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July 31, 2008

Project No. 4622G-5

SEPTIC SYSTEM AND SEEPAGE PIT MONITORING REPORT THE RANCH HOMEOWNER'S ASSOCIATION SEMI-ANNUAL REPORT (JANUARY – JUNE 2008)

Site Address: Clay Station and Tavernor Road
Sacramento County, CA

Client: The Ranch Homeowner's Association
1098 Sunrise Avenue, Suite 160
Roseville, CA 95661

Primary Agency: California Regional Water Quality Control Board (Regional Board)
Attn: Anne L. Olson, P.E.
11020 Sun Center Drive, No. 200
Rancho Cordova, CA 95670

Permit Reference: Waste Discharge Requirements (WDR) with Monitoring and Reporting
Program (MRP) Order No. R5-2002-0170

CC: Steve Kalvelage, Sacramento County Environmental Management
Department

Prepared by: Condor Earth Technologies, Inc. (Condor)

Project Manager: John H. Kramer, HG

Condor Office: Sonora

Current Phase of Project: Compliance reporting

Work Performed: Collected and analyzed 2008 semi-annual seepage pit samples and
inspected drain rock levels in seepage pits constructed in previous calendar
years (2004, 2005, 2006, and 2007).

Monitoring Frequency: Semi-annual

Attachments: Figures, Owner Database, HOA Newsletters, Inspection Procedures and
Follow Up, Seepage Pit Sampling Monitoring Data, Seepage Pit Inspection
Summary Reports



SUMMARY DATA

Table 1
Seepage Pit Data Summary – Semi-Annual Report (January – June 2008)

Field Activity: Lots		Field Activity: Pits		
Number of septic systems online as of December 2007 (1 system per Lot)	193	Number of seepage pits active	1,072	
Number of septic systems inspected	180	Number of pits with drain rock measurements	946	
Number of systems (lots) not accessed	13	Number of pits with no lot access	67	
		Number of pits covered or not found	51	
		Other	8	
Comment: Systems constructed prior to 2007 were inspected first quarter 2008. All new systems completed in 2008 will be inspected during first quarter 2009.				
Seepage Pits				
Number of pits with water or mud	30	Number of broken or missing pit caps	110	
Number of Lots with obstructions or without expansion areas ¹	15	Number of pits needing repair/follow-up ²	149	
Number of seepage pit wells sampled	3	Number of pits needing drain rock fill	286	
Number of Lots that did not have inspection ports for drain rock measurements installed at each seepage pit: 49. Approximately 3 pits in those Lots without ports could not be measured.				
Seepage Pit Water Quality Monitoring				
Constituents of Concern	Min. Value	Max. Value	Avg. Value	Comment
pH (S.U.)	6.39	6.54	6.47	Lid on MS-3 damaged (Lot 96)
TDS (mg/L)	186	259	232	
Nitrate+ Nitrite as N (mg/L)	<0.050	<0.050	<0.050	
Total Nitrogen (mg/L)	<1.0	<1.0	<1.0	
Comment: Three samples were retrieved. Five pits were visited. No water in 2 pits.				
Reported maintenance problems – Water and Mud in pits: 23 lots (30 pits). Drain rock low: 91 lots (286 pits). Risers broken: 18 lots (24 risers).				
Maintenance/repair issues – Replace damaged or collapsed buried concrete pit collar, pit caps, risers, and pipes; install drain rock, install inspection ports; and fill areas of soil settlement.				

1. Primary and expansion areas must be free of obstructions: buildings, pools, large trees, etc. Obstructions include: pit covered or not found.
2. Visible or standing water in pits, broken pipes, collapsed pits, soil settlement, etc.

SEEPAGE PIT INSPECTION AND MONITORING ACTIVITY

There are currently no leachfields installed at The Ranch. Condor performed visual inspections of seepage pits and made drain rock depth measurements within The Ranch Sewer Maintenance District (District) shown on Figure 1. In conformance with The Ranch Operations and Maintenance Plan, and Regional Board's WDR and MRP, inspections were conducted in the first quarter of 2008 for seepage pits of 193 septic systems constructed in the previous calendar years (2004, 2005, 2006, and 2007). A total of 946 seepage pits were measured for drain rock. The database of 2007 septic systems and current owners is included in Attachment 1 and the seepage pits inspected are listed in Summary Report No. 1 (Attachment 3). Maps of inspected systems are shown on Figures 2A, 2B and 2C. Condor representatives followed routine procedures described in *Septic Tank Inspection and Seepage Pit Sampling Procedures*, Attachment 2. Field forms (Attachment 2) were used to collect data during pit inspections in 2008; the data was later entered into a database. Forms used for collection of data are provided in Attachment 2.



RESULTS OF SEEPAGE PIT INSPECTIONS

All accessible seepage pits are inspected annually for signs of potential failure and to collect information on system performance. No evidence of surfacing wastewater, field saturation, runoff, or presence of nuisance conditions associated with wastewater was observed in the seepage pit areas. One hundred sixty-one Lots have complete inspections (Summary Report No. 2) and 32 lots have incomplete inspections for various reasons such as unsecured animals present, fencing and locked gates, obscured or inaccessible ports, etc.

Drain rock depths are measured to evaluate settlement of the carbonaceous treatment zones in each seepage pit. Of approximately 1,072 seepage pits, 946 were measured. Two hundred eighty-four pits at 91 different lots had drain rock at or below the required 16 inches set by SMD. Seepage pit drain rock monitoring results for 2008 are listed in *Seepage Pit Inspection Data* (Attachment 4).

Results of 2008 annual seepage pit inspections are listed in the summary reports located in Attachment 4 and indicated below. Each report identifies the specific Lots associated with inspection results.

No.	Summary Report Name
1	Seepage Pit Inspections Data
2	Lots with Complete Seepage Pit Inspections
3	Lots with Incomplete Inspections
4	Seepage Pit Caps Missing or Broken
5	Seepage Pit Caps without Ports
6	Seepage Pits with Water and/or Mud
7	Seepage Pits with Follow-up Required
8	Drain Rock Work Order List

NOTIFICATIONS AND FOLLOW-UP REGARDING SEEPAGE PIT INSPECTIONS

Follow-up inspections were performed in February and March 2008 for Lots 117, 43, 42, 200, 190, 150, and 5 in regards to soil settlement/subsidence and septic tank issues/repairs. The *Visual Inspection Daily Field Reports* are included in Attachment 2.

The *Site Visit/Field Investigation Form: Septic System* form was developed by Condor for use at The Ranch. Additional field investigation for seepage pit settlement was performed at The Ranch (using this form) by Condor personnel on April 11, 2008. Copies of these field forms are located in Attachment 2.

The Homeowner's Association (HOA) was notified regarding the need for septic system maintenance and repairs and an e-mail was forwarded to the HOA on March 24, 2008, for their use. Condor provided additional follow-up to the HOA in July in regards to maintenance and repairs. Condor also provided a form letter to the HOA for their use to print out the letters on their stationery for mailing to the individual homeowners.

A draft report regarding the evaluation of tilting seepage pit caps was provided to the HOA. Several lots were included as examples (Lots 1, 3, 4, 42, 43, 57, 58, and 117). Soil subsidence at Lot 43 has been evaluated and repairs were recommended. The HOA is establishing procedures for enforcing correction and repairs.



RESULTS OF SEEPAGE PIT WATER QUALITY MONITORING

Samples of seepage pit wastewater are monitored semi-annually at The Ranch in five seepage pits fitted with wells for collecting percolate samples (Figure 2B). The wells are screened in drain rock that was installed directly beneath the carbonaceous treatment zone at the bottoms of seepage pits. The five seepage pit monitor wells (MS) are located on Lots 77, 85, 96, 94, and 70, respectively. The first semi-annual samples for 2008 were collected on January 24, 2008. Cumulative results of seepage pit sampling are shown in Historical Monitoring Data (Attachment 3). Due to inconsistent past well depth measurements, the total depth of the wells is now remeasured at each visit.

Monitor wells MS-2, MS-3, and MS-4 yielded a sample. MS-1 and MS-5 were dry. The low sampling rate could result from over-designed pit capacity, low use, unequal distribution between pits, or rapid infiltration from seepage pit wells or bottoms. The three samples collected were in good agreement with one another and are considered typical of final effluent concentrations; although, the total dissolved solids (TDS) values were generally lower than initial sampling.

COMPARISON OF MONITORING DATA TO DISCHARGE SPECIFICATIONS AND GROUNDWATER LIMITATIONS

		Depth of water in pit	Test	pH	TDS	Nitrate + Nitrite as N	Total N
			Limits	6.5 - 8.5	450	5	5
			Units	S.U	mg/L	mg/L	mg/L
Pit	Date		Type				
MS-1	1/24/2008	-	(dry)				
MS-2	1/24/2008	9.47	grab	6.39	186	<0.050	<1.0
MS-3	1/24/2008	20.18	grab	6.54	251	<0.050	<1.0
MS-4	1/24/2008	26.17	grab	6.49	259	<0.050	<1.0
MS-5	1/24/2008	-	(dry)				

The average TDS in seepage pit samples was 232 mg/L, less than the groundwater limitation of 450 mg/L. Seepage pit waters were below the groundwater pH limitation of 6.5 SU at MS-2 (6.31 SU) and MS-4 (6.13 SU) in January as measured in the field; the water is slightly acidic. Seepage pits do not discharge directly to groundwater. The bottoms of seepage pits are approximately 80 feet or more above the static groundwater level in nearby monitoring wells. Attenuation of constituents through adsorption in soil, biological degradation, and dilution are anticipated. All other values are within the required limits for groundwater.

LABORATORY ANALYTICAL REPORTS

Laboratory reports are in Attachment 3.

HOMEOWNERS EDUCATION ACTIVITIES

Two newsletters were sent to the homeowner by the HOA in regards to the septic systems: notice of upcoming seepage pit inspections (January) and tips for keeping septic systems in good shape (March 2008). See Attachment 1 for copies of the newsletters.

2007 SEPTIC TANK INSPECTION DATA

Results of the measurements of sludge depth and scum thickness of installed systems were reported in the Second Semi-Annual 2007 Report with a summary of repair work conducted in 2007.

Follow-up inspections were performed in February and March 2008 for Lots 117, 43, 42, 200, 190, 150, and 5 in regards to soil settlement/subsidence and septic tank issues/repairs. The *Visual Inspection Daily Field Reports* are included in Attachment 2.

CONCLUSIONS

This is the eighth semi-annual report of septic system (seepage pit) monitoring. The data management issues for such a large inspection program are still evolving during the build-out period. This year, inspection and monitoring of disposal areas was required on 193 systems that were installed prior to January 2008. Measurements of drain rock fill were collected at 946 of the 1,072 seepage pits. Measurements of drain rock fill could not be collected in approximately 126 seepage pits on 32 lots for various reasons which include the following: lack of access (67 pits), obstruction (51 pits), and/or no access ports on caps (2 seepage pits caps could not be pried off and 157 caps were pried off). At least 284 of the 1,072 seepage pits need additional drain rock to keep within 16 inches of the bottom of the buried concrete collar. Settlement of backfill around septic tanks and seepage pits was observed on at least 41 lots.

The five seepage pit monitor wells were also visited. Three seepage pit monitor wells were sampled; two were dry.

RECOMMENDATIONS

Condor recommends the following:

Licensed professionals address maintenance or repair issues identified in the reports in Attachment 4, as summarized below:

1. Report No. 3: Obstructions, such as pits being covered over, were noted in the disposal areas on fifteen lots. These should be evaluated and corrected if needed. Some of these only inconvenience routine inspection and repair, but do not impact performance.
2. Report No. 4: Missing and/or damaged seepage pit caps were noted at 110 pits.
3. Report No. 5: Pits were not fitted with access ports (159) though this did not preclude inspection at 157 most sites. Only two could not be pried off for measurements. Access ports facilitate measurements and reduce the chance of cap damage during inspections.
4. Report No. 6: Twenty-three lots had observed water or mud in the pits. Water at the top of pits, indicating overuse, most commonly from tilted distribution box. Mud indicates sediment intrusion through the effluent piping, trenches or sloughing pit walls that could clog the pit.

5. Report No. 7: Pits needing repair work (e.g. broken or collapsed concrete collars). Noticeable soil settlement was observed around the seepage pits, piping and tanks. Limited settlement of backfill around septic tanks and seepage pits is not surprising due to the inability of the contractor to compact loose backfill on top of these facilities. Low spots should be filled to avoid concentrating percolation into the septic system components.
6. Report No. 8: Drain rock Work Order list, indicating pits needing drain rock additions and quantity.

LIMITATIONS AND SIGNATURE

Condor developed the interpretations and conclusions presented herein in accordance with generally accepted principles and practices at the time the work was performed. If any changes are made or errors found in the information used for this report, the interpretations and conclusions contained herein shall not be considered valid unless the changes or errors are reviewed by Condor and either appropriately modified or re-approved in writing.

Condor's involvement in the work performed at this site has been limited to installation of five seepage pit monitoring wells; inspecting for drain rock in the seepage pits of **180** completed systems, compiling data provided by the District, the HOA, and others; and creating maps and tables. Condor is not responsible for the accuracy and completeness of information collected and developed by others.

This report was prepared by Condor under the direct supervision of a Professional Geologist registered in the State of California. The report was prepared for The Ranch HOA at the request of Terri Hendrickson. It is for the sole use of The Ranch Homeowner's Association. The contents of this report may not be used or relied upon by any other person(s) without the expressed written consent and authorization of the Client and Condor. Any questions regarding the content of this document should be addressed to either Terri Hendrickson at 916.746.0111 or John Kramer at 209.532.0361, extension 2032.

Respectfully submitted,

CONDOR EARTH TECHNOLOGIES, INC.



John H. Kramer, CHG
California Certified Hydrogeologist No. 182



ATTACHMENTS

Figures

- Figure 1 Vicinity Map
- Figures 2A through 2C Septic Systems On-line

CD-ROM Attachment

Attachment 1

- Owner Database
- HOA Newsletters

Attachment 2

- Inspection Procedures
- Completed Inspection Forms
- Visual Inspection Reports
- Site Visit/Field Investigation Forms

Attachment 3

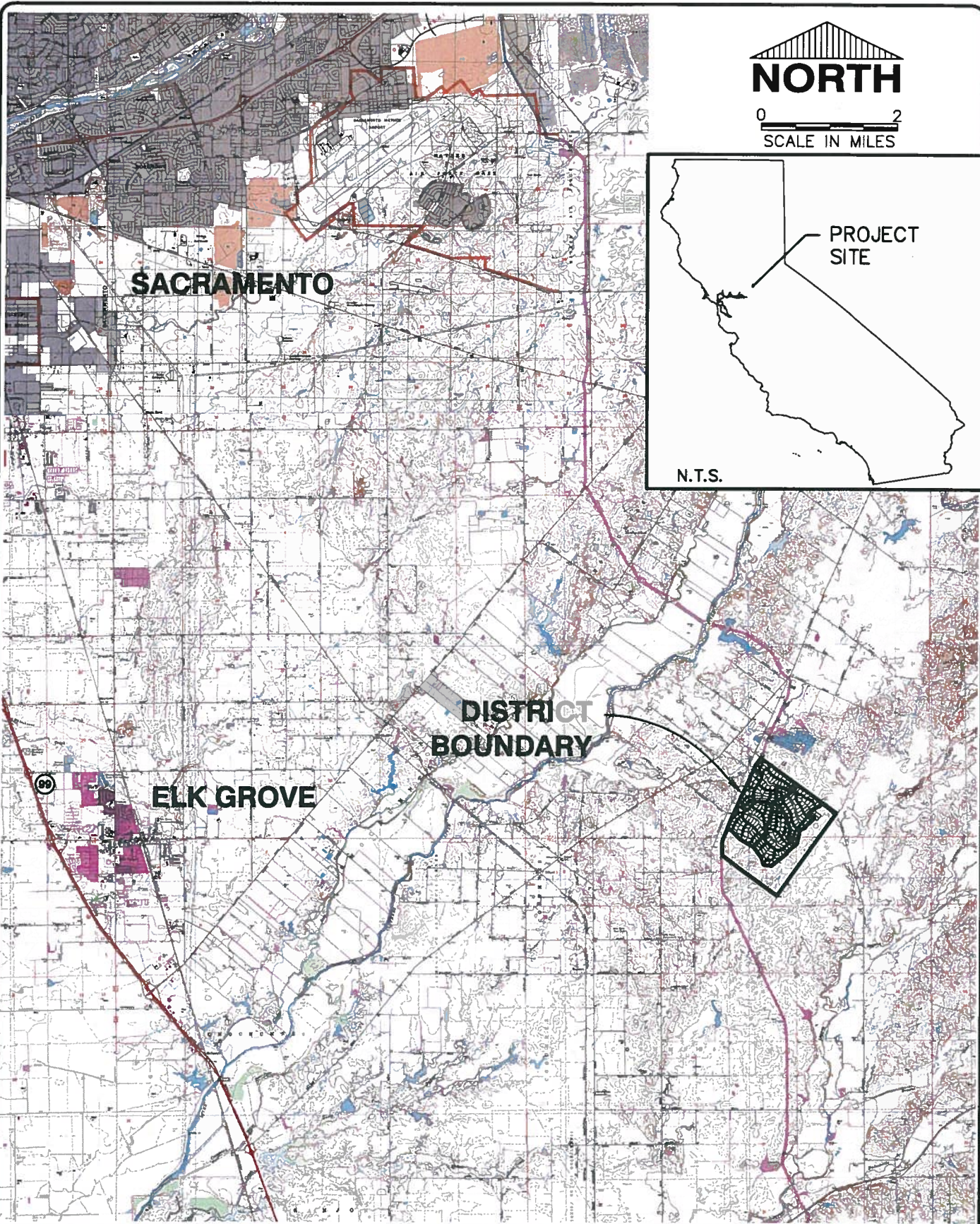
- Seepage Pit Sampling Field Forms
- Historical Monitoring Data
- Laboratory Results with Chain of Custody

Attachment 4

- Seepage Pit Inspection Summary Reports

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FIGURES



NORTH
 0 2
 SCALE IN MILES



SACRAMENTO

DISTRICT BOUNDARY

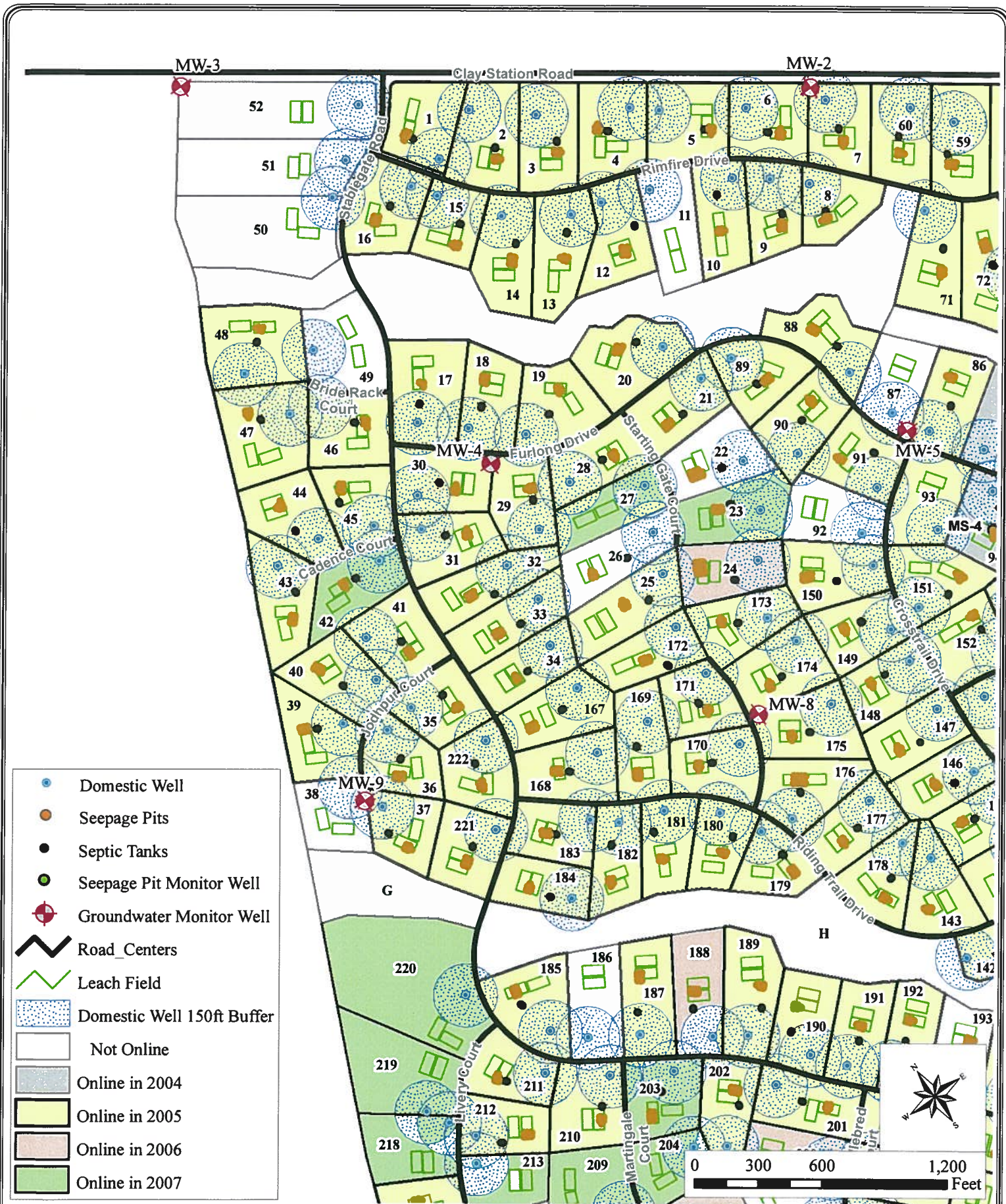
ELK GROVE

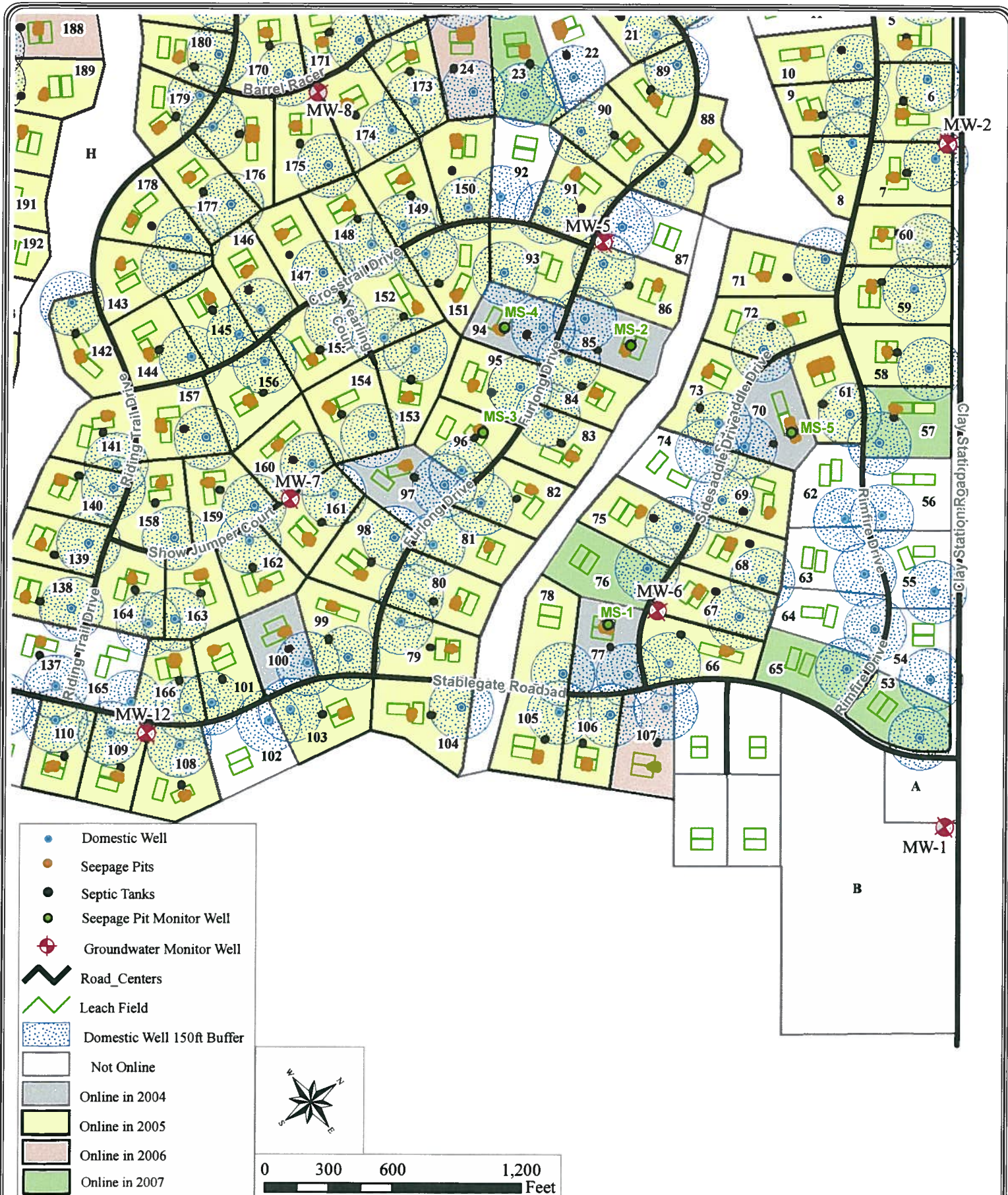
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Job No.
 4622-3
 Date
 30 JUNE 2005
 Scale
 AS SHOWN
 Drawn DJT
 Chk'd JHK

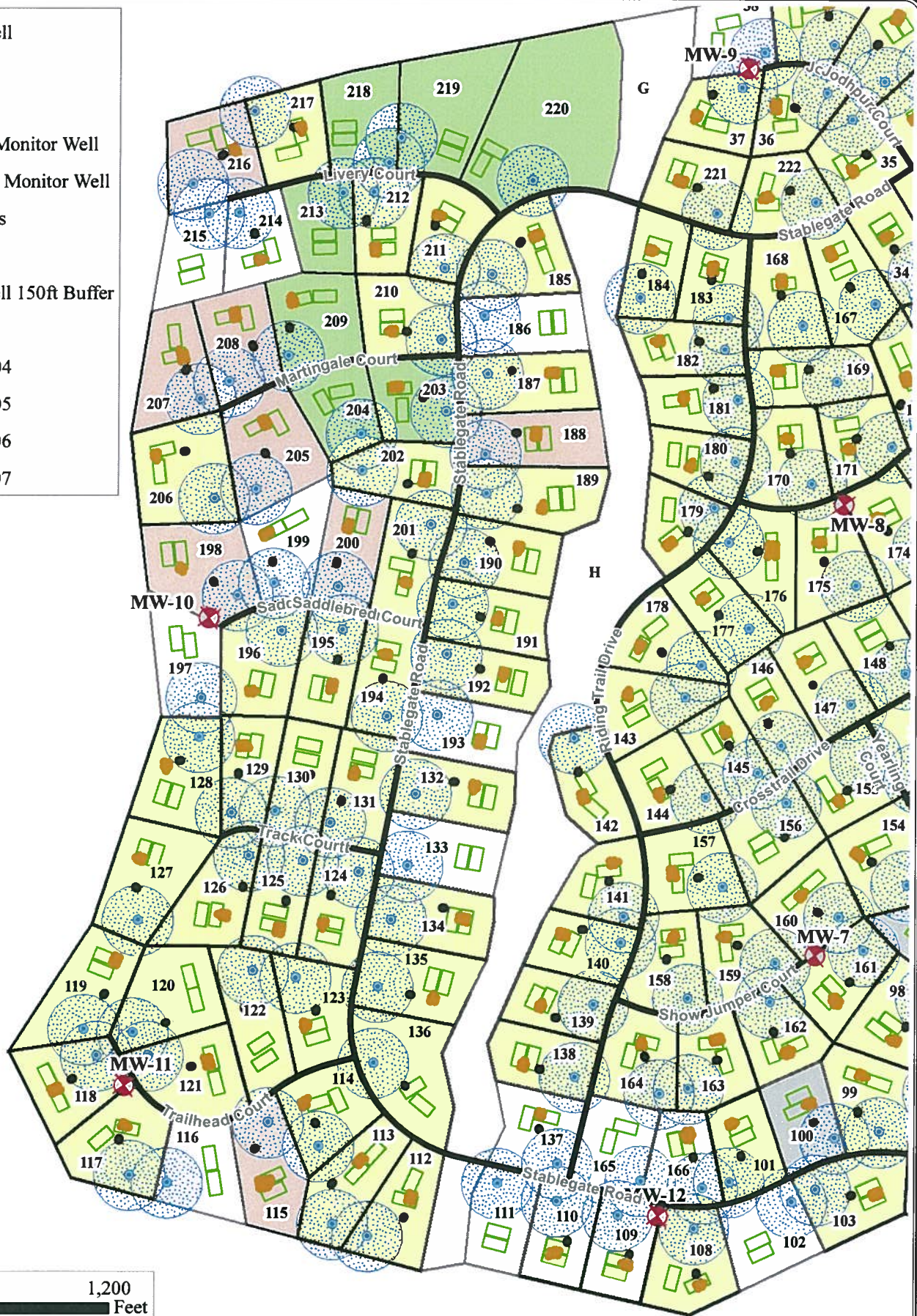
**VICINITY MAP
 THE RANCH
 SEWER MAINTENANCE DISTRICT
 SACRAMENTO COUNTY, CALIFORNIA**

**FIGURE
 1**
 File No.
 4622-3F1





- Domestic Well
- Seepage Pits
- Septic Tanks
- Seepage Pit Monitor Well
- Groundwater Monitor Well
- Road_Centers
- Leach Field
- Domestic Well 150ft Buffer
- Not Online
- Online in 2004
- Online in 2005
- Online in 2006
- Online in 2007



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SCALE
 1:7,200
 DATE
 01 JULY 2008
 JOB NO.
 4622G
 CREATED BY
 JDM
 CHECKED BY
 PG

**SEPTIC SYSTEMS ONLINE
 (SHADED LOTS)
 THE RANCH HOMEOWNERS ASSOCIATION
 SACRAMENTO, CALIFORNIA**

**FIGURE
 2C**

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