



**CONESTOGA-ROVERS
& ASSOCIATES**

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May 8, 2015

Reference No. 046121

Mr. Kegan Boyer
Chevron Environmental Management Company
1400 Smith Street, Room 07086
Houston, TX 77002

Dear Mr. Boyer:

Re: Revised Workplan for Execution of Abatement Plan – 2015 Activities
Chevron Mark Owen #9 Site
AP #57
NW/4 of SE/4 (J) Section 34, Township-21-S; Range-37-E
Lea County, New Mexico

Conestoga-Rovers and Associates (CRA) is pleased to present this revised proposal for 2015 activities to continue execution of the scope of work described in the Mark Owen #9 Stage 1 Abatement Plan (AP). This proposal is being presented based on a meeting that CRA had with Mr. Glen VonGonten and Mr. Jim Griswold with the New Mexico Oil Conservation Division held on July 29, 2013 and the AP submitted in October 2013. That scope of work consisted of:

- Sloping the former reserve pit walls for safe entry;
- Drilling of three soil borings in the bottom of the former reserve pit;
- Plugging and abandonment of temporary monitoring well TMW-3 located in the bottom of the reserve pit;
- Perform a geophysical survey of the former reserve pit area;
- Installation of an additional 6 monitoring wells to determine extent of dissolved chloride concentrations and to determine if a second release is affecting the southern portion of the property; and
- Perform pump test to assess hydrologic parameters.

To date, all of these items have been completed with the exception of the pump test. In addition, the public notice requirements of the AP have been completed. However, formal approval of the AP has not been received by the NMOCD. This workplan is being submitted to perform groundwater monitoring, backfill the former reserve pit, perform hydrologic testing, and assess options for site remediation.

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1.0 Project Information

The Mark Owen #9 well site is currently operated by Chevron. The legal description of the Site is the NW/4 of the SE/4 of Section 34, Township 21 South, Range 37 East, Lea County, New Mexico (**Figure 1**). Global Positioning System (GPS) coordinates for the site are latitude 32° 25' 56.49" north and longitude 103° 08' 46.27 west. The O-GRID number assigned to the Site is reported as #4323. An aerial photograph showing the Site and surrounding properties can be found in **Figure 2**. It is our understanding that Chevron is the current owner of the surface property.

The Site is situated immediately southeast of the town of Eunice, New Mexico and is associated with a former "horseshoe" reserve pit that was used to drill the Mark Owen #9 oil well in 2005. The pit measures approximately 120 feet (ft) by 100 ft and the depth varies between approximately 8 to 10 ft (see **Figure 2**). The pit liner and approximately 520 cubic yards of drill cuttings were removed from the site in Spring 2006. The excavation for the reserve pit has not been backfilled. A fence surrounds the former reserve pit.

Work performed since 2007 consists of the following:

- Installation of three soil borings around the former reserve pit;
- Installation of 11 groundwater monitoring wells;
- Installation of one recovery well;
- Submittal of an Interim Investigation Report to the NMOCD in March 2008;
- Submittal of Annual Groundwater Monitoring Reports to the NMOCD since January 2008;
- The former reserve pit walls were sloped for safe entry in 2013;
- Three soil borings were installed in the bottom of the former reserve pit in 2013;
- Temporary monitoring well TMW-3 that was formerly located in the bottom of the reserve pit was plugged and abandoned in 2013;
- A geophysical survey of the former reserve pit area was performed in 2013; and
- Installation of five additional soil borings and five additional monitoring wells in 2014.

2.0 Scope of Work

2.1 Quarterly Groundwater Monitoring

CRA will incorporate the five newly installed wells into the existing quarterly groundwater monitoring schedule (March, June, September, and December). Prior to sampling the wells, groundwater levels and total well depths will be measured and reported to the nearest one-hundredth of a foot using an interface probe. The interface probe will be cleaned between wells.



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Subsequent to well gauging, the monitoring wells will be sampled using EPA-approved no-purge methodology using a Hydrasleeve™ to collect samples. Geochemical field parameters including pH, conductivity, and temperature will be collected with a multi-parameter sonde. Representative groundwater samples will be placed in laboratory supplied containers and preserved on ice in insulated coolers. Groundwater samples will be submitted to Xenco Laboratories of Odessa, Texas for analysis of general groundwater quality parameters of total dissolved solids, total alkalinity, chloride, and sulfate.

2.2 Reserve Pit Restoration

This task will be executed in the event that approval to backfill the reserve pit is received from the NMOCD. Backfilling the reserve pit will be performed as follows:

- The soils extending 20 feet from the edge of the reserve pit will be excavated to a depth of 4 ft bgs. The soils will be pushed into the bottom of the pit.
- Additional clean fill will be brought to the site to bring the bottom of the excavation to within 4 ft bgs. There is currently approximately 200 yards of clean fill on the property that can be used for backfilling. The clean fill will be wheel roll compacted using on-site equipment.
- A 20 mil liner will be placed over the entire backfilled and excavated area. The liner will overlap by 2 feet on each edge. Rocks and any other potentially sharp objects will be removed prior to placing the liner to prevent puncturing.
- The lined area will be backfilled with clean soil to match grade. The backfilled area will be compacted, re-seeded using an appropriate seed mix, and mulched.

2.3 Aquifer Testing – Pump Test

The aquifer test will be performed on well RW-1. Groundwater will be pumped from the well for a period of eight (8) hours. To assess the radius of influence from pumping from RW-1, the water level in monitoring well MW-1 will also be logged. MW-1 is approximately 28 feet away from RW-1.

A 15 pounds per square inch gauge (psig), vented, In-Situ Level TROLL® 500 transducer will be used to collect water levels within RW-1 and MW-1. The Level TROLL® transducers will be placed in the wells approximately twelve hours prior to the start of the pump test to assess static water levels in these wells.

In addition, manual water level measurements will be collected from the monitoring wells using a groundwater interface probe prior to the placement of the transducers. The pumping rate will attempt to be sustained at a rate of approximately 5 gallons per minute (gpm). In order to reach a pump rate of 5 gpm, a Grundfos Redi-Flo2 submersible pump or similar will be utilized.



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Water from the pump test will be containerized in a frac tank staged on Site. Water generated during the pump test will be disposed of by Sundance Services or another approved disposal contractor. Shipping and disposal documentation will be provided to CEMC.

2.4 Geophysical Survey

The purpose of the geophysical survey is to assess areas of elevated conductivity. The elevated conductivity will help to guide the future drilling program. The geophysical survey will attempt to map the horizontal extent of chloride impacts in the vadose zone. The geophysical survey will also attempt to obtain data leading to a vertical profile of chloride concentrations in the vadose zone. Data collection techniques will consist of electromagnetic and electrical resistivity surveys. Proposed survey coverage is presented on Figure 3.

The geophysical survey will consist of performing an electromagnetic (EM) survey utilizing an EM31 conductivity meter. The EM survey will attempt to assess the horizontal extent or limits of chloride impacts in the shallow subsurface at the Site. The EM31 consists of transmitter and receiver coils located at opposite ends of a rigid boom. The coil separation for the EM31 is approximately 13 feet, which yields an approximate depth of penetration of 18 feet below ground surface (bgs) in vertical dipole mode.

Measurements of terrain conductivity from the EM31 will be used to assess the horizontal extent of chlorides associated with the former reserve pit and surrounding area. The data for the EM31 survey will be processed as a colored contour plot. The plot will then be superimposed on a site plan to correlate elevated conductivity responses indicative of chlorides relative to the Site features.

2.5 Proposed Monitoring Well Drilling Program

CRA is proposing to install up to six, 2-in. diameter groundwater monitoring wells. The location of the proposed monitoring wells can be found on **Figure 4**; however, exact monitoring well locations will be determined following review of geophysical survey data. A Chevron Dig Plan will be prepared and approved prior to performing any drilling. An excavation permit will also be obtained from the Eunice Field Management Team Office prior to any drilling.

The proposed groundwater monitoring wells will be installed to an approximate depth of 55-ft bgs. Drilling will be performed using air rotary or other appropriate drilling methods. During drilling, discrete soil samples will be collected in 5-foot intervals. The samples will be collected by removing the drilling bit (depending on the method) and installing an 18 to 24-in. long steel split-spoon sampler.



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A vertical distribution of soil samples will be collected in the respective soil borings. Samples that are not collected for laboratory analysis will be field screened using Hach Chloride Titration strips. Soil samples will also be field screened for hydrocarbons using a PID and the heated headspace method.

One soil sample from each of the following intervals: 0- to 10-ft bgs, 11- to 20-ft bgs, 21- to 30-ft bgs, and the capillary fringe will be submitted for laboratory analysis. Soil samples will be collected, placed in appropriate laboratory supplied containers, and preserved on ice in insulated coolers. Soil samples will be submitted to Xenco Analytical Laboratory (Xenco) in Midland, Texas for analysis. Soil samples will be analyzed for chlorides by EPA Method 300.0, BTEX by EPA Method 8021B, and TPH (GRO/DRO) by EPA Method 8015 Modified.

2.5.1 Monitoring Well Construction

A total of six monitoring wells will be drilled and installed by a New Mexico-licensed water well driller. Prior to the installation of the groundwater monitoring wells, the appropriate permits will be obtained from the New Mexico Office of the State Engineer (NMOSE).

Wells will be installed in accordance with the monitor well construction guidance in the 1993 NMOCD document entitled *Guidelines for Remediation of Leaks, Spills and Releases*. Wells will be constructed of two-in. diameter, flush-threaded, Schedule 40 PVC casing. Each well will be constructed with 20-ft of 0.020-in. screened-casing placed at the bottom of each well, extending approximately 15-ft below the soil/groundwater interface and approximately 5-ft above the soil/groundwater interface. The total depth of the monitoring wells is estimated at approximately 55 ft bgs.

The well annulus will be backfilled with a sand filter pack to approximately two ft above the top of the screen interval. An approximately 2-ft thick bentonite seal will be placed on top of the sand. The remainder of the well annulus will be grouted to the ground surface with a 95% Portland cement/5% bentonite powder grout. Each well will be placed with an above-ground lockable well vault. The well vaults will be placed within a minimum 24-in. by 24-in. by 4-in. thick concrete pad. A lock will be provided for each well vault and kept locked.

A State of New Mexico licensed surveyor will be utilized to prepare a site map and determine horizontal and vertical control for each monitoring well. Monitoring well construction information will be documented in well record forms submitted to the NMOSE.

2.5.2 Monitoring Well Development

Monitoring wells will be developed by removal of sufficient volumes of water to clear the well casing and annulus of sediment. Wells will be developed until geochemical field parameters of pH,



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temperature and conductivity stabilize to within 10%. Following development, the monitoring wells will be gauged with an oil/water interface probe to measure static water levels and measure any thickness of light, non-aqueous, phase liquids (LNAPL) encountered in the wells.

2.6 Remedial Options Assessment

Following completion of aquifer testing, an assessment of remedial options will be completed by CRA. Soil, groundwater, and aquifer testing data will be reviewed and assessed in order to determine various options for a potential path forward. Once remedial options have been determined and reviewed with CEMC, proposed remedial actions will be presented to the NMOCD.

3.0 Reporting Requirements

Pursuant to 19.15.30.13.C (5) NMAC, CEMC and CRA will provide quarterly progress reports to the NMOCD detailing activities performed in the preceding quarter. The progress reports will be submitted in order to meet the regulatory requirements. These reports will consist of a description of activities performed in the previous quarter and the intended activities for the next quarter. The activities for the year will be summed up in an Annual Report. The annual report will include the following:

- Summary of the year's activities;
- Description and results of the hydrologic test;
- Description and results of groundwater monitoring; and
- Recommended remedial approach for the site.

The annual report will be submitted for CEMC review within 60 days following the completion of field work.

4.0 Schedule

CRA has received CEMC approval as of May 4, 2015. Work will be scheduled and initiated based on the availability of resources and stakeholder concurrence.

If you have any questions or comments with regards to this work plan, please do not hesitate to contact our Albuquerque office at (505) 884-0672. Your timely response to this correspondence is appreciated.



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Yours truly,

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Christine Mathews
Project Scientist

Bernard Bockisch, PMP
Senior Project Manager

BB/mc/2
Encl.

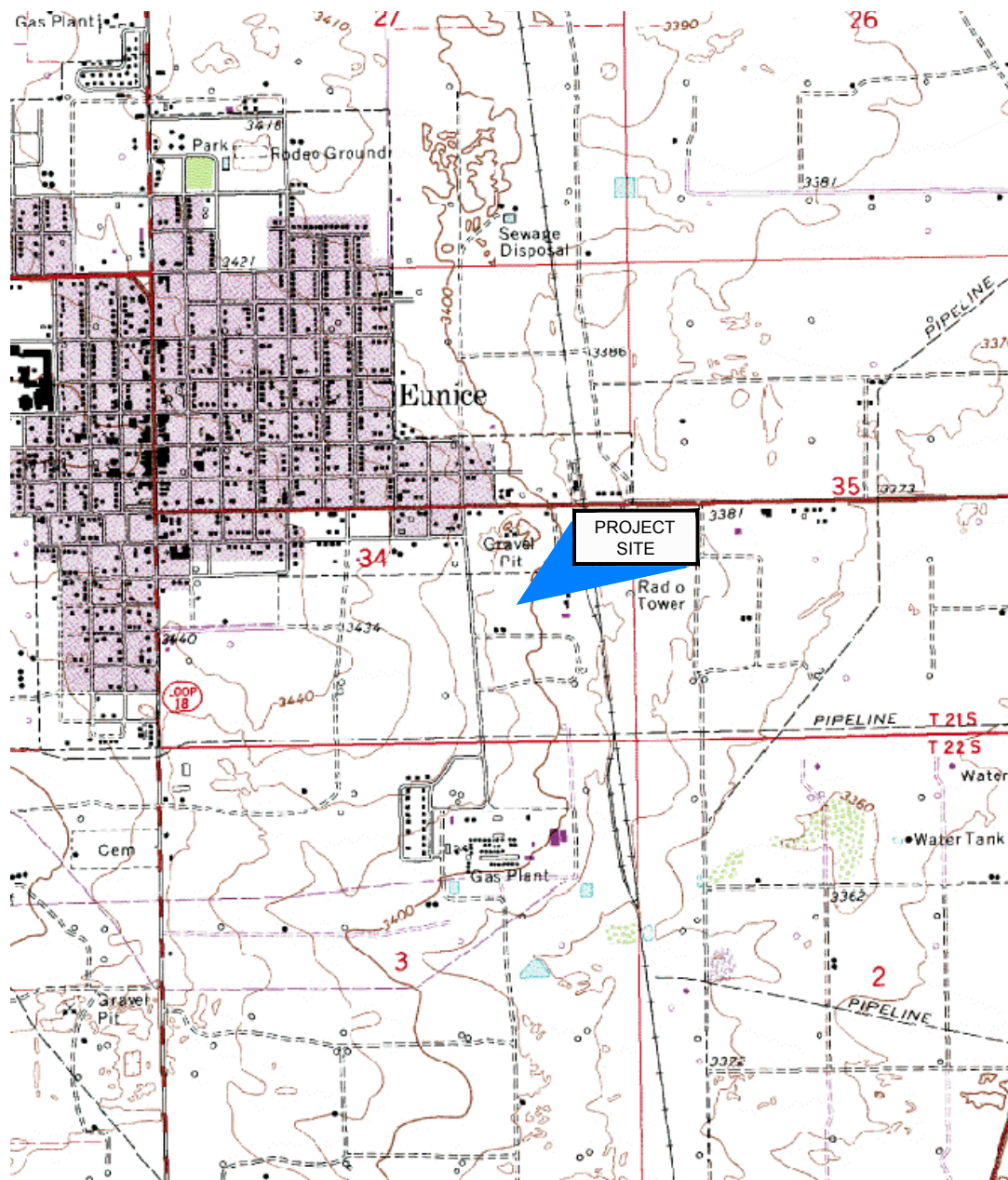
Enclosures:

- Figure 1 - Site Location Map
- Figure 2 - Site Details Map
- Figure 3 - Proposed EM31 Survey Coverage
- Figure 4 - Chloride Concentration and Proposed Monitoring Well Location Map

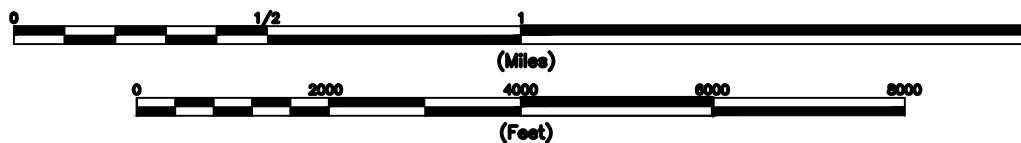
EUNICE QUADRANGLE NEW MEXICO

LAT= 32° 25' 56.9" N
LONG= 103° 08' 47.9" W

PHOTOREVISED 1977



USGS MAP SERIES 1:24000

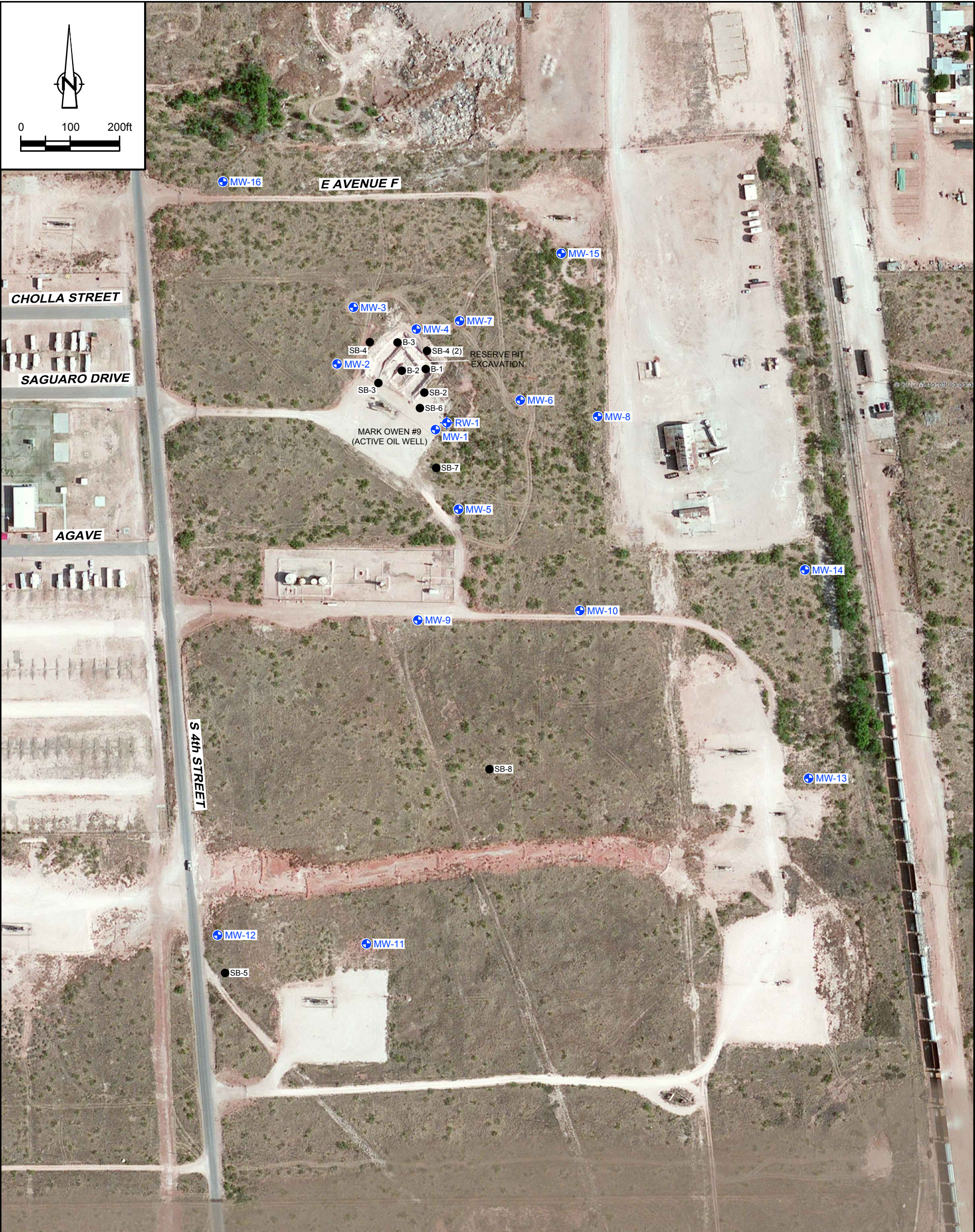


CONTOUR INTERVAL 5 FEET

Figure 1

SITE LOCATION MAP
MARK OWEN #9 RESERVE PIT
NW/4 OF SE/4 SECTION 34; T-21-S, R-37-E LEA CO., NM
Chevron Environmental Management Company





LEGEND

Monitoring Well Location

Soil Boring Location

NOTES:

1. Soil boring, fence and monitor well locations surveyed by West and company December 3, 2007 and October 8, 2010.
2. MW-5, MW-6, and MW-7 were installed in September 2010.
3. MW-8, MW-9, and RW-1 were installed in September 2011.
4. MW-10 and MW-11 were installed in December 2012.



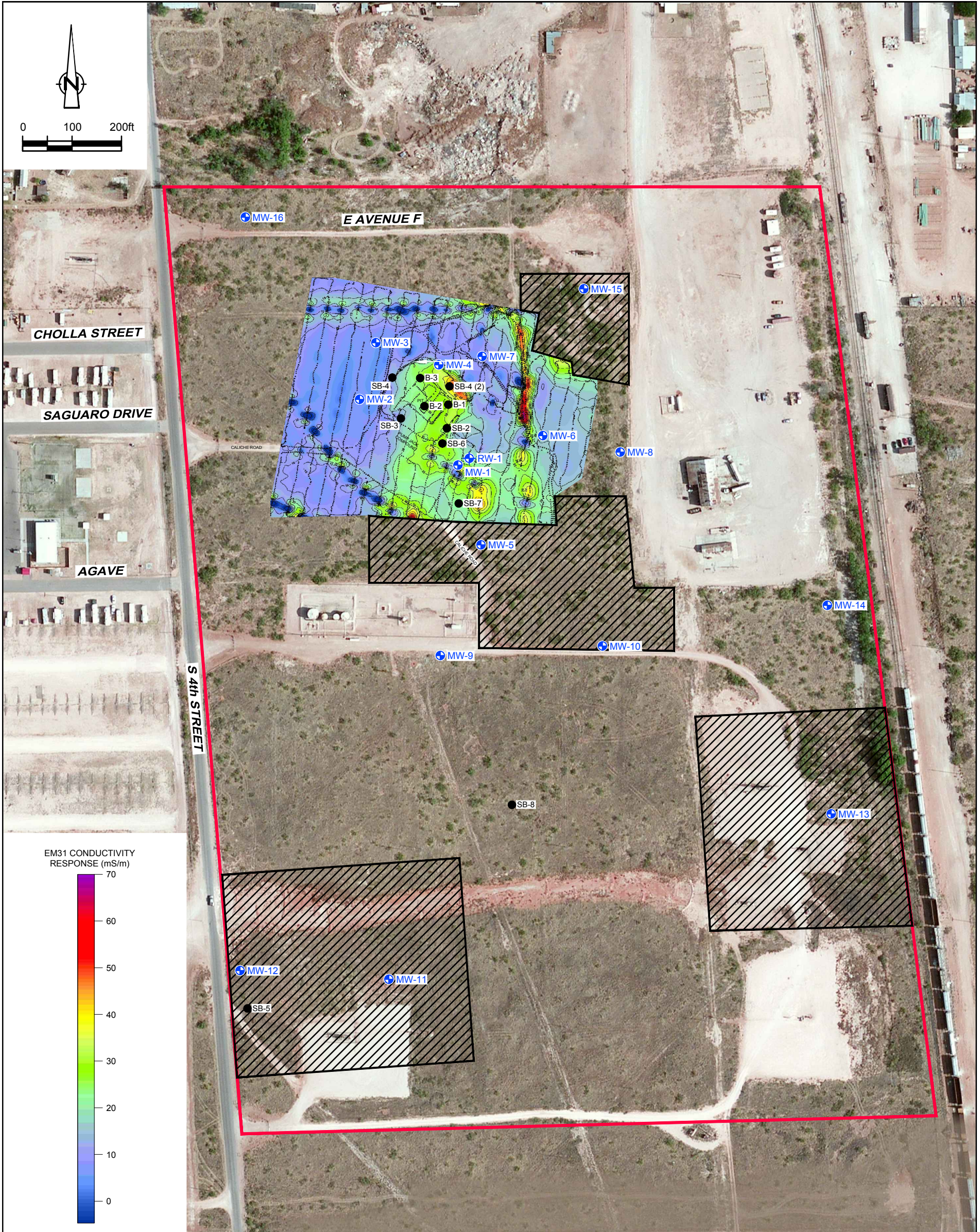
Figure 2

SITE DETAILS MAP

MARK OWEN #9 RESERVE PIT

NW/4 OF SE/4 SECTION 34; T-21-S, R-37-E LEA CO., NM

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LEGEND

Monitoring Well Location

Soil Boring Location

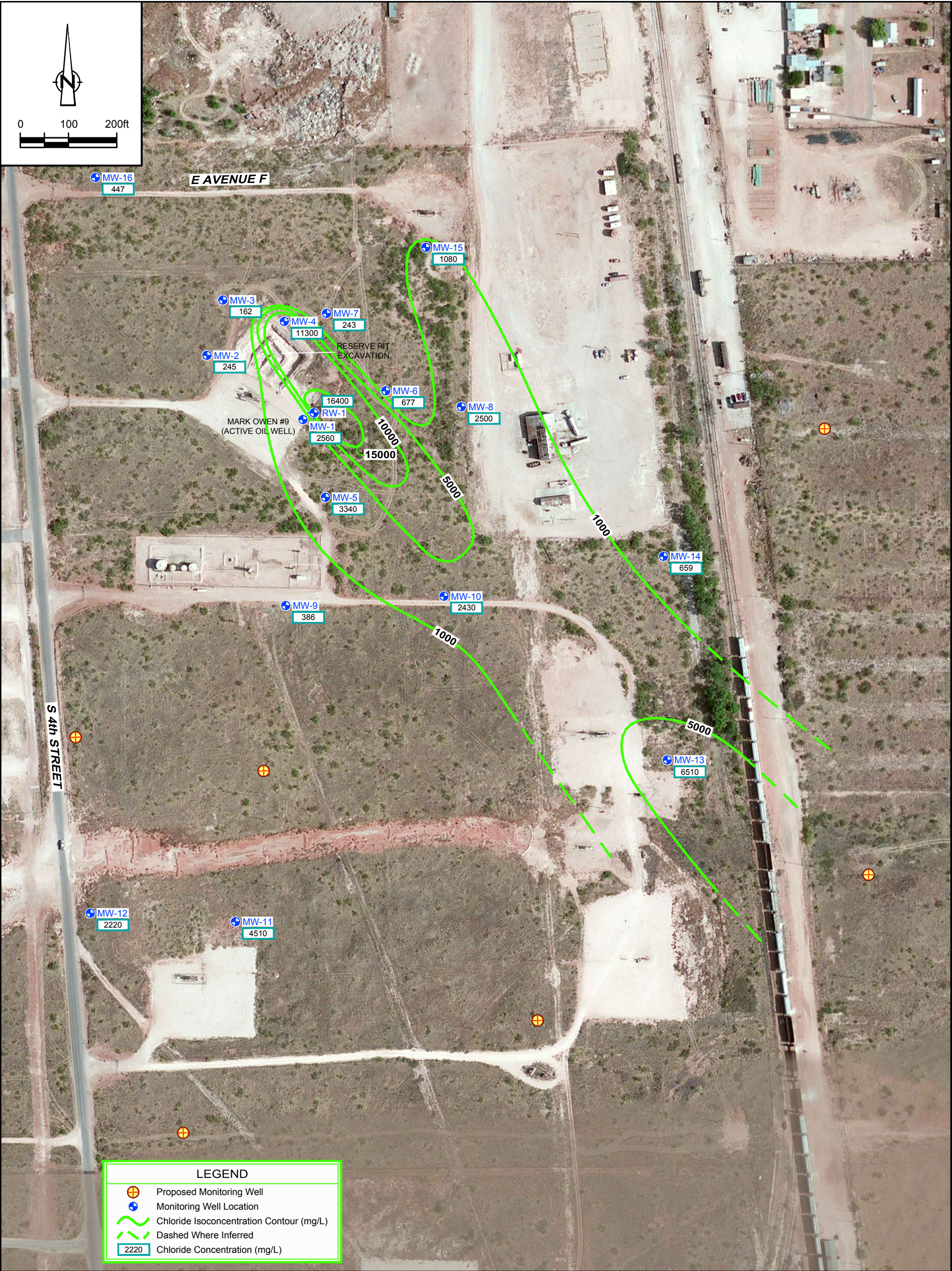
Proposed Areas To Be Assessed

NOTES:

1. Soil boring, fence and monitor well locations surveyed by West and company December 3, 2007 and October 8, 2010.
2. MW-5, MW-6, and MW-7 were installed in September 2010.
3. MW-8, MW-9, and RW-1 were installed in September 2011.
4. MW-10 and MW-11 were installed in December 2012.



Figure 3
PROPOSED EM31 SURVEY COVERAGE
MARK OWEN #9 RESERVE PIT
NW/4 OF SE/4 SECTION 34; T-21-S, R-37-E LEA CO., NM
Chevron Environmental Management Company



NOTES:

1. Soil boring, fence and monitor well locations surveyed by West and company December 3, 2007 and October 8, 2010.
2. MW-5, MW-6, and MW-7 were installed in September 2010.
3. MW-8, MW-9, and RW-1 were installed in September 2011.
4. MW-10 and MW-11 were installed in December 2012.
5. Wells were gauged November __, 2014.

Figure 4
CHLORIDE CONCENTRATION AND
PROPOSED MONITORING WELL LOCATION MAP
MARK OWEN #9 RESERVE PIT
NW/4 OF SE/4 SECTION 34; T-21-S, R-37-E LEA CO., NM
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