



EA Engineering, Science, and Technology, Inc., PBC
320 Gold Avenue SW, Suite 1300
Albuquerque, New Mexico 87102
Phone: (505) 224-9013

July 26, 2019

Mr. Matthew Smith
New Mexico Environment Department
Ground Water Quality Bureau
1190 St. Francis Drive, Suite N2200
Santa Fe, NM 87505

**RE: STAGE 2 ABATEMENT PLAN MODIFICATION PROPOSAL AND DAD-06
MONITORING WELL REHABILITATION FOR DONA ANA DAIRIES, DONA
ANA COUNTY, NEW MEXICO, REVISION 02**

Dear Mr. Smith:

On behalf of the Dona Ana Dairies (DAD), EA Engineering, Science, and Technology, Inc., PBC (EA) is submitting this revised Stage 2 Abatement Plan Modification (S2AP) proposal and DAD-06 rehabilitation plan (Revision 02) following discussion with NMED on July 9, 2019 pertaining to comments submitted by the New Mexico Citizen's Dairy Coalition.

Del Oro Dairy Nitrate Plume

NMED has determined that monitored natural attenuation of the Southern DAD perched aquifer nitrate plume has become ineffective. Concentration trends at Abatement Plan (AP) monitoring wells DAD-9 and DAD-21 support this determination. In order to abate migration of nitrate from the site, groundwater extraction to effect hydraulic control is proposed as an Abatement Plan modification.

EA proposes to install a pumping system along the western and southern boundaries of Del Oro Dairy (Figure 1). The pumping system will include five new wells within the perched aquifer. These wells will be outfitted with submersible pumps. It is difficult to determine the capture effect of these wells; however, the plume instability seems to have arisen out of plugging Discharge Plan well 692-01 in December 2015, and cessation of pumping at that well. NMED observed that this well was being pumped during a field visit that occurred in October/November 2012 (Attachment 1). Therefore, the proposed line of five pumping wells should be adequate. Performance assessment during pumping of the five wells will bear that out. As needed, additional well(s) can be incorporated into the system.

The pumping of groundwater along the western and southern margins of the dairy will require a change in point of diversion from the Office of State Engineer. Del Oro Dairy maintains a water right of 232 Acre Feet per Annum (AFA), of which they currently use around 80 percent. This leaves 20 percent, or 46.4 AFA available to facilitate the proposed abatement. The proposed

continuous pumping rate along the border is 5 gpm (1 gpm per well) for a total pumped volume of 8.1 AFA, or around 17% the available water right. Pumped groundwater will be metered for cumulative discharge (totalized flow) and instantaneous flow. Monthly volume extracted and discharged to the impoundment will be reported on a quarterly basis. Calculation for water demand is included as Attachment 2. Documentation of water rights for Del Oro Dairy is included as Attachment 3.

Figure 2 provides a process flow diagram (PFD) for the system. The pumped water will be discharged to the western wastewater pond (Pond B) as shown on Figure 1. This lagoon has the capacity to store and evaporate the pumped groundwater as provided in the attached calculation (Attachment 2). Lagoons at Del Oro Dairy are inspected and, if necessary, repaired annually to ensure the liners' integrity (Attachment 4). Sampling influent to the wastewater lagoon will be added to the quarterly monitoring regimen under the existing S2AP. Samples will be analyzed for site contaminants of concern identified in the S2AP including nitrate, total dissolved solids, chloride, and total Kjeldahl nitrogen (TKN).

In order to delineate the nitrate plume in the southern perched aquifer, a new monitoring well is proposed for installation southwest of wells DAD-22 and DAD-26 (Figure 1).

Installation of the extraction system will begin within 60 days of approval of this S2AP modification. System installation will be completed within 60 days of the initiation of construction.

DAD-06 Redevelopment/Replacement

AP monitoring well DAD-06 has been dry since September of 2013. EA proposes redevelopment of the well via high pressure jetting. Based on well construction information and recent measurements of total depth, it is estimated that approximately 12 feet of silt or other obstruction has accumulated in well DAD-06 since its installation in 2009. DAD-06 will be replaced if well rehabilitation is unsuccessful.

Redevelopment, and if necessary, installation of a replacement monitoring well will occur within 120 days of the approval of this S2AP modification.

Northern Portion Nitrate Plume

Since 2014, groundwater flow direction has migrated eastward in the Northern Portion of DAD. The shift in groundwater flow direction is evidenced by water level measurements in numerous wells and is consistent from quarter to quarter. Additionally, well casing elevations used to calculate groundwater elevations were surveyed before the shift in flow direction, suggesting that the shift in flow direction is real and not a function of incorrect or inaccurate gauging data.

The eastward groundwater flow direction may be attributable to pumping at supply/irrigation wells along the eastern boundary of the site (Figure 3). Of note, Dominguez Dairy 1 irrigation well LRG-590-S-6 is located directly west of DAD-13. This well is used to irrigate a pecan

orchard. Pumping to supply the volume of water required to irrigate a pecan orchard may help explain the shift in groundwater flow direction.

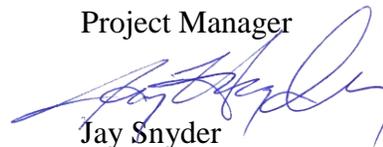
Wells along the eastern edge of the DAD properties (monitoring wells 126-09, DAD-01, 42-10, 42-11, 42-12, and DAD-13) have historically provided delineation of the nitrate plume edge. With the exception of well DAD-13, nitrate concentrations in these wells have remained below the New Mexico Water Quality Control standard and do not show an increase in nitrate concentrations (Figure 4 and Figure 5). Although nitrate concentrations in well DAD-13 had steadily increased between November of 2016 and February of 2018, the nitrate concentrations detected between May and November of 2018 were significantly lower and show a change in trend (Figure 4). A monitoring well location will be proposed in the future if nitrate concentrations in well DAD-13 do not continue downward.

I look forward to working with you, and if you have any questions or comments, please call me 505-400-7125 (cell) or 505-715-4286 (office).

Sincerely,



Gina Mullen
Project Manager



Jay Snyder
Senior Hydrogeologist

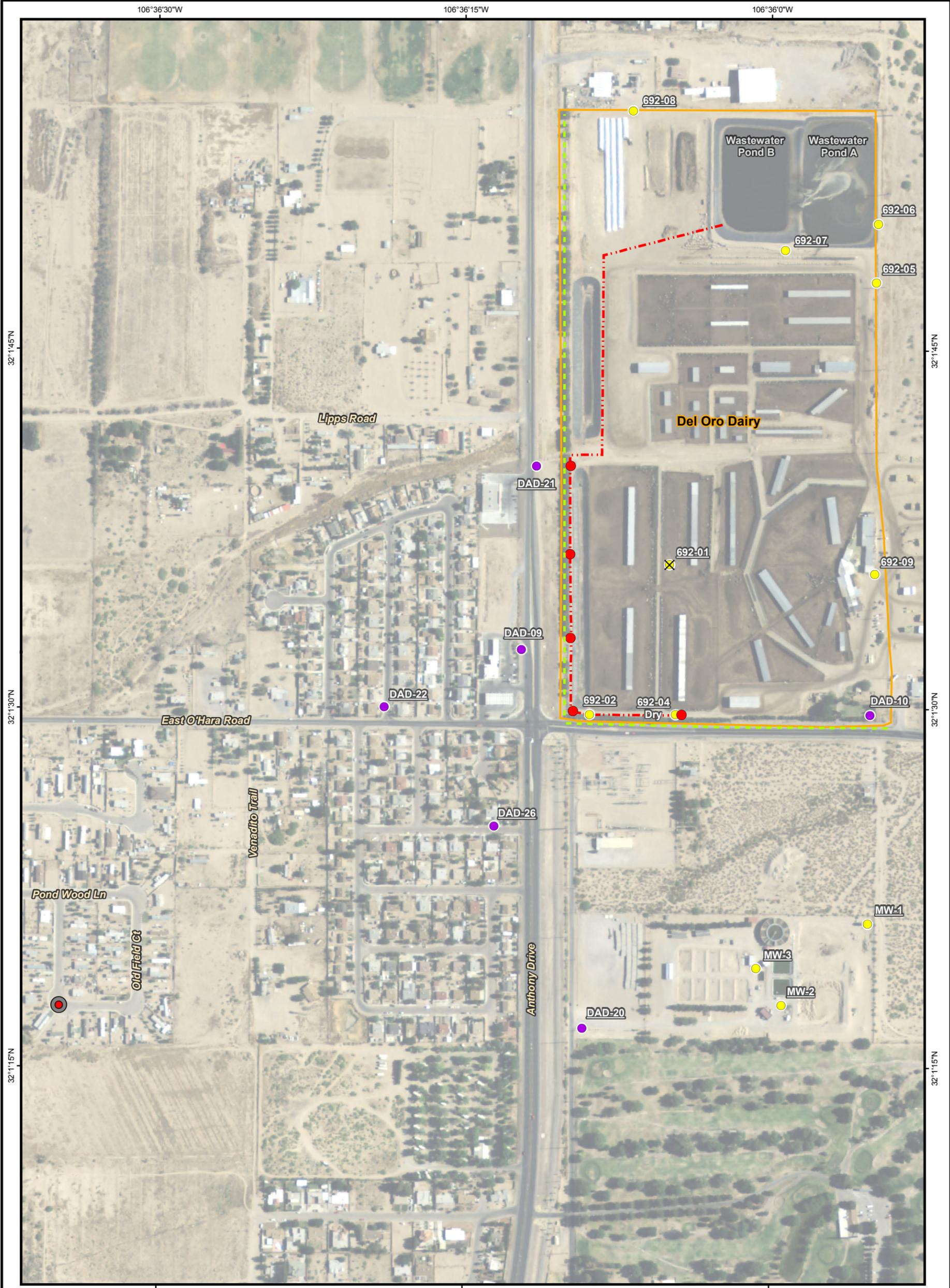
On behalf of: Ed DeRuyter, Dona Ana Dairies

cc: Michelle Hunter, NMED GWQB
Nancy McDuffie, NMED GWQB

Attachments: Figure 1. Proposed Extraction System at Del Oro Dairy
Figure 2. Process Flow Diagram
Figure 3. Supply/Irrigation Wells and the Monitoring Wells in the Northern Portion
Figure 4. Nitrate Concentration Trends in the Northern Area Abatement Plan Monitoring Wells for Delineation of Eastern Boundary
Figure 5. Nitrate Concentration Trends in the Northern Area Discharge Plan Monitoring Wells for Delineation of Eastern Boundary

Attachment 1. New Mexico Environment Department Field Trip Report
Attachment 2. Capture Analysis, Required Pumping Rate, Lagoon Capacity and Lagoon As-Built
Attachment 3. Del Oro Dairy Water Rights
Attachment 4. Documentation of Lagoon Liner Inspection and Repair at Del Oro Dairy

FIGURES

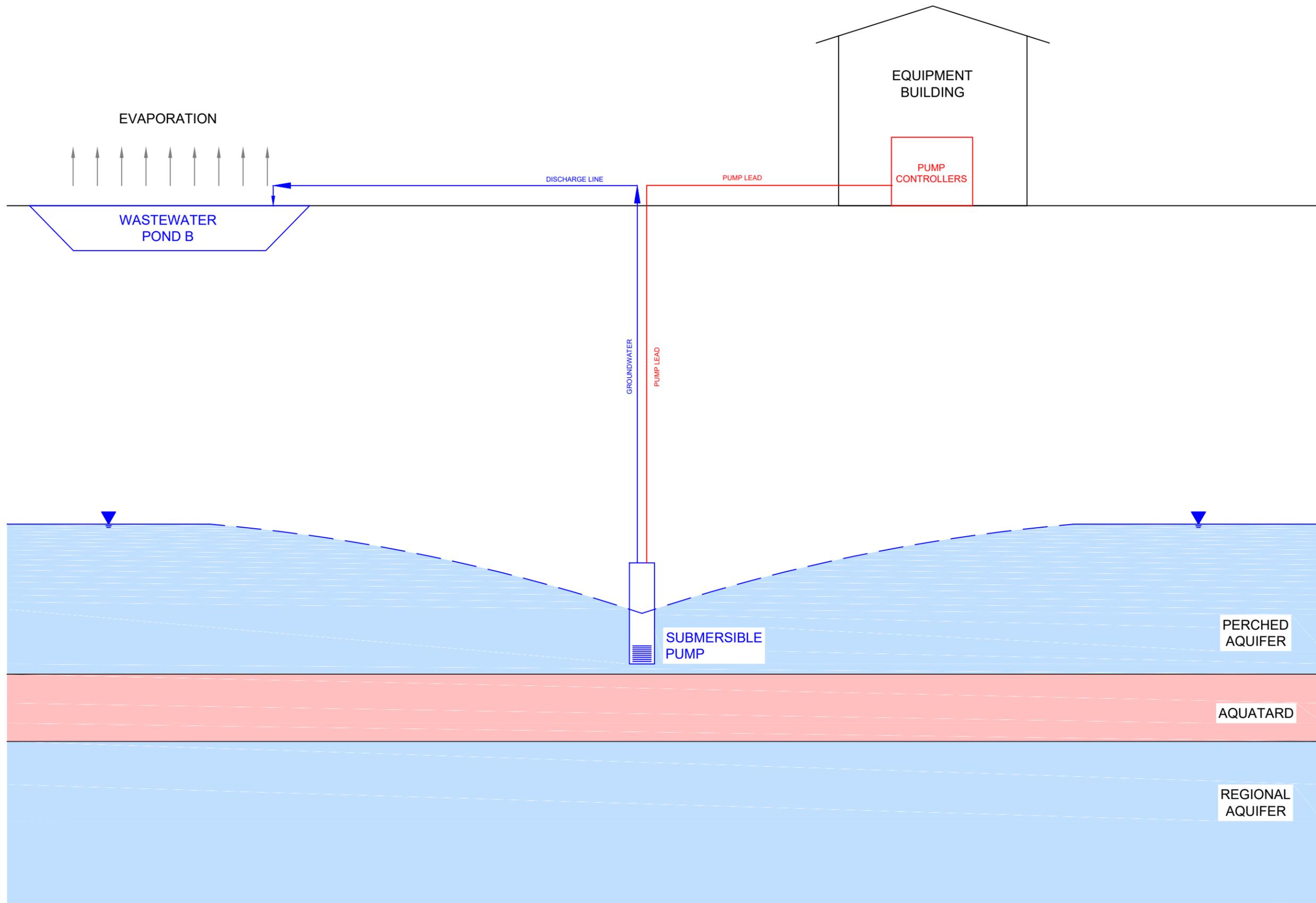


- Proposed Abatement Plan Monitoring Well
- New Extraction Well
- Abatement Plan Monitoring Well
- Discharge Plan Monitoring Well
- ⊗ Discharge Plan Monitoring Well
- - - Conveyance Line
- - - Overhead Electrical Line
- Land Owned by Dairies

0 100 200
 Feet
 1 INCH = 400 FEET
 WHEN PRODUCED AT 11X17IN



DOÑA ANA DAIRIES MESQUITE, NEW MEXICO			
PROPOSED EXTRACTION SYSTEM AT DEL ORO DAIRY SOUTHERN PORTION, PERCHED AQUIFER			
	PROJECT No. 1464103.0006	deloro_analytical_perched200908.mxd	
	DESIGN NA	SCALE AS SHOWN	REV 0
	GIS RM		
	CHECK		
REVIEW			FIGURE 1



REV	DATE	DRAWN	CHECKED	REMARKS
0	04/25/19			

DESIGNED BY: JS
 DRAWN BY: VM
 CHECKED BY: JS

615 Piikoi Street, #515
 Honolulu, HI 96814
 808-588-1455

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

DONA ANA DAIRIES
 DEL ORO DAIRY NITRATE PLUME

PROCESS FLOW DIAGRAM

PROJECT NUMBER:
 DONA_ANA

FIGURE 2

FIGURE 4
NITRATE CONCENTRATION TRENDS
NORTHERN AREA ABATEMENT PLAN MONITORING WELLS FOR DELINEATION OF EASTERN BOUNDARY
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO

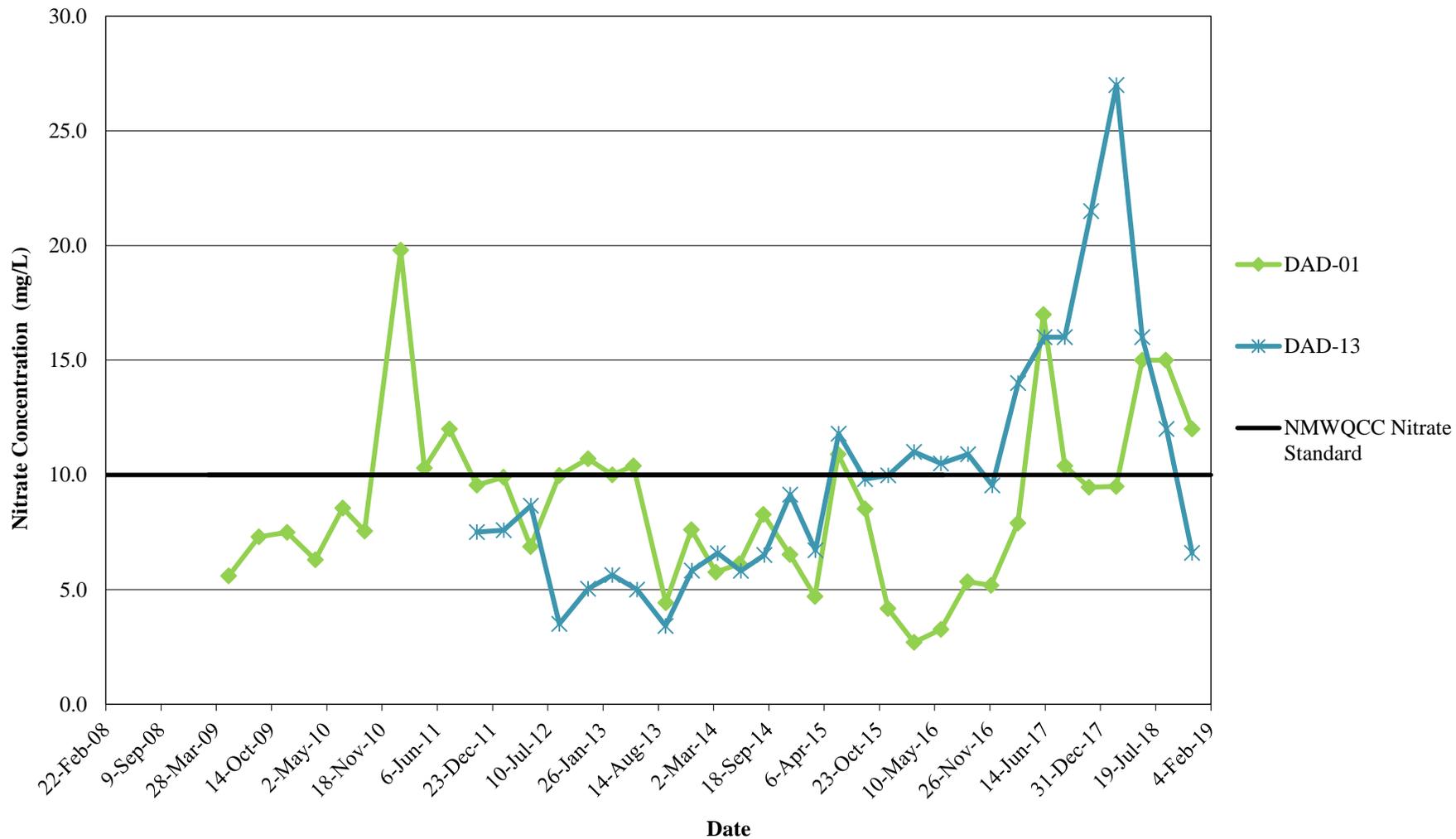
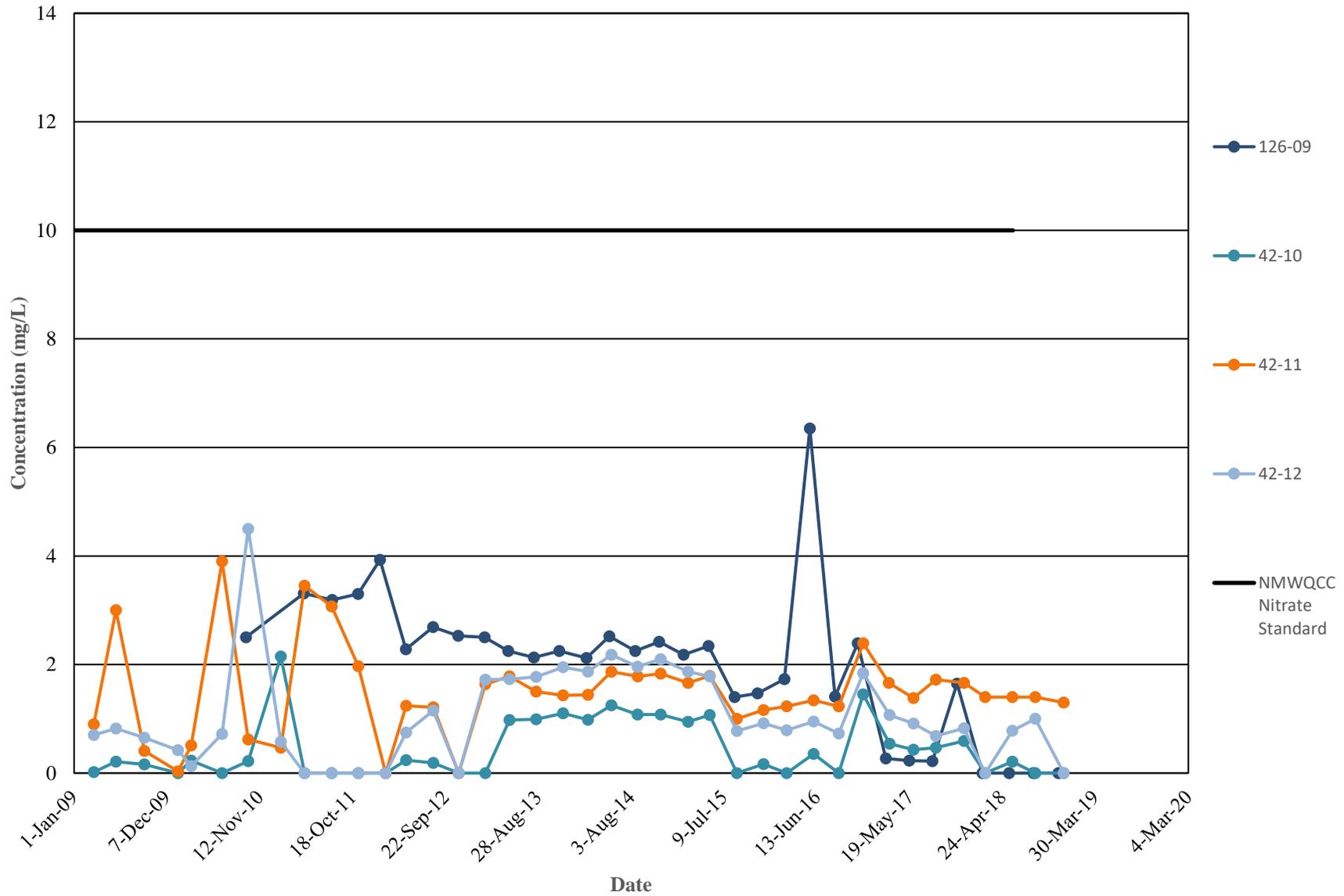


FIGURE 5
NITRATE CONCENTRATION TRENDS
NORTHERN AREA DISCHARGE PLAN MONITORING WELLS FOR DELINEATION OF EASTERN BOUNDARY
DONA ANA DAIRIES, DONA ANA COUNTY, NEW MEXICO



ATTACHMENT 1

NEW MEXICO ENVIRONMENT DEPARTMENT FIELD TRIP REPORT



Field Trip Report
Ground Water Remediation Oversight Section/CEP

Start Date: Oct. 30, 2012 **Time:** 1 pm **End Date:** Nov. 2, 2012 **Time:** 4 pm

Facility Information

Facility Name: Doña Ana Dairies
Address: South of Las Cruces on I-10
City: Mesquite/Vado/Anthony, NM

Type of Operation: Agricultural
Contact: Ed DeRuyter, Chairman
Telephone: (575) 233-2029

Inspector(s): Bart Faris, Ray Montes

Inspection Summary:

Monitoring well integrity and evaluation has been a concern for NMED as specified in point #2 of the Notice of Deficiency of March 2010. The Settlement Agreement signed in July 2011 addresses this issue of MW integrity in paragraphs 19 and 43. Doña Ana Dairy (DAD) group did provide an evaluation of the MWs in the Final Site Investigation dated February 2012. NMED had concerns with the MW screen depths and total depths in other wells identified by DAD. NMED decided, with DAD's cooperation, to camera all MWs of concern. A list of those wells is attached.

From October 20 to Nov 2, Faris and Montes video recorded and completed borehole camera logs for 27 DAD monitoring wells to determine screen depth, screen type, depth to water, total depth, and abnormalities. Results are presented in the attached spreadsheet along with the individual borehole camera logs. The video recordings of individual wells are located on GWQB's electronic files.

Activities Performed:

A downhole video camera was lowered into selected older monitor wells to determine construction details or obstructions in the wells. Dairies where wells were cameraed include Del Norte (former Daybreak), Mountain View, Bright Star, Dominguez 1, Big Sky, River Valley, Sunset, and Del Oro. See attached spreadsheet for list of wells that were cameraed and findings.

Some wells had obstructions in them such as bailers or other debris. Bailers were removed from the wells when possible by using a 3-pronged fish hook. Wells TH-1 and TH-2, as identified in historic maps for River Valley Dairy were located. TH-1 had a bailer which was removed. TH-2 was bent over and lying on its side and could not be cameraed. Several wells had older vertical-slotted screens (see findings attachment and Figure 1). All wells at Del Oro had pumps in them, with the exception of 692-02 and 692-04, and therefore were not able to be cameraed.

Well DAD-20 had a stuck bailer that was removed.

Well 692-01 was found to be pumping and was not cameraed (Figure 2). Paragraph 43 of the Settlement Agreement states that the plugging and abandonment of well 692-01 and the installation of a vertical delineation well is to be deferred until well evaluation is completed. Given that this well had a pump and could not be cameraed, comparison of past depth to water measurements when pumping and not pumping shows at least 20 feet of water column, no lithologic logs, and the well is in a corral, indicate this well should be plugged and abandoned and a new vertical delineation well should be installed.

Samples Obtained:

NA

Action Required:



The findings will be shared with Doña Ana Dairies and their consultants.

Attachments:



Figure 1 - MW TH-2

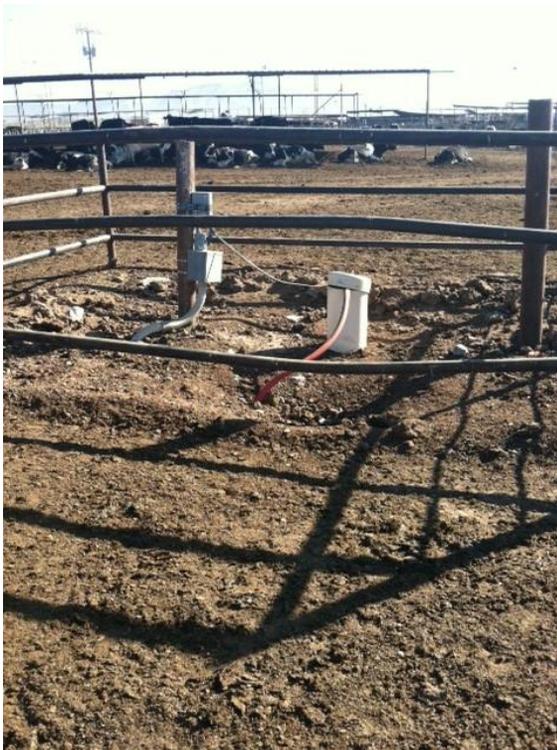


Figure 2 - MW 692-01

ATTACHMENT 2

**CAPTURE ANALYSIS, REQUIRED PUMPING RATE, AND LAGOON
CAPACITY AND LAGOON AS-BUILT**

CALCULATION 1
CAPTURE ANALYSIS, REQUIRED PUMPING RATE, AND LAGOON CAPACITY
DEL ORO DAIRY, ANTHONY, NEW MEXICO

1 Capture Zone of Single Extraction Well

Pumping Rate Single Well (Q)	1 gpm	Assumed continuous well yield
	192 ft ³ /day	
Hydraulic Conductivity (K)	14 ft/day	Assumes 5 x 10 ⁻³ cm/sec hydraulic conductivity
Aquifer Thickness (b)	15 ft	
Transmissivity of Perched Layer (T) = (K)(b)	210 ft ² /day	
Hydraulic Gradient (i)	0.002 ft/ft	
Capture Zone of Single Extraction Well	457 ft	$Y_L = Q/Ti$ (David Keith Todd, Groundwater Hydrology, 1980)

2 Length of Hydraulic Barrier

	1,600 ft	
Number of Extraction Wells Required with 25 % Overlap	5	Barrier Length / (0.75*Capture Zone Single Well) (rounded up)

3 Required Pumping Rate and Volume

Total Extraction Rate (Q _{total})	5 gpm	Number wells times pumping rate single well
Volume per Year	2,628,000 gal/year	Q _{total} gal/min * 1440 min/day * 365 day/year
	or 351,337 ft ³ /year	
	or 8.07 AFA	Total volume ft ³ /year / 43,560 ft ² /acre; AFA = Acre Feet per Annum

4 Loss to Evaporation

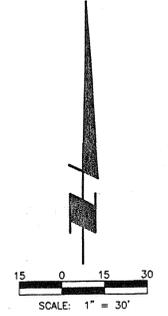
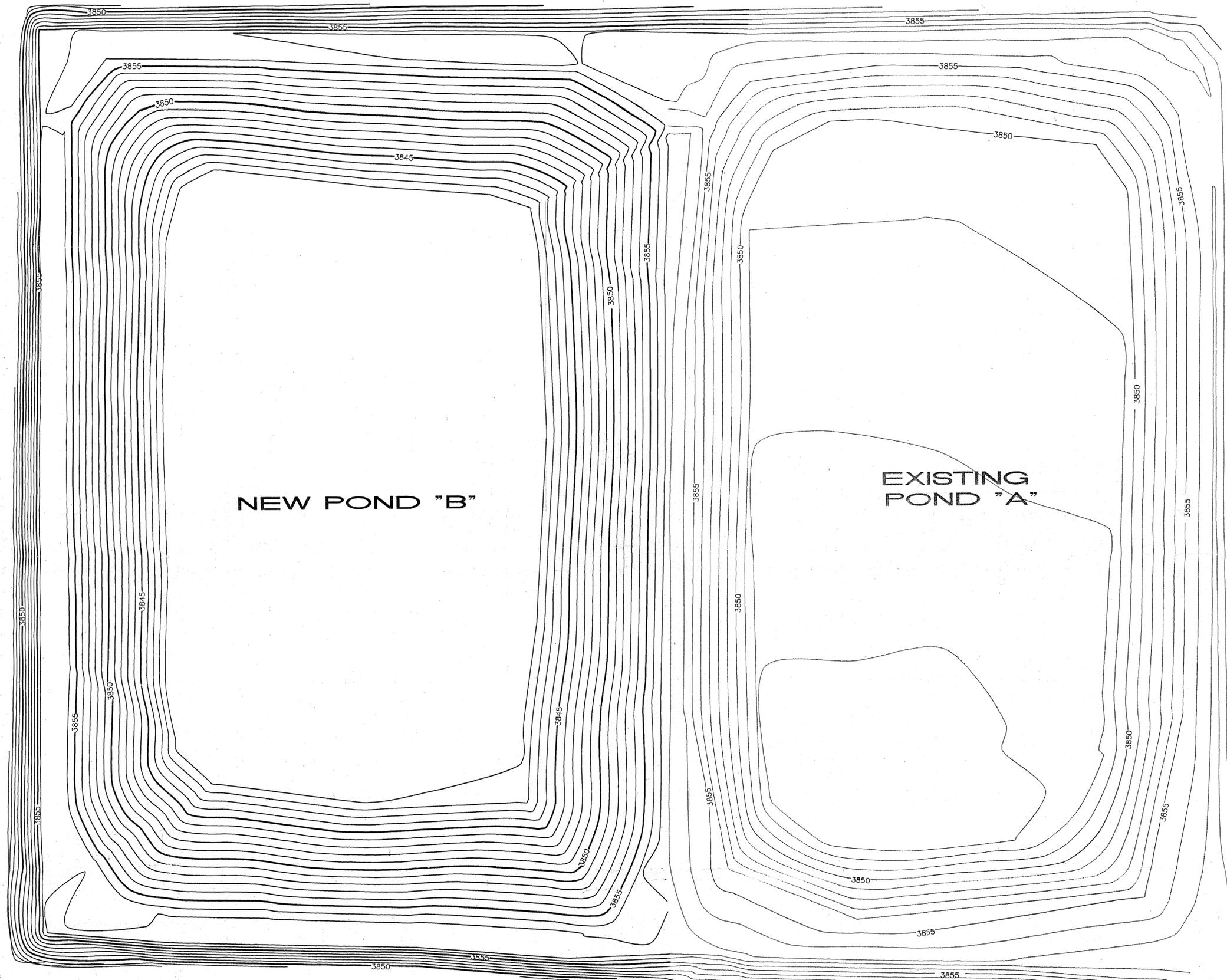
Pan Evaporation	92.9 in/year	https://wrcc.dri.edu/Climate/comp_table_show.php?stype=pan_evap_avg
Precipitation	9.8 in/year	https://www.usclimatedata.com/climate/las-cruces/new-mexico/united-states/usnm0492
Net Loss	83.1 in/year	Pan Evaporation minus Precipitation
	or 6.9 ft/year	

5 Lagoon Volume

Lagoon Top Area (3,853' contour)	144,700 ft ²	See As-Built Diagram
Lagoon Bottom Area (3,841')	73,800 ft ²	See As-Built Diagram
Maximum Depth with 2 Feet Freeboard	12 ft	
Available Lagoon Volume	1,311,000 ft ³ /year	(Maximum Depth)*(Area _{top} + Area _{bottom})/2
Available Influent Capacity	2.5 ft ³ /min	
	or 18.7 gpm	
Design Influent Flow Rate	5 gpm	

6 Safety Factor (Available Q / Design Q)

	3.7	Excess lagoon volume by factor of 3.7
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NEW POND "B"

EXISTING POND "A"

• MW7
3851.01'

DATE	REVISION
DECEMBER 1999	AS-BUILT INFORMATION

**DEL ORO DAIRY
WASTEWATER TREATMENT PONDS
POND "B" AS-BUILT**

**MARVIN MAGEE, P.E.
CONSULTING ENGINEER**

SHEET: 1 OF 1

DATE: DECEMBER 15, 1999



ATTACHMENT 3
DEL ORO DAIRY WATER RIGHTS

STATE OF NEW MEXICO
COUNTY OF DOÑA ANA
THIRD JUDICIAL DISTRICT COURT

State of New Mexico *ex rel.*
Office of the State Engineer,
Plaintiff,

v.

Elephant Butte Irrigation District, *et al.*
Defendants.

COPY
FILED

No. CV 96-288 JUN -8 PM 3: 35
Hon. Jerald A. Valentine

DISTRICT COURT
DOÑA ANA COUNTY, NM
Lower Rio Grande
Southern Mesilla Valley Section

Subfile No.: LRS-28-014-9004

Case No(s). 307-SM-9713064

STIPULATED SUBFILE ORDER

Having considered the agreement set forth below between the State of New Mexico
ex rel. State Engineer (State) and Defendant(s)

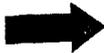
DEL ORO REAL ESTATE LLC

concerning the Defendant(s)' right(s) to use the public waters of the Lower Rio Grande stream system
and the Lower Rio Grande Underground Water Basin, the Court FINDS:

1. The Court has jurisdiction over the parties and the subject matter of this suit.
2. The State and the above-named Defendant(s) have agreed concerning the elements of the Defendant(s)' right(s) to divert and to place the public waters of the Lower Rio Grande stream system and the Lower Rio Grande Underground Water Basin to beneficial use. The State and the Defendant(s) have approved and accepted the elements of Defendant(s)' water right(s) as described in the State's Offer of Judgment and set forth below.

**Subject
Subfile**

UNDERGROUND WATER ONLY

 A. Office of the State Engineer File No(s): LRG-05820 - /

- (1) Priority: December 31, 1978 Groundwater
- (2) Source of Water: Underground waters of the Lower Rio Grande Underground Water Basin.
- (3) Purpose of Use: Dairy Operations

August 11, 2009

Event Code 3597

LRG 58207
TRD 609878

- (4) Point(s) of Diversion for this right:
Well No.: LRG-05820 Location: X=1,532,385 Y= 373,103 Map: LRS-14
Well No.: LRG-05820-S Location: X=1,532,357 Y= 373,214 Map: LRS-14
Well No.: LRG-05820-S-2 Location: X=1,531,730 Y= 373,750 Map: LRS-14
on the New Mexico State Plane Coordinate System, Central Zone, 1983 N.A.D.
- (5) Place of Use Dairy and related purposes at the Del Oro Dairy (Del Oro Real Estate LLC) located in the E1/2, SE1/4 of Section 23, Township 26 South and Range 3 East.
- (6) Amount of Water 232.27 acre-feet per annum.
3. Any conditions imposed by the Office of the State Engineer in granting any permit or license relating to these water right(s) are incorporated into this Stipulated Subfile Order.
4. The Defendant(s) have no right to divert and use the public waters of the Lower Rio Grande stream system and the Lower Rio Grande Underground Water Basin on the properties specifically described herein other than the right(s) set forth in this Order and in other orders entered by this Court.
5. The Court may enjoin and condition the exercise of the Defendant(s)' right(s) to the extent provided by state or federal law. The Court also may require the Defendant(s) to meter and report to the Office of the State Engineer all water diverted through any point of diversion described above.
6. The exercise of any water rights described in this Stipulated Subfile Order for which the "Amount of Water" element is not adjudicated herein shall be subject to such orders as the Court may enter at the time the element is adjudicated.

7. Any right to divert and use the public waters of the Lower Rio Grande stream system and the Lower Rio Grande Underground Water Basin for irrigation purposes is appurtenant to those lands upon which the water is used and is subject to the conditions and restrictions provided in the New Mexico statute entitled "Water appurtenant to land; change of place of use," NMSA 1978 § 72-5-23 (1985).
8. The Defendant(s)' water right(s) are subject to objection by any other water right owner with standing in a later phase of this adjudication suit when owners may object among themselves to individual adjudication orders, and are subject to entry of the final decree in this case.
9. The Defendant(s) will file notice with the Court and provide the Office of the State Engineer with a copy of any change of ownership of all or any part of their water right(s).
10. The Court enters this Stipulated Subfile Order as a final judgment based on the agreement between the Defendant(s) and the State as to all issues addressed herein, and pursuant to the Court's orders regarding finality, this Order is not subject to appeal.
11. There is no just reason for delay of the entry of a final judgment as to the elements of the claims of the Defendant(s) adjudicated by this Stipulated Subfile Order.

IT IS THEREFORE ORDERED that the water right(s) of the Defendant(s) are as set forth above.

IT IS FURTHER ORDERED that the Defendant(s) and all those in privity with the Defendant(s) are enjoined from any diversion or use of the public underground and surface waters of the Lower Rio Grande stream system and the Lower Rio Grande Underground Water Basin, except in strict accordance with the water right(s) set forth in this Order and in other orders of this Court.

Jerald A. Valentine
Jerald A. Valentine
District Judge

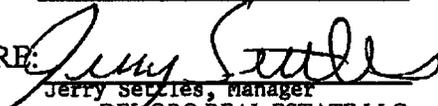
AGREED:

ADDRESS: P.O. BOX 1846

ANTHONY, NM 88021-1846

PHONE: (575) 882-4331

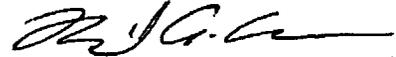
DATE: AUGUST 19, 2009

SIGNATURE: 

Jerry Settles, manager
DEL'ORO REAL ESTATE LLC

Case No. 307-SM-9713064

AGREED:



Special Assistant Attorney General
P.O. Box 25102
Santa Fe, NM 87504-5102

10-1-09
Date

ATTACHMENT 4

**DOCUMENTATION OF LAGOON LINER INSPECTION AND REPAIR
AT DEL ORO DAIRY**

SOUTHWEST LINER SYSTEMS, INC. BERNALILLO, NEW MEXICO
505-771-9122 505-771-0138 fax

7/10/2019

To whom it may concern,

Southwest Liner Systems, Inc. has visually inspected the exsisting ponds at the Del Oro Dairy in Anthony, NM. Upon the inspection we found several damaged areas and made the following repairs.

- **74 Beads**
- **5_1' x 1' patches**
- **4_2' x 1' patches**
- **1_2' x 2' patch**

All repairs were non destructive tested to meet industry standards. Upon completion of visual inspection, the exsisting ponds were free of defects and holes in inspected areas. If you would like to speak with someone from our firm about the inspection and or repairs conducted at the Del Oro facility please feel free to reach out our office for further assistance.



Juan Zarpe_Treasurer



Invoice Number
Invoice Date

SW1953
7/10/2019

Remit to:

Southwest Liner Systems, Inc.

MAILING ADDRESS

P. O. BOX 1972
BERNALILLO, NEW MEXICO 87004
(505)771-9122 Fax (505)771-0138

ACTUAL ADDRESS

301 CALLE INDUSTRIAL
BERNALILLO, NEW MEXICO 87004

Bill To:

BigSky/Desertland Dairy
PO Box 10
Mesquite, NM 88048
Attn: Linda

Ship To:

Del Oro Dairy
Repairs on site

SHIPPED VIA	FOB POINT	DATE SHIPPED	OUR ORDER	FINAL/PARTIAL
BEST WAY	BERNALILLO, NM	N/A		Final
CREDIT TERMS	PURCHASE ORDER NUMBER	REMARKS		
NET 30 DAYS	Verbal			

Bid Item NUMBER	QUANTITY		DESCRIPTION	UNIT PRICE	TOTAL
	EST QTY	Installed			
1	3	1	Liner Repairs including travel time	1,300.00	1,300.00
2	1	1	Hotel Cost Overnight Stay	250.00	250.00
3	1	1	Perdiem 3 Man Crew	180.00	180.00
A FINANCE CHARGE WILL BE CHARGED ON ALL OVERDUE BALANCES @ 1.5% PER MONTH					

TAXABLE SUBTOTAL	1,730.00
NON-TAXABLE SUBTOTAL	
FREIGHT CHARGES	
Dona Ana Cty GRT @ 6.75%	116.78
INVOICE TOTAL	1,846.78

Invoice Number
Invoice Date

SW1919
3/18/2019

Remit to:

Southwest Liner Systems, Inc.
MAILING ADDRESS
P. O. BOX 1972
BERNALILLO, NEW MEXICO 87004
(505)771-9122 Fax (505)771-0138

ACTUAL ADDRESS
301 CALLE INDUSTRIAL
BERNALILLO, NEW MEXICO 87004

Bill To:

BigSky/Desertland Dairy
PO Box 10
Mesquite, NM 88048
Attn: Linda

Ship To:

Del Oro Dairy
Repairs on site

SHIPPED VIA	FOB POINT	DATE SHIPPED	OUR ORDER	FINAL/PARTIAL
BEST WAY	BERNALILLO, NM	N/A		Final
CREDIT TERMS	PURCHASE ORDER NUMBER	REMARKS		
NET 30 DAYS	Verbal			

Bid Item NUMBER	QUANTITY		DESCRIPTION	UNIT PRICE	TOTAL
	EST QTY	Installed			
1	3	3	Pay Estimate # 1 Del Oro Dairy Evap A # 1, Evap B # 2, Runoff C # 3, Runoff D Liner Repairs including travel time	200.00	600.00
A FINANCE CHARGE WILL BE CHARGED ON ALL OVERDUE BALANCES @ 1.5% PER MONTH					

TAXABLE SUBTOTAL	600.00
NON-TAXABLE SUBTOTAL	
FREIGHT CHARGES	
Dona Ana Cty GRT @ 6.75%	40.50
INVOICE TOTAL	640.50