope for the planned containment levee at its nearest point.

Construction of the barn additions would not result in the removal of existing vegetation and therefore would have no negative impacts on vegetation. The barn expansion project would allow for management changes at the Kehoe Dairy. Pastures which are currently grazed or used for year-round exercise/feeding areas would be restored and revegetated. Therefore, the project would have an overall beneficial or positive effect on vegetation in this pasture area.

The annual grasslands of the new manure pond site are common in the region and do not include any special-status plant species. Therefore, the removal of 2.9-acres of annual grasslands would not result in a significant impact to vegetation. However, the grasslands include potential habitat for two special status birds, species that could establish ground nests at this site. (Potential impacts to these bird species are discussed below under "Special-Status Species.")

Neither the proposed expansion of the freestall barn nor the construction of the new manure pond would result in fill of wetlands or impacts to riparian habitat.

- *Cumulative Impact:* Since both the project and the McClure Dairy improvements would result in less-than-significant impacts to vegetation, there would be no cumulative impact on vegetation.

- *Conclusion:* Under this alternative, impacts to vegetation would be less than significant. Based on the above discussion of potential impacts to vegetation, there would be no long-term impairment to vegetation.

Water Resources

Methodology

Information on water resources and water quality was based on water quality data obtained from monitoring conducted in Kehoe Creek near the ranch complex. The characterization of impacts to water resources was based on assessment of effects of dairy operational changes upon the quality of stormwater discharges to Kehoe Creek.

Impact Analysis

The overall goal of the project is to improve water quality and reduce the risk of water quality impacts. This would be achieved by providing additional containment and management of cow manure within the expanded freestall barn, and by restoring and revegetating the year-round pasture area in order to reduce nutrients and sediments being conveyed in stormwater runoff to Kehoe Creek.

Grading would be limited to the immediate areas of the barn expansion and the new manure pond. Some short-term minor impacts could occur from ground disturbance and grading for the planned improvements. An *Erosion and Sediment Control Plan* prepared in compliance with the requirements of the County of Marin and the State Water Resources Control Board, will be implemented during grading and construction. Erosion control measures, such as placement of straw bales and silt fencing, would prevent sediment from entering Kehoe Creek or its ephemeral tributary.

Clean runoff from the dairy complex would be diverted around the manure management system using gutters, pipes, and v-ditches. The runoff would be discharged via existing drainage ditches east of the dairy complex. Keeping rain water out of the manure storage system helps maintain pond capacity throughout the winter. The barn additions would result in an increase in site coverage by impervious surfaces and a corresponding slight increase in clean runoff due to the loss of infiltration at the barn site.

- *Cumulative Impact:* Since both the project and the McClure Dairy improvements would result in beneficial effects to water quality, the cumulative impact to water quality would be beneficial.
- *Conclusion:* Impacts to water resources would be beneficial under this alternative. Based on the above discussion of potential impacts to water resources, there would be no long-term impairment to water resources.

Air Quality

Methodology

The evaluation of potential air quality impacts was based on consideration of new air pollutant generation involved in the alternative, and on the measures to be incorporated into the alternative to minimize generation of air pollutants.

Impact Analysis

The new dairy improvements would not release significant air pollutants. Some dust would be generated during construction activities. This would be reduced by watering disturbed areas. Since project grading would balance on site, there would be no need to import or export earth materials to or from the site, thus avoiding potential dust blown from haul trucks. Materials from the demolished buildings would be hauled off-site in covered trucks to prevent wind-blown dust and debris.

- *Cumulative Impact:* Since both the project and the McClure Dairy improvements would result in less-than-significant air quality impacts, there would be no cumulative impact to air quality.
- *Conclusion:* Impacts to air quality would be less than significant under this alternative. Based on the above discussion of potential impacts to air quality, there would be no long-term impairment to air quality.

Wildlife

Methodology

Wildlife habitats in the project area were surveyed by Wildlife Research Associates, which conducted a reconnaissance-level survey of the site on October 15, 2002. Dominant wildlife habitats were recorded. Impacts were assessed based on the extent and nature of the wildlife habitat affected by the project.

Impact Analysis

The project would allow the discontinuation of nearby pasture area for year-round use, and would provide for the restoration and revegetation of this area. This would create additional area of wildlife habitat. Reduced nutrient and sediment loading to Kehoe Creek would also improve the habitat value of the creek.

Wildlife that currently use the site are accustomed to the existing noise and human activity levels. Short-term construction activities are unlikely to result in permanent displacement of wildlife. Because the proposed project would result in only temporary and localized impacts on wildlife, these effects are considered less than significant since animals and birds would be

expected to return to the area once construction activities are completed. As discussed under 'Special-Status Species' below, demolition, grading and construction would not be permitted to occur during periods of active bird nesting at either the barn expansion site or the new manure pond site.

- *Cumulative Impact:* Both the project and the McClure Dairy improvements would have a mix of beneficial and negative effects to wildlife, although the impacts associated with both projects would all be reduced to less-than-significant levels with incorporated measures. Thus there would be no cumulative impact to wildlife.
- *Conclusion:* Impacts to wildlife would be less than significant under this alternative. Based on the above discussion of potential impacts to wildlife, there would be no long-term impairment to wildlife or wildlife habitat. The reduced pollutant loadings to Kehoe Creek would have a long-term beneficial effect on aquatic habitat.

Special-Status Species

Methodology

Information on special-status plant species was compiled by Wildlife Research Associates through review of the *California Natural Diversity Data Base* (CNNDDB, 2002) for the Tomales 7.5-minute topographic quadrangle, the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plant of California* (Skinner and Pavlik, 1999), the California Department of Fish and Game's (CDFG) *Special Plants List* (CDFG, 2002a), and the U.S. Fish and Wildlife Service list of special-status plants (USFWS, 2002). No focused surveys for special-status plant species were conducted for purposes of this assessment. The potential for special-status plants to occur on the project site, and the corresponding potential for impacts, was determined through the identification of vegetation communities on the site and their ability to support special-status plants known to occur in the area.

A list of special-status wildlife species known or expected to occur on the site was compiled through a review of the CNDDDB (CNDDDB, 2002), the CDFG's *Special Animals List* (CDFG, 2002b), the publication *State and Federally Listed Endangered and Threatened Animals of California* (CDFG, 2002c), and the U.S. Fish and Wildlife Service list of special-status animals (USFWS, 2002). No focused surveys for special-status wildlife species were conducted for purposes of this assessment. The potential for special-status wildlife to occur on the project site, and the corresponding potential for impacts, was determined through the identification of wildlife habitats on the site and their ability to support special-status wildlife species known to occur in the area.

Impact Analysis

The Point Reyes Peninsula has been designated as critical habitat for the federally-listed (as threatened) California red-legged frog. Since the nearest breeding areas for this species are a stock pond located 2,000 feet to the northwest and a marsh located one-half mile south, there will

be no anticipated impacts to breeding habitat. The freestall barn expansion area is located at the edge of the potential upland migration habitat for the frog, as defined by a 300-foot setback zone from Kehoe Creek. Given the highly disturbed nature of the ground around the barn, this area does not represent suitable migration habitat for the frog. Therefore, construction of the barn additions would have a less-than-significant impact upon habitat of the red-legged frog.

The fill slopes for the new manure pond are located approximately 70 feet from the ephemeral stream, and much of the proposed manure pond lies within the 300-foot setback zone of the stream which is considered dispersal habitat the frog. Due to the potential impacts to frogs which may use this area as a movement corridor, mitigation measures will be implemented to avoid such impacts. These include conducting pre-construction monitoring prior to grading at the manure pond site, as well as daily inspections of the work site.

The improvements to the manure management system will result in lower risk of water quality impacts in Kehoe Creek. This will have a beneficial impact to the red-legged frog, particularly in the downstream breeding area of Kehoe Marsh.

The non-native grasslands of the manure pond site may provide habitat for ground nesting birds such as the western meadowlark and California horned lark. In addition, the horse barn may provide nesting habitat for barn swallows and black phoebe. These are all passerines (perching birds) that are protected under the Migratory Bird Treaty Act. Mitigation measures will be implemented in order to avoid impacts to any such birds which may establish nests in the grasslands of the new manure pond site or in the horse barn. These measures, which include preconstruction surveys for nesting birds, and avoidance of active nests during demolition, grading, and construction, would reduce potential impacts to less-than-significant levels.

- *Cumulative Impact:* Both the project and the McClure Dairy improvements would have a mix of beneficial and negative effects to special-status species, although the impacts associated with both projects would all be reduced to less-than-significant levels with incorporated measures. Thus there would be no cumulative impacts to special-status species.
- *Conclusion:* Impacts to special-status species would be less than significant under this alternative with the incorporation of measures to reduce the effects described above. Based on the above discussion of potential impacts to special-status species, there would be no long-term impairment to special-status species. The reduced pollutant loading to Kehoe Creek would have a long-term beneficial effect on the aquatic habitat of special-status species such as the California red-legged frog.

Soils

Methodology

The evaluation of potential impacts to soils was based on the proposed grading involved in the alternative, and proposed erosion control and slope stabilization measures to be included in the alternative.

Impact Analysis

The project would help control erosion in areas currently used year-round by cows. Marin County standards would be followed for compaction and constructing the earthen embankment to the east of the new calf barn addition, as well as the containment levees for the new manure holding pond. All slopes would conform to state and County standards. No earthwork or compaction problems are anticipated with the on-site soils. The County engineer has the option of requiring a geotechnical report for projects with over 5,000 cubic yards (cy) of engineered fill (earthwork estimates are the 3,400 cy for the barn expansion and 13,800 cy for the new manure pond). This report would be prepared and followed if required by the County.

To minimize ground disturbance, equipment and materials would be stored on existing disturbed areas, those areas to be directly impacted by construction, or immediately nearby. Topsoil salvage and replacement would be practiced in cut and fill areas. Finished grades would be spread with salvaged topsoil and reseeded to promote vegetative cover.

- *Cumulative Impact:* For both the project and the McClure Dairy improvements, erosion control measures would prevent significant erosion and sedimentation impacts. The restoration and revegetation programs planned for both projects would have a beneficial effect on soils. Thus there would be no cumulative impacts to soils.
- *Conclusion:* Impacts to soils would be less than significant under this alternative. Based on the above discussion of potential impacts to soils, there would be no long-term impairment to soils.

Topography

Methodology

The evaluation of the impact to topography was based on review of topographic changes reflected in project grading plans, and determining the significance of these terrain modifications in terms of location and proposed slope stabilization measures.

Impact Analysis

The earthwork required for the barn expansion and the new manure pond would alter the site topography of those areas. At the barn site, approximately 3,400 cy of soil and rock material would be removed from the small ridge on the west side of the barn and used as fill material on the east side of the barn to create larger level area adjacent to the new calf pens. This earthwork at the barn site would balance. The new manure pond would involve excavation of approximately 13,800 cy of material from the hillside and the reuse of that material to construct downslope containment levees for the pond. This earthwork would also balance at the pond site with no net import or export of materials required. No unique geologic or ground surface features would be altered.

- *Cumulative Impact:* Both the project and the McClure Dairy improvements would result in minor terrain alterations, but no significant impacts to topography would occur in either case. There would be no cumulative impact on topography.
- *Conclusion:* Impacts to topography would be less than significant under this alternative, because cut and fill earthwork quantities for both the barn expansion and the new manure pond would be balanced. Based on the above discussion of potential impacts to topography, there would be no long-term impairment to topography.

Cumulative Impact: The combined effects of the project and the McClure Dairy improvements would not result in a cumulative impact to natural resources.

Conclusion: Overall, impacts to natural resources are beneficial under this alternative. Expansion of the barn and restoration of the year-round pasture area would improve water quality by reducing the risk of nutrient and sediment loading to Kehoe Creek. The project incorporates measures to avoid or minimize construction-related impacts to natural resources. These include the implementation of erosion control measures during construction, and also pre-construction monitoring for special-status species such as the California red-legged frog and four species of birds which may nest at the project site, with avoidance measures to be taken as appropriate. Based on the above discussion of potential impacts to natural resources, there would be no long-term impairment to natural resources.

4.3.2 Impacts on Cultural Resources

Methodology

The evaluation of impacts to historic resources was based on the document *Ranching on the Point Reyes Peninsula* (PRNS, 1994), and correspondence from the State Office of Historic Preservation (SHPO), dated April 3, 1995, regarding the determination of eligibility for Point Reyes dairy ranches to be listed on the National Register of Historic Places. The findings and conclusions of these documents with respect to the Kehoe Dairy is summarized under 'Affected Environment' above.

With respect to impacts to prehistoric archaeological resources, the PRNS archaeological base map was consulted to identify any recorded archaeological sites in the vicinity of the project site. In addition, an intensive site survey of the Kehoe Dairy which was conducted by the PRNS Archaeologist in 2001 as part of the Archaeological Clearance Survey for the project.

Impact Analysis

The two remaining historic-era structures at the Kehoe Dairy - the workshop and the horse barn - do not retain the historic integrity required to be considered historically important in their own right. As such, the removal of the horse barn to make room for the western addition to the

freestall barn would not, in and of itself, constitute a significant impact to historic resources. (Prior to demolition of the barn, a park preservation crew would salvage any materials that could be reused on other historic structures.)

However, the Kehoe Dairy is an important element in the cultural landscape of the Point Reyes Peninsula and will form an integral part of the rural historic landscape district proposed by PRNS. Although it has undergone numerous alterations over the years, and no longer resembles the original family dairy of the 1860s, it is important that any improvements be in keeping with the scale and appearance of the existing building complex. To that end, the planned additions to the freestall barn have been designed to be integrated into the existing barn, with use of similar building materials and complementary rooflines. The structural additions are both smaller than the existing barn and do not overwhelm its scale or visually diminish its importance. While the additions would be visible in certain views from Pierce Point Road, they would blend in visually with the existing dairy complex and would not appear incongruous to the setting. It is also important to consider that the barn is part of dynamic operating dairy, whose purpose from a cultural perspective is to maintain the value of the cultural landscape, and as such it is not required to remain frozen in time. Therefore, the proposed barn expansion would not have a significant impact on the cultural landscape.

The new manure holding pond would result in the disturbance of almost three acres of ground and would add a new element to the landscape. However, once vegetation is established on the banks and margins of the pond, it will be virtually indistinguishable from the surrounding grassland landscape. Moreover, the pond will be located about one-half mile east of Pierce Point Road and will also be elevated relative to the roadway, so its visibility will be greatly reduced. Therefore, the new manure pond would not have a significant impact on the cultural landscape.

No ethnic cultural values or religious or sacred uses currently occur within the project area. There are no known archaeological resources at the project site. If any archaeological material is found during demolition, grading, excavation, or construction, such activity would stop, and a qualified archaeologist would evaluate the find and make recommendations to minimize any impacts.

- *Cumulative Impact:* At both the Kehoe and the McClure dairies, there are no known cultural resource sites that would be affected by the planned improvements, and standard mitigations would be implemented if resources are found during grading and construction for each project. There would be no cumulatively significant impact to cultural resources.
- *Conclusion:* The horse barn that is proposed for removal has no historic integrity, and the proposed barn expansion and new manure pond would not substantially alter the cultural landscape of the Kehoe Dairy. Therefore, impacts to cultural resources would be less than significant under this alternative. Based on the above discussion of potential impacts to cultural resources, there would be no long-term impairment to cultural resources.

4.3.2 Impacts on Visual Quality

Methodology

The assessment of potential impacts to visual resources was based on comparison of the alternative with baseline visual conditions. Determinations of impact were made in consideration of the nature and magnitude of the visual changes proposed, and the visual quality and general visibility of the affected area.

Impact Analysis

The Kehoe Dairy, including the existing barn, is visible from various locations in the northern portion of PRNS. An overview of the entire dairy complex is available from Pierce Point Road on the higher elevations directly to the north of the dairy. From the south, the dairy complex is visible at a distance, but in the closer views the dairy is elevated relative to Pierce Point Road so many of the individual structures are not visible. The effect of the barn additions to scenic views would be minimal because the additions are relatively small in scale, they are designed to be structurally integrated into the original barn, and are constructed of similar materials to the original barn (e.g., corrugated metal roofs).

The new storage building to be constructed to the west of the western barn addition will be situated on relatively high ground. There are no structures between the planned storage building and Pierce Point Road for most of its length, with the main house located just west of the new storage building near its north end. As such, the new storage building will be largely visible to northbound travelers along Pierce Point Road. The overall visual effect will be minimized due to the relatively low profile of the building and the choice of monoslope roof (instead of pitched roof) to reduce the overall height and bulk of the building. The planned surface treatments of board-and-batten siding and the choice of rustic red paint color will result in a surface appearance similar to the old horse barn which is planned for removal from this location. The gently sloping monoslope roof, which will consist of corrugated metal, will be similar to the rooflines and textures of the existing freestall barn and barn additions. Thus, although the addition of the new storage building will be noticeable from the roadway, it will be aesthetically consistent with the existing buildings and will have a lowered profile to reduce its visual obtrusiveness. Thus the new building will be visually integrated into the overall dairy complex in a manner that minimizes impacts to visual quality.

The visual effect of the new manure pond will also be small given its location one-half mile east of Pierce Point Road and because of its elevated position relative to the roadway. Once the exposed banks of the pond are revegetated, it will almost appear as a natural element in the landscape, and certainly will not be incongruous with an agricultural setting. The restoration and revegetation of the year-round pasture area, which is located adjacent to Pierce Point Road, would have a beneficial effect on visual quality.

- *Cumulative Impact:* At the McClure Dairy, the addition of a large freestall barn would be a noticeable visual change, although this would not represent a significant impact to overall

visual quality. The proposed project would result in minor visual alterations which likewise would not represent a significant impact to visual quality. Taken together, these projects would not result in cumulative impact to visual quality.

- *Conclusion:* Impacts to visual quality would be less than significant under this alternative. Based on the above discussion of potential impacts to visual quality, there would be no long-term impairment to visual quality.

4.3.4 Impacts on Human Health and Safety

Methodology

The evaluation of potential impacts to human health and safety was based on the conformance of the alternative with: public health regulations applicable to wastewater disposal; building codes and seismic safety requirements; regulations governing the handling, storage and disposal of hazardous materials; and other applicable laws and regulations.

Impact Analysis

The barn additions and the new manure pond would be constructed to comply with all applicable federal, state, and local requirements.

Because of the dairy's proximity to the San Andreas fault, there is a potential for strong ground shaking during a seismic event centered nearby. The barn additions would be constructed in conformance with the Uniform Building Code requirements for Seismic Zone 4. The new manure pond would be designed to industry standards.

The barn additions would be constructed with a steel post and beam frame with a corrugated metal roof. With a minimum of wood used in construction and the general absence of vegetation in the immediate area, the fire hazard associated with the barn additions would be low.

Any hazardous materials and waste, such as paint, oil, or veterinary supplies would continue to be properly stored in accordance with federal and state regulations and the *Point Reyes National Seashore Hazardous Waste Management Plan*. All hazardous wastes such as paint and oil would be disposed of in accordance with the *Hazardous Waste Management Plan*. Since, no major or unusual quantities of hazardous materials or explosives would be present on the project site during construction or when the improvements are completed, the likelihood of an explosive hazard is extremely remote and deemed insignificant.

- *Cumulative Impact:* Any potential impacts to health and safety at the project site or at the McClure Dairy site would be mitigated through compliance with applicable regulations and policies. There would be no cumulative impact on human health and safety.

- *Conclusion:* Impacts to human health would be less than significant under this alternative. There would be no long-term impact to human health and safety.

4.3.5 Noise Impacts

Methodology

The evaluation of potential noise impacts was based on a comparison of existing noise sources with new noise sources included in the alternative, and in consideration of the presence of sensitive noise receptors (i.e., park visitors and off-site residences) that would be affected by changes in noise levels.

Impact Analysis

The proposed project would result in periodic generation of noise associated with short-term construction activities. Equipment operation at the site and vehicles moving to and from the site would generate intermittent low levels of noise. Although ambient noise levels in the surrounding area are expected to increase during construction, this construction-related noise would represent a temporary increase of limited duration and is not considered a significant impact. In addition, all construction activity would be regulated by the County's Design Review and building permit process, and would be in compliance with standard County regulations controlling permitted hours of activity and permitted noise levels. Once completed, the operation of the barn additions and the new manure holding pond would not generate new noise. Therefore, the project would result in a less-than-significant noise impact.

- *Cumulative Impact:* The short-term construction noise levels associated with the project and the McClure Dairy improvements would be less than significant in both cases. Since the projects are two miles apart, the construction noise generated at each site would be too far apart to be additive. Thus there would be no cumulative noise impact.
- *Conclusion:* Noise impacts would be less than significant under this alternative. Based on the above discussion of potential noise impacts, there would be no long-term noise-related impairment.

4.3.6 Impacts on Public Facilities and Services

Methodology

The evaluation of potential impacts to public facilities and services was based on consideration of the increased demand for service involved in the alternative, and the likelihood that sufficient service capacity exists to accommodate the alternative.

Impact Analysis

Water Supply. Domestic water for the Kehoe Dairy is obtained from two on-site wells operated under permit from the County of Marin Environmental Health Services Division. A large spring-fed stock pond which supplies water for the dairy operation has ample capacity to provide increased demand for water from the barn additions. No other public or private entities are dependent upon these sources for water supply. No impacts to other water sources would occur as a result of this project.

- *Cumulative Impact:* Increased water supplies required for the enhancements to the McClure Dairy manure management system would be drawn from a separate watershed and would not affect the Kehoe Dairy water supply. Since the no action alternative would involve no increase in water consumption, there would be no cumulative impact on water supply.
- *Conclusion:* No impacts to public water supply would occur under this alternative. There would be no long-term impact to public water supplies.

Roadways and Public Transportation. The project would result in a short-term increase in construction-related use of Pierce Point Road. Since there would be no increase in herd size, it is unlikely that the number of feed trucks that currently serve the dairy will increase. Overall, traffic is primarily generated by recreational users. No public or NPS transportation service is available in the area. Therefore, this project would have a less than significant impact on traffic and public transportation facilities.

- *Cumulative Impact:* Both the project and the McClure Dairy improvements would result in short-term increases in traffic during construction. Even if the projects were constructed simultaneously, the combined traffic generation would not result in a cumulative impact to Pierce Point Road.
- *Conclusion:* Impacts to roadways and public transportation would be less than significant under this alternative. There would be no long-term impact to roadways and public transportation.

Energy Consumption. Energy use is not anticipated to change significantly as a result of the project. The new energy uses associated with the barn additions would consist only of electric lighting. Wastewater intakes and discharges at the new manure holding pond would both occur by gravity and would not require pumps. Although, the increase in the number of sheltered cows would increase manure volumes that would need to be pumped, this increase would not represent a significant consumption of energy.

- *Cumulative Impact:* The new facilities at the project and the McClure dairy would each result in a very minor increase in the overall demand for energy. Thus there would be no cumulative impact to energy resources.

- *Conclusion:* Impacts to energy consumption would be less than significant under this alternative. There would be no long-term impact to energy resources.

Police Protection. NPS is the primary law enforcement agency in the area with back up by the Marin County Sheriff's Department. No increase in service by NPS or the Sheriff's Department is anticipated as a result of this project.

- *Cumulative Impact:* The improvements at the Kehoe and McClure dairies may each result in a very minor increase in demand for police protection. The combined increase in demand would not result in a cumulative impact to police protection services.
- *Conclusion:* Impacts to police protection services would be less than significant under this alternative. There would be no long-term impact to police protection services.

Fire Protection. The new barn additions and storage building would represent a minor increase in the responsibilities of the PRNS and the Marin County Fire Departments.

- *Cumulative Impact:* The new buildings and additions constructed at the Kehoe and McClure dairies would each result in a minor increase in demand for fire protection service. Taken together, this demand would not result in a cumulative impact to fire protection services.
- *Conclusion:* Impacts to fire protection services would be less than significant under this alternative. There would be no long-term impact to fire protection services.

Schools. No additional dwellings are proposed at the dairy. Therefore, no change in enrollment in local schools would occur.

- *Cumulative Impact:* The project would result in no increased school enrollment, and the one new dwelling added to the McClure Dairy would result in a minimal increase in school enrollment. There would be no cumulative impact on schools.
- *Conclusion:* No impacts to schools would occur under this alternative. There would be no long-term impact to schools.

Other Governmental Services. No new or increased levels of governmental services are anticipated to be required as a result of the project.

- *Cumulative Impact:* Since neither the project nor the McClure Dairy are anticipated to result in increased demand for governmental services, there would be no cumulative impact on governmental services.
- *Conclusion:* No impacts to governmental services would occur under this alternative. There would be no long-term impact to governmental services.

Utilities. PG&E has adequate facilities in the project area to serve the new barn additions and storage building. Only minor increases in power use are anticipated.

- *Cumulative Impact:* Since neither the project nor the McClure Dairy improvements would result in a significant increase in demand for utilities service, there would be no cumulative impact on utilities service.
- *Conclusion:* Impacts to utilities would be less than significant under this alternative. There would be no long-term impact to utilities.

Cumulative Impact: Since neither the project nor the McClure Dairy improvements would result in a significant increase in demand for public facilities and services, there would be no cumulative impact on public facilities and services.

Conclusion: Impacts to public facilities and services including water supply, roadways and public transportation, energy consumption, fire and police protection, schools, other governmental services, and utilities would be less than significant under this alternative. There would be no long-term impact to public services and utilities.

4.3.7 Impacts on Local Economy

The proposed barn additions and new manure pond are likely to have a positive effect on the local economy. Because the barn would alleviate stress on the dairy cows and reduce feed waste or loss, dairy profitability and competitiveness are likely to increase.

Cumulative Impact: Both the project and the McClure Dairy improvements would have a beneficial effect on the dairy industry and the local economy generally. Thus the cumulative effect on the local economy would be beneficial.

Conclusion: Impacts to the local economy would be beneficial under this alternative. There would be no long-term impact to the local economy.

4.4 Identification of Environmentally Preferred Alternative

A comparison of project alternatives is presented in Table 1. Alternative 2 has important site-specific benefits to the water quality and aquatic habitats in Kehoe Creek, and is also beneficial to the local economy. Alternative 2 would have minimal or no impact on vegetation, air quality, soils, topography, cultural resources, visual quality, human health and safety, noise, and public facilities and services. While Alternative 2 would result in potential impacts to special-status wildlife species, these impacts can be fully mitigated by incorporated measures. Although these potential impacts would be avoided altogether under Alternative 1 (no action), the ongoing water quality impacts to Kehoe Creek, and consequent impacts to aquatic habitats, would continue unabated under Alternative 1. For these reasons, Alternative 1 is not preferred from an

environmental perspective. Alternative 2 is the preferred alternative because it results in important benefits to water quality and aquatic wildlife habitat while having otherwise minimal or readily mitigable impacts.

Table 1: Comparison of Alternatives

Project Features/ Environmental Factors	Alternative 1: No Action	Alternative 2: Preferred
Project Features		
Barn Expansion (sq. ft.)	N/A	23,600 sq. ft.
New Manure Pond (acres)	N/A	1.3 acres
Natural Resources		
Vegetation	Some pasture restoration likely to occur.	Temporary removal of 2.9 acres of non-native grassland. Permanent removal of 1.3-acres of grassland.
Water Resources	Continued nutrient and sediment loading to Kehoe Creek, with risk of water quality impacts.	Reduction in nutrient and sediment loading to Kehoe Creek, and reduced risk of water quality impacts.
Air Quality	No change.	No new impact.
Wildlife	Potential for negative water quality impacts to aquatic habitat of Kehoe Creek.	Improvement from reduced water quality impacts, and from restoration and revegetation of year-round pasture area.
Special-Status Species	Water quality impacts could degrade California red-legged frog breeding habitat in downstream reaches of Kehoe Creek.	Potential “take” of California red-legged frog in upland migration habitat. Potential “take” of active birds nests. Preconstruction surveys and ongoing monitoring will allow impacts to be avoided.
Soils	No change. Continued erosion in year-round pasture area.	Reduction in erosion in year-round pasture area. Erosion control measures to be implemented during grading and construction.
Topography	No change.	Earthwork balanced at each work site.
Cultural Resources	No change.	No National Register Eligible resources would be adversely affected. The project elements would not substantially alter the cultural landscape.
Visual Quality	No change.	Project elements would not have a negative effect on visual quality.
Human Health and Safety	No change.	Would comply with applicable federal, state, and local requirements. Negligible potential impact.
Noise	No change.	No new impact.

Table 1: Comparison of Alternatives (Cont'd)

Project Features/ Environmental Factors	Alternative 1: No Action	Alternative 2: Preferred
Public Services and Facilities		
Water Supply	No change.	No public supplies. Existing supplies are adequate.
Roadways and Public Transportation	No change.	Temporary, construction-related traffic only.
Energy Consumption	No change.	Minimal change.
Fire Protection	No change.	Less-than-significant increase.
Police Protection	No change.	Less-than-significant increase.
Schools	No change.	No new enrollment. No impact.
Other Government Services	No change.	None anticipated.
Utilities	No change.	Service extension not anticipated.
Local Economy	Decrease in profitability.	Increase in dairy viability and profitability.

5. Summary of Impacts and Incorporated Measures

Park: Point Reyes National Seashore

Project: Kehoe Dairy Freestall Barn Additions and New Manure Holding Pond

<i>Impact To</i>	<i>Incorporated Measure (and Responsibility)</i>
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1. Natural Resources

Vegetation	Areas disturbed during construction are to be revegetated with native grasses to be determined by PRNS (Kehoe Dairy). Restoration and revegetation of currently degraded pasture is to occur after the additions to the freestall barn are completed and the pasture is no longer needed for winter use by cows (Kehoe Dairy).
Water Resources	Straw bales, silt fencing and other erosion and sediment control measures specified in the project Erosion and Sediment Control Plan are to be installed. The site is to be monitored during construction and appropriate measures are to be taken to ensure that Kehoe Creek and the ephemeral stream are not contaminated with sediment and construction debris (Kehoe Dairy).
Air Quality	Construction dust is to be monitored and minimized by watering of the exposed soils and by covering trucks leaving the area with demolition debris (Kehoe Dairy).
Wildlife	PRNS staff will monitor species before, during, and after construction to ensure that disturbance is minimal (PRNS in conjunction with Kehoe Dairy).
Special-Status Species	<u>California Red-legged Frog</u> To avoid potential “take” of individual California red-legged frogs that may move into the non-native grassland in the area of the new manure pond site, the following measures are incorporated: <ul style="list-style-type: none">• Pre-construction surveys of the non-native grassland are to be conducted prior to grading for the new manure pond. Surveys will consist of one daytime survey to be conducted on the same day as grading commences. A qualified biologist will walk the area looking for individual red-legged frogs. If an individual is found, it

should be able to leave of its own volition. Ground breaking may commence after the individual has left. If no individuals are found, ground breaking may commence immediately.

- During grading and construction at the new manure pond site, a walk through will be conducted each morning to search for individuals, with the above procedure followed if an individual is found (Kehoe Dairy in conjunction with PRNS).

Nesting Birds

To avoid potential “take” of nesting passerines (perching birds) at the horse barn or at the grasslands of the manure pond site, the following measures are incorporated:

Alternative Mitigation A. Demolition of the horse barn, and grading within the grassland area of the project site is to be conducted outside the nesting season, which occurs between February 1 and August 15, approximately.

Alternative Mitigation B. If demolition and grading in the potential nesting areas is not feasible outside of the nesting season, a nesting bird survey will be performed by a qualified biologist prior to grading or demolition. This pre-construction survey will be conducted no more than one week prior to planned demolition and/or grading activity.

- If nesting birds with eggs or young are observed during the pre-construction surveys, grading and/or demolition in the affected project area (e.g., horse barn or grasslands at the manure pond site) will not commence until after the young have fledged. (In the case of swallows in the eaves of the horse barn, early removal of the nesting structure in February or early March, while the nest is being built but before eggs are laid, would also be sufficient to prevent “take” of individuals.)
- If no nesting birds are observed, no further action is required, and demolition, grading, and construction may proceed, provided that it commences within one week of the survey to prevent “take” of individual birds that may have begun nesting after the survey (Kehoe Dairy in conjunction with PRNS).

Soils

Soils exposed by grading or heavy equipment use shall be restored and revegetated as soon as practicable after completion of grading and/or construction in the area (Kehoe Dairy).

Topography	Finished cut and fill slopes adjacent to the freestall barn are to be inspected by the project engineer prior to construction of improvements (Kehoe Dairy).
2. Cultural Resources	If any archaeological resources are discovered during demolition, grading, excavation, or construction, all such activity in the vicinity of the find will stop, and the area will be evaluated by the NPS Regional Archaeologist (Kehoe Dairy in conjunction with PRNS).
3. Visual Quality	Revegetation of new manure pond area is to commence immediately following completion of pond construction (Kehoe Dairy).
4. Health and Safety	N/A
5. Noise	Demolition, excavation, grading, and construction is to occur on weekdays only between 7:00 a.m. and 7:00 p.m. (Kehoe Dairy).
6. Public Services	N/A
7. Local Economy	N/A

6. Consultation and Coordination

The U.S. Fish and Wildlife Service was consulted regarding special-status species, including threatened and endangered species.

Marin County Comprehensive Planning Department will conduct design review of the project.

Others consulted on the project include:

National Park Service

Project Manager: Mark Homrighausen, Range Conservationist, Point Reyes National Seashore

Mark Rudo, Archaeologist, Pacific Great Basin Support Office, National Park Service

Gordon White, Historical Architect, Point Reyes National Seashore

Technical Assistance

Bert Verrips, AICP, Environmental Consulting Services

Erickson Engineering

Wildlife Research Associates

7. Preparers

Bert Verrips, AICP, Environmental Consulting Services, Oakland, CA

Bert Verrips has over 20 years experience in the preparation of environmental documents under NEPA and CEQA. He is a member of the Association of Environmental Professionals (AEP), the American Planning Association (APA), and the American Institute of Certified Planners (AICP).

Erickson Engineering, Valley Ford, CA

Lee Erickson, Ph.D., is a licensed civil and agricultural engineer. Erickson Engineering's expertise includes civil engineering from dams, water rights, drainage, erosion control, rural septic systems, roads, water development, vineyard terraces, and dairy waste management.

8. References

Erickson Engineering, Inc. August 2002. *Application for Excavating, Grading, or Filling Permit.* (As submitted to County of Marin Department of Public Works.)

Erickson Engineering, Inc. August 2002. *Development Plans for Stall Barn Expansion with Barn Pad Revisions, and Manure Pond System Expansion.* (Six sheets including plans, profiles, and erosion control specifications.)

Marin County Comprehensive Planning Department. 1994. *Marin Countywide Plan.*

Marin County Comprehensive Planning Department. 1980. *Marin County Local Coastal Program, Unit 2.* As amended..

National Park Service. 2001. *Environmental Assessment - Wilkins Ranch, Rehabilitation and Public Use; Rehabilitation of Septic and Water System, Point Reyes National Seashore, Marin County.* September.

National Park Service. 2001. *McClure Dairy Barn and Resource Enhancement Project, Point Reyes National Seashore, Marin County.* March 21.

National Park Service. 1980. *General Management Plan, Point Reyes National Seashore.*

National Park Service. 1990. *Range Management Guidelines, Point Reyes National Seashore.*

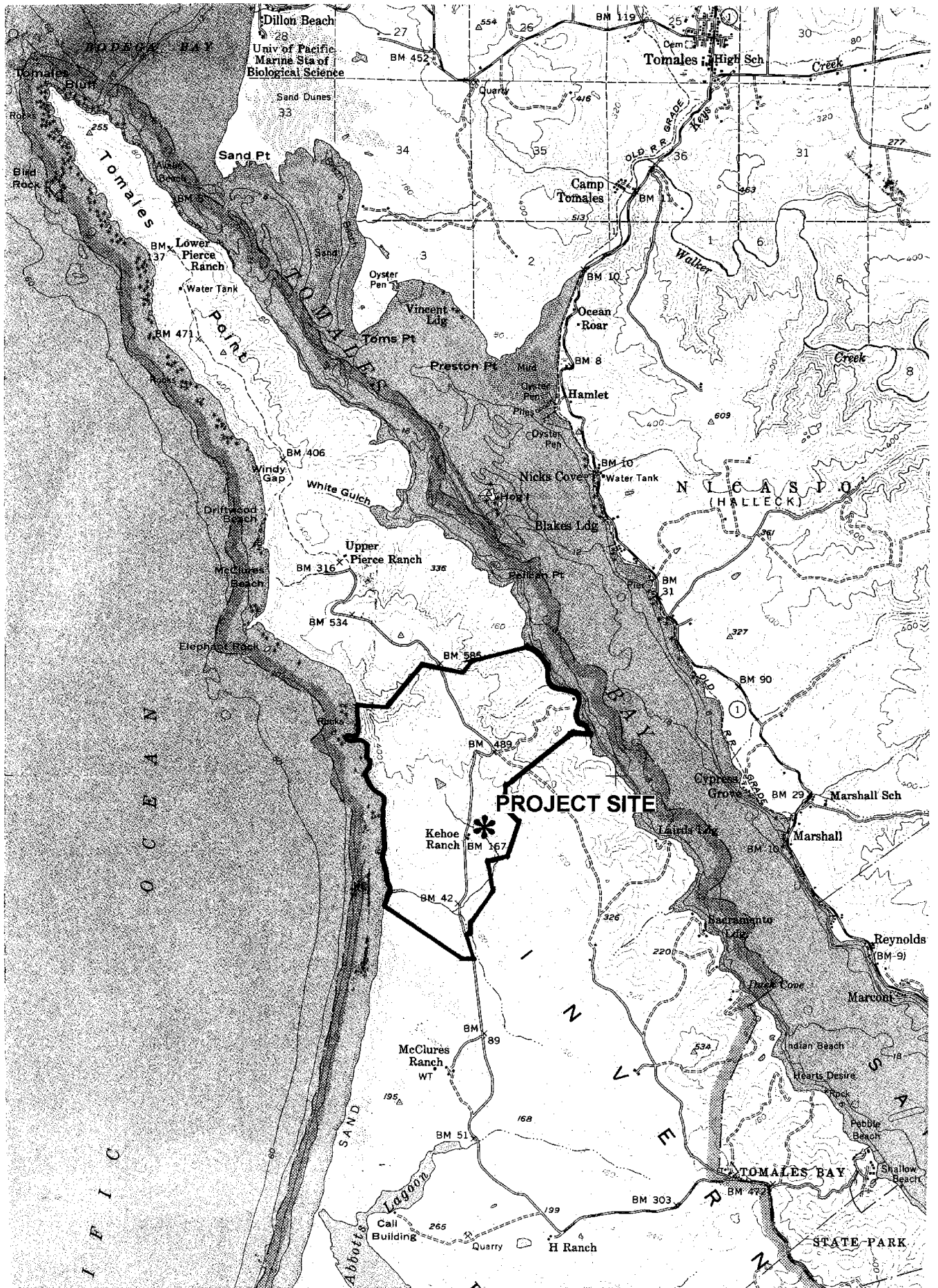
National Park Service. June 1993. *Statement for Management, Point Reyes National Seashore.*

National Park Service. July 1994. *Ranching on the Point Reyes Peninsula - A History of the Dairy and Beef Ranches within Point Reyes National Seashore, 1834-1992.*

Wildlife Research Associates. January 2003. *Biological Evaluation: Kehoe Dairy Improvement Project, Inverness, California.*

Appendix A

Project Location Map



SCALE: 1" = 1 MILE

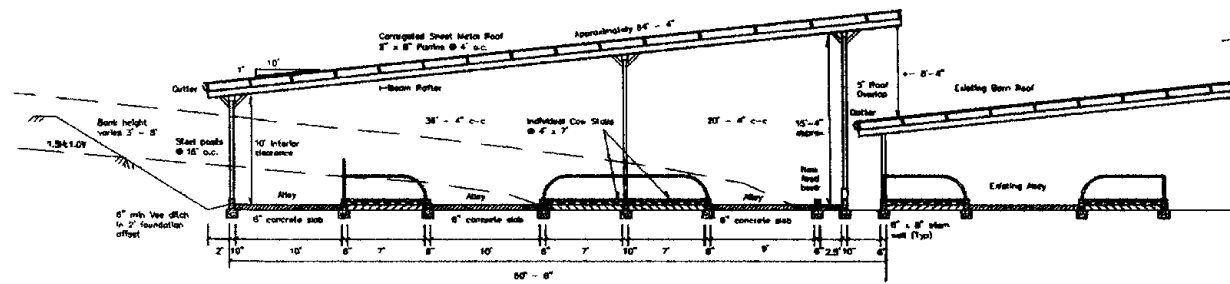
SOURCE: USGS

PROJECT LOCATION

AR 15049

Appendix B

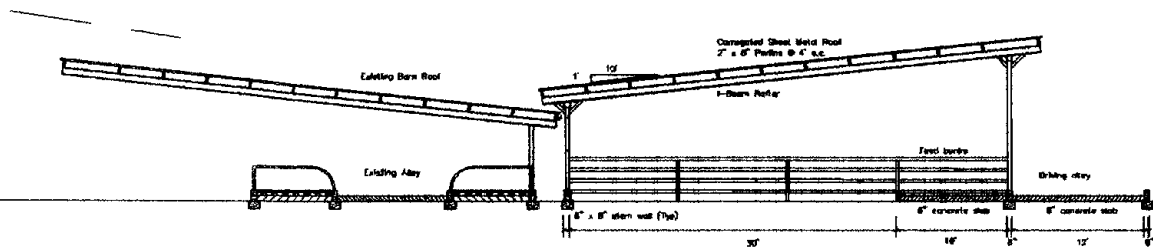
Project Site Plans and Profiles



Barn Addition - Typical Cross Section

Scale: 1" = 8'

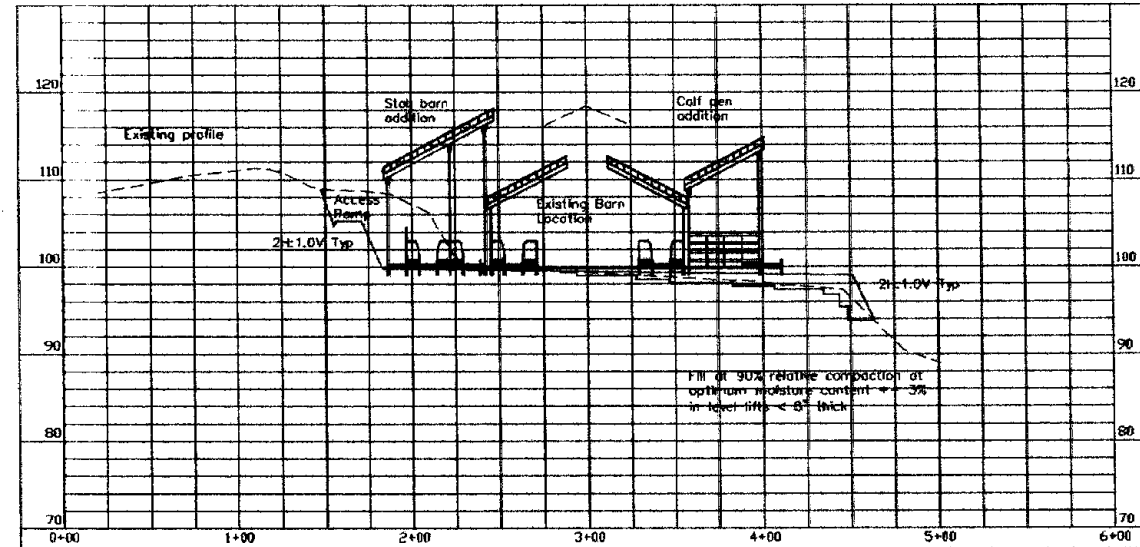
Schematic Design Only - Structural design and detailing to be provided by others



Calf Pen Addition - Typical Cross Section

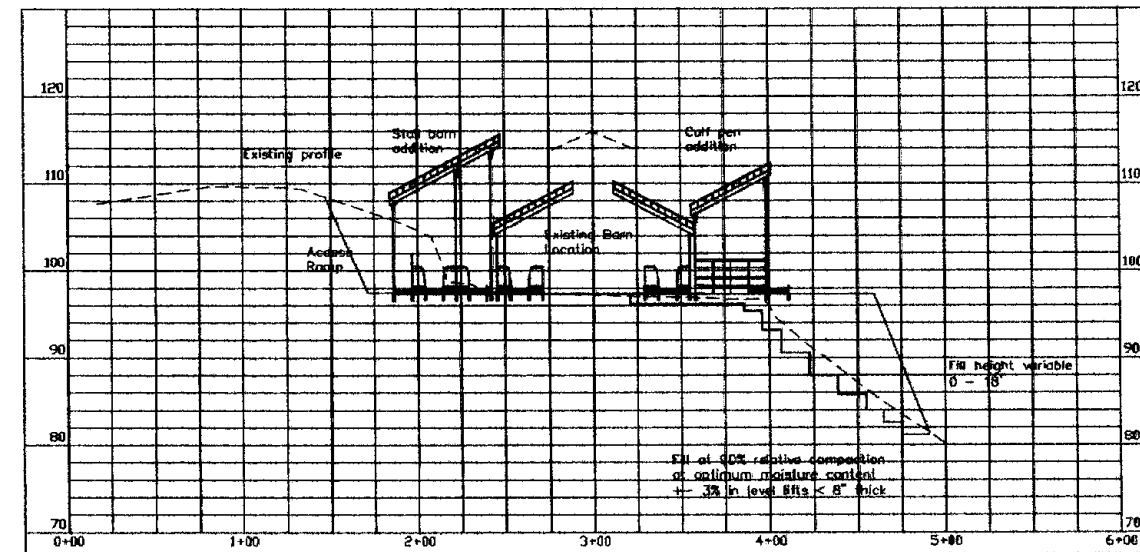
Scale: 1" = 8'

Schematic Design Only - Structural design and detailing to be provided by others



Profile on Section B - B'

Scale: 1" = 50' H 1" = 10' V



Profile on Section A - A'

Scale: 1" = 50' H 1" = 10' V

Prismoidal Volume Results

Original Surface Model:	Barn Combined
Final Surface Model:	eastpad, westpad
Total Cut Volume:	3500 cu yd
Total Fill Volume:	3500 cu yd

Date: August 20, 2002

Revised:

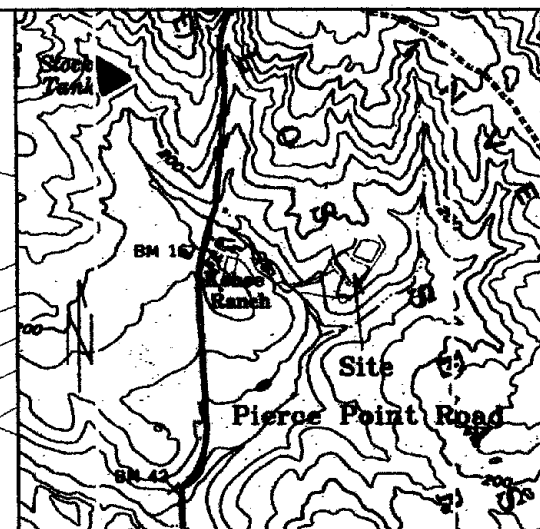
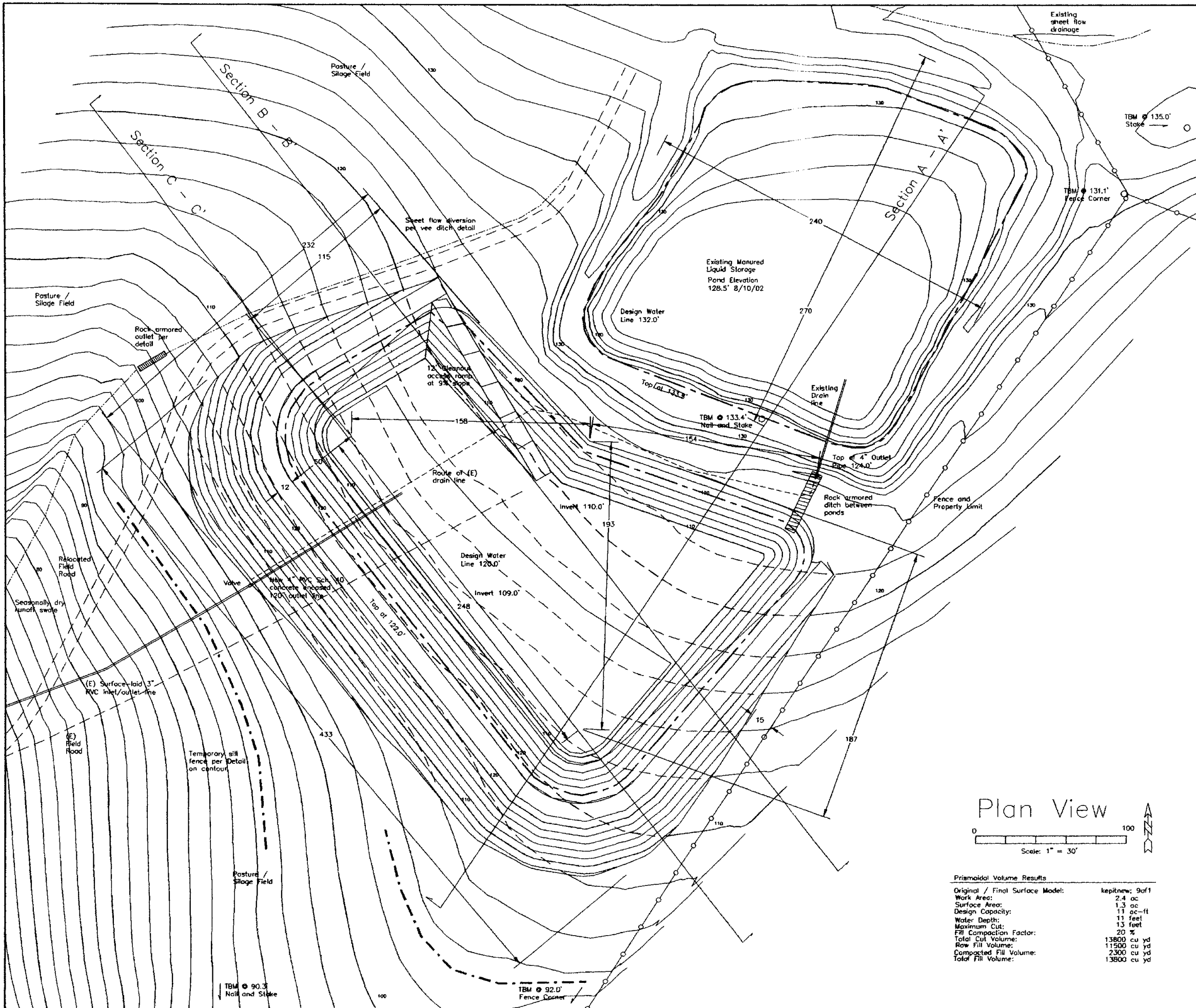
Scale: Noted

By: LRE 3 of 6

Erickson Engineering Inc.
Valley Ford CA 94972-0446
707-795-2498 Voice/Fax

Stall Barn Expansion
Profile and Details
APN 109-040-001

Kehoe Dairy
6150 Pierce Point Road
Inverness CA 95437

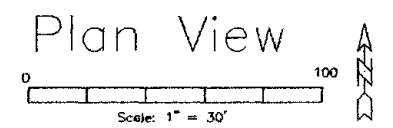


Location Sketch
 USGS 7.5-min Quad map: Tomales
 Scale: 1" = 1000' 20' Contours

Site topography based on intermittent data points collected using EDM equipment by E.I. Spring 2002. Benchmark elevation assumed North by magnetic compass. Contours by linear interpolation of intermittent data points. Field verify critical elevations and dimensions at time of construction.

LEGEND

	APPROXIMATE PROPERTY LINE		BUILDING
	UTILITY POLE W/ANCHOR		500 CONTOURS
	PAVED ROAD		525 CONTOURS
	UNPAVED ROAD		SOILS
	FENCE		CULVERT
	DRAINAGE		SALT FENCE
	VEE SWALE		WATER BAR
	SUBSURFACE DRAIN		DROP BOLT
	ROCK ARMOR		
	FIBER ROLL		



Prismoidal Volume Results

Original / Final Surface Model:	kepinew; 9af1
Work Area:	2.4 ac
Surface Area:	1.3 ac
Design Capacity:	11 ac-ft
Water Depth:	11 feet
Maximum Cut:	13 feet
Fill Compaction Factor:	20 %
Total Cut Volume:	13800 cu yd
Raw Fill Volume:	11500 cu yd
Compacted Fill Volume:	2300 cu yd
Total Fill Volume:	13800 cu yd



Date: August 20, 2002
 Erickson Engineering Inc.
 Valley Ford CA 94972-0446
 707-795-2498 Voice/Fax
 Sheet: 4 of 6
 Reviewed: Scale: Noted
 By: LRE
 Manure Storage Expansion
 11 Acre-foot Pond - Plan View
 APN 109-040-001
 Kehoe Dairy
 6150 Pierce Point Road
 Inverness CA 95437

General

1. Construction general provisions, materials, and methods shall be governed by the appropriate County Ordinances, Building Codes, and the Uniform Building Code, as applicable.
2. Temporary and permanent work shall conform to requirements and methodologies contained in the Erosion and Sediment Control Field Manual, California Water Quality Control Board, incorporated herein by reference.
3. Grading and drainage work may occur after October 15, providing that a County-approved Erosion Control Plan is in place, that good weather prevails, that the work area is small enough to be closed quickly, and that emergency supplies beyond minimum Plan requirements are on hand for storm water management if needed.
4. Landowner is responsible for locating property lines and for obtaining any easements and permits. Comply with requirements of all applicable County, State, Federal and other regulatory agency permits.
5. The Landowner or his/her designated vineyard manager is responsible for implementing and maintaining the erosion control measures in accordance with County, Agency and Plan requirements. Work shall conform to components of the Erosion Control Plan, including Time Line and Erosion Control System Maintenance Checklist.

Earthwork and Construction

1. Minor earthwork and shaping may occur in small lowland sites areas to smooth locations where tree root removal has occurred or to facilitate installation of drainage improvements. Minor volumes of earthwork associated with vee ditching and pipe trenching are expected.
2. For any cut and fill operations as shown on the plans, the following shall apply:
 - A. Salvage and stockpile the upper 12" sod from the work areas and borrow disposal areas. Materials shall be spread on finished cut and fill surfaces and compacted by truckwalking at completion of other work. Borrow limits are within the work area. Maintain minimum 2' offset plus half the heights of cuts or fills from any property line. Remove tree roots, limbs, and other organic matter down to 1" diameter from borrow materials.
 - B. Earthwork fill: Use level fills not to exceed 12" in thickness. Organic materials and rocks greater than 8" diameter are not permitted in the fill.
 - C. Compaction requirements:
 - i. None for non-engineered topsoil fill with depths less than 3'. Placement using dozer and track walking for compaction is permissible.
 - ii. 90% ASTM D1557 at optimum moisture content plus or minus 3% for engineered fill.
 - D. Maximum side slopes 2.0H:1.0V for terraces, cut and fill slopes, and vee ditches.
 - E. Trim all finished slopes to neat uniform appearance prior to installation of erosion control vegetation.

Temporary Storm Water and Sediment Control Components

1. Provide temporary erosion and drainage controls as required during construction and the first season of operation to prevent surface runoff from disturbed areas. Required temporary controls may include but are not limited to straw mulch and seeding, geotextile silt control fencing, straw bale check dams, fiber roll checks, jute netting, plastic sheeting, corrugated plastic pipes, and similar materials and assemblies. Monitor and maintain temporary measures on an as-needed basis to ensure satisfactory performance.
2. Temporary cover crops shall be installed on all disturbed areas and slopes in excess of 15% with less than 2 tons/acre residual dry matter. Slopes shall be aerified prior to installation by disc, chisel, or tracked equipment leaving tool marks parallel to slope. Seed, fertilizer, and mulch application rates shall be as noted in the Materials Specifications.
3. Silt control fencing shall be installed per manufacturer's recommendation. Place fencing at downslope perimeter of all disturbed areas during construction and development efforts. Place fabric on uphill side of stakes. Key bottom of fabric into 6" x 6" trench backfilled with local soil. Silt fence is inappropriate for use as vee ditching or water diversion on mid-slope areas.
4. Fiber rolls shall be installed per manufacturer's recommendations. Place on steep slopes at 50' on center, in swales, or other concentrated flow areas. Rolls should generally be on contour, with slight upslope concavity to provide for sediment retention. Secure in shallow shovel trench for underflow control, with placement stakes installed per specification.
5. Silt control fences, fiber rolls, and hay bale check dams are not appropriate for use in gullies or swales where significant runoff volume is expected. Use pipes, ditches armored with rock, jute, or synthetic mulching, or other appropriate means for water conveyance, erosion control, and sediment retention when flow volumes are expected to be significant.
6. Temporary plastic sheeting used for rainfall exclusion or surface water control shall be constrained by perimeter trenching and intermittent sand bags, rocks, or other appropriate weights or methods. sheeting shall be closely monitored and maintained. It shall be replaced if photodegraded, ripped, wind damaged, or otherwise incapable of providing the required performance.
 - i. If permanent drainage improvements will not be installed prior to onset of winter rains, temporary sheet flow controls consisting of low-slope vee ditches discharging to surface laid drain pipes are required in all disturbed areas.
 - ii. Temporary and permanent hillside diversions, vee ditches, and other flow control devices shall be staked and placed with aid of hand level and tape or transit.
 - iii. Maximum ditch slopes shall not exceed 5%, except in limited areas where unavoidable. Maximum tributary areas shall be on the order of 1/2 acre, with attention paid to limiting maximum sheet flow runs to 60' - 80' on slope perpendicular to contours.
 - iv. Temporary surface-laid drain lines shall be located in swales or areas of flow concentration. Lines shall be sized according to procedures required for permanent pipe installations. They shall have water tight inlets secured with a combination of soil berms, stakes, hay bales, sand bags, fiber rolls, or other appropriate means. The lines shall be secured using intermittent metal posts along the route. Pipes shall discharge in a non-erosive manner over plastic sheeting, rock riprap, or erosion-resistant natural features to a natural drainage way or sediment collection basin, as appropriate.

Permanent Storm Water Control Components

1. Install drain lines with minimum 12" cover according to manufacturer's requirements. Drain line depth may need to be greater to accommodate fillage and agronomic needs within the vineyard. Pipes shall be placed in uniformly sloped trenches. Backfill shall be moisture conditioned and placed at optimum plus or minus 3% to a density equal to pre excavation conditions or 90% ASTM D698 using hand or mechanical methods. Mound trench soil to allow for settlement. Install inlets, connectors, outlets, rock armor, collars, trash screens, and similar essential elements according to manufacturer's requirements, industry standard practices, and Plan details.
2. Install a sediment trap at individual drop inlet per Plan details. Install outlet sediment traps where noted at pipe outlets. Provide rock armor at pipe outlet locations and at ditch or swale discharge points. The pipe outlet invert elevation shall be above design water elevation of downstream improvements. Provide year-round site access for equipment necessary to clean and maintain capacity of inlets, pipes, and sediment traps.

Road and Field Avenue Components

1. Crown permanent roads with minimum 2% side slope for direct sheet flow into roadside ditches. Provide gravel or other appropriate armored wear surface of sufficient quality and thickness to prevent rutting and potholing during winter months.
2. Install seasonal rolling dips or water bars on all unimproved roads, spaced at a maximum of 100' on center. Spacing should be reduced to 50' on center in areas where the road is steeper than 20%.
3. Outslope roads where feasible or practical to minimize accumulation of concentrated flows in vee ditching. Where outslipping is not appropriate, install vee ditching on the inboard side of the road. Provide rock armored ditches where slope invert materials, or water velocity creates significant scour potential. Provide intermittent permeable rock checks in steeper or larger ditches to minimize velocity and increase capture of sediment.
4. Provide intermittent culverts for diversion of vee ditch flows to natural drainage ways. Minimum culvert size per construction plans shall be 12" O.D.P. HDPE n=.012 may be used where minimum 12" cover can be achieved. Slope all culverts at minimum 5% to outfall.
5. Provide rock armor at culvert outfall for a distance of 5d diameters using d90 rock size of 0.75 d in a bed thickness of d inches.

Permanent Erosion Control Measures

1. Provide permanent erosion control, sediment retention, and drainage controls as required by the site-specific Erosion Control Plan. Plan components are shown on the drawings and may include but are not limited to: permanent cover crops, hillside contour ditches, surface and subsurface drainage lines, drop inlet structures, armored vee ditches and channels, sediment detention basins, vegetated filter strips, and similar components.
2. Permanent cover crops shall be installed on all disturbed areas and on slopes in excess of 15% with less than 2 tons/acre residual dry matter. Seed, fertilizer, and mulch application rates shall be as noted in the Materials Specifications.
3. Permanent erosion and storm water control systems shall be installed in conjunction with vineyard development and shall be in place by time of vineyard planting.
4. Developer shall restore workable around construction and staging areas to original conditions at completion of construction and erosion control activities. Cleanup shall include piling of any salvaged sod and topsoil, finish grading, and revegetation of disturbed areas in a neat and workmanlike manner.

Materials Specifications

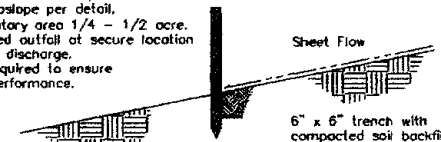
1. Drain lines, pipe connectors and fittings, drop inlets, and drop inlet collars shall be HDPE n=.015 with water tight joints or better, except where noted on the plans.
2. Culverts and drain lines subjected to vehicular traffic shall be HDPE n=.012 dual wall with water tight joints or better with minimum 12" compacted cover.
3. Concrete standpipes or inlets shall be commercially cast reinforced pipe with female end up, grouted in place. Where specified, commercial grouted rectangular drop inlets shall be used.
4. Concrete shall be 5.5-sack mix using 3/4" aggregate rated at 3000 psi minimum compressive strength at 28 days.
5. Rock riprap shall be specific gravity 2.56, with size distribution as shown on the drawings.
6. Rock for subsurface drains shall be 3/4" - 2.5" drain rock, 3/8" double washed pea gravel, or 3/4" - 1.5" lava rock.
7. Filter bedding where used shall be 1.5" minus pit run blue shale road base. Alternative bedding shall include Mirafi 400s, 500s, 700s or equivalent geotextile fabric.
8. Temporary geotextile silt control fencing shall be Mirafi Silt Control Fence or equal.
9. Temporary plastic sheeting shall be 6 mil or thicker.
10. Fiber rolls shall be minimum 8" diameter. Commercial products or economical functional equivalents fabricated on site using straw mats or jute netting and baled straw are permissible.
11. Straw mulch for mulch placement on slopes of 2H:1V or greater shall be North American Green S-75 or equal or better.

Revegetation Materials

1. The erosion control revegetation mix shall be according to recommendation of the agronomist, with a minimum application rate of 25 lb/ac, increasing to 50 lb/ac on slopes over 25%. 16-20-00 fertilizer at a rate of 150 lb/ac or cow manure at 500 #/ac shall be applied at the time of seeding. Mulch shall be grass hay or rice straw spread at a rate of 2 tons/acre. Crimping, tacking, replenishment, or other appropriate retention measures may be required to maintain adequate cover during windy periods prior to onset of winter rains.
2. Permanent Erosion Control Blend:
 - 40% Annual Rye
 - 30% Rose Clover
 - 15% Cucumerge Bromo
 - 15% Trifoliate

Mirafi Silt Control Fence or equal

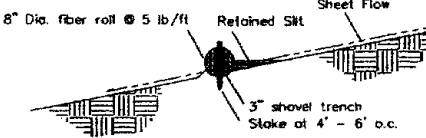
- Install on contour at lower edge of work area.
- Install per Manufacturer's specifications.
- Place fabric upslope per detail.
- Maximum tributary area 1/4 - 1/2 acre.
- Provide armored outfall at secure location for sheet flow discharge.
- Maintain as required to ensure satisfactory performance.



Silt Control Fence
No Scale

Fiber Roll Check

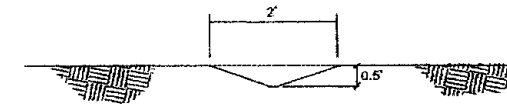
- Install on contour on hill slopes, in swales, or areas of concentrated flow.
- Install commercial products per Manufacturer's specifications.
- May be fabricated from straw and netting material.
- Place ends slightly upslope for silt retention.
- Maximum tributary area 1/4 - 1/2 acre.
- Maintain as required to ensure satisfactory performance.



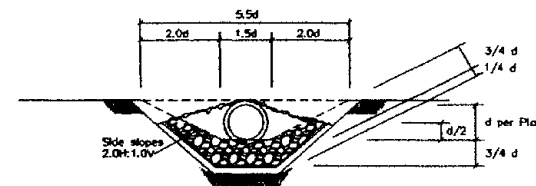
Fiber Roll Check
No Scale

Vee Ditch Detail

- Side slopes 2.0H:1.0V.
- Install per Plan View requirements.
- Maximum tributary area +/- 1/2 acre.
- For any segments over 10% slope or lengths over 300', install permanent fiber mat armor in ditch invert.
- Maintain as required to ensure satisfactory performance.



Vee Ditch Detail
No Scale



Rock Armor Detail
No Scale

Rock Riprap Specification
Specific Gravity 2.56
• d15 d/4
• d50 d/2
• d85 d

Filter Bed Specification
1-1/2" minus pit run blue shale road base or Mirafi 400s or equal/better geotextile fabric.

Appendix C

Engineering Report (Grading Permit Application)

APPLICATION FOR EXCAVATING, GRADING, OR FILLING PERMIT

County of Marin
Department of Public Works
P.O. Box 4186
Room 304, Civic Center
San Rafael CA 94903-4186

August 20, 2002

415/499-3799

Re: Manure Pond Expansion
Barn Pad Expansion
Tim Kehoe, Kehoe Dairy
6150 Pierce Point Road
Inverness CA 94937

APN 109-040-001
415/669-1696

The undersigned hereby applies for approval to excavate, grade, or fill on land in unincorporated areas of the County of Marin by performing the following work: (Applicant will describe here fully what he wishes to do using reverse side or extra sheets, if necessary, and attach two copies of plans.)

Applicant's Attention is Directed to Section 23.08 of the Marin County Code

The work proposed involves construction of a milk cow barn pad (3800 cy) and a remote manure storage pond (13800 cy) and associated grading per the attached cover letter, design computations, and construction drawings.

Applicant agrees to do work in accordance with Marin County Code Section 23.08 and the rules and regulations of the Marin County Department of Public Works subject to its inspection and approval.

Marin County Area: _____

Excavation Permit Number: _____

Parcel No. _____ Prepared by: _____
Plotted by: _____

Inspection fee, \$: _____

Surety bond, \$: _____

Permit Issue Date: _____

Owner/Applicant Signature

Tim Kehoe
Kehoe Ranch
6150 Pierce Point Road
Inverness CA 94937
415/669-1696

Erickson Engineering Inc.
Valley Ford CA 94972-0446 707/795-2498 Voice/Fax

County of Marin
Department of Public Works
P.O. Box 4186 Room 304, Civic Center
San Rafael CA 94903-4186

August 20, 2002

415/499-3799

Attn: Grading and Drainage Review

Re: 13,800 cy embankment for 11 ac ft manure pond levee
3,400 cy pad for stall barn expansion
APN 109-040-001
415-663-1696

Tim Kehoe
Kehoe Dairy
6150 Pierce Point Road
Inverness CA 95437

Enclosed please find design and documentation material for the above referenced projects that are believed to conform to County standards. The work consists of earthwork cut and fill operations to construct: a) an earthfill embankment 0 – 20' high for an 11acre-foot capacity manure storage pond and b) level pads on either side of an existing dairy stall barn to allow enlargement of the structure. The work is located in Point Reyes National Seashore on a large rural parcel in the unincorporated area of Marin County. A summary of design criteria follows.

Grading Summary: The work sites will be cleared of grass and sod. Topsoil will be salvaged and stockpiled for placement over finished grade cut and fill surfaces. Compacted fill earthwork quantities are estimated at 3400 cy for the barn pads and 13,800 cy for the manure pond levee. Cut and fill volumes have been balanced on a project basis to avoid import or export of bulk materials. Certain infrastructure will be relocated or removed to accommodate the grading work, including but not limited to corral fences, existing concrete pads, feeders, fuel storage, an old barn, and a lean-to shed attached to the farm shop.

Resource Agency Reviews: The project sites are in upland off-channel areas. The barn pad expansion site is presently denuded dairy corrals for cows and calves. The manure pond site is a ridge crest pasture with introduced grasses, thistles, and other noxious weeds present. There are believed no habitat, channel, stream, riparian, fisheries, endangered species, wetlands, or other issues or conditions of concern to CDFG or other Resource Agencies at the separate locations. Existing infrastructure between barn and manure pond site consists of ranch roads with gully crossing, fences, and a surface-laid liquid transfer pipe line, none of which will be changed or affected by the site improvements.

Geologic Setting: The California Division of Mines and Geology map archives were consulted to evaluate the site geologic setting. The sites are characterized as being underlain by Pwg Pliocene-era (2 - 5 million years old) Wilson Grove formation (marine sandstone, conglomerate, tuff) bedrock.

The barn construction site is on the east flank of a gentle hilltop ridge crest at 0 – 15% slope, adjoining an area previously leveled for the existing barns. The manure pond site is on a ridge crest at 5 – 15% slope immediately downslope of an existing manure pond. Site topography, soil morphology, and existing cut and fill slopes at both sites is consistent with parent materials of siltstone - mudstone - sandstone and shale subjected to weathering and decomposition. There is no surficial evidence of seepage, soil creep, or landslide-type instability in the construction envelopes.

The geologic map resources do not indicate presence of any ancient fault lines at the contact of the various mapped soils units in the general vicinity. The geologically active San Andreas fault line is located in Tomales Bay, about 2 miles east of the site. The barn pad and manure pond sites could therefore be expected to undergo ground shaking during the lifetime of the project.

Possible earthquake effects include fault rupture, ground shaking, liquefaction, and lateral spreading or lurching. Since there are no known fault lines in the immediate work areas, fault rupture is unlikely. Liquefaction is most closely related to loose or saturated cohesionless soils undergoing ground shaking, and is considered of low probability at the sites due to the presence of moderately cohesive well-drained soils over relatively shallow decomposed bedrock with limited moisture present. The fill materials will be compacted to 90% ASTM D1557, and minor surface runoff will be routed around the sites, minimizing risk of presence of saturated or loose materials. Lateral spreading is related to movement of horizontal alluvial layers adjacent to an exposed face. Lurching is cracking or separation of soil parallel to unsupported cliff or stream banks. Since neither condition is present on site, potential of these conditions occurring is low.

Consistent with site grading activities for a remote agricultural facility, conservative design and construction criteria have been specified in lieu of detailed geotechnical analysis or characterization of site soils. By observation, the sandy loam topsoil and loam subsoils underlain at depth by durable fine-grained siltstone/sandstone are believed to be of moderate to low permeability, suitable for use as pad and embankment fill material. The existing manure storage pond has embankments up to 10' high with no observable seepage in or through the levee structure, providing anecdotal evidence of satisfactory low permeability for embankment construction. Soil plasticity is believed low, based on modest clay content and low level of shrinkage cracking in desiccated soils. Site cut and fill slopes have been specified at an industry standard of 2.0H:1V or flatter, considered conservative under all loading conditions. Specifications are in conformance with standard UBC requirements and minimize site footprint and earthwork requirements at these hillside locations. Topsoil salvage and removal of deleterious organic material is required. 90 percent relative compaction is specified for level lifts at optimum moisture content plus 3% on prepared subgrade to ensure fill integrity and to minimize permeability.

Soils: The USDA-NRCS Marin County Soil Survey Sheet 2 – (Tomales quadrangle) indicates the mapped soils units are #136 (Kehoe loam 9 - 15% slopes) on the uplands containing the work sites. The adjoining lowland areas outside the work area are located in a narrow valley between the work areas where the soils are categorized as #160 (Rodeo clay loam 2 – 5%).

136 – Kehoe Loam 9 - 15%: Per the soil survey, this deep, moderately well drained soil is on rolling uplands and was formed in material derived from sandstone. Slopes are smooth. A typical surface layer includes 36" of dark grayish brown loam classified ML. It is typically underlain by 12" pale to very pale brown fine sandy loam classified ML. Subsoils transition to weathered and decomposed sandstone encountered at about 4'. Bedrock occurs at greater depths and less weathering is observed at depth. Observation of local topography and the adjoining silage pit cut and fill slopes and existing manure pond cut and fill slopes is consistent with the USDA mapped soil units.

Permeability is expected to be moderate, with moderate water holding capacity. Plasticity is low to moderate with surface soil PI at non-plastic to 10 and subsoil similarly classified. Corresponding liquid limit ranges are reported at 25 – 35. Runoff on unprotected slopes is expected to be rapid with moderate to high water erosion potential.

Barn Pad Hydrology: Rational Method procedures were used to estimate a 100-year design flow for surface runoff from the barn pad project site. The methodology of CalTrans District 4 was used, per the typical Marin County design approach.

Upslope tributary areas affecting the barn pad work site are relatively small due to constraining topography and the ridge crest location. Vegetated vee ditches and roof runoff controls will be used to the extent possible to divert clean runoff from the manure management system. The westerly pad is cut into native material and will essentially be covered by the barn roof extension. The easterly pad fill will be partially covered by the calf pen roof system. The remaining fill pad will be outsloped at 1% to promote diffuse sheet flow drainage away from structural improvements.

Rainfall values for the 100-year storm in various parts of the work area range from 1.8 to 4.8 inches, per the attached spreadsheet summary. Surface runoff from the uplands and from the vegetated cut slope will be by low-slope vegetated vee ditches per the attached spreadsheet Manning's Equation computations. A 6" – 8" vegetated vee ditch is satisfactory for all flow conditions per the attachments. Roof runoff will be managed using downspouts and directing flow to a 12" n=.012 culvert extension of the existing fresh water drainage system. The calf pen site runoff will be via diffuse sheet flow to downslope areas with permanent vegetation.

Manure Storage Pond Hydrology: Discharge of manured water from waste storage areas is not allowed, per State Water Quality Control Board regulation. System storage volume design criteria is therefore a function of regulatory requirements, annual rainfall totals, storm surcharge volumes, and manure produced within the system, rather than the traditional surface runoff hydrology associated with reservoir design. The manure storage pond is sized to retain the annual design volume without discharge. The pond therefore does not include a principal or emergency spillway and capacity is managed in a manner to prevent overtopping or discharge under all circumstances.

Capacity management includes creation of a storage volume consistent with regulatory requirements, minimizing clean water inputs into the management system, emptying all storage ponds via land application of liquids and solids at agronomic rates over wide areas prior to onset of winter rains, discharge of clean water from empty and clean storage areas until time of use in the rainfall season, and backup/contingency plans and hardware for land disposal of liquid and solid wastes on an as-needed basis throughout the year.

Required system storage capacity has been evaluated for foreseeable agricultural demands and factored into the present design. It includes containment of animal manure and manured surface runoff water for a 600+ cow facility based on site-specific information. Per State Water Code, it is designed to retain runoff for the 10-year wet winter and for the 25-year, 24-hour storm for the entire facility. Design values at this site include 24" average annual rainfall, 35.8" 10-year wet winter rainfall, and 3.6" rainfall for the 25-year 24-hour storm. Computations were completed using a spreadsheet format, which is attached.

The proposed waste storage pond has a water surface of about 1.33 acres at the design storage elevation, with an 11 acre-foot capacity. The structure is the last cell in a series of ponds with about 19 acre-feet total capacity, and therefore will remain unused for about half the rainfall season. During that time, clean rainwater will be discharged, increasing effective system capacity by about $1.3 \text{ ac} \times 1' = 1.3$ acre feet relative to actual capacity. The 4+ acre foot pond immediately upstream will settle out any manure solids not already captured in the first 2+ acre-foot cell, so that the material stored in the last pond will be primarily liquid. Liquid can be disposed of by irrigation via an existing system, or by use of an on-site 4200 gallon tank truck for delivery to remote silage fields.

Erosion Controls: The plans and specifications require construction during the dry season, temporary geotextile fencing, seeding and mulching, and other appropriate measures used on an as-needed basis to prevent soil mobilization and sediment transport to downslope areas. Little erosion potential is expected in this moderate rainfall area with work completed during the dry season. Permanent erosion

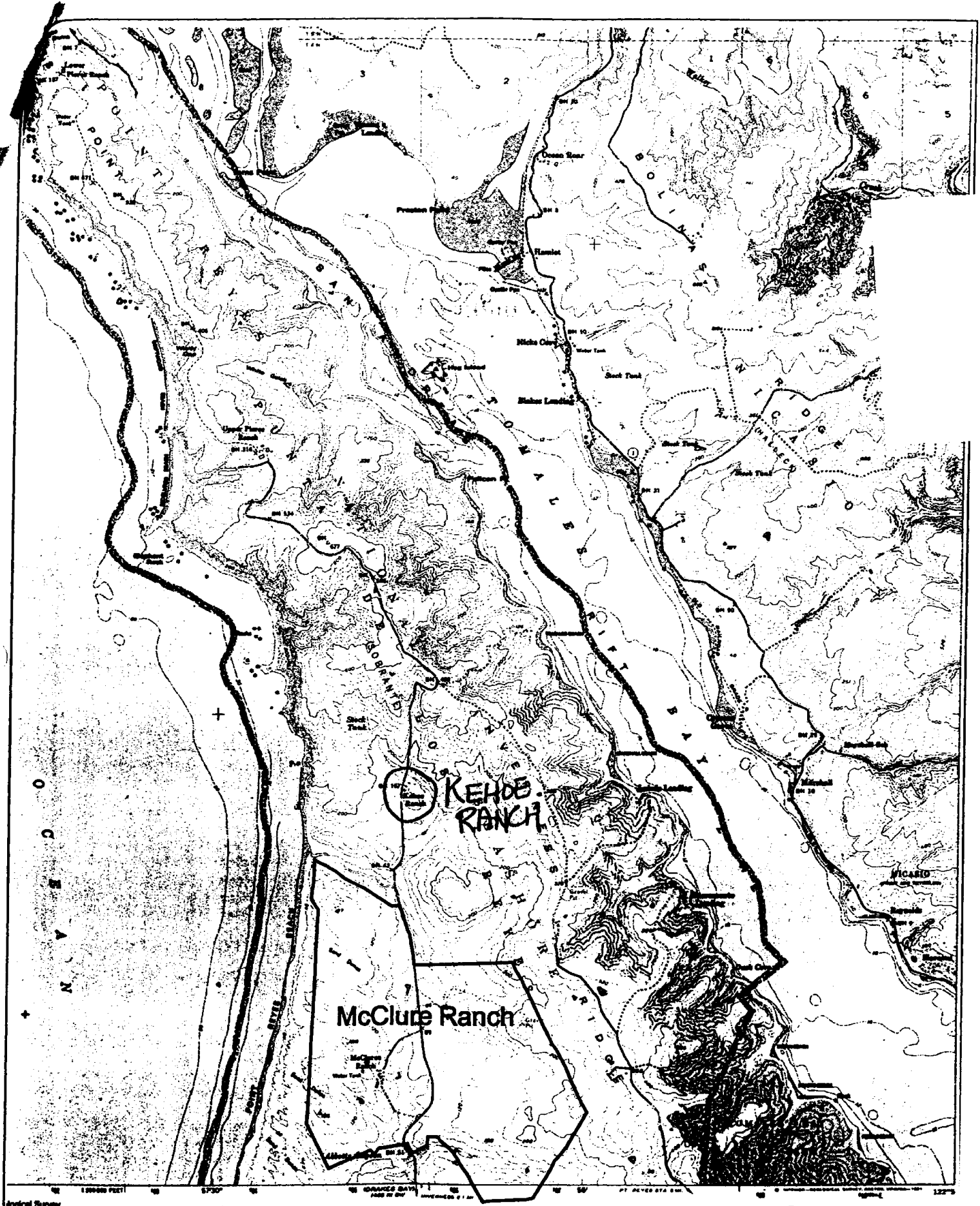
control measures include permanent cover crop conditions on embankments and within the developed hillside areas.

We trust that the narrative above and the enclosed design and construction materials provide satisfactory documentation of the work. Please call if you have comments or questions, or if additional materials are required.

Very truly yours,

Lee Erickson, PhD CE45660 AE468
Civil and Agricultural Engineer

Enclosures: Plans, Engineering calculations
cc: Client
Whitmire Consulting

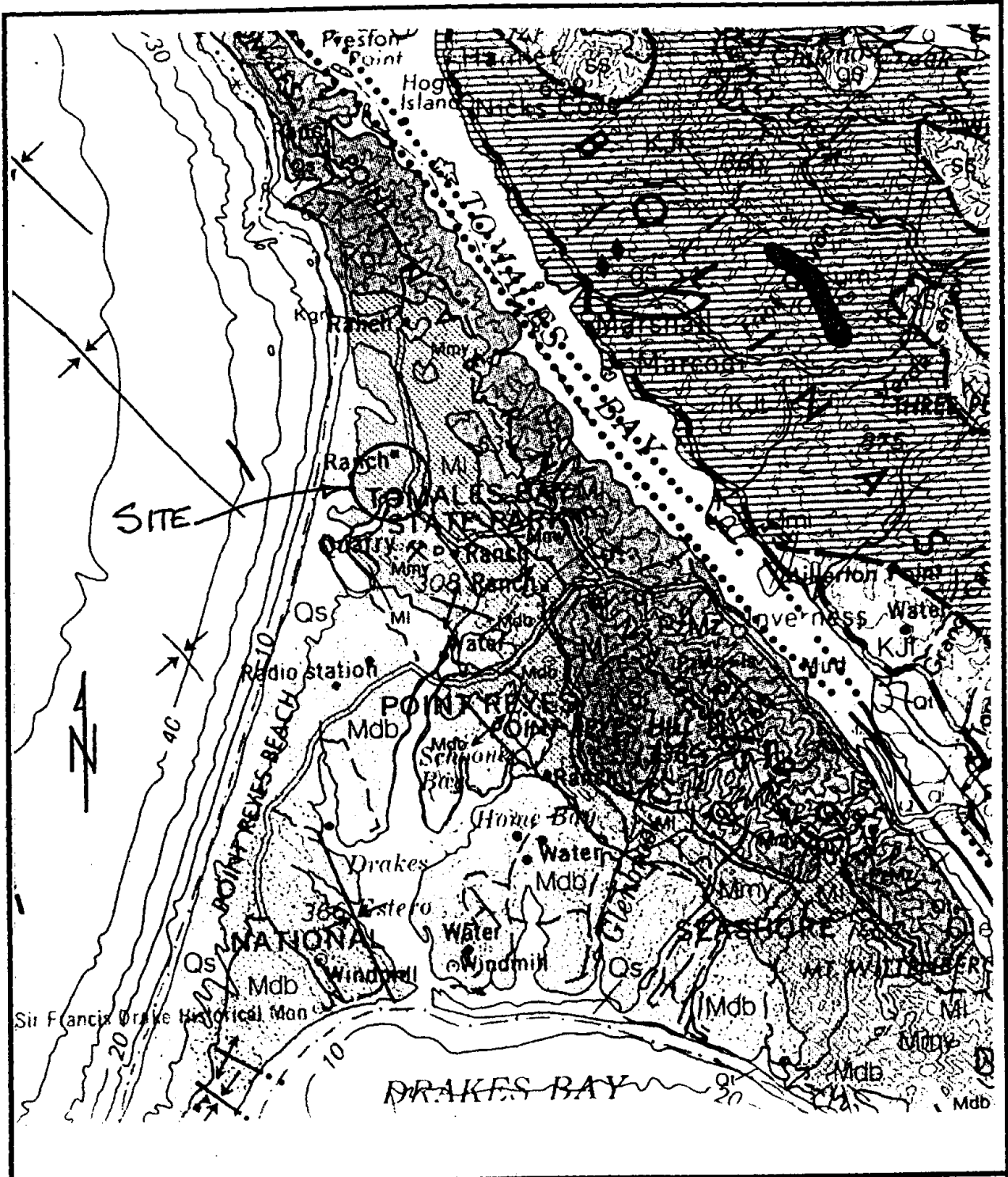


DATE: January, 2001
 SCALE: 1" = 4000'
 CHECKED BY: MN
 DRAFTED BY: EA

Point Reyes National Seashore
 Project Location Map
 on USGS Topo "Tomales"

Figure

AR 15060

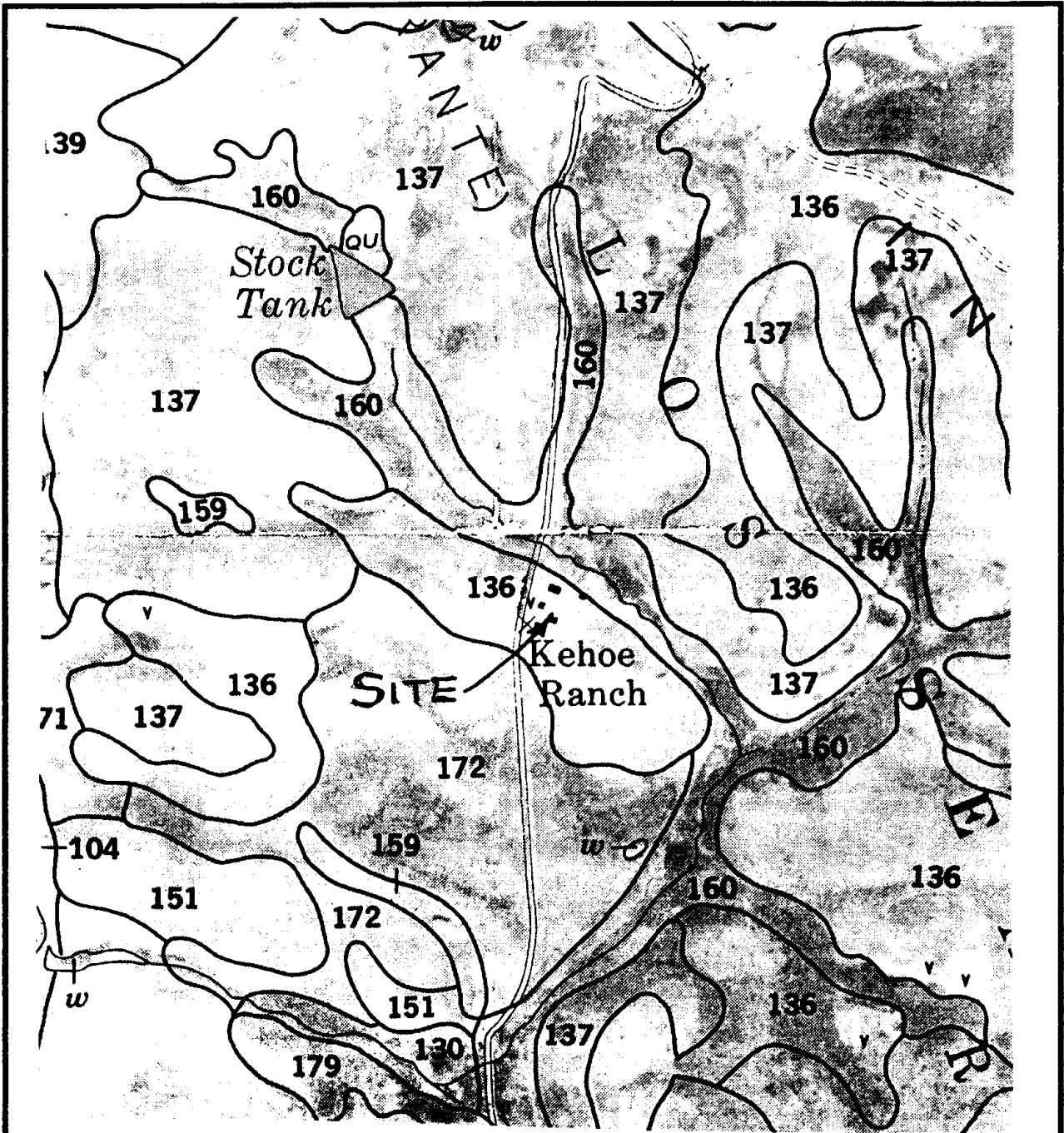


Ranch Barn Pad

- Geologic Setting

Erickson Engineering Inc.
 Valley Ford CA 94972-0446
 707/795-2498 Voice/Fax

Scale: 1:125,000 May 12, 2001
 California Div. Mines, Geology
 Santa Rosa Quad Map 2A - Geology

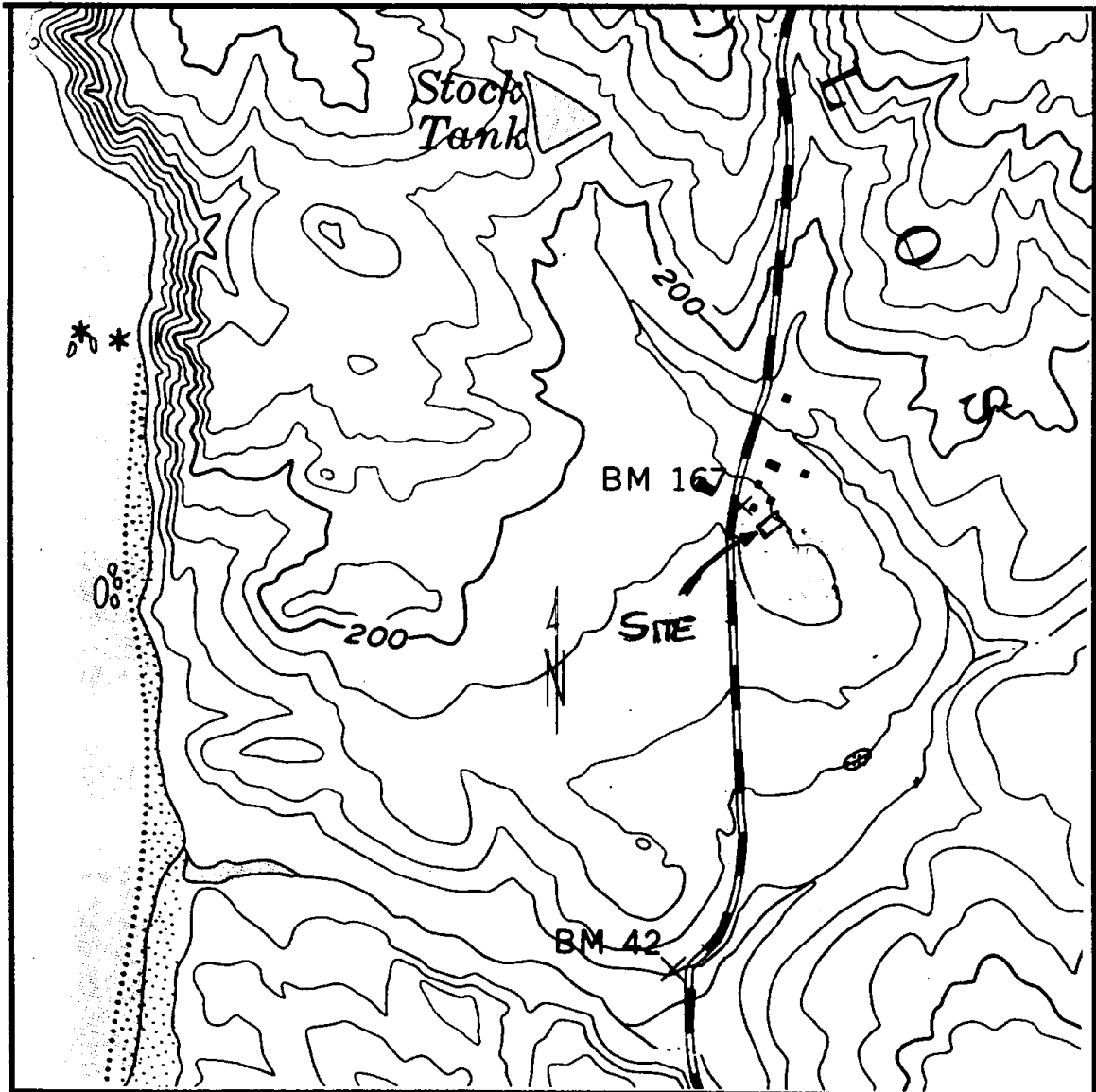


136: Uplands - Kehoe loam 9 - 15%
 160: Lowlands - Rodeo clay loam 2 - 15%

Kehoe Dairy, Pierce Point Road, Inverness CA 95437
Soils per USDA SCS Marin County Soil Survey

Erickson Engineering Inc.
 Valley Ford CA 94972-0446
 707/795-2498 Voice/Fax

June 4, 2002
 Map Sheet Tomales Point



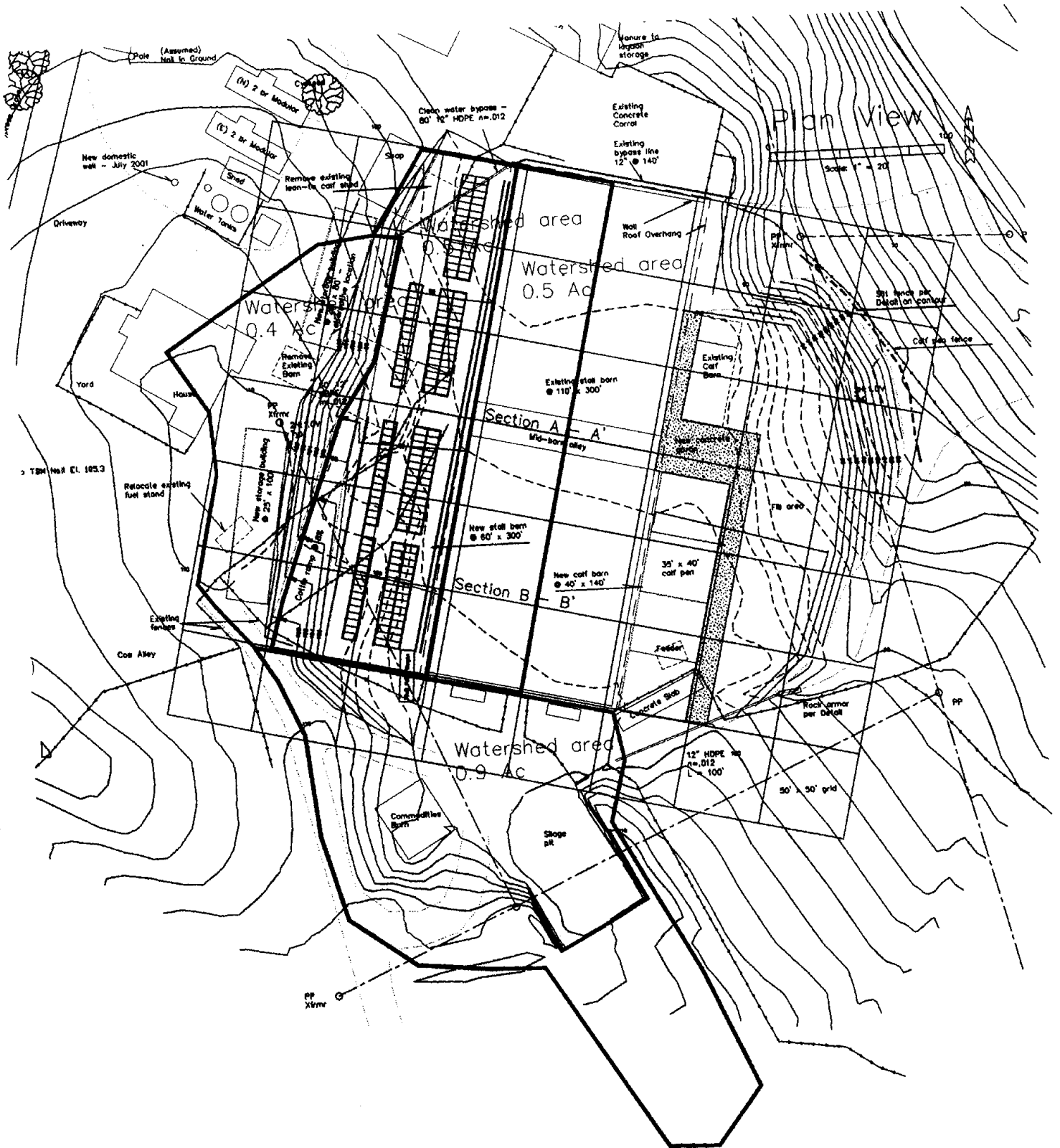
Location Sketch

USGS 7.5-min Quad map: Tomales
 Scale: 1" = 1000' 20' Contours

Kehoe Dairy - Watershed Areas

Erickson Engineering Inc.
 Valley Ford CA 94972-0446
 707/795-2498 Voice/Fax

June 4, 2002
 USGS 7.5min Map: Tomales
 Scale: 1" = 1000' Contour Interval 20'



Marin County Hydrology
 Kehoe Ranch
 Barn Pad Grading/Drainage

File: xl2000/projects/kehoe/hydro
 Time: 11:18 AM
 Date: 05-Jun-02
 Updated: 04-Jun-02

Methodology and references from Caltrans, District 4.

Design Rainfall Intensity, Map "I"
 1-hour, 100-year isohyets
 I-1,100 = 1.65 inches/hour

Design Rainfall Variations, Map V
 Site is Zone A1
 1.65 i in/hr

Runoff coefficient "c" = 1.0 for direct surface precip, no watershed area.

Runoff coefficient "c" = .45 for rural vegetated areas, slopes < 20%,

Calculate Time of Concentration Tc for each site $T_c = \{ [1.8 * (1.1 - c)^{1.5}] / [s * (100)]^{1/3} \} + 5 \text{ min.}$

	Watershed Dimension			Slope	Chart K	
	c	L, ft.	delta H, ft.	s, ft/ft	Tc, min.	I-1,100 iph
West hill and cut bank	0.45	150	12	0.080	40.4	1.8
Barn Roof (New Section)	1.00	60	6	0.100	7.8	4.8
Barn Roof (Old Section)	1.00	60	6	0.100	7.8	4.8
Silage to east swale	0.45	180	10	0.056	60.8	1.65

Use Chart "K" for Zone A to evaluate Intensity (in/hr) for use at each site.

Find chart curve using I-1,100 = 1.65 iph at Tc = 60 min.

Read I-1,100 for each site at Tc values in table above.

	c	I-1,100 iph	Topo map Acres	Q = c * I * A		
				Q100 cfs	Q500 cfs	Q1000 cfs
West hill and cut bank	0.45	1.8	0.4	0.3	0.4	0.4
Barn Roof (New Section)	1.00	4.8	0.4	2.0	2.4	2.6
Barn Roof (Old Section)	1.00	4.8	0.4	2.0	2.4	2.6
Cumulative Total for freshwater diversion, west side				4.3	5.2	5.7
Silage to east swale	0.45	1.65	0.9	0.7	0.8	0.9

From Chart K for (25 min < Tc < 50 min), 10 vs 100 yr intensity ratio = .64-.65

From Frequency Distribution Ratio Chart "R", multipliers for various return periods may be found.

For R (10/100) = .64-.65, 500-yr = 1.22 x 100 yr.

For R (10/100) = .64-.65, 1000-yr = 1.33 x 100 yr.

For R (10/100) = .64-.65, 2000-yr = 1.43 x 100 yr.

Use Mannings Equation to evaluate minimum pipe sizes

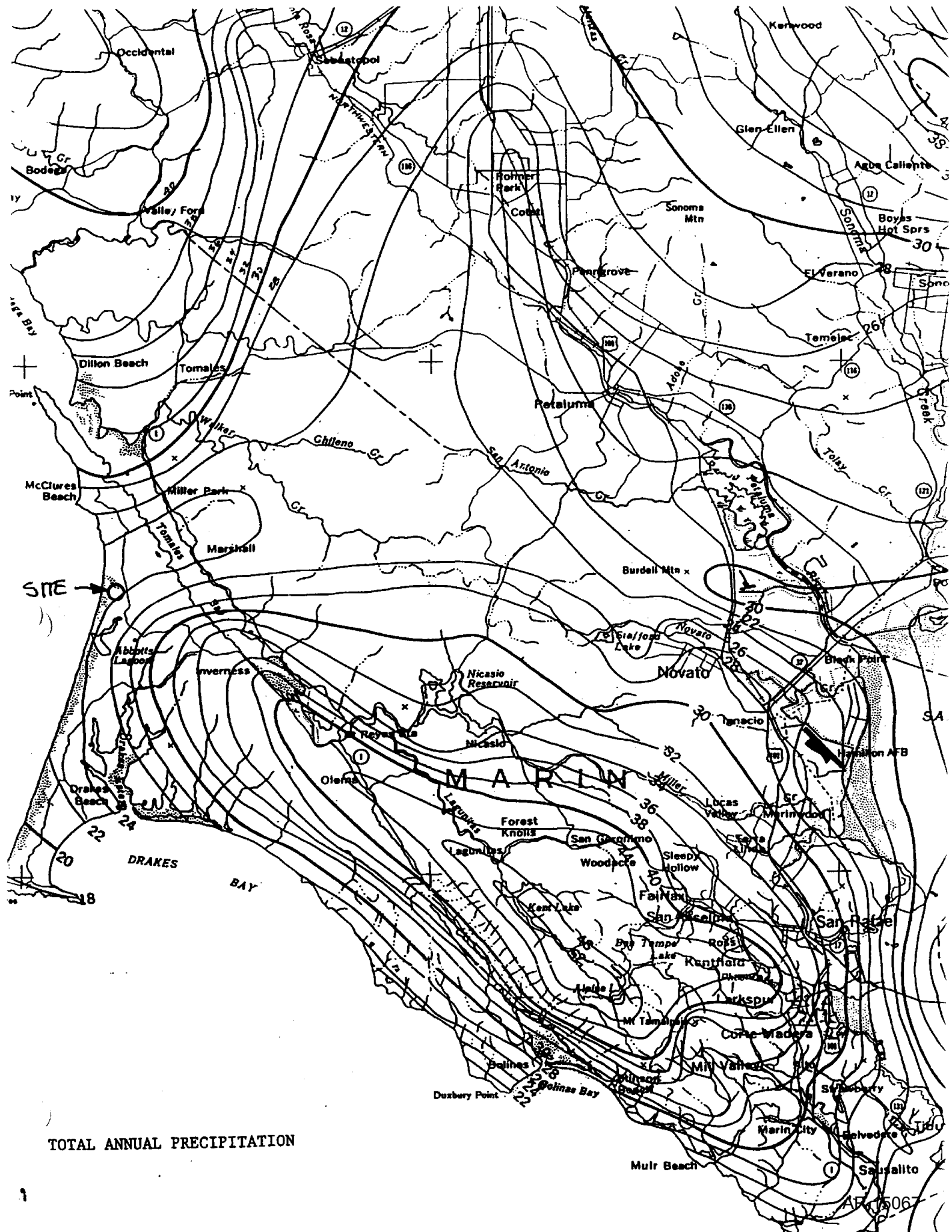
*Q100 used for design flows - low risk location
 Agricultural facility*

Mannings Equation, Circular section		West Side of Barn Q100 = 4.3 cfs	
Provides V, Q based on Diameter for given n, slope		<i>12" culvert system for roof gutters, Bypass Flows</i>	
Input Parameters		Output Parameters	
12.0 inch pipe diameter	H2O Depth d:	7.00 inches	0.58 ft at outlet
0.58 d/D ratio ← <i>OK</i>	Sector above H2O:	1.40 ft	2.09 Froude No.
0.012 Manning's n	Circumference:	3.14 ft	2.54 ft crit depth
0.030 s, channel slope ft/ft	theta:	2.81	
33.333 1/s, chl slope, ft/100 ft	Water area:	0.48 sq ft	0.79 pipe area
0.6 C, inlet coefficient	Wetted Perim:	1.74 ft	
<i>provide rock riprap @ outfall</i>	Hydraulic Radius:	0.27 ft	Inlet at pipe depth
<i>Short term Flow - OK</i>	Outlet Velocity:	9.04 ft/sec	CA(2gd) ^{.5}
	Outlet Flow Rate:	4.30 cfs	3.78 cfs inlet
Outfall Parameters		Max Outfall Time:	0.86 sec; (2D/g) ^{.5}
	Max/Actual Transition Distances:	7.80 ft, V(t)	4.55 ft, V(t)

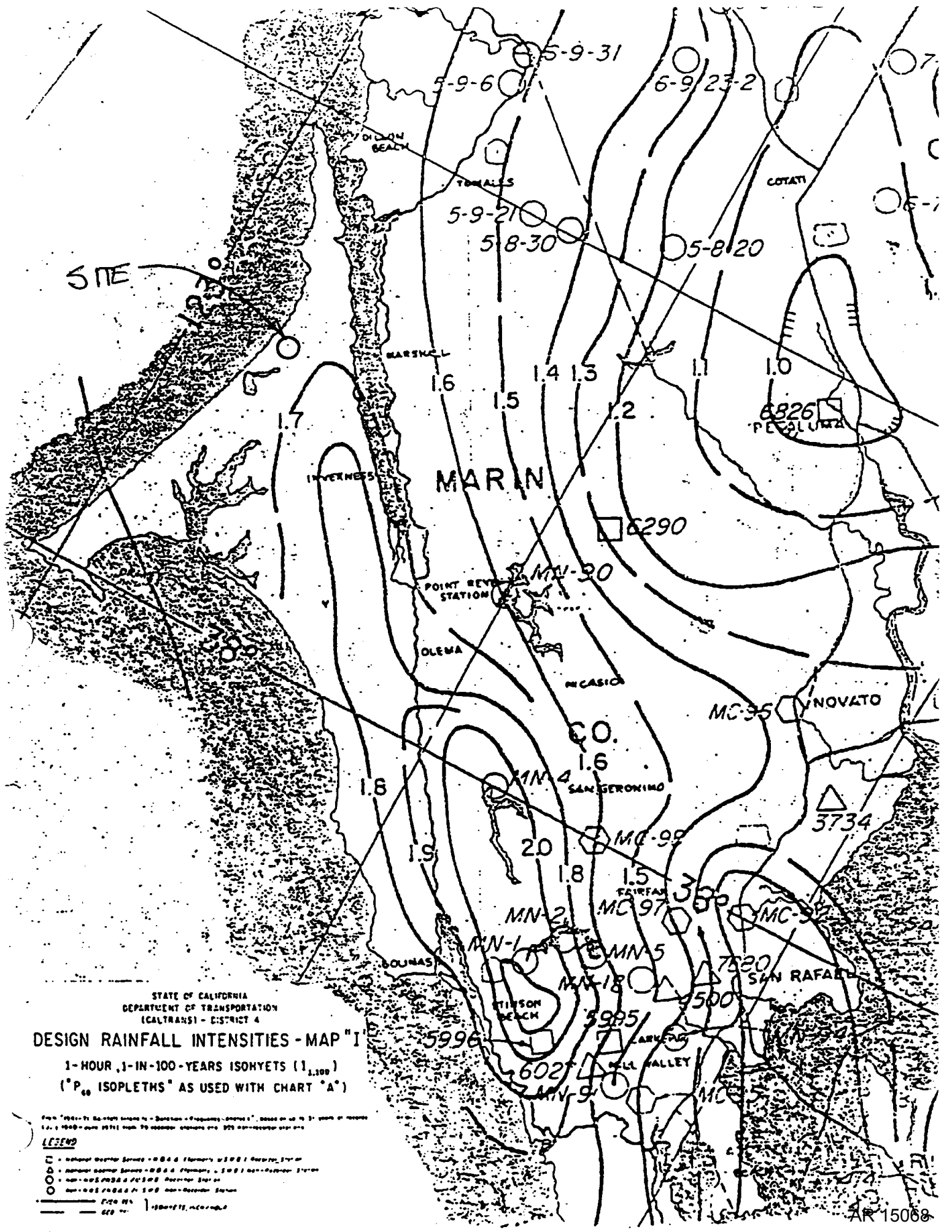
Mannings Equation, Trapezoidal Sections		Vee Ditch W side of Barn Q100 = .3 cfs	
Reference Brater and King, Chapter 7		<i>low ramp area</i>	
Input Parameters		Output Parameters	
0.15 Normal depth, ft	0.30 cu ft/sec	Flow capacity	
0.035 Manning's n	2.59 Ft/sec	Velocity	<i>non-erosive</i>
0.080 s, channel slope ft/ft (<i>Ramp slope</i>)	0.12 Sq Ft	Area	<i>OK</i>
12.50 1/s, channel slope, ft/100ft	1.08 Ft	Topwidth	
2.0 Z, side slope, ft/ft	0.10 Ft	Velocity Head	
0.5 b, bottom width, ft	0.25 Ft	Energy Head	
	1.20 V/(gd) ^{.5}	Froude #:	Supercrit

Mannings Equation, Circular section		East side culvert Q100 = 0.7 cfs	
Provides V, Q based on Diameter for given n, slope		<i>under/around new call pens</i>	
Input Parameters		Output Parameters	
12.0 inch pipe diameter	H2O Depth d:	2.62 inches	0.22 ft at outlet
0.22 d/D ratio <i>OK</i>	Sector above H2O:	2.17 ft	2.08 Froude No.
0.012 Manning's n	Circumference:	3.14 ft	0.95 ft crit depth
0.030 s, channel slope ft/ft	theta:	4.34	
33.333 1/s, chl slope, ft/100 ft	Water area:	0.13 sq ft	0.79 pipe area
0.6 C, inlet coefficient	Wetted Perim:	0.97 ft	
<i>Rock armor @ outfall per detail</i>	Hydraulic Radius:	0.13 ft	Inlet at pipe depth
	Outlet Velocity:	5.52 ft/sec <i>OK</i>	CA(2gd) ^{.5}
	Outlet Flow Rate:	0.70 cfs	3.78 cfs inlet
Outfall Parameters		Max Outfall Time:	0.86 sec; (2D/g) ^{.5}
	Max/Actual Transition Distances:	4.76 ft, V(t)	1.04 ft, V(t)

12" Lines used to accommodate potential debris, maintain excess capacity



TOTAL ANNUAL PRECIPITATION



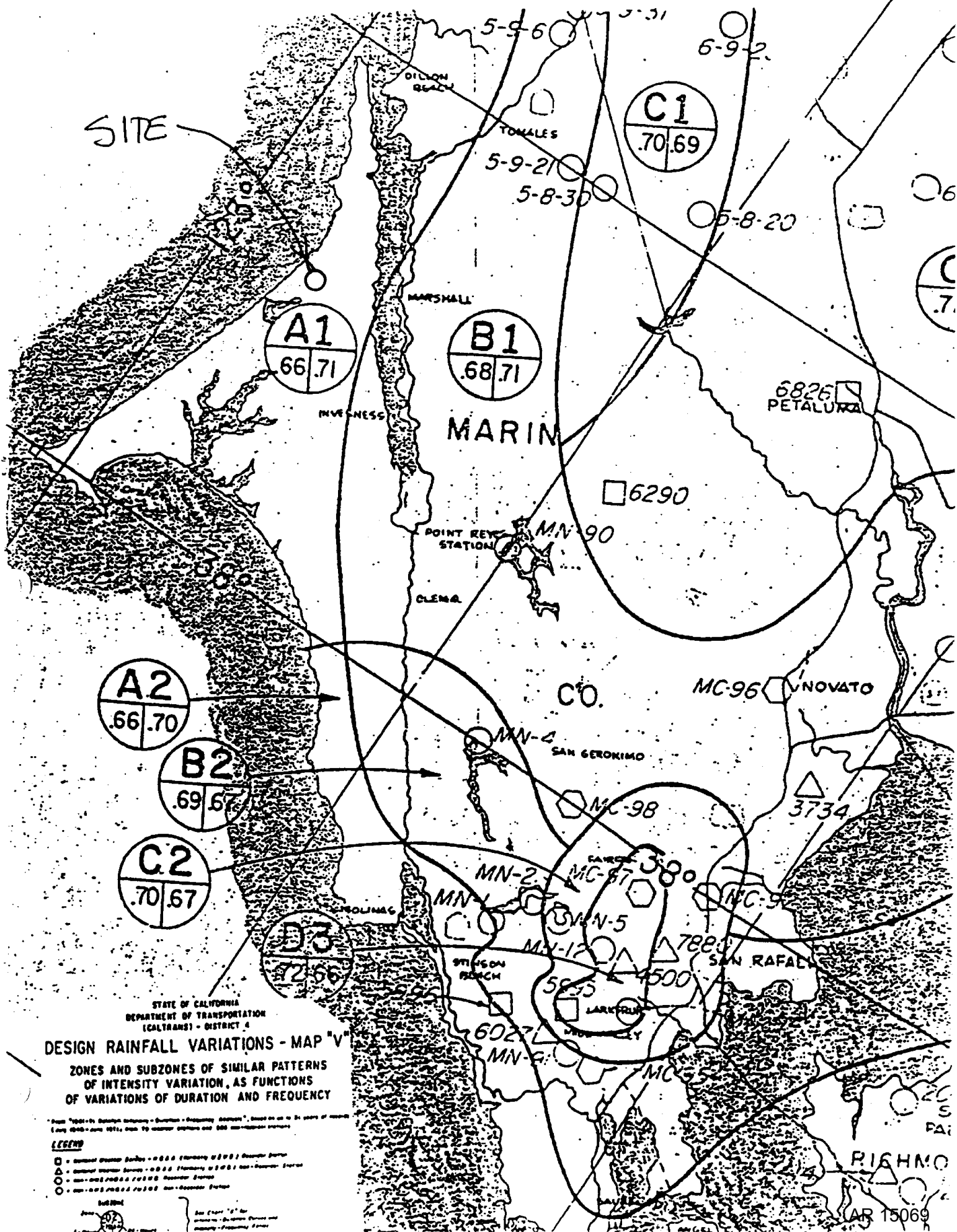
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CALTRANS - DISTRICT 4

DESIGN RAINFALL INTENSITIES - MAP "I"
1-HOUR, 1-IN-100-YEARS ISOHYETS (1,100)
("P" ISOPLETHS AS USED WITH CHART "A")

FIG. 15068-11 (REVISED) ISOPLETHS OF DESIGN RAINFALL INTENSITY, BASED ON 10 TO 31 YEARS OF RECORD (1.1 INCH PER HOUR) FROM 79 STATION STATIONS AND 252 INTERPOLATED STATIONS

LEGEND

- - National Weather Service - WSA & Stations of WSA (Weather Station)
- △ - National Weather Service - WSA & Stations, (WSA) non-Weather Station
- - National Weather Service - WSA (Weather Station)
- - National Weather Service - WSA (non-Weather Station)



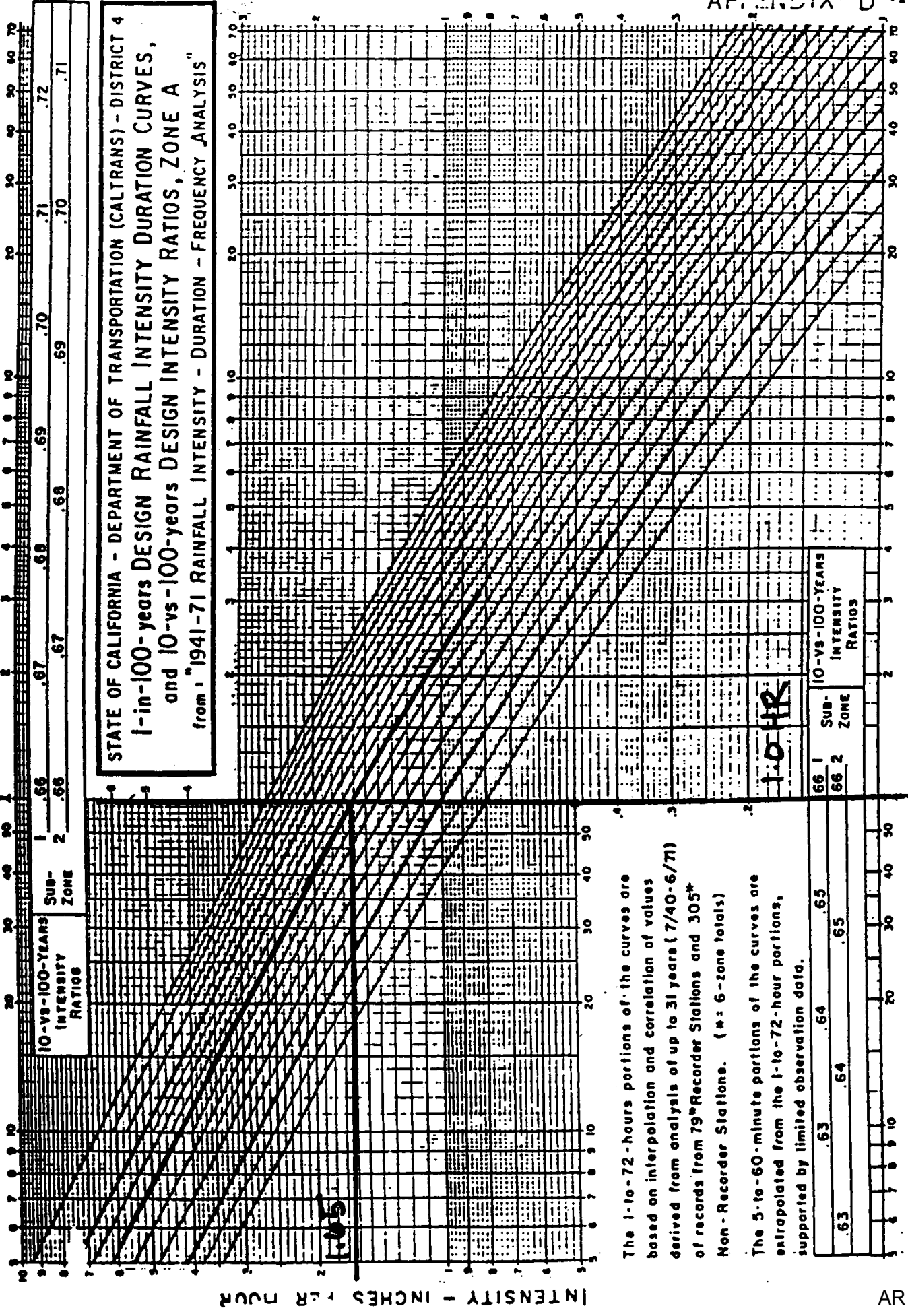
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
(CALTRANS) - DISTRICT 4

DESIGN RAINFALL VARIATIONS - MAP "V"
ZONES AND SUBZONES OF SIMILAR PATTERNS
OF INTENSITY VARIATION, AS FUNCTIONS
OF VARIATIONS OF DURATION AND FREQUENCY

From "1964-74 Duration Intensity - Duration - Frequency Analysis", based on an 11 year record
(July 1964 - June 1974), from 19 weather stations and 500 non-weather stations.

- LEGEND**
- - General Weather Station - 1964 (Station 0200) Recorder Station
 - △ - General Weather Station - 1964 (Station 0201) Non-Recorder Station
 - - Non-Weather Station - 1964 (Station 0202) Recorder Station
 - - Non-Weather Station - 1964 (Station 0203) Non-Recorder Station

Scale: 1" = 10 Miles
 Date: 1974
 Prepared by: [illegible]
 Checked by: [illegible]



The 1-to-72-hour portions of the curves are based on interpolation and correlation of values derived from analysis of up to 31 years (7/40-6/71) of records from 79th Recorder Stations and 305th Non-Recorder Stations. (*: 6-zone totals)

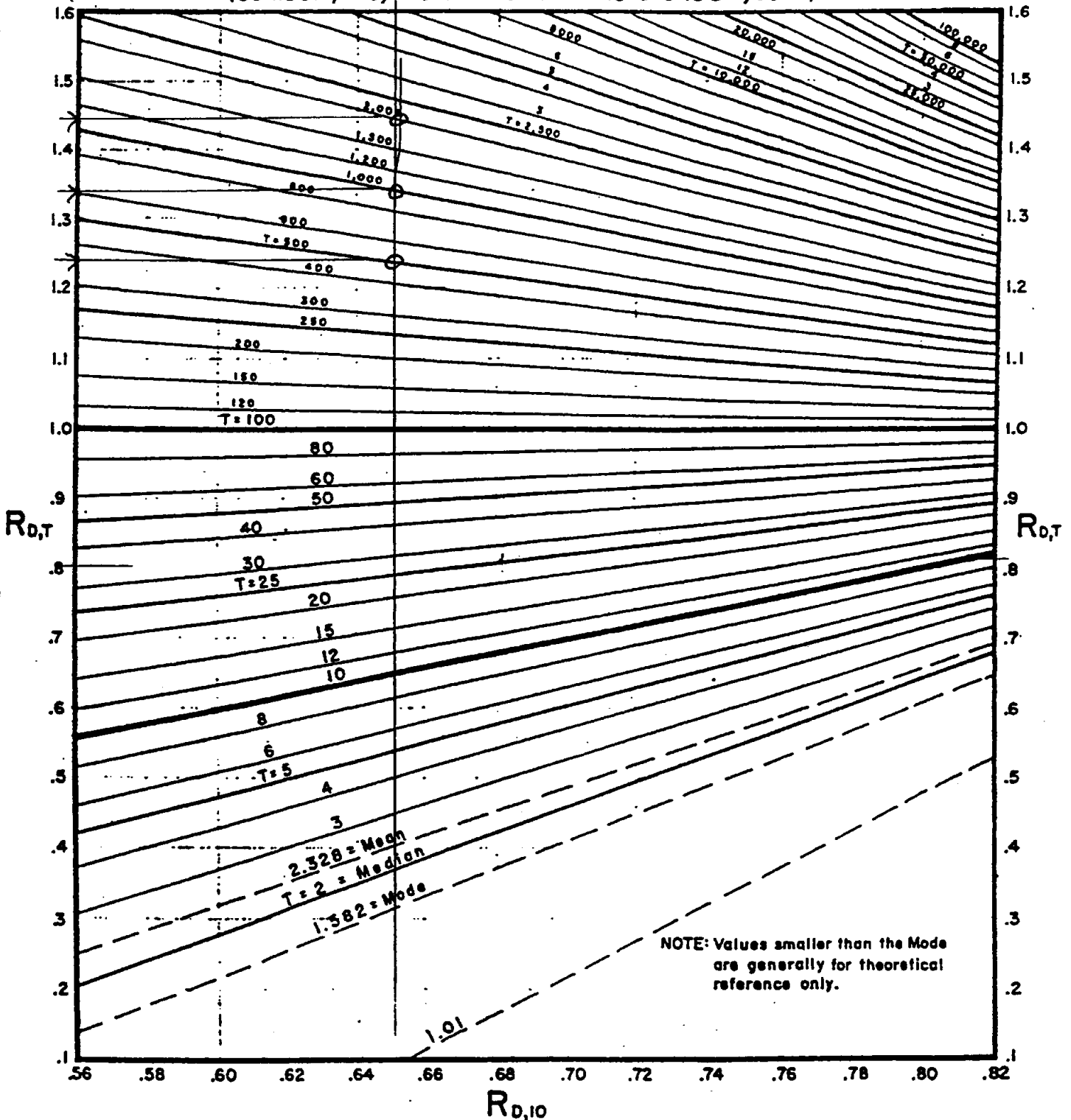
The 5-to-60-minute portions of the curves are extrapolated from the 1-to-72-hour portions, supported by limited observation data.

INTENSITY - INCHES PER HOUR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION (CALTRANS) - DISTRICT 4

FREQUENCY DISTRIBUTION RATIOS CHART "R"

(Gumbel ; Key Return Periods = 10 and 100 years)



NOTE: Values smaller than the Mode are generally for theoretical reference only.

EQUATIONS SEE "1941-71 RAINFALL INTENSITY - DURATION - FREQUENCY ANALYSIS"

(29) $R_{0,T} = I_{0,T} / I_{0,100}$, where
 (31) $I_{0,T} = I_{0,100} \left\{ 1 + \left[\frac{(1-R_{0,10})}{(y_{100}-y_{10})} \right] (y_T - y_{100}) \right\}$ and
 $y_T = -\ln [-\ln(1-1/T)]$

T = Return Period, Years
 R = Ratio
 I_0 = Intensity (For a given duration D), Inches/Hr.

Other parameters, such as discharge rate (Q) may be substituted for I_0 .

Dairy Waste Pond Size Estimation

Dairy Waste Management System Evaluation

Kehoe

Rev 07/04/02

18-Aug-02

18-Aug-02

12:31 PM

Kehoe Dairy - Tim, Tom, Mike

(415) 669-1696

6150 Pierce Point Road, Inverness CA 94937

Address

Telephone

Proposed Stall Barn Expansion - Future Animal Counts

1. Confined Animal Wastes

	No. of Animals	Weight 1000 lb. unit	Equiv Days confined	Gal/manure 000lb./day	Annual manure prod, Ac ft.	Notes. Adjust calcs in 3rd c
Milk Cows high string	260	354	319	14.8	5.27	6m confined
1400 lbs low strings	270	378	319	14.8	5.48	6m 6h paddock
Dry Cows	22	30.8	180	10.0	0.17	6m confined
1400 lbs.	23	32.2	180	10.0	0.18	6m confined
Yearling Heifers >900 lbs.	30	27	180	7.0	0.10	stall barn
Sm. Heifers 500-900 lbs.	100	70	180	4.8	0.19	dry lot around barns
Calves avg 300 lbs.	140	42	365	1.7	0.08	new east pens
Dairy Totals	845	944			11.47	

2. Unconfined Animal Wastes

Animal Group	No. of Animals	Weight 1000 lb. units	Equiv Days	Gallons Manure/ 1000lb./day	Annual Manure prod. Acre Feet	
Milk Cows high string	260	354.0	46	14.8	0.75	6mo 6h paddock
1400 lbs low strings	270	378.0	46	14.8	0.76	6mo 6h paddock
Dry Cows	22	30.8	185	10.0	0.17	6m pasture
1400 lbs.	23	32.2	185	10.0	0.18	6m pasture
Yearling Heifers >900 lbs.	100	90.0	365	7.0	0.70	dry lots
Sm. Heifers 500-900 lbs.	100	70.0	185	4.8	0.19	dry lots
Calves avg 300 lbs.	0	0.0	365	4.8	0.00	
On Site Totals	775	905			2.79	

3. Total Animal Waste

14.26 Acre Feet

4. Additions to the Confinement Waste Management System:

Notes:

24 Loads/yr sand 1.4 t/cy
0 Lb/day straw

2 % 50lb ration/day, milk strings
at 40 lb/cu ft

Imported manure, whey, other

	Tons/Year Acre Feet	
Animal Bedding	480.0	0.21
Makeup sand	tons	
Animal bedding	0.0	0.00
Straw/organic	tons	
Damaged feed or silage	96.7	0.11
Other	0	0.00
	loads	
Subtotal		0.32

Dairy Waste Pond Size Estimation

5. Wash and Process Water Produced Annually

	Rate Gal/min	Use Hr/day	Gal/Day	Ac/ft per yr	Percent of Total
Milking System Wash Water			360	0.40	20.1
Milking System Backflush			0	0.00	0.0
Milk Tank Wash Water			100	0.11	5.6
Cow Wash Water	Gal H2O/cow Milking/day	0.13 2	133	0.15	7.4
Sprinkler Pen Water			0	0.00	0.0
Milking Parlor Wash Water	10	2.00	1200	1.34	66.9
Recycled wash water, per day	0	0.00	0	0.00	0.0
Vacuum Pump Water	0	10	0	0.00	0.0
Air Comp/Milk Cooler Water	0	10	0	0.00	0.0
Leaking troughs, other losses	0	24	0	0.00	0.0
Spring flows to manure storage	0	24	0	0.00	0.0
Flush System Added Water			0	0.00	0.0
		days/year	0		
Total Wash and Process Water			1793	2.01	100.0

Gal/day Acre Feet

Section IV. Rain Water Additions to Waste System

Rainfall Data for Discretionary Design

Local average annual rainfall, inches	24.0	Local average per SCWA isohyetal map, rev June 83.	3.6	25-year, 24-hr storm Inches @ avg ³ (3.8/25.5) = local/Petaluma.
10-year Wet-Winter Annual Rainfall, inches	35.8	10-year storm prorated based on 46 year Petaluma data with 25.5" avg annual and 38.0" 10-year wet winter (O'Connor, 2000).		

Estimate of Runoff from Dairy that Contributes to the Waste System

	Acres	Runoff Coefficient	Acre-feet	
Total Manured Surface Area	0.25	1.00	0.73	
Total Pond(s) Surface Area	2.75	1.00	3.20	
Watershed Area	0.55	0.40	0.66	
Crop/pasture	0.00	0.40	0.00	
Collection Area, Total	3.55		9.59	10-year Winter Storage Required
			1.08	25 year, 24-hour Storage Required

Pump size required to handle 25 year, 24-hour storm:

Hours pumped per day	Days pumped	Required Pump size, Gal/min
12	1	479

**Pump Size OK?
Pump period available?
(Y/N; caps only)**

N

Dairy Waste Pond Size Estimation

Section V. Total Annual Waste Flows

Total System Evaluation

Estimate Annual Waste Storage Requirement at Dairy

	Acre Feet	Percent of Total	
On-Site Animal Waste	11.47	49.0	
Off-site additions to system Bedding, feed, liquids	0.32	1.4	
Wash and Process Water	2.01	8.6	
Manured-area Rainfall, 10-year wet winter	9.59	41.0	
Subtotal - Annual wastewater volume	23.38	100.0	baseline

Storage Reduction Adjustments

			Volume Reduction Acre-Feet	Adjusted Storage Volume Acre-Feet	% of Total	
Evaporation	Feet	0.50	1.38	22.01	94.1	Add 4.30 ac.ft. if no drain or slurry transport
Ponds rain drained before use	Feet	1.2	2.75	19.25	82.3	
Solids Separation		N	0.00	19.25	82.3	
Mech. Manure Separation? (Y/N; caps only)						
Slurry Transport	Gal/day	4200				
Daily drawdown of sump or pond independent of annual cleanout	Day/mo	10.0	1.54	17.71	75.7	
	Mo/yr	12.0				
Irrigation Disposal	Gal/min	200				
Daily drawdown of sump or pond independent of annual cleanout	Hr/day	0.0				
	Day/mo	0.0	0.00	17.71	75.7	
	Mo/yr	0.0				
Add 25-year, 24-hour storm runoff if insufficient pump capacity or cycle time			1.06	4.5		
Total Annual Waste Flows Requiring Storage Capacity			18.77	80.3		

Section VI. Evaluate Capacity of Existing Storage System

Waste Storage Capacity	Acre Feet
Design storage capacity of waste ponds. (from Areas worksheet)	18.77
Design storage capacity of other facilities. (add, if any)	
Total Storage Capacity (Add cells 19,21)	18.77
Waste Storage Capacity Reductions (Incomplete annual pond cleanout, etc)	0.00
Manure Handling and Storm Water Management Capability	
Working Storage Capacity (cell 3-cell 4)	18.77

Calculation indicates that:	Total Capacity Available
Storage Capacity is Satisfactory	
Excess Capacity Available: 0.0 Acre-Feet	18.8 Acre-Feet

Dairy Waste Pond Size Estimation

Dairy Pond Size Estimation - Data Summary Sheet

Kehoe

Kehoe Dairy - Tim, Tom, Mike
8150 Pierce Point Road, Inverness CA 94937

(415) 669-1696

18-Aug-02
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2. Unconfined Animal Wastes	2.79 acre feet				
1. Confined Animal Wastes	11.47 acre feet			11.47 acre-feet	
3. Total Animal Waste	14.26 acre feet				
4. Additions to the Confinement Waste Management System:					
Animal Bedding	Makeup sand	0.21 acre feet			
	Straw/organic	0.00 acre feet			
	Other	0.00 acre feet		0.32 acre-feet	
	Damaged feed	0.11 acre feet			
Milking System Wash Water		0.51 acre feet			
Milking System Backflush		0.00 acre feet			
Cow Wash Water		0.15 acre feet			
Sprinkler Pen Water		0.00 acre feet			
Milking Parlor Wash Water		1.34 acre feet	1793 gal/day	2.01 acre-feet	
Recycled wash water, per day		0.00 acre feet			
Vac Pump/Air Comp/Cooler		0.00 acre feet			
Leaks/Springs		0.00 acre feet			13.80 af wastewater
Flush System Added Water		0.00 acre feet			59 % of total
Rainfall Data for Discretionary Design					
	Acres	Coefficient	runoff, ac-ft	Design rain	Avg rain
				35.8	24.0
Manured surfaces	0.25	1.00	0.73		
Pond(s)	2.75	1.00	8.20		
Pond Watershed(s)	0.55	0.40	0.66		
Crop/Pasture areas	0.00	0.40	0.00		
Total Runoff				9.59	6.43
Collection Area,	3.55	na	9.59	ac ft	ac ft
Subtotal - Annual wastewater volume				Total:	23.38
Evaporation:				-1.38	-1.38
Solids separator:				0.00	0.00
Rainfall drawdown:				-2.75	-2.75
Slurry transport:	4200 gal/day		120 day/yr	-1.54	-1.54
Daily irrigation:	200 gpm		0 hr/yr	0.00	0.00
Adjusted storage volume, acre-feet per year:				-5.67	17.71
3.58 inches	25-year, 24-hr storm	Inches @ avg*(3.8/25.5) = local/Petaluma.			
Pump size required to handle 25 year, 24-hour storm:				1.06	0.71
12 hr/day					
1 day/yr				479 gal/min	
Total Annual Waste Flows				18.77	15.27
Requiring Storage Capacity					
Waste Storage Capacity					
Design storage capacity of waste ponds.				18.77 acre-feet	
Design storage capacity of other facilities.				0.00 acre-feet	
Waste Storage Capacity Reductions				0.00 acre-feet	
Working Storage Capacity				18.77 acre-feet	
Calculation indicates that:				Total Capacity Available	
Storage Capacity is Satisfactory					
Excess Capacity Available:				0.0 Acre-Feet	18.8 Acre-Feet

Runoff and Pond Areas Calculation Worksheet

18-Aug-02

Kehoe Dairy - Tim, Tom, Mike

Date: 18-Aug-02

6150 Pierce Point Road, Inverness CA 94937

Time: 12:34 PM

Measure individual areas or area combinations with tape measure and report in the space provided.

1. Exposed Manured Areas at Dairy

Includes feed lots, alley ways, holding corrals, sick pens, calf lots, compost piles, solids storage areas, outside loafing areas, and similar hardened or manured areas with 100% runoff to manure storage

Area	Width	Length	Sq Ft	Location Notes	Acres
1	100	107.0	10700	milk barn concrete corrals	0.25
2					0.00
3					0.00
4					0.00
5					0.00
6			0		0.00
			10700	0.25	Used in Sec IV, Cell 4 Cell 3 / 43560.
			Square Feet	Acres	

2. Manure Pit and Liquid Storage Pond Surface Areas

Includes wastewater ponds, manure pits, flush water recycle ponds, manure sumps, etc.

Note: When measuring the waste storage capacity of ponds, include the capacity of pit(s) and other collection facilities. If more than one pond is used, measure all ponds. Allow for two feet of freeboard in the last pond when making measurements.

Pond/Pit	Width	Length	Sq Ft	Avg depth	Capacity	Location Notes	Acres
1 main	80	210		6.5	2.50	manure pit/pond	0.00
1 freeboard	85	220	18700	2.0	0.86	pit 1 freeboard	0.43
2 overflow	50	80	4000	3.0	0.28	emergency overflow	0.09
3 north	190	206	39140	4.6	4.13	North pond, existing	0.90
4 north	150	387	58000	6.3	11.00	New Pond	1.33
			0		0.00		0.00
			119840	2.75	18.77	Used in Sec IV, Cell 3, Section VI Cell 1	
			Square Feet	Acres	Acres-foot		

3. Rainfall Collection Area Draining to Manure Storage Areas.

Includes tributary areas of clean water around barns and corrals that drain to manure ponds.

Area	Width	Length	Sq Ft	Location Notes	Acres
1	150	160	24000	hillside between barn and pit	0.55
2			0		0.00
3			0		0.00
4			0		0.00
5			0		0.00
			24000	0.55	Cell 3 / 43560 Used in Sec IV, Cell 4
			Square Feet	Acres	

4. Crop and Pasture Areas Draining to Manure Storage Areas

Includes tributary areas of clean water away from dairy that drain to manure ponds.

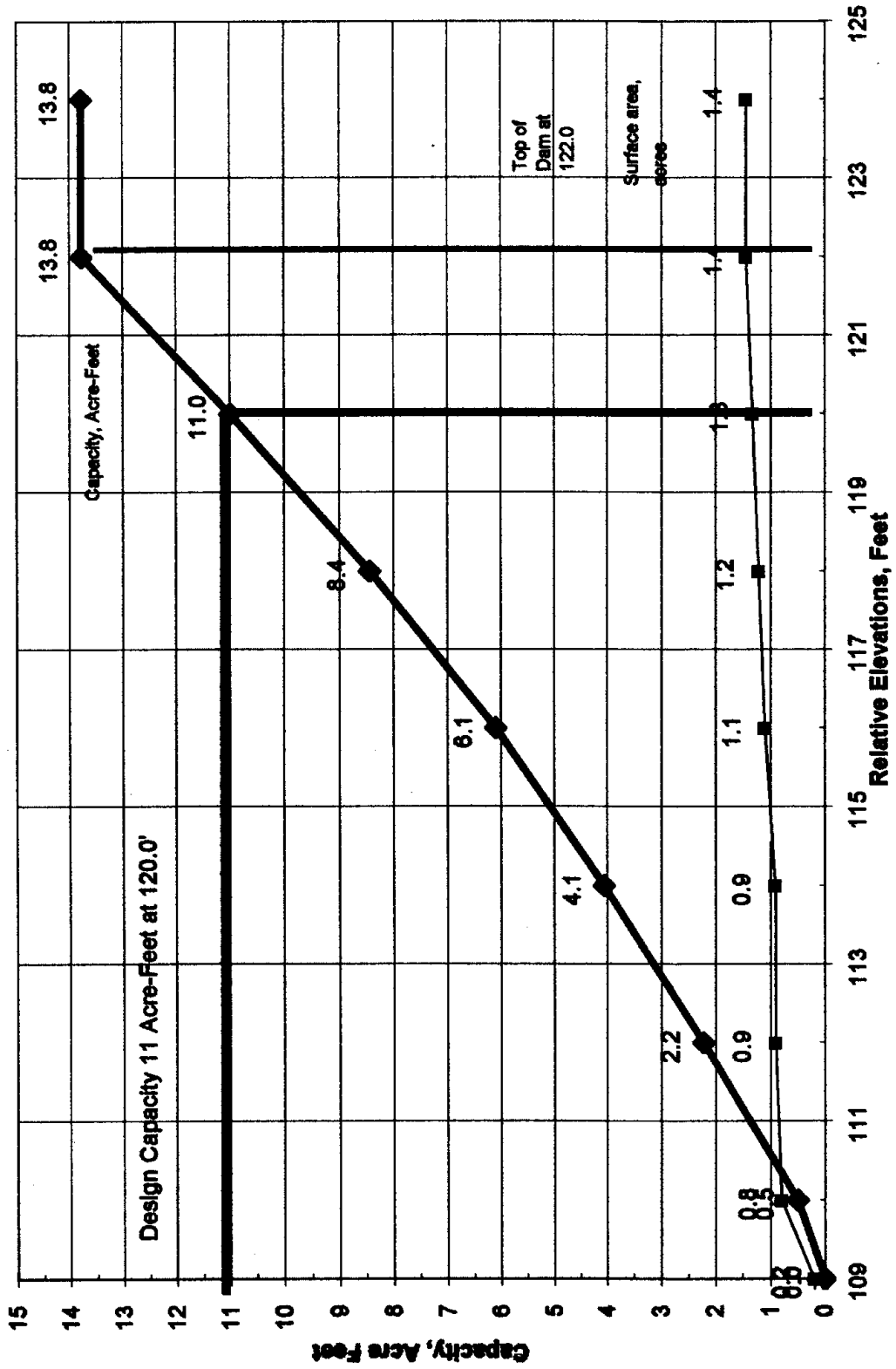
Area	Width	Length	Sq Ft	Location Notes	Acres
1			0		0.00
4			0		0.00
5			0		0.00
			0	0.00	Cell 3 / 43560 Used in Sec IV, Cell 9
			Square Feet	Acres	

Stage-Capacity Data
 Erickson Engineering Inc.
 Data from CAD

File: c:\projects\kehoe\pondvol\K-ne(2)
 Property: Kehoe Dairy
 Project: North Manure Pond - New
 Location: 6150 Pierce Point Road, Inverness CA
 Date: 20-Aug-02 04:36 PM
 Revised: 19-Aug-02

Elevation	Water Sq Ft	Avg SF	Volume Cu Ft	Cumulative Cu Ft	Water Acre-Feet	H2O Area, Acres	Water Gal x 10 ⁶
124.0					13.8	1.4	
122.0	63130	60620	121240	600400	13.8	1.4	4.497
120.0	58110	55675	111350	479160	11.0	1.3	3.589
118.0	53240	50888	101775	367810	8.4	1.2	2.755
116.0	48535	44443	88885	266035	6.1	1.1	1.993
114.0	40350	39975	79950	177150	4.1	0.9	1.327
112.0	39600	37478	74955	97200	2.2	0.9	0.728
110.0	35355	22245	22245	22245	0.5	0.8	0.167
109.0	9135	0	0	0	0.0	0.2	0.000
106.0		0	0	0	0.0	0.0	0.000
104.0		0	0	0	0.0	0.0	0.000
102.0		0	0	0	0.0	0.0	0.000
100.0		0	0	0	0.0	0.0	0.000
98.0		0	0	0	0.0	0.0	0.000
96.0		0	0	0	0.0	0.0	0.000
94.0		0	0	0	0.0	0.0	0.000
92.0		0	0	0	0.0	0.0	0.000
347455		311323					

Kehoe Dairy- New North Manure Pond Elevation - Volume Curves



This worksheet is intended to provide guidance for nutrient budgeting for management of manure produced by animals in both confined and unconfined conditions. It will partially fulfill facilities management plans as recommended by regulatory agencies.

Complete the Producer and Area worksheets prior to entering nutrient budgeting information. Provide inputs as required in empty green-shaded boxes in the Nutrient Budgeting worksheet. Calculation results are shown in non-shaded boxes.

Nutrient budgeting may include confined or unconfined animals, irrigated and non-irrigated land, fertilized or non-fertilized inputs, and may use lab or handbook data for stored manure nutrient values. Several runs of this computer spreadsheet worksheet will be needed to evaluate confined animal manures, unconfined animal manures, and individual fields, either on-site or off-site, because of the large number of possible nutrient input combinations. Take care when evaluating individual fields to include all inputs, and to eliminate duplicate accounting with such items as animals pastured elsewhere or fertilizer and irrigation water used elsewhere. Total ranch nutrient budgeting can be accomplished using total headcounts, acreages, etc., and will represent average conditions rather than site-specific conditions.

Results are based on a large number of input assumptions, and represent general nutrient budgeting trends, rather than an exact detail accounting of site-specific conditions. Detailed assessments will require concentration sampling and quantity measurements of soil, forage, crops, irrigation water, stored manure, and other inputs and outputs to the nutrient input, waste management, and nutrient consumption systems.

Section I. Producer Information

Kehoe Dairy - Tim, Tom, Mike
6150 Pierce Point Road, Inverness CA 94937

(415) 669-1696

Land Areas	On-Site Acres	Off-Site Acres	Total Acres
Total Property	1240		1240
Pasture Lands	900		900
Irrigated or dry	3	8	
All Crop Lands	180	3	180
Vineyard or Non-Dairy	120		120
Housing, corrals barns, other non-producing	40	0	40
	1	1a	
Total Crop and Pasture	1080	0	1080
	4	7	8
	(add cells 2, 3)	(add cells 5, 6)	(add cells 4, 7)
			Manure disposal Acres

Section II: Pasture and Crop Nutrient Demand

Table 1. Plant Food Utilization by Various Crops

Total uptake in harvested portion. Reference: Table 4.1, Western Fertilizer Handbook

Crop	Yield	Pounds per Acre		
		N	P ₂ O ₅	K ₂ O
Field Crops				
Corn - grain	5t/180bu	240	100	240
Corn - silage	30t	250	105	250
Grain sorghum	4t / 150bu	250	90	200
Oats	1.6t/100bu	115	40	145
Wheat	3t/100bu	175	70	200
Barley	2.5t / 100bu	160	60	160
Fruit and Nut Crops				
Apples	15t	120	55	215
Grapes	15t	125	45	195
Forage Crops				
Alfalfa	8t	480	95	480
Bromegrass	5t	220	65	315
Clover-grass	6t	300	90	360
Orchardgrass	6t	300	100	375
Sorghum-sudan	8t	325	125	475
Timothy	4t	150	55	250
Vetch	7t	390	105	320

Note: These parameter values may be adjusted as desired to best match existing site conditions.

Change numbers in this table to adjust nutrient demands to reflect soils, slope, aspect, rainfall, other parameter affecting plant vigor and nutrient demand.

Dairy Nutrient Budgeting Worksheet

Coastal Dryland Pasture	200	80	175
Irrigated Pasture	275	90	300

Section III: Nutrient Composition of Manure

Nutrient concentration of manure depends on animal species and age, feed materials and additives, source of manure, storage method, length of storage, rainwater dilution, disposal method, and other factors. The most accurate nutrient budgeting estimates will be obtained if lab samples for nutrient concentration are taken from the storage area. A composite sample from several surface locations and depths within the storage is required for a representative value. The average table values shown from USDA-SCS Ag Waste Management Field Handbook are used for calculations if you do not provide site-specific nutrient concentrations.

Table 2. USDA-NRCS Ag Waste Handbook
Nutrients, lb/day/1000lb of animal

Nutrient Parameter	lb/day/1000lb of animal		
	milking	dry	heifer
Nitrogen, N:	0.45	0.36	0.31
Phosphorous, P:	0.07	0.05	0.04
Potassium, K:	0.26	0.23	0.24
Copper, Cu:		22	

Table 3. Commercial Laboratory Analysis
of your stored liquid manure

Parameter	If available, enter data here	
	Milligrams/liter	Equivalent lb/gal
Nitrogen, N:		0.00000
Phosphorous, P:		0.00000
Potassium, K:		0.00000
Copper, Cu:		0.00000

Section IV. Annual Production of Animal Waste for All Livestock

Nutrient quantities stored in containment facilities are estimated in one of two ways:

- 1) USDA handbook N-P-K values are used with confined animal counts and manure production estimates obtained from the Producer worksheet.
- 2) If commercial lab analysis data for N-P-K is entered above, nutrient quantities are based on the lab concentration data times the pond storage volume obtained from the Producer worksheet.

Note that total nutrient quantity estimates in storage facilities may be significantly different using the two different approaches. Lab data from the storage pond will tend to be most accurate. This is because factors affecting nutrient concentration are taken into account, including seasonal dilution, process and wash water, actual manure quantities collected, external inputs to storage, changes during storage, and similar factors. Wide variation between individual facilities can be expected.

1. Handbook Method Animal counts from the companion Producer worksheet are multiplied by the appropriate table values for N, P, and K above to determine nutrient production.

Table 4. Unconfined Animal Nutrients
Production based on Handbook Values

	Unconfined Cubic Feet	Total Pounds of Nutrients		
		N	P	K
Milk Cows	32816	7473	1163	4318
1400 lbs.	34078	7761	1207	4484
Dry Cows	7607	2051	285	1311
1400 lbs.	7953	2145	298	1370
Yearling Heifers	30701	10184	1314	7884
>900 lbs.				
Sm. Heifers	8299	4015	518	3108
500-900 lbs.				
Calves	-	-	-	-
<500 lbs				
Calves	121455	0	0	0
avg 300 lbs.				
On Site Totals	121455	33628	4785	22475

Table 5. Confined Animal Nutrients
Production based on Handbook Values

	Confined Cubic Feet	Total Pounds of Nutrients		
		N	P	K
	229711	52314	8138	30226
	238546	54326	8451	31388
	7402	1996	277	1275
	7738	2087	290	1333
	4542	1507	194	1166
	8075	3906	504	3024
	3479	4752	613	3679
	-	-	-	-
	-	-	-	-
	499494	120887	18467	72092

Dairy Nutrient Budgeting Worksheet

2. Lab Data Method: Laboratory nutrient analysis of existing storage liquid is multiplied by existing pond storage volume to estimate total nutrient quantities in storage. Only for CONFINEMENT manure.

Note: If ponds are pumped to maintain adequate winter storage, or if storage encroaches into freeboard requirements, the working storage capacity is not a true measure of animal manure production and storage. Indicate additional storage in the box provided to account for total annual production.

Working storage capacity, from
Producer Worksheet, Section VI:
Acre-feet

-0.31

Storage
Additions,
Acre-feet

1.54

Based on lab sampling data, lb.		
N	P	K
0	0	0

Cells G130+g134-F159 main sheet

3. Calculation Method for Acreage Requirements:

The remainder of this worksheet is used to determine the acres required for consumption of N - P - K nutrients in keeping with good crop management practices. Application rates consistent with crop uptake needs will maximize economic benefits of applied manures and will reduce chance of impairing surface water runoff quality.

Area requirement calculations are based on total nutrients produced. Indicate in the box below if the calculations for stored liquid and solid manures should be based on: 1 = Handbook values, or 2 = Lab Data values. Unconfined animal nutrient values are based on handbook information, because lab data for grazed animal manures is difficult to obtain.

CONFINED ONLY Animal Manure
Nutrient Calculation Method

1

1 = Handbook Values
2 = Lab Data Values

Section V: Manure Nutrient Quantity Adjustments

1. Manure Storage Method

Nutrient losses from manure occur during collection, storage, application, and after land application. Losses can vary widely, depending on collection method, collection frequency, temperature, precipitation, type of handling system, duration, type, and location of storage, and other factors.

About half the N in fresh manure is inorganic, and subject to significant losses.

The table from Oregon State University publication EC1094 provides an estimate of NPK retained by various storage systems. Lab nutrient analyses of manure take these storage losses into account. Use these adjustment values in Table 14 and Table 16 below.

	N	P	K
Daily Spread	80	90	90
Dry, under roof	70	90	90
Earth storage	55	60	70
Lagoon/flush	30	40	60
Open lot	60	70	65
Pits under slats	75	95	95
Scrape/storage tank	70	90	90
None (grazing)	100	100	100

2. Manure Spreading Method

Nitrogen nutrient losses from manure can occur during spreading (Fresh manure odor is mostly volatilized ammonia). Essentially all phosphorus and potassium applied will be available to the crop. The table from OSU publication EC1094 summarizes percent nutrient delivered to cropland and available for plant uptake, based on application and preutilization losses. Use these adjustment values in Table 14 and Table 16 below.

	N	P	K
Injection	95	100	100
Broadcast	80	100	100
Broadcast/cultivate	95	100	100
Sprinkling	75	100	100
Grazing	85	100	100

Section VI: Additional Nutrient Inputs

1. Commercial Fertilizer

Many ranchers provide supplemental fertilizer to pasture or silage crops, on an annual or other intermittent basis. These nutrients should be accounted for in a complete nutrient budget. Fertilizer may be applied in pastures where unconfined animals are grazed, in irrigated pastures, where manure is disposed, and in crop areas. This section estimates total nutrients available based on the fertilizer formulation used, the application rate, and the application frequency. Fertilizer composition data is from Western Fertilizer Handbook, Table 5-5.

Table 9. Nutrient Value of Selected Commercial Fertilizers

Western Fertilizer Handbook Table 5-5 Fertilizer Formulation	Total Nitrogen N%	Available Phosphoric Acid P ₂ O ₅ %	Water- soluble Potash K ₂ O%
Ammonium nitrate	34		
Monoammonium phosphate	11	48	
Ammonium phosphate 1	13	39	
Ammonium phosphate 2	16	20	
Ammonium phosphate 3	27	12	
Diammonium phosphate	17	47	
Ammonium sulfate	21		
Anhydrous ammonia	82		
Aqua ammonia	20		
Sodium nitrate	16		
Urea	45		
Urea ammonium nitrate	32		
Single superphosphate		18	
Triple superphosphate		45	
Phosphoric acid		53	
Superphosphoric acid		80	
Potassium chloride			61
Potassium nitrate	13		44
Potassium sulfate			51
Sulfate of potash-magnesia			22

Indicate tons of fertilizer applied, area covered in acres, and how many years between applications for the commercial fertilizers noted. Formulations in Table 9 are used to estimate NPK application rates by fertilizer classification, using multipliers for elemental nutrients NPK.

You will need to rerun the spreadsheet to determine effects on individual fields, if all fields are not treated the same. Entering two kinds of fertilizer on a single field will result in acreage duplication in the Table 10 summary and errors in the nutrient budget summary in Table 14.

For simplicity, fertilizer nutrient values are included in both confined and unconfined animal manure disposal area evaluations, further down the spreadsheet. You will need to rerun the spreadsheet to individually evaluate confined and unconfined manure disposal areas, if both are not treated with equal amounts of commercial fertilizer.

Dairy Nutrient Budgeting Worksheet

Fertilizer Formulation	Fertilizer Application Data			Nutrient Summary			
	Amount applied Tons	Area covered Acres	Application frequency Years	Total Fertilizer	N	P	K
Ammonium nitrate				0	0		
Monoammonium phosphate				0	0	0	
Ammonium phosphate 1				0	0	0	
Ammonium phosphate 2				0	0	0	
Ammonium phosphate 3				0	0	0	
Diammonium phosphate				0	0	0	
Ammonium sulfate				0	0		
Anhydrous ammonia				0	0		
Aqua ammonia				0	0		
Sodium nitrate				0	0		
Urea				0	0		
Urea ammonium nitrate				0	0		
Single superphosphate				0		0	
Triple superphosphate				0		0	
Phosphoric acid				0		0	
Superphosphoric acid				0		0	
Potassium chloride				0			0
Potassium nitrate				0	0		0
Potassium sulfate				0			0
Sulfate of potash-magnesia				0			0
Subtotals:		0	Acres	0	0	0	0

Average pounds per acre per year

2. Irrigation Water

Some dairy ranches utilize reclaimed water for irrigation purposes. This water may contain significant amounts of nutrients that must be included in the nutrient budget in order to obtain accurate results. This section estimates total nutrient availability based on lab data for the water and total application rate, in inches of water per year.

Enter nutrient concentrations in mg/l for N, P, and K. If nutrient concentrations are reported in other units, provide appropriate conversions before entering data. For example, multiply P₂O₅ by .4365 to obtain P and multiply K₂O by .8301 to obtain K.

For simplicity, irrigation water nutrient values are included in both confined and unconfined animal manure disposal area evaluations, further down the spreadsheet. You will need to rerun the spreadsheet to individually evaluate confined and unconfined manure disposal areas, if both are not treated with equal amounts of irrigation water.

Irrigated Area: Acres per Year

Irrigation application: inches per acre/year

Nutrient	If available, enter data here	
Parameter	Milligrams/liter	Equivalent lb/gal
Nitrogen, N:	<input type="text" value="20.0"/>	<input type="text" value="0.00017"/>
Phosphorous, P:	<input type="text" value="1.2"/>	<input type="text" value="0.00001"/>
Potassium, K:	<input type="text" value="2.0"/>	<input type="text" value="0.00002"/>
Copper, Cu:	<input type="text" value="0.02"/>	<input type="text" value="0.00000"/>

Pounds/acre/year	
N:	<input type="text" value="0"/>
P:	<input type="text" value="0"/>
K:	<input type="text" value="0"/>
Cu:	<input type="text" value="0.0"/>

Section VII: Manure Management on Available Acreage

1. Unconfined Animals on Seasonal Pastures:

Unconfined animals are grazed on pasture or crop stubble, with manure spread naturally by the animals. All manure nutrient content is retained by the system, and the only losses are due to denitrification prior to plant uptake. Evaluate nutrient budgeting for unconfined animals by comparing annual NPK production to recommended NPK uptake for forage production on available acreage.

Indicate grazed acreage in Table 13 below. Nutrient demand is estimated based on published values in Table 1 above. Compare your yield values to those stated in Table 1. If your yields are significantly higher or lower, adjust the Table 1 nutrient demand values up or down to reflect actual crop demand based on local productivity.

Table 13. Grazed acreage for unconfined animals.

	On-Site Acres	Nutrient Demand, Pounds		
		N	P ₂ O ₅	K ₂ O
Field Crops				
Corn - grain		0	0	0
Corn - silage		0	0	0
Grain sorghum		0	0	0
Oats		0	0	0
Wheat		0	0	0
Barley		0	0	0
Fruit and Nut Crops				
Apples		0	0	0
Grapes		0	0	0
Forage Crops				
Alfalfa		0	0	0
Bromegrass		0	0	0
Clovergrass		0	0	0
Orchardgrass		0	0	0
Sorghum-sudan		0	0	0
Timothy		0	0	0
Vetch		0	0	0
Dryland Pasture	400.0	80000	32000	70000
Irrigated Pasture		0	0	0
Subtotals:	400.0 acres	80000	32000	70000

pastured

Table 14. Unconfined Animal Nutrient Balance Estimation

Note: This evaluation for grazed pasture areas is based on handbook nutrient values, since lab data for animal-distributed manure is difficult to obtain. It assumes that common acreage is used for livestock pasture and application of both commercial fertilizer and irrigation water. Unconfined animal counts are reported in the Producer worksheet. Return to previous sections if necessary to adjust animal counts, acreages, irrigation application, and commercial fertilizer application so that a valid evaluation may be made for pastured areas where unconfined animals are kept. Acre counts for Pastured, Irrigated, and Fertilized should be the same. Acres used for nutrient consumption should be equal to or less than total available on-site and off-site acres.

Acreage	400.0 Pastured acres (Table 14)	1080 On-site acres (Section 1)
Check:	0 Irrigated acres (Table 11)	0 Off-site acres (Section 1)
	0 Fertilized acres (Table 10)	1080 Total acres (Section 1)

1. Nutrient Inputs:

	N	P	K
Table 4: NPK Production, lb:	33628	4785	22475 lb/yr
Table 7: Storage adjustment (grazing)	1.00	1.00	1.00
Table 8: NPK delivery adjustment:	0.85	1.00	1.00

Revise these adjustments to match your operation.

Estimated manure application rate by grazing animals:

9 tons/acre Based on Table 5 animal production quantities, pastured acres.

Available from manure:	Manure NPK available, lb:	28584	4785	22475 lb/yr
	Manure NPK available, lb/ac:	71	12	56 lb/ac
External Inputs:	Table 10: Comm'l Fert, lb NPK/ac:	0	0	0 lb/ac
	Table 12: Irrig Water, lb NPK/ac:	0	0	0 lb/ac
	Subtotal Inputs:	71	12	56 lb/ac

2. Crop Nutrient Demands:

	N	P	K
Adjustment factor for elemental nutrient:	1.0000	0.4365	0.8301
Table 13: Adjusted NPK requirement, lb:	200	35	145 lb/ac

3. Nutrient Balance:

Subtotal Manure, Fertilizer, Irrigation Inputs, lb/yr:	71	12	56 lb/ac
Subtotal Crop and Pasture Consumption, lb/yr:	200	35	145 lb/ac
Difference, Inputs minus Outputs, lb/yr:	-129	-23	-89 lb/ac

Dairy Nutrient Budgeting Worksheet

4. Nutrient Application Recommendations

Analysis based on total pastured acres.

71 lb/ac N applied. Additional N permissible.
 12 lb/ac P applied. Additional P permissible.
 56 lb/ac K applied. Additional K permissible.

129 lb/ac additional N permissible.
 23 lb/ac additional P permissible.
 89 lb/ac additional K permissible.

2. Confined Animal Manure Disposal on Remote Fields:

Manure from confined animals is normally applied to pasture or crop stubble. The nutrient budget evaluation may be completed using either handbook values or lab analysis values. Manure nutrient quality may be adjusted for storage losses and application losses. Evaluate nutrient budgeting for seasonally-confined animals by comparing annual N-P-K production in storage to recommended N-P-K uptake for forage production on disposal acreage.

Table 15. Manure disposal acreage for confined animals.

	On-Site Acres	Nutrient Demand, Pounds		
		N	P ₂ O ₅	K ₂ O
Field Crops				
Corn - grain		0	0	0
Corn - silage		0	0	0
Grain sorghum		0	0	0
Oats		0	0	0
Wheat		0	0	0
Barley		0	0	0
Fruit and Nut Crops				
Apples		0	0	0
Grapes		0	0	0
Forage Crops				
Alfalfa		0	0	0
Bromegrass		0	0	0
Clovergrass		0	0	0
Orchardgrass		0	0	0
Sorghum-sudan		0	0	0
Timothy		0	0	0
Vetch		0	0	0
Dryland Pasture	350.0	70000	28000	61250
Irrigated Pasture		0	0	0
Subtotals:	350.0 acres spread	70000	28000	61250

Table 16. Confined Animal Nutrient Balance Estimation

Note: This evaluation for pasture and crop areas assumes that common acreage is used for stored manure disposal and application of both commercial fertilizer and irrigation water. Confined animal counts are reported in the Producer worksheet. Return to previous sections if necessary to adjust animal counts, confinement season, acreages, irrigation amounts, and commercial fertilizer amounts so that a valid evaluation may be made for pasture or crop areas where confined animal manures are disposed. Acre counts for Pastured, Irrigated, and Fertilized areas should be the same. Acres used for nutrient consumption should be equal to or less than total available on-site and off-site acres.

Acreage	350.0 manure disposal acres (Table 15)	1080 On-site acres (Section 1)
Check:	0 irrigated acres (Table 11)	0 Off-site acres (Section 1)
	0 fertilized acres (Table 10)	1080 Total acres (Section 1)

Handbook values used for Liquid Manure nutrient estimation.

1. Nutrient Inputs:

	N	P	K
Table 4: NPK Production, lb:	120887	18467	72092 lb/yr
Table 7: Storage Adjustment (Earthen):	0.55	0.60	0.70
Table 8: Delivery Adjustment (Broadcast):	0.80	1.00	1.00

Revise these parameters to match your operation.

(All storage adjustments = 1.00 for lab data approach)

Dairy Nutrient Budgeting Worksheet

Required manure application rate for disposal:
 3 tons/acre Based on Table 5 animal production quantities, spread acres.

		N	P	K
Available from manure:	Manure NPK available, lb:	53190	11080	50464 lb/yr
	Manure NPK available, lb/ac:	152	32	144 lb/ac
External Inputs:	Table 10: Comm'l Fert, lb NPK/ac:	0	0	0 lb/ac
	Table 12: Irrig Water, lb NPK/ac:	0	0	0 lb/ac
	Subtotal Inputs:	152	32	144 lb/ac
2. Crop Nutrient Demands:		N	P	K
	Adjustment factor for elemental nutrient:	1.0000	0.4365	0.8301
	Table 15: Adjusted NPK requirement, lb:	200	35	145 lb/ac
3. Nutrient Balance:				
	Subtotal Manure, Fertilizer, Irrigation Inputs, lb/yr:	152	32	144 lb/ac
	Subtotal Crop and Pasture Consumption, lb/yr:	200	35	145 lb/ac
	Difference, Inputs minus Outputs, lb/yr:	-48	-3	-1 lb/ac
4. Nutrient Application Recommendations		Analysis based on total manure disposal acres.		
	152 lb/ac N applied. Additional N permissible.		48 lb/ac additional N permissible.	
	32 lb/ac P applied. Additional P permissible.		3 lb/ac additional P permissible.	
	144 lb/ac K applied. Additional K permissible.		1 lb/ac additional K permissible.	

Table 17. Fertilizer Economic Value

Relative value of animal manure and irrigation water nutrients may be determined by comparison to commercially available bulk granular fertilizer. Enter comparative retail costs for Ammonium sulfate (16-20-0) and for Potassium Chloride KCl (0-0-60) below for use as benchmark values. Handling and spreading costs vary for each producer and are not considered in the evaluation.

Animal manures as fertilizer provide additional intangible benefits such as micronutrients, microbial populations, and organic matter for soil building.

1. Benchmark economic values

Enter current fertilizer costs

Ammonium Sulfate (16-20-0), bulk granular delivered to ranch: per ton
 Potassium Chloride (0-0-60), bulk granular delivered to ranch: per ton

	N	P	K	
Equivalent value, \$/lb:	\$ 0.0160	\$ 0.0087	\$ 0.0672	
Unconfined animal manure	\$457	\$42	\$1,511	\$2,010 unconfined
Confined animal manure	\$851	\$97	\$3,393	\$4,341 confined
Irrigation water	\$0	\$0	\$0	
Applied Nutrient Values:	\$1,308	\$138	\$4,905	Total Values

Total Applied Nutrient Value: \$6,351

This Nutrient Budgeting worksheet was developed to assist dairy ranch operators in evaluating waste management facilities and non-point source nutrient loading on their property, in order to better manage manures and protect fresh water resources. Developing and implementing a waste management plan based on appropriate management strategies will aid in preventing code violation through discharge of nutrient-laden materials into the waters of the region. The plan is the effort of the Gold Ridge Resource Conservation District, in cooperation with the University of California Cooperative Extension, Sonoma Marin Animal Waste Committee, North Coast Regional Water Quality Control Board, Natural Resource Conservation Service, and Western United Dairymen. The plan is a self-monitoring aid and may be used by anyone. The document may be copied and used freely. No warranty is expressed or implied and the authors are not responsible for facilities construction or operation or management decisions made on the basis of program outputs. Credit to the authors will be appreciated. L.R. Erickson Ph.D. Gold Ridge RCD.

Appendix D

Biological Survey Report

BIOLOGICAL EVALUATION

KEHOE DAIRY IMPROVEMENT PROJECT INVERNESS, CALIFORNIA

1/16/03

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KEHOE DAIRY BIOLOGICAL EVALUATION

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SUMMARY

Wildlife Research Associates was commissioned to conduct a biological evaluation of a proposed project within the Kehoe Dairy, located in Marin County, California. The approximately 4.0 acre proposed project includes shelter capacity improvements to an existing loafing barn to reduce the amount of animal waste entering an unnamed creek, and creation of an additional manure holding pond. The purpose of this biological evaluation was to assess the potential for the presence of special-status biological resources and to evaluate the potential biological impacts associated with the proposed project. Potential biological impacts were analyzed with respect to the grading requirements for the barn expansion and the new manure holding pond.

The Kehoe Dairy property consists of approximately 1,263 acres of mostly undeveloped land. The property is located north of Inverness, on Pierce Point Road, west of Tomales Bay and the historic K Ranch, which form the eastern boundary, and east of Point Reyes Beach, which forms the western boundary. The northern property boundary is the historic Pierce Ranch and the southern boundary is the McClure Dairy (historic I Ranch). The site topography consists of gently south-facing, sloping lands with clay loam soils.

Habitats within the Kehoe Dairy property have been altered as the result of cattle grazing, and planting of non-native grasslands. On-site, a perennial creek, with headwaters that begin on the northwestern corner of the property, supports willow riparian scrub and drains into the Pacific Ocean. An ephemeral creek that is a tributary to the perennial creek originates in the northeastern portion of the site and supports coastal scrub habitat. Several Monterey cypress trees occur along Pierce Point Road.

A total of 21 special-status plant species and 22 special-status wildlife species were evaluated in this biological evaluation, based on known occurrences in the vicinity and/or the type of habitats present on site. No special-status vegetation communities or plant species occur within the proposed project site. Several federal and state bird species of concern have a low to moderate potential to occur on site, including nesting passerines (perching birds). The California red-legged frog, a federally listed Threatened species with a strong population in the area, is known to occur within the project area.

1.0 INTRODUCTION

Wildlife Research Associates was hired by Kehoe Dairy to prepare a biological evaluation on a 4.0-acre portion of the 1,263-acre property located approximately 6 miles northwest of Inverness, Marin County, California (Figure 1). The Kehoe Dairy, part of the historic J Ranch site in Point Reyes National Seashore (PRNS), is situated toward the northern end of Pierce Point Road, south of the historic Pierce Ranch, east of the Pacific Ocean, north of the McClure Dairy (historic I Ranch), and west of Tomales Bay and the historic K Ranch.

The Kehoe Dairy is bifurcated by Pierce Point Road with two structures, a calf shed and a hay barn, located on the western portion of the property. Several structures sited on the eastern portion of the property include three occupied residences, two unused residences, one garage, a barn attached to a dairy, two calf sheds and a loafing barn with a concrete pad.

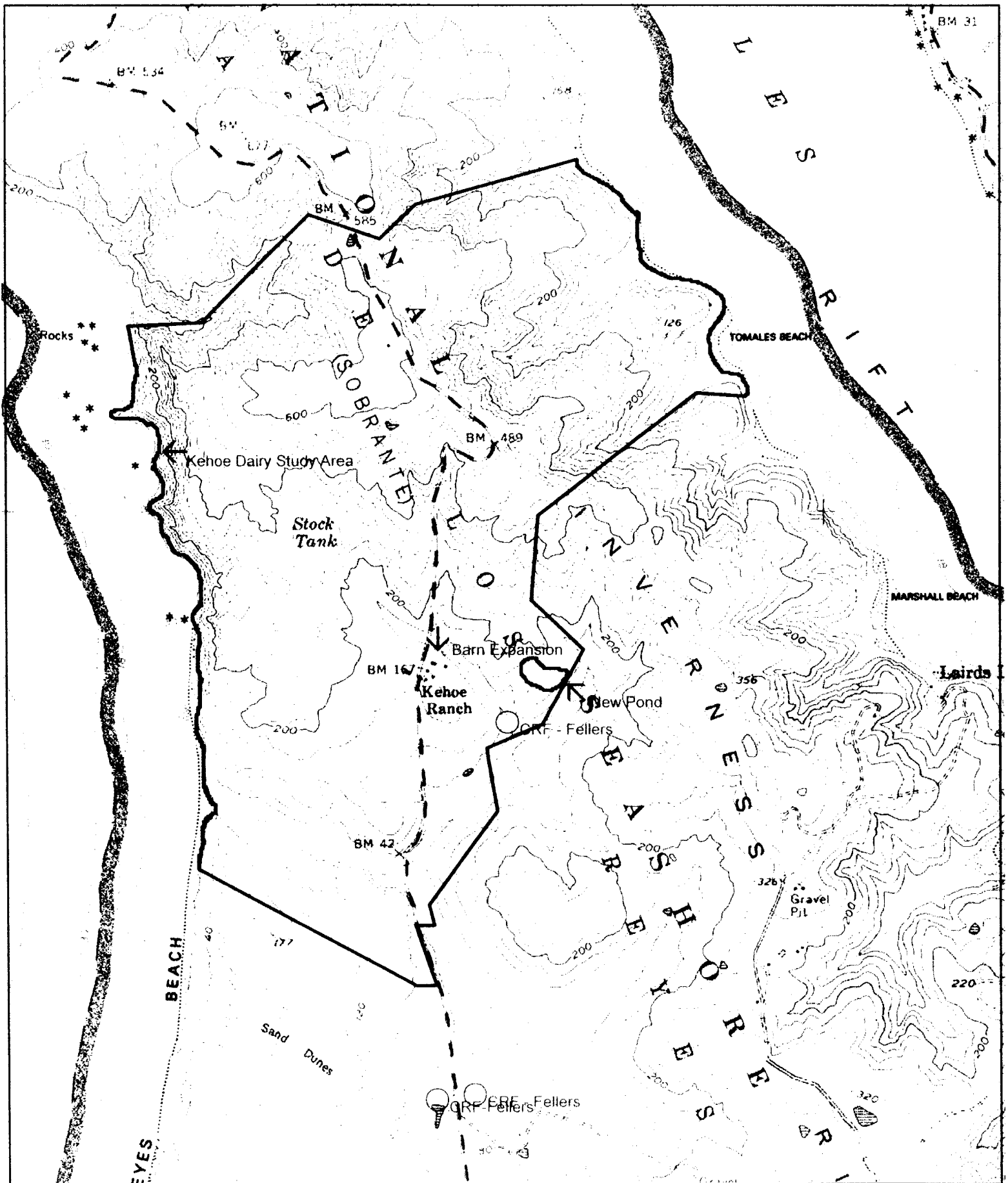
Four ponds occur within the entire property – three within the proposed project vicinity, and one, a stock pond, located outside the proposed project site in the western portion of the property. Two of the ponds are located just north of the dairy complex and have capacities of approximately 3.5 and 0.3 acre-feet. The third holding pond, located on the opposite hillside to the northeast has a capacity of approximately 4.1 acre-feet. All three of these ponds are used for animal waste management and are dredged annually to remove accumulated waste (Erickson Engineering 2002a). The ponds are clay lined to prevent seepage into the nearby creeks. As a result of the high nutrient loads and annual dredging, no emergent vegetation occurs along the edges.

This report presents the results of a reconnaissance-level survey of the project site and vicinity, a discussion of the existing plant communities and wildlife habitats, potentially occurring special-status natural communities, and special-status plant and animal species, and identifies potential impacts and mitigation measures.

1.1 Project Description

The proposed project site, approximately 4.0 acres, is located in the central area of the dairy complex and currently consists of a horse barn, a cattle barn and a calf corral. The proposed project includes shelter capacity improvements to the existing eastern loafing barn to reduce the amount of animal waste entering the unnamed creek, and creation of an additional manure holding pond.

Improvements to the shelter capacity are proposed for the western and eastern sides of the existing loafing barn, comprising 26,800 square feet and 21,500 square feet, respectively. A free-standing 18,000 square-foot addition will be constructed adjacent to the existing barn on the west side, and a 5,600 square-foot calf barn will be added adjacent to the east side. Grading, including approximately 1,000 square-foot area of fill on the east side, will be required to provide flatter ground contours upon which to place the new structures. The proposed grading will occur approximately 300 feet from the top of bank of Kehoe Creek at its nearest point. These additions to the barn will require the removal of two existing structures located to the west of the loafing barn, including the existing horse barn and the lean-to calf shed attached to the shop. The project also includes the construction of a 2,500 square-foot storage building adjacent to the existing shop.



Name: TOMALES
 Date: 1/16/2003
 Scale: 1 inch equals 1818 feet

Location: 038° 09' 47.5" N 122° 55' 58.5" W
 Caption: Kehoe Dairy Study Area

In order to further minimize the production of wastewater, improvements are planned for the existing clean water runoff system, which will control roof runoff from the existing and planned barns and shelters. No new swales or creek outfalls are planned. Minor improvements to the existing surface drainage system will include armoring at certain locations to prevent scouring and bank erosion. There are no plans to increase the total size of the dairy herd. However, the increased manure production within the barns and shelters resulting from the shelter expansion will require additional capacity at the existing manure holding ponds. This will be accomplished by creating a new manure holding pond located on the hillside east of the perennial creek, just downstream from an existing holding pond, approximately 1,000 feet northeast of the main dairy complex. The pond will be located more than 75 feet northeast of the ephemeral creek, at 180 feet in elevation, with a work area comprising 2.75 acres (120,000 square feet) of which the pond surface area will be 1.3 acres (Erickson Engineering 2002b). No alterations are planned to the existing animal waste conveyance piping system.

These improvements will allow for the restoration of nearby pasture areas that become severely degraded by cows during the wet winter months under current conditions. Revegetation and stabilization of these pastures will also reduce soil erosion and consequent sediment transport to the adjacent creek.

2.0 METHODS AND LIMITATIONS

Focused surveys for special-status wildlife species were not conducted as part of this effort. Information on special-status plant species was compiled through a review of the California Natural Diversity Data Base (CNDDDB 2002) for the Tomales 7.5-minute topographic quadrangle, the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1999), the California Department of Fish and Game's (CDFG) *Special Plants List* (CDFG 2002a) and the USFWS list of special-status plants (USFWS 2002).

A list of special-status wildlife species known or expected to occur on the site was compiled through a review of the CNDDDB (CNDDDB 2002), the CDFG's *Special Animals List* (CDFG 2002b), *State and Federally Listed Endangered and Threatened Animals of California* (CDFG 2002c) and the USFWS list of special-status plants (USFWS 2002).

A site visit was conducted on October 15, 2002 by Wildlife Research Associates ecologist Trish Tatarian. The reconnaissance-level site visit was intended only as an initial evaluation of on-site and adjacent habitat types. For purposes of this report, the study area consists of all lands within the property boundaries - approximately 1,263 acres. The project site, approximately 4.0-acres, consists of those areas proposed for expansion, including the loafing barn, the horse barn, the calf shed and the open field downstream of the large existing manure holding pond (i.e., site of the proposed additional manure holding pond). Dominant plant species and wildlife habitats and vegetation communities were recorded.

3.0 EXISTING CONDITIONS

3.1 Setting

The Kehoe Dairy study area is bordered by the Pacific Ocean on the west and Tomales Bay on the east. The rectangular-shaped study area, approximately 1,263 acres, is located within the central portion of the Tomales 7.5-minute topographic quadrangle, within the Township 4N and Range 10W area. The study area is located on south-facing, gently sloping lands, that range in elevations between 640 feet to 0 feet. Soils in this area include Kehoe loam within the upland

portions of project site, and Rodeo clay loam along the riparian corridor (Erickson Engineering 2002b)

The majority of the study area contains non-native grassland habitat that has been grazed by cattle since the early 1900's. Along with grazing, non-native grasses are seeded each year as an erosion control measure and for grazing (Kehoe, pers. comm.). One perennial creek (Kehoe Creek) occurs on-site, with its headwaters originating near the northwestern portion of the property, flowing through the property and draining into the Pacific Ocean at Kehoe Beach in the southwestern portion of the property. Riparian scrub is supported in this creek. The headwaters of Kehoe Creek, located approximately 2,270 feet from the project site, supports a stock pond and a blown out stock pond occurs at Kehoe Beach, approximately 3,190 feet from the project site. An ephemeral creek is located along the southeastern border of the property and flows into the perennial creek. Riparian scrub and coastal scrub occur along the length of this creek. A north-facing rock outcrop is located in the southern portion of the property.

The proposed cattle loafing barn expansion project site is bounded by Pierce Point Road on the west, Kehoe Creek on the north and east and manure storage and residential components of the ranch complex on the south. The immediate areas surrounding the existing loafing barn are devoid of vegetation due to the presence of cattle throughout the year. The existing calf barn proposed for removal consists of corrugated aluminum sheets on a wood frame. The horse barn proposed for removal was built in the 1860's (Kehoe, pers. comm.). The structure consists of single board walls, with a mixture of wood shingles and corrugated aluminum sheets overlaying on wooden rafters. Many of the walls had gaps between the boards greater than one-half inch, and the wall to roof gap was six inches to one-foot.

The proposed manure holding pond is located in non-native grassland that is used as a cattle-grazing pasture.

3.2 Vegetation Communities

Several vegetation communities occur on the 1,263-acre property, but not within the project site; as a result these communities will not be discussed in this report. The communities described below refer to those that are located within and adjacent to the project site.

3.2.1 Non-native Grassland

Non-native annual grassland is generally found in open areas in valleys and foothills throughout coastal and interior California (Holland 1986). It typically occurs on soils consisting of fine-textured loams or clays that are somewhat poorly drained. This vegetation type is dominated by non-native annual grasses and weedy annual and perennial forbs, primarily of Mediterranean origin, that have replaced native perennial grasslands and scrub as a result of human disturbance. Scattered native wildflower species, representing remnants of the original vegetation may also be common. Onsite, non-native annual grassland intergrades with coastal terrace prairie, northern coastal scrub and all of the disturbed habitats are dominated by non-native species.

Within the project site, non-native grassland occurs in the area of the proposed manure holding pond, and supports spiny cocklebur (*Xanthium spinosum*), yarrow (*Achillea millefolium*), and poison hemlock (*Conium maculatum*), among others. Characteristic non-native annual grasses commonly found onsite include red oats (*Avena fatua*), brome grasses, wild barley (*Hordeum* spp.), quaking grass (*Briza* spp.), Italian ryegrass (*Lolium multiflorum*), and fescue (*Vulpia* spp.). Common non-native forbs include field bindweed (*Convolvulus arvensis*), crane's-bill (*Geranium*

dissectum), sheep sorrel (*Rumex acetosella*), bur-clover (*Medicago polymorpha*), and black mustard (*Brassica nigra*), and among others.

3.2.2 Ornamental Landscape

Ornamental landscape lands are those on which the native vegetation has been completely removed and replaced with horticultural species. Because disturbed, cultivated and landscaped areas have little potential to support significant botanical resources, they were not surveyed in detail.

Several ornamental plants have been planted around the two houses east of Pierce Point Road.

3.2.3 Central Coast Riparian Scrub

Central Coast riparian scrub typically consists of a scrubby streamside, open to impenetrable thickets composed of one to several species of willows. This plant community occurs close to river channels and near the coast on fine-grained sand and gravel bars with a high water table. It is distributed along and at the mouths of most perennial and many intermittent streams of the South Coast Ranges, from the Bay Area to near Point Conception (Holland 1986). Central Coast riparian scrub is generally regarded as early seral, meaning that it typically precedes the development of other riparian woodland or forest communities in the absence of severe flooding. However, outside of riparian situations, that is, near groundwater seeps, willow-dominated scrub represents a relatively stable plant community and is not considered seral.

Adjacent to the project site, Central Coast riparian scrub is restricted to the narrow drainages of Kehoe Creek and the ephemeral creek. Characteristic native species occurring on-site include narrow-leaved willow (*Salix exigua*) and Hooker willow (*S. hookeriana*), as well as California blackberry (*Rubus ursinus*) and poison oak (*Toxicodendron diversilobum*), among others.

3.2.4 Northern (Franciscan) Coastal Scrub

Northern coastal scrub consists of a dense cover of low shrubs up to six feet high with a well-developed herbaceous or low woody understory. It is frequently interspersed with coastal terrace prairie grassland. Northern coastal scrub is most extensive on windy, exposed sites with shallow, rocky soils. This vegetation community is distributed in a discontinuous strip from southern Oregon to Point Sur, Monterey County within the immediate coastal zone and at elevations up to 1,500 feet (Holland 1986).

Adjacent to the project site, Northern coastal scrub occurs on the ravine sides of the ephemeral creek, situated within the property, but outside the project site. Characteristic species present include sticky monkey-flower (*Mimulus guttatus*), California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), poison oak, coffeeberry (*Rhamnus californica* ssp. *californica*), western bracken fern (*Pteridium aquilinum* var. *pubescens*), cow parsnip (*Heracleum lanatum*), and yarrow (*Achillea millefolium*), among others.

3.3 Wildlife Habitats

Several wildlife habitats, which include vegetation communities and anthropogenic structures (i.e., human-made), occur within the 1,263-acre property; however, the descriptions below pertain to those habitats that are within and adjacent to the project site, including non-native grasslands, coastal scrub, riparian scrub and structures.

3.3.1 Non-native Grassland

Grassland habitat, including native and non-native grasslands, attract reptiles and amphibians, such as northern alligator lizard (*Gerrhonotus multicarinatus*), western fence lizard (*Sceloporus occidentalis*), and Pacific slender salamander (*Batrachoseps attenuatus*), which feed on invertebrates found within and beneath fallen logs within the vegetation community. This habitat also attracts seed- and insect-eating species of birds and mammals. California quail (*Lophortyx californicus*), mourning dove (*Zenaidura macroura*), and meadowlark (*Sturnella neglecta*) are a few seed-eaters that nest and forage in grasslands. Insect-eaters such as scrub jays (*Aphelocoma coerulescens*), barn swallows (*Hirundo rustica*), and mockingbirds (*Mimus polyglottus*) use the habitat for foraging only. Grasslands are important foraging grounds for aerial and ground foraging insect-eating bat species such as myotis (*Myotis* spp.) and pallid bat (*Antrozous pallidus*). A large number of other mammal species such as California vole (*Microtus californicus*), deer mouse (*Peromyscus maniculatus*), Botta's pocket gopher (*Thomomys bottae*), California ground squirrel (*Spermophilus beecheyi*) and black-tailed jackrabbit (*Lepus californicus*) also forage and nest within grasslands. Small rodents attract raptors (birds of prey) such as owls that hunt at night, as well as day-hunting raptors such as red-tailed hawks (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*) and white-shouldered kite (*Elanus leucurus*), among others. Black-tailed deer (*Odocoileus hemionus californicus*) use grassland for grazing and, if the grass is tall enough, for nesting at night.

3.3.2 Ornamental Landscape

The ornamental landscape around the two residences may provide perching and roosting sites for a small number of avian species, such as Anna's hummingbird (*Calypte anna*). However, the lack of understory growth does not provide much habitat for insects and other invertebrates and, therefore, reptiles that prey upon them rarely occur within this habitat. For this same reason, mammals would not use this habitat except for cover and resting areas.

3.3.3 Riparian Corridors

The perennial and ephemeral creeks on the property, and adjacent to the project site, support willow (*Salix* sp.) riparian scrub. This habitat is a low shrubby tree structure that can cover an entire watercourse, with an impenetrable understory and includes fallen limbs and other debris.

The dense canopy and shallowness of the creek is unsuitable for many of the anadromous fish species in the region. The willow riparian habitat attracts bird species that hover while catching insects, such as Hutton's vireo (*Vireo huttoni*), and black phoebe (*Sayornis nigricans*). Other species, such as snowy egrets (*Egretta thula*), use the shallow quiet waters of the river or stream to forage for small fish and invertebrates. The American crow (*Corvus brachyrhynchos*) is found in this habitat and others, feeding on insects, fruits, carrion, amphibians, and reptiles. A high diversity of passerines can be found in this habitat and, depending on the location, can include yellow-rumped warbler (*Dendroica coronata*), and bushtit (*Psaltriparus minimus*). Omnivores, such as the raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*), forage on invertebrate species, plant parts, amphibians and fruits.

3.3.4 Structures

Anthropogenic structures, such as the horse barn located in the project site, provide potential roosting habitat for various wildlife species, including birds and bats.

Bird species that use anthropogenic structures include passerines, such as barn swallows (*Hirundo rustica*) and black phoebe (*Sayornis nigricans*), and raptors, such as barn owls (*Tyto alba*). These species have adapted to the disturbances associated with human settlements and will

nest and forage in close proximity to humans. In general, the nesting season for both passerines and raptors typically begins at the end of February and may last to mid-August. The conclusion of the nesting season is variable, as female barn swallows and black phoebe, for example, may produce 2-3 broods each year (Alsop 2001).

Evidence of previously nesting passerines, either barn swallows or black phoebe, was observed in the horse barn.

Statewide, buildings provide significant roosting habitat, and it appears that large bat populations are supported by the availability of buildings. Because bats show high roost fidelity, older structures may have provided roost habitat for generations. However, not all buildings available to bats provide the temperature, humidity and other requirements for bats; such factors vary by building design, materials, location, human activity patterns, and by bat species. As a result not all buildings provide suitable roost habitat.

No evidence of bat use was observed in any of the structures located within the project site.

3.4 Wildlife Movement Corridors

Wildlife movement includes migration (*i.e.*, usually one way per season), inter-population movement (*i.e.*, long-term genetic flow) and small travel pathways (*i.e.*, daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow between populations.

These linkages between habitat types can extend for miles between primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement between populations located in discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations comprising a large single population, often referred to as a meta-population. Even where patches of pristine habitat are fragmented, such as occurs with coastal scrub, the movement between wildlife populations is facilitated through habitat linkages, migration corridors and movement corridors. Depending on the condition of the corridor, genetic flow between populations may be high in frequency, thus allowing high genetic diversity within the population, or may be low in frequency. Potentially low frequency genetic flow may lead to complete isolation and, if pressures are strong, potential extinction (McCullough 1996; Whittaker 1998).

Movement corridors within the study area include the Kehoe Creek and the ephemeral stream that provide a suitable corridor for north-south movements of passerines, such as yellow warbler, reptiles, such as terrestrial garter snake (*Thamnophis elegans*), and amphibians, such as California red-legged frog (*Rana aurora draytonii*). The non-native grasslands of the new manure pond site provide an east-west movement corridor for medium and large mammals, such as skunk, raccoon, and black-tailed deer. The disturbed nature of the project site around the loafing barn negates the potential for its use as a movement corridor.

4.0 SPECIAL-STATUS SPECIES AND NATURAL COMMUNITIES

Certain plants and wildlife species are designated as having special status due to their overall rarity, endangerment, restricted distribution, and/or unique habitat requirements. In general, special status is a combination of these factors that leads to the designation of a species as

sensitive. The Federal Endangered Species Act (FESA), enacted by Congress in 1973, outlined the procedures whereby species are listed as endangered or threatened and established a program for the conservation of such species and the habitats in which they occur. Many individual states have enacted their own listing procedures to provide for the protection of additional locally sensitive biological resources. The California Endangered Species Act (CESA) of 1984 amends the California Fish and Game Code to protect species deemed to be locally endangered and essentially expands the number of species protected under the FESA.

The CDFG has also compiled a list of "Special Plants" (CDFG 2002c) and "Special Animals" (CDFG 2002d) which include California Special Concern species. These designations are given to those plant species whose vegetation communities are seriously threatened and those wildlife species whose breeding populations are in serious decline. Although these species may be abundant elsewhere they are considered to be at some risk of extinction in California. Although Special Concern species are afforded no official legal status under FESA or CESA, they may receive special consideration during the planning stages of certain development projects and adverse impacts may be deemed significant under the California Environmental Quality Act (CEQA).

4.1 Special-Status Plant Species

Special-status plant species include those listed as Endangered, Threatened, Rare or Candidates for listing by the USFWS (2002), the CDFG (2002a) and the CNPS (Skinner and Pavlik 1999). The CNPS listing is sanctioned by the CDFG and serves essentially as their list of "candidate" plant species.

Based on a review of the California Natural Diversity Data Base (CDFG 2002e), and general knowledge of the flora of Marin County, a total of 21 special-status plant species were determined to have at least some potential for occurring in the project region. See Appendix A. Appendix C provides the federal and state listing definitions. None of these target species were detected during the reconnaissance survey and none are considered to occur within the project site due to the highly disturbed nature of the site.

Below is a description of those species that have been reported within or adjacent to the Kehoe Dairy and their expected occurrence in the proposed project site.

Point Reyes blennosperma (*Blennosperma nanum* var. *robustum*), a federal Species of Concern and a State listed Rare species, occurs in native annual grassland with California buttercup (*Ranunculus californicus*), cow parsnip (*Heracleum lanatum*), western swordfern (*Polystichum munitum*), shiny Oregon grape (*Berberis pinnata*), creamcups (*Platystemon californicus*), baby blue eyes (*Nemophila menziesii*) and yarrow (*Achillea millefolium*) on shallow soils. This species has been reported both north and south of Kehoe Dairy; however, there are no native annual grasslands within the project site, and cattle-grazing is not conducive for growth of this species. Therefore, this species is not expected to occur within the project site.

Beach layia (*Layia carnosa*), a federal and state listed Endangered species, occurs in semi-stabilized coastal dunes, usually behind foredunes. This species has been reported at Kehoe Beach, in the southern portion of Kehoe Dairy; however, no suitable habitat occurs within the project site. Therefore, this species does not occur within the project site.

Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*), a federal Species of Concern, occurs in freshwater marshes along the coast. This species has been reported on the east side of

Pierce Point Road, northeast of McClure Ranch. Although coastal riparian scrub occurs on the property, no suitable habitat occurs within the project site. Therefore, this species is not expected to occur within the project site.

Mount Vision ceanothus (*Ceanothus gloriosus* var. *porrectus*), a federal Species of Concern, occurs on Point Reyes sandy soils in a variety of habitats, including closed-cone coniferous forest, coastal prairie, coastal scrub and foothill grassland. This species has been reported on the west side of Kehoe Dairy, approximately 1.2 miles north of Kehoe Beach trailhead and north of the project site, and at Tomales Point, on the west side of L Ranch. Although coastal scrub and non-native grasslands occur on the 1,263-acre property, these habitats do not occur within the project site. Therefore, this species is not expected to occur within the project site.

San Francisco owl's clover (*Triphysaria floribunda*), a federal Species of Concern, occurs in coastal prairie and valley and foothill grasslands on serpentine soils and Point Reyes sandy soils. This species has been reported on Pierce Point Road 0.7 miles north of Kehoe Dairy. No coastal prairie occurs within the project site. Therefore, this species is not expected to occur within the project site.

4.2 Special-Status Wildlife Species

Special-status animal species include those listed by the USFWS (2002) and the CDFG (2002b, 2002d). The USFWS officially lists species as either Threatened or Endangered, and as candidates for listing. Additional species receive federal protection under the Bald Eagle Protection Act (*e.g.*, bald eagle, golden eagle), the Migratory Bird Treaty Act (MBTA) and state protection under CEQA Section 15380(d). In addition, many other species are considered by the CDFG to be species of special concern; these are listed in Remsen (1978), Williams (1986), and Jennings and Hayes (1994). Although such species are afforded no official legal status, they may receive special consideration during the planning stages of certain development projects. The CDFG further classifies some species under the following categories: "fully protected", "protected fur-bearer", "protected amphibian", and "protected reptile". The designation "protected" indicates that a species may not be taken or possessed except under special permit from the CDFG; "fully protected" indicates that a species can be taken for scientific purposes by permit only.

A total of 22 special-status animal species have been recorded in the region or may be present within the project site. A complete list of wildlife species, including their potential to occur on site, their legal status and habitat affinities, is included in Appendix B. Appendix C provides the federal and state listing definitions. Of these, two species are considered to have a moderate potential to occur on site, two species are considered to have a high potential to occur on site, and one species is present on site, based on habitats present, proximity of known populations within the region and the observed presence on site.

The following is a discussion of species having potential to occur on site and/or are species that are prominent in today's regulatory environment, such as the California red-legged frog. This document does not address impacts to species that may occur in the region but for which no habitat occurs on site, and include the species listed in Appendix D.

4.2.1 Federally Threatened and Endangered Wildlife Species

The California red-legged frog (*Rana aurora draytonii*)(CRF) is listed by the USFWS as Threatened with associated critical habitat (areas that are essential to the conservation of the species that require special management considerations or protection), and is classified by the

CDFG as a California Special Concern species. The Point Reyes Critical Habitat Unit 12 extends along the western boundary of Marin County, from San Francisco Bay north to the northern portion of Marin County (USFWS 2001). One of the core recovery areas within this unit, as identified in the *Recovery Plan for the California Red-legged Frog* (USFWS 2002), is the North Coast and North San Francisco Bay unit that encompasses the Point Reyes Peninsula, and the watershed of Tomales-Drakes Bays (USFWS 2002). Although core areas have no legal mandate for protection under FESA, the designation of critical habitat requires proponents with projects that have a nexus with a Federal agency to consult with the USFWS regarding any action that could destroy or adversely modify critical habitat (USFWS 2002).

California red-legged frogs breed primarily in ponds, but will also breed in slow moving streams, or deep pools in intermittent streams. Inhabited ponds are typically permanent, at least 2 feet (0.6 meters) in depth, and contain emergent and shoreline vegetation. Sufficient pond depth and shoreline cover are both critical, because they provide means of escape from predators. Additionally, emergent vegetation is necessary for the deposition of eggs. The breeding period begins during heavy rains, from early to late winter, usually November through early May. The larvae mature in 11 to 20 weeks. Non-breeding CRF have been found in both aquatic and upland habitats. The majority of individuals prefer dense, shrubby or emergent vegetation, closely associated with deep (>0.7 meters) still, or slow moving water. However, some individuals use habitats that are removed from aquatic habitats, seeking cover under coyote brush (*Baccharis pilularis*) and non-native grasslands (Fellers, pers. com. 2000; Tatarian, personal observation). Upland habitat, used for foraging, migration and dispersal, includes areas up to 300 feet from a stream corridor or breeding pond and includes natural features, such as boulders, rocks, trees, shrubs, and logs (USFWS 2001). Incised stream channels with portions narrower than 18 inches and depths greater than 18 inches may also provide aestivation habitat. In general, densely vegetated terrestrial areas adjacent to the riparian corridor provide important sheltering habitat during the winter flooding of the streams. Habitats within 300 feet of a stream corridor or breeding habitat are protected under the critical habitat designation.

Although no records occur in the CNDDDB, the National Park Service conducts surveys throughout the PRNS, and CRF have been detected breeding throughout the McClure Dairy, located approximately 1.2 miles south of Kehoe Dairy (Prunuske Chatham 2001). California red-legged frogs have also been detected in the perennial creek (Kehoe Creek) (Fellers, pers. comm.).

Although the 1,263-acre property provides suitable breeding habitat (large stock pond in the northwestern portion of the site and Kehoe Marsh, on Kehoe Creek located on the southern portion of the property) and movement corridors (perennial Kehoe Creek and ephemeral stream), no suitable breeding habitat occurs within the 4.0-acre project site. The proposed expansion of the freestall barn to the west and the fill area proposed east of the calf barn are located outside the 300-foot setback from Kehoe Creek. As a result, no “take” of CRF habitat will occur with this the barn expansion project. The proposed manure holding pond is located approximately 70 feet from the high water mark of the ephemeral creek (Erickson Engineering 2002). The potential for individuals moving around the proposed fill areas is low if construction is to occur during the dry season, such as late summer, when the ground is drier and frogs are less likely to move into areas of short grass.

4.2.2 Other Special-Status Wildlife Species

Western burrowing owl (*Athene cunicularia hypugaea*), a federal and state species of concern like other raptors and birds in general, is protected under California Fish and Game Code 3503 and 3503.5, which prohibits the taking or destroying of nest or eggs of any bird and prohibits the taking or destroying of any bird or nest in the order of Falconiformes (falcons, kites, and hawks)

and Strigiformes (owls). As a migratory species, burrowing owls are protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703-711). The burrowing owl is small, and long-legged, with dull brown plumage that is barred and spotted with white. Burrowing owls are typically observed on the ground, at or near a burrow, or on elevated areas, such as dirt mounds or fence posts, that are used as observational or hunting perches. Burrows are the essential component of burrowing owl habitat (CDFG 1995, CBOC 1993) and are often the limiting factor in occupied habitat (Zarn 1974). Burrows used by burrowing owls are usually dug by small mammals, such as California ground squirrel (*Spermophilus beecheyi*), in loose soil, and are enlarged by the owls for nesting. Other structures used for nesting include soil under slabs of concrete, railroad ties, wood debris piles, and other anthropomorphic features (CBOC 1993). Burrows are used repeatedly for nesting, but not necessarily by the same pair of owls (Zarn 1974). During the breeding season, several burrows may be renovated, but only one will be used per pair, with non-nest (satellite) burrows created nearby for escaping, perching and observation points (Dechant, et al. 1999). Burrowing owls exhibit high site fidelity, reusing burrows year after year (CBOC 1997).

The loafing barn site is highly disturbed and supports no grassland habitat. Although the grasslands proposed for the waste management pond contain short grasses suitable for nesting and foraging for this species, no ground squirrel burrows were observed in the pasture. In addition, the pasture is actively grazed by cattle that may do damage to nests and nestlings. Therefore, this species is not expected to occur within the project site.

Passerines (perching birds) are protected under the MBTA and CDFG code 3503, which protects the nest and eggs of any passerine. The horse barn to be demolished showed evidence (old nests) of several pairs of nesting barn swallows or black phoebe using the structure. Several ground nesting species also have potential to occur within the non-native grasslands within the project site, specifically the area of the proposed manure holding pond. These ground nesting species include western meadowlark (*Sturnella neglecta*) and California horned lark (*Eremophila alpestris actia*). A third area of potential nesting is the riparian willow scrub adjacent to the project site. Several passerine species have potential to nest in this habitat, such as saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), reported in Kehoe Lagoon on the southern portion of the property, and yellow warbler (*Dendroica petechia*).

Based on the presence of suitable nesting habitat within the project site, there is potential for “take” of individuals if demolition or construction (ground breaking) is proposed during the nesting season. No impacts will occur to the riparian corridor on either the perennial or ephemeral streams. See Section 5 below.

Bats species, in general, are protected under Fish and Game Code 4150, as indigenous non-game mammals. Many bat species, such as big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), and to some extent, pallid bat (*Antrozous pallidus*), a California Special Concern species, and several others, evolved to roost in rock crevices and caves, but have adapted quite well to using man-made structures such as buildings and bridges.

Based on the structure of the buildings no potential roosting habitat occurs within the project site. No evidence of bat roosting was observed during the site reconnaissance. Therefore, no impacts to special status bat species will occur.

5.0 IMPACTS AND MITIGATION MEASURES

5.1 Wildlife

Potential Impact 1: The proposed project could result in “take” of individual California red-legged frog that may move into the non-native grasslands in the proposed manure holding pond site. *This is a less-than-significant impact with the following mitigation measures incorporated.*

Mitigation Measure: To avoid “take” and to determine presence or absence of this species before construction, the following measures are recommended:

- Pre-construction surveys of the non-native grassland should be conducted prior to grading for the proposed manure holding pond. Based on the grassland height and density, surveys should consist of one daytime survey to be conducted the same day as grading commences. A qualified biologist should walk the area looking for individual CRF. If an individual is found, it should be able to leave of its own volition. Ground breaking may commence after the individual has left. If no individuals are found, ground breaking may start immediately. During grading and construction, a walk through should be conducted each morning to search for individuals.

Potential Impact 2: The proposed project could result in the removal of potential passerine nesting site in the non-native grasslands at the new manure pond site, and a structure that has shown evidence of nesting (the horse barn). Disturbance during the nesting season may result in the potential nest abandonment and mortality of young. *This is a less-than-significant impact with the following mitigation measures incorporated.*

Mitigation Measure: To avoid “take” and/or further evaluate presence or absence of passerines, the following measures are recommended:

Alternative Mitigation A: Demolition of buildings, such as the horse barn, and grading within the grasslands should be conducted outside the nesting season, which occurs between February 1 and August 15, approximately.

Alternative Mitigation B: If demolition and grading in the potential nesting areas is not feasible outside of the nesting season, a nesting bird survey shall be performed by a qualified biologist prior to grading or demolition. This pre-construction survey shall be conducted no more than one week prior to planned demolition and/or grading activity.

- If nesting birds with eggs or young are observed during the pre-construction surveys, grading and/or demolition in the affected project area (i.e., horse barn or grasslands at the manure pond) shall not commence until after the young have fledged. In the case of the swallows in the eaves in the barn, early removal of the nesting structure in February or early March, while the nest is being built but before eggs are laid, would also be sufficient to prevent “take” of individuals.
- If no nesting birds are observed no further action is required and demolition, grading and construction may proceed, provided it commences within one week of the survey to prevent “take” of individual birds that may have begun nesting after the survey. These surveys may be conducted in conjunction with the amphibian survey.

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APPENDIX A
Potentially Occurring Special-Status Plant Species in the Vicinity of the
Proposed Kehoe Dairy Project Site

Scientific Name Common Name	Status¹	Habitat Affinities and Reported Localities in the Project Area	Blooming Period/ Life Form	Potential for Occurrence	
<i>Abronia umbellata</i> ssp. <i>breviflora</i> pink sand verbena	Federal State CNPS	FSC None 1B	Foredunes and interdunes with sparse cover from the north coast of California into Oregon.	July-September Perennial herb	No suitable habitat present in project site.
<i>Agrostis blasdalei</i> Blasdale's bent grass	Federal State CNPS	FSC None 1B	Coastal dunes, coastal bluff scrub and coastal prairie communities on sandy or gravelly soils close to rocks.	May-July Perennial herb	No suitable habitat present in project site.
<i>Blennosperma nanum</i> var. <i>robustum</i> Point Reyes blennosperma	Federal State CNPS	SC rare 1B	Coastal prairie and coastal scrub in open hills with sandy soils. Reported from south of Upper Pierce Ranch, and McClures Ranch south of Kehoe Creek.	March Annual herb	No suitable habitat present in project site.
<i>Campanula californica</i> Swamp harebell	Federal State CNPS	FSC None 1B	Bogs and fens in a variety of communities, such as closed-cone coniferous forest, coastal prairie, meadows, and freshwater marsh.	June-September Perennial herb	No suitable habitat present in project site.
<i>Ceanothus gloriosus</i> var. <i>porrectus</i> Mt. Vision ceanothus	Federal State CNPS	FSC None 1B	Closed cone coniferous forest, coastal prairie, coastal scrub and valley and foothill grasslands with sandy soils.	March-May Shrub	No suitable habitat present in project site.
<i>Chorizanthe cuspidate</i> var. <i>cuspidate</i> San Francisco Bay spineflower	Federal State CNPS	FSC None 1B	Coastal bluff scrub, coastal dunes, and coastal prairie communities on terraces and slopes with sandy soils.	April-July Annual herb	No suitable habitat present in project site.
<i>Chorizanthe cuspidate</i> var. <i>varvillosa</i> Woolly-headed spineflower	Federal State CNPS	FSC None 1B	Coastal bluff scrub, coastal dunes, and coastal prairie communities on sandy soils. This species is endemic only along the coastline from Bodega Bay to Point Reyes.	May-August Annual herb	No suitable habitat present in project site.
<i>Clarkia concinna</i> ssp. <i>raichei</i> Raiche's red ribbons	Federal State CNPS	FSC None 1B	Coastal bluff scrub on highly exposed rocky bluffs with a near vertical slope.	April-May Annual herb	No suitable habitat present in project site.
<i>Cordylanthus maritimus</i> ssp. <i>palustris</i> Point Reye's bird beak	Federal State CNPS	FSC None 1B	Coastal saltmarsh.	June-October Annual herb	No suitable habitat present in project site.
<i>Delphinium bakeri</i> Baker's larkspur	Federal State CNPS	FE Rare 1B	Coastal scrub and grasslands.	March-May Perennial herb	No suitable habitat present in project site.
<i>Delphinium luteum</i> Yellow larkspur	Federal State CNPS	FE Rare 1B	Chaparral, coastal prairie and coastal scrub	March-May Perennial herb	No suitable habitat present in project site.
<i>Fritillaria affinis</i> var. <i>tristulis</i> Marin checker lily	Federal State CNPS	FSC None 1B	Coastal bluff scrub, coastal scrub and coastal prairie, within canyons and riparian areas.	February-April Perennial herb	No suitable habitat present in project site.
<i>Fritillaria liliacea</i> Fragrant fritillary	Federal State CNPS	FSC None 1B	Coastal scrub, valley and foothill grassland and coastal prairie communities on serpentine rock but also on clay.	February-April Perennial herb	No suitable habitat present in project site.

APPENDIX A
Potentially Occurring Special-Status Plant Species in the Vicinity of the
Proposed Kehoe Dairy Project Site

Scientific Name	Status¹		Habitat Affinities and Reported Localities in the Project Area	Blooming Period/ Life Form	Potential for Occurrence
<i>Horkelia cuneata ssp. sericea</i>	Federal	FSC	In openings of closed cone coniferous forest, coastal scrub and chaparral communities.	April-September Perennial herb	No suitable habitat present in project site.
Kellogg's horkelia	State	None			
<i>Layia carnosa</i>	Federal	FE	Coastal dunes, in semi-stabilized dunes that are sparsely vegetated.	May-July Annual herb	No suitable habitat present in project site.
Beach layia	State	SE			
	CNPS	1B			
<i>Linanthus rosaceus</i>	Federal	FSC	Coastal bluff scrub	May-July Annual herb	No suitable habitat present in project site.
Rose linanthus	State	None			
	CNPS	1B			
<i>Lupinus tidestromii</i>	Federal	FE	Partially stabilized dunes immediately near the ocean.	May-June Perennial herb	No suitable habitat present in project site.
Tidestrom's lupine	State	SE			
	CNPS	1B			
<i>Phacelia insularis var. continentis</i>	Federal	FSC	Coastal bluff scrub on coastal dunes on open maritime bluffs on sandy soils.	March-May Annual herb	No suitable habitat present in project site.
North coast phacelia	State	None			
	CNPS	1B			
<i>Polygonum marinense</i>	Federal	FSC	Coastal saltmarshes and brackish marshes.	June-August Annual herb	No suitable habitat present in project site.
Marin knotweed	State	None			
	CNPS	3			
<i>Sidalcea calycosa ssp. rhizomata</i>	Federal	FSC	Freshwater marshes near the coast.	April-September Perennial herb	No suitable habitat present in project site.
Point Reyes checkerbloom	State	None			
	CNPS	1B			
<i>Triphysaria floribunda</i>	Federal	FSC	Coastal prairie and valley and foothill grassland communities.	April-May Annual herb	No suitable habitat present in project site.
San Francisco owl's-clover	State	None			
	CNPS	1B			

Note: See Appendix C for descriptions of classifications.

APPENDIX B
Potentially Occurring Special-Status Animal Species in the Vicinity of the
Proposed Kehoe Dairy Project Site

Scientific Name Common Name	Status ¹	Habitat Affinities and Reported Localities in the Project Area	Potential for Occurrence in Project Site	
Invertebrates				
<i>Icaricia icarioides</i> Point Reyes blue butterfly	Federal State	FSC	Larval foodplant is Lupine sp.	No suitable larval or nectar plants on project site.
<i>Speyeria zerene myrtleae</i> Myrtles silverspot butterfly	Federal State	FE	Restricted to the foggy, coastal dunes of the Point Reyes peninsula. Larval food plant is <i>Viola adunca</i> , with nectar sources of thistles and gum weed (<i>Grindelia rubicaulis</i>).	No suitable larval or nectar plants on project site.
Fish				
<i>Oncorhynchus kisutch</i> Coho salmon – Central California ESU	Federal State	FT, CH CE	Central California Coast group occurs from Punta Gorda in northern California to the San Lorenzo River, in Santa Cruz County, and includes coho salmon populations from several tributaries of San Francisco Bay.	No suitable spawning habitat on project site.
<i>Oncorhynchus mykiss</i> Steelhead – Central California Coast ESU	Federal State	FT	Commonly spends 2 years in ocean before entering freshwater one year prior to spawning.	No suitable spawning habitat on project site.
<i>Oncorhynchus tshawytscha</i> Chinook salmon – California coastal	Federal State	FT	Spawning occurs in larger coastal streams north of San Francisco Bay to Oregon.	No suitable spawning habitat on project site.
Amphibians				
<i>Rana aurora aurora</i> Northern red-legged frog	Federal State	none CSC, FP	Range occurs from northern Sonoma County to British Columbia. Inhabit perennial and ephemeral streams with quiet waters and dense emergent vegetation.	None: Low potential for Kehoe Creek to be used as migration corridor.
<i>Rana aurora draytonii</i> California red-legged frog	Federal State	FT, CH CSC, FP	Prefers semi-permanent and permanent stream pools, ponds and creeks with emergent and/or riparian vegetation. Occupies upland areas especially during the wet winter months.	High: Kehoe Creek is used as a migration corridor.
Reptiles				
<i>Clemmys marmorata marmorata</i> western pond turtle	Federal State	SC CSC, FP	Prefers permanent, slow-moving creeks, streams, ponds, rivers, marshes and irrigation ditches with basking sites and a vegetated shoreline. Requires upland sites for egg-laying.	No suitable nesting habitat on site.
Birds				
<i>Accipiter cooperi</i> Cooper's hawk (nesting site only)	Federal State	MB CSC	Nests primarily in deciduous riparian forests. May also occupy dense canopied forests from gray pine-oak woodland to ponderosa pine. Forages in open woodlands.	No suitable nesting habitat on site.
<i>Accipiter striatus</i> sharp-shinned hawk (nesting site only)	Federal State	MB CSC	Dense canopy pine or mixed conifer forest and riparian habitats. Water within one mile required.	No suitable nesting habitat on site.

APPENDIX B
Potentially Occurring Special-Status Animal Species in the Vicinity of the
Proposed Kehoe Dairy Project Site (Cont'd)

Scientific Name Common Name	Status ¹		Habitat Affinities and Reported Localities in the Project Area	Potential for Occurrence in Project Site
<i>Agelaius tricolor</i> Tricolored blackbird	Federal State	SC, MB CSC	Nests colonially near open water but often in dense thistles or cattails.	No suitable nesting habitat on site.
<i>Ammodramus savannarum</i> Grasshopper sparrow	Federal State	SC	Typically found in tall, dense grass, nesting on the ground at the base of grass tuft.	No suitable nesting habitat on site.
<i>Asio flammeus</i> Short-eared owl	Federal State	SC, MB	Nests in tall grasses and in freshwater marshes.	No suitable nesting habitat on site.
<i>Athene cunicularia hypugaea</i> Western burrowing owl	Federal State	SC, MB SSC	Open, dry grasslands, deserts, prairies, farmland and scrublands with abundant active and abandoned mammal burrows. Prefers short grasses and moderate inclined hills.	No suitable nesting habitat in grassland.
<i>Chaetura vauxi</i> Vaux's swift	Federal State	SC, MB	Nests in tree cavities in woodlands.	No suitable nesting habitat on site.
<i>Circus cyaneus</i> northern harrier	Federal State	MB CSC	Nests and forages in grasslands and open marshland, both salt and fresh. Nests consist of a thin to thick layer of small sticks and reeds, lined with grasses.	No suitable nesting habitat in grassland.
<i>Dendroica petechia brewsteri</i> California yellow warbler (nesting)	Federal State	MB CSC	Nests in riparian areas dominated by willows, cottonwoods, sycamores or alders and in mature chaparral. May also inhabit oak and coniferous woodlands and urban areas near stream courses.	None: Suitable nesting habitat in Kehoe Creek, outside project site.
<i>Elanus leucurus</i> white-tailed kite (nesting sites only)	Federal State	MB CFP	Inhabits low rolling foothills and valley margins with scattered oaks and river bottom- lands or marshes adjacent to deciduous woodlands. Nests and perches in dense-topped trees and perching.	No suitable nesting habitat.
<i>Eremophila alpestris actia</i> California horned lark	Federal State	MB CSC	Nests on relatively flat ground in open grasslands, removed from shrubs and trees. Nest is a cup made of dry grass and plant stems in a small hollow.	Moderate – suitable nesting habitat in grassland
<i>Empidonax trailii brewsteri</i> willow flycatcher	Federal State	MB SE	Nest sites occur in extensive thickets of low lying, dense willows on edge of wet meadows, ponds or backwaters. 2,000-8,000 feet in elevation. This species requires dense willow thickets for nesting and roosting.	No suitable nesting habitat.
<i>Geothlypis trichas sinuosa</i> saltmarsh common yellowthroat	Federal State	SC CSC	Nests in fresh and saltwater marshes in tall grasses, cattail patches and willows that provide dense cover to waterline.	None - Suitable nesting habitat in Kehoe Creek, outside project site.
<i>Hirundo rustica</i> barn swallows	Federal State	MB	Nests in anthropogenic structures stuck against a vertical surface. Nest made of mud pellets mixed with vegetable fibers and plant fibers.	High – suitable nesting habitat in horse barn.

APPENDIX B
Potentially Occurring Special-Status Animal Species in the Vicinity of the
Proposed Kehoe Dairy Project Site (Cont'd)

Scientific Name Common Name	Status ¹		Habitat Affinities and Reported Localities in the Project Area	Potential for Occurrence in Project Site
<i>Lanius ludovicianus</i> loggerhead shrike	Federal State	SC, MB CSC	Nests in woodland and scrub habitats at margins of open grasslands. Often uses lookout perches such as fence posts. Resident and winter visitor in lowlands and foothills throughout California.	None –Moderately suitable nesting habitat in riparian scrub.
<i>Sayornis nigricans</i> black phoebe	Federal State	MB	Nests in anthropogenic structures on ledges. Nest made of mud pellets, dry grasses, weed stems, plant fibers and hair.	High – suitable nesting habitat in horse barn.
<i>Selasphorus rufus</i> Rufous hummingbird	Federal State	SC, MB	Nests in chaparral, coniferous forest, scrub habitats and riparian habitats. Nests are placed on a downward drooping structure.	None - Suitable nesting habitat in Kehoe Creek, outside project site.
<i>Selasphorus sasin</i> Allen's hummingbird	Federal State	SC, MB	Nests in wooded areas, meadows, or thickets along shaded streams, on a branch low down on stem, although placement height varies between 10 inches and 90 feet.	None - Suitable nesting habitat in Kehoe Creek, outside project site.
<i>Sturnella neglecta</i> western meadowlark	Federal State	MB	Nests in grasslands removed from trees and shrubs. Nest is domed in structure.	Moderate – suitable nesting habitat in grassland.
Mammals				
<i>Antrozous pallidus</i> pallid bat	Federal State	none CSC	Day roosts include rock outcrops, mines, caves, hollow trees, buildings and bridges. Recent research suggests high reliance on tree roosts.	No suitable roosting habitat.
<i>Corynorhinus (Plecotus) townsendii townsendii</i> Townsend's big-eared bat	Federal State	none CSC	Roosting sites include caves, mine tunnels, abandoned buildings and other structures. Forages in a variety of plant communities including coastal conifer and broad-leaf forests, oak and conifer woodlands, arid grasslands and deserts. Most commonly associates with mesic sites. Highly sensitive to human disturbances.	No suitable roosting habitat.
<i>Myotis ciliolabrum</i> small-footed myotis bat	Federal State	SC none	Roosts in caves, mine tunnels, crevices in rocks and buildings, generally near forested areas. Feeds low among trees or over shrubs.	No suitable roosting habitat.
<i>Myotis evotis</i> long-eared bat	Federal State	SC none	Day roosts in hollow trees under exfoliating bark, and crevices in rock outcrops. Found roosting under bark of small black oaks in northern California. Found throughout California.	No suitable roosting habitat.

APPENDIX B
Potentially Occurring Special-Status Animal Species in the Vicinity of the
Proposed Kehoe Dairy Project Site (Cont'd)

<i>Myotis thysanodes</i> fringed myotis bat	Federal State	SC none	Roosts in colonies in caves, cliffs and attics of old buildings. Will also use trees as day roosts.	No suitable roosting habitat.
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Scientific Name Common Name	Status ¹		Habitat Affinities and Reported Localities in the Project Area	Potential for Occurrence in Project Site
<i>Myotis volans</i> long-legged myotis	Federal State	SC none	Day roosts in hollow trees, particularly large diameter snags or live trees with lightning scars. Habitat usually defined by montane coniferous forests, pinyon-juniper, and Joshua tree woodland habitats.	No suitable roosting habitat.
<i>Myotis yumanensis</i> Yuma myotis bat	Federal State	SC none	Roosts colonially in caves, tunnels and buildings. Inhabits arid regions.	No suitable roosting habitat.

A definition of sensitivity codes is located in Appendix C.

**APPENDIX C
EXPLANATION OF SENSITIVITY STATUS CODES**

AGENCIES

- USFWS = U.S. Fish and Wildlife Service
- CDFG = California Department of Fish and Game
- CNPS = California Native Plant Society
- BLM = Bureau of Land Management
- USFS = U.S. Forest Service

CALIFORNIA NATIVE PLANT SOCIETY DESIGNATIONS

- List 1: Plants of highest priority
- List 1A: Plants presumed extinct in California
- List 1B: Plants rare and endangered in California and elsewhere
- List 2: Plants rare and endangered in California but more common elsewhere
- List 3: Plants about which additional data are needed
- List 4: Plants of limited distribution

CNPS R-E-D Codes

R (Rarity)

- 1 = Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
- 2 = Occurrence confined to several populations or to one extended population.
- 3 = Occurrence limited to one or a few highly restricted populations, or present in such low numbers that it is seldom reported.
- ? = More data are needed

E (Endangerment)

- 1 = Not endangered
- 2 = Endangered in a portion of its range
- 3 = Endangered throughout its range
- ? = More data are needed

D (Distribution)

- 1 = More or less widespread outside California
- 2 = Rare outside California
- 3 = Endemic to California
- ? = More data are needed

note: currently, all CNPS list 1B and 2 taxa are considered "Special Plants" by the CDFG.

FEDERAL DESIGNATIONS

- FE = listed as Endangered by the Federal Government
- FT = listed as Threatened by the Federal Government
- FPE = proposed as Endangered by the Federal Government
- FPT = proposed as Threatened by the Federal Government
- FSS = federal sensitive species, as listed by BLM and USFS
- C¹ = Candidate; taxa for which USFWS has sufficient biological information to support a proposal to list as Endangered or Threatened).
- SC¹ = Species of Concern
- MB = migratory non-game birds of management concern to the USFWS; protected under the Migratory Bird Treaty Act.

¹As of Feb. 28, 1996, all Category 1 candidate taxa are now regarded merely as Candidates. The USFWS ceased to maintain lists of Category 2 and Category 3 candidate taxa; Category 2 taxa are now regarded as Species of Concern.

CALIFORNIA DEPT. OF FISH AND GAME DESIGNATIONS

- CE = Listed as Endangered by the State of California
- CR = Listed as Rare by the State of California
- CT = Listed as Threatened by the State of California
- CPE = Proposed for listing as Endangered
- CSC = California Species of Special Concern
- * = taxa that are restricted in distribution, declining throughout their range, or associated with habitats that are declining in California.
- CFP = Fully protected under the Cal. Fish and Game Code.
- CP = Protected Species under Cal. Code of Regulations.
- CEQA = taxa which are considered to meet the criteria for listing as Endangered, Threatened or Rare by the CDFG; impacts to such taxa must be addressed in CEQA documents.
- CEQA? = Taxa that might be locally significant; should be evaluated for consideration during preparation of CEQA documents, as recommended by the CDFG.

APPENDIX D
Special-Status Species Not Addressed for the
Proposed Kehoe Dairy Project Site

Scientific Name	Status ¹
Common Name	
LISTED SPECIES	
Plants	
<i>Layia carnosa</i>	FE
Beach layia	
Mammals	
<i>Arctocephalus townsendii</i>	FT
Guadalupe fur seal	
<i>Balaenoptera borealis</i>	FE
Sei whale	
<i>Balaenoptera musculus</i>	FE
Blue whale	
<i>Balaenoptera physalus</i>	FE
Finback whale	
<i>Eubalaena glacialis</i>	FE
Right whale	
<i>Eumetopias jubatus</i>	FT
Steller sea lion	
<i>Physeter catodon</i>	FE
Sperm whale	
Birds	
<i>Brachyramphus marmoratus</i>	FT
Marbled murrelet	
<i>Charadrius alexandrinus nivosus</i>	FT
Western snowy plover	
<i>Diomedea albatrus</i>	FE
Short-tailed albatross	
<i>Haliaeetus leucocephalus</i>	FT
Bald eagle	
<i>Pelecanus occidentalis californicus</i>	FE
California brown pelican	
<i>Rallus longirostris obsoletus</i>	FE
California clapper rail	
<i>Sterna antillarum browni</i>	FE
California least tern	
<i>Strix occidentalis caurina</i>	FT
Northern spotted owl	
Reptiles	
<i>Caretta caretta</i>	FT
Loggerhead turtle	
<i>Chelonia mydas</i>	FT
Green turtle	
<i>Dermochelys coriacea</i>	FE
Leatherback turtle	
<i>Lepidochelys olivacea</i>	FT
Olive Ridley sea turtle	
Fish	
<i>Eucyclogobius newberryi</i>	FE
Tidewater goby	

APPENDIX D
Special-Status Species Not Addressed for the
Proposed Kehoe Ranch Project Site

Invertebrates

<i>Haliotes sorenseni</i>	FE
White abalone	
<i>Haliotes cracherodii</i>	FC
Black abalone	
<i>Syncaris pacifica</i>	FE
California freshwater shrimp	

SPECIAL CONCERN SPECIES

Plants

<i>Amsinkia lunaris</i>	SLC
Bent-flowered fiddleneck	
<i>Arabis blepharophylla</i>	SLC
Coast rockcress	
<i>Astragalus nuttallii</i> var. <i>virgatus</i>	SLC
Nuttall's milk-vetch	
<i>Astragalus pycnostachyus pycnostachyus</i>	SLC
Marsh milkvetch	
<i>Atriplex californica</i>	SLC
California saltbush	
<i>Blennosperma nanum</i> var. <i>nanum</i>	SC
Point Reyes stickyseed	
<i>Calystegia purpurata</i> ssp. <i>saxicola</i>	SLC
Coastal bluff morning-glory	
<i>Castilleja affinis</i> spp. <i>affinis</i>	SLC
Coast Indian paintbrush	
<i>Castilleja ambigua</i> ssp. <i>ambigua</i>	SLC
Salt marsh owl's clover	
<i>Castilleja exserta</i> ssp. <i>latifolia</i>	SLC
Purple owl's clover	
<i>Cirsium andrewsii</i>	SC
Franciscan thistle	
<i>Clarkia davyi</i>	SC
Davy's clarkia	
<i>Collinsia corymbosa</i>	SC
Roundheaded Chinese houses	
<i>Gilia maritimus</i> ssp. <i>palustris</i>	SC
San Francisco gilia	
<i>Gilia capitata</i> ssp. <i>tomentosa</i>	SC
Woolly-headed gilia	
<i>Gilia millefoliata</i>	SLC
Yarrow-leaf gilia	
<i>Grindelia hirsute</i> var. <i>maritime</i>	SC
San Francisco gum plant	
<i>Lasthenia macrantha</i> ssp. <i>macrantha</i>	SLC
Perennial goldfields	
<i>Linanthus grandiflorus</i>	SC
Large-flowered linanthus	
<i>Microseris paludosa</i>	SLC
Marsh microseris	
<i>Monardella undulate</i>	SC
Curly-leaved monardella	
<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	SC
Gairdner's yampah	

APPENDIX D
Special-Status Species Not Addressed for the
Proposed Kehoe Ranch Project Site

<i>Phacelia insularis</i> var. <i>continentis</i>	SC
North coast phacelia	
<i>Spartina foliosa</i>	SLC
Pacific cordgrass	
<i>Stellaria littoralis</i>	SC
Seashore starwort	
Mammals	
<i>Aplodontia rufa phaea</i>	FSC
Point Reyes mountain beaver	
<i>Eumops perotis californicus</i>	FSC
Western mastiff bat	
<i>Zapus trinotatus orarius</i>	FSC
Point Reyes jumping mouse	
Birds	
<i>Histrionicus histrionicus</i>	FSC
Harlequin duck	
<i>Dendroica occidentalis</i>	FSC
Hermit warbler	
<i>Laterallus jamaicensis coturniculus</i>	FSC
Black rail	
<i>Melanerpes lewis</i>	FSC
Lewis' woodpecker	
<i>Numenius americanus</i>	FSC
Long-billed curlew	
<i>Oceanodroma homochroa</i>	FSC
Ashy storm-petrel	
<i>Riparia ripria</i>	FSC
Bank swallow	
<i>Sterna elegans</i>	FSC
Elegant tern	
Reptiles	
<i>Phrynosoma coronatum frontale</i>	FSC
California horned lizard	
Amphibians	
<i>Rana boylei</i>	FSC
Foothill yellow-legged frog	
Fish	
<i>Lampetra tridentate</i>	FSC
Pacific lamprey	
Invertebrates	
<i>Carterocephalus palaemon</i>	FSC
Sonoma arctic skipper	
<i>Cincidela hirticollis gravida</i>	FSC
Sandy beach tiger beetle	
<i>Coelus globosus</i>	FSC
Globose dune beetle	
<i>Helminthoglypta arrosa williamsi</i>	FSC
William's bronze shoulderband snail	
<i>Hydrochara rickseckeri</i>	FSC
Ricksecker's water scavenger beetle	
<i>Lichnanthe ursine</i>	FSC
Bumblebee scarab beetle	

Appendix E

Other Projects Considered in Cumulative Analysis

Other Projects Considered in Cumulative Analysis

1. The proposed McClure Dairy Barn and Resource Enhancement Project. Located in the North District of Point Reyes NS, the project would construct an 81,000 square foot loafing barn and develop manure holding ponds to enhance water quality. The project would enhance the viability of the ranch and exclusionary fencing will increase natural resource protection in the project area. One housing unit will be added to the complex.
2. The Pacific Coast Learning Center has been initiated in existing buildings in Olema Valley at the former Hagmaier Ranch. The site is used for office space, housing, and fire fighting and maintenance equipment. No new construction has occurred and park and visitor use has occurred on the site for over 20 years.
3. Sewage systems upgrades have been conducted at one residential unit on NPS lands and three new systems in residential units are planned for this fiscal year. The three units are all located in upper Olema Valley. The NPS headquarters buildings are receiving a new sewage system.
4. The NPS has initiated several riparian protection projects in Olema Valley for coho salmon and steelhead restoration. These projects include riparian exclusionary fencing on Blueline Creek, Giacomini Creek, Cheda Creek, and other tributaries.
5. Several cultural resource preservation projects have been conducted in the Olema Valley within the last five years. The historic bunkhouse at Truttman Ranch, northern Olema Valley, has been reroofed and is slated as a project for restoration in early 2002. The Giacomini Ranch house, in southern Olema Valley, and main barn have received preservation treatments to ensure long-term preservation. In 1997, the main barn at the Wilkins Ranch was stabilized. The main barn at Truttman will be stabilized in FY2001.
6. The MCI building in the North District of Point Reyes National Seashore is receiving rehabilitation and will provide office space for district rangers. Ranger staff will be moved from existing office. Fire staff will also use the office space. No additional construction will occur.
7. The Point Reyes Hostel has developed a proposal for upgrading housing, a new sewage system, and for providing additional overnight lodging. The proposal will increase lodging capability from 44-52 persons. Housing for staff will increase from 2 to 4 units.
8. The Red Barn at park headquarters is being rehabilitated for curatorial storage and classroom space. There will also be office space for existing Marine Sanctuary staff and park staff.

Appendix F

Glossary of Terms

Glossary of Terms Used in Environmental Analysis

Affected environment: The existing biological, physical, social, and economic conditions of an area that are subject to change, both directly and indirectly, as a result of a proposed human action.

Air Quality: A measure of health- and visibility-related characteristics of air.

Alternatives: A reasonable range of options that can achieve an agency's objectives.

Beneficial Impact: When the proposed action would improve the environment.

Cultural landscape: An area with both cultural and natural elements that is associated with an historic event, activity, or person, or that exhibits other cultural or aesthetic values.

Cultural resources: Properties such as landscapes or districts, sites, buildings, structures, objects, or cultural practices that are usually greater than 50 years old and possess architectural, historic, scientific, or other technical value.

Cumulative impact: Effects on the environment that result from the incremental impacts of an action when added to other past, present, or reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Geologic hazards: Natural geologic processes that do or could present a threat to humans or developed areas.

Enhancement: Activities conducted to improve the quality or biological function of an impacted natural resource.

Hazardous material: A substance or combination of substances that may cause or significantly contribute to an increase in mortality or in serious, irreversible, or incapacitating illness, or that pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hydric soils: Soils characterized by an abundance of moisture that periodically produce anaerobic conditions. These soils are typically found in wetland habitats.

Hydrology: Distribution and circulation of water on the surface of the land, in the soil, and in the atmosphere.

Hydrophytic plant: Any plant growing in water or in a substrate that has an abundance of moisture. Hydrophytic plants are typically found in wetland habitats.

Impacts: Effects, both beneficial and adverse, of an action on the environment. Direct impacts are those occurring at the same time and place as the action itself. Indirect impacts occur later in time or are further removed in distance from the action, yet are reasonably foreseeable.

Long-term impact: Activities that would harm the integrity of resources or values.

Mitigation: An activity designed to avoid, minimize, rectify, reduce, or compensate for the severity of, or eliminate impacts from, the proposed project. A mitigation measure should be a solution to an identified problem.

Nutrient loading: Percentage of nutrients associated with animal waste reaching an identified waterbody.

Natural resources: Features that include plants and animals, water, air, soils, topographic features, and geologic features.

No action alternative: An alternative that continues current management direction. Action alternatives are compared against the no action alternative.

Restoration: Management actions or work to remove impacts to natural resources, to restore natural processes, and to return a site to natural conditions.

Sediment: A particle of soil or rock that is transported and/or deposited by surface runoff or a stream.

Special-status species: Species of plants and animals that receive special protection under state and federal laws.

Threatened and endangered species: Species of plants and animals that have been formally listed as “threatened” or “endangered” under the federal Endangered Species Act or corresponding state statutes, and receive protection under those laws. These species are included within the broader category of special-status species.

Wetland: Areas that are inundated by surface or groundwater with a frequency sufficient to support, under normal circumstances, vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.