

NM1-57

Revised Permit Application

June 2014

Volume 4, Part 1 of 3: Siting and Hydrogeology

**STATE OF NEW MEXICO
DIRECTOR OF OIL CONSERVATION DIVISION**

**IN THE MATTER OF THE
APPLICATION OF DNCS
PROPERTIES, LLC FOR A
SURFACE WASTE MANAGEMENT
FACILITY PERMIT**

**APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS**

**NOVEMBER 2013
(UPDATED JUNE 2014)**

VOLUME IV: SITING AND HYDROGEOLOGY

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**APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS**

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CERTIFICATION OF SERVICE
C-137 APPLICATION FOR SURFACE WASTE MANAGEMENT FACILITY**

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**VOLUME IV: SITING AND HYDROGEOLOGY
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**VOLUME IV: SITING AND HYDROGEOLOGY
SECTION 1: SITING CRITERIA**

1.0 INTRODUCTION

DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility has been designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Purpose

This section provides compliance demonstrations for the Siting Criteria for Surface Waste Management Facilities specified in the NM Oil and Gas Rules, 19.15.36.13.A-C NMAC. These requirements include depth to groundwater; and proximity of watercourse, floodplains, wetlands, mines, residences/institutions, and unstable areas. The proposed DNCS site meets the Siting Requirements applicable to a Surface Waste Management Facility (i.e., 19.15.36.13.A-C NMAC).

1.2 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection east of Artesia, in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre \pm tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure IV.1.1**). Site access will be provided on the south side of NM 529.

1.3 Description

A portion of the 562-acre tract is a drainage feature that will be excluded from development. The drainage feature includes a 500-ft setback and totals 67 acres \pm . The DNCS Facility will include two main components; a liquid oil field waste Processing Area (177 acres \pm), and an oil field waste Landfill (318 acres \pm); therefore the DNCS Facility comprises 495 acres \pm . Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Plan provided as **Figure IV.1.2** identifies the locations of the Processing Area and Landfill facilities.

2.0 SITING CRITERIA FOR SURFACE WASTE MANAGEMENT FACILITIES

In order to confirm the suitability of the proposed DNCS site for a Surface Waste Management Facility, an evaluation with respect to the Siting Requirements detailed in 19.15.36.13.A-C NMAC was performed and is presented herein. Based upon available information, the proposed DNCS site satisfies the size restriction and each of the 8 siting criteria. Following is a detailed description of the DNCS Site's compliance with the siting criteria. Each siting criterion is defined, applied and discussed individually. The following sections provide the regulatory citation for each criterion, followed by a narrative response. In most cases, a Figure or study is referenced to demonstrate compliance with applicable standard(s).

2.1 Depth to Groundwater

No landfill shall be located where ground water is less than 100 feet below the lowest elevation of the design depth at which the operator will place oil field waste. (19.15.36.13.A.(1) NMAC).

No other surface waste management facility shall be located where ground water is less than 50 feet below the lowest elevation at which the operator will place oil field waste. (19.15.36.13.A.(5) NMAC).

The DNCS site is located in an area where few shallow groundwater resources are known to exist. Information obtained from six borings that were recently advanced at the DNCS site (**Volume IV.2**) provide adequate demonstration that the minimum depth to the shallowest groundwater bearing zone on the property exceeds 150 feet (ft) below ground surface (bgs); and is more than 100 ft below projected landfill base grade levels. The northwest portion of the DNCS site is planned for oil field waste processing, which has been specifically demonstrated to possess in

excess of the required 50-ft vertical setback to groundwater.

Shallow groundwater in this region is generally restricted to paleochannels and other low-lying areas that were incised into the Triassic redbeds bedrock prior to deposition of the Quaternary alluvium over the shale bedrock. Configuration of the top of the Chinle redbeds is an important control on groundwater availability that was recognized by Nicholson and Clebsch. They utilized data for the Chinle shale formation obtained from oil exploration seismic shot holes and other available data to prepare a structure contour map of the top of the Chinle Shale redbeds covering southern Lea County (Nicholson and Clebsch, 1961, Plate 1). The Nicholson and Clebsch structure contour data was projected on the project vicinity map in **Figure IV.1.3** (red isopleths).

The geometry of land surface and underlying geologic units, as well as groundwater saturations in the vicinity of the DNCS site are depicted in the hydrogeologic cross-section shown on **Figure IV.1.4**. This diagram indicates that no shallow alluvial groundwater is present at the DNCS site, consistent with site-specific drilling results. Based upon information projected from nearby petroleum wells (**Figure IV.1.3**), the shallowest potential water-bearing zone is the Santa Rosa Sandstone (lower Triassic Chinle), which is approximately 550 ft below grade at the DNCS site.

Detailed data regarding regional and site-specific hydrogeology are presented in **Volume IV.2** (Hydrogeology), including specific descriptions of the subsurface stratigraphy and water-bearing zones in the vicinity of the proposed DNCS Facility. In compliance with the requirements of 19.15.36.13.A(1) NMAC, the depth to groundwater at the DNCS Site is >100 ft below the lowest elevation of the design depth at which the operator will place oil field waste; and therefore > 50 ft below proposed processing operations.

2.2 Watercourse, Lakebed, Sinkhole, or Playa Lake

No surface waste management facility shall be located: within 200 feet of a watercourse, lakebed, sinkhole or playa lake (19.15.36.13.B.(1) NMAC).

Gordon Environmental, Inc.'s (GEI) subcontractor, Rocky Mountain Ecology (RME) conducted an investigation of the DNCS site on 04/29/2013, including review of potential watercourses, lakebeds, sinkholes, and playa lakes. Results of the field investigation are included in RME's Report, *Watercourses, Floodplains, and Wetlands Investigation* (RME 2013), provided as

Attachment IV.1.A.

In their Report, RME states that “[n]o lakebeds or playa lakes were observed within the DNCS Site boundary, based on the field survey, and analysis of [National Hydrography Dataset] NHD data.” In addition, [n]o sinkholes were observed on the property during the field survey.” As described in their Report, RME identified an ephemeral drainage that runs approximately northeast/southwest through the DNCS site as shown on **Figure IV.1.5**. Based on their field survey and review and analysis of topographic maps and aerial photography, RME concludes that there are no “Waters of the United States”, as defined by the United States Army Corps of Engineers (USACE), located within the DNCS site boundaries. As shown on the Site Plan (**Figure IV.1.2**), the DNCS Facility has been designed with a minimum 200-ft setback from this ephemeral drainage feature. The DNCS Site is not otherwise located within 200 ft of a lakebed, sinkhole or playa lake.

2.3 Wellhead Protection Area; 100-Year Floodplain

No surface waste management facility shall be located: within an existing wellhead protection area or 100-year floodplain (19.15.36.13.B.(2) NMAC).

“Wellhead protection area” means the area within 200 horizontal feet of a private, domestic fresh water well or spring used by less than five households for domestic or stock watering purposes or within 1000 horizontal feet of any other fresh water well or spring. Wellhead protection areas does not include areas around water wells drilled after an existing oil or gas waste storage, treatment or disposal site was established. (19.15.2.7.W(8) NMAC)

Based on data provided by the Office of the State Engineer (OSE) WATERS database, there are no water wells located within the DNCS site boundary. The closest apparent well is a livestock well located approximately 2,250 ft north of the site boundary (**Figure IV.1.6**). Therefore, the proposed DNCS Facility is not located within an existing wellhead protection area.

A review of potential floodplains was also conducted by RME, as reported in **Attachment IV.1.A**. Flood Insurance Rate Maps are not available from the Federal Emergency Management Agency (FEMA) for this area; therefore RME performed a field survey and followed-up with the Lea County Floodplain Management (LCFM) Office. Based on RME’s field survey, and the LCFM’s Floodplain Determination (included in Appendix C of **Attachment IV.1.A**), the DNCS site is not located within a 100-year floodplain.

2.4 Wetlands

No surface waste management facility shall be located: within, or within 500 feet of, a wetland (19.15.36.13.B.(3) NMAC).

“Wetlands” means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions in New Mexico. This definition does not include constructed wetlands used for wastewater treatment purposes. (19.15.2.7.W(9) NMAC).

The potential for wetlands at the DNCS site was also investigated by RME and is included in RME’s Report (**Attachment IV.1.A**). RME concluded that based on their field survey and review of the Natural Resources Conservation Service Web Soil Survey database, that no evidence of wetlands, as defined by the USACE, are present at or within 500 ft of the DNCS site. RME also received confirmation from the United States Fish and Wildlife Service that the surface drainage feature identified at the DNCS site is not a wetland (included in Appendix C of **Attachment IV.1.A**)

2.5 Subsurface Mines

No surface waste management facility shall be located: within the area overlying a subsurface mine (19.15.36.13.B.(4) NMAC).

The applicable section of the current NM Energy Minerals and Natural Resources Department (EMNRD) *Mines, Mills and Quarries in New Mexico* Map is provided as **Figure IV.1.7**. The closest mining operation appears to be an aggregate mining operation located in Eddy County and greater than 7.5 miles northwest of the DNCS Site. The DNCS Site is not located within an area overlying a subsurface mine.

2.6 Land Use Setbacks

No surface waste management facility shall be located: within 500 feet from the nearest permanent residence, school, hospital, institution or church in existence at the time of initial application (19.15.36.13.B.(5) NMAC).

Examination of land use surrounding the Facility, including a site reconnaissance and an aerial photo review (**Figure IV.1.8**), indicate that there are no permanent residences, schools, hospitals, institutions, or churches within 500 ft of the DNCS Site. The nearest permanent residence, school, hospital, institution, and church appear to be located in Maljamar, greater than 6 miles to the northwest of the site. No other permanent structures, other than oil and gas extraction related facilities are present within 500 ft of the DNCS site, and there is no apparent trend for development of residential, institutional, or educational facilities in the immediate vicinity of the proposed Facility.

2.7 Unstable Areas

The oil field waste disposal facility siting requirements set forth in 19.15.36.13.B(6) NMAC specify that:

No surface waste management facility shall be located within an unstable area, unless the operator demonstrates that engineering measures have been incorporated into the surface waste management facility design to ensure that the surface waste management facility's integrity will not be compromised.

An “Unstable Area” is defined in 19.15.2.7.U(6) NMAC as follows:

“Unstable area” means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a division-approved facility's structural components. Examples of unstable areas are areas of poor foundation conditions, areas susceptible to mass earth movements and karst terrain areas where karst topography is developed as a result of dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features of karst terrain include sinkholes, sinking streams, caves, large springs or blind alleys.

This section addresses regulatory requirements for defining site characteristics related to earth stability at the proposed facility.

2.7.1 Karst Potential

Karst terrains and intermittent subsidence and collapse features are present in Eddy County and in southern Lea County. The DNCS site was evaluated for potential karst by review of published and unpublished information on the area, then by detailed review of terrain maps, aerial photographs and site reconnaissance to identify potential evidence of karst features in the area.

Davies and Others (1984) mapped karst potential in the United States based upon the presence of soluble geologic units underlying areas having potential to develop karst terrains. Subsidence features related to dissolution of underlying geologic units and other areas of karst potential in the region of the DNCS site are identified on the physiographic map in **Figure IV.1.9** (Nicholson and Clebsch, 1961). Davies and Others (1984) identified karst potential in areas to the southwest of the DNCS site due to the presence of exposed or shallow beds of gypsum. Two significant subsidence features known as Nash Draw and Clayton Basin are present in this area. Several playas (Laguna Plata, Laguna Gatuna, Laguna Tonto and Laguna Toston) are present approximately 12-15 miles south of the DNCS site in an area underlain by a thin veneer of alluvium on Triassic redbeds of the Chinle Formation. Nicholson and Clebsch (1961) speculated that these features could be the result of dissolution of gypsum and/or halite in Permian sediments below. Another large subsidence feature known as San Simon Swale is present approximately 20 miles south of the DNCS site. Nicholson and Clebsch (1961) reported that seismic exploration drill holes in this feature have penetrated more than 400 ft of unconsolidated materials above the Triassic redbeds.

Davies and Others (1984) identified the area east of Mescalero Ridge as having features analogous to karst where fissures or voids may be present in areas of subsidence where meteoric waters infiltrate into thick unconsolidated material. This area is highlighted and identified as the Llano Estacado in **Figure IV.1.9**. The Llano Estacado is underlain by the Tertiary Ogallala Formation, which contains significant thickness of secondary calcite, or calcrete and is susceptible to dissolution. Numerous shallow subsidence features form playas in this area. Oosterkamp and Wood (1987) characterized the playas on the Llano Estacado as subsidence features that are aligned along structural and drainage alignments where dissolution of secondary calcite caprock had taken place.

Nicholson and Clebsch (1961, plate 1) prepared a structure contour map on the upper surface of the Triassic redbeds in southern Lea County; numerous closed depressions were identified in the upper redbed surface and were interpreted to indicate the potential presence of sinkholes that formed from dissolution of underlying evaporates prior to the deposition of the Ogallala. The Triassic redbed structure contours of Nicholson and Clebsch (1961) are shown on the map in **Figure IV.1.3**. This diagram indicates that two closed depressions in the redbed surface are

present approximately 4 miles southwest of the DNCS site.

Karst Environments and Features

Thornbury (1969) identified a number of geologic and hydrologic conditions favorable to the development of karst terrain as follows:

- Presence of soluble rock such as limestone, gypsum, dolomite or halite at or near land surface
- Dense, highly jointed and/or thinly bedded soluble rock units
- Stream valleys deeply incised into soluble rock
- Moderate to high rainfall rates

Thornbury (1969) also identified a number of characteristic karst geomorphic land forms as follows:

- Sinkholes and associated forms, including solution sinks with broad shallow sinkhole ponds and collapse sinks, with steep rocky margins
- Karst plain, as a broad flat area with no laterally extensive drainages
- Sinking creeks, or creeks that end abruptly, typically in sinkholes
- Blind valleys, or ephemeral washes that end abruptly
- Rise and resurgence of streams
- Artesian springs
- Haystack hills or hums
- Caverns
- Voids and lost drilling circulation
- Tension cracks

Karst Features in the Vicinity of the DNCS Site

No mapped subsidence or karst features are present in the immediate vicinity of the DNCS site. Comparison of conditions at the DNCS site with those conditions favorable to karst development identified by Thornbury (1969) indicates that conditions at the site are not conducive to karst development. Approximately 10 ft of calcrete or caliche were identified near land surface in several of the DNCS site borings; however no thick sections of soluble rock are present at or near land surface in the vicinity of the DNCS site. Logs of the site borings are included in **Attachment IV.2.A**. The shallowest soluble bedrock materials in the area are anhydrite beds in the Rustler Formation which were penetrated at 675 ft below land surface in a nearby oil well known as the Conoco Oil MCA Battery 4 #214 (**Table IV.2.4**). Summary lithologic logs of nearby oil wells

and water wells taken from the New Mexico Office of the State Engineer are included in **Attachment IV.2.C**.

No playas, sinkholes, or other drainage features indicative of karst are present in the area of the DNCS site. Additionally, rainfall rates in the area are low - less than 15 inches per year (Nicholson and Clebsch, 1963).

Site Reconnaissance

During site reconnaissance, the property was examined for evidence of karst or active subsidence, including closed depressions, playas, slumps or tension cracks in surface soil and rock on margins of low-lying areas. Older cultural features such as roads, powerlines, fences, oil wells and well location markers were examined for evidence offset and/or displacement. None were detected. Based upon the above referenced literature review and site reconnaissance, it is concluded that no evidence of active karst or land subsidence was discovered during these investigations.

2.7.2 Pleistocene Faults

There are no known active or geologically recent faults in the vicinity of the DNCS site. Quaternary faults and folds in New Mexico and adjacent areas were catalogued by Machette and Others (1998). The nearest Quaternary fault to the DNCS site identified by Machette and Others (1998) is the Alamogordo Fault, which is located approximately 130 miles to the west.

2.7.3 Seismic Zones

The DNCS site was also evaluated for geologic faults that have experienced movement during the last 11,000 years [i.e., Holocene Period] (**Figure IV.1.10**) and areas susceptible to potential seismic impacts (**Figure IV.1.11**) to verify the physical stability of this location. The Quaternary Faults Map (**Figure IV.1.10**) is based on the United States Geological Survey (USGS) *Map of Quaternary faults and folds in New Mexico and adjacent areas*. The DNCS site is located within an area that is described as an area of “no Quaternary Faults” or an area that is “unmapped”. No faults are shown in the vicinity of the site. The seismic impact zones map (**Figure IV.1.11**) is based on seismic data from the USGS National Seismic Hazard Mapping Project data. The seismic impact zone map indicates that the site is located within an area with no more than a 10% probability of peak horizontal ground acceleration of 0.06-0.08 g in 250 years. A “seismic impact

zone” is an area with a 10% or greater probability of peak horizontal ground acceleration of 0.10 g in 250 years. Therefore, the site is not located in a seismic impact zone.

2.8 Maximum Size

“No surface waste management facility shall exceed 500 acres” per 19.15.36.13.C NMAC.

The DNCS Facility will not exceed 500 acres. Total acreage for the DNCS site is 562 ± acres. However, as described in Section I.3, a portion of the 562-acre tract is a drainage feature that will be excluded from development. The drainage feature includes a 500-ft setback and totals 67 acres ±. The DNCS Facility will include two main components; a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±); therefore the DNCS Facility comprises 495 acres ±. A copy of the Boundary Survey (Pettigrew & Associates PA, 12/13/2012) for the DNCS site which describes the size of the site and the site boundary is provided in **Attachment IV.1.B. Table IV.1.1** provides details regarding site facilities and acreages.

**TABLE IV.1.1
Site Acreages
DNCS Environmental Solutions**

Description	Acre (±)
DNCS Site: Total Tract	562
Drainage Feature (including setbacks)	67
Surface Waste Management Facility Boundary	495
Surface Waste Management Facility: Processing Area (West Tract)	177
Surface Waste Management Facility: Landfill (East Tract)	318
Landfill: Disposal Footprint	234
Processing Area: Operations Footprint	98

3.0 REFERENCES

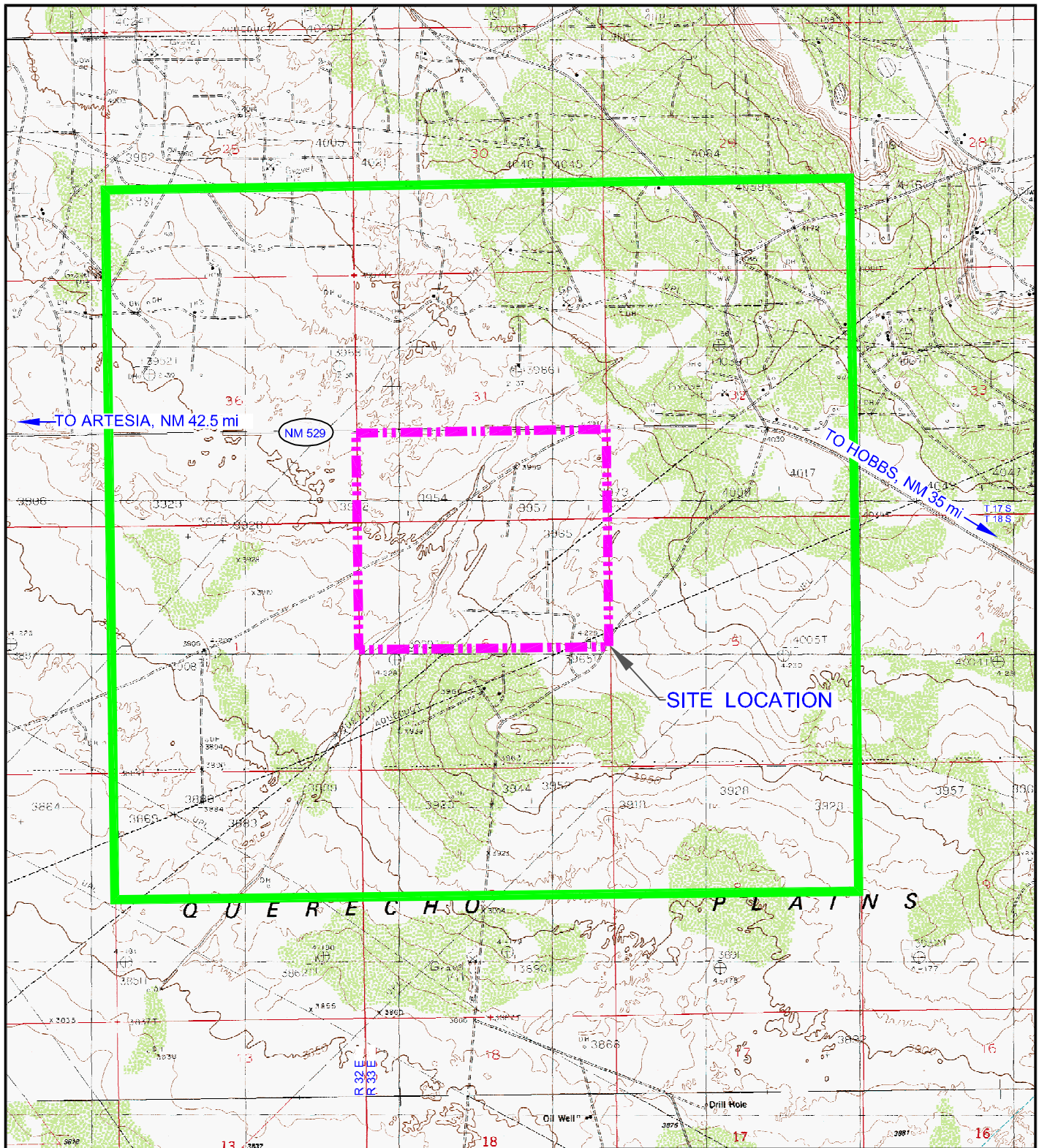
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**APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS**

**VOLUME IV: SITING AND HYDROGEOLOGY
SECTION 1: SITING CRITERIA**

FIGURES

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IV.1.8	AERIAL PHOTOGRAPH
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IV.1.10	QUATERNARY FAULTS MAP
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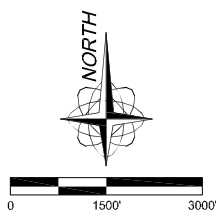
LEGEND

- - - - - SITE BOUNDARY
- 1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

Drawing: P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time: Jun. 12, 2014 12:56:21; LAYOUT: A (P)

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SITE LOCATION MAP

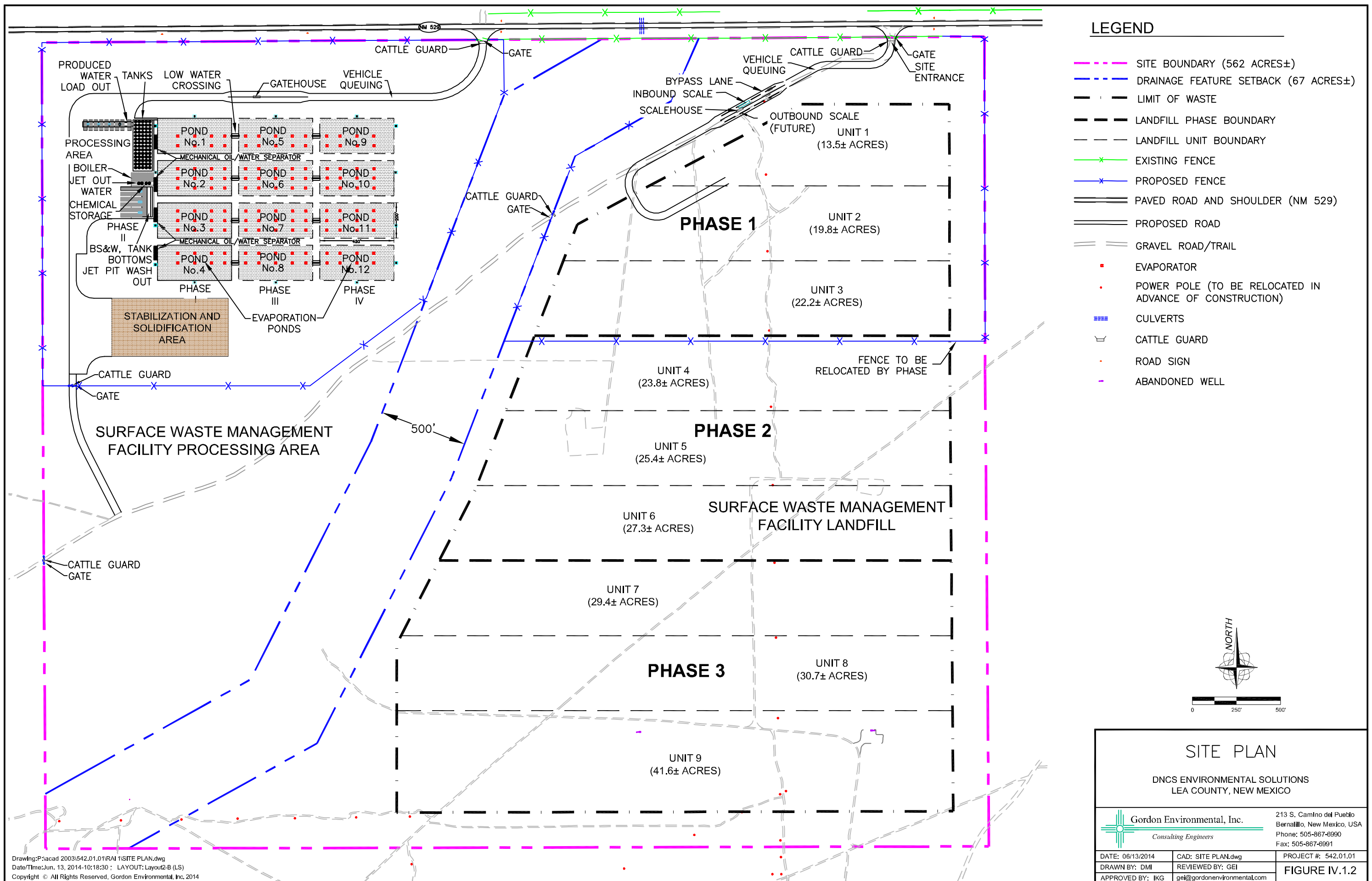
DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

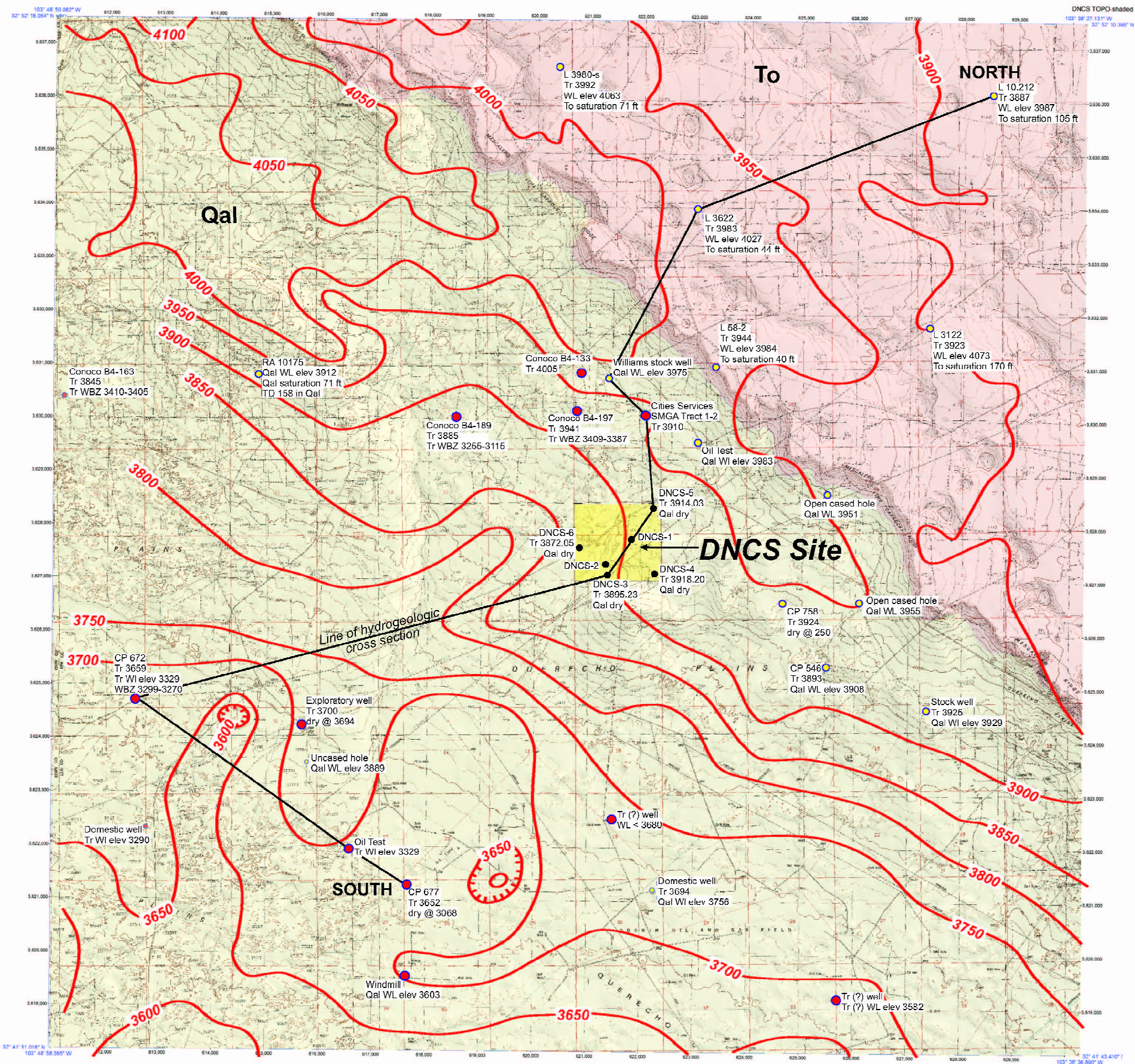


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DATE: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	
APPROVED BY: IKG	gel@gordonenvironmental.com	FIGURE IV.1.1



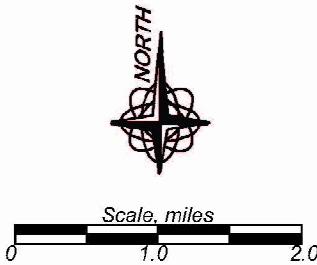


LEGEND

- Location of well having Triassic bedrock top elevation or Triassic water bearing zones and/or water levels
- Location of well completed in alluvium or Ogallala Formation
- Location of hydrogeologic boring on the DNCS site
- 3600— Isopleth on line of equal elevation (feet above MSL) on the top of Triassic bedrock units (from Nicholson and Clebsch, 1961)

To Outcrop of Tertiary Ogallala Formation

Qal Outcrop of Quaternary alluvium

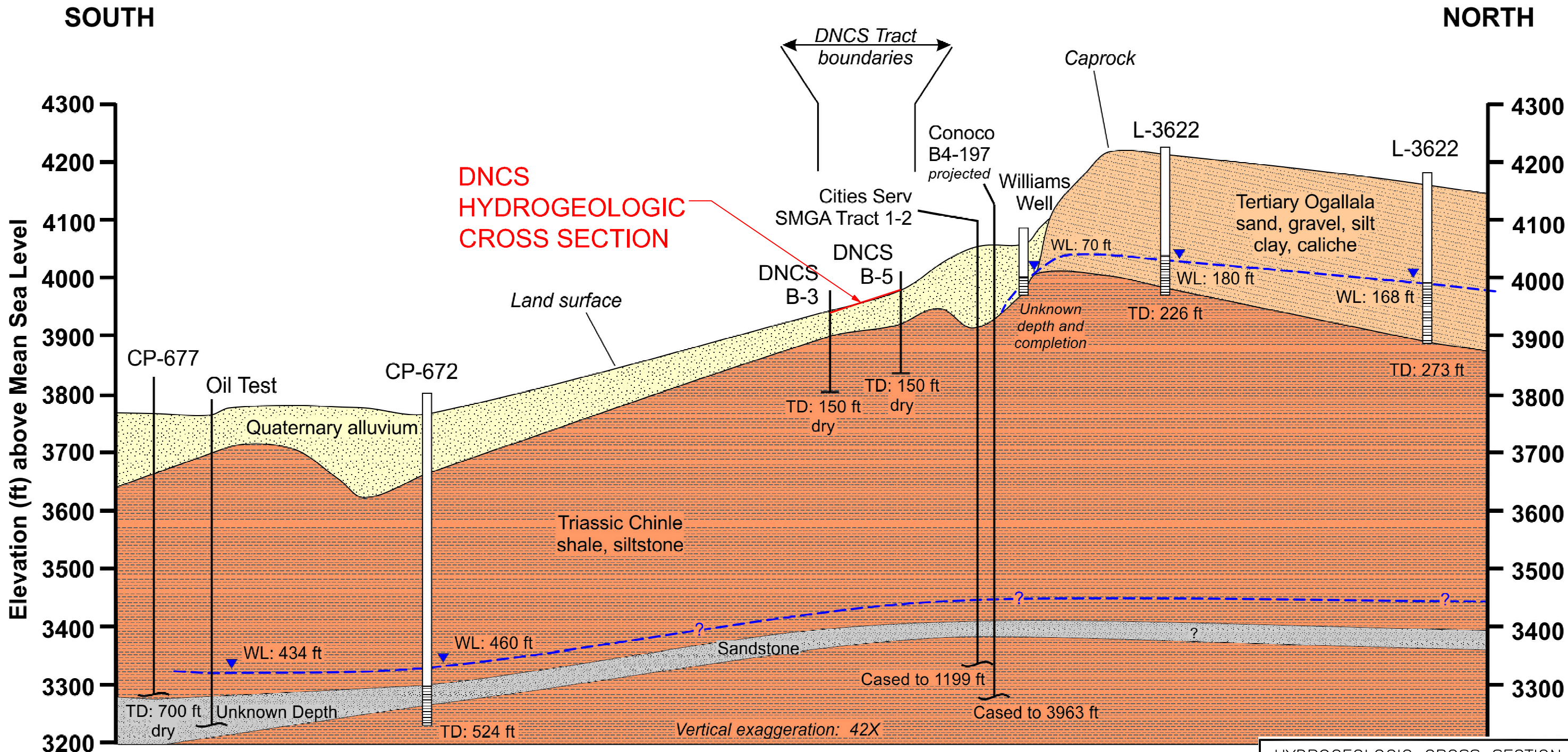


SURFACE GEOLOGY AND WELL LOCATIONS


DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

 Gordon Environmental, Inc. Consulting Engineers			213 S. Camino del Pueblo Bernalillo, New Mexico, USA Phone: 505-867-6990 Fax: 505-867-6991
DATE: 11/04/2013	CAD: UPDATED FIGURE 2.dwg	PROJECT #: 542.01.01	
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE IV.1.3	
APPROVED BY: IKG	gei@gordonenvironmental.com		

Hydrogeologic Cross Section DNCS Permit Site, Lea County, New Mexico



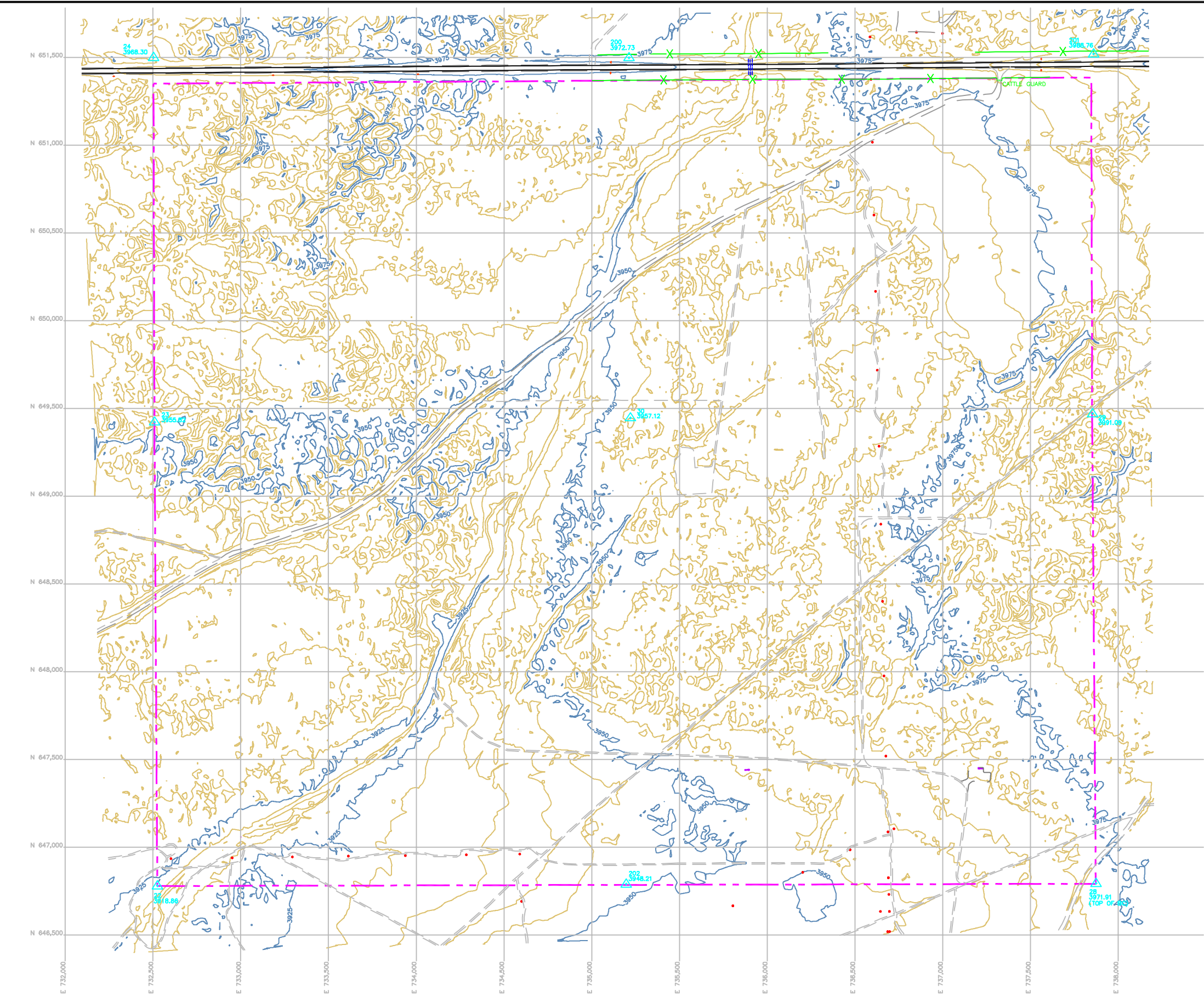
HYDROGEOLOGIC CROSS SECTION
THROUGH THE DNCS SITE
DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 09/24/2013	CAD: FIGURE 3.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	
APPROVED BY: IKG	gei@gordonenvironmental.com	FIGURE IV.1.4

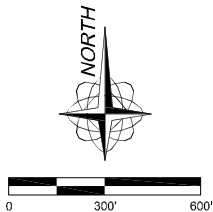
Drawing: P:\acad 2003\542.01.01\PERMIT FIGURES\FIGURE 3.dwg
Date/Time: Oct. 11, 2013-13:25:04 ; LAYOUT: B (LS)
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- LEGEND**
- SITE BOUNDARY (562 ACRES±)
 - 25' TOPOGRAPHIC CONTOUR
 - 5' TOPOGRAPHIC CONTOUR
 - EXISTING FENCE
 - == PAVED ROAD AND SHOULDER (NM 529)
 - == GRAVEL ROAD/TRAIL
 - POWER POLE
 - == CULVERTS
 - ⌒ CATTLE GUARD
 - ROAD SIGN
 - ABANDONED WELL
 - △ SURVEY CONTROL POINT
 - SITE GRID

N 646,500
E 732,000

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MAPPING AND SURVEYING
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Dallas, Texas 75243
(214)349-2200 (800)862-2190
(214)349-2193 Fax
www.dasmaps.com
D.A.S. JOB No. 13113
DATE OF PHOTOGRAPHY: 02-28-2013



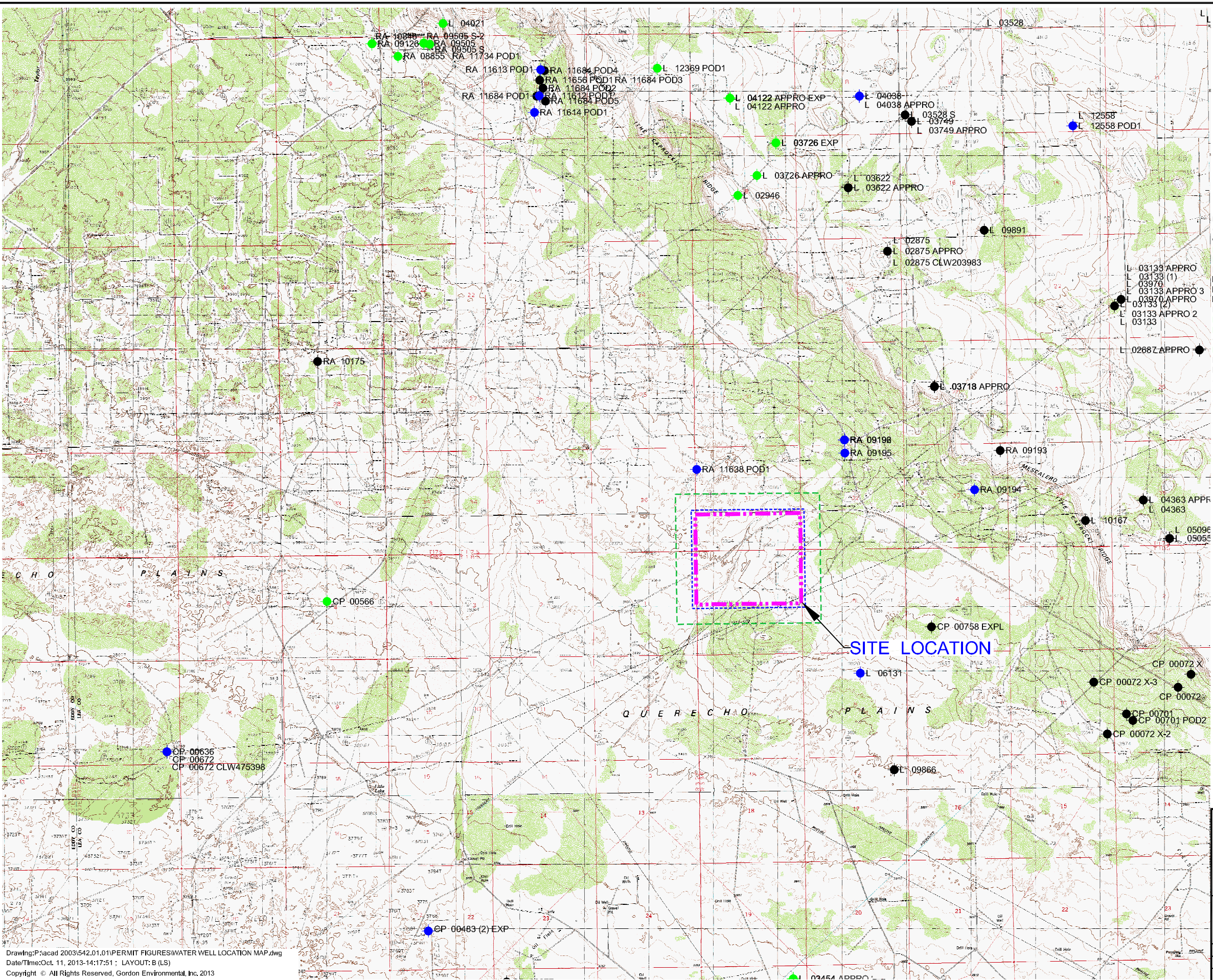
SITE TOPOGRAPHY

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO



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Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 10/11/2013	CAD: SITE TOPO.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	
APPROVED BY: IKG	gei@gordonenvironmental.com	FIGURE IV.1.5



LEGEND

SITE BOUNDARY (562 ACRES±)

200' SETBACK

1000' SETBACK

L 12558 POD1

POD BASIN-POD NUMBER-POD SUFFIX

(POD= POINT OF DIVERSION)

POD BASIN CODES: L=LEA COUNTY

CP=CAPITAN

RA=ROSWELL ARTESIAN

USE

CODE DESCRIPTION

COM COMMERCIAL

DOL 72-12-1 DOMESTIC AND LIVESTOCK WATERING

DOM 72-12-1 DOMESTIC ONE HOUSEHOLD

EXP EXPLORATION

IND INDUSTRIAL

INJ INJECTION

IRR IRRIGATION

MIN MINING OR MILLING OR OIL

MUN MUNICIPAL - CITY OR COUNTY SUPPLIED WATER

NON NON-PROFIT ORGANIZATIONAL USE

OIL OIL PRODUCTION

PDL NON 72-12-1 DOMESTIC & LIVESTOCK

PRO 72-12-1 PROSPECTING OR DEVELOPMENT OF NATURAL RESOURCE

PUB 72-12-1 CONSTRUCTION OF PUBLIC WORKS

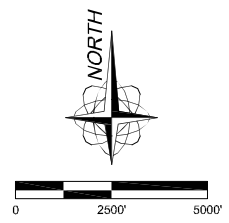
SAN 72-12-1 SANITARY IN CONJUNCTION WITH A COMMERCIAL USE

SRO SECONDARY RECOVERY OF OIL

STK 72-12-1 LIVESTOCK WATERING

WATER WELL DATA REFERENCE:
NEW MEXICO OFFICE OF THE STATE ENGINEER/
INTERSTATE STREAM COMMISSION (OSE/ISC)
WATER WELL ESRI SHAPEFILE DATABASE
(ose_wells_July_2011.shp)
http://www.ose.state.nm.us/water_info_data.html
DATED: July, 2011

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS



WATER WELL LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.

Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 10/11/2013

CAD: WATER WELL LOCATION MAP.dwg

PROJECT #: 542.01.01

DRAWN BY: MLH

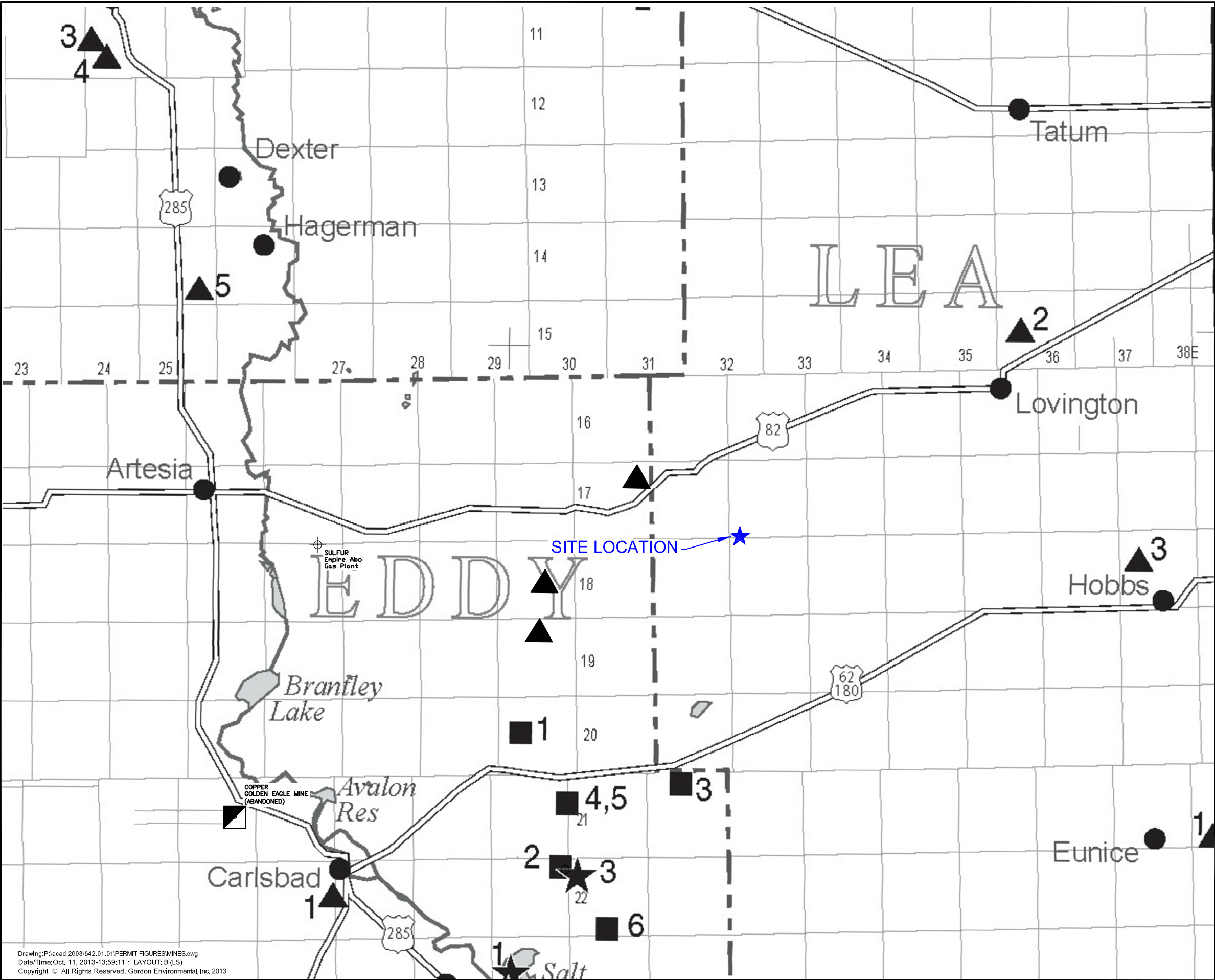
REVIEWED BY: DRT

FIGURE IV.1.6

APPROVED BY: IKG

gei@gordonenvironmental.com

Drawing: P:\acad 2003\542.01.01\PERMIT FIGURES\WATER WELL LOCATION MAP.dwg
Date/Time: Oct. 11, 2013-14:17:51; LAYOUT: B (LS)
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LEGEND

★ SITE LOCATION

▲ Aggregate and stone mining

◆ Coal mining

★ Industrial minerals, mining, and milling

■ Metals

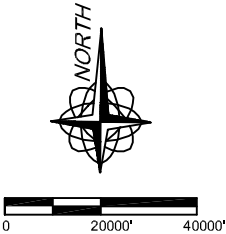
■ Potash mining and milling

□ Smelters, converters, and refineries

◆ Uranium mining and milling

MINES DATA FROM: 2001 MINES MILLS AND QUARRIES MAP, MINING AND MINERALS DIVISION, NM ENERGY, MINERALS AND NATURAL RESOURCES DEPT. NMBGMR NMIMT, AND NM BUREAU OF MINE INSPECTION. AND HOBBS, NM-TX, 2007, 1:100000 30X60 SERIES TOPOGRAPHIC SURFACE MANAGEMENT BLM MAP.

NOTE:
THIS MAP WAS COMPARED TO THE CURRENT (01-10-2013) ONLINE VERSION OF THE MINES, MILLS AND QUARRIES WEB MAP @ (<http://www.emnrd.state.nm.us/MMD/MRRS/MinesMillsQuarriesWebMap.htm>) AND NO NEW ACTIVE MINES OR ABANDONED MINES WERE DEPICTED NEAR THE SITE.



MINES, MILLS, AND QUARRIES MAP

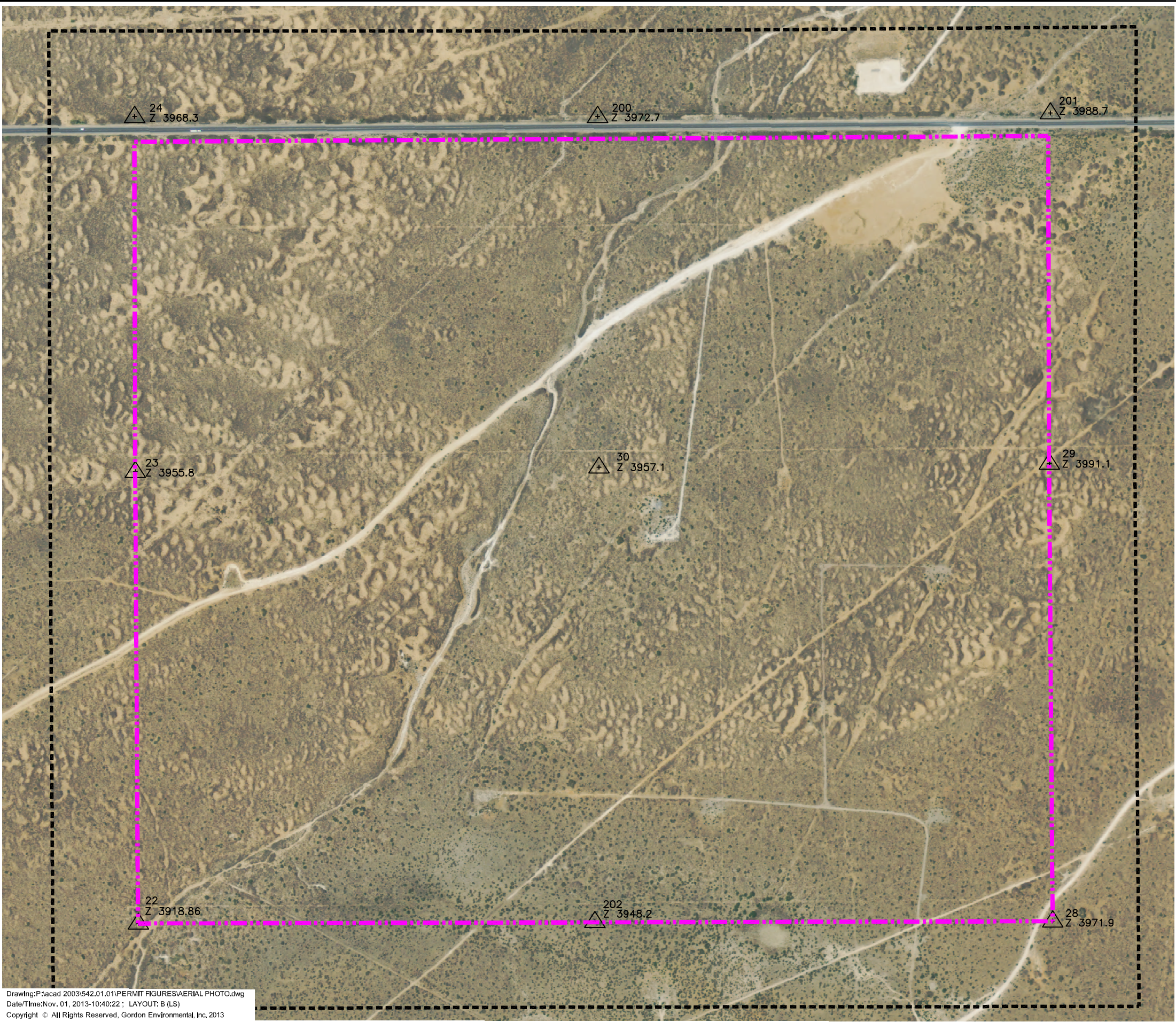
DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

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Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

Drawn: P:\acad 2003\542.01.01\PERMIT FIGURES\MINES.dwg
Date/Time: Oct. 11, 2013-13:59:11 ; LAYOUT: B (LS)
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DATE: 10/11/2013	CAD: MINES.dwg	PROJECT #: 542.01.01
DRAWN BY: MLH	REVIEWED BY: ANY	FIGURE IV.1.7
APPROVED BY: JKG	get@gordonenvironmental.com	

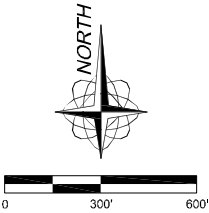


LEGEND

- SITE BOUNDARY (562 ACRES±)
- 500' SETBACK FROM SITE BOUNDARY
- △²⁹_Z 3991.1 SURVEY CONTROL POINT

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(214)349-2193 Fax
www.dasmaps.com
D.A.S. JOB No. 13113

IMAGE:
2011 NAIP COLOR MOSAIC
RESOLUTION: 1PIXEL = 1 METER



AERIAL PHOTOGRAPH

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO



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Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 11/01/2013	CAD: AERIAL PHOTO.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	
APPROVED BY: IKG	gei@gordonenvironmental.com	FIGURE IV.1.8