

***SECOND AMENDMENT
CITY OF SANTA ROSA APPROVED OFFSET CREDIT PROPOSAL FOR
NUNES-OCEAN VIEW DAIRY BMP***

January 28, 2015

Summary

This Second Amendment reflects changed conditions since an original proposal was submitted in 2012 and an amended proposal submitted in 2014. Both were approved by the Regional Water Board. The most recent Water Board approval was based on a proposal to compost manure, but conditions led the owner of the manure to land apply it on vineyards consistent with widely accepted practice. Manure was applied to 1,458 acres, which is more than twice the acreage in the original, approved proposal. This Second Amendment requests approval of the Project credit resulting from land application of 14,825 cubic yards of manure containing 89,430 pounds of phosphorus (P). Using the same factors as in the prior approved proposals, this Project provides and the City requests 23,345 credits.

Background

The City submitted a proposal to the Regional Water Board for nutrient offset credit at the Ocean View site dated October 30, 2012 (Attachment 1), and this proposal included on-site land application of manure over a four-year period on approximately 160 acres. This proposal was approved by the Regional Water Board on January 24, 2013 (Attachment 2). The project was not implemented due to land-owner issues.

The property was sold to Krasilsa Pacific Farms, LLC (Krasilsa), which converted use from dairy to vineyard. The City submitted an amended proposal (July 10, 2014, see Attachment 3) which was approved by RWQCB on August 19, 2014 (Attachment 4). The amended proposal contemplated hauling and composting all manure present in the lagoon in 2014 based on Krasilsa's proposal to the City, which we understand was based on cost and logistics considerations known at that time. As noted in the City's letter to RWQCB of October 31, 2014 (Attachment 5), Krasilsa's contractor was encouraged by a representative of the Sonoma County Department of Environmental Health and Safety (DEHS) to land-apply the manure instead of composting based on regulatory and logistical considerations, and Krasilsa proceeded accordingly.

This second amended proposal updates prior information about the quantity and quality of manure, describes the land application of the manure and requests approval of credit for land application instead of composting.

Second Amended Proposal

Table 1 provides an overview of the evolution of the credit proposals as land use, ownership and owner manure management preferences evolved. The City has worked diligently during this

period with both owners to accommodate their respective needs while 1) facilitating a creditable manure management project; and 2) updating RWQCB.

Table 1. Comparison of Credit Proposal Amendments

Project Component	Original Proposal (October 30, 2012)	Amended Proposal (July 10, 2014)	Second Amended Proposal (January 28, 2015)
Manure Source	Ongoing production, Stockpiled solids, Pond contents	Pond contents	Pond contents
BMPs	Emptying manure ponds and appropriately managing for future stormwater collection Implementing BMPs in heavy use areas to address accumulated manure On-site land application of pond manure and 12,700 tons of accumulated manure solids	Emptying manure ponds, on-site drying, haul offsite for composting (Heavy use area and manure solids stockpiles were addressed incidental to conversion of the dairy to vineyard and no credit was requested for these two BMPs)	Emptying manure ponds, on-site drying, on- and offsite land application and incorporation (Heavy use area and manure solids stockpiles were addressed incidental to conversion of the dairy to vineyard and no credit was requested for these two BMPs)
Manure recycling location	160 acres, on site pasture	Offsite compost and subsequent recycling as part of compost market	Land application and incorporation on vineyard land on 1,458 acres
Control of recycling operation	Owned and controlled by Ocean View Dairy owner	Manure hauler and compost operator under contract to Krasilsa	All land under control of Krasilsa personnel
Duration	Land application over four years	One year	Land application over one year ¹
¹ All manure in the ponds, except about 625 cubic yards, was recycled in Fall 2014 before heavy rain necessitated that the remainder be spread in 2015.			

The comparison in Table 1 shows that the application rate of manure under the Second Amended Proposal is much less (i.e., manure spread over a larger area) than under the approved, original Proposal (1,458 acres in the Second Amended Proposal vs 160 acres in each of 4 years or 640

effective acres in the original Proposal). Details of the Second Amended Proposal are provided below.

Manure Quality and Quantity

Prior estimates of pond and manure volume were based on a two-dimensional survey of the ponds (to obtain an estimate of surface area) and information about pond side slope and depth provided by the prior owner and other sources. An updated estimate of manure quantity is provided in Table 2 and is based on measurements of pond side slope and depth made after manure was removed. Rainfall runoff partially filled Pond 1 before pond depth could be definitively determined, and so Pond 1 volume will be updated when a boat can be deployed to sound Pond 1. Survey details are provided in Attachment 6.

Table 2. Pond Capacity and Manure Volume

Pond	Capacity		Manure Volume	
	acre-feet	gallons	acre-feet	gallons
1	14.71	4,800,000	5.27	1,717,120
2	14.77	4,820,000	7.84	2,554,500
Total	29.48	9,620,000	13.11	4,271,620

Prior estimates of manure quality were based on manure samples collected by City representatives from the near the surface of the ponds in 2013. Collection of manure samples from depth was infeasible based on logistical and safety considerations at that time. As the ponds were emptied in 2014, samples were collected by City representatives from near the bottom of both ponds, and the phosphorus (P) and nitrogen (N) content of manure is summarized in Table 3. Lab reports with manure quality details are provided in Attachment 7.

Table 3. Manure Quality
(parts per million, wet weight)

Pond	Sample Location	P	N
1	shallow	1,850	4,200
	deep	1,730	5,700
	average	1,790	4,950
2	shallow	3,700	6,200
	deep	2,320	6,600
	average	3,010	6,400

Average nutrient content values in Table 3 were used along with the Table 2 manure volume estimates to estimate the quantity of nutrients in the two ponds, as summarized in Table 4.

Table 4. Nutrient Quantity

Pond	Manure Volume		P			N		
	acre-feet	gallons	ppm wet	lbs/1000 gal	lbs	ppm wet	lbs/1000 gal	lbs
1	5.27	1,717,120	1,790	15	25,634	4,950	41	70,888
2	7.84	2,554,500	3,010	25	64,127	6,400	53	136,349
Total	13.11	4,271,620			89,761			207,237

Manure Management

Manure was removed from, and stacked for drying adjacent to the ponds beginning in August 2014. Berms were constructed to contain water produced first by the dewatering process and then by rainfall. After harvest of wine grapes, manure was spread on vineyards at a rate of 10 yards per acre (0.07-inch application rate) at all but one site (Figure 1 describes the appearance of a range of application rates at non-Project sites for reference). The applied manure was then incorporated using a disc to a soil depth of approximately six inches. Table 5 lists the land application sites and the quantity of manure and nutrients applied, and Figure 2 shows site location. Manure was applied at 20 yards per acre at Site 1 and incorporated using 3-foot deep soil ripper. Site 1 is to be planted with new vines and has a correspondingly elevated initial nutrient demand.

Figure 1. Appearance of Manure Application

(These photos illustrate compost/manure applied to land prior to incorporation into the soil. These photos were made at non-Project sites. The application rate of 10-20 yards per acre described above corresponds to 7.5 to 15 tons per acre in the photos below for the manure spread in this Project.)



This application rate corresponds to a P and N application rate of 60 and 139 pounds per acre, respectively. The vineyards' agronomic P and N demand is described in Attachment 8. The P demand is provided in this reference as pounds of P₂O₅ per acre. Since P₂O₅ is 43 percent P, the

values in Attachment 8 were multiplied by 0.43 to convert to pounds of P per acre. Since not all of the P and N in manure is mineralized and available to plants in the first year, this was taken into consideration also. Table 6 summarizes the total and available nutrient amount applied in comparison to the agronomic demand. Table 6 shows that the two-year agronomic demand of established vines and cover crop for P and less than the one-year demand for N was applied, which is consistent with ongoing proper vineyard management practice when organic fertilizer with a P:N ratio different from that of the crop's demand is applied. Since these sites are adequately protected against soil erosion by the sod cover crop between rows, and P is readily bound to soil particulates, providing more than one year's P demand is an accepted practice without adverse environmental consequence. Table 6 also shows an appropriate loading rate for the new vineyard at Site 1.

Field visit to representative land application sites was conducted on December 10 by City representatives and December 18, 2014, (with City representatives and RWQCB staff), which was immediately before and after a major rainfall event. No evidence of manure or soil erosion was evident on either visit.

Table 5. Manure Application

Description	Acres applied	Application Rate (cubic yards/acre)	Volume (cubic yards)	P			N		
				Pounds per Cubic Yard	Pounds applied	Pounds per acre	Pounds per Cubic Yard	Pounds applied	Pounds per acre
1. Russian River - New Vineyard Development	60	20	1,200	6.0	7,241	121	13.9	16,717	279
1. Russian River - Existing Vineyard	87	10	870	6.0	5,249	60	13.9	12,120	139
2. Bloomfield - Existing Vineyard	214	10	2,140	6.0	12,912	60	13.9	29,812	139
3. Petaluma - Existing Vineyard	327	10	3,270	6.0	19,731	60	13.9	45,553	139
4. Russian River - Existing Vineyard	55	10	550	6.0	3,319	60	13.9	7,662	139
5. Russian River - Existing Vineyard	150	10	1,500	6.0	9,051	60	13.9	20,896	139
6. Russian River - Existing Vineyard	90	10	900	6.0	5,430	60	13.9	12,538	139
7. Russian River - Existing Vineyard	200	10	2,000	6.0	12,068	60	13.9	27,861	139
8. Russian River - Existing Vineyard	75	10	750	6.0	4,525	60	13.9	10,448	139
9. Alexander Valley - Existing Vineyard	100	8	800	6.0	4,827	48	13.9	11,145	111
10. Mark West Station Road - Existing Vineyard	22	10	220	6.0	1,327	60	13.9	3,065	139
Subtotal	1380		14,200		85,680			197,816	
Removed from ponds but not applied in 2014			625	6.0	3,750		13.9	8,707	
Total for eligible for City credit			14,825		89,430			206,523	

Figure 2. Land Application Locations

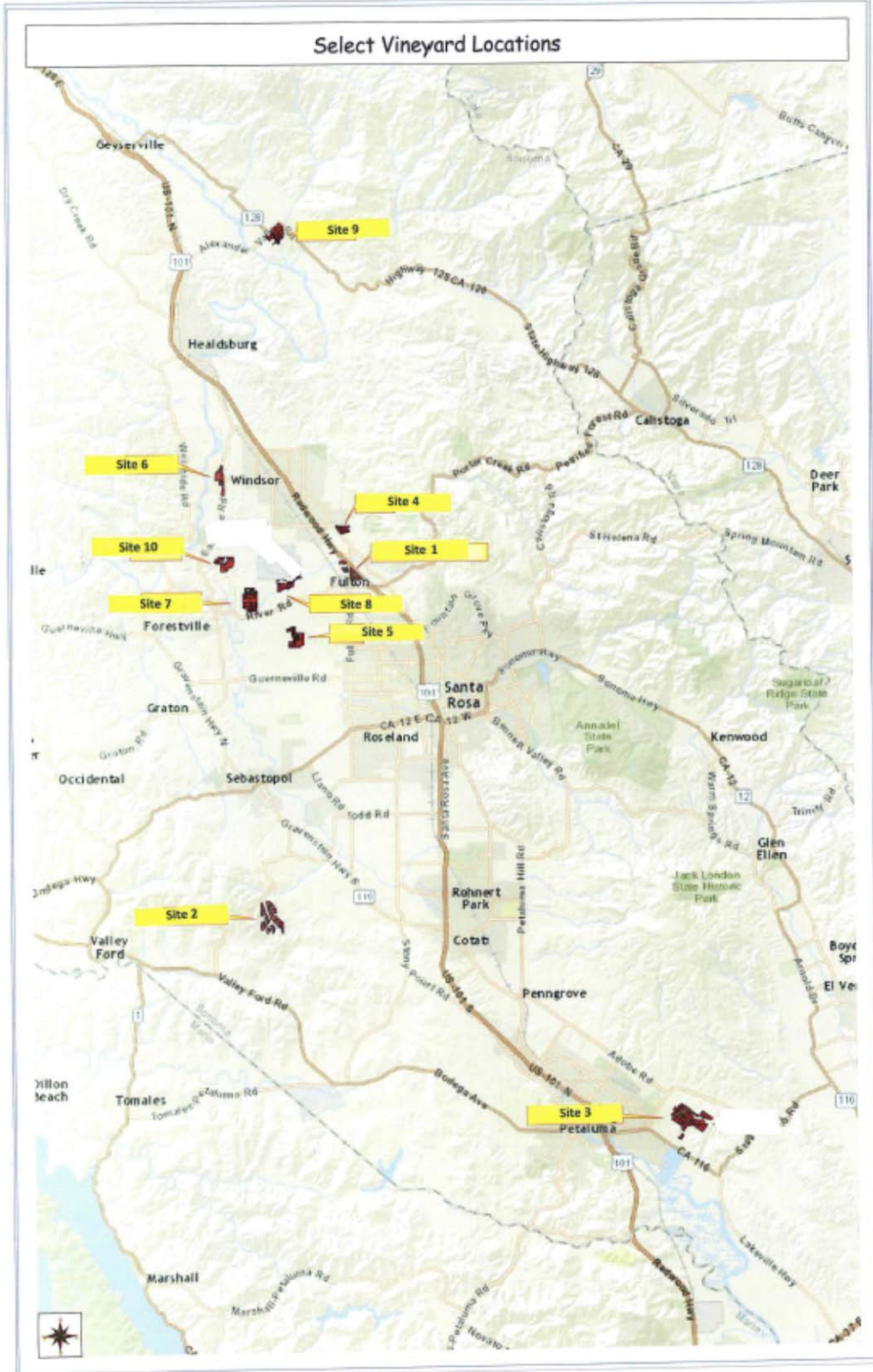


Table 6. Agronomic Demand

	Site 1 (new vineyard)		Sites 2-10 (established vineyard)	
	P	N	P	N
Total Applied (pounds per acre established vineyard) ^a	121	279	60	139
Available in first year (fraction) ^b	0.85	0.35	0.85	0.35
Available in first year (pounds per acre)	103	98	51	49
Agronomic demand (pounds per acre) ^c	65-86	>105	17 - 26	105
^a from Table 5				
^b University of Minnesota Extension. Using manure and compost as nutrient sources for fruit and vegetable crops. Carl J. Rosen and Peter M. Bierman. 2005				
^c See Attachment 8				

Nutrient Balance and Credit Calculation

Table 4 indicates that 89,761 pounds of P and 207,237 pounds of N were removed from the ponds based on estimates of pond volume (from Table 2) and manure quality (Table 3). Table 5 indicates that 85,680 pounds of P and 197,816 pounds of N were applied based on Krasilisa’s reported application rate and area. In addition, 625 cubic yards is currently stockpiled and not yet land-applied as noted in Table 5. At such time that the 625 cubic yards of stockpiled manure (which contains 3,750 pounds of P and 8,707 pounds of N) is properly land-applied, it would also qualify as a basis for P credits. 241 pounds of P and 557 pounds of N were removed from the Project because they were applied to land in a manner inconsistent with BMPs necessary to qualify for nutrient offset credit and Table 7 summarizes these nutrient quantities and shows that the estimate of nutrient quantities calculated using different methods from Tables 4 and 5, respectively) are in close agreement. Since evaporation reduced manure volume during the dewatering process, manure quantity is not tracked in Table 7.

Table 7. Disposition of Nutrients

	Basis	P (pounds)	N (pounds)
1. Land applied Fall 2014	From Table 5, based on acreage and application rate reported by Krasilsa, and manure quality data collected by City (Table 3)	85,680	197,816
2. Stockpiled on-site awaiting application	Joint estimate of 625 cy by Krasilsa and City	3,750	8,707
3. Total potential manure for credit calculation	Sum of values in rows 1 and 2	89,430	206,523
4. Removed from Ponds but not in Project	Land applied method inconsistent with project BMPs (see “hay crop” application at site 10 in Table 5)	241	557
5. Total removed from Ponds	Sum of values rows 3 plus and 4.	89,672	207,080
6. Estimated nutrients in ponds	Based on pond volume (Table 2) estimate and manure quality data (Table 3) as summarized in Table 4	89,761	207,237

Of the 89,761 pounds of P currently estimated to have been removed from the ponds, 89,430 pounds (see row 5, Table 5) are considered eligible for credit. The calculated credit in the Amended Proposal is 22,521 pounds P, which is based on the following:

- 86,273 pounds P estimated in the ponds
- Discount factor of 30 percent (multiply by 0.7) for the margin of safety,
- Discount of 39.9 percent (multiply by 0.399) for edge of field factor,
- 93.5 percent bioavailability for P (multiply by 0.935) and 85 percent for N (for tracking purposes only).

Using these same factors, but using the current estimate of 89,430 pounds P, the City requests approval of the Project for credit of 23,345 pounds P (subject to documentation of proper spreading of the stockpiled 625 cubic yards and confirmation of pond depth) as follows:

- 89,430 pounds P currently estimated in the ponds
- Discount factor of 30 percent (multiply by 0.7) for the margin of safety,
- Discount of 39.9 percent (multiply by 0.399) for edge of field factor,

- 93.5 percent bioavailability for P (multiply by 0.935) and 85 percent for N (for tracking purposes only).

The City also requests N reductions from this project be tracked for future crediting under the TMDL. Using the factors above, the potential N credit would be 206,523 pounds x 0.7 x 0.399 x 0.85 or 49,010 pounds N.

Monitoring and Reporting

The application and incorporation of the stockpiled 625 cubic yards of manure will be verified by City representatives and documentation provided to the Regional Water Board consistent with City's annual credit reporting schedule.

The sites where land application of the Ocean View Dairy manure occurs are following a nutrient management plan that is appropriate for vineyard operations. In addition, the sites have a sod cover crop protecting against erosion between the vine rows. This additional cover provides excellent surface erosion protection. Finally, as an added component these land application sites will be inspected by an independent third party (the City propose to extend its existing agreement with the Sonoma RCD to accomplish this) in fall of 2015 to determine the condition of the sod cover crop and to identify potential erosion issues that reach the downslope edge of the field. If the potential channelized erosion is identified at a site, the potential cause of the erosion will be appropriately addressed (e.g., field trafficking or rutting, and sod stand density issues).

Attachments

1. Original Proposal
2. RWQCB Approval of Original Proposal
3. Amended Proposal
4. RWQCB Approval of Amended Proposal
5. October 31, 2014 update letter from City to RWQCB
6. Pond Survey Details
7. Manure Quality Analytical Results
8. Agronomic rate backup information

City of Santa Rosa Offset Credit Proposal for Nunes – Ocean View Dairy BMPs

Credit Proposal Summary

Selected Project:

Install three agricultural Best Management Practices (BMPs) at an existing dairy operation to control and appropriately redistribute accumulated manure/manure-enriched soils to eliminate nutrient runoff.

Eligibility to Generate Nutrient Offset Program Credits at a Dairy:

The authority to generate Nutrient Offset Program credits at this dairy site is granted by the program Resolution No. R1-2008-0061 (Resolution), in combination with language provided in the General Waste Discharge Requirement (GWDR) Order R1-2012-0002.

Discharge Location in the Laguna:

Nutrient loading from the dairy site flows to Windsor Creek, which discharges into the Laguna de Santa Rosa approximately 0.75 miles upstream of the confluence of Windsor Creek with the Laguna de Santa Rosa. The Windsor Creek confluence with the Laguna is located upstream of the Trenton-Healdsburg Road crossing.

Credit Generating Practices:

The following BMPs and actions will reduce nutrient loading from this site and generate offset credits for the City of Santa Rosa's "no net load" requirements:

- BMP #1: Empty manure lagoons and appropriately manage for future stormwater collection
- BMP #2: Implement BMPs in heavy use areas to address accumulated manure
- BMP #3: Distribute 12,700 tons of manure solids for on-site land application

Margin of Safety Factors:

The credit calculation process incorporates the following factors to ensure adequate environmental protection:

- Edge-of-field calculated loads are discounted for attenuation during overland delivery to the stream
- Bioavailability factors for total nitrogen (TN) and total phosphorus (TP) are applied to compare manure versus treated wastewater bioavailability

Summary of Calculated Credits for Proposed BMPs:

Proposed Crediting Option	BMP Elements	Annual Credits (lbs P+N/yr)	Total Credits Based on a Minimum BMP Eligibility Period of 4 years¹
BMP #1 Empty and Manage Manure Lagoons	Agitation and pumping of liquid slurry, land application at agronomic rates. Dewatering solids & re-applying at agronomic rates. Interim containment using BMPs.	65,730	187,716 ²
BMP #2 Upgrade Heavy Use Areas	Exclusion of dairy milk cows on-site and scraping of accumulated manure followed by conservation cover implementation. ³	92	368
BMP #3 On-site Re-use of Stacked Manure Solids	Interim containment berm, appropriate on-site land application of stacked manure and implementation of a cover crop	125	498

¹The justification for four years is provided below in the Credit Eligibility and Credit Life discussion as well as individually under the Proposed Credit Generating Opportunities.

²Estimate includes a reduction in nutrient loading after the first year related to nutrient concentration reductions during storage and handling.

³The operator will keep six cows on site in order to maintain the successful dairy cow blood line. However, the cows, their manure and process water being generated will be managed in accordance with approvable methods for both the Nutrient Management Plan and Waste Management Plan and will minimally alter the work at the dairy site for BMP credit generation. For instance, the small number of cows will not be used to produce milk. This eliminates the need to process the milk parlor wastewater. In addition, the cows will be managed under an enclosed barn roof during the fall, winter and spring and utilize pastures only during the summer season. With proper grazing management heavy use areas will not be created. Finally, the manure and bedding materials are to be removed by a scraping and hauling solids away periodically for land application. Land applications will use agronomic rates. This eliminates the use of the current flush system to clean the stalls. By removing the flush system and process water components, the former discharges to the manure lagoons are eliminated. The manure and bedding materials will be land applied using the same appropriate methods as the manure separated solids piles discussed in BMP #3.

Nunes – Ocean View Dairy Project Synopsis:

The Nunes – Ocean View Dairy site is located along Windsor Creek (38°30'30.35"N, 122°50'47.17"W) and discharges to the Laguna de Santa Rosa (Laguna). On behalf of the City of Santa Rosa (the City), Kieser & Associates, LLC (K&A) conducted an examination of the dairy site in November 2011, while Erickson Engineering, LLC conducted a site examination in February 2012. These site evaluations identified potential nutrient offset credit opportunities associated with addressing accumulated manure and installing new BMPs. These new practices will reduce the amount of nutrients (total phosphorus and total nitrogen) entering the Laguna. A dairy herd will not be allowed on site for the period of manure removal and credit generation. The City desires to implement these practices at the Nunes – Ocean View Dairy to offset the annual water reclamation plant discharges to the Laguna. The dairy owner is willing to install these practices under an agreement with the City, if the Executive Officer of the Regional Board approves this proposal.

The proposed land management practices are considered eligible for generating nutrient reduction offsets according to the Resolution. This proposal is submitted for Regional Water Board consideration pursuant to the terms of the Resolution. When offsets are described as pounds of phosphorus and nitrogen no longer reaching the Laguna on an annual as related to proposed implementation of land management practices, they are referred to herein as credits. Credit life (i.e., the number of years credits would accrue annually to the City) is proposed to have a minimum four-year duration for new BMPs installed/implemented by the City at this crediting project site.

During this four-year crediting period, alternative agricultural land uses may be considered for this site. It is understood by the City that the Dairy has submitted a Notice of Intent for a Dairy Waiver Order R1-2012-0003 (Waiver). This proposal assumes that the dairy will operate under a GWDR Order so a change from a Waiver to GWDR will be necessary. Working under an agreement with the City, the dairy operation will remove the dairy cattle from the site during the credit generation period. The credit life of proposed BMPs is for a minimum four-year period, or until the Total Maximum Daily Load (TMDL) for the Laguna de Santa Rosa is approved (whichever is longer). Generation of credits after TMDL approval does not infer the City's acceptance of a reduced wasteload allocation in the TMDL. After the period of credit generation, the site is scheduled to return to an operating dairy condition, subject to an applicable GWDR Order, or the site operator can submit a notice of termination and apply for coverage under a Waiver.

In compliance with the Nutrient Offset Program resolution, activities undertaken to address accumulated manure and install the proposed BMPs will include temporary BMPs with equivalent or greater protection until the proposed BMPs are in place. In addition, the GWDR requirements also include a nutrient management plan (NMP) and waste management plan (WMP) scheduled to be submitted by January 19, 2015.

The City is submitting this formal crediting proposal to the Executive Officer of the Regional Board using site-specific details provided by a local agricultural engineer. This submission also follows a verbal request from Mr. Matt St. John of the Regional Board based on staff review of an initial concept proposal for the Ocean View Dairy. Crediting calculations are provided with this proposal. A detailed crediting summary is provided under separate cover. Relevant information on management practice verification and annual reporting also are included with this formal proposal.

The City will work with the current and/or future land owner/manager to implement the proposed measures. BMP installation will begin in as soon as possible after the Executive Officer approval of this formal proposal. Following such approval, the City will finalize contracting arrangements with the dairy owner. If approved by the Regional Board, the City may choose to implement the proposed practices using options such as a contract with a private land management company, and working with the owner to manage proposed site activities.

This document contains the required information associated with the Resolution.

Introduction

The Nunes – Ocean View Dairy site has three sources of nutrient loading to the Laguna that the City of Santa Rosa will address to generate nutrient offset credits. These include: substantial accumulation of separated manure solids, eroding heavy use areas, and two full manure lagoons. In addition to nutrients, agricultural runoff from these sources may contribute bacteria and suspended solids to surface waters, as well as nitrate to the groundwater. Relevant on-site conditions include:

- Two full manure lagoons with a total of approximately 5,873,000 gallons of manure slurry
- 3.6 acres of heavy use areas
- 12,700 tons of stacked manure separated solids

The dairy has been for sale for the past two years. A buyer for the site has yet to emerge. This lack of a buyer could be attributed to several factors. Stress in the dairy industry at large certainly plays a role. In addition, several site-specific conditions also have contributed to the farm remaining on the market. One of these conditions is the present status of manure handling, which can be briefly summarized as follows:

- Manure lagoons
 - The lagoons currently are full. Site visits in November 2011 and February 2012 indicated the lagoons were not being drained or cleaned prior to the wet season.
 - Preliminary manure and process water storage volume estimates indicated that operating the dairy at full capacity would result in waste generation that exceeds the lagoon capacity by approximately 10 acre-feet per year.
- Manure separated solids stacking piles
 - The dairy has accumulated more than 18,000 cubic yards (12,700 tons) of stacked manure solids generated by a manure separator process.
 - The solids piles range from 12 to 15 feet high with 1 to 1.5 slopes, creating substantial opportunities for erosion and soluble nutrient runoff.
 - The piles are located on bare ground with no enhancements for groundwater protection.
 - Under current operations, many of these stacking piles are located adjacent to a small ridge where the base of the ridge drains to Windsor Creek, less than 100 feet away from the piles.
 - There have been limited off-site sales of solids; therefore, the solids piles reflect years of surplus manure accumulation.

The crediting activities discussed in this proposal will address the existing manure handling conditions and heavy use areas, thereby allowing the operator to achieve compliance under a GWDR Order.

Nunes – Ocean View Dairy Project Overview

The Nunes – Ocean View Dairy operation occupies 172 acres and has sufficient animal and milk production buildings to manage 610 animals. Approximately 330 animals have been used for dairying as of late. This proposal will temporarily restrict the eligible uses of the site as an operating dairy, including suspending dairy livestock operations during the BMP implementation and credit generation period (consistent with the owner’s goal). In addition, interim BMPs will be installed to prevent discharges of runoff that come in contact with manure or dairy process water. Both these interim and proposed project BMPs comply with the GWDR Order by eliminating existing discharges and allowing only the Ag stormwater-related runoff to reach surface waters. In the future, this site is scheduled to return to use as a dairy and would be operated in full compliance with the GWDR Order or Waiver.

In this document, the term “credit” will be used to refer to nutrient load reductions to Windsor Creek that “offset” the City’s discharge under the authority of the Nutrient Offset Program. For the purposes of this discussion, a credit is defined as the pounds of phosphorus and nitrogen reduced per year from land management practices, adjusted for an adequate margin of safety. The long-term credit life of a practice depends on whether the practice remains in place and is well-maintained. In addition, credit generation eligibility considers whether the measures are required by another regulatory program.

The City of Santa Rosa will implement on-site BMPs to eliminate nutrient runoff to surface waters from the Nunes – Ocean View Dairy site. All three management practices will produce an estimated 65,946 credits of combined phosphorus and nitrogen reductions in the first year. In the second year and subsequent years, the proposed project will generate approximately 40,879 combined nutrient credits. The City proposes to fund practice implementation as part of the Nutrient Offset Program. The Nutrient Offset Program uses nonpoint source nutrient reductions to offset the City’s potential annual Subregional Water Reclamation Facility nutrient loading into the Laguna.

The following materials are submitted for consideration:

- Crediting Project Eligibility and Credit Life
- Proposed Credit Generating Practices
- Crediting Methods Applied for Laguna Offset Calculations (Attachment A)
- Erickson Engineering, LLC Site Map (Attachment B)

Crediting Project Eligibility and Credit Life

The approved Santa Rosa Nutrient Offset Program Resolution No. R1-2008-0061 (Resolution or Nutrient Offset Program) requires the City to operate under a “no net loading” requirement in the absence of the Laguna de Santa Rosa completed Total Maximum Daily Load (TMDL). To meet this requirement, the Regional Water Board allows, among other activities, nutrient reductions initiated by the City at remote sites to offset equivalent nutrient discharges from the City’s Subregional Water Reclamation Facility. The Resolution also restricts the use of offsets generated from sources regulated by other permits, waste discharge requirements and/or waivers. Specifically, Item 7, on page two, states:

“The Nutrient Offset Program is designed to encourage the City to undertake nutrient reduction projects that improve habitat and ecosystem conditions, and to encourage the City to undertake nutrient reduction projects that reduce or eliminate non-point source or other discharges not currently subject to waste discharge requirements, waivers, or other permits. However, the Nutrient Offset Program prohibits the City from continuing to receive nutrient reduction credits for a project that later becomes subject to additional regulatory controls imposed by the Regional Water Board. ...”

Representatives of the City’s Nutrient Offset Program had been evaluating the potential for offset opportunities associated with nutrient reductions on dairies even prior to 2011. The City requested that the Regional Water Board clarify the period that dairy improvement projects would remain eligible to generate credits after the pending Dairy Orders were approved. In response, the Regional Water Board included language in the Approved General Waste Discharge Requirement for Existing Cow Dairies Order No. R1-2012-0002 that specifically addressed the schedule for a dairy working with a “special TMDL nutrient offset”. Item 39 on page 13 of the GWDR states:

“The Regional Water Board may give special TMDL nutrient offset dairy projects an alternative schedule for enrollment and submittal of associated documents for a maximum of two years past the due dates in this GWDR. These TMDL nutrient offset dairy projects must provide temporary best management practices of equivalent or greater water quality protection in the interim. Also, these projects must be of long-term water quality benefit to the watershed.”

For a TMDL nutrient offset dairy project working under the City’s Resolution, this item specifically allows an extension of the deadline for submittal of the GWDR required Nutrient Management Plan (NMP) and a Waste Management Plan (WMP). Item 17 of the GWDR requires dairies **not** working on a special TMDL nutrient offset project ¹to develop and implement the NMP and WMP by January 19, 2013. Submission of the NMP and WMP documents for dairies working with the City Nutrient Offset Program can be completed through January 19, 2015.

In addition, Item 30 of the GWDR (on page 12) indicates that the Regional Water Board’s understanding is that small and medium-sized dairies will take two years to develop NMP and WMP plans (e.g., January 19, 2014). The Nunes – Ocean View Dairy mature dairy cow operation estimate of mature dairy cows is 370; which is well below the Concentrated Animal Feeding Operation threshold of 700. Using this criterion would categorize the Ocean View Dairy as a Medium Animal Feeding Operation. Item 30 states:

¹ The City of Santa Resolution R1-2008-0061 regarding the City’s Nutrient Offset Program and the GWDR R1-2012-0002 for existing Cow Dairies have slight terminology differences when referring to nutrient offset programs. The City’s Resolution R1-2008-0061 specifically mentions the Laguna TMDL in the findings and refers to all offsets generated as “Nutrient Offset Program” activities. The GWDR allows dairy projects to be a subset of the City’s Nutrient Offset Program activities but discusses their involvement using the terminology, “TMDL nutrient offset dairy projects”.

“A discharge of stormwater to surface water from the land application area where manure or process water has been applied is prohibited unless specific management practices have been implemented. These management practices must be consistent with a WMP, NMP or, if the WMP and NMP have not yet been required to be implemented (e.g., during the two years of development at dairies other than Large CAFOs), then land application areas must be managed consistent with BMPs as described in this Order.”

The GWDR does not include a WMP or NMP implementation schedule for dairies working with the Nutrient Offset Program. Therefore, the Regional Water Board would need to determine when the required NMP and WMP Best Management Practices (BMPs) should be implemented, and determine the eligible credit life, on a case-by-case basis. This proposal for the Nunes – Ocean View Dairy proposes a minimum of four years of credit life be granted for the practices defined in this document. Four years of credit life is based on a reasonable estimate of the period of time required to land apply the manure in the lagoons and solids stacking piles on the available pasture land at agronomic rates. The site assessment done by Erickson Engineering, Inc. states that based on the nitrogen stored in the solids, there is approximately three to five years of on-site forage production potential in the stockpiles. This is a conservative estimate as the nutrient balance used does not consider the land application of manure slurry in the lagoons in the three to five year estimate.

Proposed Credit Generating Practices

Discussions by K&A and observations at the Nunes – Ocean View Dairy by Erickson Engineering, Inc. yielded three opportunities for practices and activities that could generate nutrient offset credits. Figure 0-1 is an aerial view depicting the locations of all three BMP opportunities.

Attachment A to this document presents a summary of the credit calculations examined for these proposed practices at this dairy. These calculations assume nutrient content and concentration values based on published animal livestock research. The publications that were used to supply these estimates are widely recognized as the industry’s leading source of accurate information and/or are developed for assessing and designing livestock environmental controls in other states^{2,3,4}. Site-specific sampling is being pursued by the City and thus, credit calculations may be adjusted and later communicated with the Regional Board. Attachment B to this document provides a site map produced

² American Society of Agricultural Engineers. 2005. ASAE Standards, Manure Production Characteristics. Authored by the Engineering Practices Subcommittee of the ASAE. March 2005 ASAE D384.2

³ Midwest Plan Service. 2004. Manure Characteristics – Manure Management System Series MWPS -18, Section 1. Iowa State University, Ames Iowa

⁴ University of Missouri, Extension. 1993. Fertilizer Nutrients in Dairy Manure. Publication number WQ307. July 1993. Available at: <http://extension.missouri.edu/explore/shop/>

by Erickson Engineering, LLC from which areal calculations were derived. The three proposed crediting options are described as follows.



Figure 0-1. Location of the three management sites proposed for installation of new practices to generate nutrient offset credits.

BMP #1 — Manure Lagoon Cleanout and Management of Future Storage

The two full manure lagoons have an imminent potential to contribute nutrients to Windsor Creek during precipitation events. As an interim measure, a berm will be established to prevent nutrient loading to Windsor Creek while cleanout is initiated. The crediting project will result in emptying the full lagoons and land applying the manure slurry at agronomic rates. The method used for emptying the lagoons will be either hauling the manure to forage fields on-site or land application on-site utilizing the reclaimed water irrigation system already available on the farm. Figure 1-1 is an aerial view of the two manure lagoons (A) and direction of downgradient runoff (B). The interim containment berm (C) will contain onsite any runoff during the manure removal process serving both the lagoon system and the manure separated solids piles.

A typical lagoon cleanout process first empties the liquids in the lagoons by agitating the waste and pumping the liquid portion. The remaining solids then are stacked next to the lagoon to dewater. The proposed stacking pile is shown as point (D) in Figure 1-1. After dewatering, these solids will be similarly managed with the manure separated solids pile under BMP #3 of this crediting proposal. The production area contributing to the lagoons will be scraped and subsequently planted with cover crops in open areas. After manure removal, the lagoons will be temporarily closed allowing only Ag stormwater to enter.

In summary, proposed actions for this credit-generating BMP include:

- Agitation and agronomic rate land application of the liquid slurry from the two manure lagoons
- Dewatering and removal of all solids in the two manure lagoons
- Handling dewatered solids consistent with others for on-site land application at agronomic rates



- Installation of an interim containment berm
- Removal of accumulated manure in production buildings and corrals
- Introduction of cover crops in corrals
- Installation of clean water diversion structures to redirect the production area stormwater runoff away from refilling manure lagoons

Figure 1-1. Current manure lagoons serving the free stall milking cow barn. Manure from the production area is flushed and placed into the two manure lagoons (A). Overtopping of manure slurry from the lagoons contributes to nutrient loading to Windsor Creek at point (B). An interim berm (C) will be placed along the ridge located above Windsor Creek to protect against manure-related nutrient loading. The solids will be stacked and dewatered adjacent to the existing manure separated solids piles (D). The interim berm will serve to protect the Creek from nutrient loading from both the overtopping of lagoons and runoff from the separated solids stacking pile. (Photo Credit: Google Earth)

BMP #1 Credit Calculations

The Erickson Engineering, Inc. evaluation of rainfall runoff entering these lagoons is provided in Table 1-1. The results estimate total runoff managed in an average weather year as 15.62 acre-feet. Contact with manure remains highly probable for many of the contributing catchment areas, and the runoff will be further mixed with existing lagoon slurry. Therefore, the typical nutrient concentrations for dairy liquid manure in pits were used to calculate the nutrient loading.

Table 1-1. Production Area Stormwater Runoff Volume Estimates (based on 36-inch rainfall zone per SCWA flood control design manual, Plate B2).

Description	Acres	Runoff Coefficient	Average Acre-feet
Manured Concrete	0.23	1.00	0.68
Silage Pad Runoff	0.52	1.00	1.57
Liquid Manure Storage	2.09	1.00	6.26
Manured non-concrete	3.11	0.50	4.67
Crop/pasture	2.03	0.40	2.44
Totals	7.46	--	15.62

The manure lagoon credit calculation includes consideration of the flow entering the lagoons and the nutrient concentrations of liquid slurry. Nutrient content estimates of manure lagoon slurry were

provided by the Midwest Plan Service⁵. To incorporate the appropriate considerations for a margin of safety, the following discount factors were applied to the credit calculations (as percent remaining nutrients reaching Windsor Creek):

- Lagoon runoff nutrient loading:
 - Edge-of-field factor = 39.9% calculated at 85 feet
 - Bioavailability factors:
 - TP = 94.5%
 - TN = 85%

Resulting credits are shown in Table 1-2.

Table 1.2 - Proposed credits (combined pounds of TP + TN) calculated for BMP #1.

Proposed Crediting Option	BMP Elements	Annual Credits (lbs P+N/yr)	Proposed BMP Eligibility Minimum Period	Total Credits
BMP #1 Empty and manage manure lagoons	Agitation and pumping of liquid slurry, land application at agronomic rates. Dewatering solids & re-applying at agronomic rates. Interim containment using BMPs.	65,730 for 1 st year 40,662 for 2 nd , 3 rd and 4 th years	4 years	187,716

A minimum credit life of four years is proposed based on the expected period of time to agronomically land apply the amount of manure slurry and separated solids on the Nunes – Ocean View Dairy’s available pasture acreage. The site assessment performed by Erickson Engineering, Inc., indicates that three to five years is required for the solids stacking piles’ nitrogen content alone. The manure slurry will be managed by land applying at agronomic rates along with the stacking pile solids. In addition, the remaining solids within the lagoons after slurry application are assumed to be appreciable as they are visible from the surface. These solids will be removed, dewatered and managed along with the solids in the stacking piles. To ensure lagoon-related credit calculations are conservative, a discount factor is also applied that reduces the estimates of nitrogen reductions by 40 percent and phosphorus reductions by 30 percent on credits after the first year given there will be no new inputs.

⁵ Midwest Plan Service, 2004. Manure Characteristics: Manure Management System Series. Second Edition. MWPS-18 S-1. Iowa State University.
http://www.mwps.org/index.cfm?fuseaction=c_Products.viewProduct&catID=719&productID=6421&skunumber=MWPS18S1.
 Accessed March 1, 2011.

Supporting justification for a minimum four-year credit life also includes consideration of the longer-term recycling of the organic content of runoff in the riverine system. Once these nutrients reach Windsor Creek, they are conveyed downstream to the Laguna de Santa Rosa. In the Laguna these nutrients, associated organic solids and bacteria experience different attenuation rates and pathways depending on the flow regimes of the Laguna and the Russian River.

High water conditions in the Russian River can result in flow reversals in the lower Laguna. This provides opportunities for the Windsor Creek loading to flow upstream in the Laguna and be temporarily sequestered in low flow pools and then later be re-released. The potential for this recycling (internal loading) is difficult to quantify. However, its effects are in part, the reason the Nutrient Offset Program remains in effect even though the City has altered its operations whereby it only discharges from Delta Pond, which is also downstream of the Laguna low flow pools. The Regional Water Board contends that flooding in the Laguna with backwater flow from the Russian River redirects some of the Delta Pond nutrient loading into Laguna low flow pools and riparian floodplains.

The Regional Water Board's assumption that nutrients are persistent after moving upstream during flooding conditions are considered to be similar for all downstream sources within the Laguna. Backwater effects for nutrients entering the Laguna from Windsor Creek and the Nunes – Oceanview Dairy would experience similar physical and biological effects as Delta Pond discharges. While the amount of this loading to low flow pools from either source during flow reversals is not well-understood, the impacts from the dairy are likely to be higher than from the treated wastewater for two reasons. First, the dairy experiences more frequent opportunities for release during wet weather conditions. Second, the release from manure lagoons also contains organic solids, which more readily deposit in pools and riparian areas than soluble nutrients from the treated wastewater. Therefore, absent City intervention for offset credits, these nutrient additions to Windsor Creek and their Laguna impacts would continue as long as the manure lagoons at this site remain full.

Expected ancillary benefits of the proposed BMPs bolster support for additional water quality outcomes. Fine organics associated with manure can enhance the bacterial environment extending periods when counts can remain high. Organic materials are easily re-suspended along with bacteria associated with fines during periods of bed scouring. Such occurrences can extend the periods of higher bacterial concentrations beyond the first order decay curves encountered in healthier functioning systems^{6,7}.

BMP #2 — Heavy Use Area Restoration

For a 3.6-acre heavy use heifer loafing area situated adjacent to Mark West Creek Road, proposed activities will include scraping and closing this area, followed by the addition of a cover crop to increase

⁶ Jamieson, RC., Joy, DM., Lee, H., Kostaschuk, R., Gordon, RJ. 2004. Persistence of enteric bacteria in alluvial streams. *Journal of Environmental Engineering and Science*, 2004, 3(3): 203-212, 10.1139/s04-001

⁷ Kim, J., Pachepsky, YA., Shelton, DR., Coppock, C. 2010. Effect of streambed bacteria release of *E. coli* concentrations: Monitoring and modeling with the modified SWAT *Ecological Modeling* 221 (2010) 1592-1604

nutrient uptake and reduce erosion. The heavy use area was historically used as a heifer loafing area. The heavy use history results in higher soil nutrient concentrations. Figure 2-1 is an aerial view of the loafing area. Cows were released to this area daily and the cattle allowed to graze in the associated pasture. The total pasture is 19.4 acres, including the 3.6-acre loafing area. An adjacent 7.4-acre pasture also exists. Some 160 animals were kept 365 days per year in the open heifer barn and associated heavy use area and pastures. Animals were provided with supplemental feed bunkers and water near the barn.

BMP #2 Credit Calculations

The Pennsylvania Department of Environmental Protection (PA DEP) Chesapeake Bay Water Quality Trading Program⁸ calculation method for pastures was adapted for heavy use areas here. The adjusted method calculates the reductions in phosphorus related to enriched soil concentrations from the past heavy use activities. The calculations estimate the reductions in phosphorus loading that result from implementation of a conservation cover BMP which will reduce surface erosion. This BMP will reduce both particulate and dissolved phosphorus loadings (but does not credit nitrogen). Site-specific credit calculations consider:



- Manure deposited in heavy use area
- Remnant manure after scraping
- Soil erosion rates for heavy use area
- Cover treatment efficiency

Figure 2-1. A dairy heavy use heifer loafing area. BMP #2 eliminates nutrient loading contributions from a heifer heavy use area that has been utilized for loafing and feed bunkers. Approximately 160 milk cows have accessed the heavy use area 365 days per year. Current water quality protection is assumed to include scraping of the area in previous years prior to the wet season. The proposed project scrapes the lot in 2012, restricts the area from further cattle use for the length of credit generation, and implements a perennial cover crop in the area outlined in red. This BMP also has the ability to generate nutrient credits and other water quality protection in the longer-term if the area is left in perennial cover. (Photo Credit: Bing Maps)

⁸ PA DEP. 2007, 2008. Nutrient and Phosphorus calculation spreadsheets. Accessed May 15, 2012; available at <http://www.dep.state.pa.us/river/nutrienttrading/calculations/index.htm>

To incorporate appropriate considerations for a margin of safety, the following discount factors were applied to phosphorus credit calculations (as percent remaining phosphorus reaching Windsor Creek):

- Removal of legacy manure and Conservation Cover
 - Edge-of-field factor: 38.6% (calculated at 100 feet)
 - Bioavailability factor:
 - TP = 94.5%

Proposed credits calculated with these assumptions are provided in Table 2.1.

Table 2.1 - Preliminary credits (pounds of TP) calculated for BMP #2.

Proposed Crediting Option	BMP Elements	Annual Credits (lbs P/yr)	Minimum BMP Eligibility Period	Total Credits
BMP #2 Upgrade Heavy Use Areas	Exclusion of dairy milk cows and scraping of accumulated manure followed by conservation cover implementation. ¹	92	4 years	368

¹ The operator will keep six cows on site in order to maintain the successful dairy cow blood line. However, the cows, their manure and process water being generated will be managed in accordance with approvable methods for both the Nutrient Management Plan and Waste Management Plan and will minimally alter the work at the dairy site for BMP credit generation. For instance, the small number of cows will not be used to produce milk. This eliminates the need to process the milk parlor wastewater. In addition, the cows will be managed under an enclosed barn roof during the fall, winter and spring and utilize pastures only during the summer season. With proper grazing management heavy use areas will not be created. Finally, the manure and bedding materials are to be removed by a scraping and hauling solids away periodically for land application. Land applications will use agronomic rates. This eliminates the use of the current flush system to clean the stalls. By removing the flush system and process water components, the former discharges to the manure lagoons are eliminated. The manure and bedding materials will be land applied using the same appropriate methods as the manure separated solids piles discussed in BMP #3.

A credit life of four years is assumed for the site consistent with rationale for BMP #1. This is a reasonable estimate of time for credit generation eligibility. The BMP will reduce nutrient loading associated with runoff by establishing vegetation and temporarily resting the site for as long as the dairy does not have active milking operations during the period of crediting. Furthermore, the change in site soils will enhance infiltration for improved hydrology and will also serve to protect the Creek from loadings of both suspended solids and bacteria. In the future, a portion of the credits related to vegetation establishment could remain eligible if it exceeds the requirements for GWDR compliance.

BMP #3 — On-site Re-use of Stacked Manure Solids

The proposed credit-generating activity for BMP #3 will eliminate nutrient loading contributions to Windsor Creek by first constructing an interim containment berm, land applying on-site the manure separated solids, and then establishing a cover crop on exposed ground surfaces. During previous site

visits, at least five areas were identified where manure stacking is persistent and nutrient and bacteria loading contributions to surface water are possible via runoff. The areas of activity will be consolidated into zones that provide protection against surface water nutrient loading with temporary berming until full land application of the solids is completed. The current estimate of on-site stacked manure separated solids is 12,700 tons. Figures 3-1 and 3-2 are aerial photos depicting the location and quantity of stacked manure that persisted across the wet season.



Figure 3-1. Stacked Manure Separated Solids. BMP #3 involves land application of separated manure solids on site. Currently the 12 to 15 foot high piles of manure solids (A) may erode with runoff contributing nutrient loading to the adjacent Windsor Creek. (Manure in the adjacent corral pens is addressed as part of BMP #1.) (Photo Credit Google Earth, taken on October 24, 2009)



Figure 3-2. Stacked Manure Outside of Calf Barn. BMP #3 involves land application of manure solids on site at agronomic rates. Currently, manure piles dewater in-place contributing to nutrient loading to the adjacent Windsor Creek via runoff. (Photo Credit Google Earth, taken on October 24, 2009)

BMP #3 Credit Calculations

The credit calculations for manure and separated solids manure pile protection and land application consider erosion rates of the organic solids and the particulate attached nutrient loading, as well as soluble nutrients in runoff. The method calculates the before (current condition) and assumes that removal and cover crop protection combined with natural re-establishment of

the riparian corridor buffer will eliminate manure-related nutrient loading. Site-specific credit calculations consider the following assumptions:

- The volume of manure deposited
- Nutrient content of manure
- Nitrogen loading available from remnant manure
- Solids pile erosion rates
- Buffer treatment efficiency
- Distance from Windsor Creek

To incorporate appropriate considerations for a margin of safety, the following discount factors were applied to preliminary credit calculations (as percent remaining nutrients reaching Windsor Creek):

- Removal of manure piles
 - Edge-of-field discount factor = 39.9% (as calculated at 85 feet)
 - Bioavailability factors
 - TP = 94.5%
 - TN = 85%

Preliminary credits calculated for BMP #3 using these assumptions are provided in Table 3.1.

Table 3.1 - Preliminary credits (combined pounds of TP + TN) calculated for BMP #3.

Proposed Crediting Option	BMP Elements	Annual Credits (lbs P+N/yr)	Proposed Minimum Credit Eligibility Period	Total Credits
BMP #3 On-site Re-use of Stacked Manure Solids	Interim containment berm, appropriate on-site land application of stacked manure and implementation of a cover crop	125	4 years	498

A minimum credit life of four years is proposed based on the expected annual nutrient requirements of the pasture land available at the Nunes Dairy for land application. The site evaluation by Erickson Engineering, Inc. indicated that a three to five year period for these applications would be reasonable for appropriate nitrogen applications of the solids stacking piles given their estimated nitrogen content. The persistence of runoff that comes into contact with the manure solids is also a consideration in this longer credit life where, if left unaddressed, recycling of organics in the riverine system as noted above would remain problematic for low flow pools in the Laguna. BMP #3 will eliminate these persistent loading conditions.

Monitoring and Reporting Plans

This section outlines the proposed monitoring and reporting plan that the City will implement if this proposal is approved by the Regional Board Executive Officer. Expected agreements between the local Resource Conservation District will be completed to ensure this plan is followed.

Monitoring and Reporting:

The City will require all BMPs implemented for credit generation to be maintained to Natural Resources Conservation Service (NRCS) standards and/or specific engineering designs to ensure nutrient reductions and water quality benefits continue throughout the life of the contract period (either short-term or long-term). This will be accomplished through a contractual agreement and confirmed through annual site inspections to verify the proper operation and maintenance of each BMP. Similar to other environmental trading programs in the nation, the following verification protocol is proposed:

- Annual site visit to inspect and confirm operation and maintenance of BMP prior to the appropriate season of expected operation (as applicable). RCD or other authorized agent will visit the BMP site.
 - Agent will inspect all components of the BMP and surrounding area to ensure proper function /operation (using final engineering specifications).
 - Agent will document BMP operation and maintenance through forms and photographs.
 - Any deficiencies must be noted on the inspection documentation.
 - All site inspection documentation must be submitted to the City within a set period following inspection.
- Deficiencies
 - All deficiencies will be reported to the land owner immediately after the City receives the inspection documentation.
 - These must be appropriately corrected to previously specified conditions within 60 days of discovery, or within 90 days if an alternative improvement is necessary to avoid future failures. (The Regional Board will be notified of this latter condition where applicable.)
 - Temporary BMPs considered acceptable under the GWDR Order will be installed within 15 days of the City's receipt of inspection documentation.
 - Agent must complete a second site visit to verify all deficiencies have been corrected.
- Verification letter stating the BMP passed the annual inspection will be included in the City's annual report to RWQCB.
- Verification letters for all BMPs will be forwarded to the Regional Water Board as proof that credits are being maintained.

Agreements for Implementation:

The City anticipates entering into several agreements to fully implement, verify, and monitor the proposed BMP projects at the Nunes-Ocean View Dairy, once Regional Water Board approval is obtained. The City will rely on written agreements for the following activities:

- Project implementation oversight
- Engineering
- Construction
- Long-term maintenance
- Annual site inspections

The City will likely enter into an agreement with the local RCD to oversee implementation of the BMPs and provide annual BMP verification. The City may choose to implement the proposed practices using options such as a contract with a private land management company, and working with the owner to manage proposed site activities.

Description of Anticipated CEQA Documentation

Final engineering review of the BMPs will provide further information on whether permits might be necessary for implementing the proposed projects. The Gold Ridge RCD anticipates no need for a permit from the US Army Corps of Engineers or other California State Resource Agencies due to the location of the projects. The need for a permit from the Sonoma County Permit and Resource Management Department or Water Agency will depend on the final design (e.g., amount of excavation involved in BMP implementation). The RCD will be responsible for obtaining all permits related to the BMP projects. CEQA documentation that may be required for any necessary permits is described in the following paragraph.

Section 15168(c)(2) of the CEQA Guidelines provides that, “If the agency finds that pursuant to Section 15162, no new effects could occur or no new mitigation measures would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required.” The Discharge Compliance Project (DCP) EIR evaluated an Enhanced Nutrient Removal (ENR) component at a program-level. The EIR Project Description for the ENR component specifically includes manure management at up to eight dairies and agricultural land management in the Laguna Watershed. The Nunes—Ocean View Dairy Nutrient Removal Project is entirely consistent with the Project Description for the ENR component in the DCP EIR. Further, the City has evaluated whether the Ocean View Dairy Nutrient Removal Project would have new effects that are greater than those identified in the DCP EIR and that, pursuant to Section 15162 of the CEQA Guidelines, would be new significant impacts or significant impacts of a substantially more severe nature. The

evaluation found no new significant impacts or significant impacts of a substantially more severe nature beyond those impacts already identified for the ENR component in the DCP EIR. And, therefore, the Ocean View Dairy Nutrient Removal Project is adequately evaluated by the program-level review in the DCP EIR, and no subsequent environmental document is required.

Attachment A

Crediting Methods Applied for Laguna Offset Calculations

Site Name: Nunes -- Ocean View Dairy - BMP #1
Address: 3975 Mark West Station Road, Windsor, CA 95436
Location Information: **Description of watershed location:**
Watershed Segment Adjacent to Windsor Creek, drains to Laguna de Santa Rosa
Location Factor 100%
Distance to nearest conveyance 85 feet
Delivery Ratio (Edge-of-Field) 39.88%
 (Based on MN delivery ratio formula: distance^{-0.2069})
Area Served: 7.46 acres

Runoff Calculation from Erickson Engineering, Inc.

Surface Areas	Acres	Runoff	Average	Wet
		Coefficient	Acre-feet	Acre-feet
Manured Concrete	0.23	1.00	0.68	1.01
Silage Pad Runoff	0.52	1.00	1.57	2.33
Manure Storage, liquid	2.09	1.00	6.26	9.33
Manured non-concrete	3.11	0.50	4.67	6.96
Crop/pasture	2.03	0.40	2.44	3.64
Totals	7.46		15.62	23.27

15.62 acre feet

Nutrient content estimates from Midwest Plan Service, Section 1, Second Edition. 2004. Iowa State University Table 7. Estimated liquid pit manure characteristics.

5,089 1000 gallons

Total N	lbs/1000 gallons of manure	
	P205	TP
31	15	6.5

Midwest Plan Service, 2004. Manure Characteristics: Manure Management System Series. Second Edition. MWPS-18 S-1. Iowa State University.
http://www.mwps.org/index.cfm?fuseaction=c_Products.viewProduct&catID=719&productID=6421&sku number=MWPS18S1. Accessed March 1, 2011.

Assumed concentration strength of lagoon (1st year)

TN released during over topping	157,772.8 lbs/year	
TP released during over topping	32,826.9 lbs/year	
Years 2, 3, 4, ...		
TN Assume an additional 40% loss after year 1	94,663.7	Conservative MOS
TP Assume an additional 30% loss after year 1	22,978.8	Conservative MOS

MOS:	Delivery Ratio	39.9%	
	Location Factor	100%	
	P Bioavailability	93.5%	80% manure bioavailability/85.5% WWTP bioavailability
	N Bioavailability	85%	80% manure bioavailability/94.5% WWTP bioavailability

1st Year Credits

TN credit	53,487.8
TP Credit	12,241.8
Combined	65,729.5

2nd, 3rd and 4th Year

TN	32,092.7
TP	8,569.3
	40,661.9

Total for All Four Years
187,715.3

Site Name: Nunes -- Ocean View Dairy - BMP #2
Address: 3975 Mark West Station Road, Windsor, CA 95436

Description of watershed location:
Watershed Segment: Adjacent to Windsor Creek, drains to Laguna de Santa Rosa
Location Factor: 100%

Distance to nearest conveyance: 100 feet
Delivery Ratio (Edge-of-Field): 38.57% (Based on MN delivery ratio formula: DR = distance^{-0.2069})
Area Served: 3.6 acres

Soil Information:
Classification: Huichica Loam Htc
Hydrologic Group: D Soil C; Manure pack D

RUSLE estimate factors:
R Factor: 120 From EPA Rainfall Erosivity Factor Fact sheet
K Factor: 0.37 From EPA Rainfall Erosivity Factor Calculator for Small Construction Sites at: <http://cfpub.epa.gov/npdes/stormwater/lew/lewcalculator.cfm>
LS Factor: 2.2 From NRCS Web Soil Survey at: <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

C Factor: 0.05 From Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites and Reclaimed Lands, T.J. Toy and G. R. Foster, Co-editors J. R. Galetovic Publishing Editor. Accessed April 25, 2012 at: <http://www.greenfix.com/Channel%20Web/pdfs/RUSLE%20Guidelines.pdf>
P Factor: 1 (no erosion practice)
A = R*K*LS*C*P: 4.884 tons/acre/year (if less than 1 ton/acre/year, use 1)

Erosion Rate: 4.884 tons/acre/year
Phosphorus Soil Test: 750 ppm Type: Mehlich - 3
Field Condition: Poor

COUNTY	Climate Zone	Mean Precip (in/yr)	2 year, 24 hour rainfall event (in)	# of these events in 1 year:
Sonoma	3	30.98	3.34	9.28

2-year 24-hour rainfall event (in): gathered from CA Water Gov precipitation data available at: <ftp://ftp.water.ca.gov/.../DDF%20D%20F90/F90%20D%20Santa%20Rosa%20CIMIS.xls>
 Mean Precipitation (in/yr) is calculated from 30-yr record, missing data filled in using monthly long-term average.

Calculating Rainfall Runoff using the SCS Curve Number:

County: Sonoma **Curve Number:** 1.96 **Runoff from one 2yr, 24 hr storm event (in):** 1.96
Number of 2 year, 24 hour storm events in 1 yr: 9.28
Average Annual Rainfall Runoff (in): 18.16 in
Hydraulic Condition: 0
Curve Number Based On: Pasture Poor Conditions
Curve Number: 89

Soil P: 3.0 kg/ton P
Background Soil P Loss from Erosion: 64.6 lbs/acre
Soluble P Concentration: 1,544 ug/L (microgram/liter OR ppb)
Average Annual Runoff: 1,866,201 L/ac
Background Dissolved P Loss: 2,880,480,541 ug/ac
Background Dissolved P Loss: 6.3 lbs/ac
P Load Available from Soils: 70.9 lbs/ac

P Load Available from Soils and Nutrient Applications: 70.9 lbs/acre

Site P Loading Available: 255.4 lbs P/yr

Conservation cover provided using a conservative treatment efficiency; applied as a buffer removal efficiency.

Application of cover: 100% Treatment Efficiency
Site P Loading Reduction From Cover: 255.4 lbs P/yr
Field Total P Reduction: 255.4 lbs P/yr

MOS:
Location Factor: 1 0 Adjacent to Windsor Creek, drains to Laguna de Santa Rosa
Edge-of-field delivery: 38.57% 100 feet from conveyance
P Bioavailability: 93.5% 80% manure bioavailability/85.5% WWTP bioavailability

Phosphorus Credits without discount factors: 255.4 P credits per year
Phosphorus Credits using: Bioavailability & Edge-of-Field 92.1 P credits per year

Total for Four Years: 368.3

Site Name: Nunes, Ocean View Dairy
Address: 3975 Mark West Station Road, Windsor, CA 95436

Description of watershed location:
Watershed Segment Number: Adjacent to Windsor Creek, drains to Laguna de Santa Rosa
Location Factor: 100%

Distance to nearest conveyance: 85 feet
Delivery Ratio (Edge-of-Field): 39.88% (Based on MN delivery ratio formula: distance^{-0.2069})

Area Served: 3 acres

Soil Information:
Classification: Huichica Loam Htc
Hydrologic Group: D Soil identified as a C; manure pack/compaction assumed a D rating

RUSLE estimate factors:
R Factor: 120 From EPA Rainfall Erosivity Factor Fact sheet
K Factor: 0.1 From EPA Rainfall Erosivity Factor Calculator for Small Construction
LS Factor: 1.84 12 foot length From NRCS Web Soil Survey at: <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
C Factor: 0.42 From Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed

P Factor: 1 (no practice) From Guidelines for the (if less than 1 ton/acre/year, use 1)
A= R*K*LS*C*P: 9.27 tons/acre/year

Erosion Rate: 9.27 tons/acre/year

Field Condition: Poor

Content of screened solids:
 TN 5 lbs per ton Separated Solids nitrogen content 5
 TP 0.9 lbs per ton Separated Solids phosphorus content 0.9
 Pacific Northwest Extension Service
<http://cru.cahe.wsu.edu/cepublications/pnw0533/pnw0533.pdf>
 TN 2.5 kgs per ton TP metric ton = 1.10231131 standard tons
 TP 0.45 kgs per ton TN 0.453592 kgs per pound
 Mehlich - 3 equivalent 112.51 ppm TP

Eroded/Particulate Attached:
 TN 306.7 lbs per year
 TP 55.2 lbs per year

Soluble TP:
Soluble P Concentration: 269 ug/L (microgram/liter OR ppb)
Average Annual Runoff: 1,866,671 L/ac Using 18.16 inches annual average runoff
Background Dissolved P Loss: 501,243,054 ug/ac
Background Dissolved P Loss: 1.1 lbs/ac
Total TP: 56 lbs/ac

Total: TN 307
 Additional conservative assumption; soluble nitrogen loading not credited

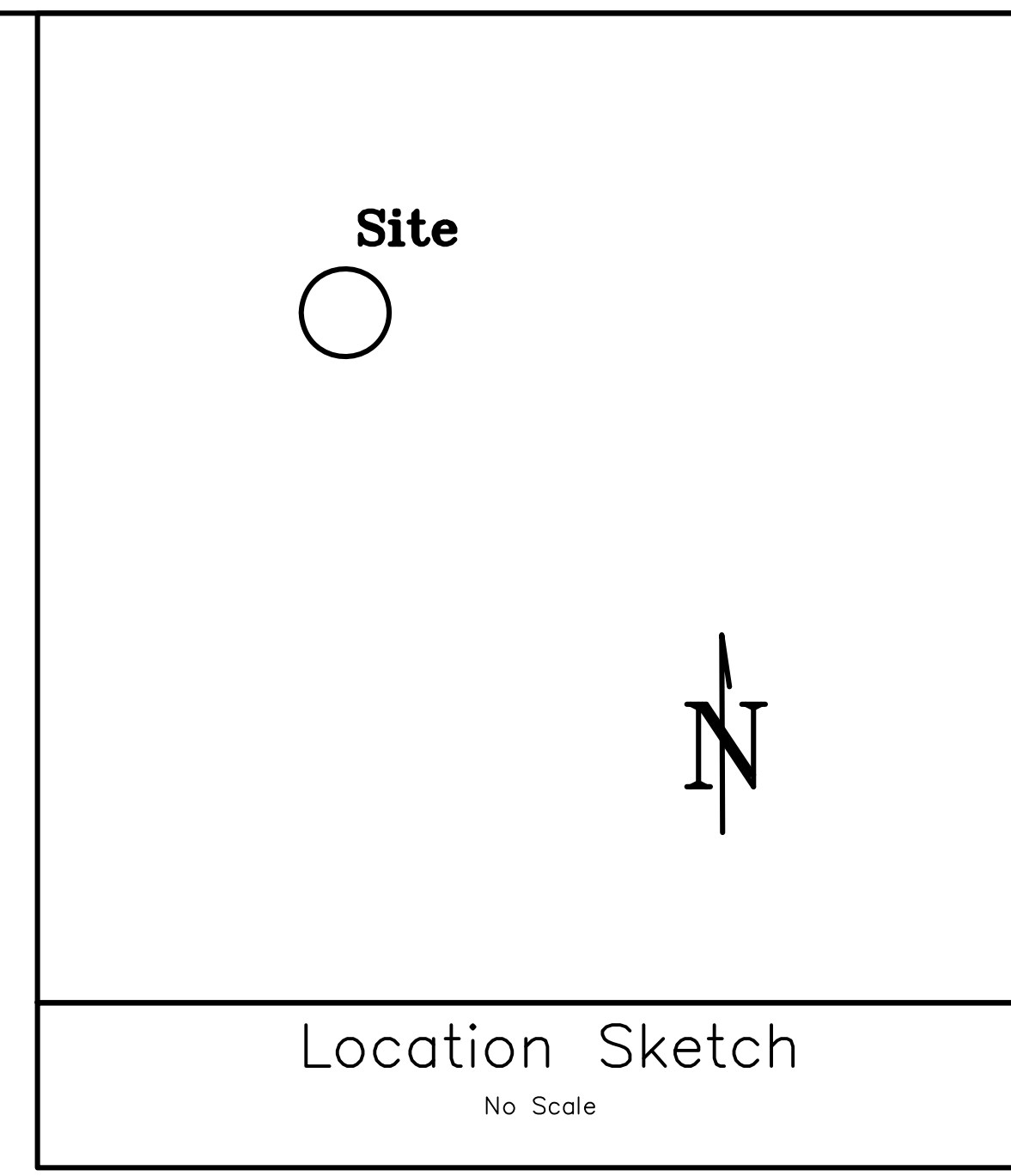
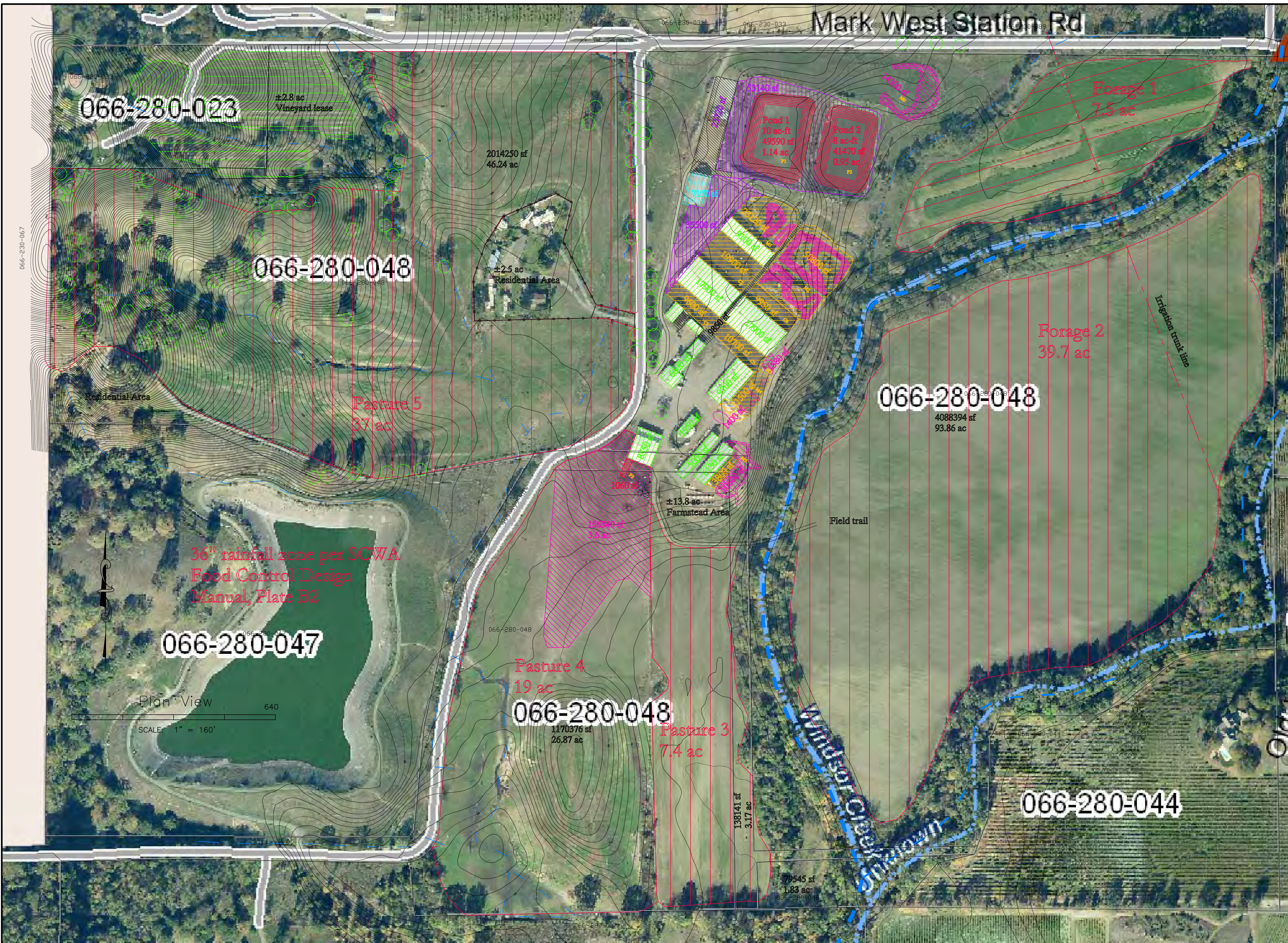
List of Discount Factors:
Location Factor: 100% Segment Windsor Creek
Edge-of-field delivery: 39.88% feet from conveyance
P Bioavailability: 93.5% 85 80% manure bioavailability/85.5% WWTP bioavailability
N Bioavailability: 85% 80% manure bioavailability/94.5% WWTP bioavailability

Phosphorus Credits without discount factors: 55.2
Phosphorus Credits using:
Bioavailability & Edge-of-Field: 20.6 P credits per year
Nitrogen Credits without discount factors: 306.7
Nitrogen Credits using:
Bioavailability & Edge of Field: 104.0 N credits per year

Combined TN & TP:
With Bio & Edge-of-field 1 year: 124.6 combined credits
4 years: 498.2 combined credits

Attachment B

Erickson Engineering, LLC Site Map



Map data: 2009 Color aerial photo from Google Earth.

Horizontal and vertical coordinates per State Plane Coordinate System, California Zone 2, NAD83, US survey feet. Contour lines are highly approximate, per USGS National Digital Terrain Model. Property line has not been located. Field verify critical elevations and dimensions at time of construction.

Planning-level document, subject to revision and adjustment per priorities, inputs, and budget of Owner and Operator. See companion spreadsheet for evaluation of manure production, manured and clean runoff areas, storage sizing requirements, and nutrient budgeting estimates.

Dairy facility geometry is approximate, developed via corrected submeter GPS augmented by tape measurements, visual estimates, and scanned and scaled color aerial photo. Detailed site topo will be required to design and implement some facilities improvement recommendations.

LEGEND

—	UNPAVED ROAD	6500 sf	Upland tributary
—	FENCE	6500 sf	Manured - concrete
---	DRAINAGE	6500 sf	Manured - pond
---	CULVERT	6500 sf	Manured - soil
		6500 sf	Manured - not controlled
		6500 sf	Buildings - guttered
		6500 sf	Buildings - unguttered
		6500 sf	Buildings

Erickson Engineering Inc.
Civil and Agricultural Engineering
707.795.2498
erickson@aei.net

Dairy Waste Management System
Plan View

Lands of:
OCEAN VIEW DAIRY
APN 066-280-048
3975 Mark West Station Road, Windsor CA

03.11.2012

Scale:
1" = 160'

20311
OceanVue.dwg

Sheet
C1
of 1





North Coast Regional Water Quality Control Board

January 24, 2013

In the Matter of

Notice of Approval, Nutrient Reduction Activities

for the

Nunes Ocean View Dairy Nutrient Offset Project

APPLICANT: City of Santa Rosa
RECEIVING WATER: Windsor Creek/Mark West Creek/Laguna de Santa Rosa
HYDROLOGIC AREA: Mark West Hydrologic Sub Area No. 114.23,
Russian River Hydrologic Unit No. 114.00
COUNTY: Sonoma County
FILE NAME: Santa Rosa Subregional Water Reclamation System

BY THE EXECUTIVE OFFICER:

1. This Notice of Approval provides notice that certain activities are eligible under Resolution No. R1-2008-0061 Approving the Nutrient Offset Program for the Santa Rosa Subregional Water Reclamation System, which was adopted by the California Regional Water Quality Control Board, North Coast Region, (Regional Water Board) on July 24, 2008. The Nutrient Offset Program establishes a framework for the review and approval of projects proposed by the City of Santa Rosa (City) that are designed to reduce the nutrient load discharged to the Laguna de Santa Rosa and a procedure for granting nutrient reduction credits to the City that will offset nutrient discharges from the City's wastewater treatment facility to the Laguna.
2. The City is regulated under National Pollutant Discharge Elimination System (NPDES) Permit No. CA0022764, Waste Discharge Requirements Order No. R1-2006-0045 for the Santa Rosa Subregional Water Reclamation System (Permit). The Permit imposes the following final effluent limitations for total nitrogen and total phosphorus:

"The Regional Board plans to develop and adopt total maximum daily loads (TMDLs) for nitrogen and phosphorus which specify wasteload allocations (WLAs) for point sources and load allocations (LAs) for non-point sources, as appropriate. Following

the adoption of these TMDLs by the Regional Water Board, this Order will be issued with final WQBELs based on applicable WLAs. Alternatively, in the absence of a TMDL, at the end of the compliance schedule authorized by this Order, the final effluent limitations for nitrogen and phosphorus will be zero, or no net loading.”

3. Footnote 5 to Effluent Limitations section IV.A.1.g of the Permit also states:

“A ‘no net loading’ effluent limit may be met by: 1) reducing the effluent concentration below detectable levels through source control and/or treatment; 2) reducing loads through recycling/reclamation; and/or 3) reducing loads elsewhere in the watershed by an amount at least equal to the amount discharged (and of equivalent bioavailability) through an approved offset program.”
4. The Nutrient Offset Program is designed to encourage the City to undertake nutrient reduction projects that improve habitat and ecosystem conditions and projects that reduce or eliminate nonpoint source or other waste discharges not currently subject to waste discharge requirements (WDRs), waivers, or other permits. The Nutrient Offset Program also prohibits the City from receiving nutrient offset credits for projects that later become subject to additional regulatory controls imposed by the Regional Water Board.
5. On October 30, 2012, Mr. Miles Ferris, on behalf of the City, submitted the proposal for activities associated with the Nunes Ocean View Dairy Nutrient Offset Proposal (Project). The Project is located adjacent to Windsor Creek, approximately 0.75 miles upstream of the confluence of Windsor Creek and the Laguna de Santa Rosa.
6. The Project consists of implementation of Management Practices (MPs) to control and appropriately redistribute accumulated manure and manure enriched soil at the Ocean View Dairy to eliminate nutrient runoff to Windsor Creek, a tributary of the Laguna de Santa Rosa, in Sonoma County. Proposed BMPs include:
 - a. The emptying the two full manure lagoons and land applying the manure slurry and remaining solids at agronomic rates on forage fields on site. (MP No.1)
 - b. The restoration of 3.6 acre heavy use areas adjacent to Mark West Creek, including the removal of accumulated manure and establishment of a cover crop to increase nutrient uptake and reduce erosion. (MP No. 2)
 - c. The construction of an interim containment berm between the manure stacking area and Windsor Creek to eliminate nutrient loading contributions from the existing manure stacks and the eventual removal and beneficial reuse of the manure through land application. (MP No. 3)
7. The Proposed nutrient offset credits and eligibility periods are as follows:

Proposed Crediting Options	Annual Credits (lbs TN/yr)	Annual Credits (lbs TP/yr)	BMP Eligibility Period
MP Type No. 1: Empty and Manage Manure Lagoons	53,487 ¹	12,241 ¹	Up to 4 years ²
MP Type No. 2: Upgrade Heavy Use Areas	0	92	Up to 4 years
MP Type No. 3: Onsite Reuse of Stacked Manure Solids	104	21	Up to 4 years

¹ To account for annual reductions in the volume of manure contained in the lagoons after initiation of the project, it is proposed that annual credits for total nitrogen and total phosphorus are discounted by 40 percent and 30 percent, respectively, after the first year.

² Offset credits are available for discharges of nitrogen and phosphorus controlled through the 2014/2015 discharge season, provided the Nunes Dairy obtains coverage under Order No. R1-2012-0002, *General Waste Discharge Requirements for Existing Cow Dairies in the North Coast Region*.

8. Regional Water Board staff reviewed the Project to assess the eligibility of the MPs for offset credits under the City's Nutrient Offset Program, focusing on the following criteria:
 - a. Are the proposed activities required by Regional Water Board WDRs, waivers, or other permits and thus ineligible for credit offsets?
 - b. Will the project improve habitat and ecosystem conditions and provide long term benefit to water quality?
 - c. Are the calculations for nutrient reductions and offset credits supported by scientific literature or other acceptable methodology?

9. Regional Water Board staff determined that the Project is eligible because the proposed MPs are not required by waste discharge requirements, waiver or other Regional Water Board permit. Order No. R1-2012-0002, *General Waste Discharge Requirements for Existing Cow Dairies in the North Coast Region* (Dairy General Permit), states that nutrient reduction projects may be eligible for offset credits for a maximum of two years past the deadlines to submit required management plans for the dairy if the enrollee is participating in an approved nutrient offset project. Accounting for the two additional years for participation in an approved offset program, the deadline for submission of required management plans is January 19, 2015. Thus, the Project would be eligible for offset credits until January 19, 2015, provided the Nunes Dairy obtains coverage under the Dairy General Permit.

The Project involves the removal and land application of manure that has accumulated as a result of past practices and site restoration to prevent erosion and migration of soil-attached nutrients to surface waters. The primary management practice proposed as a component of the Project, removal and land application of manure, is not required at this non-operational dairy by the Dairy Waiver (Order No. R1-2012-0003), the Dairy General Permit, or title 27 of the California Code of

Regulations. Ancillary activities included in the Project, including establishment of a cover crop to prevent erosion and migration of manure-enriched soil to surface waters, are proposed to generate credits only until the Nunes Dairy is required to fully comply with the Dairy General Permit.

In addition, approval of the Project implements key elements of the State Water Resources Control Board's *Policy for Implementation and Enforcement of the Nonpoint Source Control Program* (Nonpoint Source Policy) by applying management practices designed to prevent and control nonpoint sources of pollution through cooperative agreements with individual dischargers and third-party organizations.

10. The MPs recommended in the Project are accepted techniques that have been demonstrated to be effective in preventing and controlling erosion and reducing sediment delivery to watercourses from the types of sources described in the Project. Regional Water Board staff has concluded that, if implemented and employed in combination with protective land use practices, the MPs will significantly improve and protect water quality in the lower Mark West Creek watershed and the lower Russian River system, and will provide long term protection of beneficial uses of the State's waters.
11. The methodology for calculating nutrient reductions and offset credits was developed by the City's consultant, Keiser and Associates, using a nutrient offset tool known as the Pennsylvania Credit Calculator. This offset calculating tool is well established in the Midwest and accepted there by the pertinent regulatory agencies. Regional Water Board staff concluded that the assumptions used in the model were conservative and reasonable, and that the final credit proposals are acceptable.
12. On October 8, 2008, the City certified a program-level Discharge Compliance Project Environmental Impact Report (DCP EIR) for activities related to manure management and agricultural land management projects, such as the projects proposed for the Nunes Ocean View Dairy. The DCP EIR evaluated the potential impacts from nutrient offset projects and found that the impacts from nutrient offset projects would be less than significant and no mitigations were required because the nutrient offset project would reduce the nutrient loads from the Laguna Subregional Water Reclamation System to no net increase. In addition, given the nature of these offset projects, which are designed to be beneficial to water quality, it is expected that an offset project would not have a significant negative impact to the environment.
13. Pursuant to its role as a responsible agency, the Regional Water Board has considered the SCP EIR as required under title 14, California Code of Regulations, section 15096 and determined that there are no potentially significant impacts associated with the Project. The Regional Water Board will file a notice of determination in accordance with title 14, California Code of Regulations, section 15096(i) within five days from the issuance of this Notice of Approval.

14. The Project Proposal was made available for public review on the Regional Water Board's website from November 26, 2012, to December 17, 2012, in accordance with provisions of the Nutrient Offset Program. Public comments were received and considered by the Regional Water Board Executive Officer. Regional Water Board staff provided a written response to significant public comments related to this Project.

ACCORDINGLY, BASED ON AN INDEPENDENT REVIEW OF THE RECORD, THE REGIONAL WATER BOARD EXECUTIVE OFFICER APPROVES THE NUNES OCEAN VIEW DAIRY OFFSET PROPOSAL AS ELIGIBLE FOR NUTRIENT OFFSET CREDITS IN ACCORDANCE WITH RESOLUTION NO R1-2008-0061, PROVIDED THAT THE PROJECT COMPLIES WITH THE FOLLOWING TERMS AND CONDITIONS:

1. Except as may be modified by any preceding conditions, all actions subject to this approval are contingent on: (a) all proposed activities and activities to mitigate potential water quality impacts being completed in strict compliance with the City's project description, and (b) compliance with all applicable requirements of the Basin Plan.
2. Any change to the operation of the Project that would have a significant or material effect on the findings, conclusions, or conditions of this Notice of Approval must be submitted to the Executive Officer of the Regional Water Board for prior review and written approval.
3. The Project meets the eligibility criteria for Resolution No. R1-2008-0061 and the Nutrient Offset Program and, if constructed as described in the proposal and in compliance with the above-listed conditions, the Project will adhere to applicable water quality standards. Therefore, the Project is eligible for nutrient offset credits, as proposed.

Matthias St. John
Executive Officer

Amendment to:
City of Santa Rosa Approved Offset Credit Proposal for
Nunes-Ocean View Dairy BMPs

Credit Proposal Summary

On October 30, 2012, the City of Santa Rosa submitted a nonpoint source phosphorus and nitrogen crediting proposal to the North Coast Regional Water Quality Control Board (Regional Board) for the Nunes-Ocean View Dairy site. This proposal was approved by the Regional Board on January 24, 2013. The proposal contained information regarding nutrient reductions that would be achieved from three types of Best Management Practices (BMPs) at the site that included:

- BMP #1: Emptying manure lagoons and appropriately managing for future stormwater collection
- BMP #2: Implementing BMPs in heavy use areas to address accumulated manure
- BMP #3: Distributing 12,700 tons of accumulated manure solids for on-site land application

Since the January 24, 2013 proposal approval, the former owner sold the site to Krasilsa Pacific Farms, LLC (Krasilsa). The site's current managing partner, Mr. Hugh Reimers, is in the process of converting the site to a vineyard. This transition has already included implementation of BMPs #2 and #3.

On March 13, 2014, a site visit to confirm these site conditions was conducted by Mr. Dave Smith (Merritt Smith Consulting), Mr. James Klang (Kieser & Associates, LLC), and Mr. Andrew Fang (Kieser & Associates, LLC). At that time, the site heavy use areas had been scraped of manure and grass establishment on previously denuded areas was underway. Both the accumulated 12,700 tons of manure solids previously stock-piled on-site, as well as the solids separating equipment, had been removed. Early signs of grass establishment were evident where manure previously had been stockpiled. At the direction of Mr. Riemers, the two manure lagoons had been drawn down approximately one-third of the lagoon depth to minimize the imminent risk of lagoon overflows.

Subsequent to this site visit, Mr. Riemers indicated to the City that he had observed a historic construction photo suggesting that the lagoons could be as deep as 30 feet below the top of the berm. Though not yet seen by the City, this could suggest that the amount of accumulated solids remaining in these lagoons may be greater than previous engineering estimates.

The lagoon drawdown and grass establishment are deemed appropriate interim BMPs as stipulated in the Dairy Waste Discharge Regulations¹ and Waiver² requirements for nutrient crediting projects. While the current status of the lagoon drawdown was adequate for late spring conditions at the time of the

¹ North Coast Regional Water Quality Control Board. 2012. General Waste Discharge Requirements Order No. R1-2012-002 for Existing Cow Dairies in the North Coast Region. Available online at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/dairies/ Accessed July 2, 2014.

² North Coast Regional Water Quality Control Board. 2012. Conditional Waiver of Waste Discharge Requirements Order No. R1-2012-003 for Existing Cow Dairies in the North Coast Region. Available online at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/dairies/ Accessed July 2, 2014

March 2013 site visit, available lagoon capacity potentially would not be adequate to contain a large storm or runoff associated with a wet season.

With BMPs #2 and #3 implemented, the remaining available credit generating activity at the site still of interest is BMP #1. This would include complete emptying of the two manure lagoons including management and appropriate off-site disposal of accumulated manure solids. As such, the previously approved credit estimates are being amended to reflect lagoon cleanout.

Amended Crediting Proposal Considerations

In addition to the site modifications noted above, three other relevant activities or actions that affect crediting for BMP #1 have occurred since the Nunes-Ocean View Dairy proposal was approved on January 24, 2013. These include a modification to the City's waste discharge requirements (WDR) that now requires only phosphorus offsets, up-to-date phosphorus sampling of the dairy manure storage lagoons, and removal of all cattle from the dairy site. These are summarized as follows.

Phosphorus Offsets Only:

On November 21, 2013, the Regional Board approved Order No. R1-2013-0001, which reissued the City of Santa Rosa Water Reclamation Facility Waste Discharge Requirements (WDR) and NPDES permit CA0022764. The reissued permit reduced the requirements of the Nutrient Offset Program. This Order modified the "zero" or "no net loading" requirements by only applying it to phosphorus discharges. Previously, the Nutrient Offset Program addressed both phosphorus and nitrogen discharges from the Water Reclamation Facility. The nitrogen reduction benefits are still tracked by the City of Santa Rosa so that they can be considered for crediting later for TMDL compliance.

Manure Lagoon Content Sampling for Phosphorus:

Manure samples from the lagoons were collected and lab results were obtained using a composite sample process. The collection of site samples was part of the approved City of Santa Rosa Nunes-Ocean View Dairy Credit Proposal, (as stated on page 7 of that proposal). Specifically, it stated: "Site-specific sampling is being pursued by the City and thus, credit calculations may be adjusted and later communicated with the Regional Board."

The lab results indicated that phosphorus concentrations for Lagoon number 1 had a wet weight of 1,850 ppm or 15 pounds per thousand gallons (2.3 times the book value estimate³). For Lagoon number 2, the wet weight phosphorus concentration was 3,700 ppm or 31 pounds per thousand gallons (4.7 times the book value estimate⁴). These lab results are provided as Attachment A. Potential contributing factors to these elevated concentrations include the previous dairy operator's use of a solids separating system. This system sent only the finer particulate materials into the lagoons, contributing organic particles with a high phosphorus content, or fine soil particles that have a high affinity for P sorption. Another contributing factor is that the lagoons are full of solids that have settled out over a long period of time. Lab results indicated that the solids concentrations were 14 and 19 percent. These high solids concentrations likely reflect limited historic lagoon cleanout activities when managed by the Nunes-Ocean View Dairy operation.

³ Midwest Plan Service. 2004. Manure Characteristics - Manure Management System Series MWPS-18, Section 1 Iowa State University, Aims Iowa

⁴ Ibid.

No Cattle on the Site:

In advance of the property transfer to Krasilisa, all but six cattle were removed from the site. The credit calculation therefore is now based on managing the existing manure in the lagoons and does not consider ongoing manure production and capture that would have occurred if the active dairy operation was still present at the site. Previously, the approved proposal brought the site into WDR compliance status by land applying the new runoff that came into contact with manure as well as existing manure in the lagoons. Land application was to be specified in a manure management plan. Manure in the lagoons now will be removed and dried sufficiently for environmentally safe transport to an offsite composting facility. As such, the credit calculation now is based only on removal and management of the existing manure in the lagoons.

Amended Credit Sums

Revised credit sums were calculated that take into account the current Nunes-Ocean View Dairy site conditions and activities (management changes, offset requirements for phosphorus only, manure sample results, and removal of cattle from the site) as noted above. The original and approved phosphorus credit sum estimated 12,242 credits in the first year and 8,569 credits in years 2, 3 and 4 for a total of 37,949 phosphorus credits. In addition, the approved proposal estimated the nitrogen credit sum to be 149,767. These credit amounts are amended, as shown in Table 1. The revised credit estimation also would have provided 33,419 nitrogen credits. However, no nitrogen credits are required for compliance purposes. The methods used to calculate the reductions are included as Attachment B.

Table 1. July 2014 amended credits (pounds of TP) calculated for BMP #1.

Approved Crediting Option	BMP Elements	Adjusted Annual Credits (lbs P/yr)	Approved BMP Eligibility Period	Total Credits (lbs P)
BMP #1 Empty and manage manure lagoons	Agitation and pumping of liquid slurry, removal of solids, stacking/drying and transport to an offsite composting facility. Interim containment of stacked solids using BMPs	5,630	4 years	22,521

To incorporate the appropriate considerations for a margin of safety, the previously approved methods were applied. A conservative margin of safety (MOS) of 30 percent for all four years (instead of just the last three years as in the original proposal) was applied. In addition, the previously approved discount factors were applied to calculate transport losses that occur prior to reaching Windsor Creek and differences in bioavailability between the manure source and the wastewater treatment facility discharges. In summary, Lagoon runoff nutrient loading discount factors as applied in an Excel calculation spreadsheet (included herein as Attachment B) include:

- Edge-of-field factor = 39.9% calculated at 85 feet
- Bioavailability factors:

- TP = 93.5%
- TN = 85%
- 30% conservative margin of safety for phosphorus
- 40% conservative margin of safety for nitrogen

As noted above, it is possible that the volume of accumulated solids in these lagoons could be greater than estimated in the original crediting proposal. As such, the City will here again, provide updated credit calculations to the Regional Board if manure solids are greater than noted in these credit estimates.

Additional Interim BMPs

The updated approach for implementing BMP #1 includes first agitating and then removing the manure from the lagoons. The excavated manure will be placed at an on-site location in close proximity to the lagoon. Interim BMPs will be used to prevent release of runoff that has come in contact with the stockpiled manure and subsequent transport of the manure to an offsite compost facility. The removal of manure from the lagoon will take place during the dry season to minimize runoff. Effective interim BMPs during the manure stacking phase will consist of selecting a location that provides the use of either:

- A containment berm around the manure stacking pile and grass establishment between the berm and Windsor Creek, or
- A number of stacking piles placed under the former stall barn complex

The selection of either option will consider the current owner's preferences and the type of equipment used to remove and stack the manure. The method to transport the manure to the composting facility will incorporate transportation practices selected from the National Manual of Good Practices for Biosolids⁵ as appropriate for the characteristics of the manure.

Monitoring and Reporting

The previously approved monitoring and reporting procedures will be followed throughout the operating period required to empty the manure lagoons. One inspection will take place during the removal operation (or on a monthly basis if excavation takes more than one month) and one inspection will occur after all manure has been transported off-site. A verification report will include:

- A summary of the interim practices implemented
- BMP #1 schedule of events
- Confirmed volume of manure removed, and the adjusted credit sum reflecting actual volume
- Documentation of the manure being safely transported to the offsite composting facility

The documents will include site photos (as appropriate) and observations that record the performance of interim BMPs and the lagoon manure removal project activities. In addition, the documents will include a summary of site complications encountered (if any) and the methods used to resolve the complications in order to prevent potential discharges of manure contaminated runoff.

⁵ Water Environment Federation (for the National Biosolids Partnership). 2005. National Manual of Good Practices for Biosolids. Available online at: <http://www.wef.org/Biosolids/page.aspx?id=7767> Accessed June 30, 2014.

A project verification letter documenting that the BMP verification/monitoring goals were met will be included in the City's annual report to the Regional Board. An annual verification letter will be submitted to the Regional Board for each of the four years of crediting to provide a record that the credits are active because the manure cleanout efforts were successfully completed.

Amendment Conclusions

Implementation planning is underway for the Nunes-Ocean View Dairy BMP #1 crediting project to completely remove historic manure accumulations from the two existing lagoons. The project will follow the previously approved proposal methods for managing the removal, stacking, and drying of the manure. Under the amended approach, the dried manure will be transported off-site rather than the on-site agronomic application described in the original proposal. Activities that have taken place since the January 24, 2013 approval have necessitated adjustments to the credit sum, reducing the total to 22,521 phosphorus credits. These credits will be applied across four years, at 5,630 phosphorus credits per year. The nitrogen reductions from BMP #1, as amended, will produce related reductions of 33,419 pounds, though these will not be used as compliance credits. The total verified phosphorus credits that will be awarded may change based on the measurement of actual manure volumes removed from the site. Site verification protocols as outlined herein will be followed, as will reporting procedures.

Attachment A

Nunes-Ocean View Dairy Lagoon Sample Testing Results

Laboratory Examination Report

REPORT TO:

Cynthia Kaul
Utilities
Environmental Services
(707) 543-3363

Lab ID# NN14712

Ocean View Dairy Manure Lagoon 1 NORTH

Collection Date: 4/24/14 12:00		Date Received: 4/24/14 12:38		Sample Type: Grab		Sampler: THROOP (R) REIMERS (H)		
METHOD	ANALYTE	RESULT	RL	RESULT DRY WT.	DRY WT. RL	UNITS	ANALYSIS START	QUALIFIER
6010B	Phosphorus, ICP-Soils	1850	125	13000	890	mg/kg	5/1/14	5,1
EPA 353.2	Nitrite as N - Soils	5.0	1.0	36	7.1	mg/kg	4/29/14	
EPA 353.2	Nitrate as N - Soils	1.7	1.0	12	7.1	mg/kg	4/29/14	1
SM4500NorgC-NH3B	Tot. Kjeldahl Nitrogen - Soils	4200	10	30000	71	mg/kg	4/30/14	
Calculation	Total Nitrogen in Soils	4200	12	30000	86	mg/kg	5/12/14	
SM2540B-1997	Total Solids	19	0.1			%	4/24/14	

Lab ID# NN14713

Ocean View Dairy Manure Lagoon 2 SOUTH

Collection Date: 4/24/14 12:00 Date Received: 4/24/14 12:38 Sample Type: Grab Sampler: THROOP (R) REIMERS (H)

METHOD	ANALYTE	RESULT	RL	RESULT DRY WT.	DRY WT. RL	UNITS	ANALYSIS START	QUALIFIER
6010B	Phosphorus, ICP-Soils	3700	125	26000	890	mg/kg	5/1/14	5,1
EPA 353.2	Nitrite as N - Soils	Not detected	1.0	Not detected	7.1	mg/kg	4/29/14	
EPA 353.2	Nitrate as N - Soils	Not detected	1.0	Not detected	7.1	mg/kg	4/29/14	1
SM4500NorgC-NH3B	Tot. Kjeldahl Nitrogen - Soils	6200	10	44000	71	mg/kg	4/30/14	
Calculation	Total Nitrogen in Soils	6200	12	44000	86	mg/kg	5/12/14	
SM2540B-1997	Total Solids	14	0.1			%	4/24/14	

Qualifiers

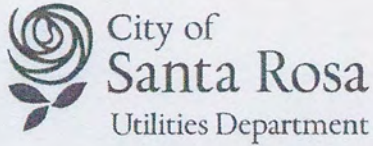
1 - Batch LFM/D or MS/D outside acceptance limits. Data is accepted based on passing method required LFB and/or QCS/LCS.
5 - Reporting Limit(s) have been raised to account for sample dilution due to probable matrix interference.

This data has been reviewed and approved for release.


Shirlee Johnson
Lab Supervisor
sjohnson@srcity.org

Digitally signed by Shirlee Johnson

Date: 2014.05.12 12:31:02 -07'00' Page 2 of 2



Laguna Environmental Laboratory
 ELAP Cert # 1126
 4300 Llano Road Santa Rosa, CA 95407
 (707) 543-3365

Chain of Custody

Department: ENVIRONMENTAL COMPLIA Phone: (707) 543-3363
 Report To: Cynthia Kaul Utilities Project Name/#: NUTRIENT OFFSET
 Sampled By: ROY THROOP/Peimers(H) Date Submitted: 4/24/14
 Date Sampled: 4/24/14 Reported As: LIMS

NN14712 - Ocean View Dairy Manure Lagoon 1

Time	Bottle / Preservation	Matrix	Col. Meth.	Requested Analyses
12:00	1L_P_UNPRES		G	TN
	P_H2SO4		G	TKN
	P_HN03		G	ICP-P
	P_UNPRES		G	NO2 NO3 TS

NN14713 - Ocean View Dairy Manure Lagoon 2

Time	Bottle / Preservation	Matrix	Col. Meth.	Requested Analyses
12:00	1L_P_UNPRES		G	TN
	P_H2SO4		G	TKN
	P_HN03		G	ICP-P
	P_UNPRES		G	NO2 NO3 TS

Relinquished By	Received By	Date	Time
<i>[Signature]</i>	<i>Roy Throop</i>	4/24/14	1200 PM
Remarks/Comments	<i>Anna Vest</i>	4/24/14	12:38

LEGEND		
Matrix:	Sample Method:	
DW = Drinking Water	SW = Surface Water	G = Grab
SL = Sludge	WW = Waste Water	C = Composite
SO = Soils	GW = Ground Water	F = Filtered

Attachment B

Crediting Methods Applied for Laguna Offset Calculations

88,963 lbs. of TN in lagoon 1

Assumed concentration strength of lagoon (1st year)

TP released during over topping 86,273 lbs

Assumed an additional 30% loss as a conservative assumption

TP 60,391 Conservative MOS

MOS: Delivery Ratio 39.9% From Lagoons to Windser Creek

Reference: Moncrief, J., Bloom, P., Hansen, N. Mulla, D., Bierman, P., Birr, A., and Mozaffari, M., 2002. Minnesota Phosphorus Site Risk Index. Final GEIS on Animal Agriculture. Environmental Quality Board (EQB), July 2002. <http://www.eqb.state.mn.us/geis/GEIS-AnimalAgFinal.pdf>. Accessed July 3, 2014.

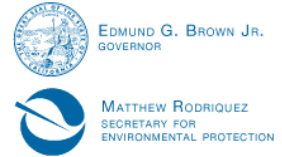
P Bioavailability 93.5%

P Bioavailability factor = 80% manure bioavailability/85.5% WWTP bioavailability

Reference: Barr Engineering Company, 2004. Detailed Assessment of Phosphorus Sources to Minnesota Watersheds. Supporting Technical Memorandum: Assessment of Bioavailable Fractions of Phosphorus and Annual Phosphorus Discharge for Each Major Basin memo. Available on line at: <http://www.pca.state.mn.us/index.php/view-document.html?gid=3987> Accessed July 3, 2014.

Estimated Credit Amount	TP Credits	22,521
	4-year crediting period	5,630 credits per year

TN Tracking:	TN Released during over topping	98,577 lbs.	Assumed 40%
	Delivery Ratio	39.9%	MOS
	N Bioavailability	85%	
	TN Credits	33,419	
	4-year crediting period	8,354.85 credits per year	

EDMUND G. BROWN JR.
GOVERNORMATTHEW RODRIGUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

North Coast Regional Water Quality Control Board

August 19, 2014

Mr. David Guhin
Santa Rosa Utilities Department
4300 Llano Road
Santa Rosa, CA 95407
dguhin@srcity.org

Dear Mr. Guhin:

Subject: Approval of Amendment to City of Santa Rosa Offset Credit Proposal for Nunes-Ocean View Dairy

File: Santa Rosa Subregional Water Reclamation System (Nutrient Offset Program)

On October 30, 2012, the City of Santa Rosa submitted a proposal for activities associated with the Nunes Ocean View Dairy Nutrient Offset Proposal (Project). The Project is located adjacent to Windsor Creek, approximately 0.75 miles upstream of the confluence of Windsor Creek and the Laguna de Santa Rosa. The Project proposed specific actions to eliminate nutrient runoff from the Nunes Ocean View Dairy to Windsor Creek, a tributary of the Laguna de Santa Rosa. After review of the Project for compliance with requirements of Resolution No. R1-2008-0061, the Notice of Approval, Nutrient Reduction Activities for the Nunes Ocean View Dairy Nutrient Offset Project was issued to the City of Santa Rosa on January 24, 2014 (January 24th NOA).

The City was unable to implement the Project as previously approved because the property transferred to a new owner who is converting the property from a dairy to a vineyard. This transition has already included implementation of two out of the three best management practices (BMPs) proposed for nutrient offset in the original Project proposal.

The January 24th NOA requires that *“Any change to the operation of the Project that would have a significant or material effect on the findings, conclusions, or conditions of this Notice of Approval must be submitted to the Executive Officer of the Regional Water Board for prior review and written approval”*. In compliance with the January 24th NOA, on August 5, 2014,

the City of Santa Rosa submitted the *Amendment to City of Santa Rosa Approved Offset Credit Proposal for Nunes-Ocean View Dairy BMPs* (Amended Project) reflecting changes to the Project BMPs.

Regional Water Board staff completed review of the Amended Project and find that revisions to the Project remain consistent with requirements of Resolution No. R1-2008-0061, result in reduction of nutrient loads to the Laguna de Santa Rosa, and are eligible for nutrient reduction credits applicable to discharges from the City of Santa Rosa Subregional Water Reclamation System.

The projected nutrient offset credits and eligibility periods applicable to the Amended Project are as follows:

Approved Crediting Option	BMP Elements	Adjusted Annual Credits (lbs P/yr)	Approved BMP Eligibility Period	Total Credits (lbs P)
Empty and manage manure lagoons	Agitation and pumping of liquid slurry, removal of solids, stacking/drying and transport to and offsite composting facility. Interim containment of stacked solids using BMPs	5,630	4 years	22,521

Please incorporate additional sample collection and nutrient analysis during the manure removal process to confirm crediting calculations. Final crediting calculations shall be presented in the Amended Project Verification Report.

We look forward to implementation of the Amended Project at your earliest opportunity. If you have any questions, you may contact Lisa Bernard at (707) 576-2677 or by email at Lisa.Bernard@waterboards.ca.gov.

Sincerely,

Original Signed By Fred Blatt For

Matthias St. John
Executive Officer

140819_LMB_ef_NunesOceanViewDairyProposalAmendment_Approval

cc: Rita Miller, Santa Rosa Utilities Department, RMiller@srcity.org
Dave Smith, Merritt Smith Consulting, davesmith@merritt-smith.com



October 31, 2014

North Coast Regional Water Quality Control Board
5550 Skylane Blvd. Ste. A
Santa Rosa, CA 95403
Attn: Lisa Bernard,

Re: NPDES Permit No. CA0022764; WDID No. 1B830990SON

Subject: Nunes Ocean View Nutrient Offset Project Update

Dear Ms. Bernard:

As preliminarily reported to you by email last week, the City was informed by the owner of the Ocean View property (Krasilisa Farms, LLP) that its contractor was encouraged by a representative of the Sonoma County Department of Environmental Health and Safety (DEHS) to land-apply the manure removed from the lagoons instead of composting, and is proceeding accordingly. This letter provides additional information about the land application activity and documents consistency with the City's approved project proposal.

The City's original proposal to the Regional Water Board for nutrient offset credit at the Ocean View site (dated October 30, 2012) included on-site land application of manure over a four-year period. This proposal was approved by the Regional Water Board on January 24, 2013. The City's amended proposal (dated July 10, 2014, and approved August 19, 2014) contemplated hauling and composting all manure removed from the lagoons in 2014 based on Krasilisa's proposal to the City, which we understand was based on cost and logistics considerations. With consideration to DEHS's recommendation, Krasilisa shifted to land application but still with the intent of completion in 2014.

Krasilisa reports that land application is occurring on vineyards under the management of Krasilisa personnel at a rate of less than or equal to 10 cubic yards per acre and incorporated into the soil. This loading rate is equivalent to 105 pounds or less of nitrogen and 63 pounds or less of phosphorus per acre. For nitrogen, this loading rate is equivalent to, and, for phosphorus, less than the agronomic demand of the vines and cover crop to which the manure is being applied. .

The October 30, 2012 proposal specified that up to four years would be needed to apply the manure on site based on the agronomic demand of the pasture present on site at that time. As indicated in the City's amended proposal, property ownership and use changed (which necessitated the amendment), and all manure is to be removed in 2014. With the DEHS-recommended change from composting to land application and incorporation, application to additional lands has become necessary.

Lisa Bernard
North Coast Regional Water Quality Control Board
Nunes Ocean View Nutrient Offset Project Update
Page 2

The project is being conducted consistent with the intent of the City's proposal. Thus, the Regional Water Board's approval based on the fact that vineyards receiving Krasilsa manure are under the management of Krasilsa personnel, the manure is being managed beneficially and manure hauling was anticipated in the amended proposal. Documentation of project implementation and calculation of earned offset credit will henceforth be provided consistent with reporting requirements.

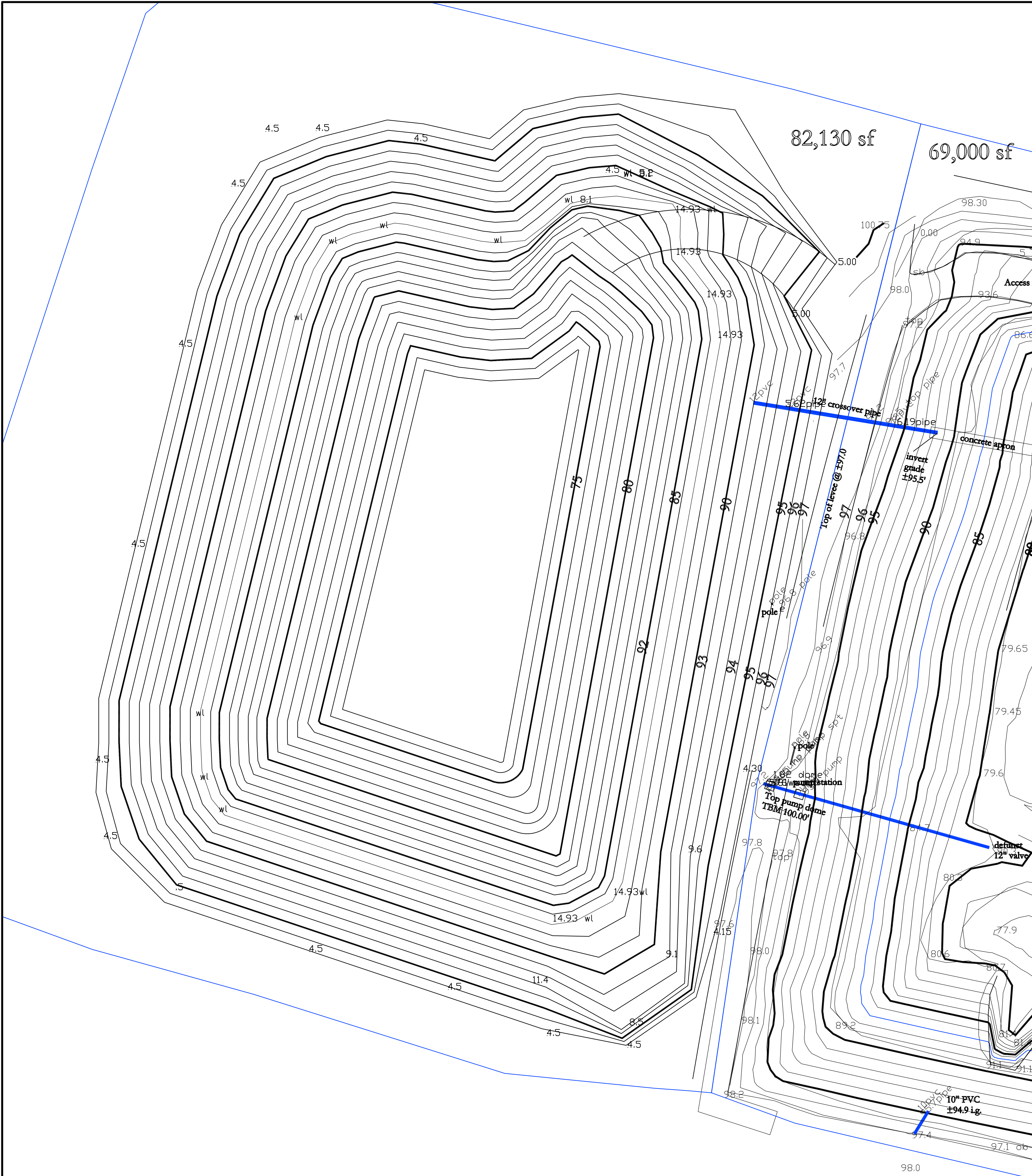
Please feel free to contact me at 707 543-3879 or Dave Smith at 707 849-6123 if you have any questions.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Rita M. Miller".

Rita M. Miller, P.E.
Deputy Director of Environmental Services

cc: Jim Klang, Keiser and Associates
Dave Smith, Merritt Smith Consulting



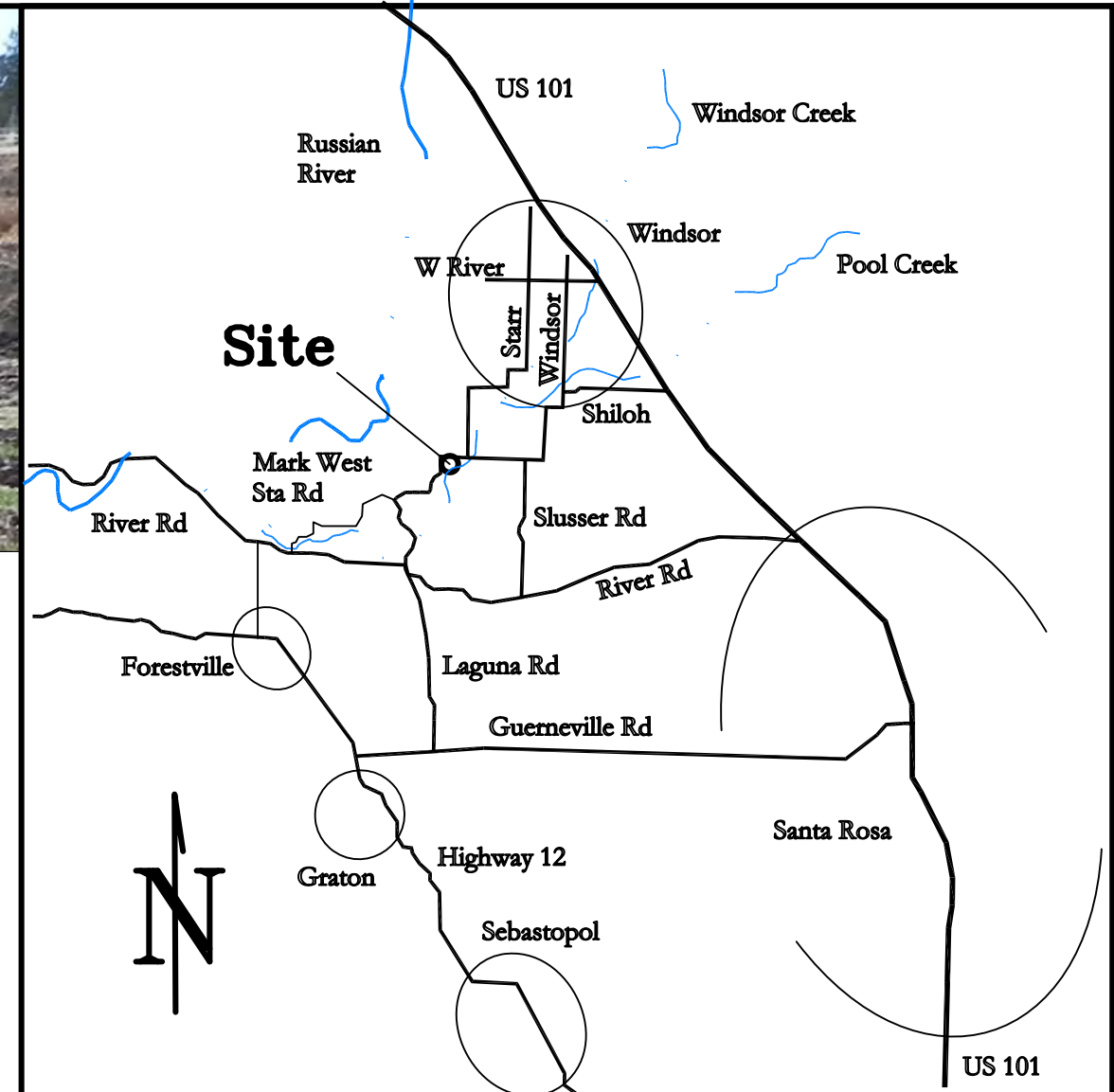
Site photo 9/23/2014. Pipe in distance is 18" i.d. Photo scaled based on pipe i.d. 12" elevation increments parallel to bottom of pipe. Pipe projects about 20' towards camera from water line, so cloned pipe outline used to project from observed water line to determine approximate water elevation. Liquid line judged +10' below top of bank, consistent with calibration curve elevation 87'.

Both reservoirs partially filled with rain water 12/14/2014. Water surface elevations in Pond 1 and Pond 2 were within +0.07' (+3/4") at time of site review. Per previous calibration curve, easterly Pond 2 water surface at elevation 87' contains an estimated storage volume of 192,715 ft³.

Tributary areas scaled in CAD are 82,130 and 69,000 sf for Ponds 1 and 2 respectively. Pond 1 tributary is 1.19x that of Pond 2. Since both have been subjected to equal rainfall, accumulated storage volume in Pond 1 should be 1.19x that of Pond 2, equal to about 229,390 ft³.

Contours for Pond 1 were estimated by determining water line perimeter using submeter GPS horizontal coordinates and rotating beam laser for elevations. Top of levee elevation at 97' was determined all around the impoundment and contours prorated between water line at 86.9' and top of levee. The resulting slopes were projected into Pond 1 to unknown total depth. Since means were not readily available for soundings or depth measurements, impoundment depth was reverse engineered by increasing depth per CAD contours and resulting Pond 1 calibration curve until the theoretical storage volume at elevation 87' was equivalent to 1.19x that of Pond 2 at elevation 87'. This results in an estimated bottom elevation of about 73', about 6' deeper than that of Pond 2.

The manure storage elevation of 9/23/2014 was indirectly estimated per the annotated photo above, with a resulting manure surface elevation of about 87'. Per the calibration curve developed in accordance with methods indicated above, the storage volume removed would amount to about 5.3 acre-feet.



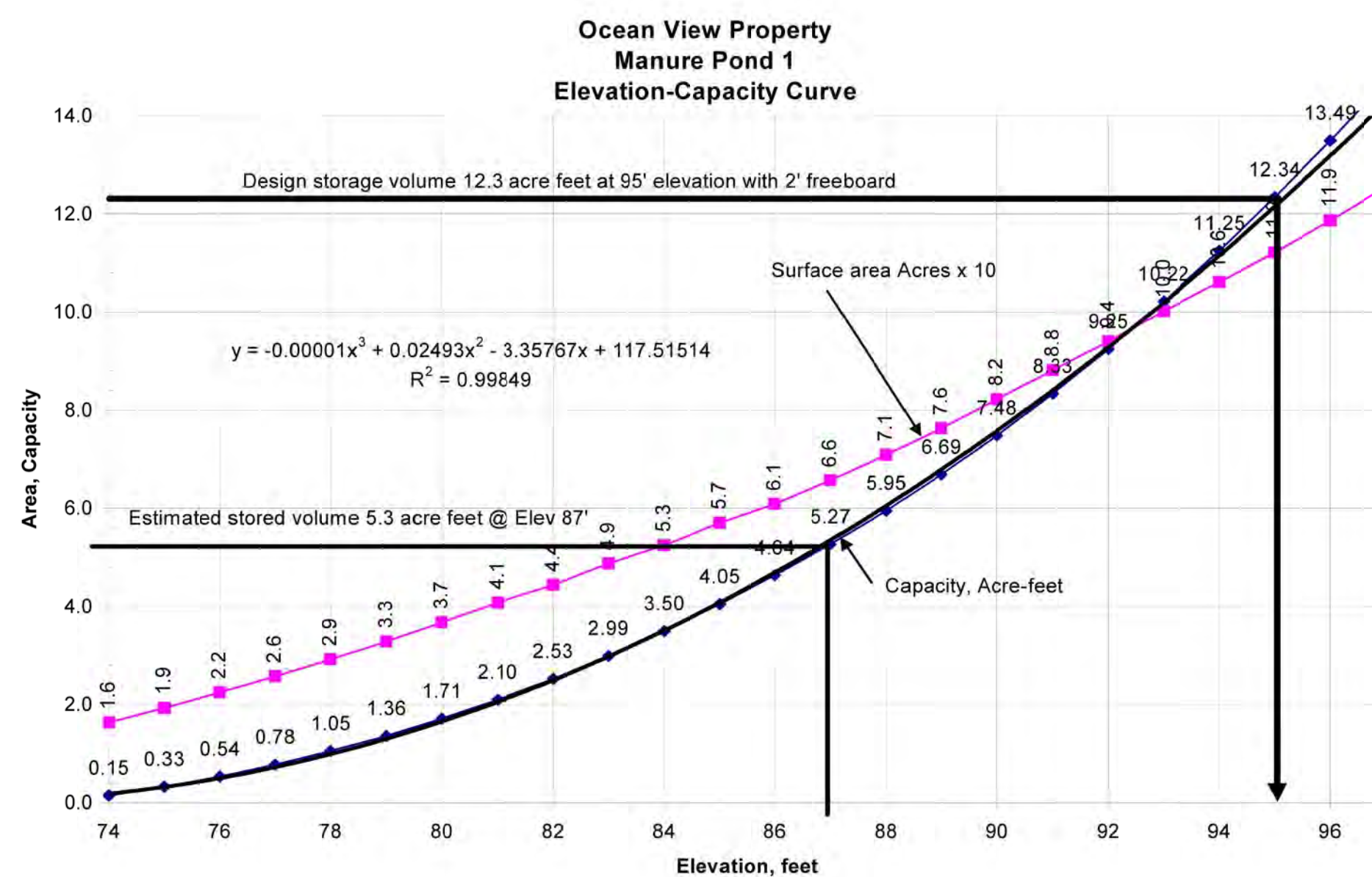
Location Sketch
No Scale

Site topography per photointerpretation of 1' Lidar-derived contours obtained through Sonoma County Vegetation Mapping and Lidar Contours by W. Hart at Goldridge RCD, dated April 2013. Interior sides slopes assumed at 3:1 per Lidar and per Pond 2 field data. Impoundment depth assumed to match Pond 2.

Design capacity about 10.7 acre feet at relative elevation 95' assuming 2' freeboard. Design capacity about 13.0 acre feet at relative elevation 97' assuming 0' freeboard consistent with RWQCB criteria for initial ponds. Engineer observed this condition present in company of prior owner prior to termination of dairy.

April 2013 stored volume at ±9 acre-ft based on previous assumptions and per evaluation of Lidar contours and manure solids surcharged over estimated liquid elevation of 91'.

Reversed elevation-capacity curve provided to show incremental volume as a function of increased depth. Incremental volume between depth increments remains the same independent of design surface area assumption and declines substantially at maximum depths. Incremental volumes may be determined from elevation-capacity data or the incremental volumes shown in the data table.



Stage-Capacity Data
Erickson Engineering Inc.
Data from CAD

File: 40924 manure1
Property: Ocean View
Project: Waste Pond Capacity
Location: Mark West Station Road, Windsor CA
Date: 14-Dec-14 10:41 PM
Revised: 14-Dec-14

Pond 1 - per site data in CAD

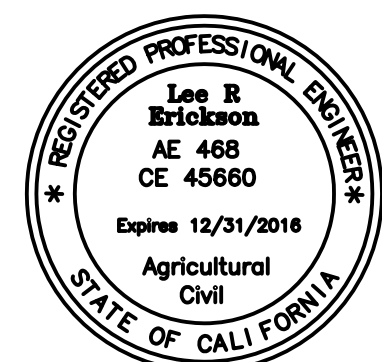
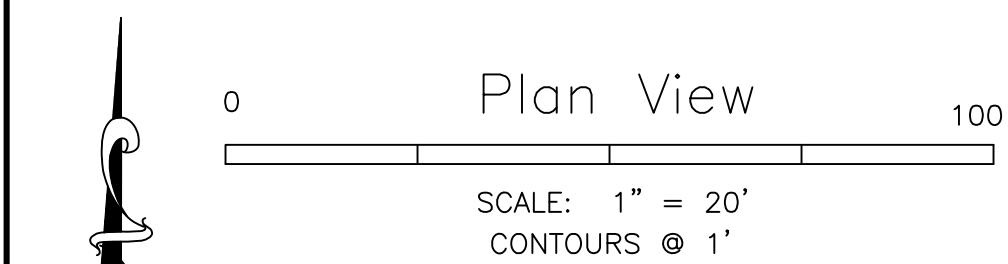
Elevation	Water Sq Ft	Avg SF	Volume Cu Ft	Cumulative Cu Ft	Water H2O Area Acre-Feet	H2O Area Acres x 10	Water Gal x 10 ⁶
100					14.71	12.55	4.800
99			0	640900	14.71	12.55	4.800
98			0	640900	14.71	12.55	4.800
97	54650	53165	53165	640900	14.71	12.55	4.800
96	51680	50270	50270	587735	13.49	11.86	4.402
95	48860	47535	47535	537465	12.34	11.22	4.026
94	46210	44920	44920	489930	11.25	10.61	3.670
93	43630	42295	42295	445010	10.22	10.02	3.333
92	40960	39680	39680	402715	9.25	9.40	3.016
91	38400	37110	37110	363035	8.33	8.82	2.719
90	35820	34535	34535	325925	7.48	8.22	2.441
89	33250	32075	32075	291390	6.69	7.63	2.183
88	30900	29765	29765	259315	5.95	7.09	1.942
87	28630	27585	27585	229550	5.27	6.57	1.719
86	26540	25690	25690	201965	4.64	6.09	1.513
85	24840	23855	23855	176275	4.05	5.70	1.320
84	22870	22055	22055	152420	3.50	5.25	1.142
83	21240	20295	20295	130365	2.99	4.88	0.976
82	19350	18560	18560	110070	2.53	4.44	0.824
81	17770	16895	16895	91510	2.10	4.08	0.685
80	16020	15170	15170	74615	1.71	3.68	0.559
79	14320	13530	13530	59445	1.36	3.29	0.445
78	12740	11985	11985	45915	1.05	2.92	0.344
77	11230	10510	10510	33930	0.78	2.58	0.254
76	9790	9105	9105	23420	0.54	2.25	0.175
75	8420	7775	7775	14315	0.33	1.93	0.107
74	7130	6540	6540	6540	0.15	1.64	0.049
73	5950				0.00	1.37	0.000

Pond 2
69000 sf trib watershed
87.0 water elev
192715 cum ft³ water stored per
Pond 2 calibration curve

Pond 1
82130 sf trib watershed
87.0 water elev
1.19 area multiplier
229387 theor ft³ stored per
Pond 1 calibration curve
**< Increase depth to obtain 229390
100.07 percent**

LEGEND

- UNPAVED ROAD
- FENCE
- DRAINAGE
- CULVERT



Erickson Engineering Inc.
Civil and Agricultural Engineering
707.795.2498
erickson@ep.net

Dairy Waste Management System
Westerly Storage Pond #1
Elevation - Capacity Curve

Lands of:
APN 066-280-048
OCEAN VIEW DAIRY
3975 Mark West Station Road, Windsor CA

12.15.2014

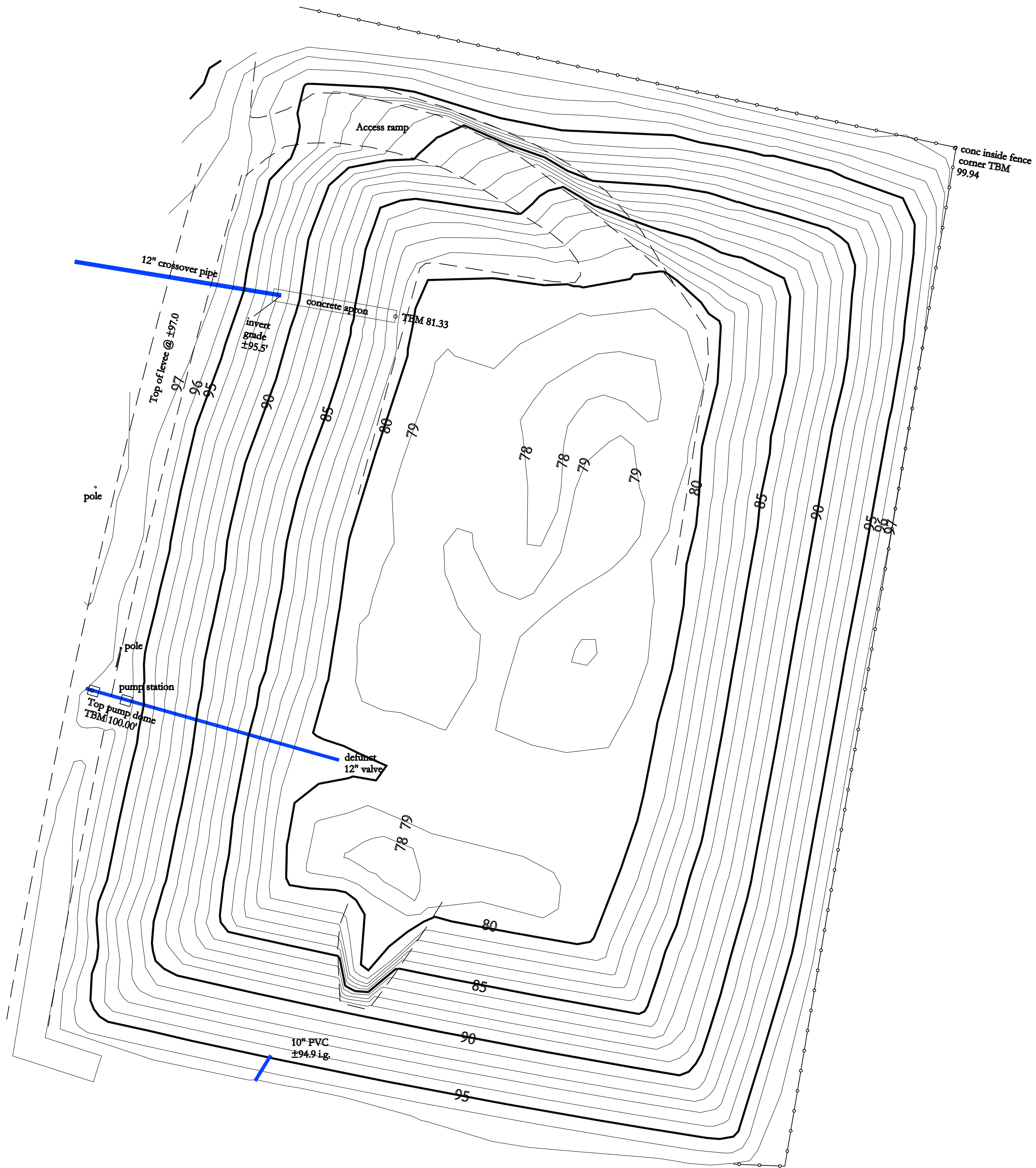
1" = 20'

41215 P1 .dwg

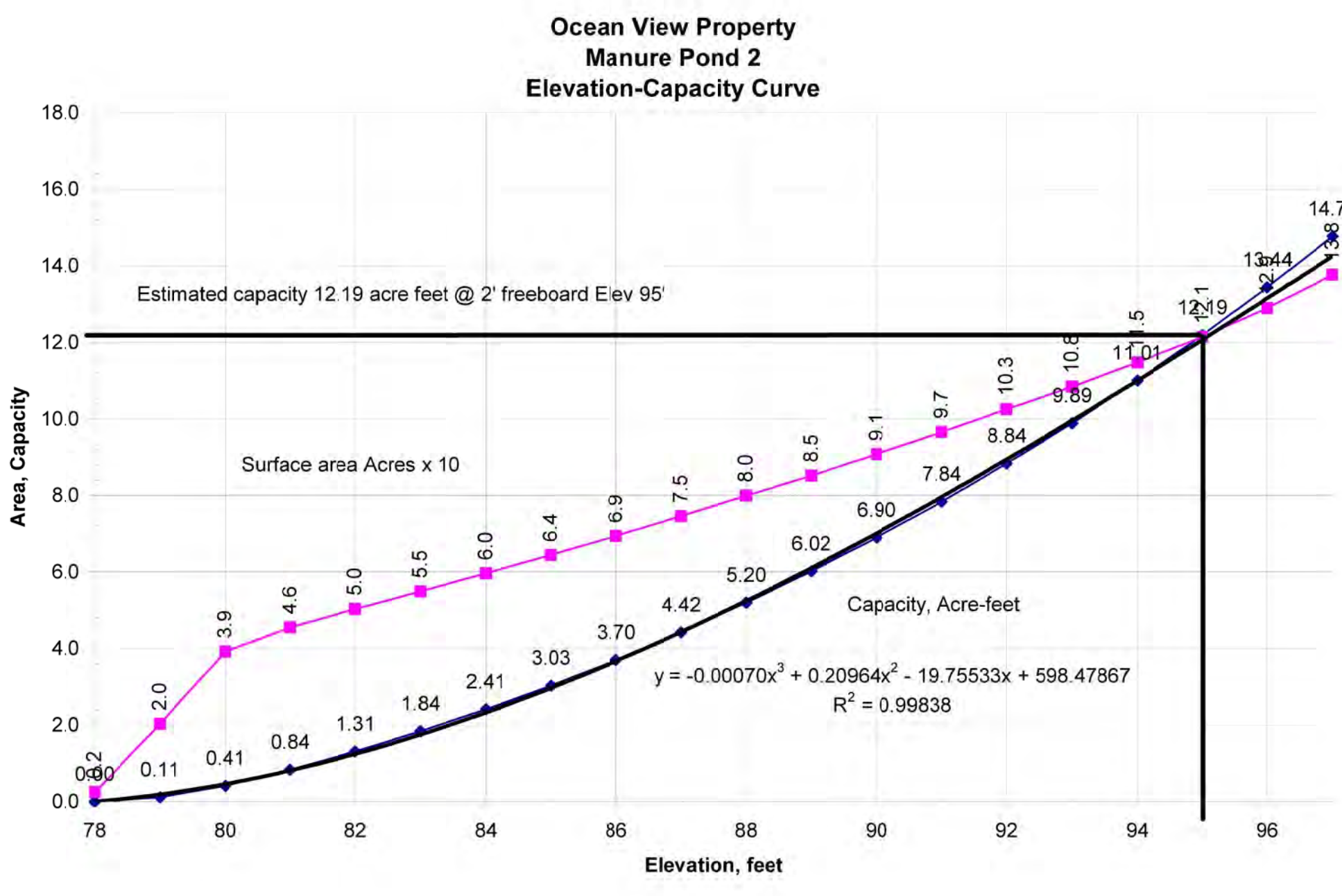
Sheet

C1

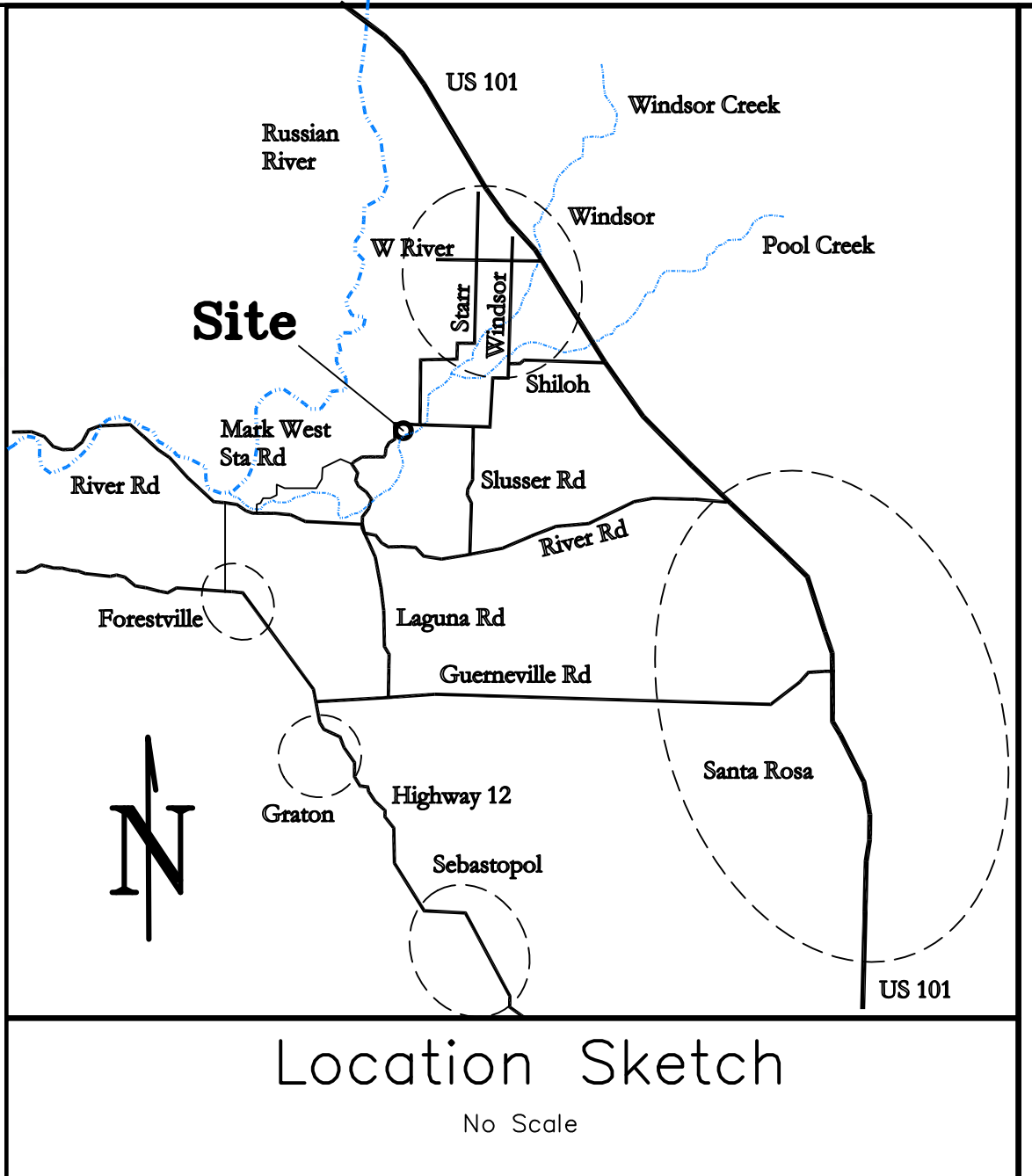
of 1



Plan View
 SCALE: 1" = 20'
 CONTOURS @ 1'



Elevation	Water Sq Ft	Avg SF	Volume Cu Ft	Cumulative Cu Ft	Water Acre-Feet	H2O Area, Acres x 10	Water Gal x 10 ⁶
100					14.77	13.77	
99			0	643535	14.77	13.77	4.820
98			0	643535	14.77	13.77	4.820
97	59980	58080	58080	643535	14.77	13.77	4.820
96	56180	54545	54545	585455	13.44	12.90	4.385
95	52910	51445	51445	530910	12.19	12.15	3.977
94	49980	48610	48610	479465	11.01	11.47	3.591
93	47240	45965	45965	430855	9.89	10.84	3.227
92	44690	43385	43385	384890	8.84	10.26	2.883
91	42080	40810	40810	341505	7.84	9.66	2.558
90	39540	38330	38330	300695	6.90	9.08	2.252
89	37120	35980	35980	262365	6.02	8.52	1.965
88	34840	33670	33670	226385	5.20	8.00	1.696
87	32500	31370	31370	192715	4.42	7.46	1.443
86	30240	29160	29160	161345	3.70	6.94	1.208
85	28080	27045	27045	132185	3.03	6.45	0.990
84	26010	24965	24965	105140	2.41	5.97	0.787
83	23920	22920	22920	80175	1.84	5.49	0.601
82	21920	20880	20880	57255	1.31	5.03	0.429
81	19840	18460	18460	36375	0.84	4.55	0.272
80	17080	12960	12960	17915	0.41	3.92	0.134
79	8840	4955	4955	4955	0.11	2.03	0.037
78	1070		0	0	0.00	0.25	0.000



Site topography of interior of existing emptied easterly Manure Pond #2 September 23, 2014 by linear interpolation of intermittent data points collected using rotating beam laser (elevation) and submeter GPS (horizontal coordinates). TBM assumed at 100.0' on the domed top of the westerly pump station.
 Design capacity about 12.19 acre feet at relative elevation 95.0' based on required 2.0' freeboard, consistent with piping facilities installation elevations. Design volume is equivalent to 530,910 ft³ or 3.997 x10⁶ gallons.
 Use calibration curve or trend line equation to determine storage capacity at other elevation levels.

LEGEND

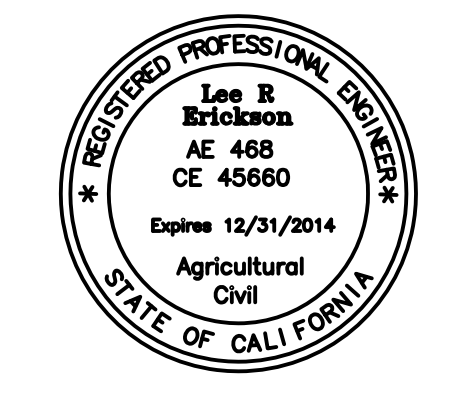
- UNPAVED ROAD
- FENCE
- DRAINAGE
- CULVERT

Erickson Engineering Inc.
 Civil and Agricultural Engineering
 707.795.2498 erickson@ep.net

Dairy Waste Management System
 Easterly Storage Pond #2
 Elevation - Capacity Curve

APN 066-280-048
OCEAN VIEW DAIRY
 3975 Mark West Station Road, Windsor CA

Lands of:
 09.24.2014
 1" = 20'
 40923 P2.dwg
 Sheet
C1
 of 1



Results shown here are from samples collected from pond bottoms.
Results from surface samples are provided in an attachment to the original proposal, which is in Attachment 1.

Laboratory Examination Report

REPORT TO:

Cynthia Kaul
Utilities
Environmental Services
(707) 543-3363

Lab ID# NN21723

Manure Pond 1

<i>METHOD</i>	<i>ANALYTE</i>	<i>RESULT</i>	<i>RL</i>	<i>RESULT DRY WT.</i>	<i>DRY WT. RL</i>	<i>UNITS</i>	<i>ANALYSIS START</i>	<i>QUALIFIER</i>
6010B	Phosphorus, ICP-Soils	1730	20.0	8200	95	mg/kg	12/3/14	
EPA 353.2	Nitrite as N - Soils	2.0	1.0	9.5	4.8	mg/kg	12/1/14	
EPA 353.2	Nitrate as N - Soils	Not detected	1.0	Not detected	4.8	mg/kg	12/1/14	
SM4500NorgC-NH3B	Tot. Kjeldahl Nitrogen - Soils	5700	10	27000	48	mg/kg	11/19/14	
Calculation	Total Nitrogen in Soils	5700	12	27000	57	mg/kg	12/4/14	
SSPA 2nd ed.	Bulk Density	0.64		3		g/cc	12/15/14	
SM2540B-1997	Total Solids	28	0.1			%	11/12/14	

Manure Pond 2

Collection Date: 11/10/14 13:00		Date Received: 11/10/14 13:53		Sample Type: Grab			Sampler: HART (W)		
<i>METHOD</i>	<i>ANALYTE</i>	<i>RESULT</i>	<i>RL</i>	<i>RESULT DRY WT.</i>	<i>DRY WT. RL</i>	<i>UNITS</i>	<i>ANALYSIS START</i>	<i>QUALIFIER</i>	
6010B	Phosphorus, ICP-Soils	2320	66.7	11000	320	mg/kg	12/3/14	5	
EPA 353.2	Nitrite as N - Soils	Not detected	1.0	Not detected	4.8	mg/kg	12/1/14		
EPA 353.2	Nitrate as N - Soils	Not detected	1.0	Not detected	4.8	mg/kg	12/1/14		
SM4500NorgC-NH3B	Tot. Kjeldahl Nitrogen - Soils	6600	10	31000	48	mg/kg	11/19/14		
Calculation	Total Nitrogen in Soils	6600	12	31000	57	mg/kg	12/4/14		
SSPA 2nd ed.	Bulk Density	0.60		2.9		g/cc	12/15/14		
SM2540B-1997	Total Solids	21	0.1			%	11/12/14		

Qualifiers

5 - Reporting Limit(s) have been raised to account for sample dilution due to probable matrix interference.

This data has been reviewed and approved for release.

Spectrum Analytic Inc.

FERTILIZING GRAPES



Soil Analysis
Plant Analysis
Fertilizer Analysis
Manure Analysis

1087 Jamison Road
PO Box 639
Washington C.H., Ohio 43160

1-800-321-1562
(740) 335-1562
Fax: (740) 335-1104
www.spectrumanalytic.com

Nitrogen (N)

Grapes do not have a high N requirement, when compared to many other crops. In fact, a high plant N content late in the season is often detrimental to the quality of both types of grapes, whether for jams, juice, jelly, or wine. High plant N levels late in the season can also adversely affect the vines ability to withstand a severe winter. However, inadequate N will reduce yields and profits. It is important to understand and identify the needs of a specific crop, or section of the vineyard.

New Plantings

There is little in the literature to suggest a different N rate for new plantings. Some sources recommend about ½ the rate of N for new plantings. However, a logical case can be made for maintaining the same, or increasing the rate of N on new plantings, since the goal is to grow vines, not grapes. The use of a higher N rate should be tempered by the possibility of having a soft succulent plant going into winter or creating a significant amount of carry-over N in the first year of bearing fruit.

Established Vineyards

Depending on the inherent N supplying ability of the soil, the correct N rate for a vineyard will typically range from 30 to 100 lb. N/acre, with 75 lb. N/acre being a commonly needed N application rate. One significant difference from this is when the vines are planted in the “Geneva Double Curtain” system. This system often produces best with up to twice the N rate of a single trellis design. Where a sod cover crop is present, it may require an additional 40 lb. N/acre to maintain a healthy grass stand.

N Application Timing

There is significant disagreement here as well. Most authorities agree that the greatest demand for N is from bud-break through early berry development. In wine producing areas such as California and Europe the recommendations are typically for a single N application prior to bud-break. This is probably so that the proper concentrations of compounds desirable for wine production form in the berries by harvest. In areas where the production is primarily for table or other uses, a split application is sometimes recommended. They typically suggest applying ½ of the N prior to bud-break and ½ post-bloom.

While this is not necessarily a large difference, it could be very significant on soils with a high possibility of N leaching. Some recommendations suggest that mid-winter N applications are satisfactory. Producers that are interested in this option should consider the possibilities of N losses on their particular land and typical weather pattern.

Foliar N

Foliar N should not be considered a substitute for a sound soil applied program, and few authoritative sources make any recommendation for foliar N. However, where foliar N is needed the following program has been successful. Mix 5.0 lb. of low biuret urea per 100 gal. and apply at 200 gal./acre starting with the first cover spray and spacing the sprays about 10 days to 2 weeks apart. Up to 3 applications are recommended. Calcium nitrate can be applied at 5.0 – 7.0 lb. per 100 gal.

Some Universities recommend that growers allow weeds and grass to grow within the rows late in the season (from September on in the Mid-west). The reasoning is that the weeds will pull N and moisture from the crop. This will slow growth, promote fall hardening and help hold the soil in place for the winter.

Phosphorus (P)

It is generally agreed that grapes do not put a great demand on the soil for P. However, a crop grown on an acid soil will get less efficient use of the P in the soil, and should benefit from an adequate rate of P_2O_5 . Also, most grapes are grown with a cover crop. This crop typically needs a sound P_2O_5 program to maintain a healthy, dense stand. Several sources suggest that corrective rates of P_2O_5 (up to as much as 300 lb./acre of P_2O_5) be applied when establishing a new vineyard. Our P recommendations try to reach a practical medium.

NEW PLANTING

Soil Status	Pre-Plant Incorporated	Established Vineyard
	lb. P_2O_5 /Acre	
Poor	200	60
Medium	150	40
Good	50	20
High	0	0

Application Methods

See General Application Methods discussed earlier.

Foliar

None suggested.