# Final Report:
# Pine Gulch Creek Instream Flow Enhancement Project

*Grant Agreement # P1130410*

*Prepared for*

*The California Department of Fish and Wildlife*

*Prepared by*
*Marin Resource Conservation District*
*Point Reyes Station, California*

*December 20, 2015*

## Acknowledgements

The Marin Resource Conservation District would like to thank everyone involved in creating this unique project, especially the three organic farmers: Warren Weber, Peter Martinelli, Dennis Dierks and their families. In addition, we would like to express our appreciation to Annabelle Lenderick, Farm Manager, Star Route Farm; Gail Seymour, Project Grant Manager and Marcin Whitman, Grant Engineer, California Department of Fish and Wildlife; Lee Erickson, Project Engineer, Erickson Engineering Inc.; Bill Rege and the Rege Construction crew, Project Contractor; Jennifer Michaud, Project Biologist, Prunuske Chatham Inc.; Mike Morisoli, Project Geotechnical Engineer, Miller Pacific Engineering Group; Dimitra Zalarvis-Chase, Project Archaeologist, DZC Consulting via Pacific Watershed Associates; Michael Bowen, State Coastal Conservancy; Carol Whitmire; Barry Epstein, Water Rights Attorney; Huffman-Broadway Group, Inc.; Brannon Ketchum, Hydrologist, and Amelia Ryan, Wetland Ecologist of the Point Reyes National Seashore; Jeremy Terjirian and Tammy Taylor of Marin County Community Development Agency; Scott Wise, Department of Agriculture, Weights and Measures, Marin County; Richard Kyper, United States Fish and Wildlife Service; Bryan Matsumoto, Army Corps of Engineers; Xavier Fernandez, San Francisco Regional Water Quality Control Board; Justine Herrig, Water Board Division of Water Rights; Corinne Gray, California Department of Fish and Wildlife; Patrick Rutten and Bill Hearn, National Oceanic and Atmospheric Administration; Brian Johnson, Trout Unlimited; Supervisor Steve Kinsey and Liza Crosse, Board Aide, Marin County; Jeff Stump, Director of Conservation, Marin Agricultural Land Trust; the Marin Agricultural Land Trust and the Marin Resource Conservation District Board of Directors for their steadfast dedication in making this project happen and seeing it to fruition.

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*Front page photo credits from left to right go to*
*Nancy Scolari, Casey Del Real and Elise Suronen.*

Pine Gulch Creek

Elise Suronen, Marin RCD


*Photo by Marin Organic*

# Pine Gulch Creek Instream Flow Enhancement Project

**Accomplishments:** Constructed four irrigation ponds for three organic farms eliminating their need to divert from Pine Gulch Creek for irrigation, thus increasing summer instream flows and improving salmonid habitat in Pine Gulch Creek.

**Start & End Dates:** June 1, 2012 – March 31, 2016

**Geographic Area:** Pine Gulch Creek Watershed, Tributary to Bolinas Lagoon

**Location of Work:** Pine Gulch Watershed Map – see page 2, Figure 1
Fresh Run Farm (FRF): Latitude = 37.9336 Longitude = - 122.7069
New Land Fund (NLF): Latitude = 37.9245 Longitude = - 122.7012
Star Route Farms (SRF): Latitude = 37.9178 Longitude = - 122.6972

**Total Volunteer Hours:** 666 hours = $15,364.62 match cost-share


*Photo by Jennifer Michaud*

# Pine Gulch Creek within the Bolinas Lagoon Watershed


**Figure 1. Map of the Bolinas watershed, in Marin County, California (courtesy of Marin County) showing the Pine Gulch Creek watershed. A portion of it flows within the Point Reyes National Seashore and the remainder run through private property. The orange dots show the locations of the irrigation ponds constructed in the Pine Gulch Creek Instream Flow Enhancement Project.**

## Project Benefits to Anadromous Salmonids

The goal of the Pine Gulch Creek Instream Enhancement Project is to enhance summer instream flows of Pine Gulch Creek by building off-stream ponds for three organic farms (Figure 1). Pine Gulch Creek runs 11.7 km with the lower 7.8 km used by coho salmon and the lower 10 km used by steelhead trout. Three organic farms are located along the lower three kilometers of Pine Gulch Creek, the section of habitat utilized by salmonids. (Top Right Photo: Fish survey conducted in Pine Gulch Creek)

In 1997, the Point Reyes National Seashore (PRNS) estimated the average monthly summer agricultural demand on Pine Gulch Creek to be 0.15 cubic feet per second (cfs), about a third of the estimated 0.5 cfs summer flow of Pine Gulch Creek. A PRNS habitat assessment[1] revealed that water quality and quantity were being impacted by agricultural water use. PRNS concluded it was likely that instantaneous irrigation demands on the creek exceeded base flows for short periods, reducing rearing habitat for salmonids[2]. The National Park Service estimated that average commercial diversions by the farmers from 1995 - 2002 was about 56.91 acre-feet (AF) during the summer months of July – November. This information led PRNS to propose the farmers develop off-site water storage sites to reduce agricultural summer demands upon the creek (Bottom Right Photo: Pine Gulch Creek).

**Project Benefits to Salmonids[2]**

- significantly enhance 2 acres of stream habitat
- increase depths & current velocities
- reduce instream temperatures
- increase instream oxygen levels
- improve rearing habitat quality
- improve macroinvertebrate habitat, a large component of juvenile salmonid habitat
- increase survival and abundance of steelhead and coho salmon
- promote the return of adult salmon

The neighboring farmers accepted the proposed project and after seventeen years of planning and permitting, the Pine Gulch Creek Instream Flow Enhancement Project was constructed, resulting in four irrigation ponds that collectively store

[1] Coho and Steelhead Restoration Project. 1997. National Park Service.
[2] Fisheries and other Ecological Benefits of the Pine Gulch Creek Watershed Enhancement Project. 2013. National Marine Fisheries Service Southwest Region. California.

69.2 AF of water. The ponds fill via direct rainfall, sheet flow and strict creek diversions limited to the winter months. From December 15 through the end of March, when Pine Gulch Creek is flowing above 25 cfs, appropriative water can be diverted at 2 cfs. Then from April – June, the farms can continue commercial diversions at reduced rates (Table 1).

**Table 1. Commercial withdrawal limitations from Pine Gulch Creek Points of Diversion (PODs) for the three farms participating in the Pine Gulch Creek Instream Flow Enhancement Project.**

| ***Withdrawal Limitations*** | *Dec 15* | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *Jun* | *Jul* | *Aug* | *Sep* | *Oct* | *Nov* | *Dec 14* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum cfs bypass required before diverting | 25 cfs | | | | 3 cfs | 2 cfs | 1 cfs | N/A | | | | | |
| Maximum instantaneous rate of withdrawal for all PODs | Not exceed 2 cfs or 898 gallons per minute | | | | 0.3 cfs | 0.2 cfs | 0.1 cfs | N/A | | | | | |

According to a PRNS hydrology report[3], this project is expected to reduce the rate of diversion by ten-fold, thus increasing streamflow rates by 15 - 45%. Increased stream flows will improve summer rearing habitat value by increasing pool area and riffle connectively, lowering water temperatures, and maintaining beneficial dissolved oxygen levels (see benefits table on page 1). The construction of storage ponds would enable the farmers to cede their summer commercial riparian water rights to instream flows for anadromous salmonids.

This project model is critical to the success of Threatened and Endangered species in heavily diverted watersheds where the endangered Coho salmon and threatened steelhead trout are struggling, as in Pine Gulch Creek. The National Marine Fisheries Service set a recovery target for coho salmon in Pine Gulch Creek at 394 spawning adult fish. Over the past sixteen years, only five observations were made of two to six adult coho salmonids in Pine Gulch Creek. For the past seven consecutive years, no juvenile coho salmon were observed during basin-wide surveys by the National Park Service. For steelhead, the National Marine Fisheries Service does not have a recovery target for spawning adults in Pine Gulch Creek. Steelhead are more consistently present with larger numbers in Pine Gulch Creek than coho with counts over the past seventeen years ranging from zero to fifty-four adults. By improving instream habitat quality, through a project like the Pine Gulch Creek Instream Enhancement Project, the goal is to increase coho salmon and steelhead trout numbers in Pine Gulch Creek.

[3] Pine Gulch Creek Watershed: Water Availability and Cumulative Instream Impact Analysis. Prepared as part of the Pine Gulch Creek Watershed Enhancement Project. Version 5.2. November 2005. Ketcham, B., National Park Service

## Project Access & Landowner Contact Information:

The Pine Gulch Creek Instream Enhancement Project is located in Bolinas, CA (Figure 2). Pond 3A and 3B at Star Route Farm are located on private property at 95 Olema-Bolinas Road. The other ponds can be accessed by Olema-Bolinas Road continuing onto Horseshoe Hill Road heading north and turning west on Paradise Valley Road. Paradise Valley Road dead ends at a 'T' with New Land Fund to the left and Fresh Run Farm accessible to the right. Taking a left turn at the 'T' on a private road will take you to Pond 2 on the New Land Fund property. Turning a right at the 'T' is a private road to Fresh Run Farm. This private road branches several times but if you stick to the roads that go uphill, the road will dead-end at Pond 1A at the top. Winter access to some of these locations will be extremely difficult at times.

Fresh Run Farms: 615 Horseshoe Hill Road, Bolinas, CA 94924
Peter Martinelli, 415-868-2313, peter.martinelli@sbcglobal.net

New Land Fund: 235Paradise Valley Road, Bolinas, CA 94924
Dennis Dierks, 415-868-0205, dennisadierks@gmail.com

Star Route Farms: 95 Olema-Bolinas Road, Bolinas, CA 94924
Warren Weber, 415-868-1658, starroutefarms@gmail.com



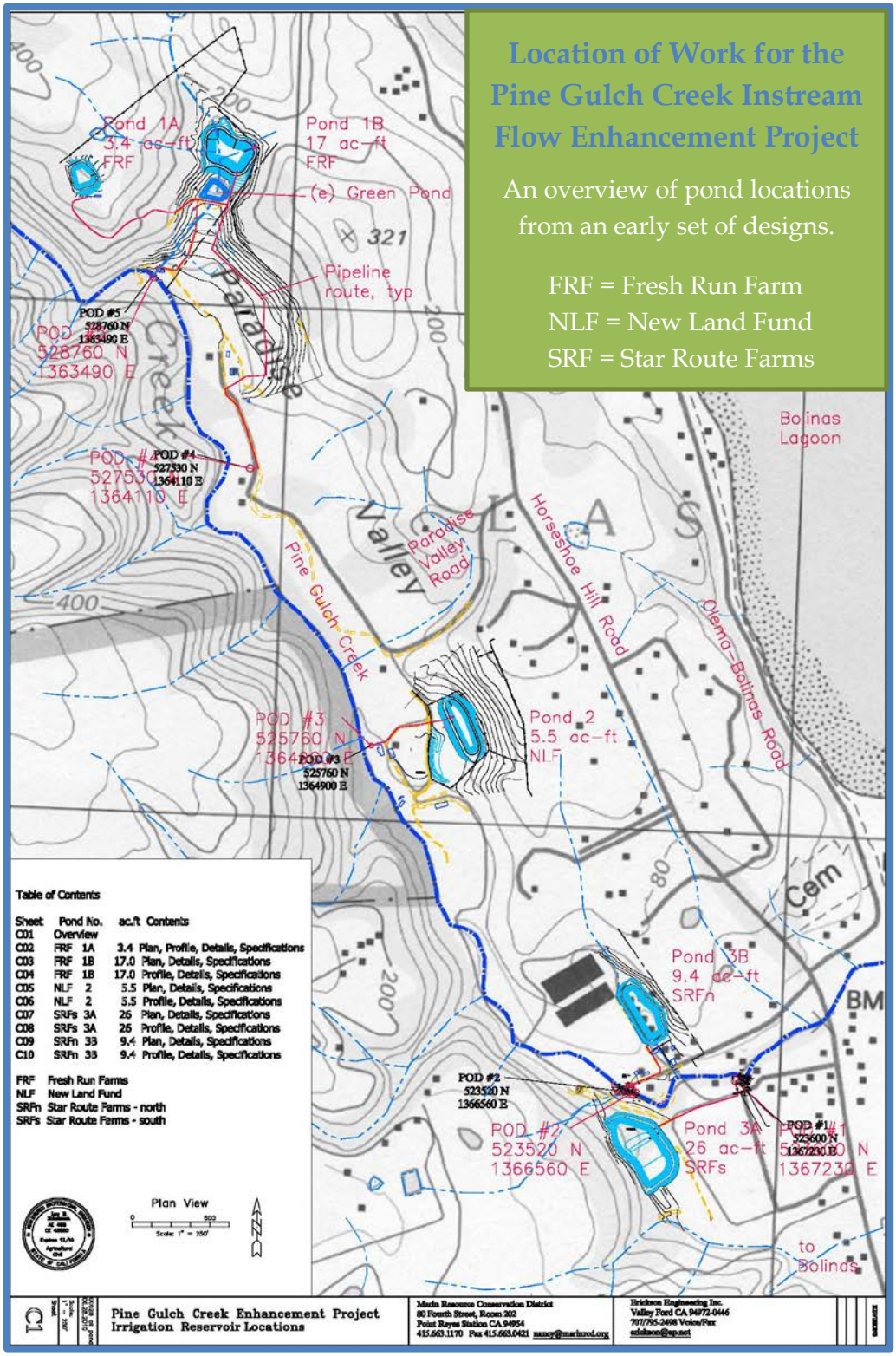


**Figure 2. Map of pond locations for the Pine Gulch Creek Instream Enhancement Project from an early set of plans. This map also shows the relation of the ponds to roads within Bolinas, California.**

## Pond Construction

The completion of the Pine Gulch Creek Instream Flow Enhancement Project will improve anadromous salmonid habitat in the lower end of Pine Gulch Creek by increasing instream summer flows by eliminating summer commercial diversions of three organic farms on the creek. The farms relinquished their riparian summer diversions for appropriative water rights to store winter storm water. The participating farms include Fresh Run Farm, New Land Fund and Star Route Farms. The State Coastal Conservancy funded the design and permitting process for the Pine Gulch Instream Flow Enhancement Project[4]. Through this grant the following permit applications were created and ultimately received: a Marin County Coastal Permit, State Water Resources Control Board Water Right permits, California Department of Fish and Wildlife Streambed Alteration Agreement, a §401 Regional Water Quality Control Board Water Quality Certification, and a §404 Army Corps of Engineers Nationwide Permit 27. With 100% designs and permits in progress, the California Department of Fish and Wildlife's Fisheries Restoration Grant Program funded a proposal to construct the five irrigation ponds: 1A, 1B, 2, 3A and 3B. Pond 1A and Pond 1B were designed to provide Fresh Run Farm with 20.5 AF of water. Pond 2 was planned to provide New Land Fund with 5.5 AF of water. Pond 3A and Pond 3B were engineered provide Star Route Farms with 35.4 AF of water. The project would conserve 61.5 AF of water and improve summer salmonid habitat.

The Marin Resource Conservation District (MRCD) created and circulated a Request for Cost Proposals (RFCP) per farm, for public bid. MRCD held pre-bid site visits (see photo below of pre-bid walk) and received completed RFCPs and reviewed RFCPs to confirm that each bidder met the California Department of Fish and Wildlife and MRCD RFCP requirements (i.e. bonding, insurance licensing, etc.). The Project Civil Engineer reviewed the qualifying bids and recommended a contractor for each farm to the MRCD Board. Rege Construction was awarded all three project sites at a regularly scheduled monthly MRCD Board meeting.


[4] Pine Gulch Watershed Enhancement: Instream Flow Enhancement Project. Grant Agreement #07-081. 2010-2011. State Coastal Conservancy

Construction began on June 1, 2015. A pre-construction meeting was held at Star Route Farm where the Project Biologist provided a biological training, the Project Archaeologist provided an archaeological training, and a tribal representative from the Federated Indians of Graton Rancheria presented a historical perspective of the project location. In addition, the Project Geotechnical Engineer and the Project Civil Engineer spoke about their duties during construction. The Project Biologist conducted pre-construction biological sweeps and observed the vegetation clearing of all pond sites. At Pond 3B and Pond 2, the Project Archeologist witnessed vegetation removal and excavation to depth. For all ponds, inspection points were made throughout construction by the Geotechnical Engineer and by the Civil Engineer to ensure the project was being completed according to plan.

### Pond 1A/1B – Fresh Run Farm

Construction of the ponds at Fresh Run Farm began with Pond 1B, since the site's Geotechnical Investigation Report (Miller Pacific Engineering Group, 2002) indicated the soils were highly saturated, yet buildable with reasonable soil profiles. The site for Pond 1B was slated to be built over a historically farmed site just above an old livestock pond, called Green Pond (see historical photo to the right. Green Pond is indicated above the farmed area, later to be the site for Pond 1B). On June 15, 2015, construction at Pond 1B was initiated. The contractor removed vegetation and installed drainage trenches, which revealed the underlying soil to be saturated, consolidated sand with substantial water present. Once disturbed, the sand lost all strength. The drains developed were somewhat effective: a meadow center drain 12 feet deep flowed at about 3 gallons per minute (gpm); and a 740-foot perimeter drain around the east and north of the meadow flowed at a steady 4 gpm. The sub-drains functioned as intended but were unable to significantly affect the bulk of the saturated material. Additional water percolated up maintaining the profile in a saturated condition (see photo below of the Pond 1B site with Green Pond to the right of the yellow water truck).

The unexpected saturated conditions prevented effective operation with standard earthmoving equipment. The deep profile of saturated soil prevented the development an adequate foundation to support the levee embankment. It was the consensus of Project Geotechnical Engineer and Project Civil Engineer that timely and cost-effective construction was not possible at this site. MRCD notified all permitting agencies of the issue and proposed a project modification that would achieve the desired environmental goals consistent with the permit provisions and would provide the Fresh Run Farm with its irrigation water needs. MRCD proposed and ultimately received agency approval for the following solution: abandon Pond 1B, capture water from the existing drains at the Pond 1B site to supplement the farm's water supply, and expand Pond 1A to partially mitigate for storage loss due to not constructing Pond 1B. The drains at 1B were estimated to collect about 1 AF of water a month (if flows stay constant over time) from the impacted area. By capturing this water over the irrigation season, the farm can potentially secure about 7AF of water to irrigate. The combination of seasonal drainage flows collected from 1B along with expansion of 1A to 11.7 AF would help the farm meet its irrigation demands.

In late August 2015, the soils at Pond 1B were regraded back into place. A portion of the disturbed area at Pond 1B was return to its' historical farmland use and another portion at the bottom of the work area was left to return to wetland. Plumbing and a sump pump were installed to route sub-drain discharge to tank storage.

Construction at Pond 1A began June 22, 2015. Soil conditions were good and the small pond, 3.5 AF, was practically finished by July 2, 2015 when construction at Pond 1A was halted due to the issues at Pond 1B. Once the project modification was accepted, the storage capacity of Pond 1A was increased from 3.5 AF to 11.7 AF starting on August 28, 2015. The altered configuration expanded the pond footprint into highly used farmland and avoided a man-made duck pond. The expanded pond version of Pond 1A, Pond 1A.2, would collect about 11.7 AF/year of rainfall and non-jurisdictional upland sheet flow based on its location in the watershed. The new pond design would eliminate the need to withdrawal from Pine Gulch Creek. The modified Pond 1A also included a shallow section to create California red-legged frog (CRLF), *Rana draytonii,* breeding habitat (see photo below of shallow shelf in Pond 1A).

### Pond 2 – New Land Fund

Construction of Pond 2 began on July 27, 2015 and wet soil conditions slowed construction. Wet soils lead to unexpected soil shrinkage problems that resulted in the elimination of the pond's backside pathway in order to secure enough material to finish the pond (see photo to the right of Pond 2 and no pathway on the right side of the pond). The increased level of excavation created a larger reservoir from 5.5 AF to 8.2 AF. Without a complete pathway, New Land Fund may have difficulties managing the vegetation on the backside of the pond. The MRCD will continue to work with the landowner to resolve the issue.


*Photo by Jennifer Michaud*

### Pond 3A & 3B – Star Route Farm

Pond 3B was the first site of the Pine Gulch Creek Instream Flow Enhancement Project opened for construction. Work immediately slowed due to water draining into the construction site. A curtain drain was installed to capture the water in order to dry the site (see photo to the right of the draining process of the Pond 3B site). The contractor also continually worked the dirt, mixing soils to keep soil moisture content levels low and to expedite the drying process. Dues to wet soil conditions, the contractor had to wait a couple of weeks to let the bottom of the pond dry out before the final compaction. The completed pond holds 10.6 AF.

On July 20, 2015, construction began at Pond 3A. Constructing Pond 3A included the demolition of an existing irrigation pond (see bottom right photo of existing pond). The Project Biologist conducted several surveys of the existing pond before construction began and relocated many species from the pond into Pine Gulch Creek including but not limited to: four


*Photo by Jennifer Michaud*

CRLF adults, 61 CRLF juveniles, and 350 CRLF tadpoles. The Project Biologist also captured four American bullfrogs, *Lithobates catesbeianus*, which were removed from the site. The soils below the existing pond site were saturated and slow to work with and, in addition other locations within the footprint of Pond 3A, also had high soil moisture content prolonging construction. Pond 3A also experience unexpected soil shrinkage problems, which lead to the expansion of the pond size. The completed pond holds 31AF of water.

### Riparian Enhancement Area

The Pine Gulch Creek Instream Flow Enhancement Project included a 0.67-acre Riparian Enhancement Area improving the riparian corridor along a degraded section of Pine Gulch Creek. This section of creek is situated on Star Route Farm next to Pond 3A and lacks robust riparian vegetation. MRCD hired the Conservation Corps North Bay to remove invasive non-native species by hand, weed wrench, weed-eat, and chainsaw from the area. No heavy equipment was used in the riparian zone and only minimal soil disturbance occurred. Invasive species including broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), ivy (*Hedera helix*), and others were disposed of in an approved location. Care was taken that removal of native understory species was minimized. Once Conservation Corps North Bay removed the non-natives, Point Blue Conservation Sciences'

Students and Teachers Restoring a Watershed Program then came out with 111 volunteers, students and teachers (see photo below), who worked for six hours to plant 80 native trees: box elders (*Acer negundo*), red alders (*Alnus rubra*), coast live oaks (*Quercus agrifolia*) and California bay (*Umbellularia californica*). The area will be maintained and monitored for five years.

*Photo by Point Blue Conservation Science STRAW staff*

## Points of Diversion

The Points of Diversion (POD) were installed once the majority of the earthwork was completed for the pond sites. The project originally included five PODs, one for each pond. However, the project modifications at Fresh Run Farm (the elimination of Pond 1B and the development of a spring) are expected to eliminate the farm's need to divert from Pine Gulch Creek altogether for irrigation purposes, thus POD 4 for Pond 1B and POD 5 for Pond 1A were not installed. Instead, Fresh Run Farm received a pump to move the collected spring water from the tank system into Pond 1A.

At the other farms, POD 3 for Pond 2, POD 2 for Pond 3B and POD 1 for Pond 3A began installation on September 29, 2015 and were completed on December 15, 2015. The PODs include fish screens at the intake valves, in-take flow meters to quantify diversion rate and meters to quantify amount of water diverted. Downstream of Star Route Farm's POD 2 and New Land Fund's POD 3, stream gauges were installed within Pine Gulch Creek. The meters will enable farmers to read stream flow levels and determine time sequence for appropriate diversion. Consequently, Fresh Run Farm did not receive a stream gauge because the farm does not expect to need to pump from Pine Gulch Creek for commercial irrigation.

### Maintenance and Monitoring

The Pine Gulch Creek Instream Enhancement Project includes pond and pump maintenance protocols as well as habitat monitoring procedures and reports. The Project Civil Engineer, Project Biologist and MRCD staff created a Compliance and Effectiveness Monitoring Plan as required by the State Water Quality Control Board (SWRCB) and California Department of Fish and Wildlife (DFW). The plan outlines the methods for the recording bypass flows and pond storage levels. Farmers will submit annual reports to SWRCB for ten years of their monthly recordings of instantaneous rate of withdrawals, cumulative amount of water diverted, days of actual diversion and the end of the month reservoir reading/s. For three years, a pond maintenance report will be submitted to the County of Marin and Army Corps of Engineers documenting maintenance, repairs and pond conditions including: any vandalism, trash, vegetation management activities, and any altered hydrology patterns. The Marin County Department of Agriculture, Weights and Measures will work with the farmers to submit annual Safe Harbor Agreement reports to United States Fish and Wildlife Service for the next 30 years. This report requires specific updates on ponds 1A and 3A: the farmer will describe and photographically document the habitat conditions of the ponds, and track their maintenance activities. Annually for five years, the farmers must submit a report to

the Army Corps of Engineers and the Regional Water Quality Board (RWQCB) reporting on the vegetative goals of the ponds, specifically the percentage of pond occupied by hydrophytic vegetation, the condition of those plants and general observations of pond functioning. Ponds will be surveyed on an annual basis for invasive species and reports will be submitted to SWRCB (indefinitely) and DFW (until 2018). At year three and year five post-construction, 2019 and 2021, MRCD will conduct a California Rapid Assessment of the pond sites and will submit the findings to the Army Corps of Engineers and the RWQCB. Five years post-construction, 2021, a biologist will conduct wetland delineation survey of the pond sites and a report will be submitted to the RWQCB and Army Corps of Engineers. MRCD staff will report on the functional goals of the Riparian Enhancement Area, tree survival and canopy and invasive species cover, which will be submitted annually to Marin County for three years and for five years to Army Corps of Engineers and DFW.

Finally, the Safe Harbor Agreement states that a post-construction report will be provided to the United States Department of Fish including pre and post-project photos and discussion on the implementation of avoidance and minimization measures. In February 2016, the Project Biologist was establishing photo points and sighted the following: two sub-adult red-legged frogs at Star Route Farm's Pond 3B, a Western Pond Turtle and a CRLF eggs mass at Star Route Farm's Pond 3A.

## Conclusion

The Pine Gulch Creek Instream Enhancement Project resulted in the construction of four irrigation ponds capturing 62.2 AF of storm water. Pond 1A can hold 11.7 AF and developed springs at site 1B provide Fresh Run Farm with 1AF per irrigation month for a total of 18.7 AF. Pond 2 provides New Land Fund with 8.2 AF. Pond 3A and Pond 3B provide Star Route Farms with 42.3 AF of water (Pond 1B shown below). The Project Civil Engineer prepared as-built drawings provided in Exhibit C. The project provides 62.2 AF of water storage; therefore, conserving instream summer flows, thus improving summer salmonid habitat.

## Measureable Metrics for Project Sites

*Habitat Protection and Restoration Projects – Reporting Metrics*

| ***Reporting Metric*** | ***Project Total*** |
|---|---|
| Miles of stream protected for adequate flow | *6.14 miles* |
| Flow rate in cfs of water conserved | *The required pump flow rates for recharge based on a particular set of dry year worst case assumptions total 4 cfs, occurring during the wet winter storage period. The average equivalent irrigation withdrawal rates the creek during the "no take" summer season and assuming 100% water consumption in that period total 1 cfs.* |
| Start date of return flow to the stream | *July 1* |
| End date of return flow to the stream | *December 15* |
| Number of days that flow was returned to the stream | *167 days* |
| Acre-feet of water conserved | *61.5 AF* |

Please note that the Pine Gulch Creek Instream Flow Enhancement Project did not include a monitoring component.

# Exhibit A: Final Budget

| FINAL PROJECT BUDGET | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **PROJECT NAME:** *Pine Gulch Creek Instream Flow Enhancement Project* | | | | | | | | |
| | Hours/ Units for FRGP | Hours/Units of Applicant Cost Share | Hours/ Units of Partner Cost Share | Hourly Rate / Unit Price | Amount Requested | Applicant Amt. of Cost Share | Partner Amt. of Cost Share | Total Project Cost |
| **A. PERSONNEL SERVICES** | | | | | | | | |
| Executive Director | 332.00 | 0 | 0 | $46.20 | $15,338.40 | $0.00 | $0.00 | $15,338.40 |
| Project Manager | 900.24 | 62.17 | 0 | $31.00 | $27,907.45 | $1,927.33 | $0.00 | $29,834.78 |
| | | | | | | | | |
| Subtotal | | | | | $43,245.85 | $1,927.33 | $0.00 | $45,173.18 |
| Staff Benefits @ 15% | | | | | $6,486.90 | $0.00 | $0.00 | $6,486.90 |
| TOTAL PERSONNEL SERVICES | | | | | $49,732.75 | $1,927.33 | $0.00 | $51,660.08 |
| **B. OPERATING EXPENSES: SUBCONTRACTORS** | | | | | | | | |
| **Description** | # Units for FRGP | # Units of Applicant Cost Share | # Units of Partner Cost | Unit Price | Amount Requested | Applicant Amt. of Cost Share | Partner Amt. of Cost Share | Total Project Cost |
| Civil Engineer | 300.22 | 0 | 0 | 125 | $37,528.00 | $0.00 | $0.00 | $37,528.00 |
| Geotechnical Engineer | 480.88 | 0 | 0 | 185 | $88,963.42 | $0.00 | $0.00 | $88,963.42 |
| Biologist | 306.21 | 0 | 0 | 175 | $53,586.64 | $0.00 | $0.00 | $53,586.64 |
| Archeologist | 432.09 | 0 | 0 | 95 | $41,048.30 | $0.00 | $0.00 | $41,048.30 |
| Construction Contractor | | | | | $2,149,885.72 | $0.00 | $70,685.62 | $2,220,571.34 |
| Subtotal of Subcontractors | | | | | $2,371,012.08 | $0.00 | $70,685.62 | $2,441,697.70 |
| | | | | | | | | |
| **OPERATING EXPENSES: OTHER** (i.e. Materials and Supplies, indicate type of units) | | | | | | | | |
| **Description** | # Units for FRGP | # Units of Applicant Cost Share | # Units of Partner Cost | Unit Price | Amount Requested | Applicant Amt. of Cost Share | Partner Amt. of Cost Share | Total Project Cost |
| Operating (MRCD Broad) | 0 | | | | $0.00 | $2,425.00 | $0.00 | $0.00 |
| Operating | 0 | | | | $0.00 | $213.00 | $0.00 | $0.00 |
| Subtotals of Other | 0 | | | | $0.00 | $2,638.00 | $0.00 | $0.00 |
| TOTAL OPERATING EXPENSES | | | | | $2,371,012.08 | $2,638.00 | $70,685.62 | |
| | | | | | | | | |
| Subtotal A + B (Personnel + Operating) | | | | | $2,420,744.83 | $4,565.33 | $70,685.62 | $2,493,357.78 |
| Requested Indirect Amount (max. 20%) @ 15% | | | | | | | | |
| Applicant Indirect Amount @ 15% | | | | | $7,459.90 | $0.00 | $0.00 | $7,460.00 |
| Partner Indirect Amount @ | | | | | $0.00 | $0.00 | $0.00 | $0.00 |
| **D. GRAND TOTAL** | | | | | **$2,428,204.73** | **$4,565.33** | **$70,685.62** | **$2,500,817.78** |

# Exhibit B: Before and After Photographs

***Fresh Run Farm Pond 1A:*** *Pond 1A is 11. Exhibit C 7 AF and will irrigate 22.5 acres of organic produce. The pond coupled with a spring development will eliminate the diversion of 29.1 AF from Pine Gulch Creek every year.*

*Pond 1A – Start of Construction*

*Pond 1A – Mid-Construction (original size of Pond 1A before the project was modified to expand the size of Pond 1A)*

*Pond 1A – After Construction*

***Fresh Run Farm Site 1B Spring Development:*** *Pond 1B was planned to provide Fresh Run Farm with 17AF of water storage, but wet soil conditions rendered the pond unbuildable. The perimeter drains installed to dry out the construction site ended up tapping into a spring that provides a reliable source of water for the farm providing the farm with about 1AF each month.*

*Pond 1B Before Construction*

*Pond 1B After Construction (pond abandoned & sump pump)*

***New Land Fund Pond 2:*** *Pond 2 is 8.2 AF and will irrigate up to 10 acres of organic farmland. This pond will eliminate the annual diversion of 7.54 AF from Pine Gulch Creek.*

*Pond 2- Before Construction*

*Pond 2- After Construction*

***Star Route Farm Pond 3A and 3B:*** *Pond 3A is 31 AF and Pond 3B is 10.6 AF. These two irrigation ponds will support 29 acres of organic row crops. These ponds will eliminate the annual diversion of 53.5 AF from Pine Gulch Creek.*

*Pond 3A Before Construction*

*Pond 3A - After Construction*

*Pond 3A – Before Construction (from the north looking southeast)*

*Pond 3A – After Construction (from the north looking southeast)*

*Pond 3A – Before Construction (photo from the south looking northeast)*

*Pond 3A – After Construction (photo from the south looking northeast)*

*Pond 3B – Construction Start (photo from the southeast looking northwest)*


*Pond 3B – After Construction (photo from the southeast looking northwest)*

*Pond 3B – Before Construction (photo from the southwest looking north)*

*Pond 3B – After Construction (photo from the southwest looking north)*

*Points of Diversions (POD) at Star Route Farm (SRF) and New Land Fund (NLF)*

*POD 1 for Pond 3A at SRF before Installation*

*POD 1 for Pond 3A at SRF after Installation*

*POD 2 for Pond 3B at SRF before Installation*

*POD 2 for Pond 3B at SRF after Installation*

*POD 3 for Pond 2 at NLF before Installation*

*POD 3 for Pond 2 at NLF after Installation*

## *Other Techniques Implemented*

*Concrete inlets*

*Pond spillway*

*Pond staff gauges*

*Diversion Flow Meter*


*Stream staff gauges*

*Fish Screen*

***Riparian Enhancement Area at Star Route Farm*** *– A 0.67-acre stretch of Pine Gulch Creek, the Riparian Enhancement Area, was improved by removing invasive species and installing 80 native trees. This segment of enhanced riparian corridor is located adjacent to Pond 3A.*

*Before Planting the Riparian Enhancement Area at Star Route Farm*

*After Planting the Riparian Enhancement Area at SRF*

# Exhibit C: As-built Plans of Pond 1A.1, Pond 2, Pond 3A and Pond 3B

# Pine Gulch Creek Watershed Enhancement Project
# Post-construction Report
# Fresh Run Farm
# February 2016

*Prepared for:*

MARIN RESOURCE CONSERVATION DISTRICT

Marin Resource Conservation District
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(415) 663-1170

*Prepared by:*

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400 Morris Street, Suite G
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# Table of Contents

# Introduction

The Pine Gulch Creek Watershed Enhancement Project, administered by the Marin Resource Conservation District (MRCD), was implemented in the summer 2015 to improve summer habitat conditions for aquatic species in the Pine Gulch Creek watershed, Bolinas, Marin County. MRCD worked with three local organic farms to construct a series of off-channel water storage ponds to enhance summer stream flows by substituting summer riparian diversions for winter appropriative diversions. Limited riparian diversion in the spring (April through June) and appropriative storage of winter diversions will accommodate the continuing irrigation needs of the farms between July and December. Appropriative winter diversion into the ponds will ensure that they are full by the last day of March on an annual basis. As part of this project, the farmers are dedicating all of their commercial riparian diversions between July 1 and December 15 to instream flow for the benefit of salmonids and other aquatic species occupying the watershed. The Fresh Run Farm property is one of the three farms engaged in the project. Work on the property included construction of one off-channel irrigation pond and installation of subdrain and water storage tanks. The water supply will irrigate approximately 22.9 acres of farm land.

The project was funded by the California Department of Fish and Wildlife (CDFW) Fisheries Grant Restoration Program (FRGP #P1130410) and authorized under a §1602 Lake or Streambed Alteration Agreement issued by CDFW, §401 Water Quality Certification from the San Francisco Bay Regional Water Quality Control Board, §404 Individual Permit from the U.S. Army Corps of Engineers, Marin County Community Development Agency permits, and a Programmatic Safe Harbor Agreement from U.S. Fish and Wildlife Service.

As per the requirements of the project permits and the Biological Mitigation Plan prepared for the project (Huffman-Broadway Group, Inc. 2007[1]), Prunuske Chatham, Inc. (PCI) is providing the following post-construction conditions report. This report includes:

- Description of the project setting
- Description of the constructed project
- Description of the photo points (with tables of locations and coordinates)
- Pre-project photographs
- Photo point location maps
- Post-construction photographs
- As-built drawings

This report will serve as the baseline for future monitoring activities to be completed for the project.

[1] Huffman-Broadway Group, Inc. 2007. Pine Gulch Creek Watershed Enhancement Project, Biological Mitigation Plan, Bolinas, Marin County, California. January 24, 2007.

## Project Setting

Fresh Run Farm is located on Paradise Valley Road north of the town of Bolinas in western Marin County, California (Figure 1); the property is accessed from Horseshoe Hill Road. It is mapped on the Bolinas USGS quadrangle 37°55'59.09"N and 122°42'25.07"W) at elevations ranging from approximately 59 to 725 feet. The property is surrounded by forested habitat, agricultural fields, and rural residential parcels. Pine Gulch Creek runs through the property. The Pine Gulch Creek watershed encompasses 7.5 squares miles of coastal habitat. The majority of the watershed is located within the Point Reyes National Seashore. The creek flows in a southerly direction from the Seashore towards Bolinas and into Bolinas Lagoon thence the Pacific Ocean.

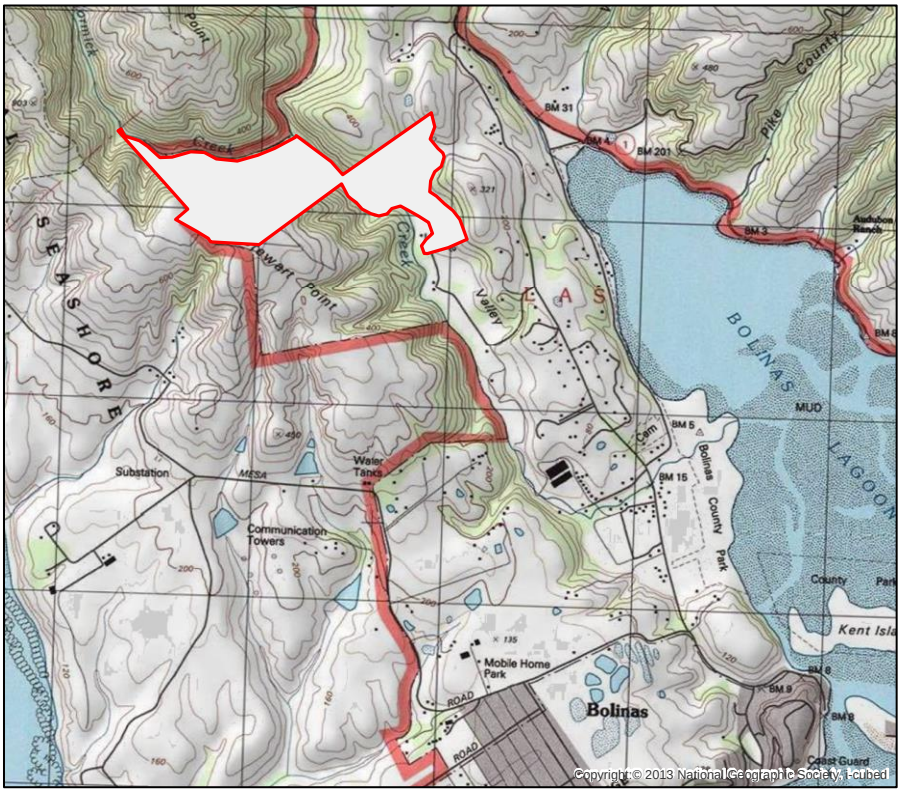



**Figure 1. Fresh Run Farm location map.**

## Constructed Project

Construction at the Fresh Run Farm property consisted of building Pond 1A, an off-channel irrigation water storage impoundment, with related improvements in upland areas and subdrains and water storage tanks at the Pond 1B site (Erickson Engineering, Inc. 2015a[2] and 2015b[3]); see as-builts below. Work at the sites included, but was not limited to, tree and brush removal; fence removal and replacement; topsoil salvage, stockpile, and replacement; soil excavation; groundwater management; installation of engineered embankment fill; relocation of local gravel roadways; construction of appurtenant structures (inlet and outlet devices, water delivery pipeline, overflow spillway, etc.); and temporary and permanent erosion and sediment control measures within the work areas. The primary adjustments made to the project relative to the original plan are as follows:

- Pond 1B was not constructed. The site is located in an area with highly saturated soils. After initial vegetation removal, site grading, and subdrain installation, it was determined that due to the saturated conditions operation of standard earthmoving equipment was not feasible and that soil conditions would not support the levee embankment. As a solution, Pond 1B was abandoned and existing subdrains were routed to water storage tanks to supplement the farm's water supply. The disturbed areas were graded back into place and were returned to historical farmland use. A wetland conservation area was established at the site between Green Pond and the farmed area.
- Pond 1A was expanded to partially mitigate for the storage loss at Pond 1B. The pond was expanded from 3.5 acre-feet to 11.7 acre-feet. The pond was expanded to the northeast into a disturbed, farmed field. Pond 1A is filled by sheet flow runoff, rainfall, and pumped groundwater from the 1B site. Therefore, the Point of Diversions on Pine Gulch Creek were eliminated from the project design. To improve habitat conditions for California red-legged at Pond 1A, a small, shallow bench area was constructed at the northeast corner of the pond to provide additional habitat complexity and encourage breeding habitat.
- Both sites were seeded with an erosion control blend consisting of brome, clover, and fescue or a functional equivalent; vegetation growth at the sites is visible in the post-construction photographs below.

[2] Erickson Engineering, Inc. 2015a. Fresh Run Farm, Irrigation Reservoirs – Plan, Specs, and Details. Dated January 8, 2015.

[3] Erickson Engineering, Inc. 2015b. Fresh Run Farm, PGC Pond 1A.3 11.7 Acre-feet Irrigation Reservoir. Dated July 17, 2015.

## Photo Points

In February 2016, photo points were established at the Fresh Run Farm Pond 1A and the Pond 1B site to document completed conditions. At Pond 1A, photo points were established around the pond perimeter, overflow structure, upland sheet flow chute, and near the interior bench. At the Pond 1B site, photo points were established along the road edge, top of culvert, and around the perimeter of the wetland conservation area. The locations of the points were marked in the field with survey ginnies (stakes), and GPS coordinates were recorded to sub-meter accuracy. Locations were mapped on the as-built drawings (Sheet 2), and maps of the locations were developed in ArcGIS. Ten photo points were established at Fresh Run Farm; see Tables 1 and 2 and Figures 2 and 3.

**Table 1. Photo Point Locations and Coordinates at Pond 1A**

| Photo Point | Description of Location | Latitude | Longitude | Photo Orientation |
|---|---|---|---|---|
| 1 | southwest edge of pond at tank overflow | 37.9331293 | -122.7100254 | north, northeast, southeast |
| 2 | northwest edge of pond at top of concrete chute | 37.9337835 | -122.7093822 | northwest, east, southeast, southwest |
| 3 | northeast edge of pond at top of interior bench | 37.9340723 | -122.7088938 | southwest |
| 4 | southeast edge of pond above field road | 37.9335381 | -122.7091097 | north, west, northwest |

**Table 2. Photo Point Locations and Coordinates at Pond 1B Site**

| Photo Point | Description of Location | Latitude | Longitude | Photo Orientation |
|---|---|---|---|---|
| 1 | northern edge of site, at western edge of road adjacent to historic runoff path to pond | 37.934478 | -122.707006 | south, southeast |
| 2 | northeast corner of site along road | 37.93377 | -122.706264 | northwest, southwest |
| 3 | top of culvert | 37.93346 | -122.70655 | north, east, south, west |
| 4 | base of channel along western edge of site | 37.933482 | -122.706901 | north, northeast, southeast, south |
| 5 | southeast corner of field, edge of fruit trees | 37.93324 | -122.706569 | northwest, southwest |
| 6 | southeast corner of Green Pond | 37.932898 | -122.706742 | north, northwest |

## Pre-project Photographs

The following photos were taken on the property on March 2, 2015.

Looking north to property line at Pond 1A site.

Looking west at Pond 1A site.

Looking south at Pond 1B site.

Looking west towards Green Pond at Pond 1B site.


Figure 2. Photo Point Locations
Post-construction Report
Fresh Run Farm - Pond 1A
February 2016

## Post-construction Photographs at Pond 1A

The following photos were taken on February 4, 2016, at established Photo Points; see Figure 2.

Photo Point 1. Looking north at pipe overflow and embankment.

Photo Point 1. Looking northeast above tank overflow.

Photo Point 1. Looking southeast.

Photo Point 2. Looking northwest at man-made stock pond.

Photo Point 2. Looking east at interior bench.

Photo Point 2. Looking southeast at concrete chute.

Photo Point 2. Looking southwest.

Photo Point 3. Looking southwest at interior bench and pond.

Photo Point 4. Looking north at interior bench.

Photo Point 4. Looking west.

Photo Point 4. Looking northwest at concrete chute.

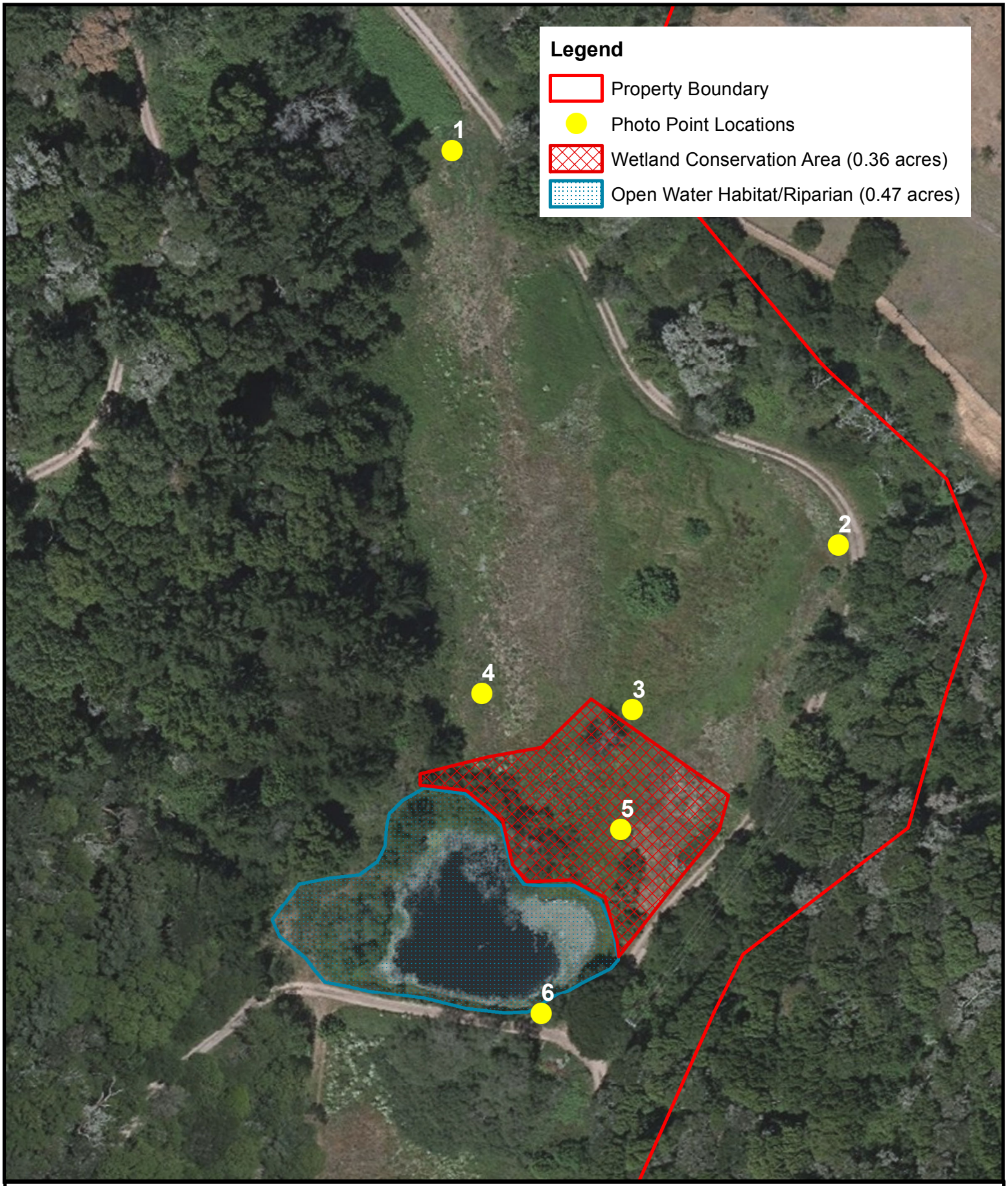



Figure 3. Photo Point Locations
Post-construction Report
Fresh Run Farm - Pond 1B Site
February 2016

## Post-construction Photographs at Pond 1B Site

The following photos were taken on February 4, 2016, at established Photo Points; see Figure 3.

Photo Point 1. Looking south at historic runoff path to pond and farmed area.

Photo Point 1. Looking southeast towards road.

Photo Point 2. Looking northwest at farmed area and road.

Photo Point 2. Looking southwest at farmed area from edge of road.

Photo Point 3. Looking north at farmed area.

Photo Point 3. Looking east at farmed area.

Photo Point 3. Looking south at farmed area and wetland conservation area.

Photo Point 3. Looking west at farmed area.

Photo Point 4. Looking north at historic runoff path to pond.

Photo Point 4. Looking northeast at farmed area.

Photo Point 4. Looking southeast at wetland conservation area.

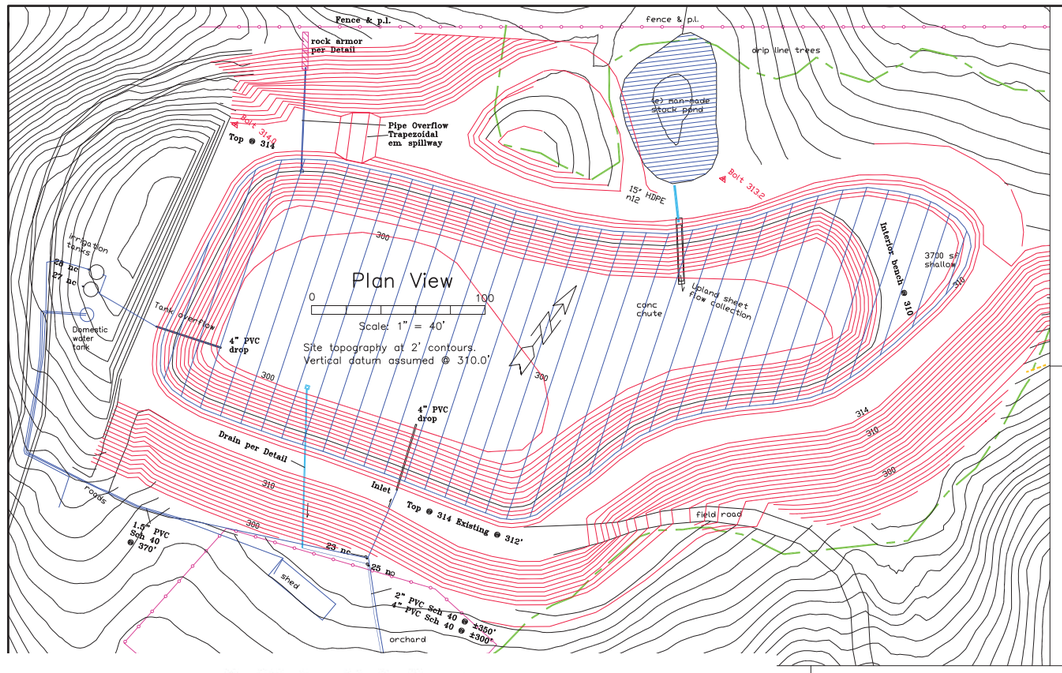
Photo Point 4. Looking south at wetland conservation area.

Photo Point 5. Looking northwest at wetland conservation area.

Photo Point 5. Looking southwest at Green Pond and wetland conservation area.

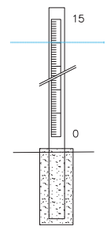
Photo Point 6. Looking north at Green Pond.

Photo Point 6. Looking northwest at Green Pond.




## Legend

- APPROx PL
- UNPAVED ROAD
- FENCE
- CHANNEL
- DRAIN LINE
- ROCK ARMOR
- BUILDING
- CONTOURS
- TREE
- DRIPLINE
- FIBER ROLL




Staff Gage Detail

No Scale

## Erosion Prevention and Sediment Control Notes

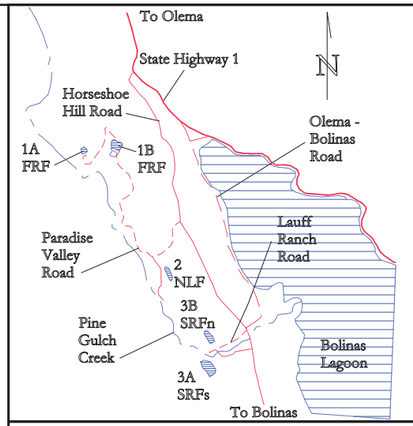
1. Perform erosion prevention and sediment control in accordance with the latest edition of Appendix Chapter 33 of the California Building Code, applicable County regulations, and Section 20 of the Caltrans Standard Specifications.
2. The approved plans shall conform with the Erosion Prevention and Sediment Control Best Management Practices contained in the latest editions of the following publications or an equivalent Best Management Practice:
   * Erosion and Sediment Control Field Manual by the San Francisco Bay Regional Water Quality Control Board.
   * Manual of Standards for Erosion and Sediment Control Measures by the Association of Bay Area Governments.
   * Construction Site Best Management Practices Manual by Caltrans.
   * Stormwater Best Management Practices Handbook by the California Stormwater Quality Association.
3. If discrepancies occur between these notes, material referenced herein or manufacturer's recommendations then the most protective shall apply.
4. The Owner is responsible for obtaining and complying with the National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for discharges of stormwater runoff associated with construction activity disturbing land equal to or greater than one acre. Construction activities include but are not limited to clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement.
5. Preservation of existing vegetation shall occur to the maximum extent practical.
6. The Owner is responsible for preventing stormwater pollution generated from the construction site year round. The Owner must implement an effective combination of erosion prevention and sediment control on all disturbed areas during the rainy season of October 15 – April 15.
7. Erosion prevention and sediment control measures shall be inspected by the Owner before forecasted storm events and after actual storm events to ensure measures are functioning properly. Storm events produce at least 1 inch of precipitation in a 24–hour period. Erosion prevention and sediment control measures that have failed or are no longer effective shall be promptly replaced. Erosion prevention and sediment control measures shall be maintained until disturbed areas are stabilized.
8. Changes to the Erosion Prevention and Sediment Control Plan may be made to respond to field conditions. Changes shall be noted on the Plan when made.
9. Discharges of potential pollutants from construction sites shall be prevented using source controls to the maximum extent practicable. Potential pollutants include but are not limited to sediment, trash, nutrients, pathogens, petroleum hydrocarbons, metals, concrete, cement, asphalt, lime, paint, stains, glues, wood products, pesticides, herbicides, chemicals, hazardous waste, sanitary waste, vehicle or equipment wash water, and chlorinated water.
10. Entrances(s) to the construction site shall be maintained in a condition that will prevent tracking or flowing of potential pollutants offsite. Potential pollutants deposited on paved areas within the County right–of–way, such as roadways and sidewalks shall be properly disposed of at the end of each working day or more frequently as necessary.
11. Exposed slopes shall be protected by using erosion prevention measures to the maximum extent practicable, such as establishing 70% vegetation coverage, hydroseeding, straw mulch, geotextiles, plastic covers, blankets, or mats.
12. Whenever it is not possible to utilize erosion prevention measures, exposed slopes shall employ sediment control devices, such as fiber rolls. Fiber rolls shall be trenched and keyed into the soil and installed on contour.
13. The erosion control revegetation mix shall be according to Marin County requirements for erosion controls, using native materials. , 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 shall be applied at the time of seeding. Mulch shall be rice straw, or small grains straw spread at a rate of 2 tons/acre. Crimping, tackifying, 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:
   - 35% Blando Brome
   - 30% Rose Clover
   - 15% Cucamonga Brome
   - 15% Triticale
   - 5% Zorro Fescue
14. The Owner shall protect storm drain inlets from potential pollutants until drainage conveyance systems are functional and construction has been completed.
15. Energy dissipators shall be installed at storm drain outlets which may convey storm water flow leading to soil erosion.
16. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.
17. Solid waste such as trash, discarded building materials and debris, shall be placed in designated collection areas or containers. The construction site shall be cleared of solid waste daily or as necessary and regular removal and proper disposal shall be arranged.
18. A concrete washout area, such as a temporary pit, shall be designated to clean concrete trucks and tools. At no time shall concrete products and waste be allowed to enter County waterways such as creeks or storm drains.
19. Proper application, cleaning, and storage of potentially hazardous materials, such as paints and chemicals, shall be conducted to prevent the discharge of pollutants.
20. When utilized, temporary restrooms and sanitary facilitites shall be located and maintained to prevent the discharge of pollutants.
21. Appropriate vehicle storage, fueling, maintenance, and cleaning areas shall be designated and maintained to prevent discharge of pollutants.

## Grading Notes

1. Perform grading in accordance with the latest edition of Appendix Chapter 33 of the California Building Code and applicable County regulations. Conform to the recommendations of any Geotechnical Engineering Report developed as part of the project design.
2. Existing drainage courses receiving waters from this site and located throughout this site shall remain open and clear of debris to properly convey storm water. If existing drainage courses receiving waters from this site are located in the County right–of–way and need maintenance, contact the Department of Transportation and Public Works for further assistance. In any event, the Owner and/or Contractor shall be held liable for any damage due to obstructing natural drainage patterns.
3. Retaining walls are not approved under this grading permit. Retaining walls require a separate building permit, unless exempted by the County.
4. The Contractor shall immediately notify the design Engineer upon discovering significant discrepancies, errors, or omissions in the Plans. Prior to proceeding, the Owner shall have the Plans revised to clarify identified discrepancies, errors, or omissions. The revised Plans shall be subject to review by the Chief Building Official.
5. The Contractor shall be responsible for notifying Underground Service Alert (USA) toll free at 1.800.642.2444 at least two working days prior to excavation. The Contractor shall uncover relevant utilities to verify their location and elevation. If unexpected or conflicting utilities are encountered during excavation, notify USA, the utility owner, and/or the project Engineer immediately. Utilities include but are not limited to water, sewer, electrical, gas, telephone, and cable/TV.
6. In the event of cultural resources (i.e. historical, archaeological, and paleontological resources, and human remains) are discovered during grading or other construction activities, work shall be halted within a 100–foot radius of the find. The Northwest Information Center shall be notified at 707.664.0880. A qualified archeologist shall be consulted for an on–site evaluation. Additional mitigation may be required by the County per the archeologist's recommendations. If human burials or human remains are encountered, the Contractor shall also notify the County Coroner.
7. Should grading operations encounter hazardous materials, or what appear to be hazardous materials, stop work in the affected area immediately and contact 911 or the appropriate agency for further instruction.
8. The grading permit and approved copy of the grading plans shall be maintained on the project site throughout the duration of construction activities.
9. Drainage facilities and grading shall be inspected before receiving final approval. The Contractor shall consult the project Job Card for coordination of inspection requests.

## 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 grated rectangular drop inlets shall be used.
4. Concrete shall be 5.5–sack mix using 3/4" aggregate rated at 3000 psi minimu 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 400x, 500x, 700x 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 matting for mulch placement on slopes of 2H:1V or greater shall be North American Green S–75 or equal or better.




## Location Sketch

Based on USGS 7.5–min. quad: Bolinas @ 1" = 2000'

Site topography survey by EEI 1999 – 200 using assumed coordinates and elevations with North by declination adusted magnetic compass. Property lines have not been located or field verified. Contours by linear interpolation of intermittent data points. Tree locations approximate. Field verify critical elevations and dimensions at time of construction.

## Geotechnical Requirements

Refer to Geotechnical Investigation for Pine Gulch Creek Reservoirs, Bolinas CA dated 3/26/2004 by Miller Pacific Engineering Group (415) 382–3444 for detailed site soils information.

1. Surface Preparation – Clear all grass, brush, trees, oversized debris and organic material from areas to be graded. The estimated depth of stripping is 4 – 6", with deeper grubbing required to remove brush and tree roots. Excavate soft or saturated soil to expose uniformly firm natural soils. Any excess and unsuitable materials shall be hauled off site or stockpiled for later reuse in landscaping.

Soils exposed by clearing, stripping, and required excavations should be scarified to a dept of about 6", moisture conditioned to optimum or greater, and recompacted to minimum 92% ASTM D1557.

2. Keyway Excavations – Keyways must be into firm natural soil or weathered rock to the depth and width indicated. The bottom must be firm and unyielding, moisture conditioned to 0–2 % over optimum, and compacted to 92 % ASTM D1557.

3. Slope Criteria – Cut and fill slopes should be no steeper than 2.5H:1.0V. Localized slopes may be as steep as 2H:1V within firm natural soil or where needed to minimize the grading area, with concurrence of the Soils engineer in the field.

4. Compacted Fill – Fill shall be: 1) free of organic material, 2) have a Liquid Limit less than 50 and a Plasticity Index of less than 25, and 3) have a particle size of less than 2 inches.

Onsite material is believed suitable for embankment construction. Clay soils will require close control of moisture content in order to achieve required compaction. It will be necessary to remove areas of sandy material or blend with clay materials within the upper two feet of reservoir lining.

Moisture condition fill to optimum m.c. or greater, place in uniform horizontal lifts <8", and compact to 92 pct. ASTM D1557. The upper six inches of the reservoir lining should be at 95 pct. r.c. to produce a uniform impermeable surface.

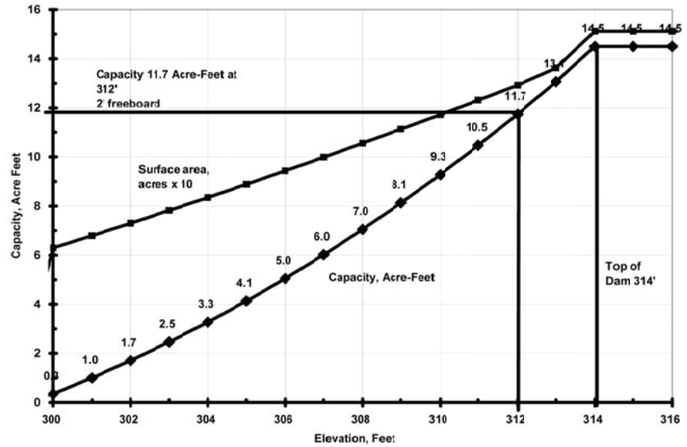
5. Trench Backfill – Conform to requirements of engineered fill with regard to materials, lift thickness, and moisture conditioning. Two sack concrete slurry to 3" above pipe diameter may be used in lieu of hand compaction for principal spillway pipes. Jetting for trench backfill compaction is not permitted.

6. Geotechnical Engineer shall observe and direct site preparation, grading, keyway excavations, drainage placement, placement and compaction of engineered fill, and shall be responsible for lab and field testing for conformance with the GE report.

Erosion Control Revegetation
1. Seed mix at min. 25 lb/ac.
   50% Blando brome
   20% Zorro fescue
   20% Rose clover
2. 16–20–00 fertilizer at 150 lb/ac
3. Straw mulch at 4000 lb/ac
   Crimp or tackify for retention for slopes over 15 pct.
   Use straw blanket on slopes over 3H:1V.

Design Engineer shall certify to Marin County in writing, including signature and stamp that all grading and drainage was completed according to Plans and field directions. Changes in the approved Plans, if any, shall be described. Department of Public Works Engineer shall inspect driveway, parking, and site improvements prior to final inspection.

**Fresh Run Farms Irrigation Reservoir**
**APN 188-090-15**
**Elevation - Volume Curves**




Project Statement: Construct Pine Gulch Creek Enhancement and Pond Development Program Irrigation Storage Reservoir #1A and appertunant structures at Fresh Run Farm

**1A-3 RESERVOIR**
**11.7 ac-ft capacity 1.44 ac water surface**
**0-12' depth 2' higher than original Pond 1A**
**0.30 ac emergent fringe 308 - 313' elev**
**0.07 ac shallow pool of 3700 sf included**
**Levee height 0-24' slopes @ 2.5H:1.0V**
**11' perimeter trail**
**Configuration shown incorporates 1A**
**Extends levee ±400'**
**13200 cy total cut 10200 cy total fill**
**3000 cy excess - Fill N swale to extent possible**
**Foundation earthwork estimate**
**400' x 4' x 60' wide ->3500 cy**

## Principal Spillway Detail

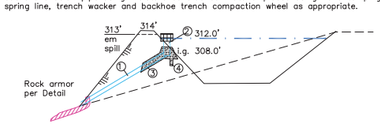
No Scale

① 15" PVC SDR 35 n = .012. Watertight joints. L = ±80'. Install in accordance with ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe

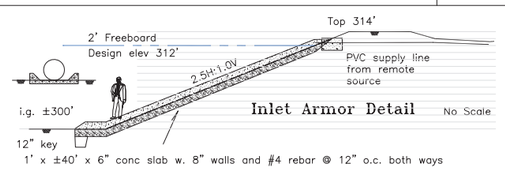
② 24x24 commercial DI set level, no–shrink grouted joints. Welded galvanized trash rack with 8" openings extends above DI 12" and beyond and below outer wall 6"

③ Concrete encasement, 4" min. all around x 30' long.
Concrete: 5–sack, 3/4" aggregate, 2500 psi @ 28 days; 5" max slump. Support and constrain pipe during pour to obtain minimum coverage and to prevent flotation and maintain uniform slope. Vibrate or rod as required for uniform pour without voids.

④ 12" Pad with 18" footing extends beyond DI 12" in all directions.
All pipe trenches require inspection prior to pour. Trench shall have smooth compacted wall and invert surfaces without tooth marks or sloughed material and shall be moisture conditioned prior to concrete placement. Soil backfill where used at 95% r.c. above and below pipe using moisture conditioned material placed using hand tamping to spring line, trench wacker and backhoe trench compaction wheel as appropriate.



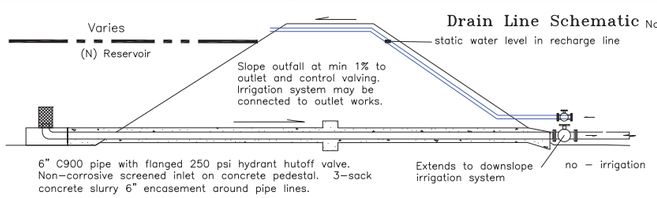

**Upland tributary area ±4.8 acres**
**Existing meadow pond not disturbed by design concept.**
**30" rainfall zone per Marin County isohyetal map**
**Average year runoff 12.18" depending on infiltration**
**4.8 ac-ft average year yield if 12" runoff**
**Pond surface at 1.2 ac yield 3 ac-ft average year rainfall.**
**Tonal average year yield 7.8 ac-ft runoff.**
**May require pumping up to 2.5 ac-ft from below to refill.**
**May require zero pumping if residual is available.**
**Sheet flow collection not believed subject to LWR jurisdiction.**
**Assuming 2' seepage-evaporation at half-full elevation surface results in 0.8 ac x 2 -> 1.6 ac-ft unavailable for irrigation.**
**Residual hilltop farmland ± 1 ac depending on perimeter canopy management.**
**Pond 1B meadow provides additional 1.9 - 2.0 acres farmable relative to original development concept.**




## Inlet Armor Detail

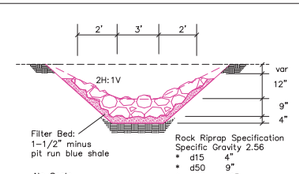
No Scale

1' x ±40' x 6" conc slab w. 8" walls and #4 rebar @ 12" o.c. both ways



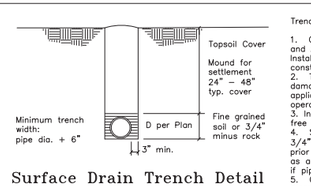

## Drain Line Schematic

No Scale




## Rock Lined Ditch Detail

No Scale

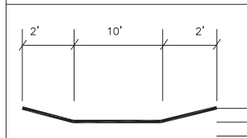



## Surface Drain Trench Detail

No Scale

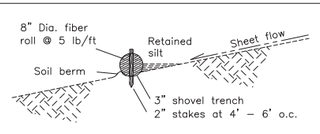
Trench Detail

1. Conform to requirements of pipe Manufacturer and ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for all aspects of construction.
2. Trench depth as required to prevent system damage due to farming practices. Conform to all applicable OSHA and safety requirements for labor operations in and around trenches.
3. Install at uniform grade to outlet. Invert to be free of debris or sharp objects.
4. Shade pipe with fine–grained native material or 3/4" minus road base compacted at optimum m.c. prior to trench backfill. Lean concrete may be used as an alternative bedding material to pipe spring line if pipe is properly anchored to maintain grade.
5. Compact trench soil using hand or mechanical means to minimize or eliminate soil settlement. Mound soil over trench to allow for incidental settlement after backfill and compaction.




## Overflow Detail

No Scale




* 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.
* Butt ends together without overlap.
* Maintain as required to ensure satisfactory performance.

No Scale

## Fiber Roll Check

REGISTERED PROFESSIONAL ENGINEER
Lee B Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS

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

# PGC Pond 1A.3 11.7 Acre–feet Irrigation Reservoir As–Built Documentation

Peter Marinelli
Fresh Run Farms
PO Box 478
Paradise Valley Road
Bolinas CA 94924
(415) 868-2139
petermarinelli@sbcglobal.net

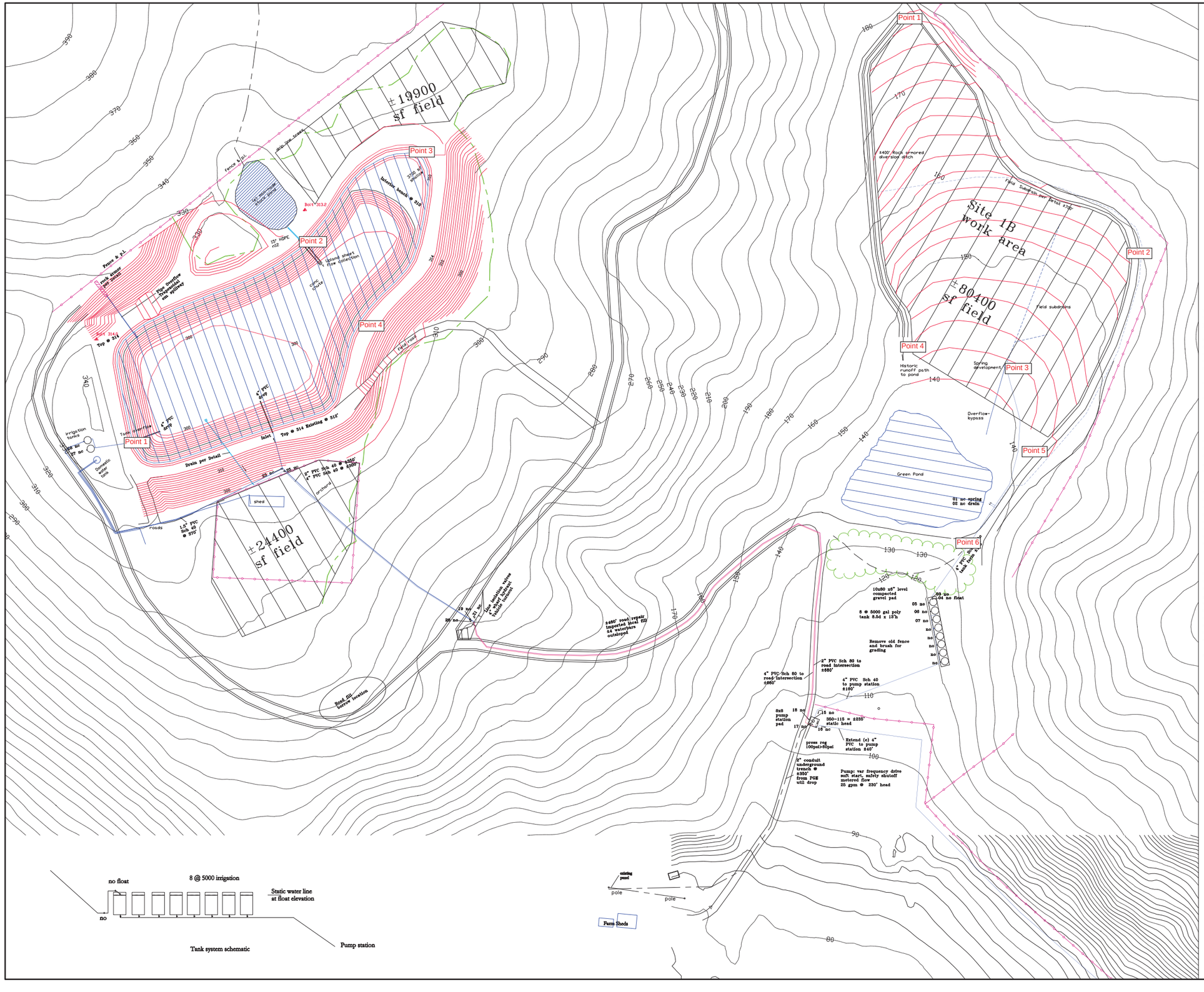
Lands of: APN 188–090–15
FRESH RUN FARMS
Paradise Valley Road, Bolinas CA 94924

51231 z3
NAD27
ussf.dwg

12.31.2015

1" = 40'

Sheet
1A.3
1 of 2




REVISIONS

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

# PGC Pond 1A.1 11.7 Acre-feet
# Irrigation Reservoir
# Water Delivery and Management System
# Area 1B as-built

Peter Martinelli
Fresh Run Farms
PO Box 478
Paradise Valley Road
Petaluma CA 94924
(415)663-1313
petermartinelli@sbcglobal.net

Lands of: FRESH RUN FARMS
APN 188-090-15
Paradise Valley Road, Bolinas CA 94924

51231 z3
NAD27
ussf.dwg

12.31.2015

1" = 50'

Sheet
1A.3
2 of 2

# Pine Gulch Creek Watershed Enhancement Project
# Post-construction Report
# New Land Fund – Pond 2
# February 2016

*Prepared for:*

MARIN RESOURCE CONSERVATION DISTRICT

Marin Resource Conservation District
P.O. Box 1146
Point Reyes Station, CA 94956
(415) 663-1170

*Prepared by:*

PRUNUSKE CHATHAM, INC.

Prunuske Chatham, Inc.
400 Morris Street, Suite G
Sebastopol, CA 9547
(707) 824-4600

# Table of Contents

# Introduction

The Pine Gulch Creek Watershed Enhancement Project, administered by the Marin Resource Conservation District (MRCD), was implemented in the summer 2015 to improve summer habitat conditions for aquatic species in the Pine Gulch Creek watershed, Bolinas, Marin County. MRCD worked with three local organic farms to construct a series of off-channel water storage ponds to enhance summer stream flows by substituting summer riparian diversions for winter appropriative diversions. Limited riparian diversion in the spring (April through June) and appropriative storage of winter diversions will accommodate the continuing irrigation needs of the farms between July and December. Appropriative winter diversion into the ponds will ensure that they are full by the last day of March on an annual basis. As part of this project, the farmers are dedicating all of their commercial riparian diversions between July 1 and December 15 to instream flow for the benefit of salmonids and other aquatic species occupying the watershed. The New Land Fund property is one of the three farms engaged in the project. Work on the property included construction of one off-channel irrigation pond that will provide water for approximately 8.7 acres of farmland.

The project was funded by the California Department of Fish and Wildlife (CDFW) Fisheries Grant Restoration Program (FRGP #P1130410) and authorized under a §1602 Lake or Streambed Alteration Agreement issued by CDFW, §401 Water Quality Certification from the San Francisco Bay Regional Water Quality Control Board, §404 Individual Permit from the U.S. Army Corps of Engineers, Marin County Community Development Agency permits, and a Programmatic Safe Harbor Agreement from U.S. Fish and Wildlife Service.

As per the requirements of the project permits and the Biological Mitigation Plan prepared for the project (Huffman-Broadway Group, Inc. 2007[1]), Prunuske Chatham, Inc. (PCI) is providing the following post-construction conditions report. This report includes:

- Description of the project setting
- Description of the constructed project
- Description of the photo points (with table of locations and coordinates)
- Pre-project photographs
- Photo point location map
- Post-construction photographs
- As-built drawings

This report will serve as the baseline for future monitoring activities to be completed for the project.

[1] Huffman-Broadway Group, Inc. 2007. Pine Gulch Creek Watershed Enhancement Project, Biological Mitigation Plan, Bolinas, Marin County, California. January 24, 2007.

## Project Setting

New Land Fund farm is located at 235 Paradise Valley Road north of the town of Bolinas in western Marin County, California (Figure 1); the property is accessed from Horseshoe Hill Road. It is mapped on the Bolinas USGS quadrangle (37°55'24.47"N and 122°42'4.31"W) at elevations ranging from approximately 35 to 150 feet. The property is surrounded by forested habitat, agricultural fields, and rural residential parcels. Pine Gulch Creek runs through the property and serves as the western boundary. The Pine Gulch Creek watershed encompasses 7.5 square miles of coastal habitat. The majority of the watershed is located within the Point Reyes National Seashore. The creek flows in a southerly direction from the Seashore towards Bolinas and into Bolinas Lagoon, thence the Pacific Ocean.

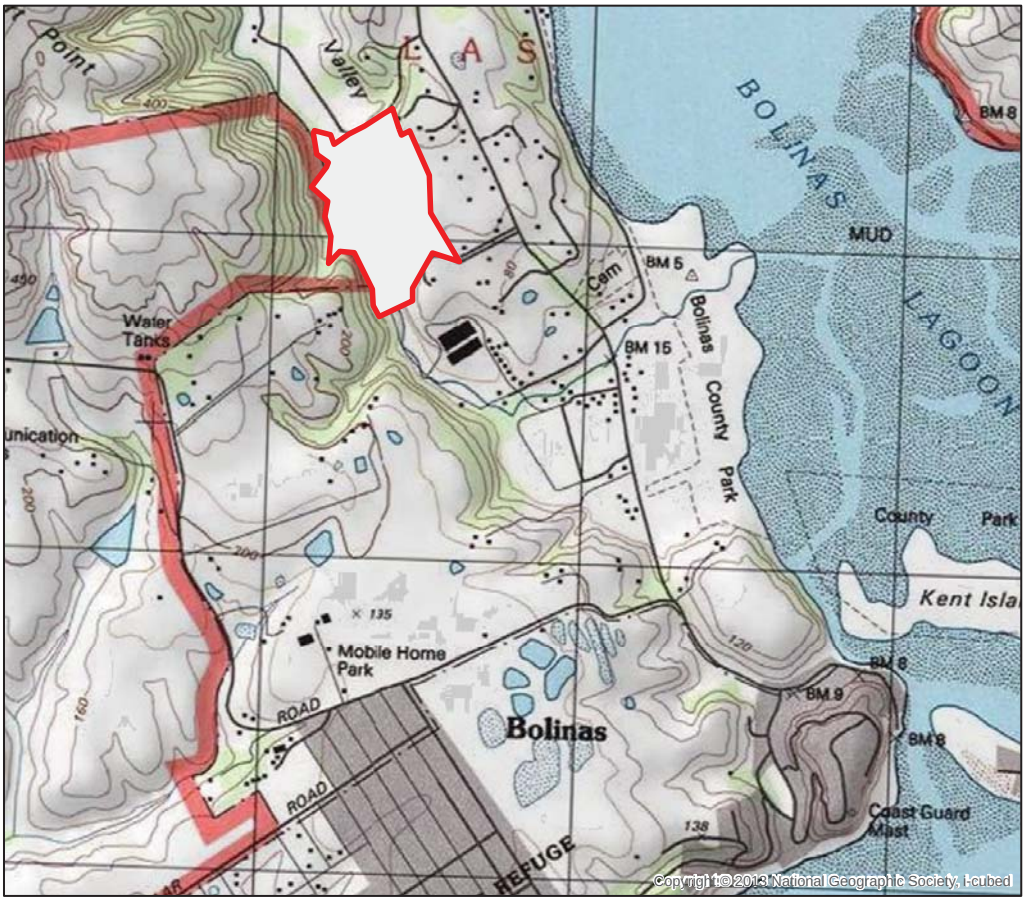



**Figure 1. New Land Fund location map.**

## Constructed Project

Construction at the New Land Fund property consisted of building Pond 2, a 5.5-acre-foot off-channel irrigation water storage impoundment, with related improvements in upland areas and improvements to the Point of Diversion on Pine Gulch Creek (Erickson Engineering, Inc. 2015[2]; see as-builts below). Work at the site included, but was not limited to, tree and brush removal; fence removal and replacement; topsoil salvage, stockpile, and replacement; soil excavation; groundwater management; installation of engineered embankment fill; relocation of local gravel roadways; construction of appurtenant structures (inlet and outlet devices, water delivery pipeline, overflow spillway, etc.); and temporary and permanent erosion and sediment control measures within the work areas. The primary adjustments made to the project relative to the original plan are as follows:

- Considerable shrinkage of wet soil during pond construction resulted in a need to eliminate the hillside bench and to slightly deepen the impoundment in order to obtain sufficient material to construct the embankment.
- Adjustment of the earthwork balance increased storage capacity to about 8.2 acre-feet relative to the 5.5 acre-feet in the original design.
- The calibration curve and a profile showing elevations of the pipe between storage and pump station are provided.
- The pump vendor provided a single high-volume low-head variable frequency drive pump to meet design criteria instead of the designed multi-pump system. Performance criteria prevent its dual use for irrigation and reservoir filling, so the original plumbing concept was retained.
- As-built locations of pipelines, armored inlets, outlets, and related features are shown.
- The principal spillway outlet detail was modified during construction and is shown.
- The site was seeded with an erosion control blend consisting of brome, clover, and fescue or a functional equivalent; vegetation growth at the site is visible in the post-construction photographs below.

[2] Erickson Engineering, Inc. 2015. New Land Fund, Irrigation Reservoir – Plan, Specs, and Details. Dated January 8, 2015.

## Photo Points

In February 2016, photo points were established at the New Land Fund pond site and Point of Diversion on Pine Gulch Creek to document completed conditions. Photo points were established around the pond perimeter, inlet and outlet structures, adjacent wetlands, and along the creek. The locations of the points were marked in the field with survey ginnies (stakes), and GPS coordinates were recorded to sub-meter accuracy. Locations were mapped on the as-built drawings (Sheets 2A.1 and 2A.3), and a map of the locations was developed in ArcGIS; see Figure 2. Six photo points were established at New Land Fund; see Table 1 and Figure 2.

**Table 1. Photo Point Locations and Coordinates**

| Photo Point | Description of Location | Latitude | Longitude | Photo Orientation |
|---|---|---|---|---|
| 1 | southern end of pond at inlet, at fence line, near tank | 37.9231918 | -122.7006544 | northwest |
| 2 | western edge of pond, above concrete and rebar outlet, | 37.9237240 | -122.7012942 | northeast, southeast, southwest |
| 3 | northern edge of pond, at top of inlet, swale | 37.924256 | -122.7014014 | northwest, southeast |
| 4 | at base of pond embankment, above culvert and rock armor | 37.9236624 | -122.7014595 | northwest, west, southwest |
| 5 | top of bank at diversion point | 37.9233534 | -122.7030762 | northwest, northwest, east |
| 6 | south of pond, near single fence post | 37.9226564 | -122.7013783 | north |

## Pre-project Photographs

The following photos were taken on the property on February 25 and March 2, 2015.

Above: Downstream view of Pine Gulch Creek from diversion point.

Below: View of constructed pond area from hillside from southeast.

Above: Looking northeast at constructed pond area from main road; see inset for close-up.
Below: View to south of constructed pond area and surrounding land.

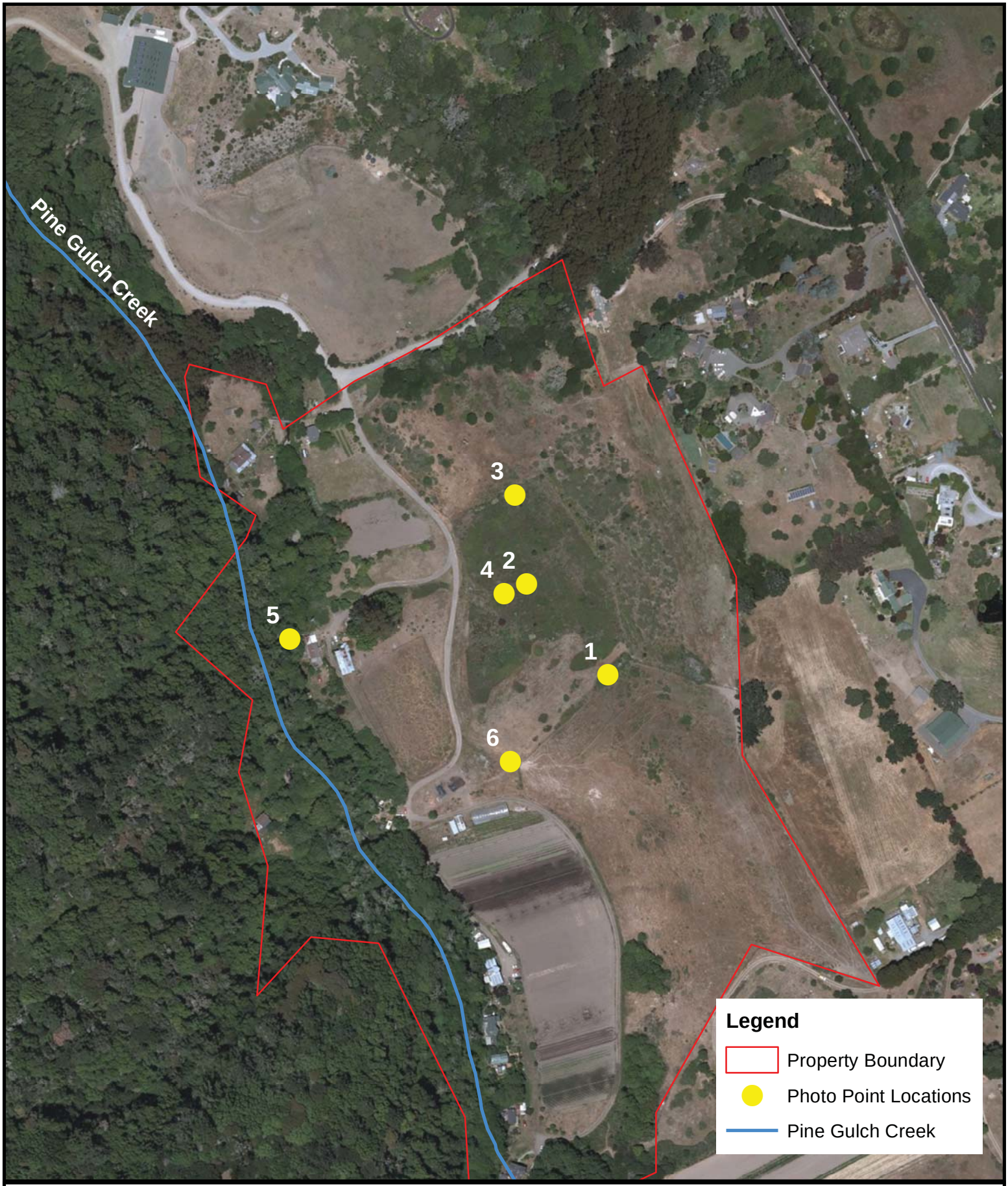



Figure 2. Photo Point Locations
Post-construction Report
New Land Fund - Pond 2

Date Created: February 2016

## Post-construction Photographs

The following photos were taken on February 4, 2016, at established Photo Points; see Figure 2.

Photo Point 1 (above): Looking northwest at inlet to constructed pond.

Photo Point 2 (below): Looking northeast along western edge of constructed pond.

Photo Point 2: Looking southeast along western edge of constructed pond.

Photo Point 2: Looking southwest at remnant wetland.

Photo Point 3: Looking northwest at hillside swale.

Photo Point 3: Looking southeast at constructed pond.

Photo Point 4: Looking northwest at remnant wetland.

Photo Point 4: Looking west at rocked outlet.

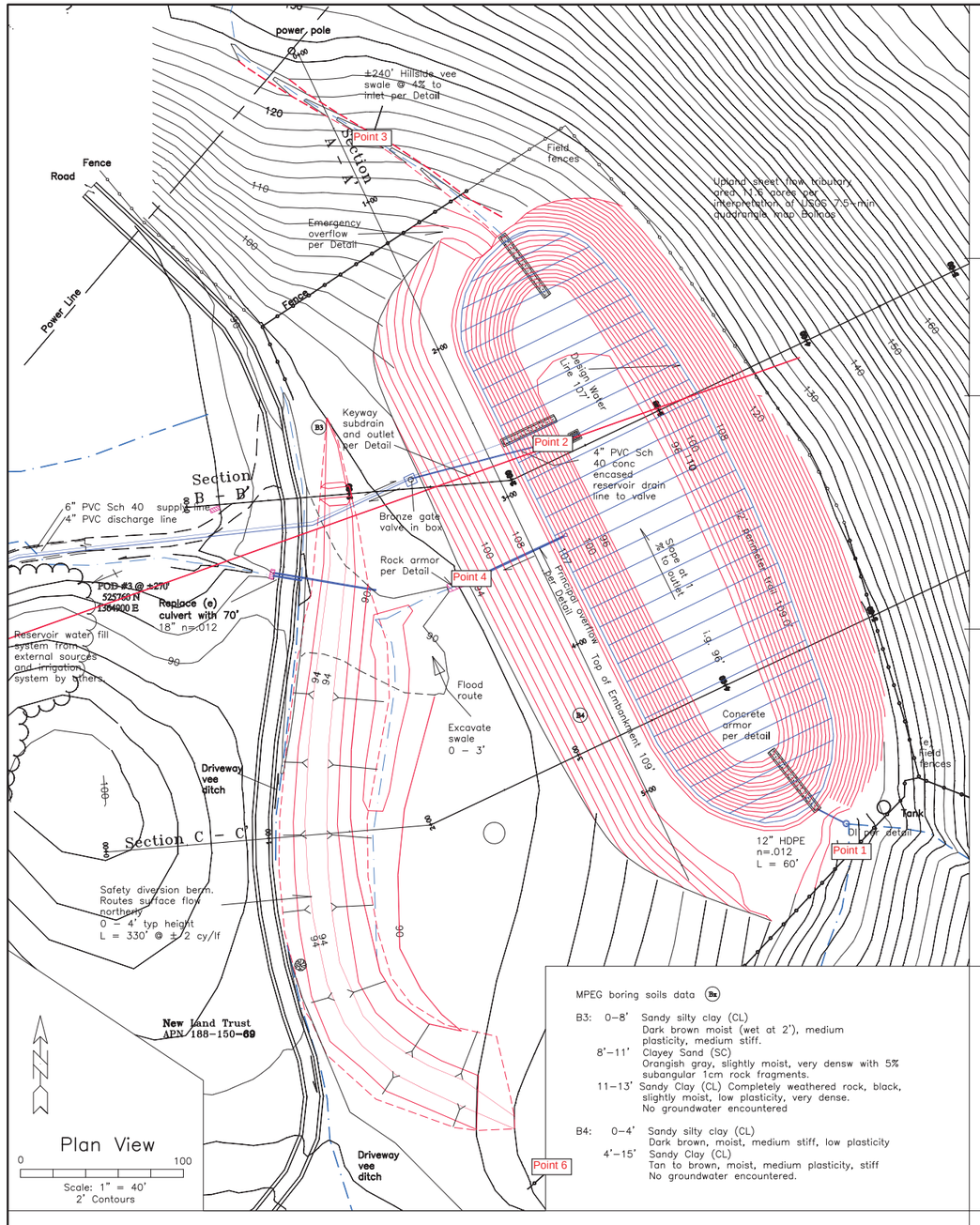
Photo Point 4: Looking southwest at remnant wetland.

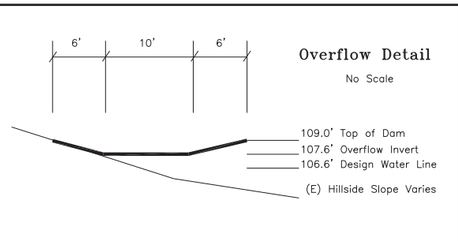
Photo Point 5: Looking downstream (southwest) at Point of Diversion.

Photo Point 5: Looking upstream (northwest) at Point of Diversion.

Photo Point 5: Looking east at pump station.

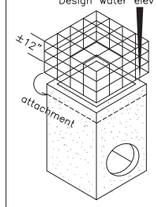
Photo Point 6: Looking north at remnant wetland and pond embankment.




## Overflow Detail

No Scale



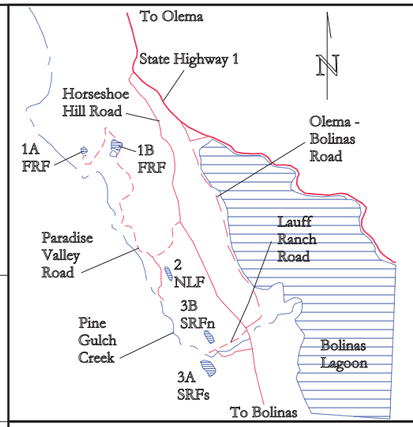

5/8" rebar cage or equal/better
*E60XX 1/4" welds
*Galvanized
*Fasten securely with bolts or clamps
*Field removable for maintenance

Commercial concrete inlet 6" wider than pipe OD

Watertight grout in place

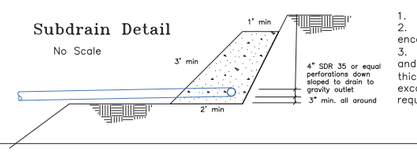
## Trash Rack Detail

No Scale

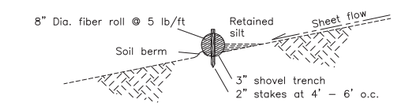



## Location Sketch

Based on USGS 7.5–min. quad: Bolinas @ 1" = 2000'



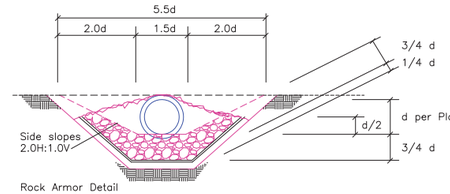

1. Subdrain uphill keyway cut slope per detail.
2. Use additional subdrains where seepage is encountered or where required by Soils engineer.
3. Use 4" PVC SDR 35 pipe or better, perforated and embedded in Class 2 permeable material. Drain thickness minimum 12", extending 3' above base of excavation. Subdrain extents per Soils engineer requirements.




* 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.
* Butt ends together without overlap.
* Maintain as required to ensure satisfactory performance.

No Scale

## Fiber Roll Check




Rock Armor Detail

Extend riprap per Plan. Concrete grout in place between res. outfall and channel

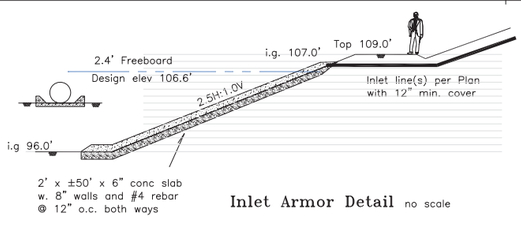
Rock Riprap Specification
Specific Gravity 2.56
* d15 d/4
* d50 d/2
* d85 d

Filter Bed Specification

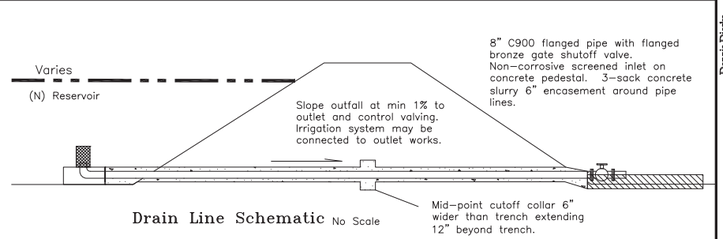
6" of 1–1/2" minus pit run blue shale road base

## Rock Lined Ditch Detail

No Scale




## Inlet Armor Detail no scale




## Drain Line Schematic No Scale

MPEG boring soils data (Bx)

B3: 0–8' Sandy silty clay (CL)
Dark brown moist (wet at 2'), medium plasticity, medium stiff.
8'–11' Clayey Sand (SC)
Orangish gray, slightly moist, very densw with 5% subangular 1cm rock fragments.
11–13' Sandy Clay (CL) Completely weathered rock, black, slightly moist, low plasticity, very dense.
No groundwater encountered

B4: 0–4' Sandy silty clay (CL)
Dark brown, moist, medium stiff, low plasticity
4'–15' Sandy Clay (CL)
Tan to brown, moist, medium plasticity, stiff
No groundwater encountered.

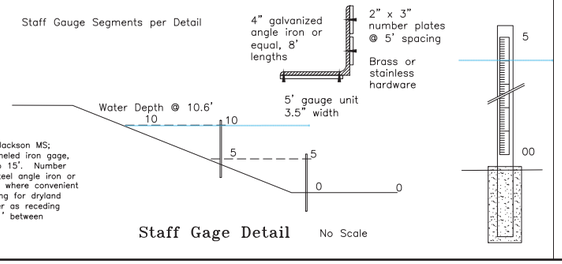
## Legend

Post-construction Report Photo Point Locations and Numbers

APPROXIMATE PROPERTY LINE
PAVED ROAD
UNPAVED ROAD
FENCE
CHANNEL
TREE
DRIPLINE
VEE DITCH
SUBSURFACE DRAIN
BUILDING
500
525
CONTOURS
CULVERT
ROCK ARMOR
FIBER ROLL

| Item | Description | Count |
|---|---|---|
| 39741 | Style E, 5' unit | 2 |
| 39743 | "0" Plate | 1 |
| 39744 | "1" Plate | 1 |
| 39745 | "2" Plate | 0 |
| 39748 | "5" Plate | 2 |

"WaterMark" Stream Gauge or equal (Forestry Suppliers Inc., Jackson MS; 1–800–647–5368; www.forestry–suppliers.com) porcelain enameled iron gage, Style E or equal 0.1' and 1.0' graduations, 5' sections 0 to 15'. Number plates for dimension 15, 10, and 5. Attach to 8 ft. x 4" steel angle iron or equal using brass or stainless screws Locate individual units where convenient to read set vertically with support in 12" x 2' concrete footing for dryland construction, or drive 2' into soil if installed in standing water as receding water allows. Verify vertical and horizontal alignment to <.01' between individual gauge sections.




## Staff Gage Detail

No Scale

Design Engineer shall certify to Marin County in writing, including signature and stamp that all grading and drainage was completed according to Plans and field directions. Changes in the approved Plans, if any, shall be described. Department of Public Works Engineer shall inspect driveway, parking, and site improvements prior to final inspection.

REGISTERED PROFESSIONAL ENGINEER
Lee B Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

Project Statement: Construct Pine Gulch Creek Enhancement and Pond Development Program Irrigation Storage Reservoir #2A and appertunant structures at New Land Fund

Site topography survey by EEI Spring 2003 using assumed coordinates and elevations with basis of bearing by magnetic compass. Property lines per record data and have not been located or field verified. Contours by linear interpolation of intermittent data points. Tree locations approximate. Field verify critical elevations and dimensions at time of construction.

Plan developed under the auspices of the Pine Gulch Creek Watershed Enhancement Program sponsored by Point Reyes National Seashore, California Department of Fish and Game, Point Reyes National Seashore Association and others.

**Table of Contents**



Reservoir Details

| | |
|---|---|
| Work Area: | 1.64 Ac |
| Reservoir Surface Area: | 0.75 Ac |
| Brush Removal Area: | 0.5 Ac |
| Storage Capacity: | 5.5 Ac–ft |
| Top Width: | 12 feet |
| Levee Height, ft: | 0–15 feet |
| Water Depth: | 10 feet |
| Total Cut Volume: | 8700 cu yd |
| Compacted Fill Volume: | 7700 cu yd |
| Cut/Fill Ratio: | 1.15/1.00 C/F |
| Foundation (3'x0.5ac): | 2500 cu yd |
| Topsoil (6"x.8 ac): | 1300 cu yd |


Nancy Scolari Executive Director
Marin Resource Conservation District
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nancy@marinrcd.org


REVISIONS


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

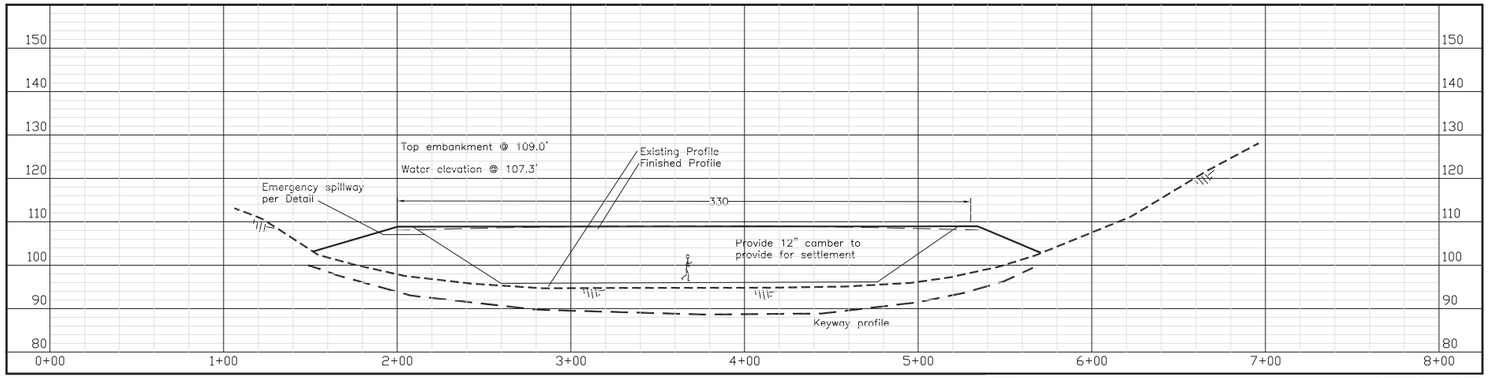

# PGC Pond 2 Asbuilt: 8.2 Acre–feet Irrigation Reservoir Plan View, Details


Dennis Dircks
New Land Fund
PO Box 382
Paradise Valley Road
Point Reyes, CA 94924
(415) 868-0305
ddircks@comcast.net

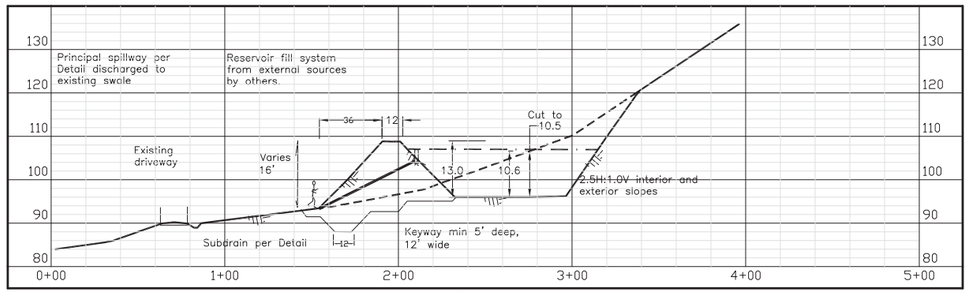

Lands of: NEW LAND FUND
APN 188–150–86
235 Paradise Valley Road, Bolinas CA 94924

51231 2 asblt.dwg
12.31.2015
1" = 40'

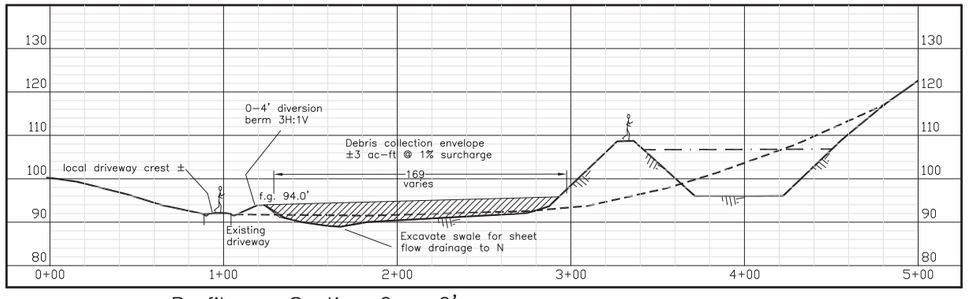
Sheet 2A.1 of 3



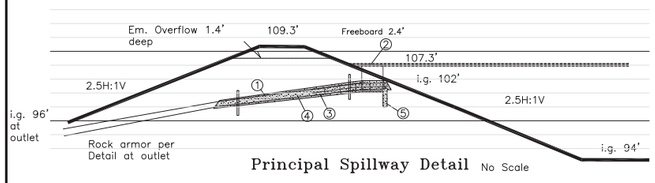

Profile on Section A – A' Scale: 1" = 40' Horizontal; 1" = 16' Vertical




Profile on Section B – B', Scale: 1" = 40' Horizontal; 1" = 16' Vertical




Profile on Section C – C', Scale: 1" = 40' Horizontal; 1" = 16' Vertical




## Principal Spillway Detail No Scale

① Min. 18" PVC SDR 35 n = .012. Watertight joints. L = ±70'. Install in accordance with ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe

② Min. 30" RCP inlet, f. end up. Chipped or spalled lip not allowed. Set level, grout in place on min 6" concrete pad. Float finish and seal grouted joints inside and out. Custom trash rack per Detail required.

③ Rebar: 3 @ 40' #4 @ 12" oc U–shape around inlet tied with #4 vert U @ 24" o.c.

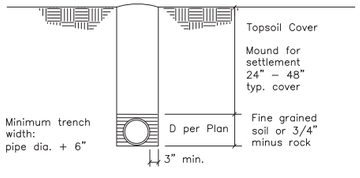
④ Concrete encasement, 4" min. all around x 30' long. Two contiguous cutoff collars @ min 12" wide extending 24" all sides of pipe required at 15' o.c.
Concrete: 5–sack, 3/4" aggregate, 2500 psi @ 28 days; 5" max slump. Support and constrain pipe during pour to obtain minimum coverage and to prevent flotation and maintain uniform slope. Vibrate or rod as required for uniform pour without voids.

⑤ Footing: Min 18" wide, 7' long, 4' deep. Pad extends beyond RCP 2' in all directions.

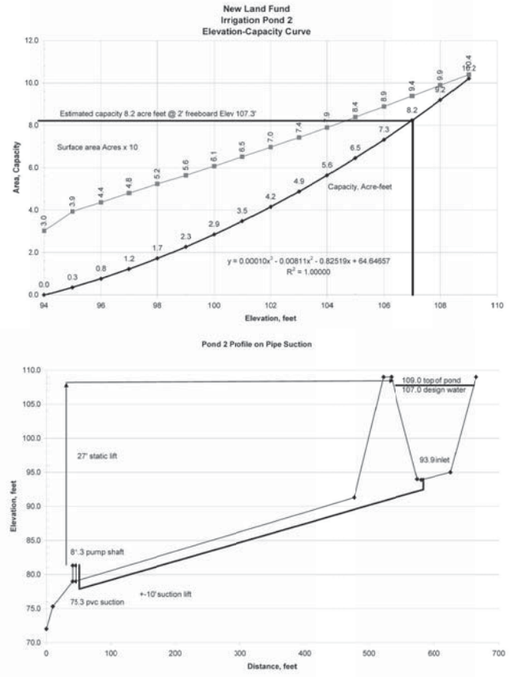
All pipe trenches require inspection prior to pour. Trench shall have smooth compacted wall and invert surfaces without tooth marks or sloughed material and shall be moisture conditioned prior to concrete placement. Soil backfill where used at 95% r.c. above and below pipe using moisture conditioned material placed using hand tamping to spring line, trench wacker and backhoe trench compaction wheel as appropriate.

Trench Detail

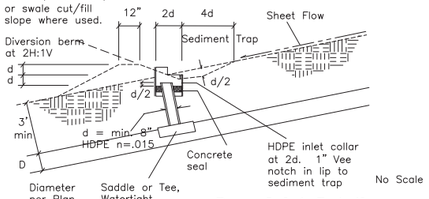
1. Conform to requirements of pipe Manufacturer and ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for all aspects of construction.
2. Trench depth as required to prevent system damage due to farming practices. Conform to all applicable OSHA and safety requirements for labor operations in and around trenches.
3. Install at uniform grade to outlet. Invert to be free of debris or sharp objects.
4. Shade pipe with fine–grained native material or 3/4" minus road base compacted at optimum m.c. prior to trench backfill. Lean concrete may be used as an alternative bedding material to pipe spring line if pipe is properly anchored to maintain grade.
5. Compact trench soil using hand or mechanical means to minimize or eliminate soil settlement. Mound soil over trench to allow for incidental settlement after backfill and compaction.




## Surface Drain Trench Detail No Scale




* Install at maximum 60' o.c. in surface drain lines per Plan. Use elbow or sweep as required to locate inlet in vine row to minimize risk of tractor damage.
* Install pipe products per Manufacturer's specifications.
* Use d = D and 90 degree elbow instead of tee at first inlet on pipe.
* Provide water tight connections for all components.
* Install sediment trap at inlet collar.
* Maintain as required to ensure satisfactory performance.




No Scale

## Drop Inlet Detail

* Remove topsoil prior to fill placement.
* Compact soil in place.
* 2H:1V side slopes.
* Slope at 4% to outlet.
* Bottomwidth 12", depth 18".
* Seed, fertilize, straw mulch all disturbed areas per ECP.

## Sidehill Ditch Detail No Scale

## Erosion Prevention and Sediment Control Notes

1. Perform erosion prevention and sediment control in accordance with the latest edition of Appendix Chapter 33 of the California Building Code, applicable County regulations, and Section 20 of the Caltrans Standard Specifications.
2. The approved plans shall conform with the Erosion Prevention and Sediment Control Best Management Practices contained in the latest editions of the following publications or an equivalent Best Management Practice:
   * Erosion and Sediment Control Field Manual by the San Francisco Bay Regional Water Quality Control Board.
   * Manual of Standards for Erosion and Sediment Control Measures by the Association of Bay Area Governments.
   * Construction Site Best Management Practices Manual by Caltrans.
   * Stormwater Best Management Practices Handbook by the California Stormwater Quality Association.
3. If discrepancies occur between these notes, material referenced herein or manufacturer's recommendations then the most protective shall apply.
4. The Owner is responsible for obtaining and complying with the National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for discharges of stormwater runoff associated with construction activity disturbing land equal to or greater than one acre. Construction activities include but are not limited to clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement.
5. Preservation of existing vegetation shall occur to the maximum extent practical.
6. The Owner is responsible for preventing stormwater pollution generated from the construction site year round. The Owner must implement an effective combination of erosion prevention and sediment control on all disturbed areas during the rainy season of October 15 – April 15.
7. Erosion prevention and sediment control measures shall be inspected by the Owner before forecasted storm events and after actual storm events to ensure measures are functioning properly. Storm events produce at least 1 inch of precipitation in a 24–hour period. Erosion prevention and sediment control measures that have failed or are no longer effective shall be promptly replaced. Erosion prevention and sediment control measures shall be maintained until disturbed areas are stabilized.
8. Changes to the Erosion Prevention and Sediment Control Plan may be made to respond to field conditions. Changes shall be noted on the Plan when made.
9. Discharges of potential pollutants from construction sites shall be prevented using source controls to the maximum extent practicable. Potential pollutants include but are not limited to sediment, trash, nutrients, pathogens, petroleum hydrocarbons, metals, concrete, cement, asphalt, lime, paint, stains, glues, wood products, pesticides, herbicides, chemicals, hazardous waste, sanitary waste, vehicle or equipment wash water, and chlorinated water.
10. Entrances(s) to the construction site shall be maintained in a condition that will prevent tracking or flowing of potential pollutants offsite. Potential pollutants deposited on paved areas within the County right–of–way, such as roadways and sidewalks shall be properly disposed of at the end of each working day or more frequently as necessary.
11. Exposed slopes shall be protected by using erosion prevention measures to the maximum extent practicable, such as establishing 70% vegetation coverage, hydroseeding, straw mulch, geotextiles, plastic covers, blankets, or mats.
12. Whenever it is not possible to utilize erosion prevention measures, exposed slopes shall employ sediment control devices, such as fiber rolls. Fiber rolls shall be trenched and keyed into the soil and installed on contour.
13. The erosion control revegetation mix shall be according to Marin County requirements for erosion controls, using native materials. , 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 shall be applied at the time of seeding. Mulch shall be rice straw, or small grains straw spread at a rate of 2 tons/acre. Crimping, tackifying, 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:
   35% Blando Brome
   30% Rose Clover
   15% Cucamonga Brome
   15% Triticale
   5% Zorro Fescue
14. The Owner shall protect storm drain inlets from potential pollutants until drainage conveyance systems are functional and construction has been completed.
15. Energy dissipators shall be installed at storm drain outlets which may convey storm water flow leading to soil erosion.
16. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.
17. Solid waste such as trash, discarded building materials and debris, shall be placed in designated collection areas or containers. The construction site shall be cleared of soild waste daily or as necessary and regular removal and proper disposal shall be arranged.
18. A concrete washout area, such as a temporary pit, shall be designated to clean concrete trucks and tools. At no time shall concrete products and waste be allowed to enter County waterways such as creeks or storm drains.
19. Proper application, cleaning, and storage of potentially hazardous materials, such as paints and chemicals, shall be conducted to prevent the discharge of pollutants.
20. When utilized, temporary restrooms and sanitary facilitites shall be located and maintained to prevent the discharge of pollutants.
21. Appropriate vehicle storage, fueling, maintenance, and cleaning areas shall be designated and maintained to prevent discharge of pollutants.

## Grading Notes

1. Perform grading in accordance with the latest edition of Appendix Chapter 33 of the California Building Code and applicable County regulations. Conform to the recommendations of any Geotechnical Engineering Report developed as part of the project design.
2. Existing drainage courses receiving waters from this site and located throughout this site shall remain open and clear of debris to properly convey storm water. If existing drainage courses receiving waters from this site are located in the County right–of–way and need maintenance, contact the Department of Transportation and Public Works for further assistance. In any event, the Owner and/or Contractor shall be held liable for any damage due to obstructing natural drainage patterns.
3. Retaining walls are not approved under this grading permit. Retaining walls require a separate building permit, unless exempted by the County.
4. The Contractor shall immediately notify the design Engineer upon discovering significant discrepancies, errors, or omissions in the Plans. Prior to proceeding, the Owner shall have the Plans revised to clarify identified discrepancies, errors, or omissions. The revised Plans shall be subject to review by the Chief Building Official.
5. The Contractor shall be responsible for notifying Underground Service Alert (USA) toll free at 1.800.642.2444 at least two working days prior to excavation. The Contractor shall uncover relevant utilities to verify their location and elevation. If unexpected or conflicting utilities are encountered during excavation, notify USA, the utility owner, and/or the project Engineer immediately. Utilities include but are not limited to water, sewer, electrical, gas, telephone, and cable/TV.
6. In the event of cultural resources (i.e. historical, archaeological, and paleontological resources, and human remains) are discovered during grading or other construction activities, work shall be halted within a 100–foot radius of the find. The Northwest Information Center shall be notified at 707.664.0880. A qualified archeologist shall be consulted for an on–site evaluation. Additional mitigation may be required by the County per the archeologist's recommendations. If human burials or human remains are encountered, the Contractor shall also notify the County Coroner.
7. Should grading operations encounter hazardous materials, or what appear to be hazardous materials, stop work in the affected area immediately and contact 911 or the appropriate agency for further instruction.
8. The grading permit and approved copy of the grading plans shall be maintained on the project site throughout the duration of construction activities.
9. Drainage facilities and grading shall be inspected before receiving final approval. The Contractor shall consult the project Job Card for corrdination of inspection requests.

## Geotechnical Requirements

Refer to Geotechnical Investigation for Pine Gulch Creek Reservoirs, Bolinas CA dated 3/24/2003 by Miller Pacific Engineering Group (415) 382–3444 for detailed site soils information.
1. Surface Preparation – Clear all grass, brush, trees, oversized debris and organic material from areas to be graded. The estimated depth of stripping is 4 – 6", with deeper grubbing required to remove brush and tree roots. Excavate soft or saturated soil to expose uniformly firm natural soils. Any excess and unsuitable materials shall be hauled off site or stockpiled for later reuse in landscaping.
Soils exposed by clearing, stripping, and required excavations should be scarified to a dept of about 6", moisture conditioned to optimum or greater, and recompacted to minimum 92% ASTM D1557.
2. Keyway Excavations – Keyways must be into firm natural soil or weathered rock to the depth and width indicated. The bottom must be firm and unyielding, moisture conditioned to 0–2% over optimum, and compacted to 92% ASTM D1557.
3. Slope Criteria – Cut and fill slopes should be no steeper than 2.5H:1.0V. Localized slopes may be as steep as 2H:1V within firm natural soil or where needed to minimize the grading area, with concurrence of the Soils engineer in the field.
4. Compacted Fill – Fill shall be: 1) free of organic material, 2) have a Liquid Limit less than 50 and a Plasticity Index of less than 25, and 3) have a particle size of less than 2 inches.
Onsite material is believed suitable for embankment construction. Clay soils will require close control of moisture content in order to achieve required compaction. It will be necessary to remove areas of sandy material or blend with clay materials within the upper two feet of reservoir lining.
Moisture condition fill to optimum m.c. or greater, place in uniform horizontal lifts <8", and compact to 92 pct. ASTM D1557. The upper six inches of the reservoir lining should be at 95 pct. r.c. to produce a uniform impermeable surface.
5. Trench Backfill – Conform to requirements of engineered fill with regard to materials, lift thickness, and moisture conditioning. Two sack concrete slurry to 3" above pipe diameter may be used in lieu of hand compaction for principal spillway pipes. Jetting for trench backfill compaction is not permitted.
6. Geotechnical Engineer shall observe and direct site preparation, grading, keyway excavations, drainage placement, placement and compaction of engineered fill, and shall be responsible for lab and field testing for conformance with the GE report.

## 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 grated rectangular drop inlets shall be used.
4. Concrete shall be 5.5–sack mix using 3/4" aggregate rated at 3000 psi minimu 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 400x, 500x, 700x 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 matting for mulch placement on slopes of 2H:1V or greater shall be North American Green S–75 or equal or better.

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS

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

# PGC Pond 2 Asbuilt:
# 8.2 Acre–feet Irrigation Reservoir
# Profile, Specs, Details

Dennis Dicks
New Land Fund
PO Box 382
Paradise Valley Road
Tomales CA 94924
(415) 663-8090
ddicks@music.net

Lands of: APN 188–150–86
NEW LAND FUND
235 Paradise Valley Road, Bolinas CA 94924

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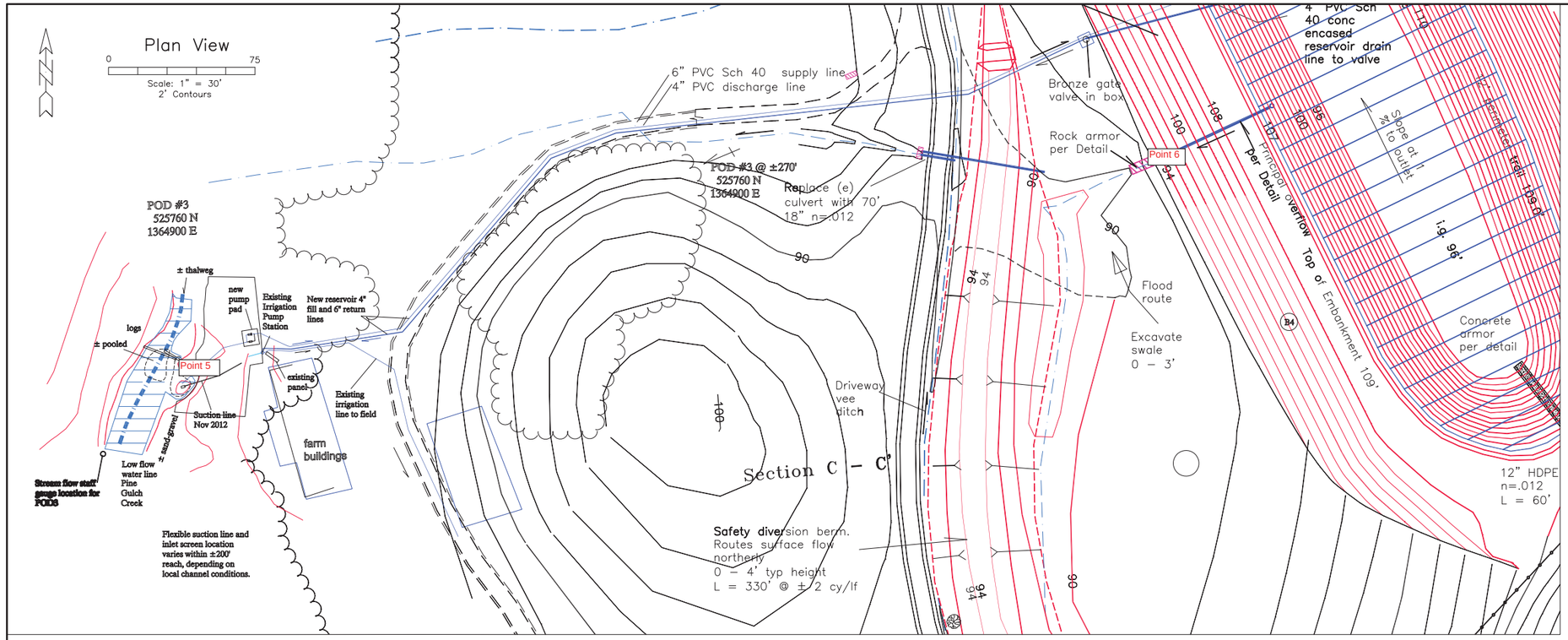
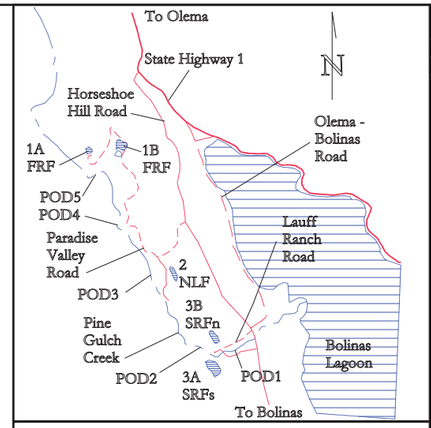
12.31.2015
Scale: Noted
Sheet 2A.2
of 3




## Location Sketch

Based on USGS 7.5–min. quad: Bolinas @ 1" = 2000'

Site topography survey by EEI Spring 2003 using assumed coordinates and elevations with basis of bearing by magnetic compass. Property lines per record data and have not been located or field verified. Contours by linear interpolation of intermittent data points. Tree locations approximate. Field verify critical elevations and dimensions at time of construction.

Plan developed under the auspices of the Pine Gulch Creek Watershed Enhancement Program sponsored by Point Reyes National Seashore, California Department of Fish and Game, Point Reyes National Seashore Association and others.

Reservoir Details

| | |
|---|---|
| Work Area: | 1.64 Ac |
| Reservoir Surface Area: | 0.94 Ac |
| Brush Removal Area: | 0.5 Ac |
| Storage Capacity: | 8.2 Ac–ft |
| Top Width: | 12 feet |
| Levee Height, ft: | 0–15 feet |
| Water Depth: | 12 feet |
| Total Cut Volume: | 8700 cu yd |
| Compacted Fill Volume: | 7700 cu yd |
| Cut/Fill Ratio: | 1.15/1.00 C/F |
| Foundation (3'x0.5ac): | 2500 cu yd |
| Topsoil (6"x.8 ac): | 1300 cu yd |

REVISIONS


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


PGC Pond 2 Asbuilt
8.2 Acre-feet Irrigation Reservoir
POD 3


Dennis Dierks
New Land Fund
PO Box 382
Paradise Valley Road
Bolinas, CA 94924
(415) 868-0205
ddierks@comic.net

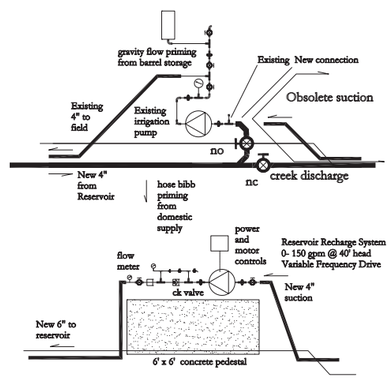

Lands of: NEW LAND FUND
APN 188–150–86
235 Paradise Valley Road, Bolinas CA 94924

51231 2 asblt.dwg
12.31.2015
Scale: Noted

Sheet
2A3
of 3

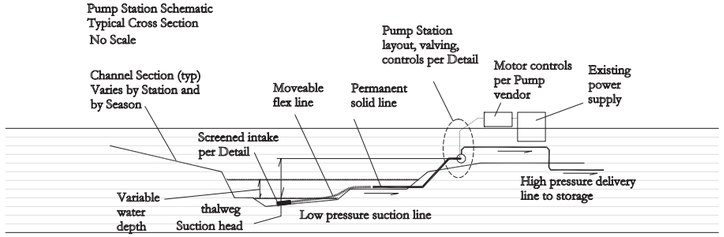
### NLF POD 3 Intake Parameters

| | |
|---|---|
| Design Flow | 0.22 cfs |
| Design Flow | 100 gpm |
| Suction lines | 4" dia |
| Approach vel | 0.2 fps |
| Screen | |
| Passive cleaning | |
| Gross area | 2.0 sf |
| Open area | 1.1 sf |
| Matl | #8 .032" ss mesh |




Pump station schematic only. Consult with qualified vendors and installers to finalize system components and details. Provide performance specs and cut sheets. Locate, secure, and support all components with appropriate stands, straps, bracing per Manufacturer's recommendations. Conform to applicable electrical, plumbing, and mechanical codes for design and installation. County electrical or plumbing permits may be required for intertie to existing systems. Final configuration and component locations developed in consultation with and approval of Landowner, Engineer, and MRCD.

POD 3
Pump Station Schematic
Typical Cross Section
No Scale



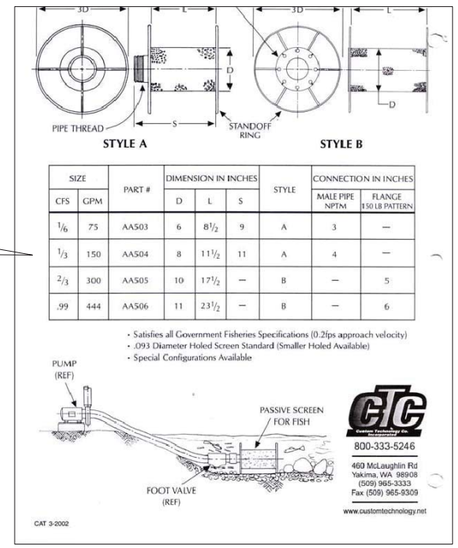

## Legend

PROPERTY LINE+–
PAVED ROAD
UNPAVED ROAD
FENCE
CHANNEL
TREE DRIPLINE
VEE DITCH
SUBSURFACE DRAIN
BUILDING
CONTOURS
CULVERT
ROCK ARMOR
FIBER ROLL

Post-construction Report Photo Point Locations and Numbers

**Screened Intake Operation and Maintenance Requirements**

* Operate system in conformance with minimum instream flow requirements of 25 CFS February Median Flow per CDFW criteria.
* Maintain a copy of this schematic diagram with O & M notes in a water tight container at the pump station for referal by the system operator on an as-needed basis.
* The intent of intake screening is to prevent fish entrainment in the diversion flow, prevent fish impingement/possible injury/descaling on the screen surface, and to avoid delay or predation due to diversion operations.
* Place screened intake in deeper pools using hand tools and hand methods in order to provide adequate submergence to prevent loss of prime. Seasonal or annual relocation may be required to follow pool migration.
* A 6" suction line when primed weighs approximately 140 lb/10'. Use appropriate manpower and methods when setting and adjusting the intake to avoid strain or injury to workers.
* Water depth over top of screen should be at least 1 radius per NOAA criteria and to prevent loss of prime.
* Place long screen axis parallel to flow to the extent practical when setting moveable intake. Orient to provide adequate fish bypass/escape routes and to prevent flow reversals over significant area of the screen.
* Place screen at minimum 1D from any vertical bank to ensure stream flow all around intake.
* Adjust flexible suction line as required to achieve desired screen placement while minimizing head requirements and impacts to adjoining creek banks.
* Should inadvertent minor bank damage occur due to dragging or hand placement of flexible suction lines, provide jute netting armor in accordance with Manufacturer's recommendations to cover any bared soil areas.
* Use steel t-posts or equal to stake flex line in place as required to prevent pipe or screen migration due to channel flow.
* Place standoff rings on natural channel invert with minimal settlement of screen support into substrate.
* Support standoff rings with clean rock, brick or similar material placed flush with invert grade if required to prevent settlement into substrate. Remove non-native materials at time of intake removal.
* Observe and maintain intake screen and suction line as required to meet performance objectives. Screens are sized per CDFW/NOAA criteria for manual cleaning. Clean any accumulated debris such as leaves or organic debris by hand on a daily basis.
* Should excessive channel flooding occur, temporarily remove intake, supports, and flex line in order to prevent system damage.
* Remove intake, intake supports, and flex line at the completion of the water diversion season for storage outside the riparian zone.
* Inspect and maintain all system components as required for performance within standard operating parameters. Replace or repair damaged, defective, leaking, cracked, or ineffective components so as to maintain system in good working order.
* CDFW requests as operational log be maintained for the first five years of operation, in order to accumulate knowledge to improve and refine operations. The log should include date, screen placement information, start/stop times, and results of inspections at diversion events ( plugging, cleaning, relocations, etc). CDFW and/or NOAA staff may request operations observation, most likely during first-season diversion events.
* O&M procedures and the schematic diagram illustrating system components and configuration(s) may evolve over time on an as-needed basis in order to best meet Program objectives and system performance criteria. Collaboration between Landowner, Resource Agency staff, energy provider, funding agency, and Engineer may be required to implement evolutionary changes in system configuration and operation.




| SIZE CFS | SIZE GPM | PART # | DIMENSION IN INCHES D | L | S | STYLE | CONNECTION IN INCHES MALE PIPE NPTM | FLANGE 150 LB PATTERN |
|---|---|---|---|---|---|---|---|---|
| 1/6 | 75 | AA503 | 6 | 8 1/2 | 9 | A | 3 | — |
| 1/3 | 150 | AA504 | 8 | 11 1/2 | 11 | A | 4 | — |
| 2/3 | 300 | AA505 | 10 | 17 1/2 | — | B | — | 5 |
| .99 | 444 | AA506 | 11 | 23 1/2 | — | B | — | 6 |

- Satisfies all Government Fisheries Specifications (0.2fps approach velocity)
- .093 Diameter Holed Screen Standard (Smaller Holed Available)
- Special Configurations Available





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CAT 3-2002

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

# Pine Gulch Creek Watershed Enhancement Project
# Post-construction Report
# Star Route Farms – Ponds 3A and 3B
# February 2016

*Prepared for:*

MARIN RESOURCE CONSERVATION DISTRICT

Marin Resource Conservation District
P.O. Box 1146
Point Reyes Station, CA 94956
(415) 663-1170

*Prepared by:*

PRUNUSKE CHATHAM, INC.

Prunuske Chatham, Inc.
400 Morris Street, Suite G
Sebastopol, CA 9547
(707) 824-4600

# Table of Contents



## Report Attachments

# Introduction

The Pine Gulch Creek Watershed Enhancement Project, administered by the Marin Resource Conservation District (MRCD), was implemented in the summer 2015 to improve summer habitat conditions for aquatic species in the Pine Gulch Creek watershed, Bolinas, Marin County. MRCD worked with three local organic farms to construct a series of off-channel water storage ponds to enhance summer stream flows by substituting summer riparian diversions for winter appropriative diversions. Limited riparian diversion in the spring (April through June) and appropriative storage of winter diversions will accommodate the continuing irrigation needs of the farms between July and December. Appropriative winter diversion into the ponds will ensure that they are full by the last day of March on an annual basis. As part of this project, the farmers are dedicating all of their commercial riparian diversions between July 1 and December 15 to instream flow for the benefit of salmonids and other aquatic species occupying the watershed. The Star Route Farms property is one of the three farms engaged in the project. Work on the property included construction of two off-channel irrigation ponds and non-native plant removal and riparian restoration along Pine Gulch Creek.

The project was funded by the California Department of Fish and Wildlife (CDFW) Fisheries Grant Restoration Program (FRGP #P1130410) and authorized under a §1602 Lake or Streambed Alteration Agreement issued by CDFW, §401 Water Quality Certification from the San Francisco Bay Regional Water Quality Control Board, §404 Individual Permit from the U.S. Army Corps of Engineers, Marin County Community Development Agency permits, and a Programmatic Safe Harbor Agreement from U.S. Fish and Wildlife Service.

As per the requirements of the project permits and the Biological Mitigation Plan prepared for the project (Huffman-Broadway Group, Inc. 2007[1]), Prunuske Chatham, Inc. (PCI) is providing the following post-construction conditions report. This report includes:

- Description of the project setting
- Description of the constructed project
- Description of the photo points (with table of locations and coordinates)
- Pre-project photographs
- Photo point location maps
- Post-construction photographs
- As-built drawings

This report will serve as the baseline for future monitoring activities to be completed for the project.

[1] Huffman-Broadway Group, Inc. 2007. Pine Gulch Creek Watershed Enhancement Project, Biological Mitigation Plan, Bolinas, Marin County, California. January 24, 2007.

## Project Setting

Star Route Farms is located at 95 Olema-Bolinas Road north of the town of Bolinas in western Marin County, California (Figure 1); the property is accessed directly off the main road to Bolinas. It is mapped on the Bolinas USGS quadrangle (37.917275°N and 122.695481°W) at approximately 25 feet in elevation. The property is surrounded by forested habitat, agricultural fields, roadways, and a local school. Pine Gulch Creek runs through the middle of the property. The Pine Gulch Creek watershed encompasses 7.5 square miles of coastal habitat. The majority of the watershed is located within the Point Reyes National Seashore. The creek flows in a southerly direction from the Seashore towards Bolinas and into Bolinas Lagoon, thence the Pacific Ocean.

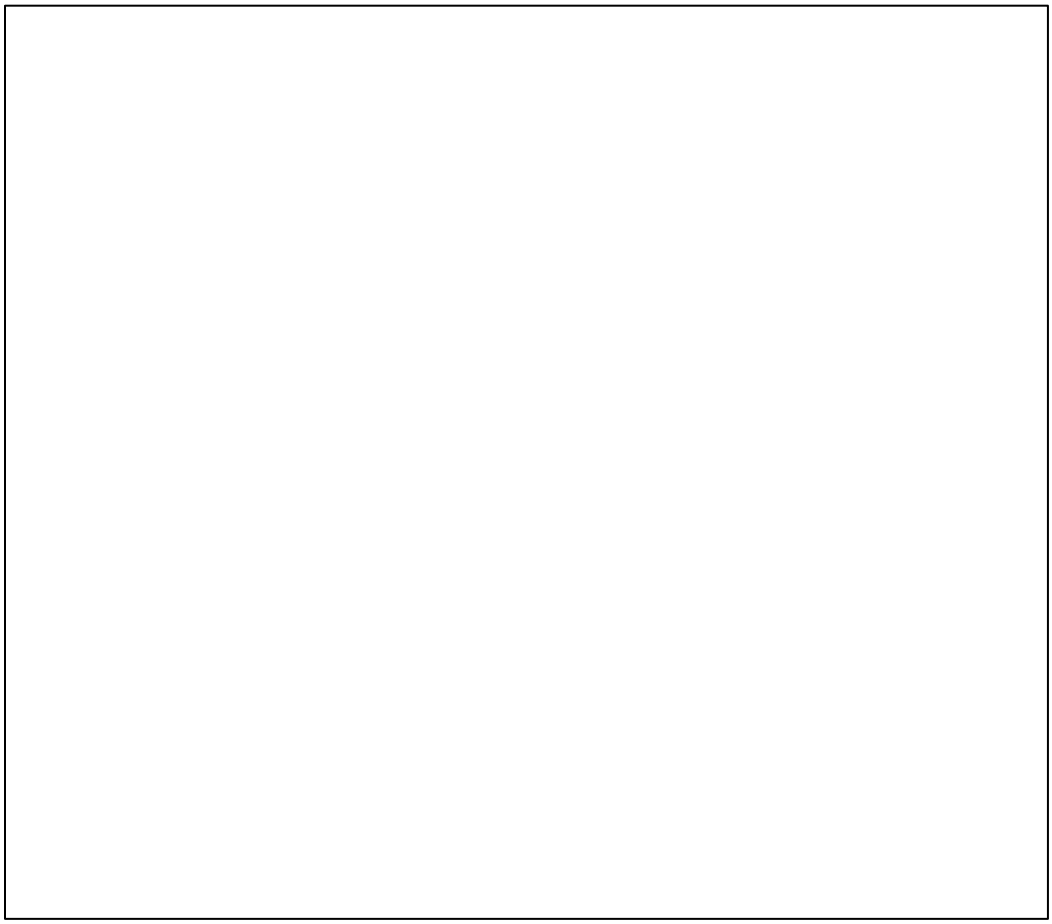


**Figure 1. Star Route Farms location map.**

## Constructed Project

Construction at the Star Route Farms property consisted of building two off-channel irrigation water storage impoundments, Pond 3A and Pond 3B, with related improvements in upland areas and improvements to the Point of Diversions on Pine Gulch Creek (Erickson Engineering, Inc. 2015[2]; see as-builts below), and non-native plant removal and native revegetation along Pine Gulch Creek (see Point Blue report below). For the revegetation effort, non-native broom, Himalayan blackberry, ivy, and fennel were removed and 80 native trees were installed. Work at the site included, but was not limited to, tree and brush removal; topsoil salvage, stockpile, and replacement; soil excavation; groundwater management; installation of engineered embankment fill; relocation of local gravel roadways; construction of appurtenant structures (inlet and outlet devices, water delivery pipeline, overflow spillway, etc.); and temporary and permanent erosion and sediment control measures within the work areas. The primary adjustments made to the project relative to the original plan are as follows:

- Considerable shrinkage of wet soil during pond construction resulted in need to increase excavation and to slightly deepen the impoundments, in order to obtain sufficient material to construct the embankments.
- Adjustment of the earthwork balance for Pond 3A increased storage capacity to approximately 31.7 acre-feet relative to the 26 acre-feet original design.
- Adjustment of the earthwork balance for Pond 3B increased storage capacity to approximately 10.6 acre-feet relative to the 9.4 acre-feet original design.
- The calibration curve and a profile showing elevations of the pipe between storage and pump station are provided on the as-builts.
- The pump vendor provided a single high-volume low-head variable frequency drive pump to meet design criteria instead of the designed multi-pump system. Performance criteria prevent its dual use for irrigation and reservoir filling, so the original plumbing concept was retained.
- As-built locations of pipe lines, armored inlets, outlets, and related features are shown.
- The principal spillway outlet detail was modified during construction and is shown.

[2] Erickson Engineering, Inc. 2015. Star Route Farms, Irrigation Reservoirs – Plan, Specs, and Details. Dated January 5, 2015.

## Photo Points

In February 2016, photo points were established at the Star Route Farms pond sites, Point of Diversion on Pine Gulch Creek, and riparian restoration area to document completed conditions. Photo points were established around the pond perimeters, Point of Diversions along Pine Gulch Creek, and riparian restoration area. The locations of the points were marked in the field with survey ginnies (stakes), and GPS coordinates were recorded to sub-meter accuracy. Locations were mapped on the as-built drawings (see Sheets 3A.1, 3A.4, 3B.1, 3B.4), and a map of the locations was developed in ArcGIS; see Figures 2, 3, and 4. Fourteen photo points were established at Star Route Farms; see Tables 1, 2, and 3.

**Table 1. Photo Point Locations and Coordinates at Pond 3A**

| Photo Point | Description of Location | Latitude | Longitude | Photo Orientation |
|---|---|---|---|---|
| 1 | northeast edge of pond | 37.9166680 | -122.6965285 | west, southwest, south |
| 2 | northwest edge of pond | 37.9168524 | -122.6975110 | east, southeast |
| 3 | western edge of pond | 37.9162119 | -122.6973010 | north, northeast, east |
| 4 | southern edge of pond | 37.9157771 | -122.6963589 | north, west |
| 5 | Point of Diversion | 37.9175047 | -122.6948556 | east, northwest |

**Table 2. Photo Point Locations and Coordinates at Pond 3B**

| Photo Point | Description of Location | Latitude | Longitude | Photo Orientation |
|---|---|---|---|---|
| 1 | northwest edge of pond | 37.9192143 | -122.6973355 | east, southeast, south |
| 2 | western edge of pond | 37.9186383 | -122.6970885 | north, southeast |
| 3 | southern edge of pond | 37.9186383 | -122.6970885 | north, west, northwest |
| 4 | northeast edge of pond | 37.9188780 | -122.6966514 | south, northwest |
| 5 | Point of Diversion | 37.9177560 | -122.697440 | southeast, northwest |

**Table 3. Photo Point Locations and Coordinates along Riparian Restoration Area**

| Photo Point | Description of Location | Latitude | Longitude | Photo Orientation |
|---|---|---|---|---|
| 1 | Downstream end of restoration area | 37.9168999 | -122.6964584 | northwest |
| 2 | Middle of restoration area | 37.9170212 | -122.6970629 | east, northwest |
| 3 | Middle of restoration area | 37.9171041 | -122.6973821 | east, northwest |
| 4 | Upstream end of restoration area | 37.9174301 | -122.6981407 | southeast |

## Wildlife Usage of Pond Sites

During the February 10th field survey, California red-legged frogs were documented breeding at the Pond 3A site. An egg mass was discovered at the water's edge on the northeast edge of the pond. It was located in approximately 1-foot of water and appeared to be free floating. The egg mass was approximately 6 to 8 inches in diameter. An adult western pond turtle was also documented at the Pond 3A site. It measured approximately 7 inches in length and was visible in the deeper water about 20 feet from the edge of the pond.

Several frogs were also detected at the Pond 3B site. Positive identification could not be determined, but they appeared to be juvenile California red-legged frogs (at least 2 individuals). They did not exhibit the characteristic "squawk" made by American bullfrog and were too large to be Sierran treefrog. Sierran treefrog were also detected at the Pond 3B site in the ditch around the perimeter of the pond and access road.

California red-legged frog egg mass observed on February 10, 2016; see inset for close-up.

## Pre-project Photographs

The following photos were taken on the property in February and March 2015.

Above: Existing pond and fields at Pond 3A site prior to construction (5/21/15).

Below: Field and tree limb mulching prior to construction (5/25/15).

Above: Looking southeast of Pond 3B site prior to construction.

Below: Looking north at Pond 3B site.

## Photo Point Locations at Pond 3A

Insert Figure 2

## Post-construction Photographs at Pond 3A

The following photos were taken on February 10, 2016, at established Photo Points; Figure 2.

Photo Point 1 (above): Looking west at constructed pond.

Photo Point 1 (below): Looking southwest.

Photo Point 1 (above): Looking south at constructed pond.

Photo Point 2 (below): Looking east at outlet structure.

Photo Point 2 (above): Looking southeast.

Photo Point 3 (below): Looking north.

Photo Point 3 (above): Looking northeast towards screened inlet.

Photo Point 3 (below): Looking east.

Photo Point 4 (above): Looking north.

Photo Point 4 (below): Looking west.

Photo Point 5 (above): Looking downstream at Point of Diversion.

Photo Point 5 (below): Looking upstream at Point of Diversion.

## Photo Point Locations at Pond 3B

Insert Figure 3

## Post-construction Photographs at Pond 3B

The following photos were taken on February 10, 2016, at established Photo Points; Figure 3.

Photo Point 1 (above): Looking southeast at constructed pond.

Photo Point 1 (below): Looking east at inlet.

Photo Point 1 (above): Looking south.
Photo Point 2 (below): Looking north.

Photo Point 2 (above): Looking southeast.
Photo Point 3 (below): Looking northwest.

Photo Point 3 (above): Looking north.

Photo Point 3 (below): Looking west.

Photo Point 4 (above): Looking south.

Photo Point 4 (below): Looking  northwest.

Photo Point 5 (above): Looking downstream at Point of Diversion.

Photo Point 5 (below): Looking upstream at Point of Diversion.

## Photo Point Locations at Riparian Restoration Area

Insert Figure 4

## Post-construction Photographs at Riparian Restoration Area

The following photos were taken on February 10, 2016, at established Photo Points; Figure 4.

Photo Point 1 (above): Looking northwest at planting area.

Photo Point 2 (below): Looking east.

.

Photo Point 2 (above): Looking northwest.

Photo Point 3 (below): Looking east.

.

Photo Point 3 (above): Looking northwest.

Photo Point 4 (below): Looking southeast.

**PROJECT REPORT**

Pine Gulch Creek Riparian Enhancement Project

The STRAW Project

A Project of Point Blue Conservation Science

## *PROJECT GOALS*

During the fall of 2015, Point Blue Conservation Science (Point Blue) Students and Teachers Restoring A Watershed (STRAW) Program, in partnership with Marin Resource Conservation District (MRCD), completed riparian enhancement work on Pine Gulch Creek at Star Route Farms. The invasive plant removal and native tree installation improves water quality and increases riparian vegetation, enhancing critical habitat for endangered species. This project is part of the implementation of the Biological Mitigation Plan for the Pine Gulch Creek Watershed Enhancement Project.

## *PROJECT DESCRIPTION*

In the fall of 2015, the on-site contractor removed large debris (mostly logs) from the Riparian Enhancement Area.

Next, Prunuske Chatham, Inc. (PCI) staff supervised a labor crew from Conservation Corps North Bay (CCNB) to prepare the Riparian Enhancement Area. Invasive species were removed from the site by hand, weed wrench, weed-eater, and chainsaw and disposed of in an approved location. Species included broom, Himalayan blackberry, ivy, fennel, and others. No heavy equipment was used in the riparian area and only minimal soil disturbance shall occur. Care was taken that removal of native understory species was minimized. On-site native species include, but are not limited

to, salmon berry, native blackberry, thimbleberry, bee plant, elderberry and coyote brush. A botanist from PCI assisted with plant identification before work began.

Finally, STRAW installed 80 native trees during two work days with students. The exact location of planting spots was pin-flagged by the revegetation specialist from PCI. General plant spacing is 10 to 20 feet apart to fit site conditions. The original plan called for only three tree species – alder, live oak and bay. Boxelder was added to the mix as it is a fast growing native riparian plant that occurs on the site and because of the concern that live oak and bay are susceptible to Sudden Oak Death (SOD) on the coast. See below for the species mix. Note that the total plant count is 80 plants whereas the required number is 60. The final survival requirement at year 5 is 80% of 60 which equals 48 plants.

Planting by students guided by parents and teachers proceeded by established STRAW planting protocol. Planting holes are no deeper than the root mass of the container plant and at least twice as wide as the container width. Backfill was compacted by hand and watered after inspected. No soil amendment or pieces of organic matter larger than three-quarter inch diameter was mixed with the backfill. Cardboard and weed-suppressing mulch was then installed around the trees along with a browse protection cage.

## *NUMBER AND TYPE OF PLANTING*

| Species | | number |
|---|---|---|
| *Acer negundo* | box elder | 20 |
| *Alnus rubra* | red alder | 25 |
| *Quercus agrifolia* | coast live oak | 21 |
| *Umbellularia californica* | California bay | 14 |

## *PROJECT SIZE*

582 FT X 50 FT = 29,100 $FT^2$ = 0.67 ACRES

## *PROJECT PARTICIPANTS*

| Date | School | Grade | # Volunteers | # Hours Worked | Dollar Value |
|---|---|---|---|---|---|
| 11/19/15 | Lagunitas School | 1, 2, 3, 4, 5, 6 | 67 | 6 | $9,274.14 |
| 11/20/15 | Lagunitas School | 3, 4 | 44 | 6 | $6,090.48 |
| | | **TOTAL** | **111** | **6** | **$15,364.62** |

*Dollar value based on $23.07/hr as estimated by Independent Sector for the national value of volunteer time in 2014.

## *SERVICES PROVIDED BY POINT BLUE*

### PLANTING IMPLEMENTATION

- Staff contracted a PCI botanist to perform an assessment of invasive plants in the restoration area to determine presence and abundance of Tier 1 and other invasive plant species.
- Staff and PCI drafted a Riparian Enhancement Plan.
- Staff or selected native plant nurseries collected, propagated and/or purchased native plant species.
- Staff and PCI directed, trained and oversaw CCNB work crew in removal of invasive plants and site preparation.
- Staff procured all additional implementation supplies including, but not limited to, weed mats, browse protection, and irrigation supplies.
- Staff trained and oversaw students, volunteers, and all other workers to ensure project quality and success.
- Staff tracked the number and species of plants installed.
- Staff prepared installation reports as needed.
- Staff will design and install effective and efficient irrigation practices.

**EDUCATION**

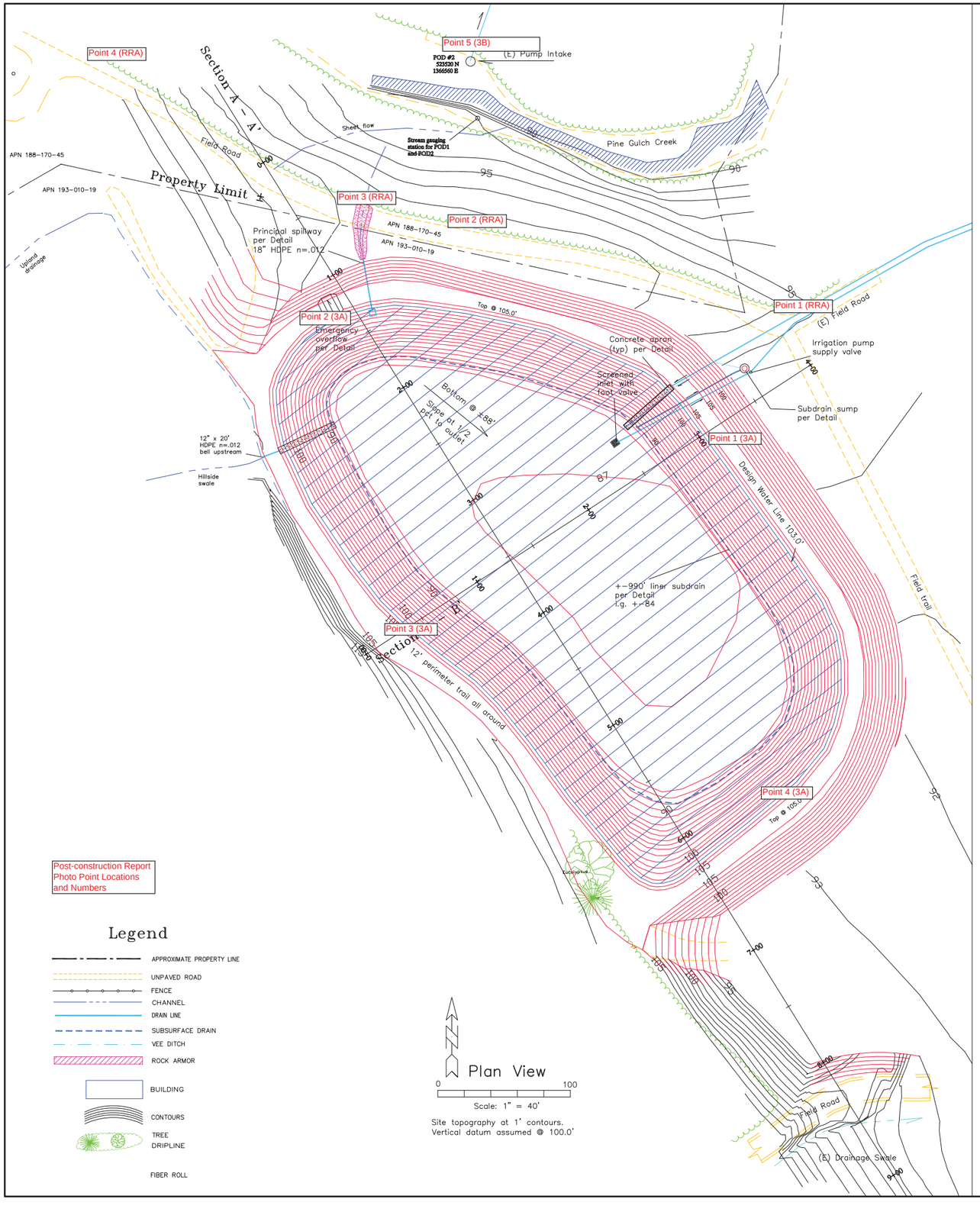
- Students received a pre-restoration presentation about their project, including watershed and restoration science, as well as site specific training and details.
- Classes received any additional in-class and/or field activities as requested by their teacher to supplement their regular class curriculum. Examples of additional topics include macro invertebrates, water quality, ornithology, geology, and mapping. STRAW staff, STRAW Faculty, and partners teach these topics.

## PHOTOS

Closing circle next to the new pond at Star Route Farms with Lagunitas School students sharing what they hope the area will look like in 20 years.

Riparian Enhancement Area adjacent to new pond at Star Route Farms, prepped and ready for planting.

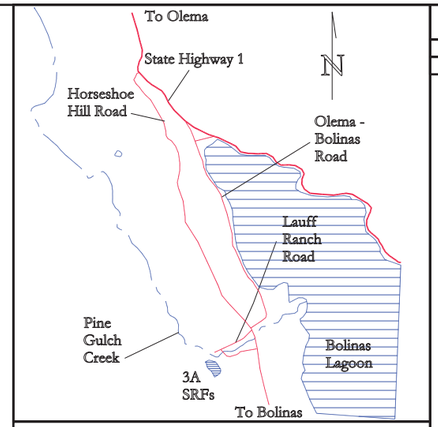
Lagunitas School students planting in the Riparian Enhancement Area




Post-construction Report Photo Point Locations and Numbers

## Legend

- APPROXIMATE PROPERTY LINE
- UNPAVED ROAD
- FENCE
- CHANNEL
- DRAIN LINE
- SUBSURFACE DRAIN
- VEE DITCH
- ROCK ARMOR
- BUILDING
- CONTOURS
- TREE DRIPLINE
- FIBER ROLL




## Location Sketch

Based on USGS 7.5-min. quad: Bolinas @ 1" = 2000'

Site topography survey by EEI 1999 – 2000 using assumed coordinates and elevations with North by declination adusted magnetic compass. Subtract 73.55' from elevations noted to convert to MSL data per nearby Marin County Public Works monumentation. Property lines and easements per record data and have not been located or field verified. Contours by linear interpolation of intermittent data points. Tree locations approximate. Field verify critical elevations and dimensions at time of construction.

Project Statement: Construct Pine Gulch Creek Enhancement and Pond Development Program Irrigation Storage Reservoir #3A and appertunant structures at Star Route Farms (south)

**Table of Contents**



31.7 Ac Ft
14.0 Ac Ft below grade
3.7 Ac footprint
2.5 Ac surface area
1.0 Ac farmland conversion
0-13' embankment @2.5H:1V
16000 cy cut
14300 cy fill
16000 cy fill, compacted @
1.12:1 c/f ratio
10400 cy foundation
@ 4'x80'x880'

105' levee top
103' water elev
87' bottom
16' water depth
95' ground surface


Nancy Scolari Executive Director
Marin Resource Conservation District
PO Box 1146
Point Reyes Station CA 94956
(415) 663-1170
nancy@marinrcd.org

Warren and Amy Weber
Star Route Farms
95 Olema-Bolinas Road
Bolinas CA 94924
(415) 868-1658
warrenweber@earthlink.net


Design Engineer shall certify to Marin County in writing, including signature and stamp that all grading and drainage was completed according to Plans and field directions. Changes in the approved Plans, if any, shall be described. Department of Public Works Engineer shall inspect driveway, parking, and site improvements prior to final permit approval.

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS

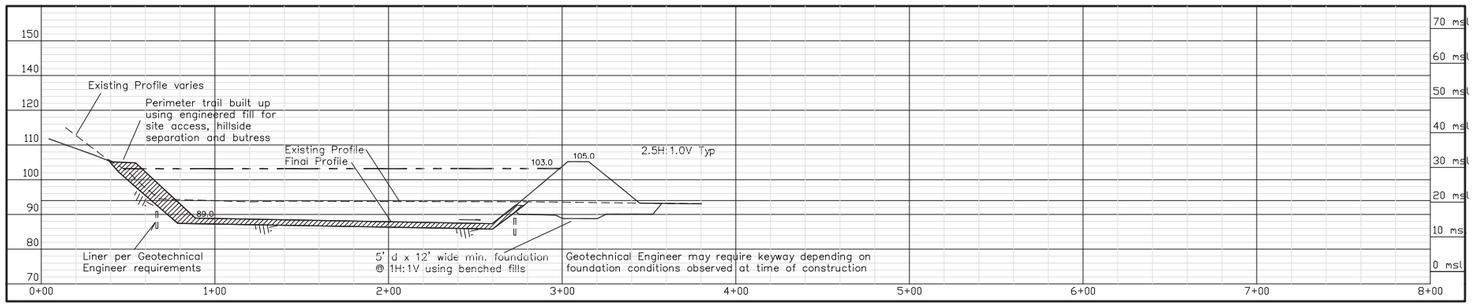

Erickson Engineering Inc.
Valley Ford CA 94972-0446
707/795-2498 Voice/Fax


# PGC Pond 3A Asbuilt: 31 Acre-feet Irrigation Reservoir Plan View, Details

Lands of: STAR ROUTE FARMS
APN 193-010-19
95 Olema-Bolinas Road, Bolinas CA 94924

51231 3A asbilt.dwg
12.31.2015
1" = 40'

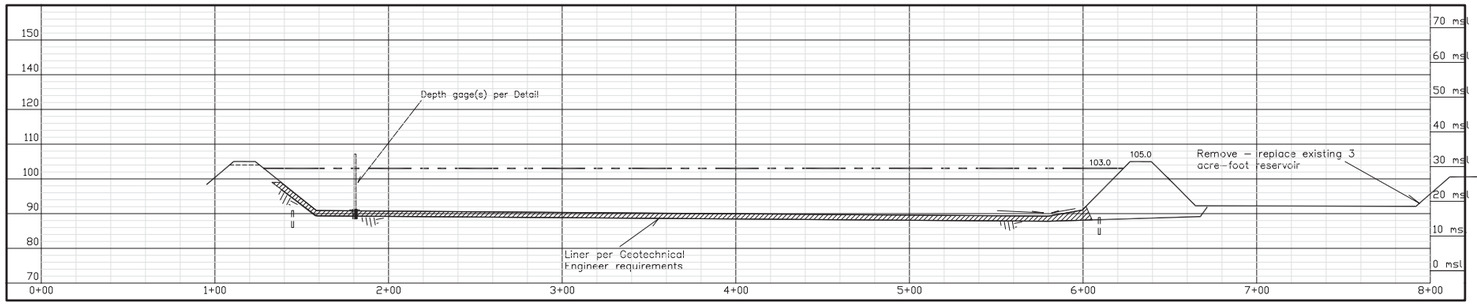
Sheet
3A.1
of 4




## Profile on Section B – B'

Scale: 1" = 40'H, 1" = 20' V

All dimensions in feet unless otherwise noted




## Profile on Section A – A'

Scale: 1" = 40'H, 1" = 20' V

All dimensions in feet unless otherwise noted

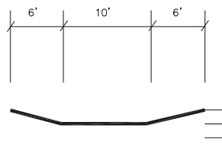
Evidence of permeable material or excessive seepage within the excavation as determined by the GE during construction will require installation of a liner. Liner and associated required subdrain shall be installed per requirements of the Geotechnical Engineer.

The finished liner shall look natural and be capable of supporting growth of emergent aquatic vegetation. Low Permeability Liner alternatives:
24" clay soil at 92% r.c., bentonite mat rated at 1x10–9 cm/sec covered with 12" topsoil, 60 mil HDPE, or equivalent installed per Manufacturer's specification covered by non–woven geotextile and 12" soil, all in accordance with Mfgr's criteria. Max. permeability 1x10–6 cm/sec (1"/month)

Foundation per Geotechnical Engineer's requirements. Fill using level lifts <= 8" at 92% relative compaction.

Cut slopes to be observed by Geotechnical Engineer while excavation is in progress. Weak zones, if any, may require removal/ replacement, or mitigation with compacted fill, a subdrain system, and/or rock riprap.

Work site has experienced removal of ±400 eucalyptus trees. Remove organic material and roots down to 1/2" diameter from any soil that will be utilized in the engineered fill. Liner materials must be free of organic debris.

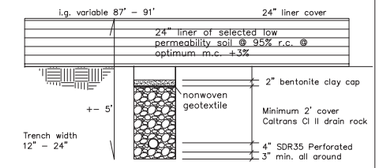



## Overflow Detail

No Scale

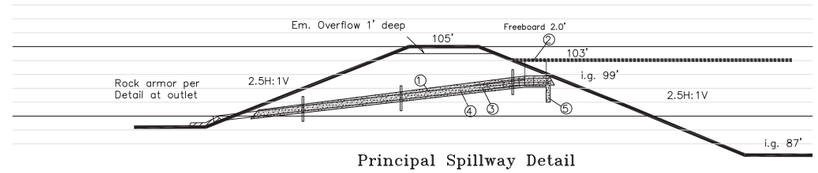
1. Trench depth as required to provide separation to lined surface
2. Install with aid of level to ensure uniform grade at minimum 1/2 % to outlet.
3. Provide 3" gravel bedding prior to pipe placement.
4. Mound soil in trench to allow for settlement after backfill and compaction.
5. Manifold to trunk line per Plan for conveyance to outlet.
6. Trunk line: Solid 6" Sch 40 PVC to outlet

Liner subdrain Bid item 3A.5 and related infrastructure to be installed at discretion of and under guidance of GE




## Liner Subdrain Detail

No Scale




## Principal Spillway Detail

No Scale

All pipe trenches require inspection prior to pour. Trench shall have smooth compacted wall and invert surfaces without tooth marks or sloughed material and shall be moisture conditioned prior to concrete placement. Soil backfill where used at 95% r.c. above and below pipe using moisture conditioned material placed using hand tamping to spring line, trench wacker and backhoe trench compaction wheel as appropriate.

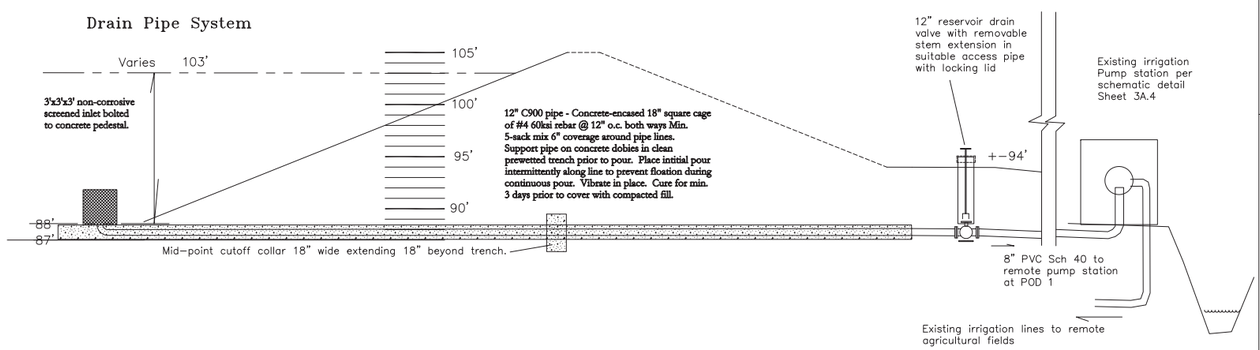
① Min. 18" PVC SDR 35 n = .012. Watertight joints. L = ±50'. Install in accordance with ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe

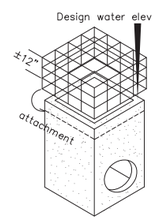
② Min. 36" RCP inlet, f. end up. Chipped or spalled lip not allowed. Set level, grout in place on min 6" concrete pad extending 2' from pipe in all directions. Float finish and seal grouted joints inside and out. Custom trash rack per Detail required.

③ Rebar: 3 @ 40' #4 @ 12" oc U–shape around inlet tied with #4 vert U @ 24" o.c.

④ Concrete encasement, 4" min. all around. Provide contiguous cutoff collars @ min 12" wide extending 24" all sides of pipe required at 15' o.c.
Concrete: 5–sack, 3/4" aggregate, 2500 psi @ 28 days; 5" max slump. Support and constrain pipe during pour to obtain minimum coverage and to prevent flotation and maintain uniform slope. Vibrate or rod as required for uniform pour without voids.

⑤ Footing: Min 18" wide, 7' long, 4' deep. Pad extends beyond RCP 2' in all directions.




5/8" rebar cage or equal/better
*E60XX 1/4" welds
*Galvanized
*Fasten securely with bolts or clamps
*Field removable for maintenance

Commercial concrete inlet 6" wider than pipe OD

Watertight grout in place

## Trash Rack Detail

No Scale

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS

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

# PGC Pond 3A: 26 Acre–feet Irrigation Reservoir Profile View, Details

Warren and Amy Weber
Stone Bridge Farms
95 Olema-Bolinas Road
Bolinas CA 94924
(415) 868-1658
warrenweber@earthlink.net

Lands of: STAR ROUTE FARMS
APN 193–010–19
95 Olema–Bolinas Road, Bolinas CA 94924

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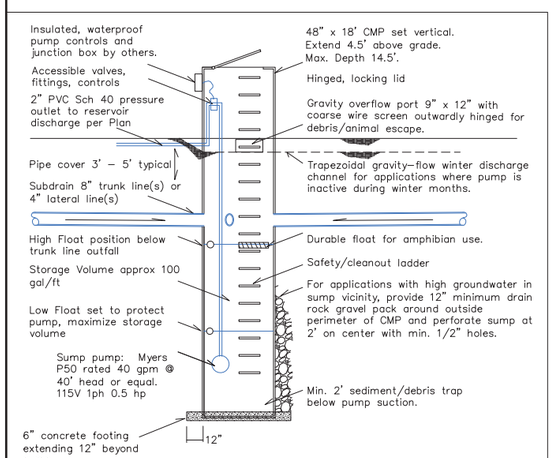
12.31.2015
Scale noted
Sheet 3A.2
of 4

## Erosion Prevention and Sediment Control Notes

1. Perform erosion prevention and sediment control in accordance with the latest edition of Appendix Chapter 33 of the California Building Code, applicable County regulations, and Section 20 of the Caltrans Standard Specifications.
2. The approved plans shall conform with the Erosion Prevention and Sediment Control Best Management Practices contained in the latest editions of the following publications or an equivalent Best Management Practice:
   * Erosion and Sediment Control Field Manual by the San Francisco Bay Regional Water Quality Control Board.
   * Manual of Standards for Erosion and Sediment Control Measures by the Association of Bay Area Governments.
   * Construction Site Best Management Practices Manual by Caltrans.
   * Stormwater Best Management Practices Handbook by the California Stormwater Quality Association.
3. If discrepancies occur between these notes, material referenced herein or manufacturer's recommendations then the most protective shall apply.
4. The Owner is responsible for obtaining and complying with the National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for discharges of stormwater runoff associated with construction activity disturbing land equal to or greater than one acre. Construction activities include but are not limited to clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement.
5. Preservation of existing vegetation shall occur to the maximum extent practical.
6. The Owner is responsible for preventing stormwater pollution generated from the construction site year round. The Owner must implement an effective combination of erosion prevention and sediment control on all disturbed areas during the rainy season of October 15 – April 15.
7. Erosion prevention and sediment control measures shall be inspected by the Owner before forecasted storm events and after actual storm events to ensure measures are functioning properly. Storm events produce at least 1 inch of precipitation in a 24–hour period. Erosion prevention and sediment control measures that have failed or are no longer effective shall be promptly replaced. Erosion prevention and sediment control measures shall be maintained until disturbed areas are stabilized.
8. Changes to the Erosion Prevention and Sediment Control Plan may be made to respond to field conditions. Changes shall be noted on the Plan when made.
9. Discharges of potential pollutants from construction sites shall be prevented using source controls to the maximum extent practicable. Potential pollutants include but are not limited to sediment, trash, nutrients, pathogens, petroleum hydrocarbons, metals, concrete, cement, asphalt, lime, paint, stains, glues, wood products, pesticides, herbicides, chemicals, hazardous waste, sanitary waste, vehicle or equipment wash water, and chlorinated water.
10. Entrances(s) to the construction site shall be maintained in a condition that will prevent tracking or flowing of potential pollutants offsite. Potential pollutants deposited on paved areas within the County right–of–way, such as roadways and sidewalks shall be properly disposed of at the end of each working day or more frequently as necessary.
11. Exposed slopes shall be protected by using erosion prevention measures to the maximum extent practicable, such as establishing 70% vegetation coverage, hydroseeding, straw mulch, geotextiles, plastic covers, blankets, or mats.
12. Whenever it is not possible to utilize erosion prevention measures, exposed slopes shall employ sediment control devices, such as fiber rolls. Fiber rolls shall be trenched and keyed into the soil and installed on contour.
13. The erosion control revegetation mix shall be according to Marin County requirements for erosion controls, using native materials. , 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 shall be applied at the time of seeding. Mulch shall be rice straw, or small grains straw spread at a rate of 2 tons/acre. Crimping, tackifying, 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:
   35% Blando Brome
   30% Rose Clover
   15% Cucamonga Brome
   15% Triticale
   5% Zorro Fescue
14. The Owner shall protect storm drain inlets from potential pollutants until drainage conveyance systems are functional and construction has been completed.
15. Energy dissipators shall be installed at storm drain outlets which may convey storm water flow leading to soil erosion.
16. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.
17. Solid waste such as trash, discarded building materials and debris, shall be placed in designated collection areas or containers. The construction site shall be cleared of soild waste daily or as necessary and regular removal and proper disposal shall be arranged.
18. A concrete washout area, such as a temporary pit, shall be designated to clean concrete trucks and tools. At no time shall concrete products and waste be allowed to enter County waterways such as creeks or storm drains.
19. Proper application, cleaning, and storage of potentially hazardous materials, such as paints and chemicals, shall be conducted to prevent the discharge of pollutants.
20. When utilized, temporary restrooms and sanitary facilitites shall be located and maintained to prevent the discharge of pollutants.
21. Appropriate vehicle storage, fueling, maintenance, and cleaning areas shall be designated and maintained to prevent discharge of pollutants.

## Geotechnical Requirements

Refer to Geotechnical Investigation for Pine Gulch Creek Reservoirs, Bolinas CA dated 3/24/2003 by Miller Pacific Engineering Group (415) 382–3444 for detailed site soils information.
1. Surface Preparation – Clear all grass, brush, trees, oversized debris and organic material from areas to be graded. The estimated depth of stripping is 4 – 6", with deeper grubbing required to remove brush and tree roots. Excavate soft or saturated soil to expose uniformly firm natural soils. Any excess and unsuitable materials shall be hauled off site or stockpiled for later reuse in landscaping.
Soils exposed by clearing, stripping, and required excavations should be scarified to a dept of about 6", moisture conditioned to optimum or greater, and recompacted to minimum 92% ASTM D1557.
2. Keyway Excavations – Keyways must be into firm natural soil or weathered rock to the depth and width indicated. The bottom must be firm and unyielding, moisture conditioned to 0–2% over optimum, and compacted to 92% ASTM D1557.
3. Slope Criteria – Cut and fill slopes should be no steeper than 2.5H:1.0V. Localized slopes may be as steep as 2H:1V within firm natural soil or where needed to minimize the grading area, with concurrence of the Soils engineer in the field.
4. Compacted Fill – Fill shall be: 1) free of organic material, 2) have a Liquid Limit less than 50 and a Plasticity Index of less than 25, and 3) have a particle size of less than 2 inches.
Onsite material is believed suitable for embankment construction. Clay soils will require close control of moisture content in order to achieve required compaction. It will be necessary to remove areas of sandy material or blend with clay materials within the upper two feet of reservoir lining.
Moisture condition fill to optimum m.c. or greater, place in uniform horizontal lifts <8", and compact to 92 pct. ASTM D1557. The upper six inches of the reservoir lining should be at 95 pct. r.c. to produce a uniform impermeable surface.
5. Trench Backfill – Conform to requirements of engineered fill with regard to materials, lift thickness, and moisture conditioning. Two sack concrete slurry to 3" above pipe diameter may be used in lieu of hand compaction for principal spillway pipes. Jetting for trench backfill compaction is not permitted.
6. Geotechnical Engineer shall observe and direct site preparation, grading, keyway excavations, drainage placement, placement and compaction of engineered fill, and shall be responsible for lab and field testing for conformance with the GE report.




Subdrain Sump Schematic No Scale

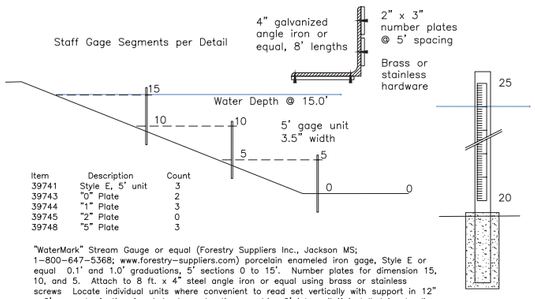
## Grading Notes

1. Perform grading in accordance with the latest edition of Appendix Chapter 33 of the California Building Code and applicable County regulations. Conform to the recommendations of any Geotechnical Engineering Report developed as part of the project design.
2. Existing drainage courses receiving waters from this site and located throughout this site shall remain open and clear of debris to properly convey storm water. If existing drainage courses receiving waters from this site are located in the County right–of–way and need maintenance, contact the Department of Transportation and Public Works for further assistance. In any event, the Owner and/or Contractor shall be held liable for any damage due to obstructing natural drainage patterns.
3. Retaining walls are not approved under this grading permit. Retaining walls require a separate building permit, unless exempted by the County.
4. The Contractor shall immediately notify the design Engineer upon discovering significant discrepancies, errors, or omissions in the Plans. Prior to proceeding, the Owner shall have the Plans revised to clarify identified discrepancies, errors, or omissions. The revised Plans shall be subject to review by the Chief Building Official.
5. The Contractor shall be responsible for notifying Underground Service Alert (USA) toll free at 1.800.642.2444 at least two working days prior to excavation. The Contractor shall uncover relevant utilities to verify their location and elevation. If unexpected or conflicting utilities are encountered during excavation, notify USA, the utility owner, and/or the project Engineer immediately. Utilities include but are not limited to water, sewer, electrical, gas, telephone, and cable/TV.
6. In the event of cultural resources (i.e. historical, archaeological, and paleontological resources, and human remains) are discovered during grading or other construction activities, work shall be halted within a 100–foot radius of the find. The Northwest Information Center shall be notified at 707.664.0880. A qualified archeologist shall be consulted for an on–site evaluation. Additional mitigation may be required by the County per the archeologist's recommendations. If human burials or human remains are encountered, the Contractor shall also notify the County Coroner.
7. Should grading operations encounter hazardous materials, or what appear to be hazardous materials, stop work in the affected area immediately and contact 911 or the appropriate agency for further instruction.
8. The grading permit and approved copy of the grading plans shall be maintained on the project site throughout the duration of construction activities.
9. Drainage facilities and grading shall be inspected before receiving final approval. The Contractor shall consult the project Job Card for coordination of inspection requests.

## 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 grated rectangular drop inlets shall be used.
4. Concrete shal be 5.5–sack mix using 3/4" aggregate rated at 3000 psi minimu 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 400x, 500x, 700x 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 matting for mulch placement on slopes of 2H:1V or greater shall be North American Green S–75 or equal or better.

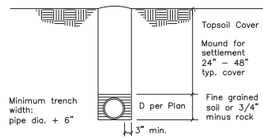
**The latest edition of the Standard Specifications of the State of California, Division of Transportation, shall govern operations and materials (but not pricing) for this project except where otherwise indicated in the specifications and on the plans. The CalTrans Standard Specifications are included as part of this Plan by reference.**



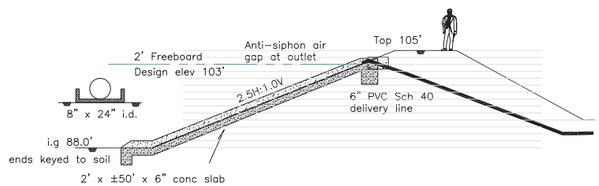

"WaterMark" Stream Gauge or equal (Forestry Suppliers Inc., Jackson MS; 1–800–647–5368; www.forestry–suppliers.com) porcelain enameled iron gage, Style E or equal 0.1' and 1.0' graduations, 5' sections 0 to 15'. Number plates for dimension 15, 10, and 5. Attach to 8 ft. x 4" steel angle iron or equal using brass or stainless screws Locate individual units where convenient to read set vertically with support in 12" x 2' concrete footing for dryland construction, or drive 2' into soil if installed in standing water as receding water allows. Verify vertical and horizontal alignment to <.01' between individual gauge sections.

Staff Gage Detail No Scale

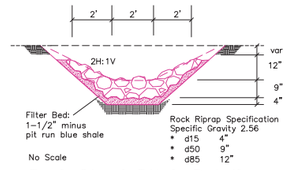
1. Conform to requirements of pipe Manufacturer and ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for all aspects of construction.
2. Trench depth as required to prevent system damage due to farming practices. Conform to all applicable OSHA and safety requirements for labor operations in and around trenches.
3. Install at uniform grade to outlet. Invert to be free of debris or sharp objects.
4. Shade pipe with fine–grained native material or 3/4" minus road base compacted at optimum m.c. prior to trench backfill. Lean concrete may be used as an alternative bedding material to pipe spring line if pipe is properly anchored to maintain grade.
5. Compact trench soil using hand or mechanical means to minimize or eliminate soil settlement. Mound soil over trench to allow for incidental settlement after backfill and compaction.




Surface Drain Trench Detail No Scale

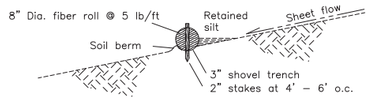



Inlet Armor Detail no scale




No Scale

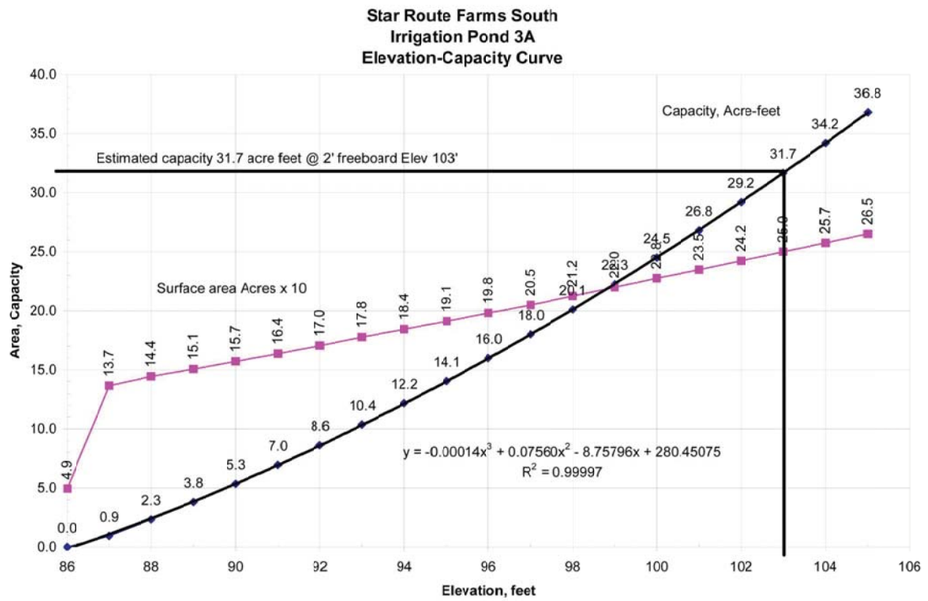
Rock Lined Ditch Detail




* Install on contour 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.
* Butt ends together without overlap.
* Maintain as required to ensure satisfactory performance.

No Scale

Fiber Roll Check

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Erickson Engineering Inc.
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707/795–2498 Voice/Fax

# PGC Pond 3A: 26 Acre–feet Irrigation Reservoir Construction Specs, Details

Warren and Amy Weber
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95 Olema–Bolinas Road
Bolinas CA 94924
(415) 868–1658
warrenweber@earthlink.net

Lands of: STAR ROUTE FARMS
APN 193–010–19
95 Olema–Bolinas Road, Bolinas CA 94924

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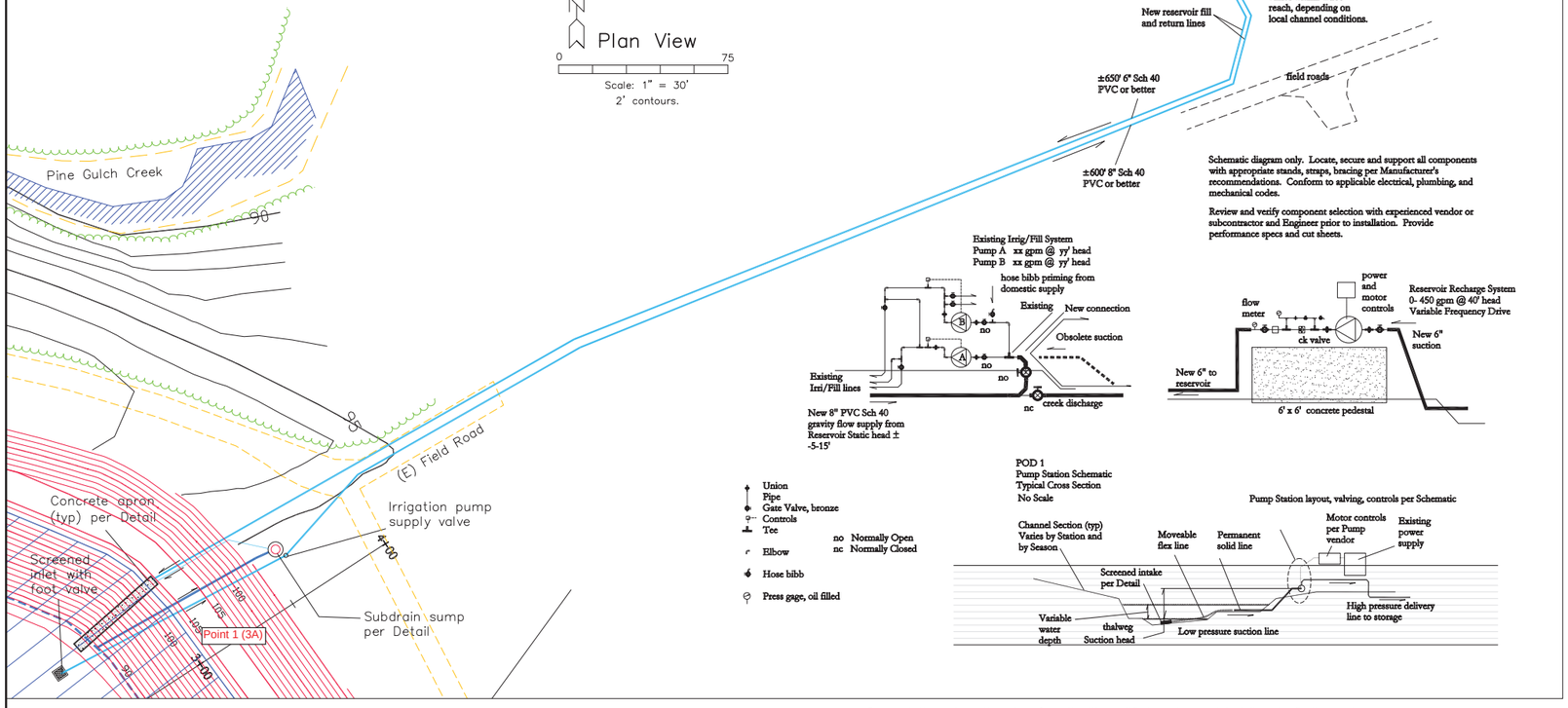
12.31.2015
1" = 40'
Sheet 3A.3
of 4

## Legend

APPROXIMATE PROPERTY LINE
UNPAVED ROAD
FENCE
CHANNEL
DRAIN LINE
SUBSURFACE DRAIN
VEE DITCH
ROCK ARMOR
BUILDING
CONTOURS
TREE DRIPLINE
FIBER ROLL

Post-construction Report Photo Point Locations and Numbers




Plan View
0 75
Scale: 1" = 30'
2' contours.

SRF-S POD 1 Intake Parameters

| | |
|---|---|
| Design Flow | 1.00 cfs |
| Design Flow | 450 gpm |
| Suction lines | 6" dia |
| Approach vel | 0.2 fps |
| Screen | |
| Passive cleaning | |
| Gross area | 9.0 sf |
| Open area | 5.0 sf |
| Matl | #8 .032" ss mesh |




Schematic diagram only. Locate, secure and support all components with appropriate stands, straps, bracing per Manufacturer's recommendations. Conform to applicable electrical, plumbing, and mechanical codes.

Review and verify component selection with experienced vendor or subcontractor and Engineer prior to installation. Provide performance specs and cut sheets.







POD 1

Union
Pipe
Gate Valve, bronze
Controls
Tee
no Normally Open
nc Normally Closed
Elbow
Hose bibb
Press gage, oil filled

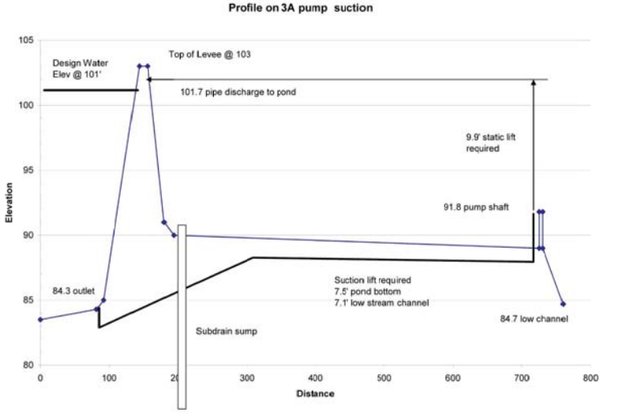
POD 1
Pump Station Schematic
Typical Cross Section
No Scale

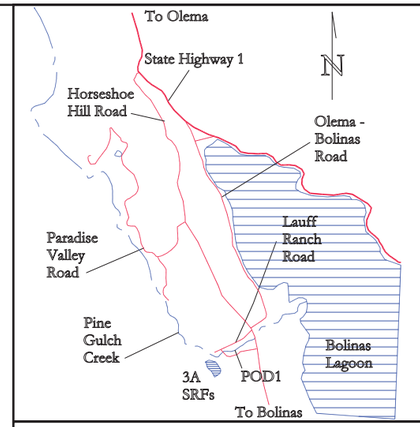



Pump station schematic only. Consult with qualified vendors and installers to finalize system components and details. Provide performance specs and cut sheets. Locate, secure, and support all components with appropriate stands, straps, bracing per Manufacturer's recommendations. Conform to applicable electrical, plumbing, and mechanical codes for design and installation. County electrical or plumbing permits may be required for intertie to existing systems. Final configuration and component locations developed in consultation with and approval of Landowner, Engineer, and MRCD.

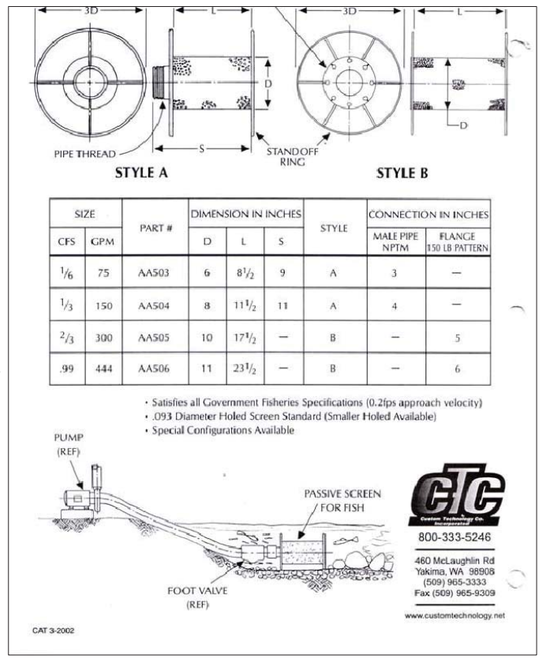
Screened Intake Operation and Maintenance Requirements

* Operate system in conformance with minimum instream flow requirements of 25 CFS February Median Flow per CDFW criteria.
* Maintain a copy of this schematic diagram with O & M notes in a water tight container at the pump station for referal by the system operator on an as-needed basis.
* The intent of intake screening is to prevent fish entrainment in the diversion flow, prevent fish impingement/possible injury/descaling on the screen surface, and to avoid delay or predation due to diversion operations.
* Place screened intake in deeper pools using hand tools and hand methods in order to provide adequate submergence to prevent loss of prime. Seasonal or annual relocation may be required to follow pool migration.
* A 6" suction line when primed weighs approximately 140 lb/10'. Use appropriate manpower and methods when setting and adjusting the intake to avoid strain or injury to workers.
* Water depth over top of screen should be at least 1 radius per NOAA criteria and to prevent loss of prime.
* Place long screen axis parallel to flow to the extent practical when setting moveable intake. Orient to provide adequate fish bypass/escape routes and to prevent flow reversals over significant area of the screen.
* Place screen at minimum 1D from any vertical bank to ensure stream flow all around intake.
* Adjust flexible suction line as required to achieve desired screen placement while minimizing head requirements and impacts to adjoining creek banks.
* Should inadvertent minor bank damage occur due to dragging or hand placement of flexible suction lines, provide jute netting armor in accordance with Manufacturer's recommendations to cover any bared soil areas.
* Use steel t-posts or equal to stake flex line in place as required to prevent pipe or screen migration due to channel flow.
* Place standoff rings on natural channel invert with minimal settlement of screen support into substrate.
* Support standoff rings with clean rock, brick or similar material placed flush with invert grade if required to prevent settlement into substrate. Remove non-native materials at time of intake removal.
* Observe and maintain intake screen and suction line as required to meet performance objectives. Screens are sized per CDFW/NOAA criteria for manual cleaning. Clean any accumulated debris such as leaves or organic debris by hand on a daily basis.
* Should excessive channel flooding occur, temporarily remove intake, supports, and flex line in order to prevent system damage.
* Remove intake, intake supports, and flex line at the completion of the water diversion season for storage outside the riparian zone.
* Inspect and maintain all system components as required for performance within standard operating parameters. Replace or repair damaged, defective, leaking, cracked, or ineffective components so as to maintain system in good working order.
* CDFW requests an operational log be maintained for the first five years of operation, in order to accumulate knowledge to improve and refine operations. The log should include date, screen placement information, start/stop times, and results of inspections at diversion events ( plugging, cleaning, relocations, etc). CDFW and/or NOAA staff may request operations observation, most likely during first-season diversion events.
* O&M procedures and the schematic diagram illustrating system components and configuration(s) may evolve over time on an as-needed basis in order to best meet Program objectives and system performance criteria. Collaboration between Landowner, Resource Agency staff, energy provider, funding agency, and Engineer may be required to implement evolutionary changes in system configuration and operation.




Location Sketch
Based on USGS 7.5-min. quad: Bolinas @ 1" = 2000'




| SIZE | | PART # | DIMENSION IN INCHES | | | STYLE | CONNECTION IN INCHES | |
|---|---|---|---|---|---|---|---|---|
| CFS | GPM | | D | L | S | | MALE PIPE NPTM | FLANGE 150 LB PATTERN |
| 1/6 | 75 | AA503 | 6 | 8 1/2 | 9 | A | 3 | — |
| 1/3 | 150 | AA504 | 8 | 11 1/2 | 11 | A | 4 | — |
| 2/3 | 300 | AA505 | 10 | 17 1/2 | — | B | — | 5 |
| .99 | 444 | AA506 | 11 | 23 1/2 | — | B | — | 6 |

- Satisfies all Government Fisheries Specifications (0.2fps approach velocity)
- .093 Diameter Holed Screen Standard (Smaller Holed Available)
- Special Configurations Available




CTC
Custom Technology Corp.
800-333-5246
460 McLaughlin Rd
Yakima, WA 98908
(509) 965-3333
Fax (509) 965-9309
www.customtechnology.net

CAT 3-2002

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PGC Pond 3A: 26 Acre-feet
Irrigation Reservoir
POD 1


Warren and Amy Weber
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Lands of:
APN 193-010-19
STAR ROUTE FARMS
95 Olema-Bolinas Road, Bolinas CA 94924

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12.31.2015
1" = 30'
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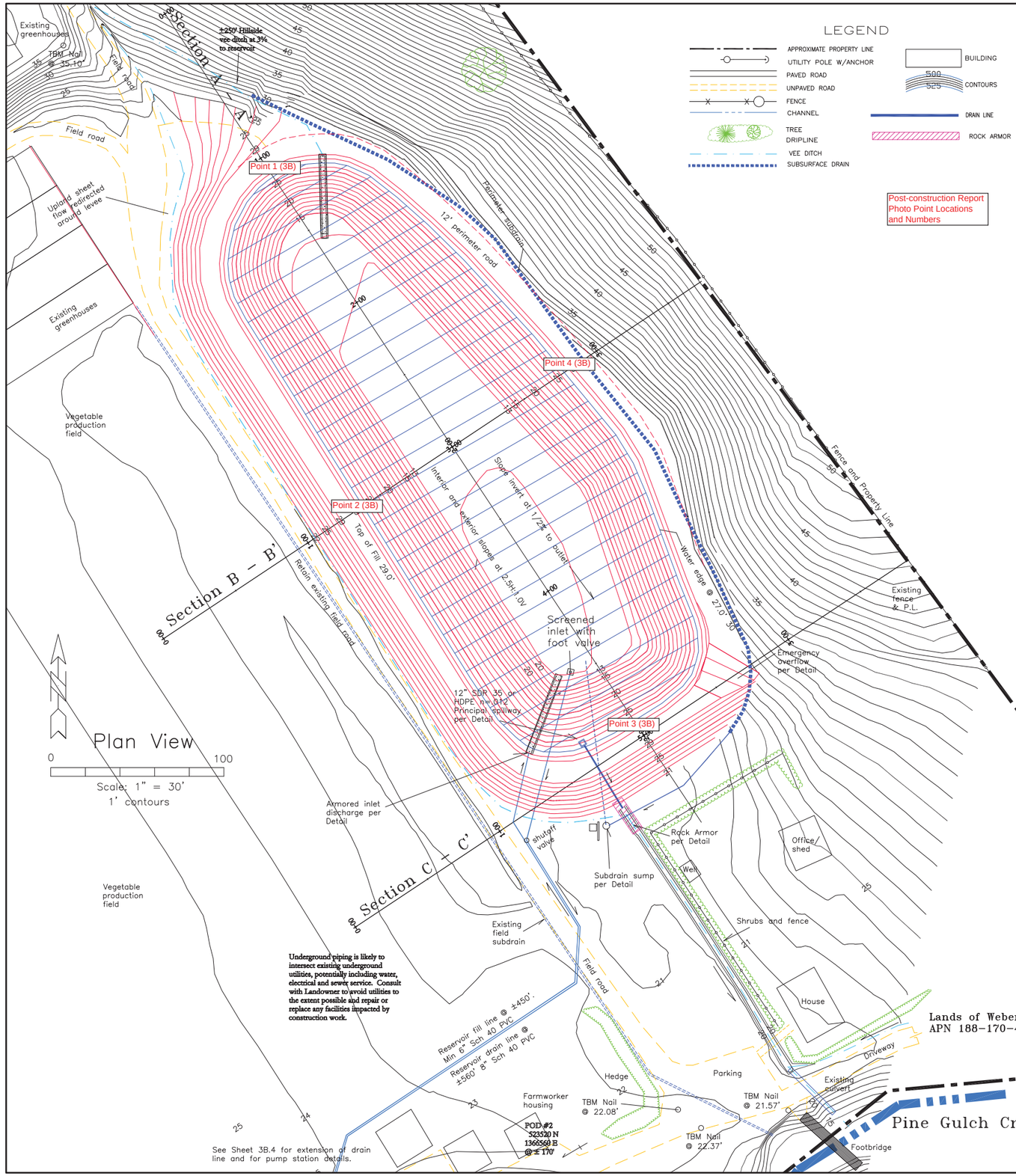
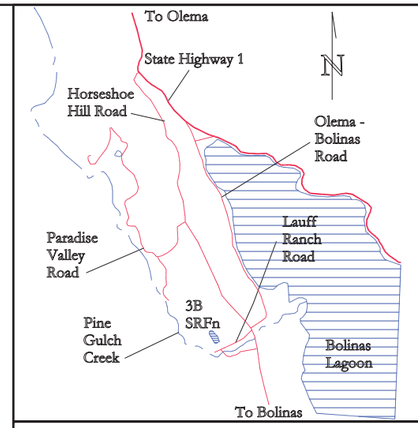
of 4




## Location Sketch

Based on USGS 7.5–min. quad: Bolinas @ 1" = 2000'

Site topography survey by EEI Spring 2003 using assumed coordinates and elevations consistent with local DPW monumentation with basis of bearing as AP map data. Property lines per record data and have not been located or field verified. Contours by linear interpolation of intermittent data points. Tree locations approximate. Field verify critical elevations and dimensions at time of construction.

Plan developed under the auspices of the Pine Gulch Creek Watershed Enhancement Program sponsored by Point Reyes National Seashore, California Department of Fish and Game, Point Reyes National Seashore Association and others.

Project Statement: Construct Pine Gulch Creek Enhancement and Pond Development Program Irrigation Storage Reservoir #3B and appertunant structures at Star Route Farms (north)

**Table of Contents**




Nancy Scolari Executive Director
Marin Resource Conservation District
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(415) 663-1170
nancy@marinrcd.org

Warren and Amy Weber
Star Route Farms
95 Olema-Bolinas Road
Bolinas CA 94924
(415) 868-1658
warrenweber@earthlink.net


Approximate Reservoir Parameters

| | |
|---|---|
| Work Area: | 1.50 Ac |
| Reservoir Surface Area: | 1.10 Ac |
| Brush Removal Area: | 0.5 Ac |
| Storage Capacity: | 10.6 Ac–ft |
| Storage Capacity, below grade: | 4.1 Ac–ft |
| Top Width: | 12 feet |
| Levee Height, ft: | 0–9 feet |
| Water Depth: | 14 feet |
| Total Cut Volume: | 7500 cu yd |
| Compacted Fill Volume: | 7000 cu yd |
| Cut/Fill Ratio: | 1.15/1.00 C/F |
| Foundation (3'x0.7ac): | 3300 cu yd |
| Topsoil (6"x1ac): | 800 cu yd |

Design Engineer shall certify to Marin County in writing, including signature and stamp that all grading and drainage was completed according to Plans and field directions. Changes in the approved Plans, if any, shall be described. Department of Public Works Engineer shall inspect driveway, parking, and site improvements prior to final inspection.

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
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CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS


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# PGC Pond 3B Asbuilt: 10.6 Acre-feet Irrigation Reservoir Plan View


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Lands of: APN 188-170-45
STAR ROUTE FARMS
95 Olema-Bolinas Road, Bolinas CA 94924

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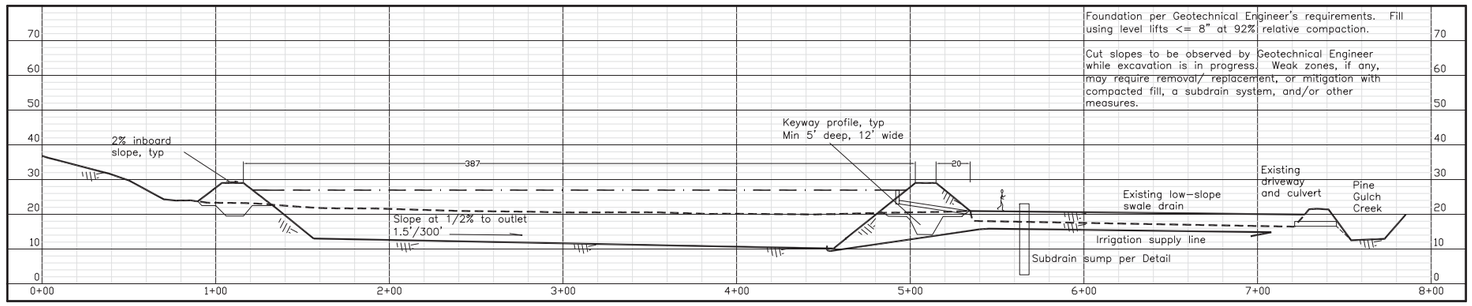
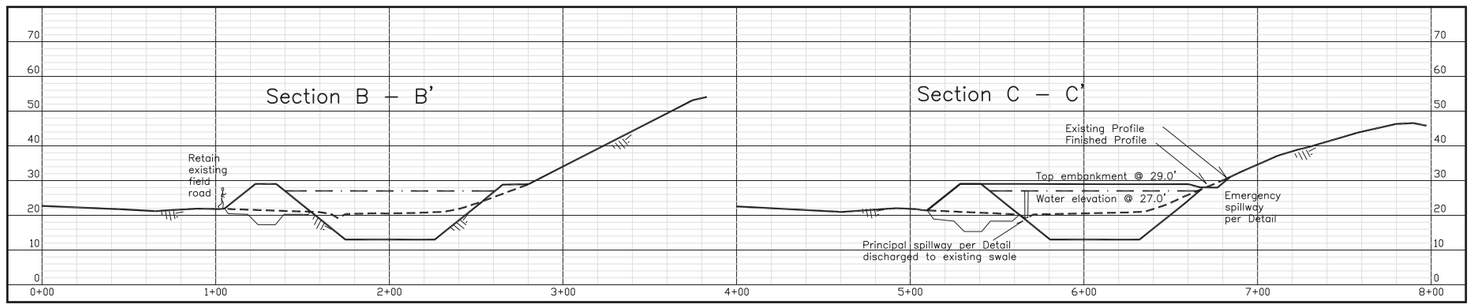
12.31.2015
Scale: 1" = 30'
Sheet 3B.1
of 4



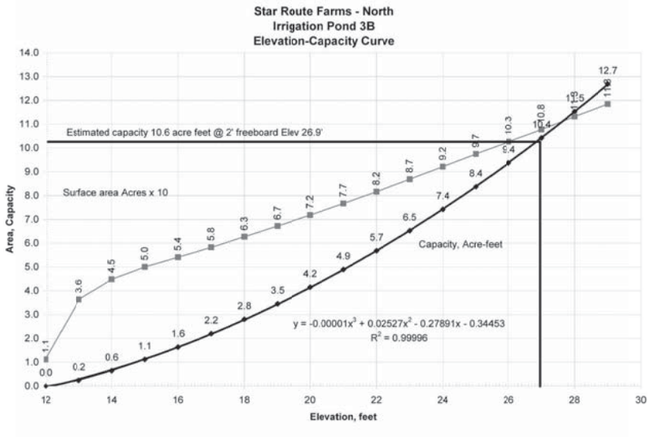

Profile on Section A – A'

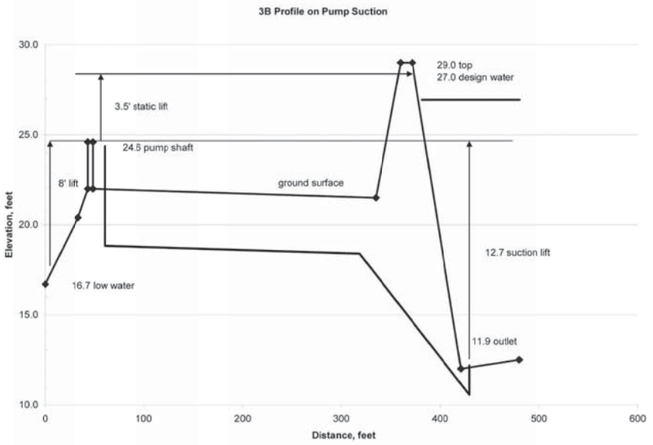
Scale: 1" = 40' Horizontal; 1" = 20' Vertical

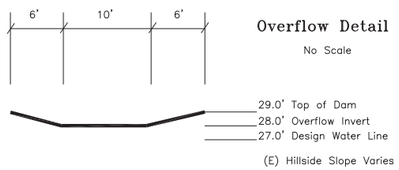



Profile on Sections B – B', C – C'

Scale: 1" = 40' Horizontal; 1" = 20' Vertical

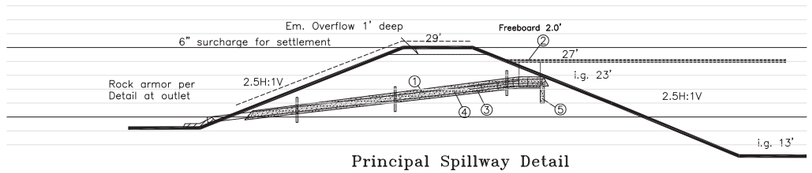


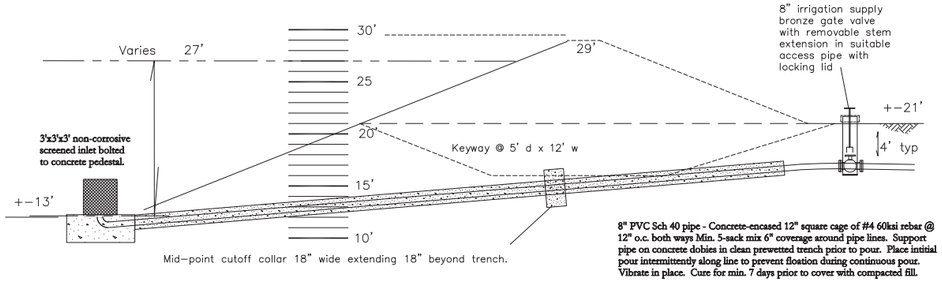

Overflow Detail

No Scale




Principal Spillway Detail

No Scale




Drain Pipe System

All pipe trenches require inspection prior to pour. Trench shall have smooth compacted wall and invert surfaces without tooth marks or sloughed material and shall be moisture conditioned prior to concrete placement. Soil backfill where used at 95% r.c. above and below pipe using moisture conditioned material placed using hand tamping to spring line, trench wacker and backhoe trench compaction wheel as appropriate.

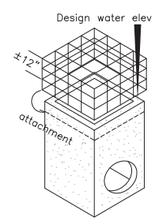
① Min. 12" PVC SDR 35 n = .012. Watertight joints. L = ±50'. Install in accordance with ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe

② Min. 24" RCP inlet, f. end up. Chipped or spalled lip not allowed. Set level, grout in place on min 6" concrete pad extending 2' from pipe in all directions. Float finish and seal grouted joints inside and out. Custom trash rack per Detail required.

③ Rebar: 3 @ 40' #4 @ 12" oc U-shape around inlet tied with #4 vert U @ 24" o.c.

④ Concrete encasement, 4" min. all around. Provide contiguous cutoff collars @ min 12" wide extending 24" all sides of pipe required at 15' o.c.
Concrete: 5-sack, 3/4" aggregate, 2500 psi @ 28 days; 5" max slump. Support and constrain pipe during pour to obtain minimum coverage and to prevent flotation and maintain uniform slope. Vibrate or rod as required for uniform pour without voids.

⑤ Footing: Min 18" wide, 7' long, 4' deep. Pad extends beyond RCP 2' in all directions.




5/8" rebar cage or equal/better
*E60XX 1/4" welds
*Galvanized
*Fasten securely with bolts or clamps
*Field removable for maintenance

Commercial concrete inlet 6" wider than pipe OD

Watertight grout in place

Trash Rack Detail

No Scale

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PGC Pond 3B Asbuilt: 10.6 Acre-feet Irrigation Reservoir Profiles, Details

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Lands of: STAR ROUTE FARMS APN 188-170-45
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Scale: noted
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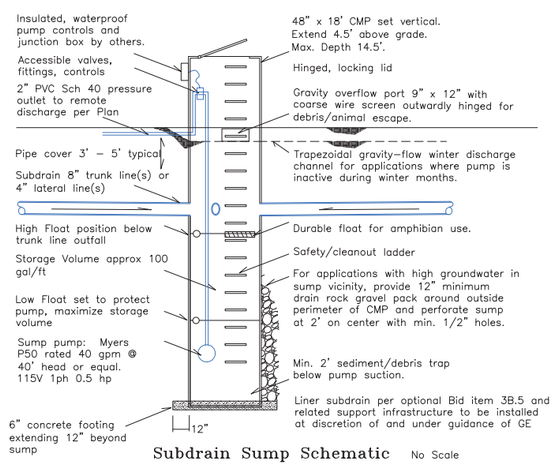
of 4

## Erosion Prevention and Sediment Control Notes

1. Perform erosion prevention and sediment control in accordance with the latest edition of Appendix Chapter 33 of the California Building Code, applicable County regulations, and Section 20 of the Caltrans Standard Specifications.
2. The approved plans shall conform with the Erosion Prevention and Sediment Control Best Management Practices contained in the latest editions of the following publications or an equivalent Best Management Practice:
   * Erosion and Sediment Control Field Manual by the San Francisco Bay Regional Water Quality Control Board.
   * Manual of Standards for Erosion and Sediment Control Measures by the Association of Bay Area Governments.
   * Construction Site Best Management Practices Manual by Caltrans.
   * Stormwater Best Management Practices Handbook by the California Stormwater Quality Association.
3. If discrepancies occur between these notes, material referenced herein or manufacturer's recommendations then the most protective shall apply.
4. The Owner is responsible for obtaining and complying with the National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for discharges of stormwater runoff associated with construction activity disturbing land equal to or greater than one acre. Construction activities include but are not limited to clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement.
5. Preservation of existing vegetation shall occur to the maximum extent practical.
6. The Owner is responsible for preventing stormwater pollution generated from the construction site year round. The Owner must implement an effective combination of erosion prevention and sediment control on all disturbed areas during the rainy season of October 15 – April 15.
7. Erosion prevention and sediment control measures shall be inspected by the Owner before forecasted storm events and after actual storm events to ensure measures are functioning properly. Storm events produce at least 1 inch of precipitation in a 24–hour period. Erosion prevention and sediment control measures that have failed or are no longer effective shall be promptly replaced. Erosion prevention and sediment control measures shall be maintained until disturbed areas are stabilized.
8. Changes to the Erosion Prevention and Sediment Control Plan may be made to respond to field conditions. Changes shall be noted on the Plan when made.
9. Discharges of potential pollutants from construction sites shall be prevented using source controls to the maximum extent practicable. Potential pollutants include but are not limited to sediment, trash, nutrients, pathogens, petroleum hydrocarbons, metals, concrete, cement, asphalt, lime, paint, stains, glues, wood products, pesticides, herbicides, chemicals, hazardous waste, sanitary waste, vehicle or equipment wash water, and chlorinated water.
10. Entrances(s) to the construction site shall be maintained in a condition that will prevent tracking or flowing of potential pollutants offsite. Potential pollutants deposited on paved areas within the County right–of–way, such as roadways and sidewalks shall be properly disposed of at the end of each working day or more frequently as necessary.
11. Exposed slopes shall be protected by using erosion prevention measures to the maximum extent practicable, such as establishing 70% vegetation coverage, hydroseeding, straw mulch, geotextiles, plastic covers, blankets, or mats.
12. Whenever it is not possible to utilize erosion prevention measures, exposed slopes shall employ sediment control devices, such as fiber rolls. Fiber rolls shall be trenched and keyed into the soil and installed on contour.
13. The erosion control revegetation mix shall be according to Marin County requirements for erosion controls, using native materials. , 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 shall be applied at the time of seeding. Mulch shall be rice straw, or small grains straw spread at a rate of 2 tons/acre. Crimping, tackifying, 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:
   - 35% Blando Brome
   - 30% Rose Clover
   - 15% Cucamonga Brome
   - 15% Triticale
   - 5% Zorro Fescue
14. The Owner shall protect storm drain inlets from potential pollutants until drainage conveyance systems are functional and construction has been completed.
15. Energy dissipators shall be installed at storm drain outlets which may convey storm water flow leading to soil erosion.
16. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.
17. Solid waste such as trash, discarded building materials and debris, shall be placed in designated collection areas or containers. The construction site shall be cleared of soild waste daily or as necessary and regular removal and proper disposal shall be arranged.
18. A concrete washout area, such as a temporary pit, shall be designated to clean concrete trucks and tools. At no time shall concrete products and waste be allowed to enter County waterways such as creeks or storm drains.
19. Proper application, cleaning, and storage of potentially hazardous materials, such as paints and chemicals, shall be conducted to prevent the discharge of pollutants.
20. When utilized, temporary restrooms and sanitary facilitites shall be located and maintained to prevent the discharge of pollutants.
21. Appropriate vehicle storage, fueling, maintenance, and cleaning areas shall be designated and maintained to prevent discharge of pollutants.

## Geotechnical Requirements

Refer to Geotechnical Investigation for Pine Gulch Creek Reservoirs, Bolinas CA dated 3/24/2003 by Miller Pacific Engineering Group (415) 382–3444 for detailed site soils information.
1. Surface Preparation – Clear all grass, brush, trees, oversized debris and organic material from areas to be graded. The estimated depth of stripping is 4 – 6", with deeper grubbing required to remove brush and tree roots. Excavate soft or saturated soil to expose uniformly firm natural soils. Any excess and unsuitable materials shall be hauled off site or stockpiled for later reuse in landscaping.
Soils exposed by clearing, stripping, and required excavations should be scarified to a dept of about 6", moisture conditioned to optimum or greater, and recompacted to minimum 92% ASTM D1557.
2. Keyway Excavations – Keyways must be into firm natural soil or weathered rock to the depth and width indicated. The bottom must be firm and unyielding, moisture conditioned to 0–2% over optimum, and compacted to 92% ASTM D1557.
3. Slope Criteria – Cut and fill slopes should be no steeper than 2.5H:1.0V. Localized slopes may be as steep as 2H:1V within firm natural soil or where needed to minimize the grading area, with concurrence of the Soils engineer in the field.
4. Compacted Fill – Fill shall be: 1) free of organic material, 2) have a Liquid Limit less than 50 and a Plasticity Index of less than 25, and 3) have a particle size of less than 2 inches.
Onsite material is believed suitable for embankment construction. Clay soils will require close control of moisture content in order to achieve required compaction. It will be necessary to remove areas of sandy material or blend with clay materials within the upper two feet of reservoir lining.
Moisture condition fill to optimum m.c. or greater, place in uniform horizontal lifts <8", and compact to 92 pct. ASTM D1557.
The upper six inches of the reservoir lining should be at 95 pct. r.c. to produce a uniform impermeable surface.
5. Trench Backfill – Conform to requirements of engineered fill with regard to materials, lift thickness, and moisture conditioning. Two sack concrete slurry to 3" above pipe diameter may be used in lieu of hand compaction for principal spillway pipes. Jetting for trench backfill compaction is not permitted.
6. Geotechnical Engineer shall observe and direct site preparation, grading, keyway excavations, drainage placement, placement and compaction of engineered fill, and shall be responsible for lab and field testing for conformance with the GE report.




Subdrain Sump Schematic No Scale

## Grading Notes

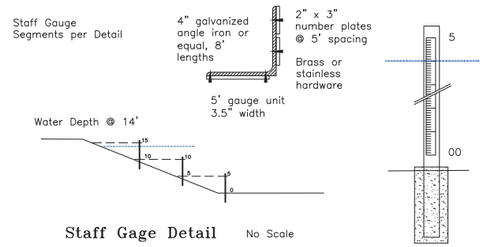
1. Perform grading in accordance with the latest edition of Appendix Chapter 33 of the California Building Code and applicable County regulations. Conform to the recommendations of any Geotechnical Engineering Report developed as part of the project design.
2. Existing drainage courses receiving waters from this site and located throughout this site shall remain open and clear of debris to properly convey storm water. If existing drainage courses receiving waters from this site are located in the County right–of–way and need maintenance, contact the Department of Transportation and Public Works for further assistance. In any event, the Owner and/or Contractor shall be held liable for any damage due to obstructing natural drainage patterns.
3. Retaining walls are not approved under this grading permit. Retaining walls require a separate building permit, unless exempted by the County.
4. The Contractor shall immediately notify the design Engineer upon discovering significant discrepancies, errors, or omissions in the Plans. Prior to proceeding, the Owner shall have the Plans revised to clarify identified discrepancies, errors, or omissions. The revised Plans shall be subject to review by the Chief Building Official.
5. The Contractor shall be responsible for notifying Underground Service Alert (USA) toll free at 1.800.642.2444 at least two working days prior to excavation. The Contractor shall uncover relevant utilities to verify their location and elevation. If unexpected or conflicting utilities are encountered during excavation, notify USA, the utility owner, and/or the project Engineer immediately. Utilities include but are not limited to water, sewer, electrical, gas, telephone, and cable/TV.
6. In the event of cultural resources (i.e. historical, archaeological, and paleontological resources, and human remains) are discovered during grading or other construction activities, work shall be halted within a 100–foot radius of the find. The Northwest Information Center shall be notified at 707.664.0880. A qualified archeologist shall be consulted for an on–site evaluation. Additional mitigation may be required by the County per the archeologist's recommendations. If human burials or human remains are encountered, the Contractor shall also notify the County Coroner.
7. Should grading operations encounter hazardous materials, or what appear to be hazardous materials, stop work in the affected area immediately and contact 911 or the appropriate agency for further instruction.
8. The grading permit and approved copy of the grading plans shall be maintained on the project site throughout the duration of construction activities.
9. Drainage facilities and grading shall be inspected before receiving final approval. The Contractor shall consult the project Job Card for corrdination of inspection requests.

## Materials Specifications

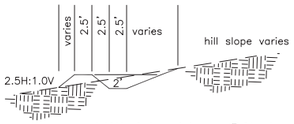
1. Drain lines, pipe connectors and fittings, drop inlets, and drop inlet collars shall be HDPE n=.015 with water tight joints or better, except where noted on the plans.
2. Culverts and drain lines subjected to vehicular traffic shall be HDPE n=.012 dual wall with water tight joints or better with minimum 12" compacted cover.
3. Concrete standpipes or inlets shall be commercially cast reinforced pipe with female end up, grouted in place. Where specified, commercial grated rectangular drop inlets shall be used.
4. Concrete shal be 5.5–sack mix using 3/4" aggregate rated at 3000 psi minimu 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 400x, 500x, 700x 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 matting for mulch placement on slopes of 2H:1V or greater shall be North American Green S–75 or equal or better.

**The latest edition of the Standard Specifications of the State of California, Division of Transportation, shall govern operations and materials (but not pricing) for this project except where otherwise indicated in the specifications and on the plans. The CalTrans Standard Specifications are included as part of this Plan by reference.**

"WaterMark" Stream Gauge or equal (Forestry Suppliers Inc., Jackson MS; 1–800–647–5368; www.forestry–suppliers.com) porcelain enameled iron gage, Style E or equal 0.1' and 1.0' graduations, 5' sections 0 to 15'. Number plates for dimension 15, 10, and 5. Attach to 8 ft. x 4" steel angle iron or equal using brass or stainless screws Locate individual units where convenient to read set vertically with support in 12" x 2' concrete footing for dryland construction, or drive 2' into soil if installed in standing water as receding water allows. Verify vertical and horizontal alignment to <.01' between individual gauge sections. Alternative configurations permissible with permission of Engineer.




Staff Gage Detail No Scale

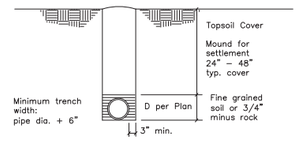



Hillside Vee Ditch Detail

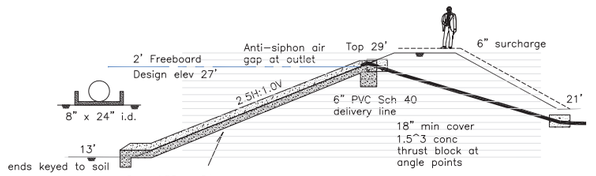
No Scale

* Scarify surface, moisture condition soil, wheel roll for compaction.
* Slope uniformly at ±4% to reservoir.
* Treat per ECP revegetation requirements
* Maintain as required to ensure satisfactory performance.

1. Conform to requirements of pipe Manufacturer and ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for all aspects of construction.
2. Trench depth as required to prevent system damage due to farming practices. Conform to all applicable OSHA and safety requirements for labor operations in and around trenches.
3. Install at uniform grade to outlet. Invert to be free of debris or sharp objects.
4. Shade pipe with fine–grained native material or 3/4" minus road base compacted at optimum m.c. prior to trench backfill. Lean concrete may be used as an alternative bedding material to pipe spring line if pipe is properly anchored to maintain grade.
5. Compact trench soil using hand or mechanical means to minimize or eliminate soil settlement. Mound soil over trench to allow for incidental settlement after backfill and compaction.

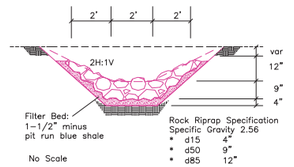



Surface Drain Trench Detail No Scale



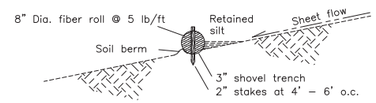

Inlet Armor Detail

no scale




No Scale

Rock Lined Ditch Detail




* Install on contour 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.
* Butt ends together without overlap.
* Maintain as required to ensure satisfactory performance.

No Scale

Fiber Roll Check

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS

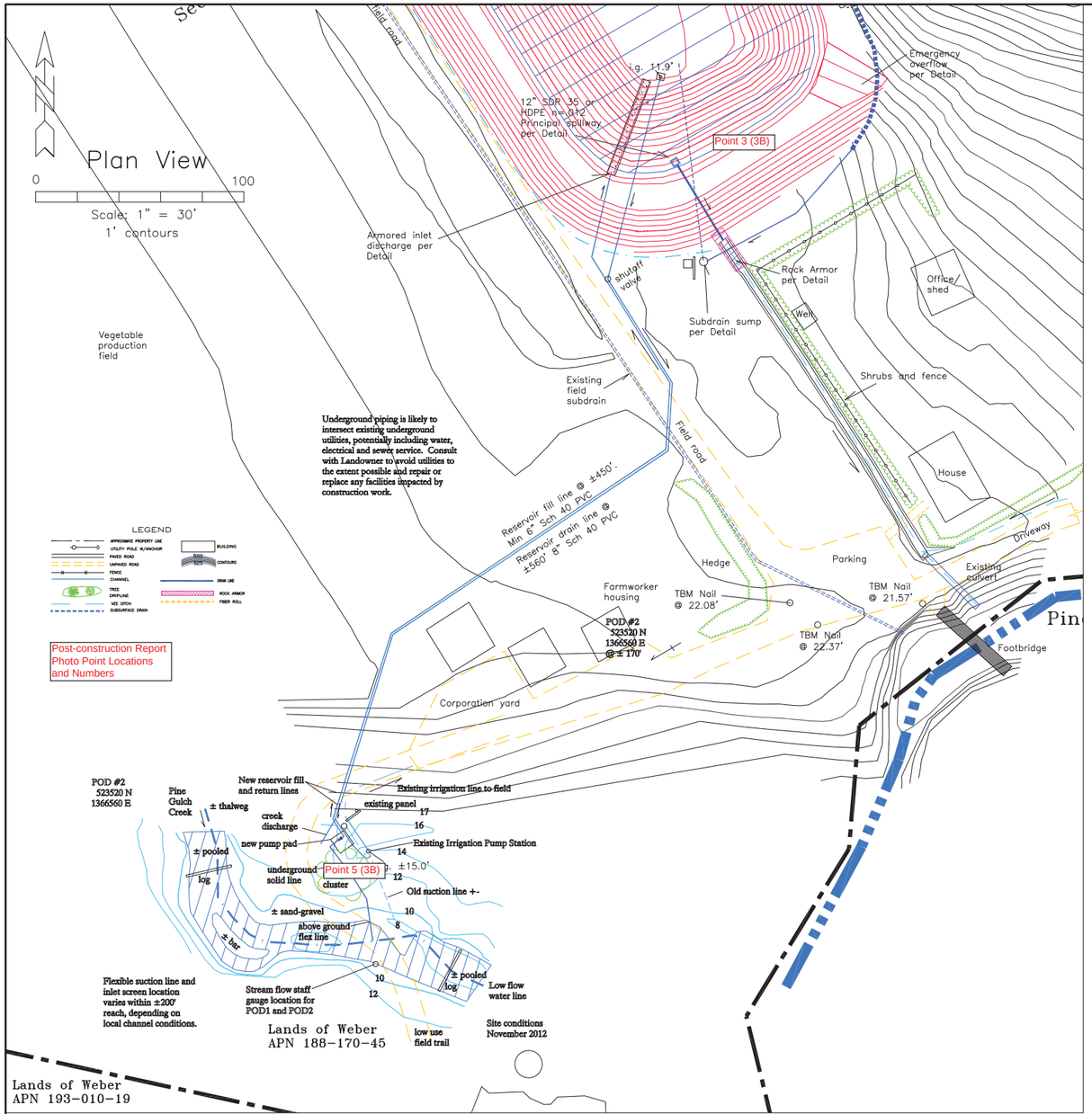

Erickson Engineering Inc.
Valley Ford CA 94972–0446
707/795–2498 Voice/Fax

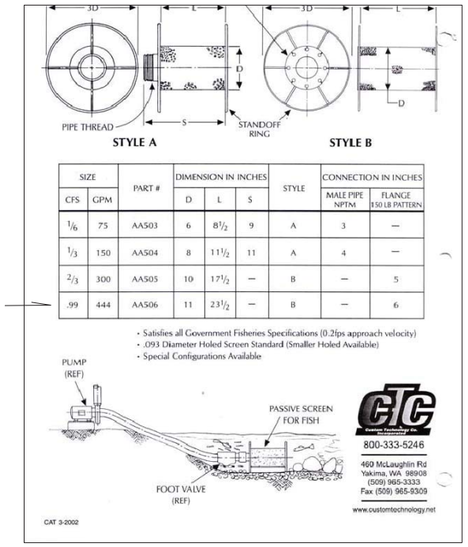

# PGC Pond 3B Asbuilt: 10.6 Acre–feet Irrigation Reservoir Specifications, Details


Warren and Amy Weber
Star Route Farms
95 Olema–Bolinas Road
Bolinas CA 94924
(415) 868–1658
warrenweber@earthlink.net

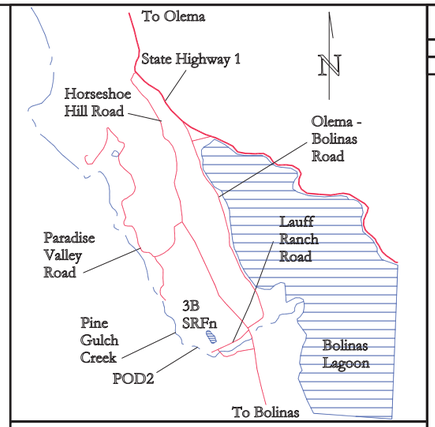

Lands of:
STAR ROUTE FARMS
95 Olema–Bolinas Road, Bolinas CA 94924
APN 188–170–45

51231 3B asbit.dwg
12.31.2015
Scale: 1" = 30'
Sheet 3B.3
of 4




| SIZE | | PART # | DIMENSION IN INCHES | | | STYLE | CONNECTION IN INCHES | |
|---|---|---|---|---|---|---|---|---|
| CFS | GPM | | D | L | S | | MALE PIPE NPTM | FLANGE 150 LB PATTERN |
| 1/6 | 75 | AAS03 | 6 | 8 1/2 | 9 | A | 3 | — |
| 1/3 | 150 | AAS04 | 8 | 11 1/2 | 11 | A | 4 | — |
| 2/3 | 300 | AAS05 | 10 | 17 1/2 | — | B | — | 5 |
| .99 | 444 | AAS06 | 11 | 23 1/2 | — | B | — | 6 |




## Location Sketch

Based on USGS 7.5–min. quad: Bolinas @ 1" = 2000'

Site topography survey by EEI Spring 2003 using assumed coordinates and elevations consistent with local DPW monumentation with basis of bearing as AP map data. Property lines per record data and have not been located or field verified. Contours by linear interpolation of intermittent data points. Tree locations approximate. Field verify critical elevations and dimensions at time of construction.

Plan developed under the auspices of the Pine Gulch Creek Watershed Enhancement Program sponsored by Point Reyes National Seashore, California Department of Fish and Game, Point Reyes National Seashore Association and others.

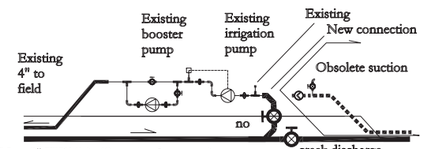
**SRF-N POD 2 Intake Parameters**

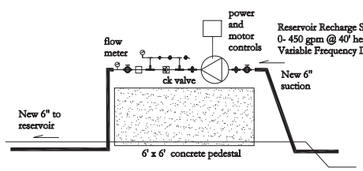
| | |
|---|---|
| Design Flow | 1.00 cfs |
| Design Flow | 450 gpm |
| Suction lines | 6" dia |
| Approach vel | 0.2 fps |
| Screen | |
| Passive cleaning | |
| Gross area | 9.0 sf |
| Open area | 5.0 sf |
| Matl | #8 .032" ss mesh |

Pump station schematic only. Consult with qualified vendors and installers to finalize system components and details. Provide performance specs and cut sheets. Locate, secure, and support all components with appropriate stands, straps, bracing per Manufacturer's recommendations. Conform to applicable electrical, plumbing, and mechanical codes for design and installation. County electrical or plumbing permits may be required for intertie to existing systems. Final configuration and component locations developed in consultation with and approval of Landowner, Engineer, and MRCD.

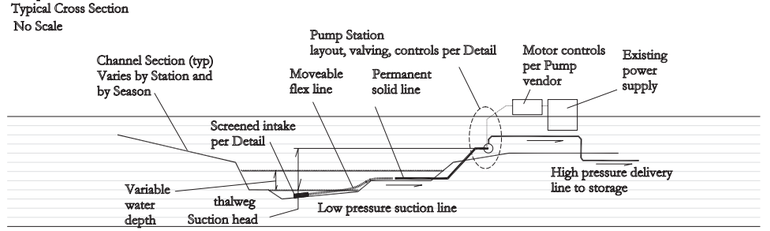
- Union
- Pipe
- Gate Valve, bronze
- Controls
- Tee
- Elbow
- Hose bibb
- Press gage, oil filled

no Normally Open
nc Normally Closed




POD 2
Pump Station Schematic
Typical Cross Section
No Scale




Screened Intake Operation and Maintenance Requirements
* Operate system in conformance with minimum instream flow requirements of 25 CFS February Median Flow per CDFW criteria.
* Maintain a copy of this schematic diagram with O & M notes in a water tight container at the pump station for referal by the system operator on an as-needed basis.
* The intent of intake screening is to prevent fish entrainment in the diversion flow, prevent fish impingement/possible injury/descaling on the screen surface, and to avoid delay or predation due to diversion operations.
* Place screened intake in deeper pools using hand tools and hand methods in order to provide adequate submergence to prevent loss of prime. Seasonal or annual relocation may be required to follow pool migration.
* A 6" suction line when primed weighs approximately 140 lb/10'. Use appropriate manpower and methods when setting and adjusting the intake to avoid strain or injury to workers.
* Water depth over top of screen should be at least 1 radius per NOAA criteria and to prevent loss of prime.
* Place long screen axis parallel to flow to the extent practical when setting moveable intake. Orient to provide adequate fish bypass/escape routes and to prevent flow reversals over significant area of the screen.
* Place screen at minimum 1D from any vertical bank to ensure stream flow all around intake.
* Adjust flexible suction line as required to achieve desired screen placement while minimizing head requirements and impacts to adjoining creek banks.
* Should inadvertent minor bank damage occur due to dragging or hand placement of flexible suction lines, provide jute netting armor in accordance with Manufacturer's recommendations to cover any bared soil areas.
* Use steel t-posts or equal to stake flex line in place as required to prevent pipe or screen migration due to channel flow.
* Place standoff rings on natural channel invert with minimal settlement of screen support into substrate.
* Support standoff rings with clean rock, brick or similar material placed flush with invert grade if required to prevent settlement into substrate. Remove non-native materials at time of intake removal.
* Observe and maintain intake screen and suction line as required to meet performance objectives. Screens are sized per CDFW/NOAA criteria for manual cleaning. Clean any accumulated debris such as leaves or organic debris by hand on a daily basis.
* Should excessive channel flooding occur, temporarily remove intake, supports, and flex line in order to prevent system damage.
* Remove intake, intake supports, and flex line at the completion of the water diversion season for storage outside the riparian zone.
* Inspect and maintain all system components as required for performance within standard operating parameters. Replace or repair damaged, defective, leaking, cracked, or ineffective components so as to maintain system in good working order.
* CDFW requests an operational log be maintained for the first five years of operation, in order to accumulate knowledge to improve and refine operations. The log should include date, screen placement information, start/stop times, and results of inspections at diversion events ( plugging, cleaning, relocations, etc). CDFW and/or NOAA staff may request operations observation, most likely during first-season diversion events.
* O&M procedures and the schematic diagram illustrating system components and configuration(s) may evolve over time on an as-needed basis in order to best meet Program objectives and system performance criteria.

Collaboration between Landowner, Resource Agency staff, energy provider, funding agency, and Engineer may be required to implement evolutionary changes in system configuration and operation.

REGISTERED PROFESSIONAL ENGINEER
Lee R Erickson
AE 468
CE 45660
Expires 12/31/2016
Agricultural
Civil
STATE OF CALIFORNIA
12.31.2015

REVISIONS

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

PGC Pond 3B Asbuilt: 10.6 Acre-feet
Irrigation Reservoir
POD 2 Details

Warren and Amy Weber
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warrenweber@earthlink.net

Lands of: STAR ROUTE FARMS
APN 188-170-45
95 Olema-Bolinas Road, Bolinas CA 94924

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12.31.2015
1" = 30'

Sheet 3B.4 of 4