INTERIM SOURCE REMOVAL PLAN AND GROUNDWATER MONITORING PLAN

Countryside Executive Golf Course
2506 Countryside Boulevard
Clearwater, Pinellas County, Florida
July 2006

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Countryside Executive Golf Course
2506 Countryside Boulevard
Clearwater, Pinellas County, Florida

Prepared for:

Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637

Prepared by:

HSA Engineers & Scientists
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HSA Project Manager: Brian Moore, P.E.
HSA Project No. 6016036

July 2006

PROFESSIONAL ENGINEER CERTIFICATION

Interim Source Removal Plan
and Groundwater Monitoring Plan

Countryside Executive Golf Course
Countryside Boulevard
Clearwater, Pinellas County, Florida
HSA Project Number: 601-5928-00

In accordance with Chapter 471, Florida Statutes, I hereby certify that, to the best of my knowledge, all engineering plans, specifications, and calculations included herein are in accordance with standard and appropriate engineering practices.

Brian Moore, P.E.
Program Manager
Florida Registration #64017

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1.0 INTRODUCTION

HSA Engineers & Scientists (HSA) has prepared this Interim Source Removal Plan and Groundwater Monitoring Plan (ISR) for the Countryside Executive Golf Course site located in Clearwater, Pinellas County, Florida (see **Figure 1**). The proposed ISR involves the removal of source material in soils beneath and in the vicinity of the maintenance facility that contain arsenic at elevated concentrations above site-wide levels as determined during previous site assessment activities.

A Site Assessment Report and Remedial Action Plan (SAR/RAP) that included the results of historical assessment activities at the site and a recommended remedial approach to address site conditions was submitted in December 2005. The SAR/RAP identified two areas of concern at the site that included the presence of elevated levels of arsenic in soil and groundwater in the vicinity of the maintenance facility that appeared to be a result of a historical discharge as defined by Chapter 62-780, Florida Administrative Code (FAC). The second area of concern included the presence of arsenic in shallow soils throughout the subject site that appeared to be the result of normal and routine pesticide/herbicide application.

Based upon the apparent discharge of arsenic and the presence of associated groundwater impacts above the arsenic Natural Attenuation Default Source Concentration (NADSC) found in Chapter 62-777, FAC of 100 micrograms per liter (ug/L), HSA recommended source removal activities near the maintenance facility. The SAR/RAP proposed the excavation of arsenic-impacted soils (in the vicinity of the maintenance facility) in order to remove the source of continuing groundwater impacts to allow for natural attenuation of the arsenic impacted groundwater. At the Department's request, the following ISR Plan was prepared for the excavation of arsenic-impacted soils.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site and Vicinity Description

The subject site consists of approximately 44 acres that is currently used as an 18-hole executive golf course. The site is located in Clearwater, Pinellas County, Florida in Section 30 and 31 of Township 28 South, Range 16 East. The physical address is 2506 Countryside Boulevard, Clearwater, Florida. A site location map is given on **Figure 1**.

The site is being operated as an 18-hole executive golf course. The site contains an approximately 8,548 square foot (ft^2) clubhouse with a restaurant and lounge, an asphalt-paved parking lot, a snack pavilion, a golf cart shack, and a golf course maintenance facility. The maintenance facility is located on the northeast side of the property.

Land use surrounding the subject property includes residential development to the west, southwest, south, and southeast. Commercial businesses including CVS Pharmacy, Psychic Reader, and the North Belcher Professional Center are located northwest of the subject site. The Florida Auto Exchange, St. Michael Catholic Church, and Casa Miguel are located north of the site. Various commercial businesses are located east of the site. The Countryside Professional Center and Woodgate Park are located southeast of the site. City of Clearwater sewer lift stations are located to the east and south of the subject site.

Two ponds are located at the site. The nearest off-site surface water body is a pond in the Village on the Green residential development located approximately 200 feet west of the subject site.

2.2 Previous Investigations

A Site Assessment Report and Remedial Action Plan that included previous sampling results was submitted in December 2005. A summary of the previous sampling activities and results is included below.

The initial site characterization and supplemental arsenic testing were conducted by Land Assessment Services, Inc. (LAS) from August 2004 through November 2004. The sampling activities included soil sampling near the maintenance facility and throughout the golf course along with groundwater sampling near the maintenance facility and throughout the site.

In general, arsenic soil impacts above default Residential Exposure Soil Cleanup Target Levels (SCTLs) found in Chapter 62-777, FAC were detected throughout the subject site in shallow soils and an area of groundwater arsenic impacts above Groundwater Cleanup Target Levels (GCTLs) found in Chapter 62-777, FAC were identified in the immediate vicinity of the maintenance facility. A summary of historical soil sampling arsenic analytical results for the immediate vicinity of the maintenance facility is included as **Table 1**. A soil sampling location plan (maintenance facility) is included as **Figure 2**. The results of the soil analysis indicate arsenic concentrations varying from below laboratory reporting levels to 48 milligrams per kilogram (mg/kg). The highest concentrations of arsenic were detected in shallow soils (top six inches) at locations CSS-33 (48 mg/kg) and CSS-40 (13 mg/kg), which are located east of the maintenance facility. The concentrations of arsenic in soil generally decrease with depth and to the south and west of the maintenance facility.

Groundwater quality in the immediate vicinity of the maintenance facility also exhibited elevated arsenic concentrations. A summary of groundwater arsenic analytical results for the immediate vicinity of the maintenance facility is included as **Table 2**. A groundwater sampling location plan (maintenance facility) is included as **Figure 3**. Groundwater arsenic concentrations varied from below laboratory reporting levels to 540 ug/L. Based on the most recent analytical data, the highest concentrations of arsenic detected in the vicinity of the maintenance facility were

detected at monitoring wells TW-5 (540 ug/L) and TW-1 (180 ug/L). As with the shallow soils, the concentrations of arsenic in groundwater generally decrease with depth and to the south and west away from the maintenance facility.

3.0 PROPOSED INTERIM SOURCE REMOVAL PLAN

In order to resolve the arsenic impacts identified beneath and in the vicinity of the maintenance facility, HSA has developed the following interim source removal plan.

As presented above, arsenic-impacted soils exist in the vicinity of the maintenance facility located on the subject property. HSA proposes the excavation of the arsenic-impacted soil throughout the maintenance facility area. Based upon soil and groundwater analytical data gathered from the vicinity of the maintenance facility, the majority of the impacts appear to be located to the east and northeast of the existing structure. As such, an area approximately 70 feet by 120 feet has been selected for excavation. The proposed extent of excavation is depicted in **Figure 4**. Soil excavation will occur to the water table, which is expected to be encountered within five feet of land surface.

Prior to excavation, all surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees. The impacted soil will be excavated using a backhoe excavator and stockpiled on-site prior to off-site disposal. A proposed excavation plan depicting the location of the proposed stockpile area is included as **Figure 4**. A minimum side slope of 1:1 will be maintained, where possible, to prevent cave-in of soils from around the excavation.

All of the arsenic impacted soils will be disposed off-site at an approved facility. It is envisioned that either Chambers or Omni Landfills will be utilized for soil disposal. During the excavation activities, soils may be temporarily stockpiled on-site depending upon the local trucking schedule. If soils are stockpiled, they will be placed on visqueen and any stockpiled soils that remain overnight will be covered with visqueen and secured.

Typically, an appropriate remedial target concentration (RTC) for arsenic soil impacts would be the default Residential Exposure SCTL of 2.1 mg/kg. Because arsenic-impacted soils exist throughout the subject site that contain concentrations above the default Residential Exposure SCTL, the use of the default Residential Exposure SCTL or development of a site-specific RTC is not recommended. The goal of the soil removal activities will be to remove arsenic-impacted soil that is associated with a suspected discharge in the vicinity of the maintenance facility and that is resulting in groundwater impacts. Because surrounding soils are impacted with arsenic as a result of routine legal herbicide/pesticide application, confirmation soil sampling (following excavation) is not recommended. Alternatively, the effectiveness of the remedial activities will be evaluated by monitoring groundwater quality trends following soil removal activities and evidenced by an improvement in groundwater quality (see **Section 4.0** below).

4.0 PROPOSED GROUNDWATER MONITORING PLAN

4.1 Monitoring Plan Detail

Following the proposed removal of arsenic-impacted soils, the groundwater quality in the immediate vicinity of the maintenance facility is expected to improve rapidly. As such, active groundwater remediation is currently not recommended. Rather, HSA recommends the completion of quarterly groundwater monitoring for one year in order to evaluate the effectiveness of the soil removal activities.

In order to evaluate groundwater quality conditions following soil removal activities, HSA recommends quarterly sampling at seven groundwater monitoring wells including existing monitoring wells TW-2, TW-3, TW-4, TW-11, and TW-12. In addition to the existing wells, HSA recommends the installation and quarterly sampling of two additional monitoring wells TW-17 and TW-18. The locations of existing and proposed monitoring wells to be included in the groundwater monitoring plan are included in **Figure 5**. The proposed monitoring wells will be installed to a total depth of 13 feet below land surface. The wells will be constructed with 10 feet of 2-inch diameter 0.010-slot well screen and casing blank to land surface. The annular area between the borehole wall and well screen will be backfilled with 20/30 silica sand to one foot above the well screen. The well will be sealed with six inches of 30/65 fine sand and neat cement grout.

As mentioned above, the monitoring wells will be sampled quarterly for one year. The monitoring wells will be sampled in accordance with Florida Department of Environmental Protection (FDEP) Standard Operating Procedure (SOP) FS2200. The samples will be submitted to a certified laboratory for the analysis for the presence of arsenic by Environmental Protection Agency (EPA) Method 6010.

4.2 Reporting

Quarterly groundwater monitoring reports will be submitted following each groundwater sampling event. The groundwater monitoring reports will include a summary of groundwater elevation data, sampling procedures, and analytical results. The fourth groundwater monitoring report (following one year of groundwater monitoring) will include an annual summary of results along with recommendations for future corrective action, if necessary. Depending upon groundwater quality conditions, the annual monitoring summary will include a recommendation for either no further action, additional groundwater monitoring, or active remediation.

5.0 INTERIM SOURCE REMOVAL REPORTING

Upon completion of the ISR, HSA will prepare a report that summarizes the excavation-related activities of the ISR, including quantity of soil excavated, and soil disposal manifests. The report

will be signed and sealed by a professional engineer. HSA will initiate ISR activities immediately following the Department's approval of this plan. The ISR activities are expected to require approximately 2 weeks to complete and an ISR report will be submitted within 60 days of completion of ISR activities.

TABLES

Table 1
Summary of Historical Arsenic Soil Sampling Results (Maintenance Facility)
Countryside Executive Golf Course, Clearwater, Florida
HSA Project Number 6015982-00

Depth (ft)	Sample ID									
	CSS-7	CSS-8	CSS-9	CSS-10	CSS-32	CSS-33	CSS-34	CSS-35	CSS-36	CSS-37
	8/26/2004	8/26/2004	8/26/2004	8/26/2004	10/7/2005	10/7/2005	10/7/2005	10/7/2005	10/7/2005	10/7/2005
0 - 2' (a)	**9.0**	**8.3**	**3.2**	**5.1**	**3.5**	**48**	**4.4**	**2.8**	1.8I	<0.63
2' - 4' (b)	-	-	-	-	**3.0**	<0.8	**7.1**	**5.3**	**3.9**	1.5

Depth (ft)	Sample ID									
	CSS-38	CSS-39	CSS-40	CSS-41	CSS-42	CSS-43	CSS-44	CSS-45	CSS-46	CSS-47
	10/7/2005	10/7/2005	10/7/2005	10/7/2005	11/16/2004	11/16/2004	11/16/2004	11/16/2004	11/16/2004	11/15/2004
0 - 2' (a)	**7.9**	**6.8**	**13**	1.3	0.29I	**2.3**	1.4	**3.8**	1.4	1.8
2' - 4' (b)	1.6I	<0.76	1.5	0.76	0.23I	0.57	0.32I	1.1	**3.2**	**2.4**

Depth (ft)	Sample ID									
	CSS-48	CSS-49	CSS-50	CSS-51	P3					
	11/15/2004	11/15/2004	11/15/2004	11/15/2004	10/6/2004					
0 - 2' (a)	**5.0**	**3.5**	**3.8**	0.80	<0.76					
2' - 4' (b)	0.60	0.41I	1.9	1.7	<0.67					
4' - 6'	-	-	-	-	<0.70					
6' - 8' (d)	-	-	-	-	<0.76					
8' - 10' (e)	-	-	-	-	<0.72					
10' - 12' (f)	-	-	-	-	<0.66					
12' - 14' (g)	-	-	-	-	<0.76					
14' - 16' (h)	-	-	-	-	<0.67					

Notes:

ft	feet
mg/kg	units are milligram per kilogram
SCTL	Soil Cleanup Target Level as established in Chapter 62-777, Florida Administrative Code

Bold indicates exceedance of the Residential Direct Exposure SCTL of 2.1 mg/kg

Shade indicates exceedance of the Commercial/Industrial Direct Exposure SCTL of 12 mg/kg

NA=Not Analyzed

BDL=Below Detection Limits

Table 2
Summary of Historical Arsenic Groundwater Sampling Results (Maintenance Facility)
Countryside Executive Golf Course, Clearwater, Florida
HSA Project Number 6015982-00

	TW-1			TW-2		TW-3		TW-4		TW-5		TW-8
Date	08/27/04	10/07/04	11/16/04	10/06/04	11/16/04	10/06/04	11/15/04	10/06/04	11/15/04	10/07/04	11/16/04	11/15/04
Arsenic	**470**	**620**	**180**	**15**	8.2I	**100**	**23**	**87**	**75**	**330**	**540**	3.5I

	TW-9	TW-10	TW-11	TW-12		TW-13	DW-1				
Date	11/15/04	11/15/04	11/15/04	11/15/04	6/13/2006	11/16/04	07/14/05	08/01/05	08/26/05	11/07/05	
Arsenic	4.4I	<2.8	**13**	**12**	5.44	**12**	**17.6**	**12.4**	**15.2**	<2.8	

Note:

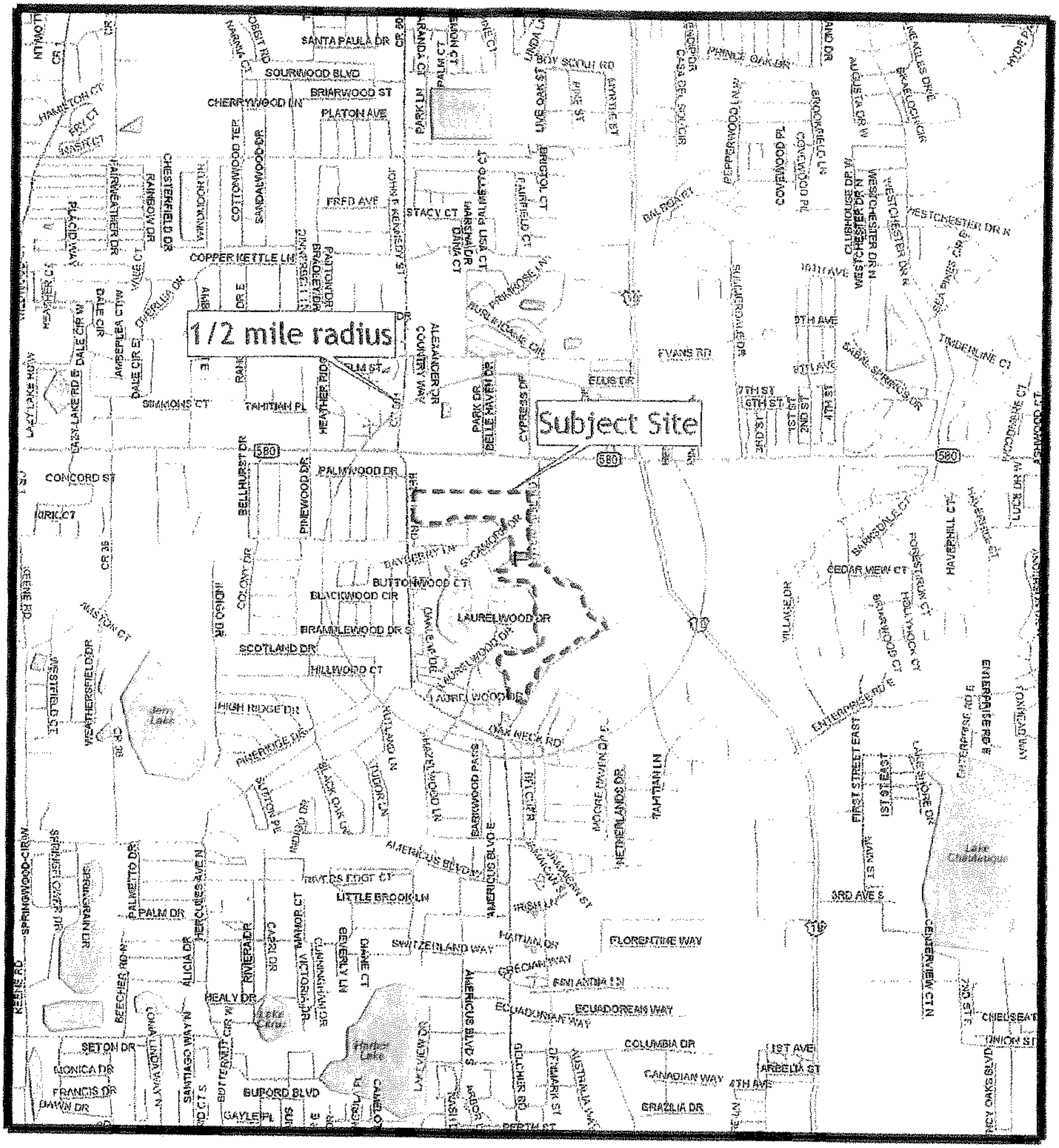
Units given in micrograms per liter (ug/l).

I: Analyte detected below the quantitation limits.

Red indicates result exceeds Groundwater Cleanup Target Level (GCTL) of 10 ug/L as established in Chapter 62-777, Florida Administrative Code (FAC).

Blue indicates result exceeds Natural Attenuation Default Source Concentration (NADSC) of 100 ug/L as established in Chapter 62-777, FAC.

FIGURES



SCALE 1:24000

1 — 1/2 — 0 — 1 MILE

1000 — 0 — 1000 — 2000 — 3000 — 4000 — 5000 — 6000 — 7000 FEET

1 — .5 — 0 — 1 KILOMETER

N

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JOB NO.:	601598200
CAD NO.:	598200-01
DATE:	7/5/06

HSA
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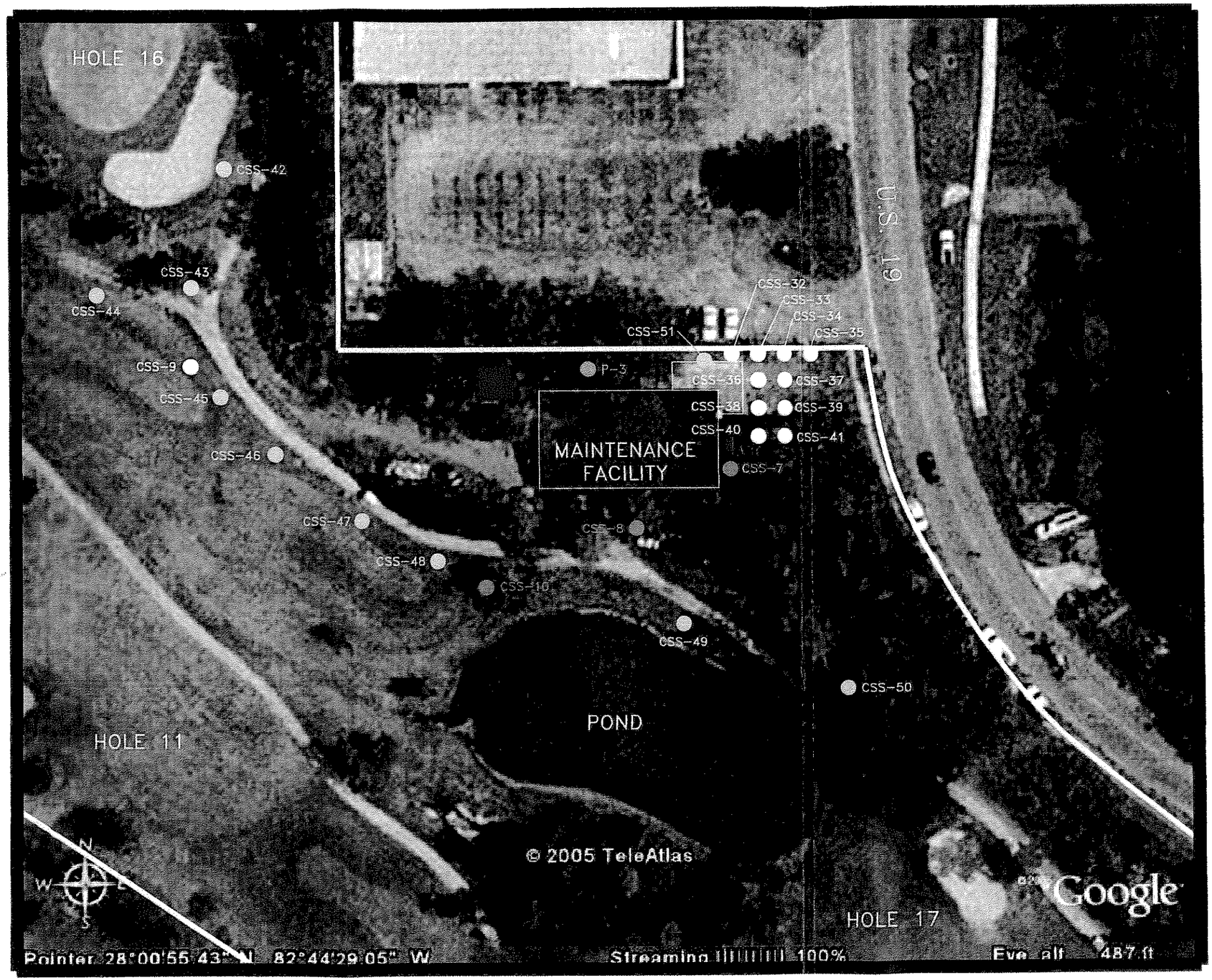
4019 E. Fowler Avenue Tampa, Florida 33617 Tel: (813) 971-3882

COUNTRYSIDE
EXECUTIVE GOLF COURSE
2506 COUNTRYSIDE BOULEVARD
CLEARWATER, FLORIDA

SHEET TITLE

SITE LOCATION MAP

FIGURE 1



LEGEND

AST ABOVEGROUND STORAGE TANK LOCATION

SOIL SAMPLE LOCATIONS (CSS-11-CSS-41) TAKEN OCTOBER 1-7, 2004

SOIL SAMPLE LOCATIONS (P-1-P-6) TAKEN OCTOBER 1-7, 2004

SOIL SAMPLE LOCATIONS (CSS-42-CSS-50) TAKEN NOVEMBER 15-16, 2004

SOIL SAMPLE LOCATIONS (CSS-1-CSS-10) TAKEN AUGUST 26, 2004

N

0 25 50 75 100

SCALE: 1" = 50'±

COUNTRYSIDE EXECUTIVE GOLF COURSE
2506 COUNTRYSIDE BOULEVARD
CLEARWATER, FLORIDA

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JOB NO.: 601598200	DESIGNED N/A		
DATE: 7/5/06	DRAWN SBW		
CAD NO.: 598200-02	CHECKED BM		

SHEET TITLE
SOIL SAMPLING LOCATION PLAN (MAINTENANCE FACILITY)

FIGURE 2

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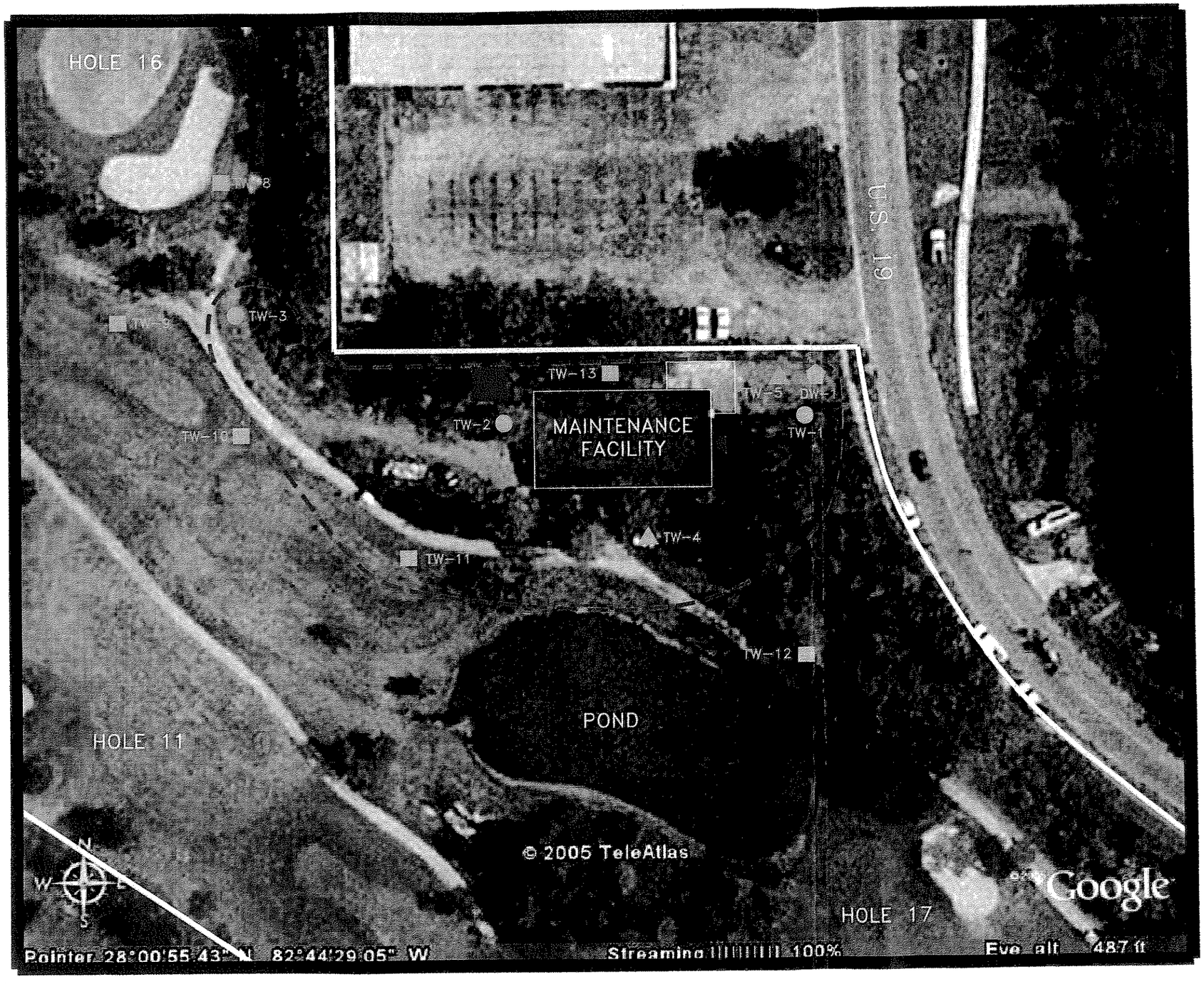

LEGEND

- AST ■ ABOVEGROUND STORAGE TANK LOCATION
- ● TEMPORARY MONITOR WELL LOCATIONS (TW-1-TW-3) INSTALLED AUGUST 27, 2004
- ▲ TEMPORARY MONITOR WELL LOCATIONS (TW-4-TW-7) INSTALLED OCTOBER 6, 2004
- ■ TEMPORARY MONITOR WELL LOCATIONS (TW-8-TW-13) INSTALLED NOVEMBER 12, 2004
- ⬟ DEEP MONITOR WELL LOCATION (DW-1) INSTALLED JULY 5, 2005
- — — APPROXIMATE EXTENT OF ARSENIC GROUNDWATER IMPACTS ABOVE THE GROUNDWATER CLEAN UP TARGET LEVEL (GCTL) AS ESTABLISHED IN CHAPTER 62-777, F.A.C.

N

0 25 50 75 100

SCALE: 1" = 50'±

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DRAWN	SBW	DATE:	7/5/06
CHECKED	BM	CAD NO.:	598200-02

SHEET TITLE
GROUNDWATER SAMPLING LOCATION PLAN (MAINTENANCE FACILITY)

FIGURE 3

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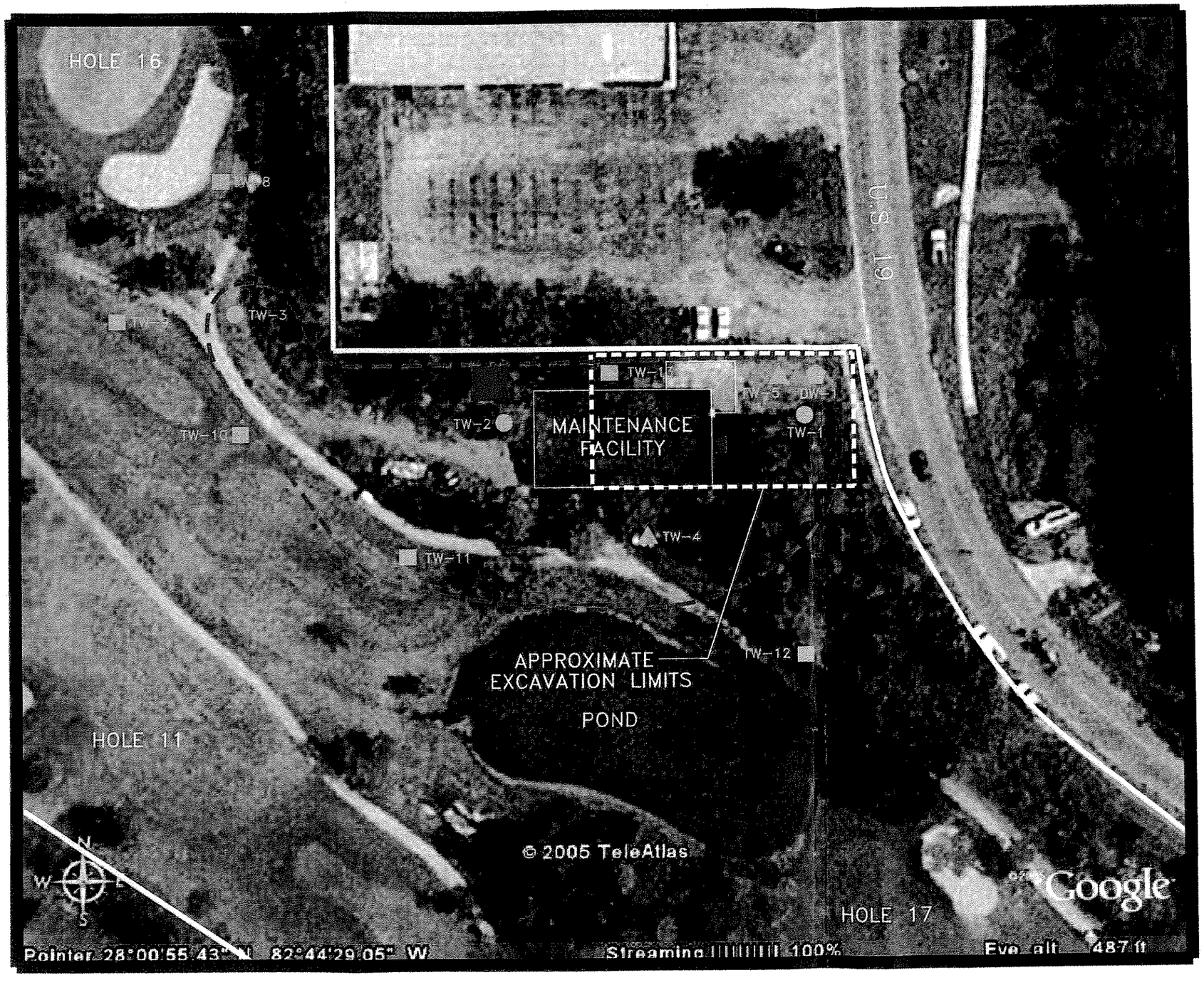

LEGEND

AST ■ ABOVEGROUND STORAGE TANK LOCATION

● TEMPORARY MONITOR WELL LOCATIONS (TW-1-TW-3) INSTALLED AUGUST 27, 2004

▲ TEMPORARY MONITOR WELL LOCATIONS (TW-4-TW-7) INSTALLED OCTOBER 6, 2004

■ TEMPORARY MONITOR WELL LOCATIONS (TW-8-TW-13) INSTALLED NOVEMBER 12, 2004

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N

0 25 50 75 100

SCALE: 1" = 50'±

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SHEET TITLE
SOIL EXCAVATION PLAN

FIGURE 4

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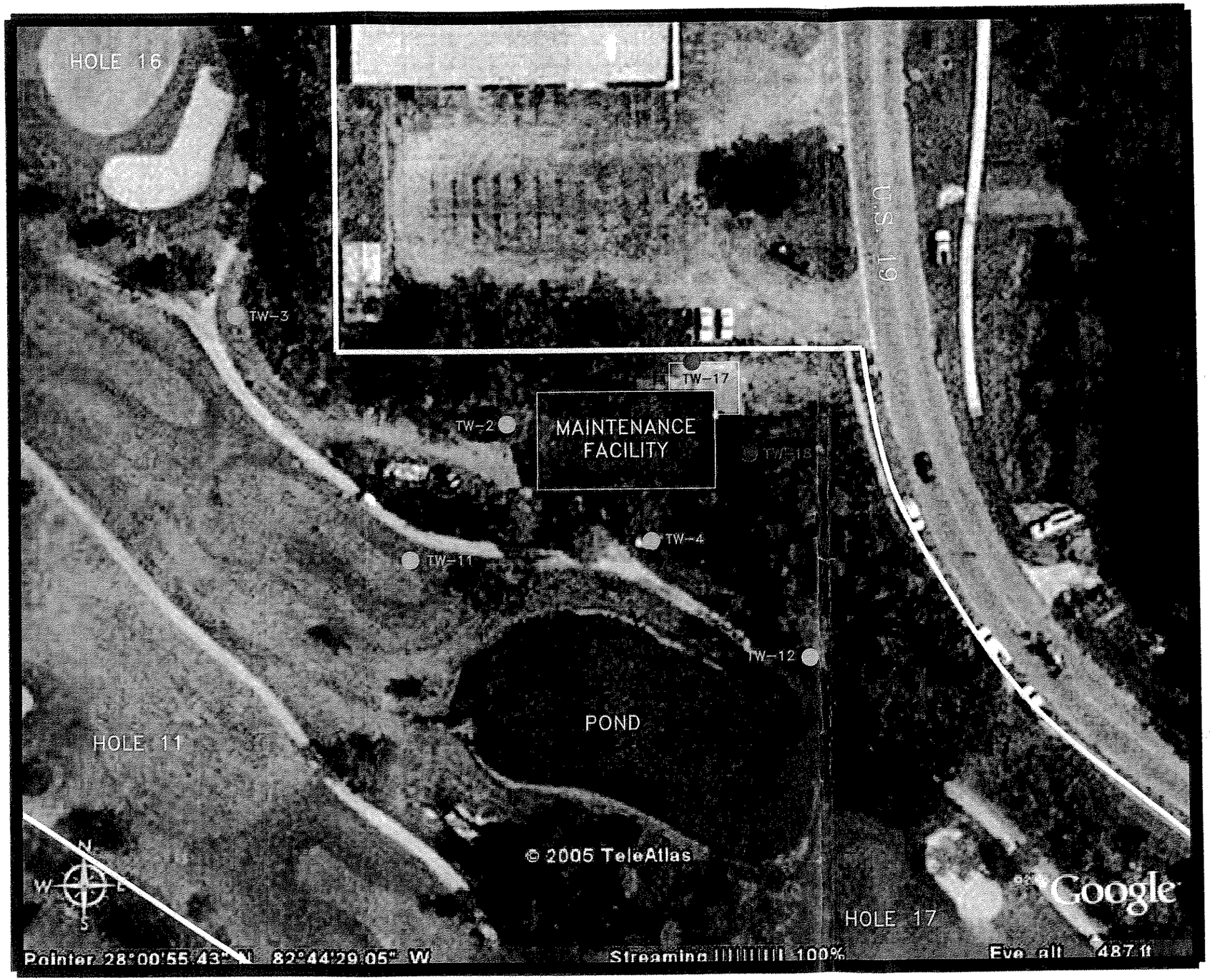

LEGEND

- TW-2, TW-3, TW-4, TW-11 & TW-12
  EXISTING GROUNDWATER MONITORING WELLS
- TW-17 & TW-18
  PROPOSED GROUNDWATER MONITORING WELLS

N

0 25 50 75 100

SCALE: 1" = 50'±

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GROUNDWATER MONITORING PLAN

FIGURE 5

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