ENVIRONMENTAL RESOURCES PERMIT
MODIFICATION APPLICATION
(MODIFICATION TO FDEP #48-0187635-002-EM AND 48-0187635-003-EM)

REQUEST FOR ADDITIONAL INFORMATION

VISTA CLASS III LANDFILL PHASED REDESIGN
APOPKA, FLORIDA

PREPARED FOR

WASTE MANAGEMENT INC., OF FLORIDA
255 WEST KEENE ROAD
APOPKA, FLORIDA 32703

SUBMITTED TO:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
3319 MCGUIRE BLVD., SUITE 232
ORLANDO, FLORIDA 32803-3767

FEBRUARY 2011

APPLIED TECHNOLOGY AND MANAGEMENT, INC.
5550 NW 111 BLVD.
GAINESVILLE, FLORIDA 32653
386-418-6400
FAX 386-418-6401

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Attachment B — Seasonal High Water Table Estimates, Buttrey Development Four L.L.C. Class III Landfill Expansion (BD4 Site) by Devo Engineering, October 2003

Supplement 2 to Report Dated October 21, 2002
Additional Hydrogeologic Data, Buttery Development Three L.L.C. Class III Landfill Expansion (DB3 Site) by Devo Engineering, June 2003

Supplement 1 to Report Dated October 21, 2002
Additional Hydrogeologic Data, & Responses to Selected Comments of Orange County EPD RAI Dated Dec. 27, 2002 by Devo Engineering, April 2003

Estimate of Seasonal High Groundwater Elevation, Bishop & Buttrey Class III Landfill Expansion (BD3 Site) by Devo Engineering, October 2002

Attachment C — Full Size, Signed and Sealed Revised Drawings:

Final Grading and Drainage Plan (Drawing 2)

Post Developed Contributing Drainage Basin Maps (Drawings 4 and 5)

Interim Pre-Consumer Vegetative Waste Organic Recycling Facility Grading and Drainage Plan (Drawing 9)

One Complete Set with Revisions Reduced Size (11" X 17")

APPLIED TECHNOLOGY & MANAGEMENT

5550 NW 111th BLVD.
GAINESVILLE, FLORIDA 32653
TEL: 386-418-6400
FAX: 386-418-6401

www.appliedtm.com

February 28, 2011

Mr. Leonardo Anglero
Engineering Support, SLERP
Florida Department of Environmental Protection
Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Re: Vista Landfill, LLC, formerly Buttrey Landfill (BD1-BD4) ERP Application Modification Request for Additional Information #1- Orange County
ATM Project Number 10-2141

Dear Mr. Anglero:

The following is a response to your request for additional information dated February 10, 2011. Please find your original questions and responses with attachments below:

1. **Question**: Provide the email address of the applicant.
1. **Response**: The applicant's e-mail address is dmcconnell@wm.com. Please copy Ms. Sheree Grant (sgrant@wm.com), Waste Management District Engineer, on all correspondences also.

2. **Question**: Contact the Department to discuss the project in more detail and schedule a site visit.
2. **Response**: Ms. Sheree Grant and I enjoyed meeting you at the Vista Landfill on Thursday, February 17, 2011, to review the site and discuss your questions.

3. **Question**: Has the stormwater management system (SWMS) been constructed as designed? Has the SWMS been properly maintained and operated? Does it reasonably comply with the rules of the St. Johns River Water Management District and the Department of Environmental Protection? Explain in detail.
3. **Response**: Only Ponds 1, 2 and 3 have been constructed as per the existing permit. Only a portion of the build-out stormwater system actually drains to the ponds at this time, as a majority of the runoff currently drains to Cells 2 and 3, which are below grade. The ponds do not discharge and show no signs of standing water after rain events. The ponds appear to meet the rules of the City of Apopka, the St. Johns River Water Management District and the Department of Environmental Protection for a total dry retention system. No offsite discharges have been observed from the current system. Your staff was provided survey benchmarks during their site visit on Friday, February 18, 2011,

to collect informal pond as-built data. No as-built certifications have been submitted for this system yet.

4. **<u>Question</u>**: Will there be any increase to the overall impervious surface at the landfill? Explain in detail.
4. **<u>Response</u>**: All areas, whether landfill surface, access roads or perimeter future landscape areas, have been considered impervious in the stormwater calculations and have been assigned a curve number of 98.

5. **<u>Question</u>**: Will there be any runoff from the landfill that is not routed to the SWMS? Explain in detail.
5. **<u>Response</u>**: All stormwater runoff from the landfill will be routed to the dry total retention stormwater management systems that surround the landfill.

6. **<u>Question</u>**: Provide a geotechnical report signed, sealed and dated by the registered engineer supporting the recommended hydraulic conductivity, seasonal high groundwater table for each retention area, and the locations and elevations from where soil borings were taken.
6. **<u>Response</u>**: Please refer to Attachment A for a signed and sealed geotechnical report from Devo Engineering submitted for the current application and design. Also, please refer to the previously submitted geotechnical report from Devo Engineering, which was submitted to the Department in support of the Buttrey Landfill BD4 as Attachment B, for the previously performed boring locations and profiles across the southern portion of the site. The boring (piezometer and well) locations were taken from the previous geotechnical reports and were digitized on the Post Developed Contributing Basin Maps for reference across the site. Please refer to the revised Interim Drainage Plan contained in Attachment C.

7. **<u>Question</u>**: Provide revised engineering drawings that include best management practices to prevent erosion and sediment flow into the existing nearby surface water bodies. Provide revised engineering drawings that include the proposed location(s) where erosion / sediment control measure(s) are planned and a detail illustrating the correct installation of erosion / sediment control measure(s) to be utilized.
7. **<u>Response</u>**: The previously submitted grading and drainage drawings include the use of silt fences to be constructed around the perimeter of the construction area for erosion control. A silt fence detail was and is included on the details page on the revised plans. The location of a truck tire dirt removal stone gallery location and associated detail has been added to prevent tracking of dirt from the site to the entrance at Keene Road at two locations on the Interim Grading and Drainage Plan in Attachment C.

8. **<u>Question</u>**: Where is the construction entrance to the site? Provide revised engineering drawings that depict the construction entrance and include a detail illustrating the erosion control measures to be utilized and/or installed for this construction entrance.
8. **<u>Response</u>**: The revised engineering final grading and drainage plans are provided to show the construction entrance to the site. The revised Interim Grading and Drainage Plan drawings now contain locations and a detail for a rock gallery, where the trucks leaving the dirt surface travel over the rocks and dirt is removed prior to entering the asphalt area.

The locations of the truck tire dirt removal galleries and detail are shown on the Interim Grading and Drainage Plan in Attachment C.

9. **Question**: Note that at least 48 hours prior to commencement of construction activities authorized by the issued permit, the permittee shall submit to the Department the notice of commencement, DEP form 62-343.900(3), F.A.C., indicating the start date.
9. **Response**: The permittee is aware of the requirement and will supply the appropriate commencement of construction notice to the Department 48 hours prior to construction of the permit activities.

10. **Question**: Note that within 30 days after completion of construction of the surface water system, the permittee shall submit the certification of construction completion, DEP form 62-343.900(5), F.A.C., and two sets of record drawings of the project, as actually constructed.
10. **Response**: The permittee is aware of the requirement and will submit the appropriate certification of completion form that is required to the FDEP within 30 days after completion of construction.

11. **Question**: Submit one copy of any revised drawings in full size, signed and sealed by the professional engineer of record, and one complete set in reduced size (11” x 17”)
11. **Response**: Please find one copy of the signed and sealed revised full sized Interim Grading and Drainage Plan, Final Grading Plan and the Post Developed Contributing Drainage Maps and one revised reduced full set of 11” x 17” plans in Attachment C.

If you require any further information or clarifications, please do not hesitate to call me at 386-418-6400.

Sincerely,

Chris Schumacher, P.E.
Senior Water Resources Engineer

Attachments

cc: Sheree Grant, WMIF

Attachment A

Report on Review of SHWT and Aquifer Parameters for Stormwater Management System Design, Waste Management's Vista Landfill (Class III) (f.k.a. Bishop & Buttrey Keene Road Landfill) by Devo Engineering, August 2010

Report On Review Of SHWT And Aquifer Parameters For Stormwater Management System Design

WASTE MANAGEMENT'S VISTA LANDFILL (CLASS III)

(f.k.a. Bishop & Buttrey Keene Road Landfill)

Keene Road, Apopka, Florida

Prepared for

Applied Technology and Management, Inc.
5550 NW 111 Boulevard
Gainesville, FL 32653

Prepared by

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

DEVO SEEREERAM, PH.D., P.E., LLC.
5500 ALHAMBRA DR., ORLANDO, FL-32808
PHONE: (407) 290-2371 - FAX: (407) 298-9011

August 2010

DEVO SEEREERAM, PH.D., P.E.
CONSULTING GEOTECHNICAL ENGINEER
FLORIDA REGISTRATION NO. 48303

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808 E-Mail address: devo@devoeng.com
Phone: (407) 290-2371 . Fax: (407) 298-9011 Website: http://www.devoeng.com

Geotechnical Engineering • Ground Water Modeling • Software Development • Subcontract Drilling

5500 Alhambra Drive ❄ Orlando, Florida 32808 ❄ phone: 407-290-2371 ❄ fax: 407-298-9011

e-mail: devo@devoeng.com | www.devoeng.com

Date: June 30, 2010 (revised August 6, 2010)	***Devo's Project No.*** 10-605.01

To:

APPLIED TECHNOLOGY AND MANAGEMENT, INC.
5550 NW 111 Boulevard
Gainesville, FL 32653
phone: 386-418-6400; fax: 386-418-6401; email: Cschumacher@appliedtm.com

attention: **CHRIS M. SCHUMACHER, P.E.**

Re:

Recommended Aquifer Parameters For Stormwater Management System Design

Waste Management's Vista Landfill (Class III)
(f.k.a. Bishop & Buttrey Keene Road Landfill)

East Keene Road, Apopka, Florida

Dear Mr. Schumacher:

The attached report documents the results of our supplemental geotechnical field investigation, review of previous and current data, our evaluation and assessment of updated SHWT estimates and other aquifer parameters to be used in the ground infiltration analysis of the proposed stormwater management areas at WM's Vista Class III Landfill site located in Apopka, Florida.

Please do not hesitate to contact us if you have any questions regarding the contents of this report.

Devo Seereeram

Devo Seereeram, Ph.D., P.E.
Florida Registration No. 48303
Date: August 6, 2010

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Attachment 1. Double Ring Infiltrometer Tests

1.0 Background Information

The stormwater management system for the Waste Management's Vista Class III Landfill on Keene Road (Apopka, Orange County, Fl) is being re-permitted by Applied Technology & Management, Inc. The proposed layout of the stormwater management system (i.e., perimeter ponds and swales) are shown in Figure 1.1 (attached).

Devo Engineering was requested to provide geotechnical engineering supporting data for the stormwater management areas.

2.0 Previously Issued Reports

In calendar years 2002 to 2005, Devo Engineering performed several water table and hydro-stratigraphic evaluations of the landfill footprints formerly known as BD-3 and BD-4 (see Figure 1.1 for limits of BD-2, BD-3, and BD-4).

These studies were multi-purpose and were used for setting the landfill base grades to provide adequate separation from the seasonal high water table, assessing the rise in onsite water table from adjacent offsite artificial recharge facilities. In addition, we also provided infiltration parameters for the stormwater management swales around the BD-3 and BD-4 phases. A list of the previously issued reports is in chronological order below:

BD3 Footprint (see limits of BD3 in Figure 1.1)

① October 21, 2002. Estimate Of Seasonal High Groundwater Elevation, Bishop & Buttrey Class III Landfill Expansion (BD3 Site), Keene Road & McQueen Road, Orange County, Florida

② April 21, 2003. Supplement #1 to Report Dated October 21, 2002. Additional Hydrogeologic Data & Responses to Selected Comments of Orange County EPD RAI dated Dec 27, 2002. Buttrey Development Three L.L.C. Class III Landfill Expansion (BD3 Site) Keene Road & McQueen Road, City of Apopka, Florida

③ June 13, 2003. Supplement #2 to Report Dated October 21, 2002. Additional Hydrogeologic Data, Buttrey Development Three L.L.C. Class III Landfill Expansion (BD3 Site). Keene Road & McQueen Road, City of Apopka, Florida

BD4 Footprint (see limits of BD4 in Figure 1.1)

④ July 1, 2003. Preliminary Seasonal High Water Table Estimates, Buttrey Development Four L.L.C. Class III Landfill Expansion (BD4 Site), Keene Road & McQueen Road, City of Apopka, Florida

⑤ October 17, 2003. Seasonal High Water Table Estimates, Buttrey Development Four L.L.C. Class III Landfill Expansion (BD4 Site), Keene Road & McQueen Road, City of Apopka, Florida.

⑥ February 6, 2004. Potential Water Table Impact of Lake Cora Lee Wetland Treatment On Buttrey Development Four L.L.C. Class III Landfill Expansion (BD4 Site). Keene Road & McQueen Road, City of Apopka, Florida

⑦ February 10, 2004. Water Table Estimates & Proposed Base Grade Elevations, Buttrey Development Four L.L.C. Class III Landfill Expansion (BD4 Site), Keene Road & McQueen Road, City of Apopka, Florida

⑧ February 3, 2005. Potential Water Table Impact of Lake Cora Lee Wetland Treatment On Buttrey Development Four L.L.C. Class III Landfill Expansion (BD4 Site). Keene Road & McQueen Road, City of Apopka, Florida

BD3 & BD4 Combined Footprint

⑨ February 22, 2005. Estimate of Aquifer Parameters for Swale Recovery Analysis. Bishop and Buttrey, Keene Road Landfill, City of Apopka, Florida. It is our understanding that some of these parameters were modified by the drainage engineer to account for mounding from the adjacent Lake Cora Lee project.

3.0 Existing Dry Retention Ponds on North

There are three (3) existing dry ponds on the north side of the property (north of the BD-2 landfill footprint) and these ponds are labeled Pond 1, Pond 2, and Pond 3 in Figure 1.1. These ponds are also to be re-permitted in addition to the ponds labeled Ponds 4 through 12.

Key data on the northern ponds are as follows:

Table 1. Key Pond Parameters

Pond No.	Area (ac)	Top elevation (ft)	Bottom elevation (ft)
POND 1	6.1	94	70
POND 2	7.6	84	70
POND 3	7.3	102	90

These ponds have been constructed since 2006-2007 (based on review of historical aerials) and appear to be functioning effectively as dry bottom ponds based on our recent site inspection.

4.0 Objectives

The objectives of this investigation will be to provide the following aquifer parameters for each stormwater management area shown in Figure 1.1:

- ➡ Seasonal high groundwater elevations
- ➡ Base of aquifer
- ➡ Horizontal saturated hydraulic conductivity
- ➡ Fillable porosity
- ➡ Unsaturated vertical infiltration rate

5.0 Supplemental Geotechnical Field Work

The follow supplemental scope of field testing was undertaken for this assessment:

1. Four (4) Double Ring Infiltrometer (DRI) tests in Ponds 1, 2, and 3 (the existing ponds along Keene Road). These test locations are labeled DRI-1, DRI-2A, DRI-2B, and DRI-3, as shown in Figure 1.1.

2. Four (4) hand auger borings within the existing pond bottoms. These boring locations are labeled HA-1 through HA-4 in Figure 1.1. Borings HA-1 to HA-3 were drilled to 10 ft depth while boring HA-4 was drilled to 7 ft depth.

3. Visual and tactile examination of soil samples.

4. Measurement of the water table in accessible piezometers within the site.

6.0 Soil and Water Table Conditions

6.1 Presentation of Data

Borings and DRI test locations are shown in Figure 1.1 (attached).

Soil profiles for the four (4) hand auger borings drilled with the pond bottoms are presented in Figure 2.1. Water table measurements are annotated adjacent to the soil profiles in Figure 2.1.

Figure 1.1 shows contours of the seasonal high water table altitude (in ft NGVD) developed from our previous studies of the site (see Section 2 for list of reports).

6.2 Soil Stratigraphy - Ponds 1, 2, and 3

Pond 1 [Boring HA-1, Figure 2.1]

The soil boring drilled in Pond 1 (HA-1) disclosed a very thin (0.2 ft thick) surficial layer of silty material (dried slush) underlain by free-draining fine sands through to the termination of the boring at 10 ft depth.

Pond 2 [Borings HA-2 & HA-3, Figure 2.1]

The soil borings drilled in Pond 2 (HA-2 & HA-3) both disclosed layers of fine sands from the ground surface through to the termination of the borings at 10 ft depth.

Pond 3 [Boring HA-4, Figure 2.1]

The soil boring drilled in Pond 3, HA-4, disclosed a 2 ft thick surficial layer of fine sand with clay lumps, underlain by a 1 ft layers of clayey fine sand and fine sand with clay lumps to 4 ft depth. From 4 ft depth the boring disclosed layers of fine sands through to the termination of the boring at 7 ft depth.

6.3 Soil Infiltration Rate

Double ring infiltrometer tests performed within the pond bottoms disclosed values of 15.3 ft/day to 76.5 ft day and these results are shown in Table 2. The values obtained were generally with typical range for the types of sandy soils with deep water table. Detailed DRI test results are included in Attachment #1.

Table 2. Summary of DRI Test Results

Pond No.	DRI Test No.	Soil type(s)	Permeability (ft/day)
POND 1/DA-1A	DRI-1	Fine sands	50.2
POND 2/DA-2A	DRI-2	Fine sands	76.5
	DRI-3	Fine sands	60.0
POND 3/DA-3A	DRI-4	Clayey fine sand and fine sand	15.3

6.4 Water Table

The ground water table was not encountered in three (3) of the four (4) borings drilled in this investigation and these borings were drilled to 10 ft depth. A seasonal high water table contour map of the site is presented in Figure 1.1 and this was developed based on our previous studies.

7.0 Assessment and Recommendations

Based on the data collected as part of this evaluation and the previously collected data, the aquifer parameters in Table 3 are recommended for each of the stormwater management areas. Note that the unsaturated vertical infiltration rate values in this table already include a safety factor of over 2 and do not need to be factored downward when used in the computer model.

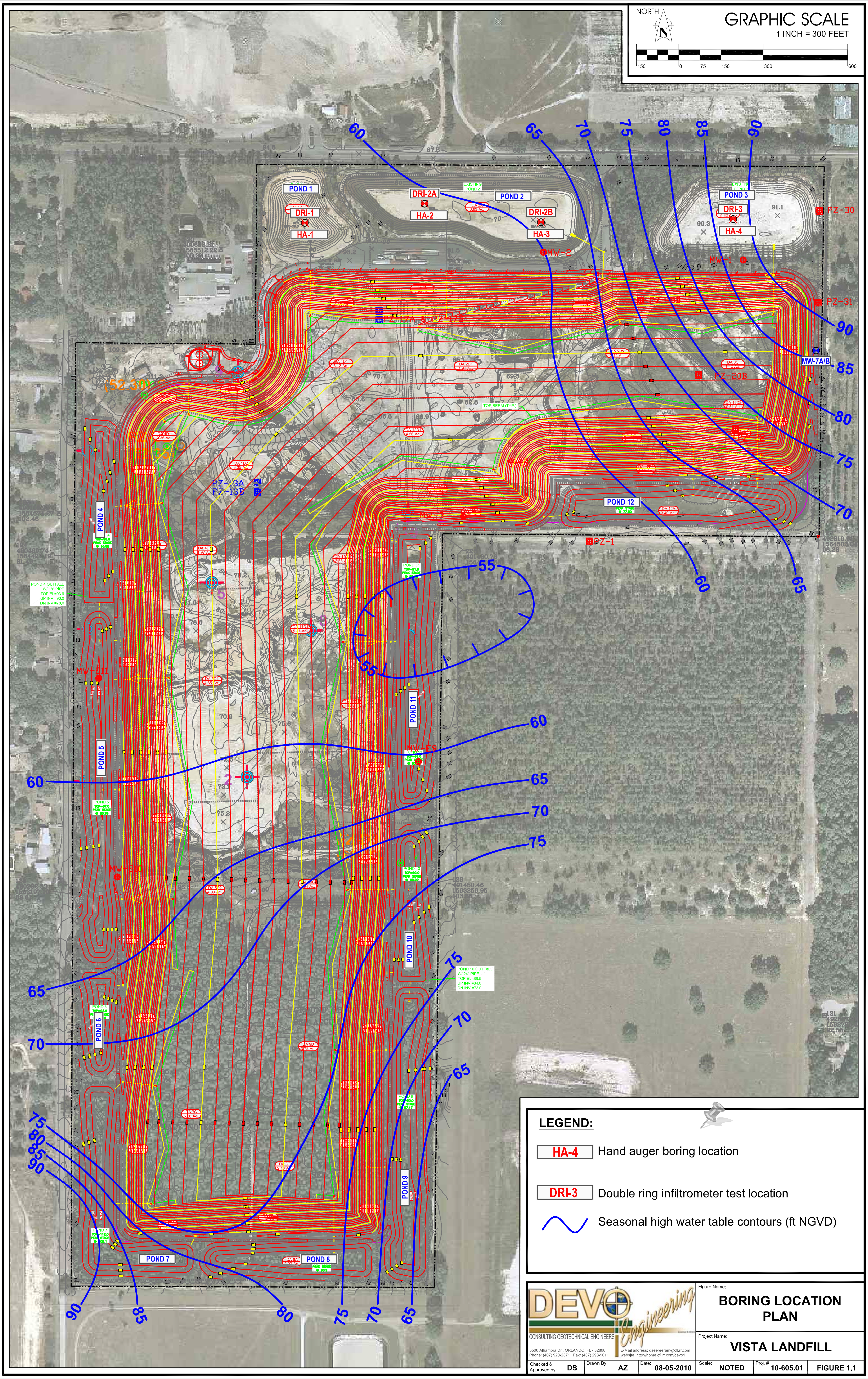
Table 3. Recommended Aquifer Parameters for Analysis of Stormwater Management Areas

Pond Number	Elevations (ft NGVD)				Unsaturated Infiltration Rate (includes FS = 2) (ft/day)	Horizontal Saturated Hydraulic Conductivity (ft/day)	Fillable Porosity (%)
	Pond Top of Bank	Pond Bottom	Seasonal High Water Table	Base of Aquifer			
1	94	70	60	59	5	15	20
2	84	70	60	59	5	15	20
3	102	90	85	84	5	15	20
4	95	82	60	59	5	15	20
5	87	72	60	59	5	15	20
6	95	85	67	66	5	15	20
7	112	102	85	84	5	15	20
8	100	92	77	76	5	15	20
9	90	78	74	69	5	15	20
10	92	82	79	74	5	15	20
11	91	80	60	59	5	15	20
12	78	70	62	61	5	15	20

Notes:
1. The unsaturated vertical infiltration rate vlaues in this table already incorporate a safety factor of over 2.
2. The seasonal high water table values for Ponds 9 and 10 are each raised 4 ft due to potential mounding from artificial recharge from the adjacent Lake Cora Lee wetland treatment project.

The weighted horizontal hydraulic conductivity calculations were presented previously in our February 2005 report. A conservative value of the unsaturated infiltration rate is recommended (5 ft/day versus measured values in the range 15 to 76 ft/day.

FIGURES



LEGEND:

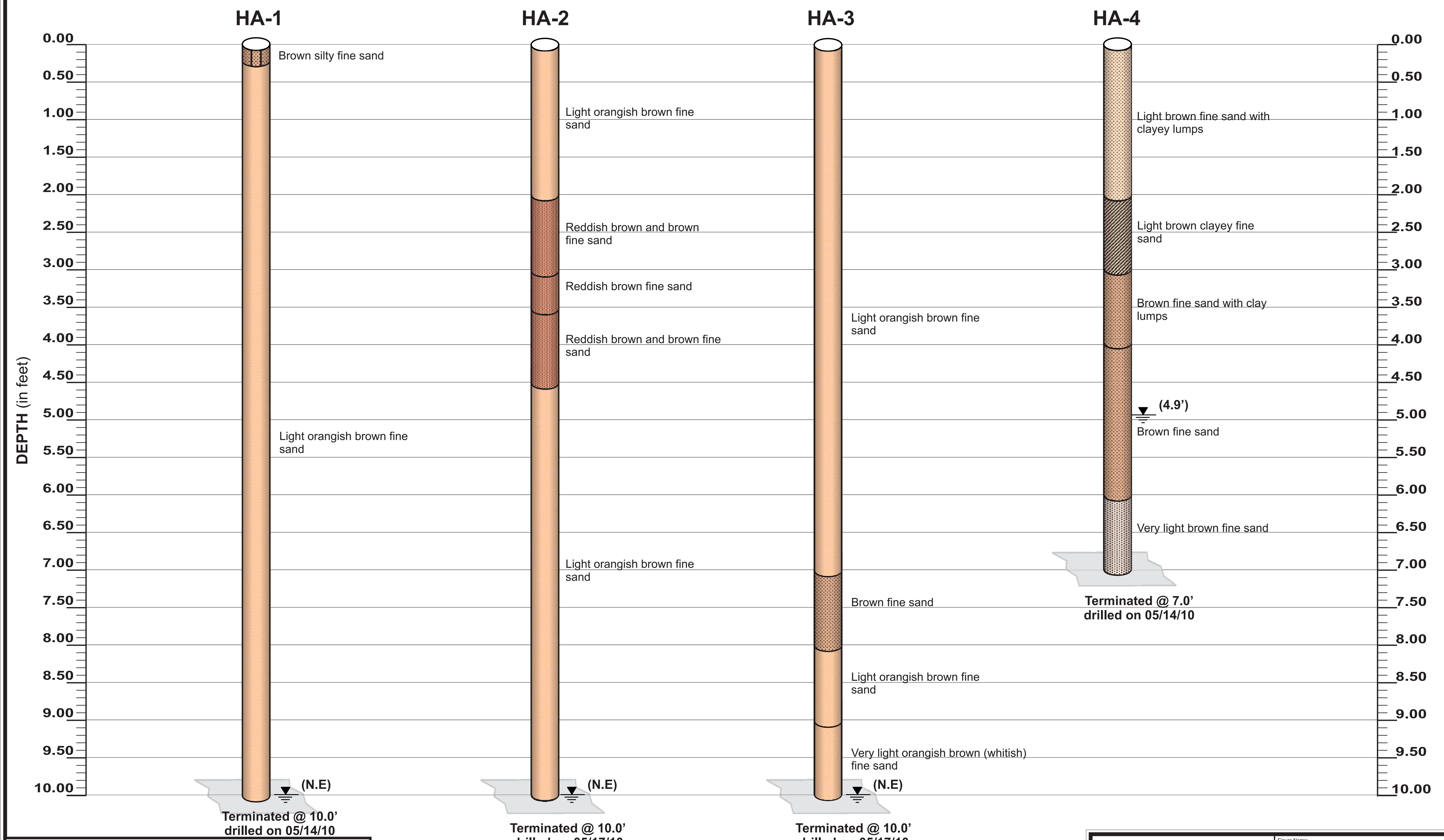
HA-4	Hand auger boring location
DRI-3	Double ring infiltrometer test location
(blue curve)	Seasonal high water table contours (ft NGVD)

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Dr., ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram@cfl.rr.com
website: http://home.cfl.rr.com/devo1

Figure Name: **BORING LOCATION PLAN**

Project Name: **VISTA LANDFILL**

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	AZ	08-05-2010	NOTED	10-605.01	FIGURE 1.1



NOTES:

Borings drilled on Date as noted

Water level measured on May 17, 2010

N.E. Water table not encountered within depth of exploration on date of exploration

DEVO Engineering — CONSULTING GEOTECHNICAL ENGINEERS	Figure Name: SOIL PROFILES FOR HA-1 TO HA-4
5500 Alhambra Drive . Orlando, Florida 32808 Phone: (407) 290-2371 . Fax: (407) 298-9011 E-Mail address: devo@devoeng.com Website: http://www.devoeng.com	Project Name: VISTA LANDFILL
Checked & Approved By: DS · Drawn By: SM · Date: 06-17-10	Scale: NOTED · Project # 10-605.01 · Figure 2.1

ATTACHMENT #1

DRI TEST RESULTS

Vista landfill
Test Date: 5/17/2010

DRI-2A

Ring Dimension

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm
Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **11.00** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	1	149.3	13.97	131.99
2	1	149.7	14.01	132.34
3	1	149.9	14.02	132.52
4	1	150.2	14.05	132.78
5	1	150.7	14.10	133.22
10	5	152	2.84	26.87
15	5	153.4	2.87	27.12
20	5	154.6	2.89	27.33
25	5	156	2.92	27.58
30	5	157.4	2.95	27.83
45	15	161.6	1.01	9.52
60	15	166.2	1.04	9.80
75	15	169.9	1.06	10.01
90	15	174	1.09	10.25

Increment from 1 mins to 90 mins

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm
Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **76.53** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ft3)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	90	93489.5	97.19	918.31
				76.5255778

DRI-2B

Ring Dimension

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm
Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **13.10** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	1	177.8	16.63	157.18
2	1	178	16.65	157.36
3	1	178.1	16.66	157.45
4	1	178.3	16.68	157.62
5	1	178.5	16.70	157.80
10	5	179.7	3.36	31.77
15	5	180.8	3.38	31.97
20	5	181.5	3.40	32.09
25	5	182.3	3.41	32.23
30	5	183.2	3.43	32.39
45	15	187.1	1.17	11.03
60	15	189.7	1.18	11.18
75	15	193	1.20	11.37
90	15	196.2	1.22	11.56
105	15	200.4	1.25	11.81

Increment from 1 mins to 105 mins

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm
Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **60.02** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	105	85540	76.22	720.19
				60.015888

DRI-1

Ring Dimension

Average for Entire Test Duration 120 mins

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm

Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **9.67** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	1	131.3	12.28	116.07
2	1	131.5	12.30	116.25
3	1	131.7	12.32	116.43
4	1	131.9	12.34	116.60
5	1	132.2	12.37	116.87
10	5	133.5	2.50	23.60
15	5	134.3	2.51	23.75
20	5	135.1	2.53	23.89
25	5	136.1	2.55	24.06
30	5	136.9	2.56	24.20
45	15	139.4	0.87	8.22
60	15	142.1	0.89	8.37

Increment from 1 mins to 60 mins

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm

Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **50.19** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	60	40880	63.75	602.32
				50.1933204

DRI-3

Ring Dimension

Average for Entire Test Duration 90 mins

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm
Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **8.97** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	1	121.8	11.40	107.67
2	1	121.8	11.40	107.67
3	1	121.9	11.40	107.76
4	1	122.1	11.42	107.94
5	1	122.1	11.42	107.94
10	5	122.3	2.29	21.62
15	5	122.6	2.29	21.68
20	5	122.7	2.30	21.69
25	5	123	2.30	21.75
30	5	123.1	2.30	21.76
45	15	123.6	0.77	7.28
60	15	124.2	0.77	7.32
75	15	124.6	0.78	7.34
90	15	125.2	0.78	7.38
105	15	127.8	0.80	7.53
120	15	128.4	0.80	7.57

Increment from 60 mins to 75 mins

Diameter of inner ring.......................... **0.94** ft, or **28.65** cm
Diameter of outer ring................... **1.97** ft, or **60.05** cm

Area Within Inner Ring......................... **641.30** sq. cm.

Stabilized infiltration rate............. **15.34** ft/day

Elapsed Time (min)	Time Increment (min)	Volume Increment (ml)	Infiltration Rate (cm/hr)	Infiltration Rate (in/day)
1	120	24981	19.48	184.03
				15.3360976

Attachment B

Seasonal High Water Table Estimates,
Buttrey Development Four L.L.C. Class III Landfill Expansion
(BD4 Site) by Devo Engineering, October 2003

Supplement 2 to Report Dated October 21, 2002
Additional Hydrogeologic Data, Buttery Development Three L.L.C.
Class III Landfill Expansion (DB3 Site) by
Devo Engineering, June 2003

Supplement 1 to Report Dated October 21, 2002
Additional Hydrogeologic Data, & Responses to Selected
Comments of Orange County EPD RAI Dated Dec. 27, 2002 by
Devo Engineering, April 2003

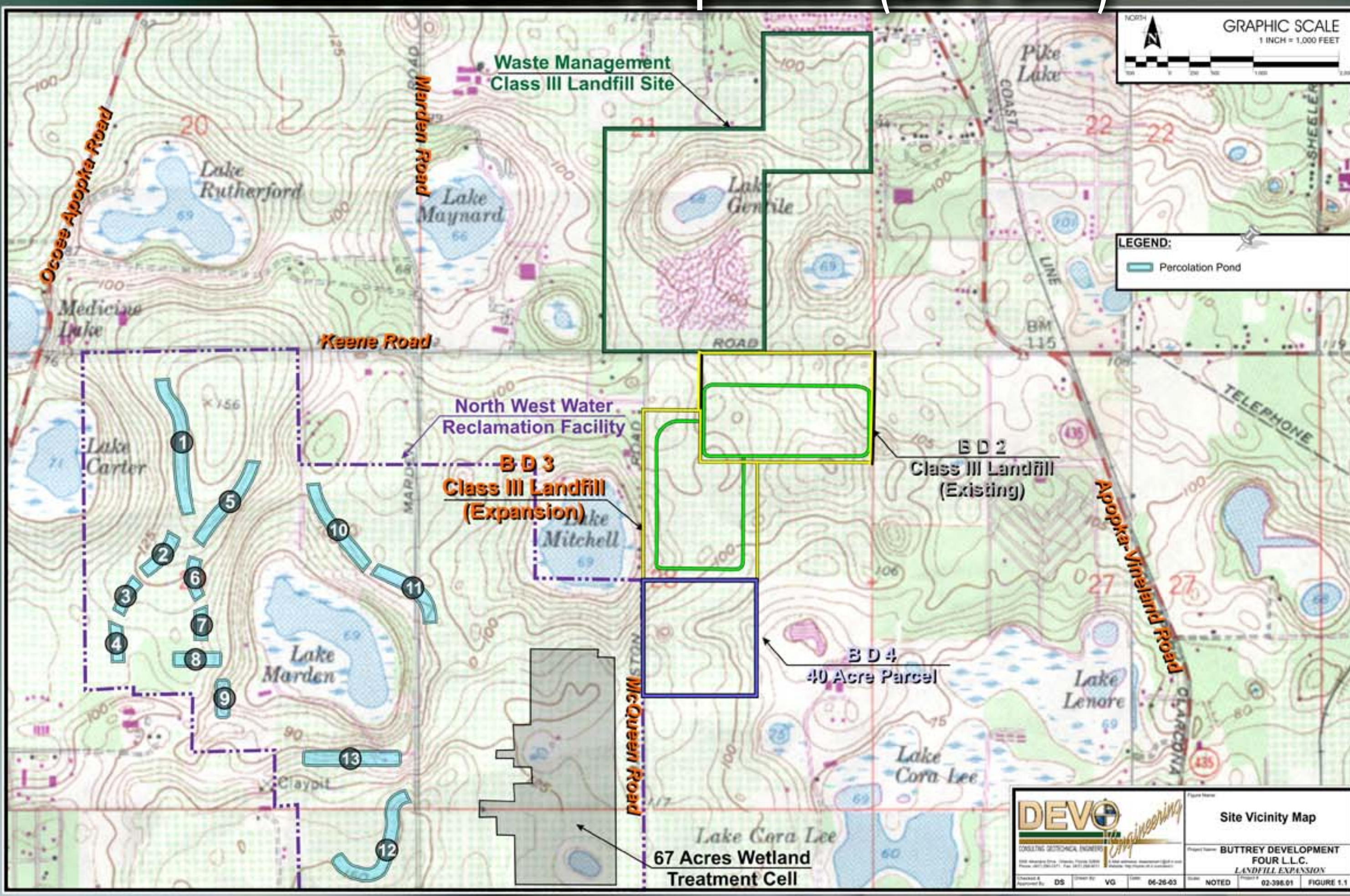
Estimate of Seasonal High Groundwater Elevation,
Bishop & Buttrey Class III Landfill Expansion (BD3 Site) by
Devo Engineering, October 2002

Seasonal High Water Table Estimates,
Buttrey Development Four L.L.C. Class III Landfill Expansion
(BD4 Site) by Devo Engineering, October 2003

Seasonal High Water Table Estimates

Buttrey Development Four L.L.C.

Class III Landfill Expansion (BD4 Site)



Keene Road & McQueen Road, City of Apopka, Florida

Prepared for

Buttrey Development Four, L.L.C.
6239 Edgewater Drive, Suite D-1
Orlando, Fl 32810

Prepared by

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

DEVO SEEREERAM, PH.D., P.E.
5500 ALHAMBRA DR., ORLANDO, FL-32808
PHONE: (407) 290-2371 - FAX: (407) 298-9011

OCTOBER 2003

DEVO SEEREEREERAM, PH.D., P.E.

CONSULTING GEOTECHNICAL ENGINEER

FLORIDA REGISTRATION NO. 48303

GEOTECHNICAL ENGINEERING • GROUND WATER MODELING • SOFTWARE DEVELOPMENT • SUBCONTRACT DRILLING

5500 ALHAMBRA DRIVE ❈ ORLANDO, FLORIDA 32808 ❈ PHONE: 407-290-2371 ❈ FAX: 407-298-9011

e-mail: devo@devoeng.com | www.devoeng.com

Date: October 17, 2003

Devo's Project Number: 02-398.01

to:
Buttrey Development Four, L.L.C.
6239 Edgewater Drive, Suite D-1
Orlando, Fl 32810
phone: 407-296-0016 fax: 407-294-8090

attention: **Ed Chesney, P.E.**
Staff Engineer

Ref:

SEASONAL HIGH WATER TABLE ESTIMATES
BUTTREY DEVELOPMENT FOUR L.L.C. CLASS III LANDFILL EXPANSION (BD4 SITE)
KEENE ROAD & MCQUEEN ROAD, CITY OF APOPKA, FLORIDA

Dear Mr. Chesney:

The purpose of this report is to present estimates of the seasonal high water table within the BD4 Class III landfill footprint. The location of this footprint is shown on the quadrangle map in Figure 1.1 relative to the following adjacent and nearby facilities:

- ➥ BD3 Class III landfill footprint
- ➥ BD2 Class III landfill footprint
- ➥ Waste Management Class III Landfill north of Keene Rd, and
- ➥ OCPU Northwest Water Reclamation Facility.

The purpose of this report is to provide an estimate of the seasonal high water table within the BD4 landfill footprint.

Note that we recently completed a detailed analysis of the seasonal high water table assessment within the BD3 landfill footprint. Figure 1.2 shows the monitor wells and piezometers installed on all of the landfill sites (prospective and existing) and their ground water level readings for June 18, 2003. This is a magnified view of the site vicinity map, showing the elevations of the adjacent lakes and the topography of the vicinity. Note that there were only four (4) piezometers within the BD4 site at that time of the June 2003 measurements.

The program of site-specific geotechnical investigation included fourteen (14) Standard Penetration Test (SPT) borings (50-70 ft deep) and eight (8) surficial aquifer piezometers (30-55 ft deep). The field work was performed in three (3) phases as outlined below:

	Sep 2002	May/Jun 2003	Aug 2003
SPT boreholes	5 borings	6 borings	3 borings
	CB-6; CB-7; CB-8; CB-9; & CB-10	CB-1; CB-3; CB-5; CB-12; CB-14; & CB-17	CB-4; CB-11; & CB-13
Piezometers	0 piezometers	4 piezometers	4 piezometers
		CB-1; CB-5; CB-14; & CB-17	CB-4; CB-9; CB-11; & CB-13

Test locations are shown in Figure 1.3.

Figure 1.3 shows the locations of surficial aquifer piezometers and SPT borings within the subject area as well as measured water table elevations on August 26, 2003.

Figure 1.4 shows the land surface topography at 1 ft intervals based on a site-specific survey. Figures 2.1 to 2.4 show the stratigraphic cross-sections through the site based on the completed test borings. Cross-section locations are shown in Figure 1.4.

Figure 1.5 shows water table altitude measurements on October 3, 2003 which follows an extended period of above-average rainfall. Based on antecedent rainfall, water table altitudes at this time would have been at or above normal seasonal high levels.

Based on the body of data above, seasonal high water table contours at 5 ft intervals are plotted in Figures 1.3 and 1.5.

A 5 ft interval contour map of the estimated seasonal high water table within the BD4 footprint is shown in Figure 1.5. This map was developed based on the available data and our knowledge of the hydrogeology of this area.

Report Certification

We trust that this report provides the information on the seasonal high water table within the BD4 Landfill footprint for design and permit considerations.

Feel free to contact us if there are any questions or if any clarifications are needed.

Sincerely,

Devo Seereeram

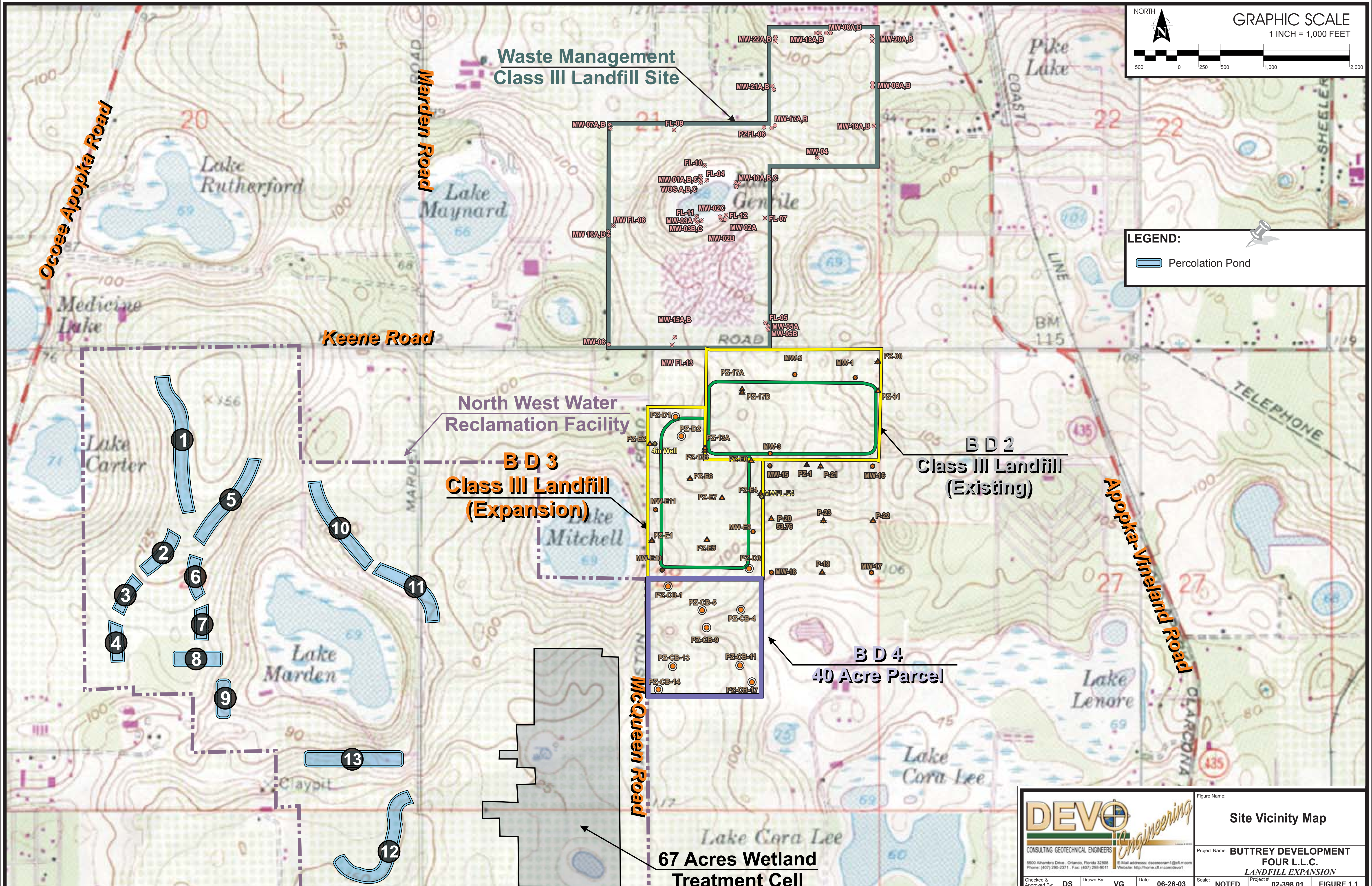
Devo Seereeram, Ph.D., P.E.
Florida Registration No. 48303
Date: October 17, 2003

List of Attached Figures

Figure 1.1 Site Vicinity Map
Figure 1.2 Magnified View of BD4 Site Vicinity Map
Figure 1.3 Boring/Piezometer Location Plan
Figure 1.4 Topographic Contour Map for BD4 Site With Cross-Section Locations
Figure 1.5 Seasonal High Water Table Contours

Figure 2.1 Stratigraphic Cross-Section A-A'
Figure 2.2 Stratigraphic Cross-Section B-B'
Figure 2.3 Stratigraphic Cross-Section C-C'
Figure 2.4 Stratigraphic Cross-Section D-D'

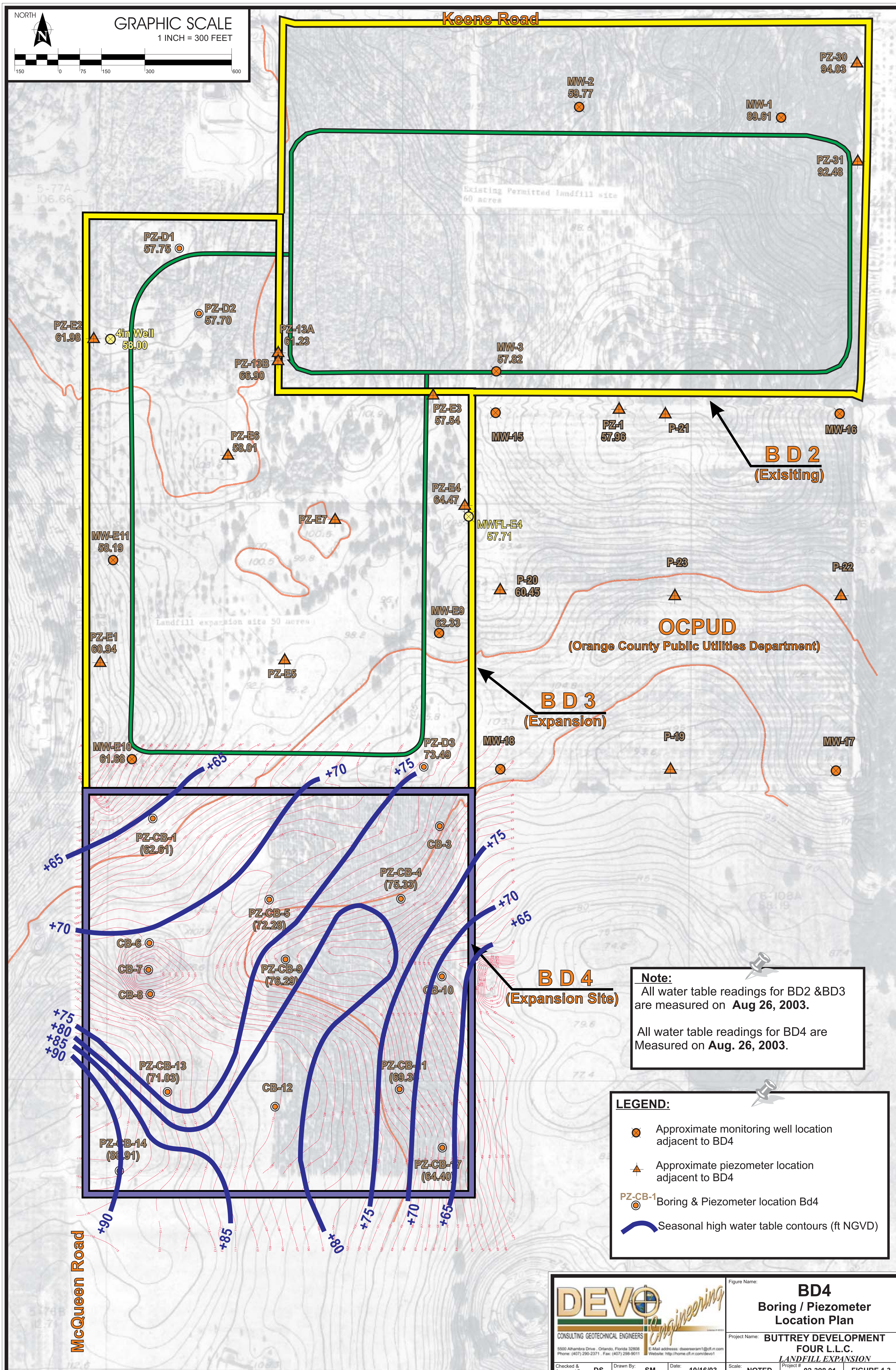
FIGURES

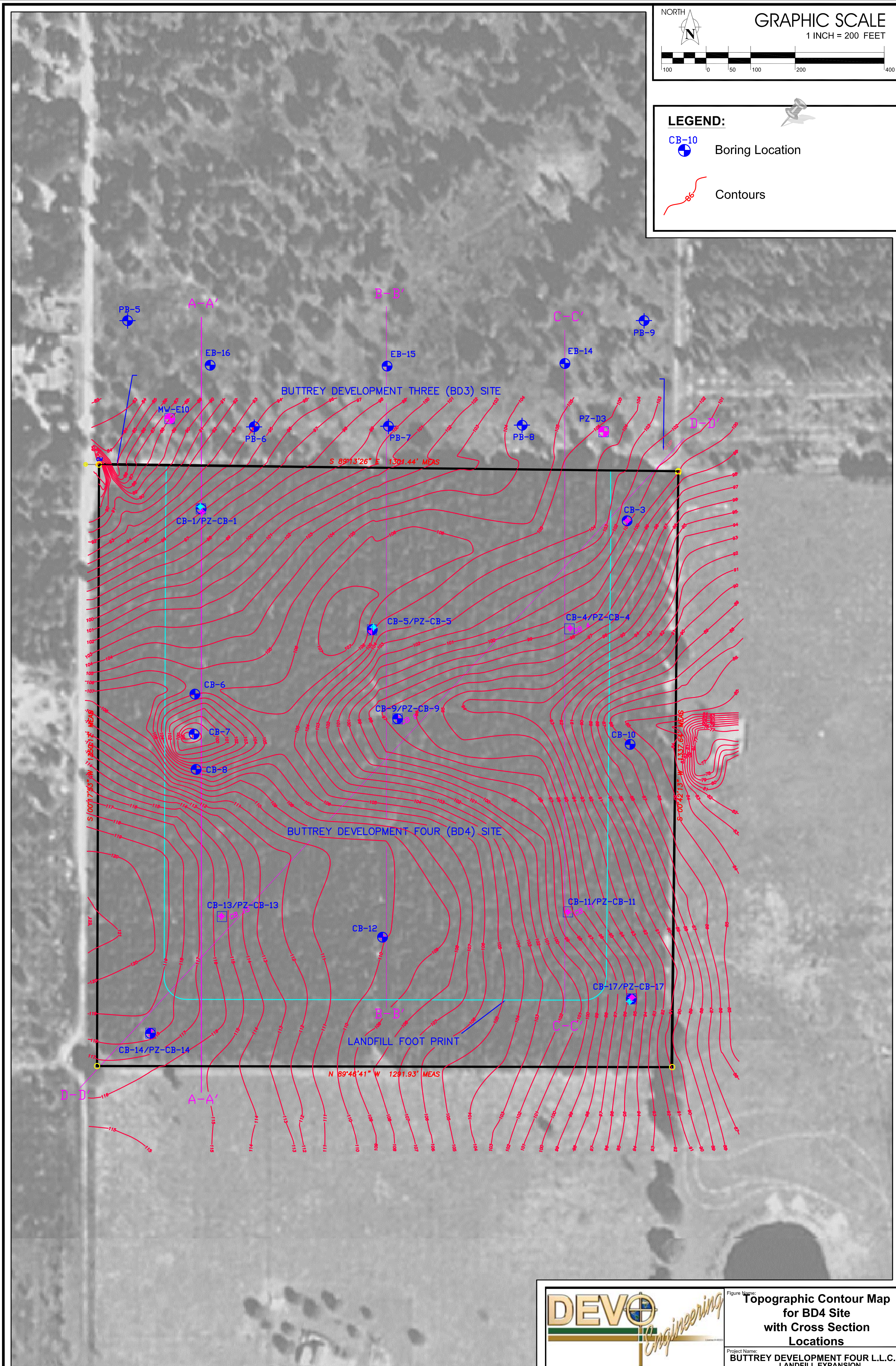


GRAPHIC SCALE
1 INCH = 1,000 FEET
NORTH
LEGEND:
Percolation Pond
Waste Management
Class III Landfill Site
North West Water
Reclamation Facility
B D 3
Class III Landfill
(Expansion)
B D 2
Class III Landfill
(Existing)
B D 4
40 Acre Parcel
67 Acres Wetland
Treatment Cell
Ocoee Apopka Road
Marden Road
Keene Road
McQueen Road
Apopka-Vineland Road
Lake Rutherford
Lake Maynard
Medicine Lake
Lake Carter
Lake Mitchell
Lake Marden
Lake Lenore
Lake Cora Lee
Pike Lake
Claypit
1
2
3
4
5
6
7
8
9
10
11
12
13
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
Figure Name:
Site Vicinity Map
Project Name: BUTTREY DEVELOPMENT
FOUR L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 06-26-03
Scale: NOTED
Project # 02-398.01
FIGURE 1.1

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name:	Magnified View of Wells in Study Area		
Project Name:	BUTTREY DEVELOPMENT FOUR L.L.C. *LANDFILL EXPANSION*		
Checked & Approved By: DS	Drawn By: SM	Date: 10-17/03	
Scale: NOTED	Project #: 02-398.01	FIGURE 1.2	


NORTH
N
GRAPHIC SCALE
1 INCH = 300 FEET
150 0 75 150 300 600
Keene Road
McQueen Road
Existing Permitted landfill site 60 acres
Landfill expansion site 50 acres
PZ-30 94.03
MW-2 59.77
MW-1 89.61
PZ-31 92.48
PZ-D1 57.75
PZ-D2 57.70
PZ-E2 61.98
4in Well 58.00
PZ-13A 61.23
PZ-13B 66.90
MW-3 57.82
PZ-E3 57.54
MW-15
PZ-1 57.96
P-21
MW-16
PZ-E6 58.01
B D 2
(Exisiting)
PZ-E4 64.47
MWFL-E4 57.71
PZ-E7
MW-E11 58.19
P-23
P-22
P-20 60.45
MW-E9 62.33
OCPUD
(Orange County Public Utilities Department)
PZ-E1 60.94
PZ-E5
B D 3
(Expansion)
MW-18
P-19
MW-17
MW-E10 61.68
PZ-D3 73.49
PZ-CB-1 (62.61)
CB-3
PZ-CB-4 (75.33)
PZ-CB-5 (72.28)
CB-6
CB-7
CB-8
PZ-CB-9 (76.29)
CB-10
B D 4
(Expansion Site)
PZ-CB-13 (71.03)
CB-12
PZ-CB-14 (88.91)
PZ-CB-17 (64.40)
+65
+70
+75
+80
+85
+90
Note:
All water table readings for BD2 &BD3 are measured on **Aug 26, 2003.**
All water table readings for BD4 are Measured on **Aug. 26, 2003.**
LEGEND:
Approximate monitoring well location adjacent to BD4
Approximate piezometer location adjacent to BD4
PZ-CB-1 Boring & Piezometer location Bd4
Seasonal high water table contours (ft NGVD)
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
Figure Name:
BD4
Boring / Piezometer Location Plan
Project Name: BUTTREY DEVELOPMENT FOUR L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: SM
Date: 10/16/03
Scale: NOTED
Project #: 02-398.01
FIGURE 1.3

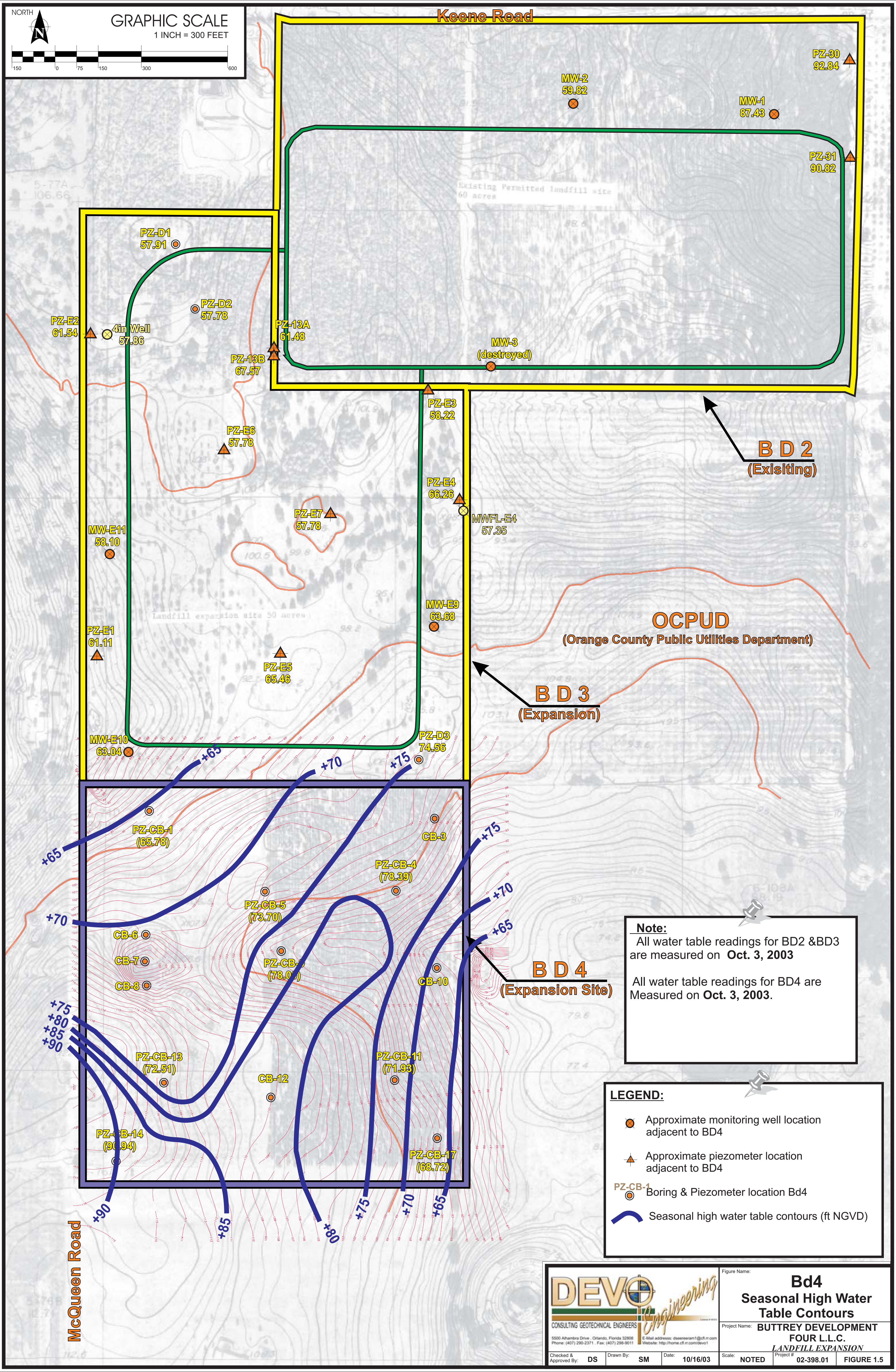


DEVO Engineering

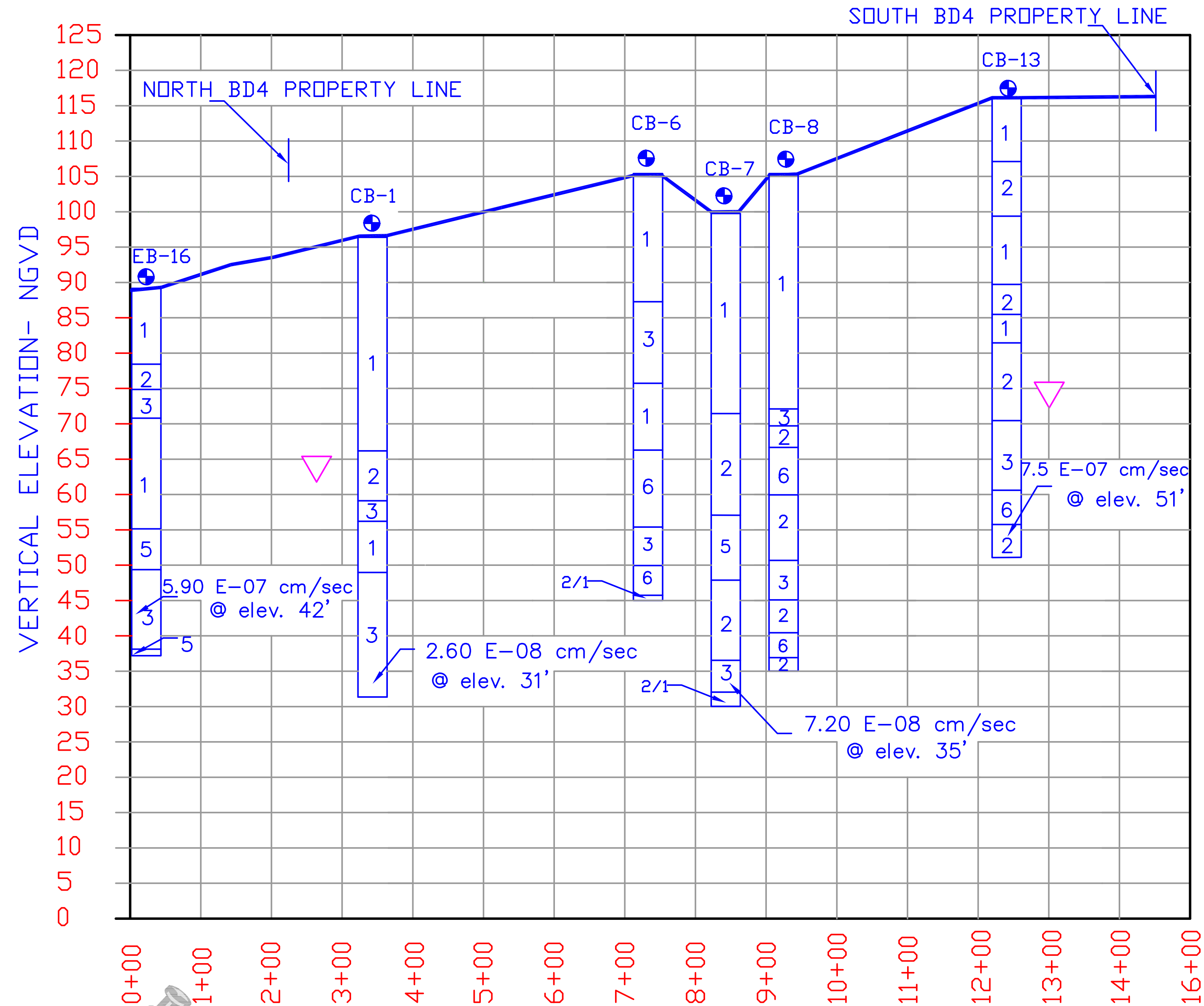
Figure Name: **Topographic Contour Map for BD4 Site with Cross Section Locations**

Project Name: **BUTTREY DEVELOPMENT FOUR L.L.C. LANDFILL EXPANSION**

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	SM	10/20/03	N.T.S.	02-398.01	FIGURE 1.4



NORTH
N
GRAPHIC SCALE
1 INCH = 300 FEET
150
0
75
150
300
600
Keene Road
PZ-30
92.84
MW-2
59.82
MW-1
87.43
PZ-31
90.82
Existing Permitted landfill site
60 acres
PZ-D1
57.91
PZ-D2
57.78
PZ-E2
61.54
4in Well
57.86
PZ-13A
61.48
PZ-13B
67.57
MW-3
(destroyed)
PZ-E3
58.22
PZ-E6
57.78
B D 2
(Exisiting)
PZ-E4
66.26
PZ-E7
57.78
MWFL-E4
57.35
MW-E11
58.10
Landfill expansion site 50 acres
MW-E9
63.68
OCPUD
(Orange County Public Utilities Department)
PZ-E1
61.11
PZ-E5
65.46
B D 3
(Expansion)
MW-E10
63.04
PZ-D3
74.56
+65
+70
+75
PZ-CB-1
(65.78)
CB-3
PZ-CB-4
(78.39)
PZ-CB-5
(73.70)
CB-6
CB-7
CB-8
CB-10
B D 4
(Expansion Site)
+80
+85
+90
PZ-CB-13
(72.51)
CB-12
PZ-CB-11
(71.93)
PZ-CB-17
(68.72)
McQueen Road
Note:
All water table readings for BD2 &BD3 are measured on **Oct. 3, 2003**
All water table readings for BD4 are Measured on **Oct. 3, 2003**.
LEGEND:
Approximate monitoring well location adjacent to BD4
Approximate piezometer location adjacent to BD4
PZ-CB-1
Boring & Piezometer location Bd4
Seasonal high water table contours (ft NGVD)
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
Figure Name:
Bd4
Seasonal High Water Table Contours
Project Name:
BUTTREY DEVELOPMENT FOUR L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: SM
Date: 10/16/03
Scale: NOTED
Project #: 02-398.01
FIGURE 1.5



LEGEND

1	FINE SAND (SP) (A-3)
2	CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7
3	SANDY/SILTY CLAY (CL) (A-6 / A-7)
4	SANDY CLAY (CH) (A-7-5) (A-7-6)
5	SILTY SAND (SM) (SP-SM)
6	LIMESILT (A-4/A-5)
7	LIMESTONE

2.6 E-07 cm/sec
@ elev. 47' NGVD
(VERTICAL PERMEABILITY AT NOTED ELEVATION)

▽ WATER TABLE ELEVATION 08/26/03

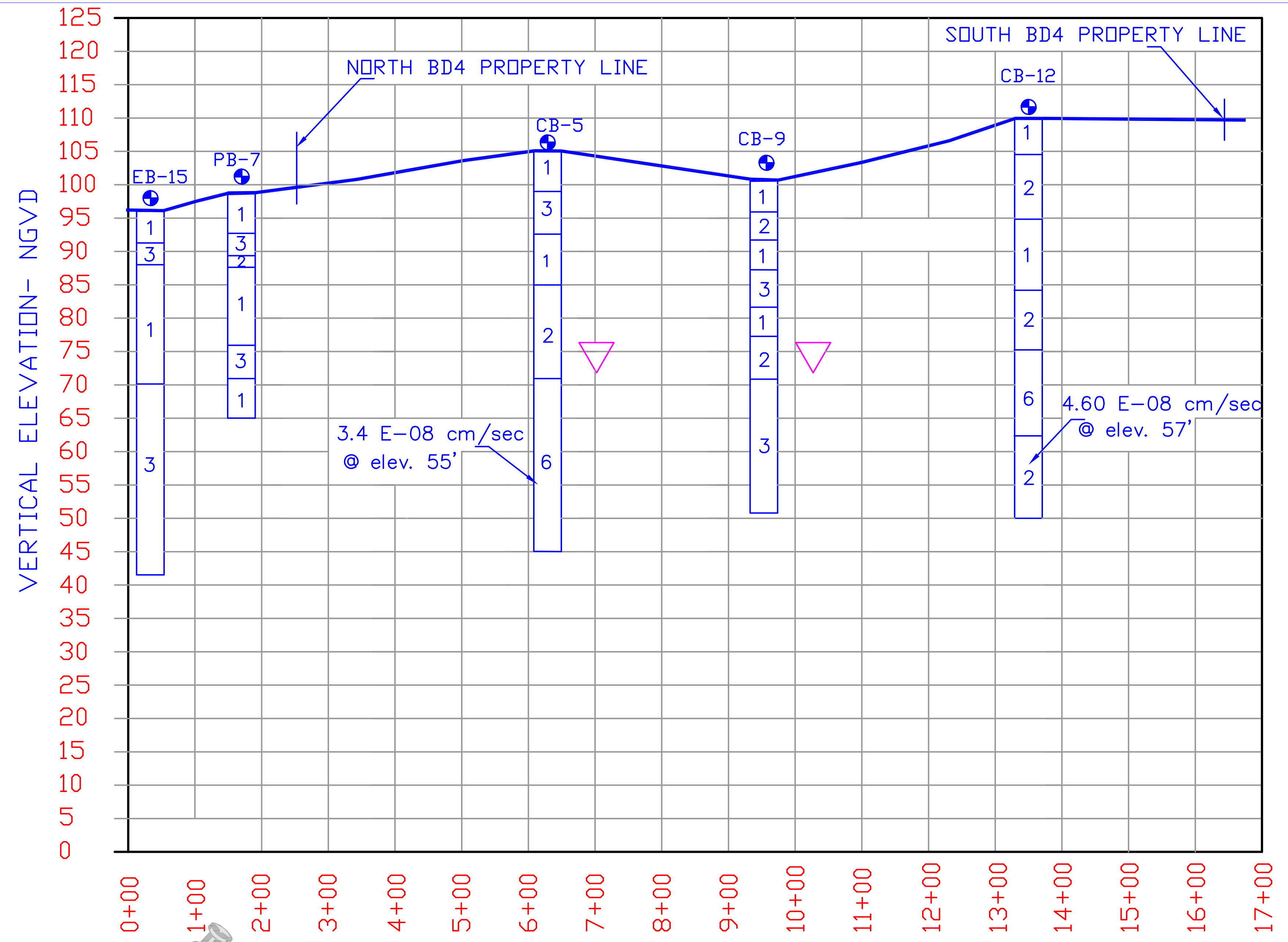
CB-9 EXPANSION BORING LOCATION

DEVO Engineering

Figure Name: **Stratigraphic Cross-Section A-A'**

Project Name: BUTTREY DEVELOPMENT FOUR L.L.C. LANDFILL EXPANSION

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	SM	10/20/03	N.T.S.	02-398.01	FIGURE 2.1



LEGEND

1	FINE SAND (SP) (A-3)
2	CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7
3	SANDY/SILTY CLAY (CL) (A-6 / A-7)
4	SANDY CLAY (CH) (A-7-5) (A-7-6)
5	SILTY SAND (SM) (SP-SM)
6	LIMESILT (A-4/A-5)
7	LIMESTONE

2.6 E-07 cm/sec
@ elev. 47' NGVD
(VERTICAL PERMEABILITY AT NOTED ELEVATION)

▽ WATER TABLE ELEVATION 08/26/03

CB-9 EXPANSION BORING LOCATION

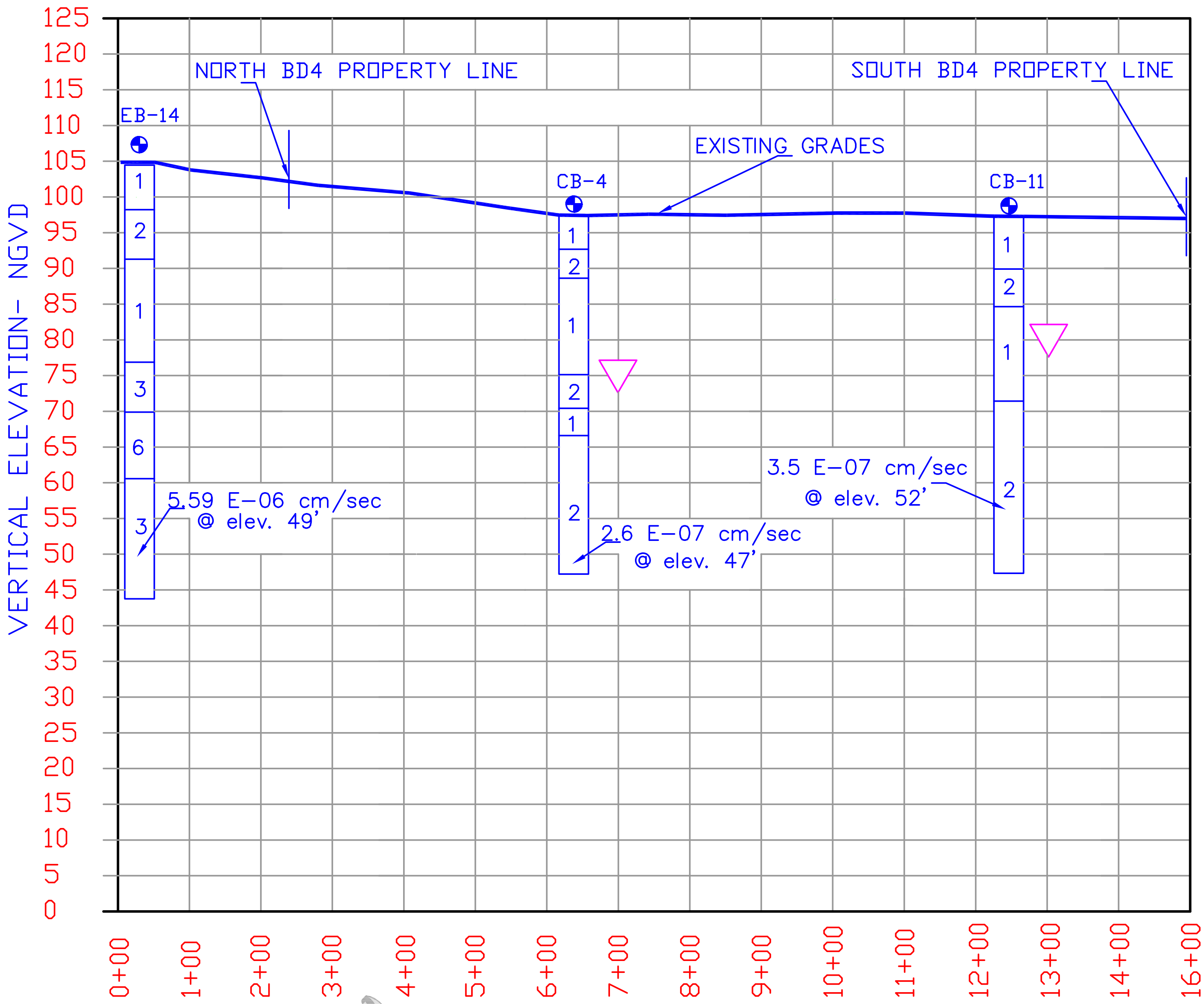
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

5500 Alhambra Dr . ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
E-Mail address: devo@devoeng.com
website: http://www.devoeng.com

Figure Name: **Stratigraphic Cross-Section B-B'**

Project Name: **BUTTREY DEVELOPMENT FOUR L.L.C. LANDFILL EXPANSION**

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	SM	10/20/03	N.T.S.	02-398.01	FIGURE 2.2



LEGEND

1	FINE SAND (SP) (A-3)
2	CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7
3	SANDY/SILTY CLAY (CL) (A-6 / A-7)
4	SANDY CLAY (CH) (A-7-5) (A-7-6)
5	SILTY SAND (SM) (SP-SM)
6	LIMESILT (A-4/A-5)
7	LIMESTONE

2.6 E-07 cm/sec
@ elev. 47' NGVD
(VERTICAL PERMEABILITY AT NOTED ELEVATION)

▽ WATER TABLE ELEVATION 08/26/03

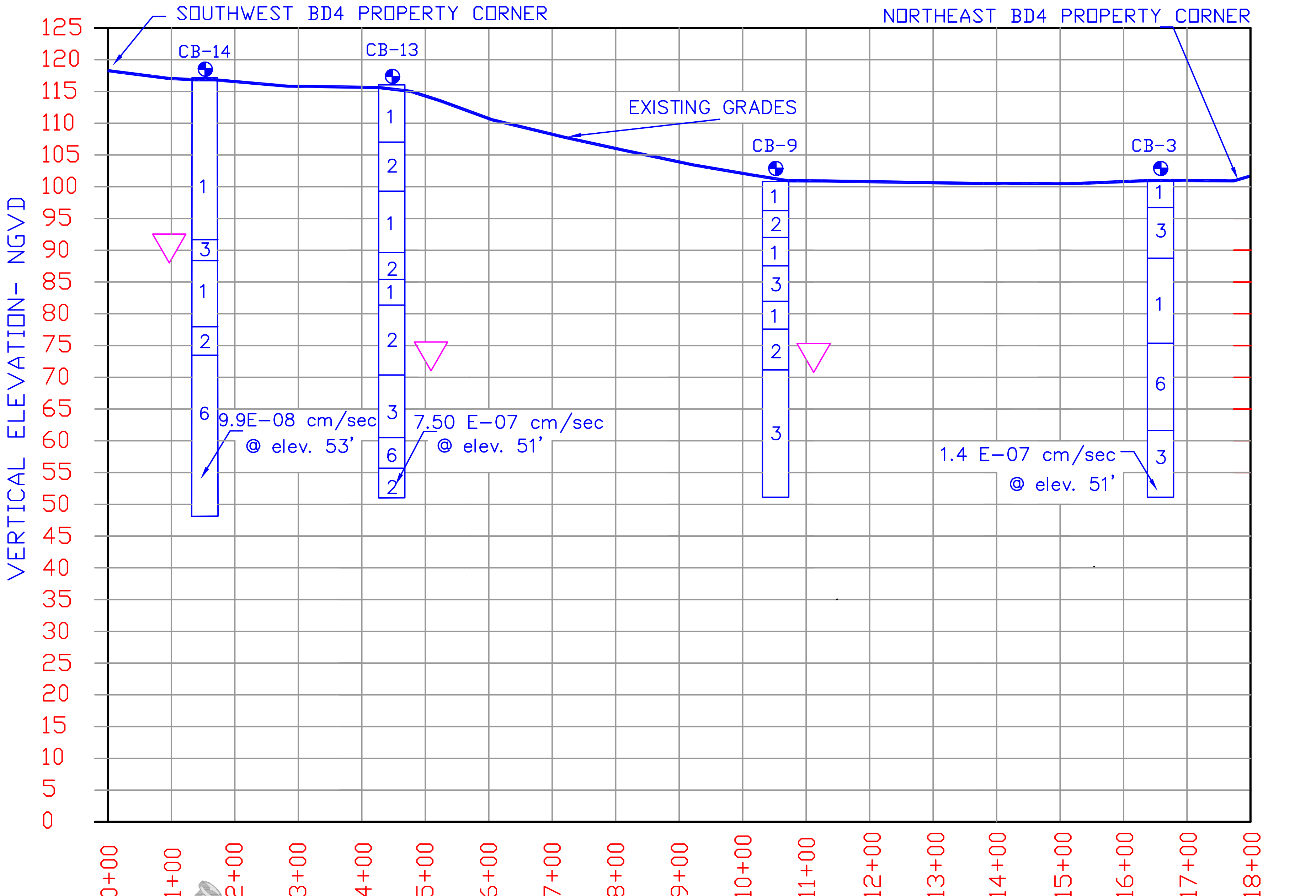
CB-9 EXPANSION BORING LOCATION

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Dr . ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
E-Mail address: devo@devoeng.com
website: http://www.devoeng.com

Figure Name: **Stratigraphic Cross-Section C-C'**

Project Name: **BUTTREY DEVELOPMENT FOUR L.L.C. LANDFILL EXPANSION**

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	SM	10/20/03	N.T.S.	02-398.01	FIGURE 2.3



LEGEND

1 FINE SAND (SP) (A-3)

2 CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7

3 SANDY/SILTY CLAY (CL) (A-6 / A-7)

4 SANDY CLAY (CH) (A-7-5) (A-7-6)

5 SILTY SAND (SM) (SP-SM)

6 LIMESILT (A-4/A-5)

7 LIMESTONE

2.6 E-07 cm/sec
@ elev. 47' NGVD
(VERTICAL PERMEABILITY AT NOTED ELEVATION)

▽ WATER TABLE ELEVATION 08/26/03

CB-9 EXPANSION BORING LOCATION

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

5500 Alhambra Dr . ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
E-Mail address: devo@devoeng.com
website: http://www.devoeng.com

Figure Name: **Stratigraphic Cross-Section D-D'**

Project Name: **BUTTREY DEVELOPMENT FOUR L.L.C. LANDFILL EXPANSION**

Checked & Approved by: DS	Drawn By: SM	Date: 10/20/03	Scale: N.T.S.	Proj. # 02-398.01	FIGURE 2.4

Supplement 2 to Report Dated October 21, 2002
Additional Hydrogeologic Data, Buttery Development Three L.L.C.
Class III Landfill Expansion (DB3 Site) by
Devo Engineering, June 2003

DEVO SEEREERAM, PH.D., P.E.
CONSULTING GEOTECHNICAL ENGINEER
FLORIDA REGISTRATION NO. 48303

GEOTECHNICAL ENGINEERING • GROUND WATER MODELING • SOFTWARE DEVELOPMENT • SUBCONTRACT DRILLING

5500 ALHAMBRA DRIVE ❈ ORLANDO, FLORIDA 32808 ❈ PHONE: 407-290-2371 ❈ FAX: 407-298-9011

e-mail: devo@devoeng.com | www.devoeng.com

Date: June 13, 2003	*Devo's Project Number:* 02-398.01
to: Buttrey Development Three, L.L.C. 6239 Edgewater Drive, Suite D-1 Orlando, Fl 32810 phone: 407-296-0016 fax: 407-294-8090 attention: **Ed Chesney, P.E.** **Staff Engineer**	

Ref:
Supplement #2 to Report Dated October 21, 2002

Additional Hydrogeologic Data
Buttrey Development Three L.L.C. Class III Landfill Expansion (BD3 Site)
Keene Road & McQueen Road, City of Apopka, Florida

Dear Mr. Chesney:

This not a stand-alone report but a supplement to the following previously issued reports:

① Main report dated October 21, 2002, and
② Supplement #1 report dated April 21, 2003.

The purpose of this report is to provide additional information requested by CDM at our meeting on June 5, 2003.

The two (2) additional items which need clarification are as follows:

❶ the vertical leakage rate in the water balance analysis, and

❷ the addition of two (2) Floridan aquifer monitor wells and clarification that the open hole interval of the Floridan aquifer wells will be 10 ft into the top of the limestone.

Item ❶: Vertical Leakage Rate

The vertical recharge to the Floridan aquifer is computed as follows:

q (ft/day) $= (k_v/b)\,\Delta h$ . . . . (1a)
q (inches/year) $= [(k_v/b)\,\Delta h] \times 12 \times 365$ . . . . (1b)

where

q	=	vertical leakage (flow rate) in units of ft/day or (in/yr)
k_v	=	vertical hydraulic conductivity of the semi-confining layers above the top of the Floridan aquifer in units of ft/day
Δh	=	difference between the surficial aquifer and the level of the potentiometric surface of the Floridan aquifer
b	=	thickness of the semi-confining layer

The parameter (k_v/b) is known as the leakance. The calculations in Appendix B of our Supplement #1 report dated April 21, 2003 gave a leakance value of 6.1×10^{-5} ft/day per ft using the borehole specific data. At this particular site, a leakance range 9×10^{-5} to 20×10^{-5} ft/day per ft is reported in the following publication:

Murray, L. C., Jr. and K.J. Halford. 1996. *Hydrogeologic conditions and simulation of ground-water flow in the greater Orlando metropolitan area, east-central Florida*, USGS WRI 96-4181.

If we pick the high end of this range, the vertical recharge rate will be about 3.24 inch/year at a head difference of 3.7 ft as shown below:

k_v/b (ft/day per ft)	Head difference, Δh (ft)	Computed Vertical Recharge Rate (in/yr)
6.10e-05	3.7	0.99
2.00e-04	3.7	3.24
2.00e-04	6.0	5.26

On the periphery of the site, the interaquifer head difference is greater so the recharge rate is higher, perhaps as much as 5 to 6 inches per year in the areas where the interaquifer head difference is greater. Therefore, it is likely that a vertical recharge rate of 3 to 5 inches per year will be representative of this area, although 3 inch/year may be representative of the local area of interest.

Of the 10 inch/year which recharges the surficial aquifer, say 3-4 inch/year recharges the Floridan aquifer vertically which means that 6-7 in/yr moves horizontally.

This analysis still shows that *the confining layer is able to separate and prevent an overwhelming amount of surficial aquifer groundwater from percolating downward to the drinking water aquifer below the waste footprint, and the ability of the confining layer to cause horizontal flow to the surficial aquifer, sufficient to allow effective interception and treatment of potential leachate, in an area beyond the waste footprint.*

Item ❷: Additional Floridan Aquifer Monitor Wells

As agreed to at the June 5, 2003 meeting, two (2) additional Floridan aquifer monitor wells are proposed at the locations labeled MW-FL5 and MW-FL6 as shown on the revised Figure 4.1 (attached). The Floridan wells will have their open hole intervals in the uppermost 10 ft of the Floridan limestone aquifer.

Report Certification

We trust that this report provides the additional information required by the City of Apopka to facilitate their review and approval of the permit application.

Feel free to contact us if there are any questions or if any clarifications are needed.

Sincerely,

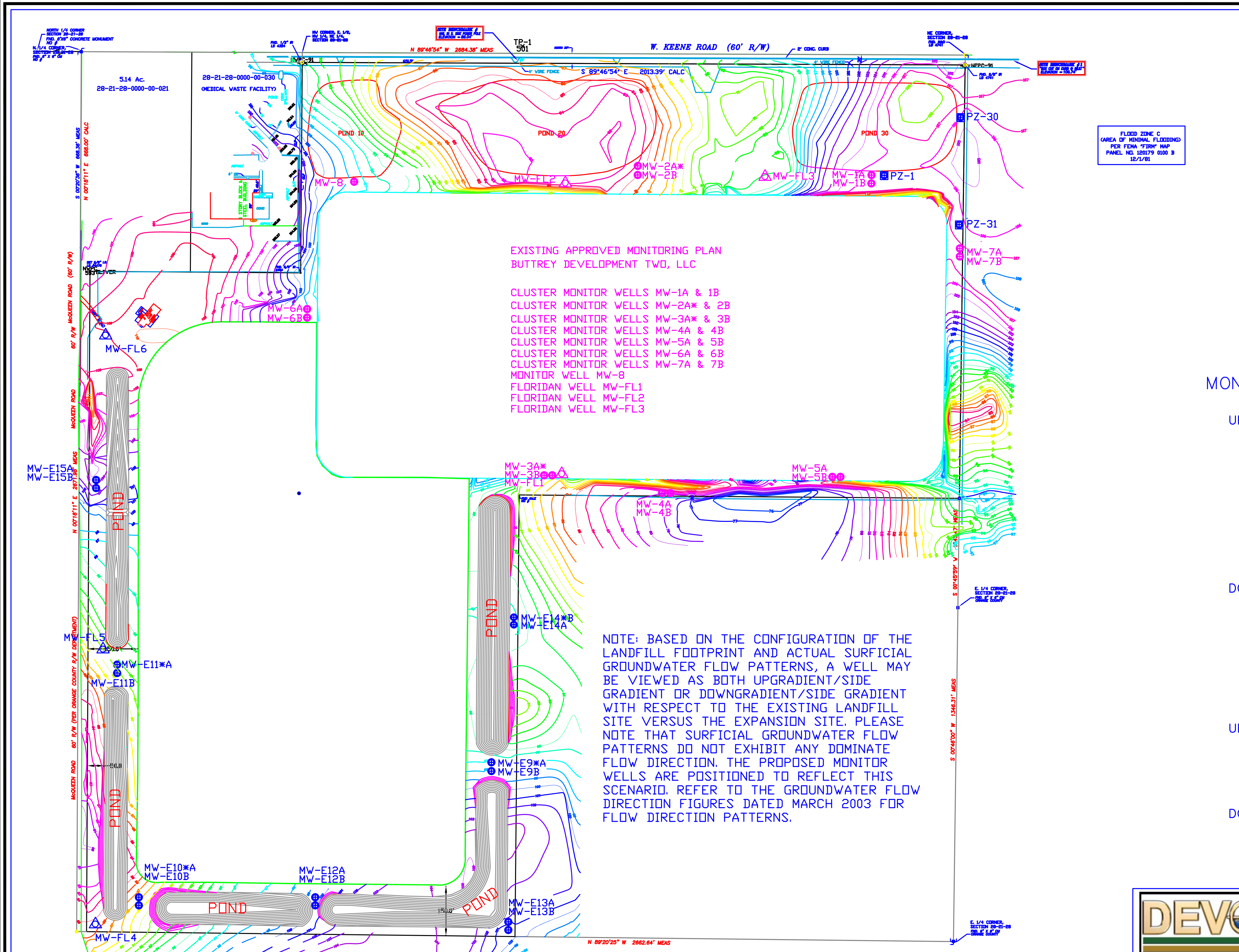
Devo Seereeram

Devo Seereeram, Ph.D., P.E.
Florida Registration No. 48303
Date: June 13, 2003

List of Attached Figures

Figure 4.1 Monitor Well Location Plan (revised)

FIGURE



NORTH

GRAPHIC SCALE
1 INCH = 300 FEET

150 0 75 150 300 600

LEGEND:

- GROUND WATER MONITORING WELL
- FLORIDAN AQUIFER MONITORING WELL
- GROUND WATER LEVEL PIEZOMETER
- * DENOTES EXISTING WELL

MONITOR WELL DESIGNATIONS

UPGRADIENT/SIDE GRADIENT SURFICIAL

MW-1 A & B
MW-2 A & B
MW-8
MW-6 A & B
MW-7 A & B
MW-E9 A & B
MW-E12 A & B
MW-E13 A & B

DOWNGRADIENT/SIDE GRADIENT SURFICIAL

MW-3 A & B
MW-4 A & B
MW-5 A & B
MW-E10 A & B
MW-E11 A & B
MW-E14 A & B
MW-E15 A & B

UPGRADIENT FLORIDAN

MW-FL1
MW-FL4
MW-FL5
MW-FL6

DOWNGRADIENT FLORIDAN

MW-FL2
MW-FL3

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Dr . ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
E-Mail address: devo@devoeng.com
website: http://www.devoeng.com

Figure Name:
MONITOR WELL LOCATION PLAN

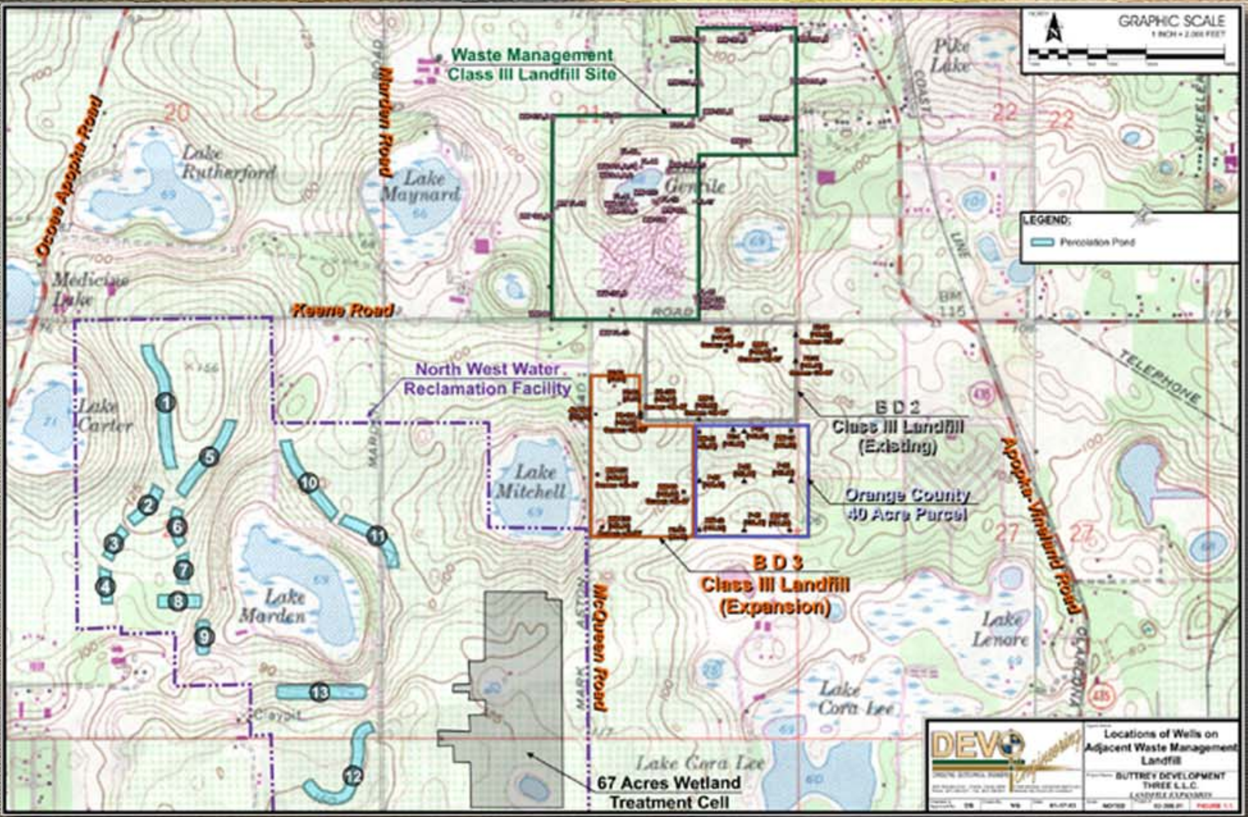
Project Name:
BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION

Checked & Approved by: DS	Drawn By: AZ	Date: 04/16/03	Scale: N.T.S.	Proj. # 02-398.01	FIGURE 4.1

Supplement 1 to Report Dated October 21, 2002
Additional Hydrogeologic Data, & Responses to Selected
Comments of Orange County EPD RAI Dated Dec. 27, 2002 by
Devo Engineering, April 2003

"SUPPLEMENT #1 TO REPORT DATED OCTOBER 21,2002"

ADDITIONAL HYDROGEOLOGIC DATA & RESPONSES TO SELECTED COMMENTS OF ORANGE COUNTY EPD RAI Dated Dec 27, 2002



KEENE RD. & MCQUEEN RD., City of Apopka, FLORIDA

Prepared for

BUTTREY DEVELOPMENT THREE, L.L.C.

6239 Edgewater Drive, Suite D-I

Orlando, Fl 32810

Prepared by

DEVO Engineering

CONSULTING GEOTECHNICAL ENGINEERS

DEVO SEEREERAM, PH.D., P.E.

5500 ALHAMBRA DR., ORLANDO, FL-32808

PHONE: (407) 290-2371 FAX: (407) 298-9011

April 2003

DEVO SEEREERAM, PH.D., P.E.
CONSULTING GEOTECHNICAL ENGINEER
FLORIDA REGISTRATION NO. 48303

GEOTECHNICAL ENGINEERING • GROUND WATER MODELING • SOFTWARE DEVELOPMENT • SUBCONTRACT DRILLING

5500 ALHAMBRA DRIVE ❄ ORLANDO, FLORIDA 32808 ❄ PHONE: 407-290-2371 ❄ FAX: 407-298-9011

e-mail: devo@devoeng.com | www.devoeng.com

Date: April 21, 2003	*Devo's Project Number:* 02-398.01
to: Buttrey Development Three, L.L.C. 6239 Edgewater Drive, Suite D-1 Orlando, Fl 32810 phone: 407-296-0016 fax: 407-294-8090 attention: **Ed Chesney, P.E.** **Staff Engineer**	

Ref:

Supplement #1 to Report Dated October 21, 2002

ADDITIONAL HYDROGEOLOGIC DATA &
RESPONSES TO SELECTED COMMENTS OF ORANGE COUNTY EPD RAI DATED DEC 27, 2002
BUTTREY DEVELOPMENT THREE L.L.C. CLASS III LANDFILL EXPANSION (BD3 SITE)
KEENE ROAD & MCQUEEN ROAD, CITY OF APOPKA, FLORIDA

Dear Mr. Chesney:

This not a stand-alone report but a supplement to our report dated October 21, 2002.

The purpose of this report is to provide responses to selected comments of the Orange County EPD RAI dated December 27, 2002 and additional data & analyses per our meeting with EPD and CDM representatives on January 24, 2003.

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ORANGE COUNTY EPD COMMENT # 20

(CDM) From our review, it appears that Buttrey has collected and provided significant additional onsite geotechnical and hydrological monitoring data to evaluate the site hydrogeology and water table conditions at the site for a typical wet season. These data were compared to the results of an August 2000 study Groundwater Modeling in Support of Reclaimed Water Recharge Capacity Expansion at Northwest Water Reclamation Facility (NWWRF) for Orange County Utilities. This groundwater model was a MODFLOW representation of the surficial and Floridan aquifers in Northwest Orange County and encompasses the Keene Road Class III Expansion site.

The NWWRF is an existing Rapid Infiltration Basin recharge system that was being loaded at a rate of 3.0 mgd. This groundwater model for this study was calibrated using 1995 water level conditions in the vicinity of the NWRF and was used to estimate the seasonal high water table elevations with expansion of the reuse system to 6.3 mgd by adding lake augmentation and a constructed wetlands to the existing RIBs. The 1995 water levels were above normal due to a wet year in 1994. As indicated by the modeling results, the seasonal high water table elevation in the vicinity of the Class III site ranged from 70 to 80 feet NGVD and there was little change in these offsite water table elevations due to doubling of the hydraulic loading of the NWWRF reuse system. This suggests significant downward vertical flow from the surficial to the Floridian aquifer at the NWWRF site.

The Class III Landfill Expansion site is located approximately 1,500 feet east of the NWWRF. The recharge capacity of the RIBs is strongly influenced by leakage to the Floridan aquifer; local lake and water table elevations are well correlated to potentiometric surface elevations of the upper Floridian aquifer.

The northwest area of Orange County is dominated by karst topography. The terrain consists of sand ridges interspersed with numerous circular depressional features. These depressional features are a surface expression of solution activity in the Floridan aquifer that has occurred in the past. When the land surface of the depression is below the water table, lakes are formed. There are varying degrees of connection between the lakes, the surficial aquifer and the Floridan aquifer, but most of the rainfall runoff that occurs in the area drains to the lakes or depressions. Correspondingly, shallow groundwater flows from the uplands towards the lakes and depressions and then seeps downward to the Floridan aquifer. This groundwater flow pattern occurs at the Class III landfill site as evidenced by several rounds of water table measurements collected from monitoring wells at the landfill site and the NWWRF site in 2002 (Devo Engineering, 2002).

Based on the data collected near the end of the traditional wet season from onsite piezometers, water table elevations ranged from 52 to 74 feet NGVD. According to the NOAA Orlando International Airport Weather Gauge, approximately 93 percent of the average rainfall occurred through September 2002. This indicates that 2002 was a normal to slightly greater than normal rainfall year. Therefore, water table elevation data collected during September 2002 should be representative of normal wet season conditions. According to Devo Engineering, an estimated seasonal high water table elevation of 65 feet NGVD should be used for design of the NWWRF, there were no groundwater elevations measurements collected in the vicinity of the Class III landfill site. PB Water primarily developed a correlation between potentiometric surface elevations for the upper Floridian aquifer and lake elevations and applied an offset within the model area to estimate seasonal high water table elevations. The site-specific water table elevation measurements are much more representative of what is occurring at the site, particularly in consideration of the influence of the depressional feature in the vicinity of the site. CDM agrees with the seasonal high water table estimates of 65 feet NGVD for a typical wet season. By placing the bottom of the landfill of the landfill at an elevation of 73 feet NGVD, sufficient vertical separation will be provided for a typical wet season.

(EPD) See EPD requirement below.

Additional piezometric data should be provided to demonstrate the seasonal high groundwater level in a wet year. An analysis of data from calender years from 1994 and 1995, which include a wet period should be provided, as was referenced in the permit application for the original parcel. Piezometric data available from the surrounding area as well as the development of a correlation between Floridan levels and surficial piezometric reading are needed to confirm that the seasonal high groundwater level in a wet year does not result in groundwater levels closer than 5 feet to the proposed bottom of the landfill for the expansion area.

In addition, there is the assertion that "The 73 feet NGVD lowest base elevation proposed in this application was evaluated by Orange County Utilities consultant PB Water and deemed acceptable as capable of maintaining an adequate separation between the seasonal high groundwater table and the landfill bottom under the full loading capacity at the NWWRF". A letter dated May 3, 2002 from Mr. Mike Chandler (Director of Orange County Utilities) to John Buttrey provided conditional approval of this proposal subject to approval by the Orange County Board of County Commissioners (BCC). CDM recommends that a copy of the BCC approved agreement and all other related documents be obtained from Buttrey Development, LLC for the record. Orange County EPD should have a copy of these documents for review purposes.

(EPD) *Please provide a rainfall analysis based on the 1994/1995 wet period referenced above to confirm that the required 5 ft. separation is maintained.*

Please provide a copy of all approved agreements between applicant and the County Board of County Commissioners and any documents related to the permit request.

For above CDM text:
"RIB" = Rapid Infiltration System
"mgd" = Million Gallons per Day
"PB water" = PB Water, A Division of Parsons Brinkerhoff Quade & Douglas, Inc.

Response To Orange County EPD Comment # 20

Figure 1.1 (attached) shows the locations of the following pertinent sites:

- Buttrey Development Three L.L.C. Class III Landfill - **Proposed Expansion** [BD3 Expansion]
- Buttrey Development Two L.L.C. Class III Landfill - **Existing** [BD2 Existing]
- Waste Management Class III Landfill on the north side of the Keene Rd.
- Northwest Water Reclamation Facility (showing locations of rapid infiltration basins and wetland treatment cells).

Also shown on this figure are monitor well locations on the three (3) landfill sites as well as wells on the County's 40 acre parcel..

Figure 1.2 is a magnified view of the area of interest showing the locations of the monitor wells. Ground water altitude readings (Dec 2002) are annotated adjacent to these well locations for ease of review. As noted, water table altitude readings in the adjacent wells on the Waste Management site are similar to the readings measured in the adjacent BD3 Expansion site. Fortunately, we have quarterly ground water level readings for the Waste Management site for the period January 1995 to December 2002 which affords us an opportunity to observe the trend in surficial aquifer and Floridan aquifer ground water altitudes over very wet periods (such as Jan 1998, El Nino) and very dry periods (such as June 2001, the end of a record drought).

Ground water altitudes in the Waste Management landfill monitor wells are shown in Figures 1.3 through 1.6 (attached). As seen in Figure 1.6, the altitude of the potentiometric surface of the Floridan aquifer fluctuated in the range +40 ft to +60 ft over this period of record, with the highest levels in January 1995 and the lowest levels in June 2001. Ground water altitudes in all of the surficial aquifer "A", "B", and "C" wells in close proximity to the expansion site also show the same elevation range of fluctuation (+40 ft to +60 ft).

This measured hyrdologic data set provides powerful evidence that the +65 ft NGVD seasonal high water table estimate for the BD3 Expansion Site is reasonable and somewhat conservative, even when considering rise in ground water during periods of above-average rainfall.

Orange County EPD Comment # 23

(CDM) Additional piezometric information has been provided by Buttrey as performed by Devo Engineering. Based on the piezometer readings, groundwater in the surficial aquifer appears to be generally flowing toward the east-northeast. There is a broad-flat area in the water table in the central portion of the site probably due to the enhanced vertical leakage to the Floridian aquifer in this area of the site.

Therefore we would recommend that series of vertically nested piezomenters be installed along the center of the site and at least one additional monitor well cluster on the eastern side of the Class III landfill site to monitor groundwater elevations and water quality in this area of high leakage to the Floridian aquifer. Additional clusters may also be required on the west side of the landfill expansion based on figure 2.5 of the Devo report. The well clusters should consist of a shallow well (water table), a deep surficial well (screened above the bottom of the surficial aquifer), and an upper Floridan well (screened immediately below the Hawthorn formation).

By default, it is assumed that Buttrey is essentially requesting an exemption to a bottom liner requirement for this landfill expansion. The County Criteria for a Liner Exemption is:

> ***DEMONSTRATION OF ENTITLEMENT TO AN EXEMPTION TO A BOTTOM LINER REQUIREMENT AT A LANDFILL***
>
> ***To obtain entitlement, it must be shown, to the satisfaction of the County, that the confining layer is able to separate and prevent an overwhelming amount of surficial aquifer groundwater from percolating downward to the drinking water aquifer below the waste footprint, and the ability of the confining layer to cause horizontal flow to the surficial aquifer, sufficient to allow effective interception and treatment of potential leachate, in an area beyond the waste footprint.***
>
> ***In considering the demonstration, the county uses engineering judgement, on a case-by-case basis, to evaluate potential harm to the drinking water aquifer and the environment.***

To satisfy this request for an exception Buttrey must provide a water balance, as required on the original parcel, for this proposed landfill expansion. This water balance must demonstrate that an "overwhelming amount of the surficial aquifer groundwater" is being confined at this site. However, the Devo Engineering report shows a significant portion of the expansion landfill area as being a zone of high leakage to the Floridian. Buttrey must provide a demonstration that the proposed landfill expansion meets the ordinance criteria. They must also clearly show the direction of groundwater flow within the piezometric 'flat area' shown on figure 2.5 of the Devo Engineering Report.

If it is determined that confinement restoration is required, then a plan should be presented which meets the criteria outlined for Confinement Restoration by Orange County.

(EPD) The Devo Report presents a major departure from the hydrogeology presented to the County for the original parcel. Please resolve or clearly explain all conflicts between the Devo

Report and other information submitted to EPD for review. It is suggested that you review Section 32-217(a)(3) of the County Code regarding revocation of permits due to misrepresentation prior to your resubmittal.

Response To Orange County EPD Comment # 23

General

This comment deals with two (2) different items:

❶ Additional shallow and deep piezometers to show horizontal direction of ground water flow and vertical gradient between aquifers.

❷ Provide a water balance for the BD3 expansion site, as required on BD2 Existing site. This water balance must demonstrate that an "overwhelming amount of the surficial aquifer groundwater" is being confined at this site. See Exhibit 1 for EPD's interpretation of this county ordinance.

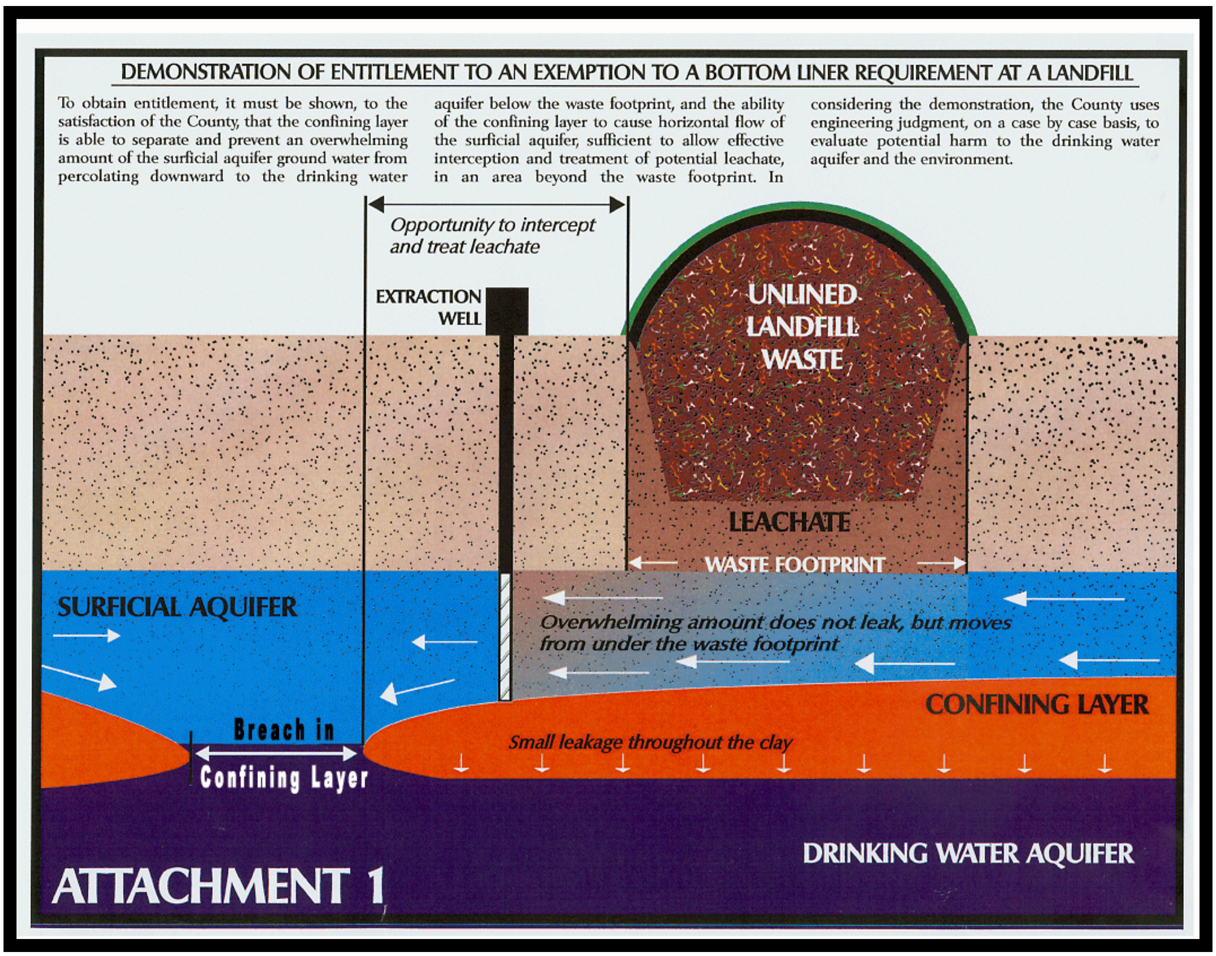


Exhibit 1. Orange County EPD Interpretation on Confining Layer

Additional Piezometer Data

As agreed at our January 24, 2003 meeting with CDM and Orange County EPD, the following additional piezometers were installed:

- ➥ Seven (7) additional surficial aquifer wells were installed, each with their screen intervals in the general elevation range +40 to +50 ft NGVD. These locations are labeled PZ-E1 through PZ-E7 in Figure 2.1 (attached).

  Note that PZ-E2 is adjacent to the existing 4" Floridan aquifer well and PZ-E4 is adjacent to a newly installed Floridan aquifer well (MWFL-E4). These are the two (2) locations where there are well clusters.

- ➥ One (1) Floridan aquifer well adjacent to PZ-E4. This well has an open hole section in the Floridan aquifer, the top of which is at an elevation of approximately -4 ft NGVD. This location is labeled MWFL-E4 in Figure 2.1.

Ground water altitude readings for the surficial aquifer wells in the area of the BD3 expansion site are shown in Figures 2.2 through 2.4 for the following dates:

- ✍ February 7, 2003
- ✍ March 18, 2003
- ✍ April 17, 2003

Ground water contours are plotted on Figure 2.3 for the March 2003 readings and, as expected, there is not a well-defined flow pattern in the surficial aquifer within this relatively small footprint, although the ground water flow direction in the Floridan aquifer is well defined. As discussed at our meeting on January 24, 2003, the monitoring well configuration (see Figure 4.1) will completely circumscribe the facility so it will be possible to detect any offsite movement of contaminated ground water regardless of direction. The precise directions of ground water flow is therefore not that important given such a comprehensive monitoring program.

These are the key observations with respect to these measurements:

- ❒ The head difference between the surficial aquifer and the Floridan aquifer at the location PZ-E4 is approximately 8.6 ft while it is approximately 0.76 ft at PZ-E2.

- ❒ The flow direction in the Floridan aquifer is to the northeast which is consistent with the regional flow pattern in this aquifer.

Water Balance Analysis

Site-specific stratigraphic cross-sections are shown on an elevation basis in Figures 3.2 to 3.8. These eight (8) cross-section locations A-A′ to G-G′ are shown in Figure 3.1. Permeability test results are also annotated on these cross-sections. As noted in these cross-sections, there are a fair amount of very low permeability clayey soils separating the surficial aquifer from the underlying Floridan aquifer.

The average rainfall is about 50 inches/year (Lichtler et al., 1968) and the average evapotranspiration is about 39 inches/year (Jones et al. 1984). On such excessively drained soils, the annual rainfall runoff is one inch or less during a normal rainfall year; this can be verified by running a continuous simulation hydrograph for an average rainfall year (such as 1982 at OIA) on soil with curve number of 45. Therefore, the net recharge to the surficial aquifer is approximately 10 inches/year.

Lichtler, W.F., W. Anderson, and B.F. Joiner. *Water Resources of Orange County, Florida*. Report of Investigation No. 50, Florida Geological Survey, 1968.

Jones, J.W., L.H. Allen, S.F. Shih, J.S. Rogers, L.C. Hammond, A.G. Smajstrala, and J.D. Martsolf. December 1984. *Estimated and Measured Evapotranspiration for Florida Climate, Crops, and Soils.* Bulletin 840. Institute of Food & Agricultural Sciences, University of Florida.

As agreed at our meeting on January 24, 2003, the vertical recharge to the Floridan aquifer will be computed as follows:

$$q \text{ (ft/day)} = (k_v/b)\, \Delta h \quad \text{(1a)}$$

$$q \text{ (inches/year)} = [(k_v/b)\, \Delta h] \times 12 \times 365 \quad \text{(1b)}$$

where

q	=	vertical leakage (flow rate) in units of ft/day
k_v	=	vertical hydraulic conductivity of the semi-confining layers above the top of the Floridan aquifer in units of ft/day
Δh	=	difference between the surficial aquifer and the level of the potentiometric surface of the Floridan aquifer
b	=	thickness of the semi-confining layer

The average surficial aquifer water table elevation within the site is +57.4 ft for the readings plotted in Figures 2.2 to 2.4 while the average Floridan aquifer potentiometric surface elevation is +53.7 ft which means that there is a 3.7 ft head difference at the test locations shown in these figures.

Our analysis of the vertical leakance (k_v/b) is presented in Appendix B using the site-specific soil profiles and permeability test data. In this analysis, only soils below elevation +60.0 ft were considered as this is the lowest level at which full saturation is assumed to take place.

k_v/b (ft/day per ft)	Head difference, Δh (ft)	Computed Vertical Recharge Rate (in/yr)
0.000061	3.7	0.988566

Of the 10 inch/year which recharges the surficial aquifer, only 1 inch/year recharges the Floridan aquifer vertically which means that 9 in/yr moves horizontally.

This analysis shows that *the confining layer is able to separate and prevent an overwhelming amount of surficial aquifer groundwater from percolating downward to the drinking water aquifer below the waste footprint, and the ability of the confining layer to cause horizontal flow to the surficial aquifer, sufficient to allow effective interception and treatment of potential leachate, in an area beyond the waste footprint.*

A confinement restoration plan is therefore not required.

Orange County EPD Comment # 24

(CDM) The proposed monitoring well locations have been provided on a water table elevation contour map. However, there are no piezometers in the center of the site or water quality wells along the western or eastern boundary. The Monitoring Well plan should be revised to include additional well clusters as described above.

(EPD) Please propose a revised Groundwater Monitoring Plan.

Response To Orange County EPD Comment # 24

The monitor well plan has been revised by Buttrey Development Three LLC to include additional well clusters as shown in Figure 4.1 (attached). Note that the surficial aquifer "A" wells have their screen intervals in the elevation range +37 ft to +57 ft while the surficial aquifer "B" wells have their screen intervals in the elevation range +10 to +20 ft.

The Floridan wells will be much deeper with open hole sections in the altitude range -35 to -45 ft.

Report Certification

We trust that this report provides the additional information required by the City of Apopka to facilitate their review and approval of the permit application.

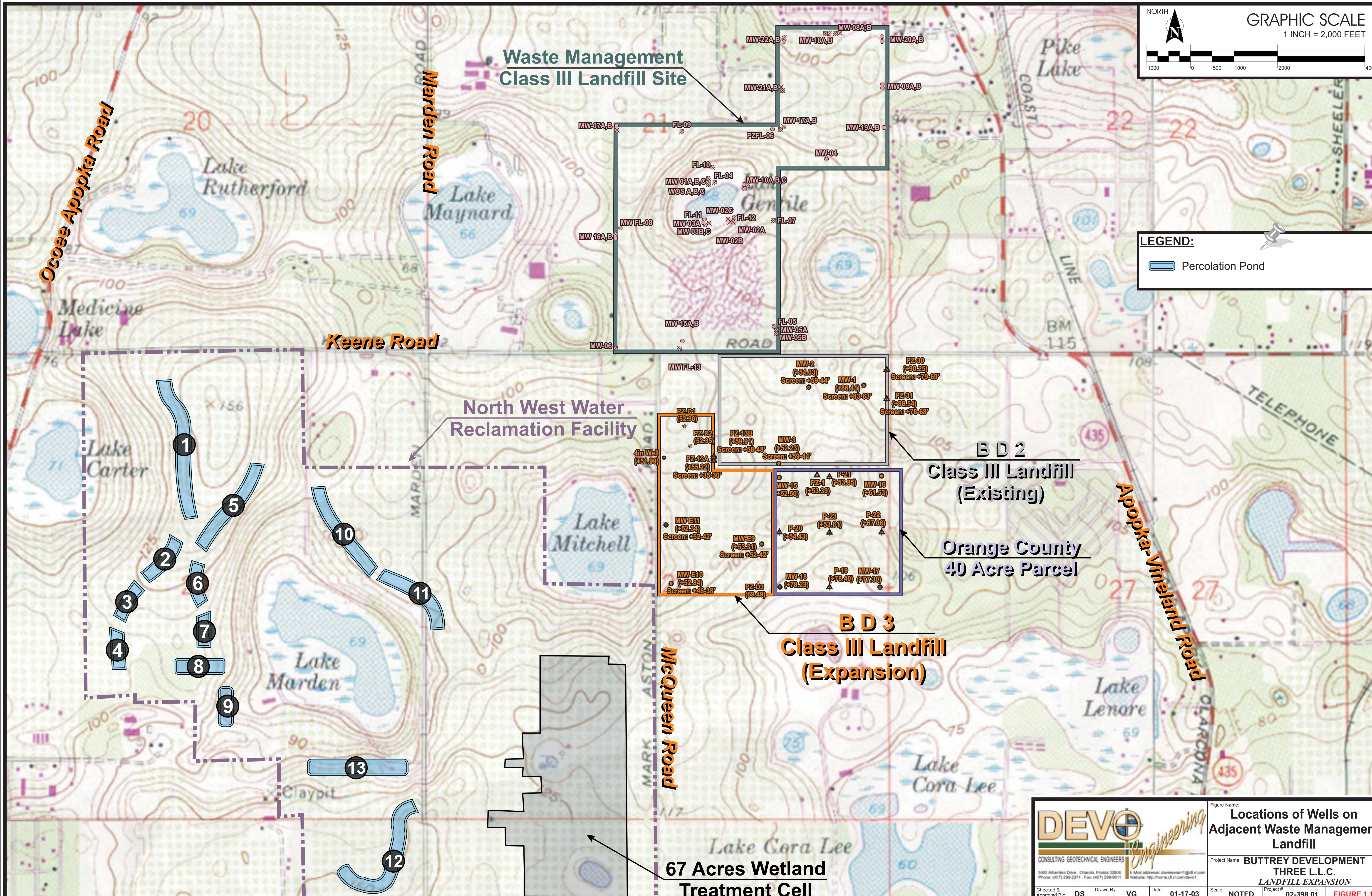
Feel free to contact us if there are any questions or if any clarifications are needed.

Sincerely,

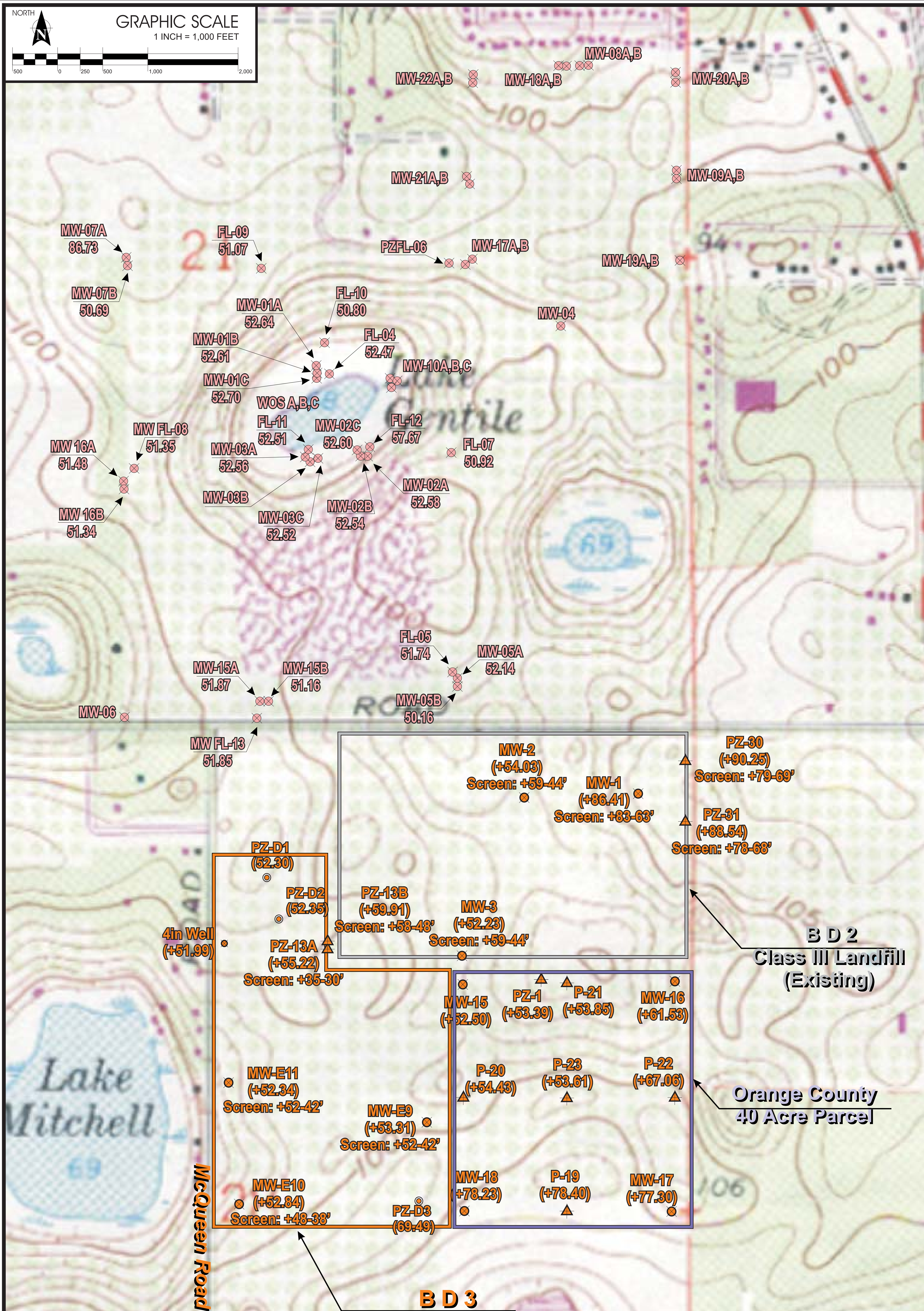
Devo Seereeram

Devo Seereeram, Ph.D., P.E.
Florida Registration No. 48303
Date: April 22, 2003

FIGURES



GRAPHIC SCALE
1 INCH = 2,000 FEET
NORTH
LEGEND:
Percolation Pond
Waste Management
Class III Landfill Site
Ocoee Apopka Road
Marden Road
Keene Road
Lake Rutherford
Lake Maynard
Medicine Lake
Lake Carter
Lake Mitchell
Lake Marden
Lake Lenore
Lake Cora Lee
Pike Lake
Claypit
North West Water
Reclamation Facility
B D 2
Class III Landfill
(Existing)
Orange County
40 Acre Parcel
B D 3
Class III Landfill
(Expansion)
Apopka-Vineland Road
McQueen Road
67 Acres Wetland
Treatment Cell
1
2
3
4
5
6
7
8
9
10
11
12
13
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
Figure Name:
Locations of Wells on Adjacent Waste Management Landfill
Project Name: BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 01-17-03
Scale: NOTED
Project #: 02-398.01
FIGURE 1.1



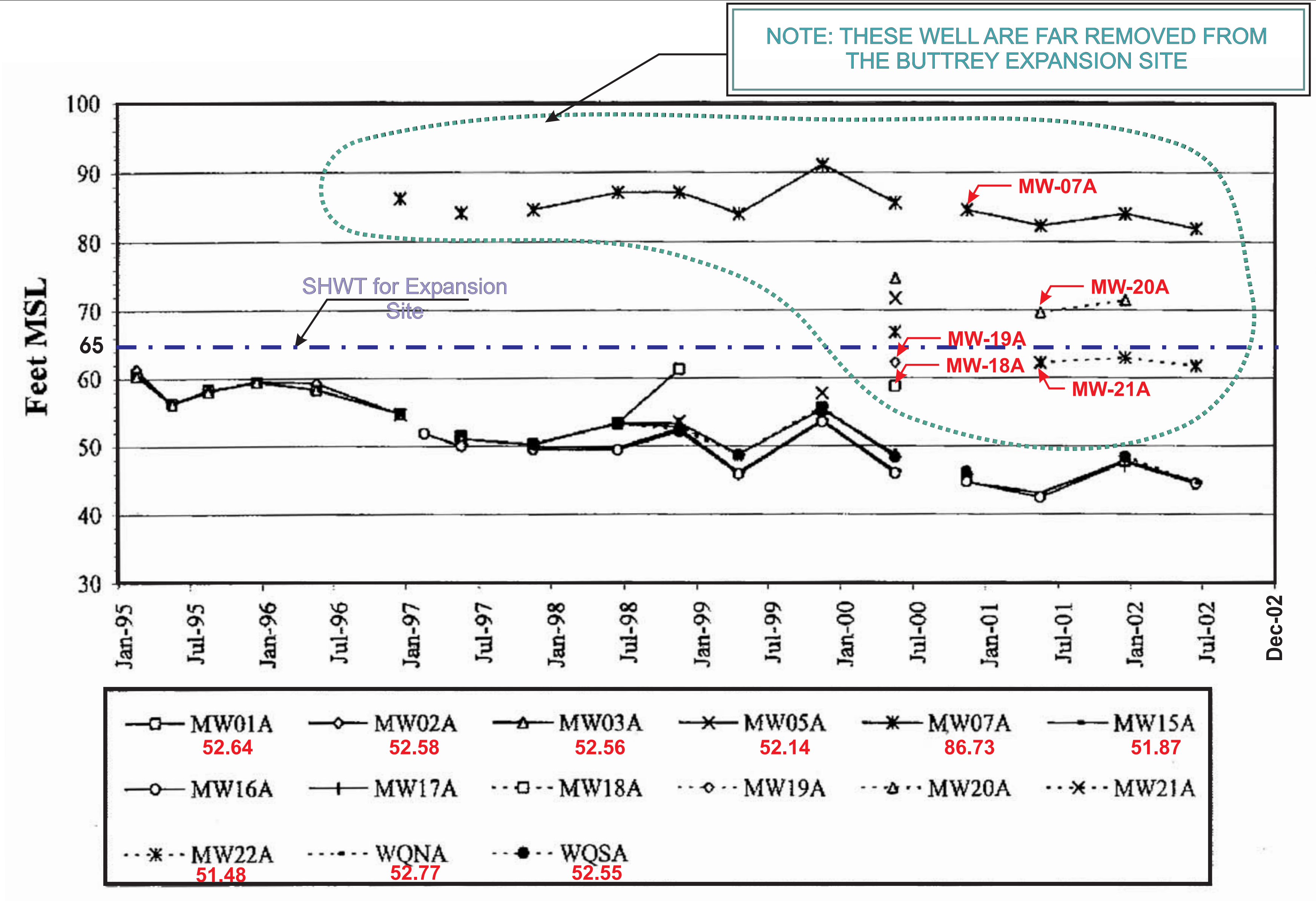
Note:
The Water Table Readings Date is (Dec 2002)

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name: Magnified View of Wells on Waste Management Site

Project Name: BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION

Checked & Approved By:	Drawn By:	Date:	Scale:	Project #:	
DS	VG	01-17-03	NOTED	02-398.01	FIGURE 1.2



LEGEND:

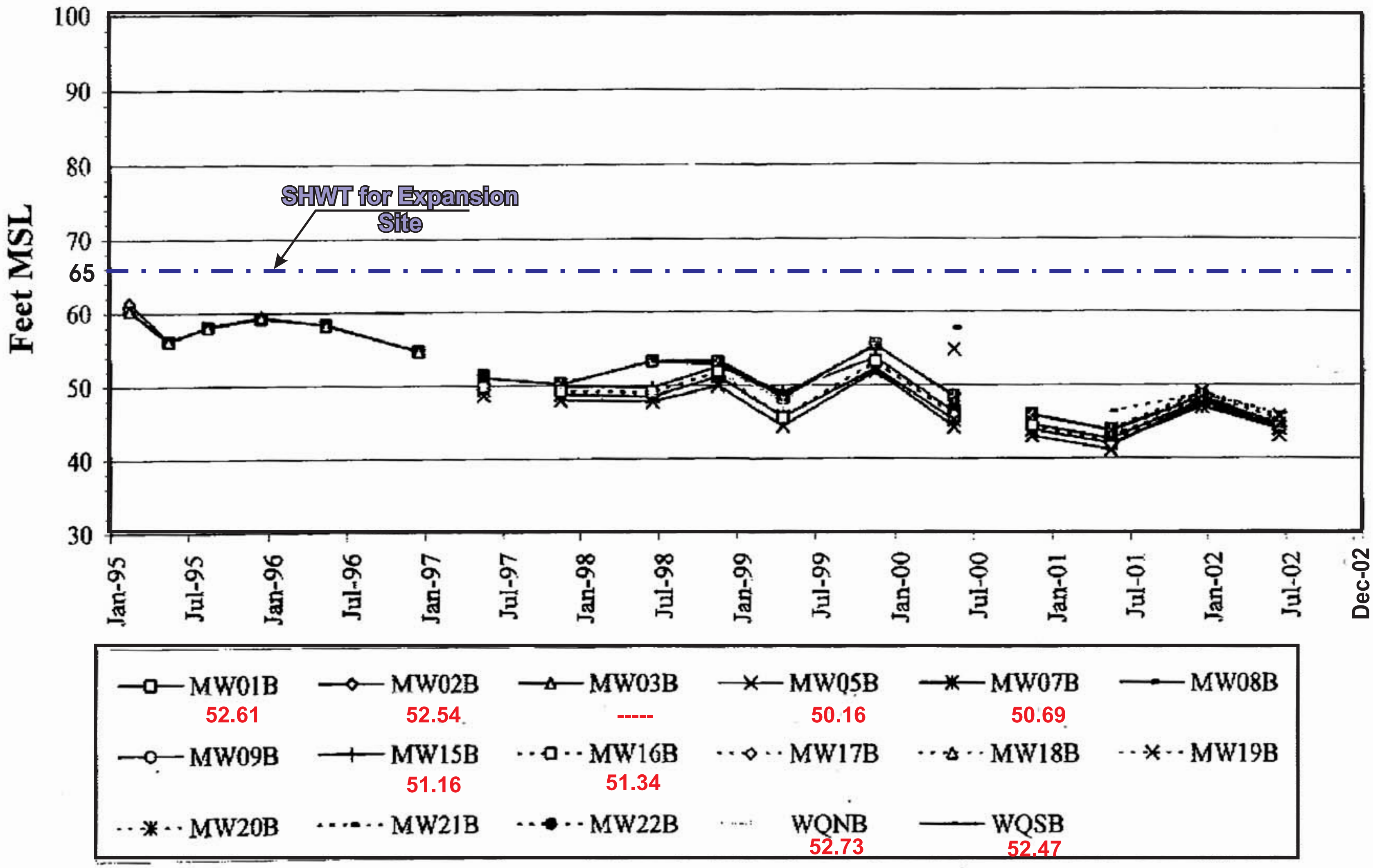
52.61 Dec. 2002 Readings (TYP.)

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name: **SURFICIAL AQUIFER Ground Water Elevation "A" Wells**

Project Name: **BUTTREY DEVELOPMENT THREE L.L.C.**
LANDFILL EXPANSION

Checked & Approved By: DS	Drawn By: SM	Date: 04/21/03	Scale: NOTED	Project # 02-398.01	FIGURE 1.3



LEGEND:

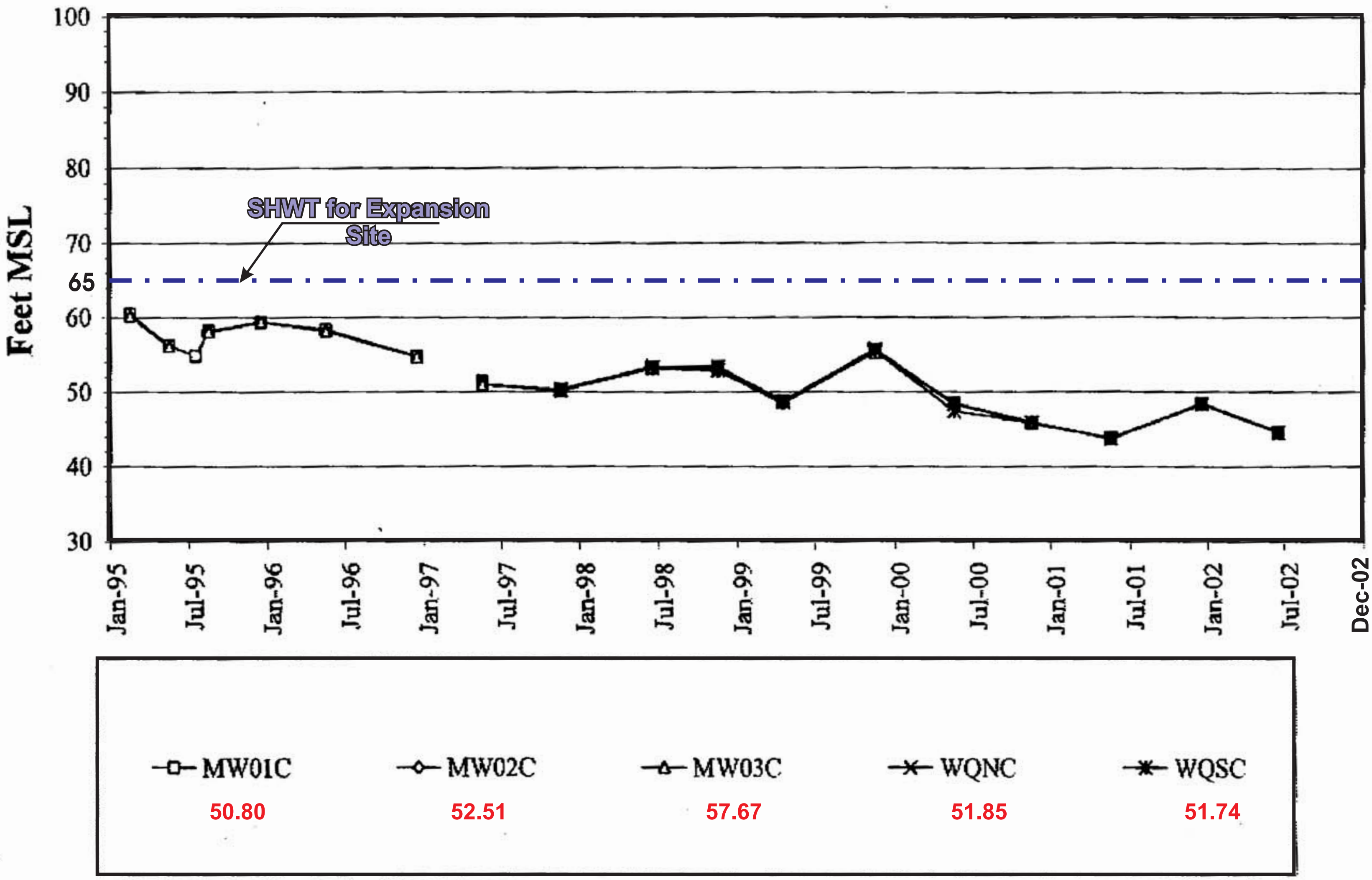
52.61 Dec. 2002 Readings (TYP.)

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name: **SURFICIAL AQUIFER Ground Water Elevation "B" Wells**

Project Name: **BUTTREY DEVELOPMENT THREE L.L.C.**
LANDFILL EXPANSION

Checked & Approved By:	Drawn By:	Date:	Scale:	Project #	
DS	SM	04/21/03	NOTED	02-398.01	FIGURE 1.4

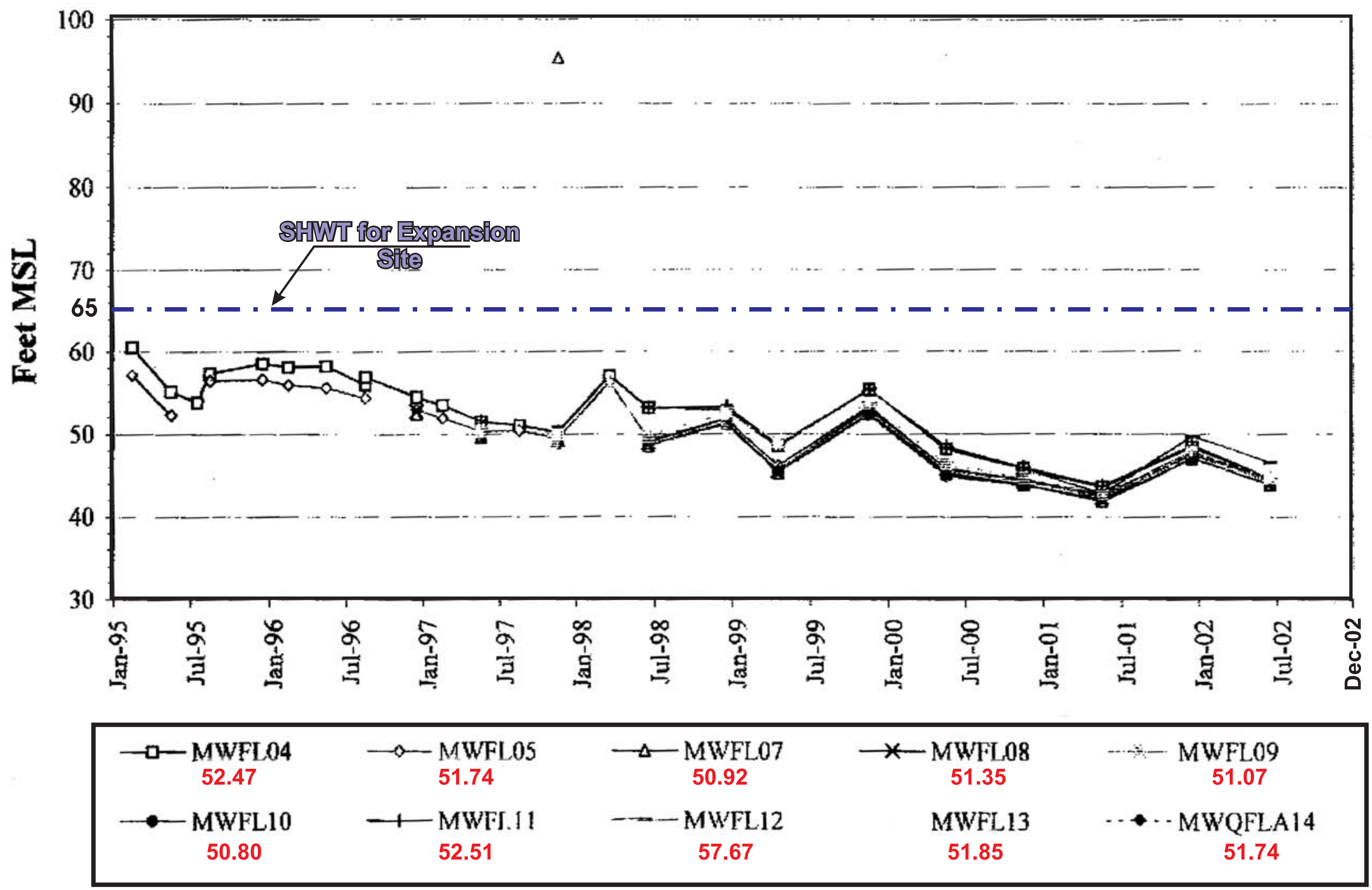


LEGEND:

52.51 Dec. 2002 Readings (TYP.)

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name: SURFICIAL AQUIFER Ground Water Elevation "C" Wells						
Project Name: BUTTREY DEVELOPMENT THREE L.L.C. *LANDFILL EXPANSION*						
Checked & Approved By: DS	Drawn By: SM	Date: 04/21/03	Scale: NOTED	Project # 02-398.01	FIGURE 1.5	



LEGEND:

52.51 Dec. 2002 Readings (TYP.)

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5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011

E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name: **FLORIDAN AQUIFER Ground Water Elevation**

Project Name: **BUTTREY DEVELOPMENT THREE L.L.C.**
LANDFILL EXPANSION

Checked & Approved By:	Drawn By:	Date:	Scale:	Project #	
DS	SM	04/21/03	NOTED	02-398.01	FIGURE 1.6

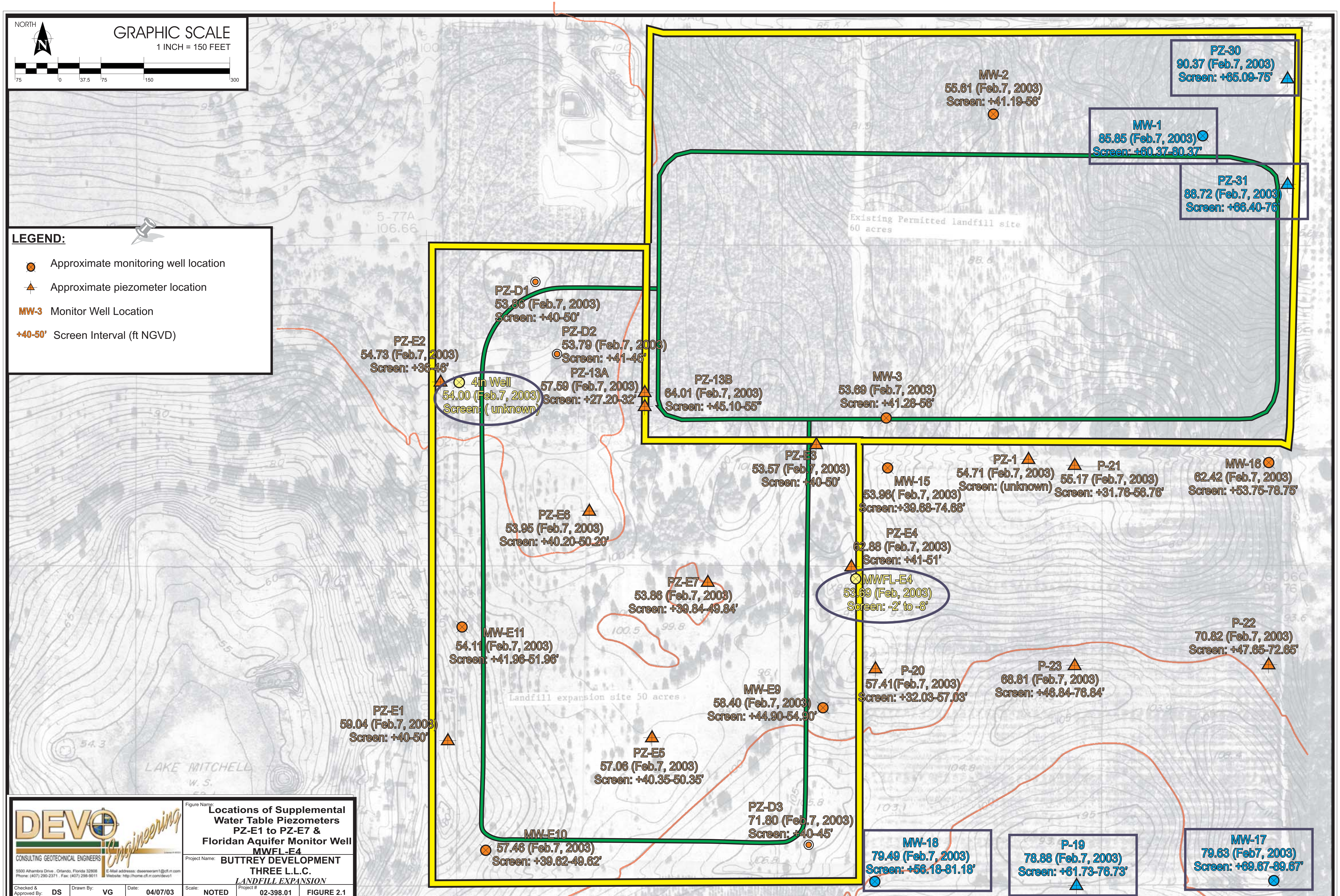
NORTH
GRAPHIC SCALE
1 INCH = 150 FEET
75 0 37.5 75 150 300
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3 Monitor Well Location
+40-50' Screen Interval (ft NGVD)
PZ-30
90.37 (Feb.7, 2003)
Screen: +65.09-75'
MW-2
55.61 (Feb.7, 2003)
Screen: +41.19-56'
MW-1
85.85 (Feb.7, 2003)
Screen: +60.37-80.37'
PZ-31
88.72 (Feb.7, 2003)
Screen: +66.40-76'
Existing Permitted landfill site
60 acres
PZ-D1
53.86 (Feb.7, 2003)
Screen: +40-50'
PZ-D2
53.79 (Feb.7, 2003)
Screen: +41-46'
PZ-E2
54.73 (Feb.7, 2003)
Screen: +36-46'
4in Well
54.00 (Feb.7, 2003)
Screen: (unknown)
PZ-13A
57.59 (Feb.7, 2003)
Screen: +27.20-32'
PZ-13B
64.01 (Feb.7, 2003)
Screen: +45.10-55"
MW-3
53.69 (Feb.7, 2003)
Screen: +41.28-56'
PZ-E3
53.57 (Feb.7, 2003)
Screen: +40-50'
MW-15
53.96(Feb.7, 2003)
Screen:+39.68-74.68'
PZ-1
54.71 (Feb.7, 2003)
Screen: (unknown)
P-21
55.17 (Feb.7, 2003)
Screen: +31.76-56.76'
MW-16
62.42 (Feb.7, 2003)
Screen: +53.75-78.75'
PZ-E6
53.95 (Feb.7, 2003)
Screen: +40.20-50.20'
PZ-E4
62.88 (Feb.7, 2003)
Screen: +41-51'
MWFL-E4
53.69 (Feb, 2003)
Screen: -2' to -8'
PZ-E7
53.86 (Feb.7, 2003)
Screen: +39.84-49.84'
P-22
70.82 (Feb.7, 2003)
Screen: +47.65-72.65'
MW-E11
54.11 (Feb.7, 2003)
Screen: +41.96-51.96'
P-20
57.41(Feb.7, 2003)
Screen: +32.03-57.03'
P-23
68.81 (Feb.7, 2003)
Screen: +46.84-76.84'
MW-E9
58.40 (Feb.7, 2003)
Screen: +44.90-54.90'
Landfill expansion site 50 acres
PZ-E1
59.04 (Feb.7, 2003)
Screen: +40-50'
PZ-E5
57.06 (Feb.7, 2003)
Screen: +40.35-50.35'
LAKE MITCHELL
PZ-D3
71.80 (Feb.7, 2003)
Screen: +40-45'
MW-E10
57.46 (Feb.7, 2003)
Screen: +39.62-49.62'
MW-18
79.49 (Feb.7, 2003)
Screen: +56.18-81.18'
P-19
78.88 (Feb.7, 2003)
Screen: +61.73-76.73'
MW-17
79.63 (Feb7, 2003)
Screen: +69.67-89.67'
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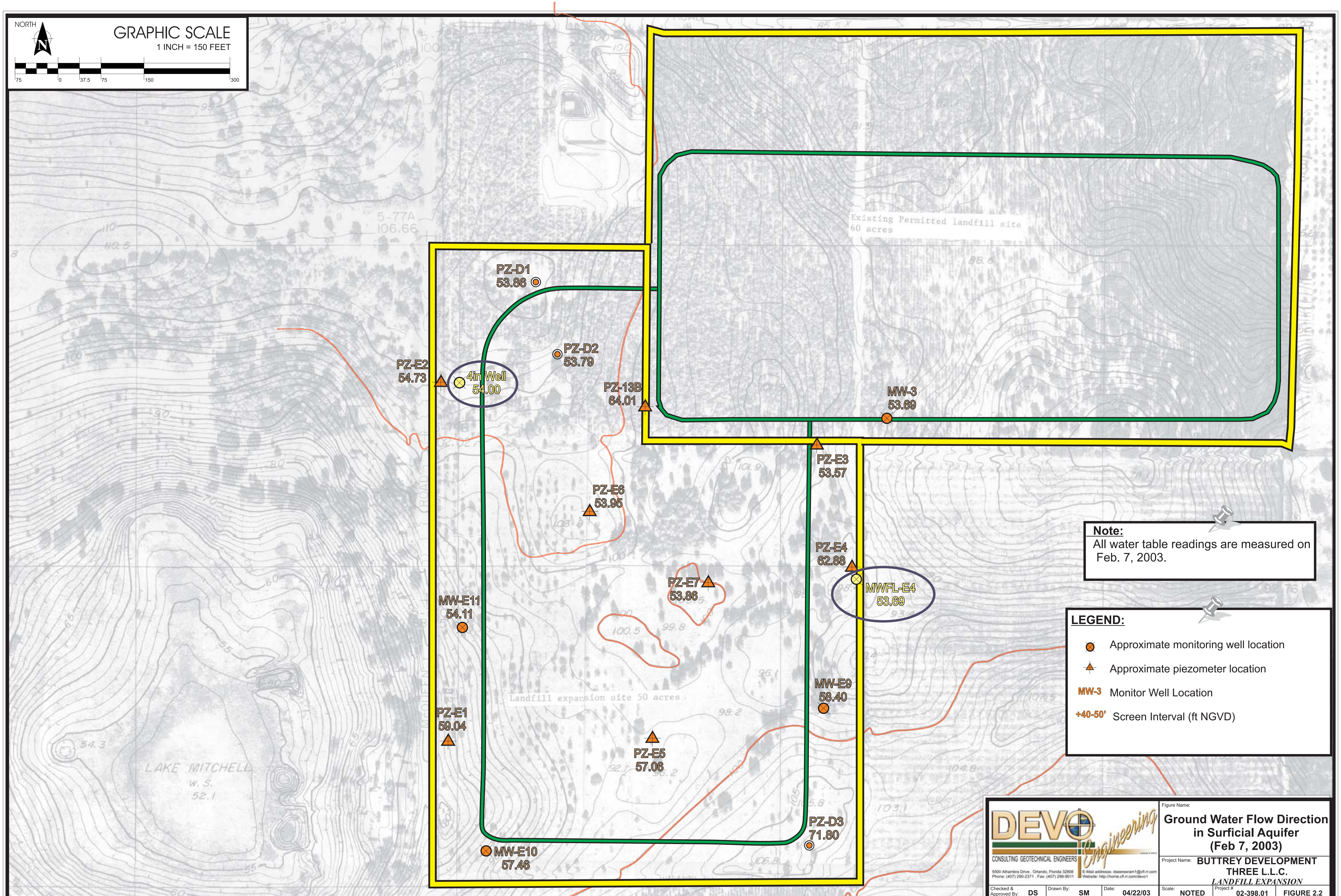
Figure Name:
Locations of Supplemental Water Table Piezometers PZ-E1 to PZ-E7 & Floridan Aquifer Monitor Well MWFL-E4
Project Name: BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 04/07/03
Scale: NOTED
Project #: 02-398.01
FIGURE 2.1



NORTH
GRAPHIC SCALE
1 INCH = 150 FEET
75
0
37.5
75
150
300
Existing Permitted landfill site
60 acres
Landfill expansion site 50 acres
LAKE MITCHELL
W. S.
52.1
PZ-D1
53.86
PZ-D2
53.79
PZ-E2
54.73
4in Well
54.00
PZ-13B
64.01
MW-3
53.69
PZ-E3
53.57
PZ-E6
53.95
PZ-E4
62.88
PZ-E7
53.86
MWFL-E4
53.69
MW-E11
54.11
MW-E9
58.40
PZ-E1
59.04
PZ-E5
57.06
PZ-D3
71.80
MW-E10
57.46
Note:
All water table readings are measured on Feb. 7, 2003.
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3 Monitor Well Location
+40-50' Screen Interval (ft NGVD)
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Figure Name:
Ground Water Flow Direction
in Surficial Aquifer
(Feb 7, 2003)
Project Name:
BUTTREY DEVELOPMENT
THREE L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: SM
Date: 04/22/03
Scale: NOTED
Project # 02-398.01
FIGURE 2.2

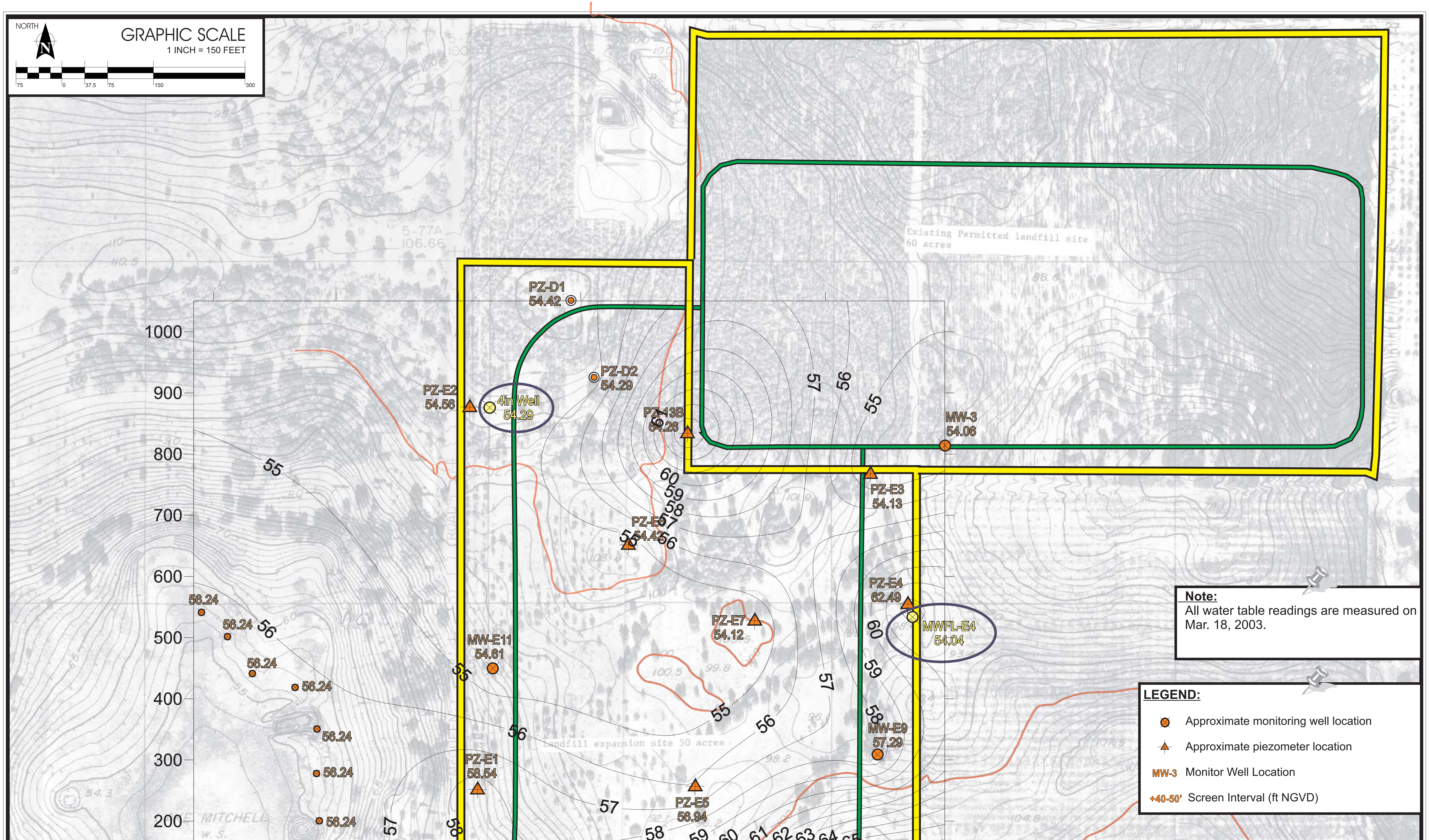

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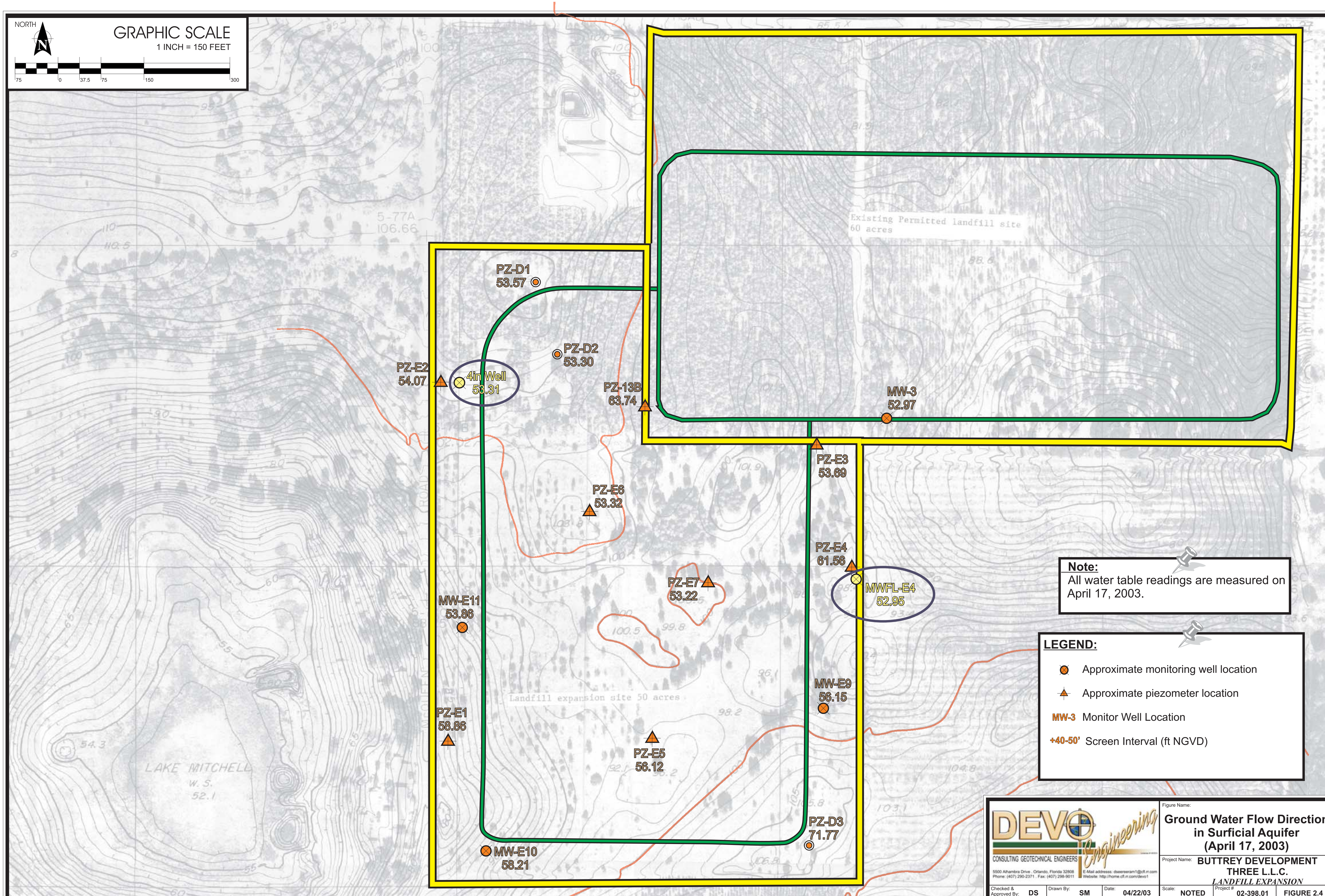
Figure Name:	**Ground Water Flow Direction in Surficial Aquifer (March 18, 2003)**
Project Name:	**BUTTREY DEVELOPMENT THREE L.L.C.** *LANDFILL EXPANSION*

Checked & Approved By:	Drawn By:	Date:	Scale:	Project #:	
DS	SM	04/22/03	NOTED	02-398.01	FIGURE 2.3



NORTH
N
GRAPHIC SCALE
1 INCH = 150 FEET
75
0
37.5
75
150
300
Existing Permitted landfill site
60 acres
Landfill expansion site 50 acres
LAKE MITCHELL
W. S.
52.1
PZ-D1
53.57
PZ-D2
53.30
PZ-E2
54.07
4in Well
53.31
PZ-13B
63.74
MW-3
52.97
PZ-E3
53.69
PZ-E6
53.32
PZ-E4
61.56
MWFL-E4
52.95
PZ-E7
53.22
MW-E11
53.86
MW-E9
56.15
PZ-E1
58.86
PZ-E5
56.12
PZ-D3
71.77
MW-E10
58.21
Note:
All water table readings are measured on April 17, 2003.
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3 Monitor Well Location
+40-50' Screen Interval (ft NGVD)
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Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1
Figure Name:
Ground Water Flow Direction in Surficial Aquifer (April 17, 2003)
Project Name: BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: SM
Date: 04/22/03
Scale: NOTED
Project # 02-398.01
FIGURE 2.4

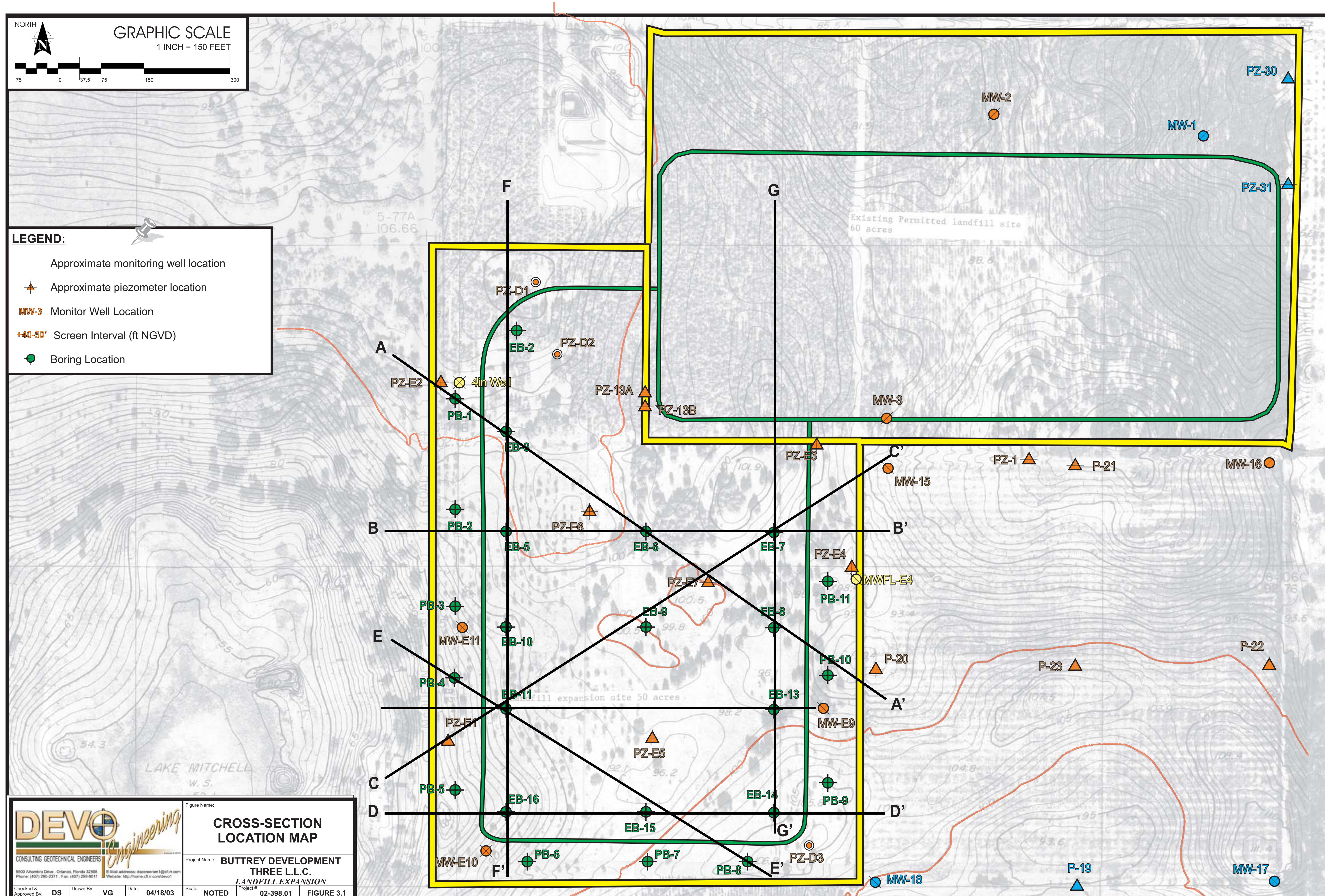
NORTH
N
GRAPHIC SCALE
1 INCH = 150 FEET
75 0 37.5 75 150 300
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3 Monitor Well Location
+40-50' Screen Interval (ft NGVD)
Boring Location
Existing Permitted landfill site
60 acres
landfill expansion site 50 acres
LAKE MITCHELL
A
A'
B
B'
C
C'
D
D'
E
E'
F
F'
G
G'
PZ-30
PZ-31
MW-1
MW-2
MW-3
MW-15
MW-16
MW-17
MW-18
PZ-1
P-19
P-20
P-21
P-22
P-23
PZ-D1
PZ-D2
PZ-D3
PZ-E1
PZ-E2
PZ-E3
PZ-E4
PZ-E5
PZ-E6
PZ-E7
PZ-13A
PZ-13B
4in Well
MWFL-E4
MW-E9
MW-E10
MW-E11
PB-1
PB-2
PB-3
PB-4
PB-5
PB-6
PB-7
PB-8
PB-9
PB-10
PB-11
EB-2
EB-3
EB-5
EB-6
EB-7
EB-8
EB-9
EB-10
EB-11
EB-13
EB-14
EB-15
EB-16
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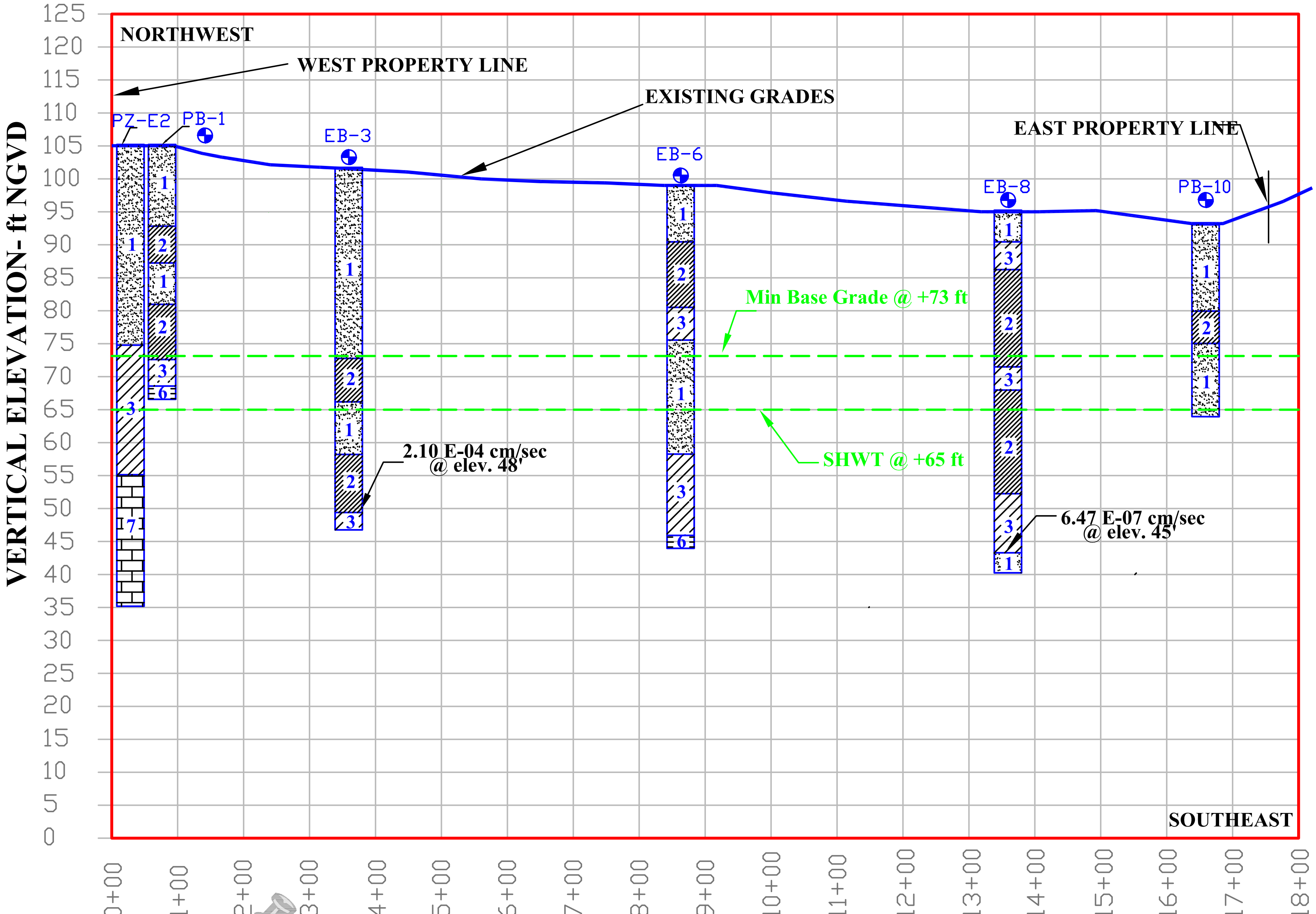
Figure Name:
CROSS-SECTION LOCATION MAP
Project Name:
BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 04/18/03
Scale: NOTED
Project #: 02-398.01
FIGURE 3.1



SOIL KEY

1 FINE SAND (SP) (A-3)

2 CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7

3 SANDY/SILTY CLAY (CL) (A-6 / A-7)

4 SANDY CLAY (CH) (A-7-5) (A-7-6)

5 SILTY SAND (SM) (SP-SM)

6 LIMESILT (A-4)

7 LIMESTONE

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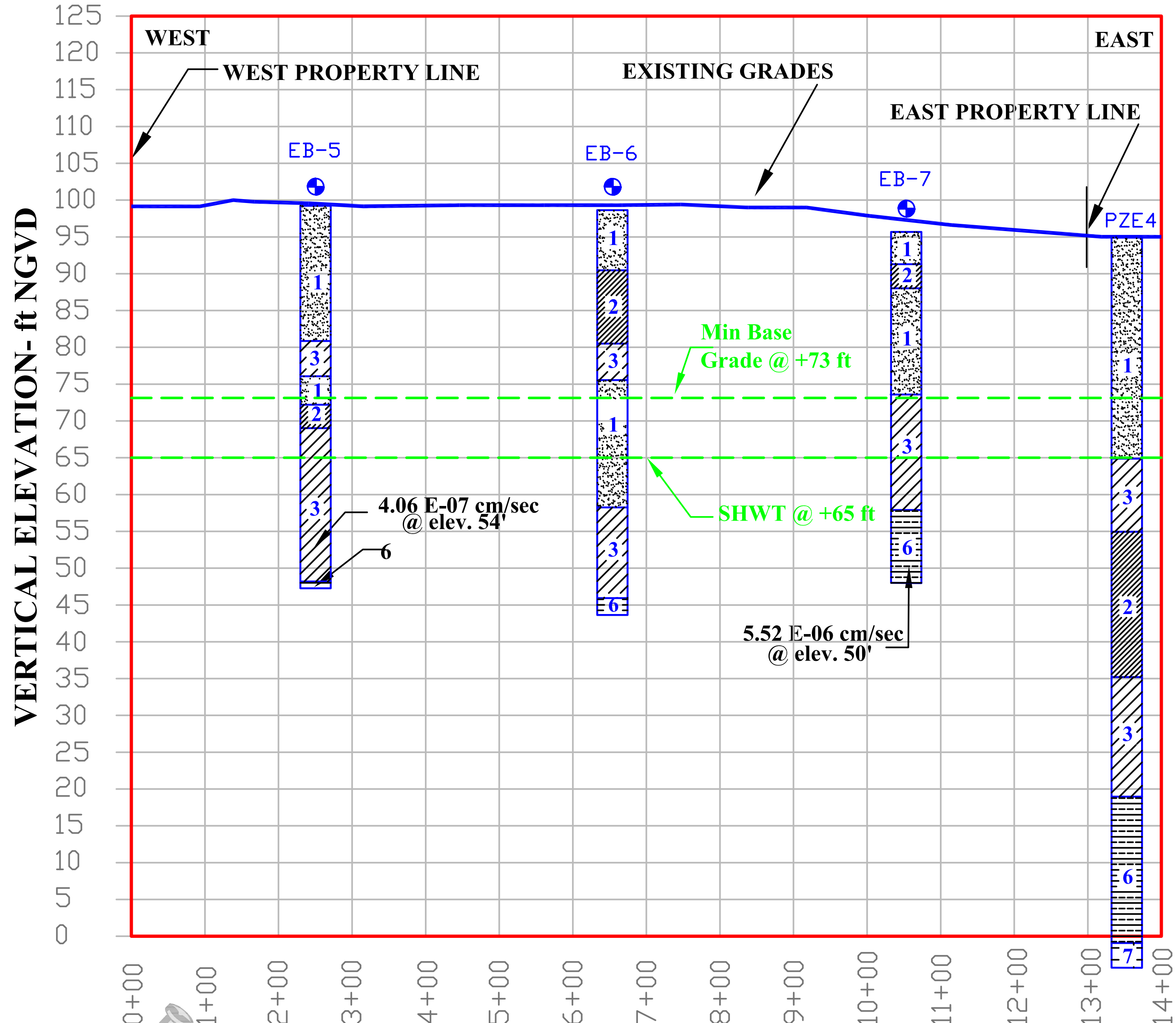
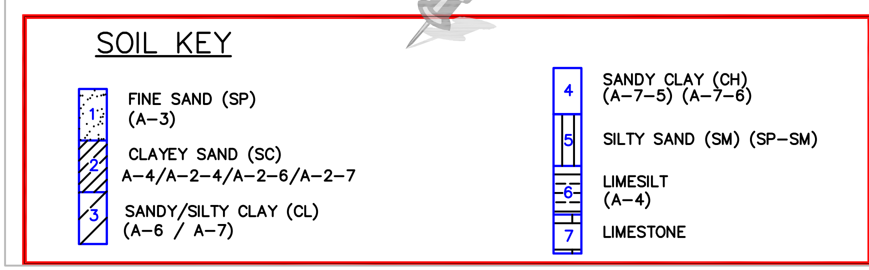
Figure Name: **CROSS-SECTION A-A'**

Project Name: BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	AZ	04/16/03	N.T.S.	02-398.01	FIGURE 3.2





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5500 Alhambra Dr . ORLANDO, FL - 32808
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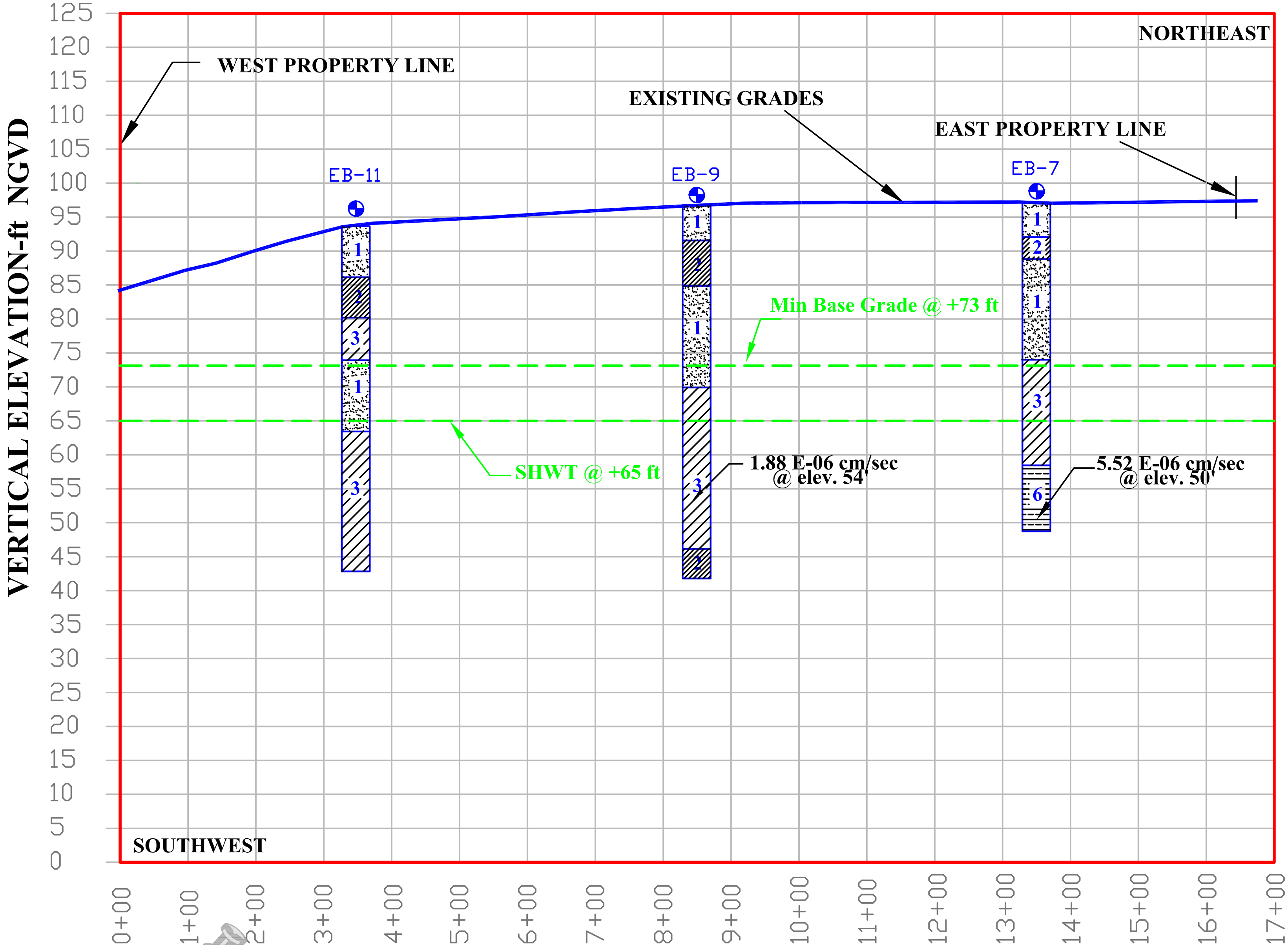
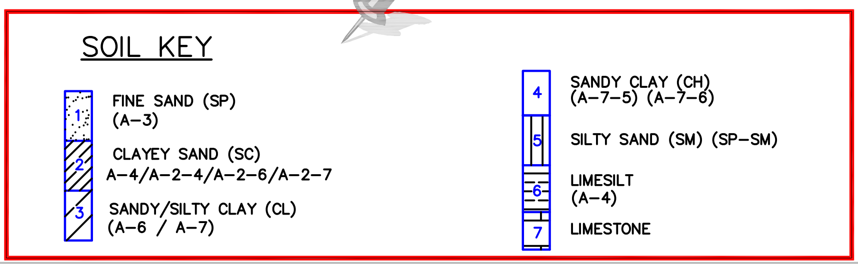
website: http://www.devoeng.com

Figure Name: CROSS-SECTION B-B'					
Project Name: BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION					
Checked & Approved by: DS	Drawn By: AZ	Date: 04/16/03	Scale: N.T.S.	Proj. # 02-398.01	FIGURE 3.3





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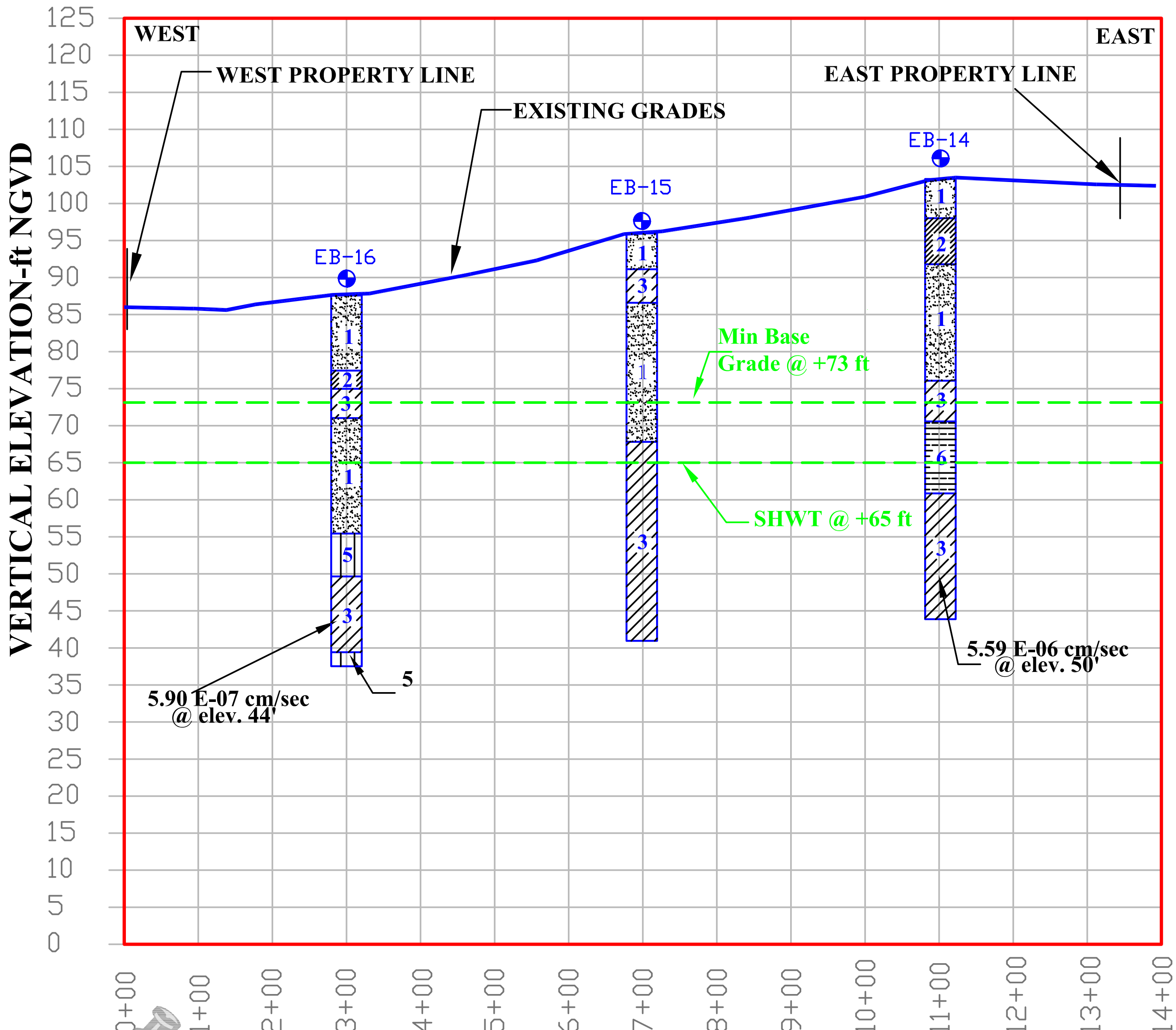
website: http://www.devoeng.com

Figure Name:	**CROSS-SECTION C-C'**								
Project Name:	BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION								
Checked & Approved by:	DS	Drawn By:	AZ	Date:	04/16/03	Scale:	N.T.S.	Proj. #	02-398.01
FIGURE 3.4									



SOIL KEY

1	FINE SAND (SP) (A-3)
2	CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7
3	SANDY/SILTY CLAY (CL) (A-6 / A-7)
4	SANDY CLAY (CH) (A-7-5) (A-7-6)
5	SILTY SAND (SM) (SP-SM)
6	LIMESILT (A-4)
7	LIMESTONE

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5500 Alhambra Dr . ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
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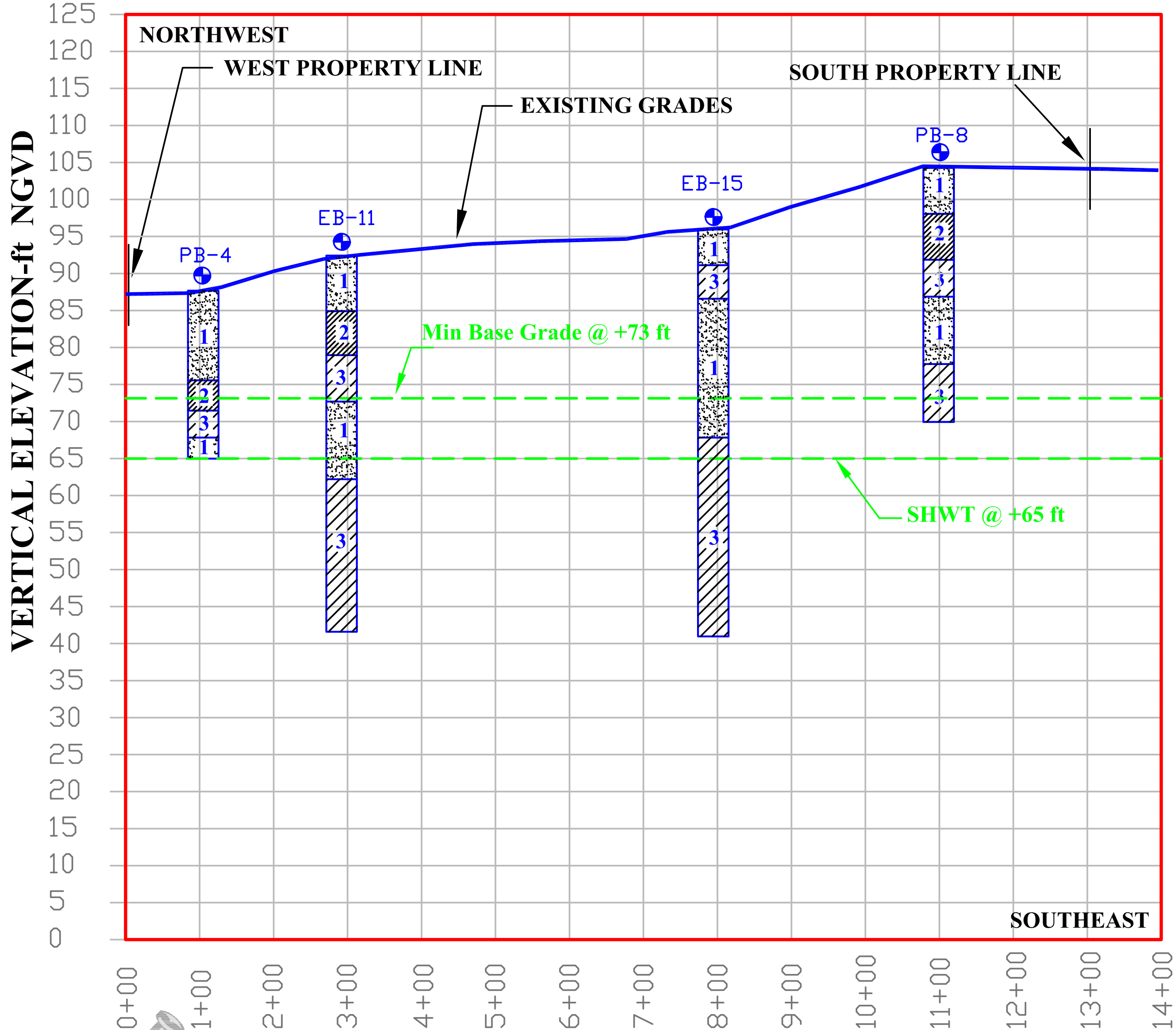
website: http://www.devoeng.com

Figure Name: **CROSS-SECTION D-D'**

Project Name: **BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION**

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	AZ	04/16/03	N.T.S.	02-398.01	FIGURE 3.5



SOIL KEY

1 FINE SAND (SP) (A-3)

2 CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7

3 SANDY/SILTY CLAY (CL) (A-6 / A-7)

4 SANDY CLAY (CH) (A-7-5) (A-7-6)

5 SILTY SAND (SM) (SP-SM)

6 LIMESILT (A-4)

7 LIMESTONE

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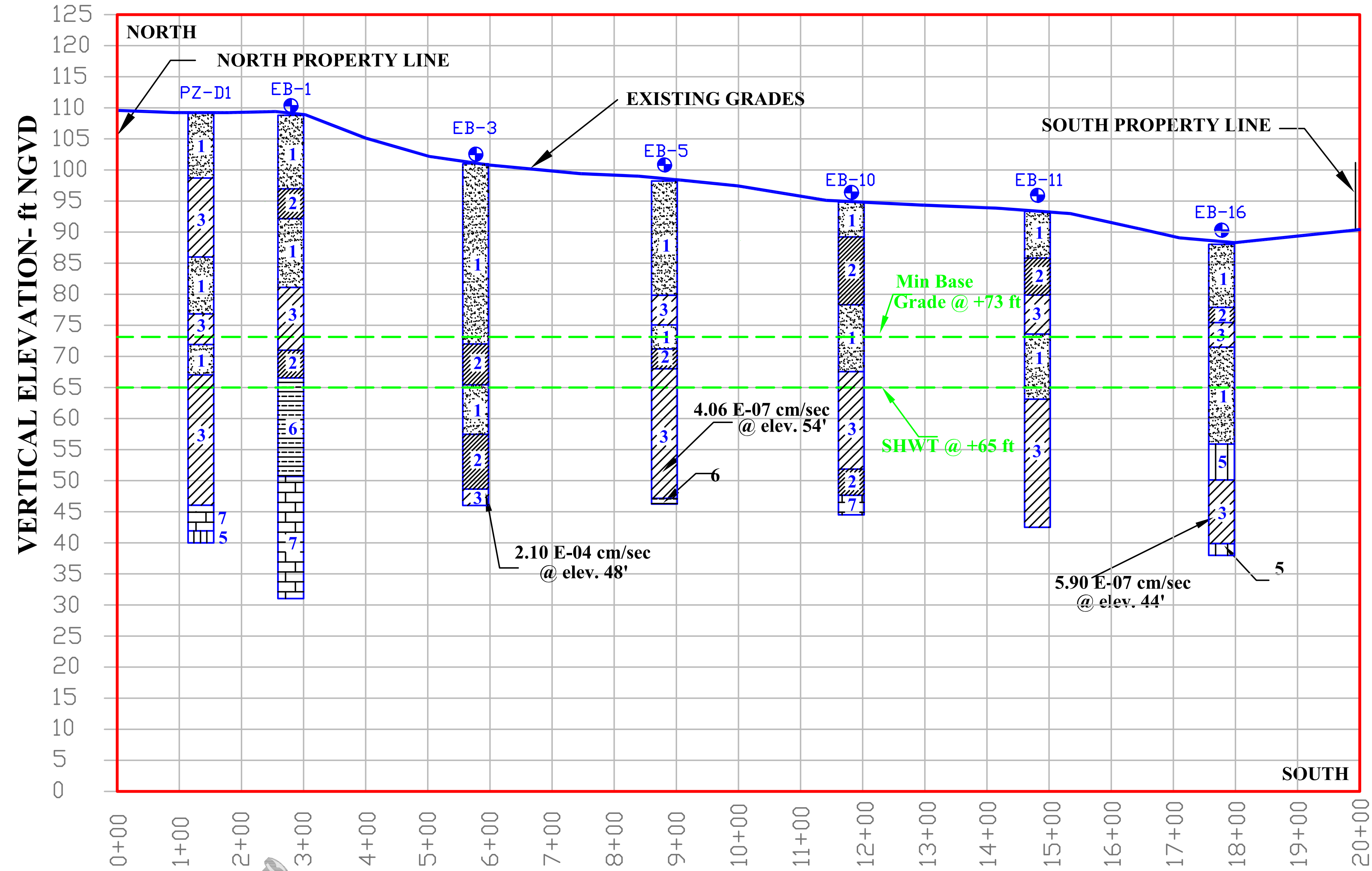
5500 Alhambra Dr . ORLANDO, FL - 32808
Phone: (407) 920-2371 . Fax: (407) 298-9011
E-Mail address: devo@devoeng.com
website: http://www.devoeng.com

Figure Name:	CROSS-SECTION E-E'
Project Name:	BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION

Checked & Approved by:	DS	Drawn By:	AZ	Date:	04/16/03	Scale:	N.T.S.	Proj. #	02-398.01	FIGURE 3.6



SOIL KEY

1. FINE SAND (SP) (A-3)
2. CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7
3. SANDY/SILTY CLAY (CL) (A-6 / A-7)
4. SANDY CLAY (CH) (A-7-5) (A-7-6)
5. SILTY SAND (SM) (SP-SM)
6. LIMESILT (A-4)
7. LIMESTONE

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Figure Name:
CROSS-SECTION F-F'

Project Name:
BUTTREY DEVELOPMENT THREE L.L.C.
LANDFILL EXPANSION

Checked & Approved by: DS	Drawn By: AZ	Date: 04/16/03	Scale: N.T.S.	Proj. # 02-398.01	FIGURE 3.7

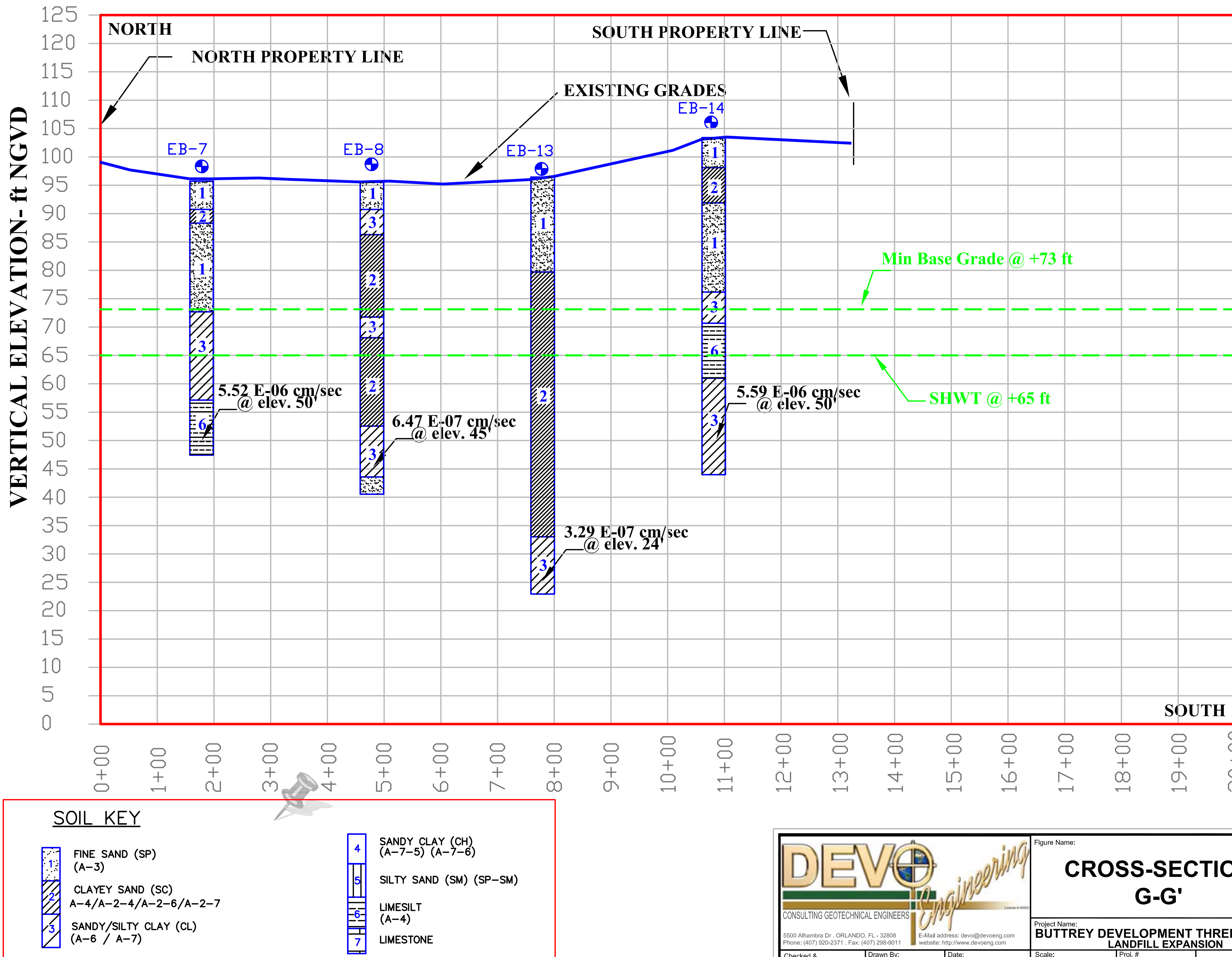

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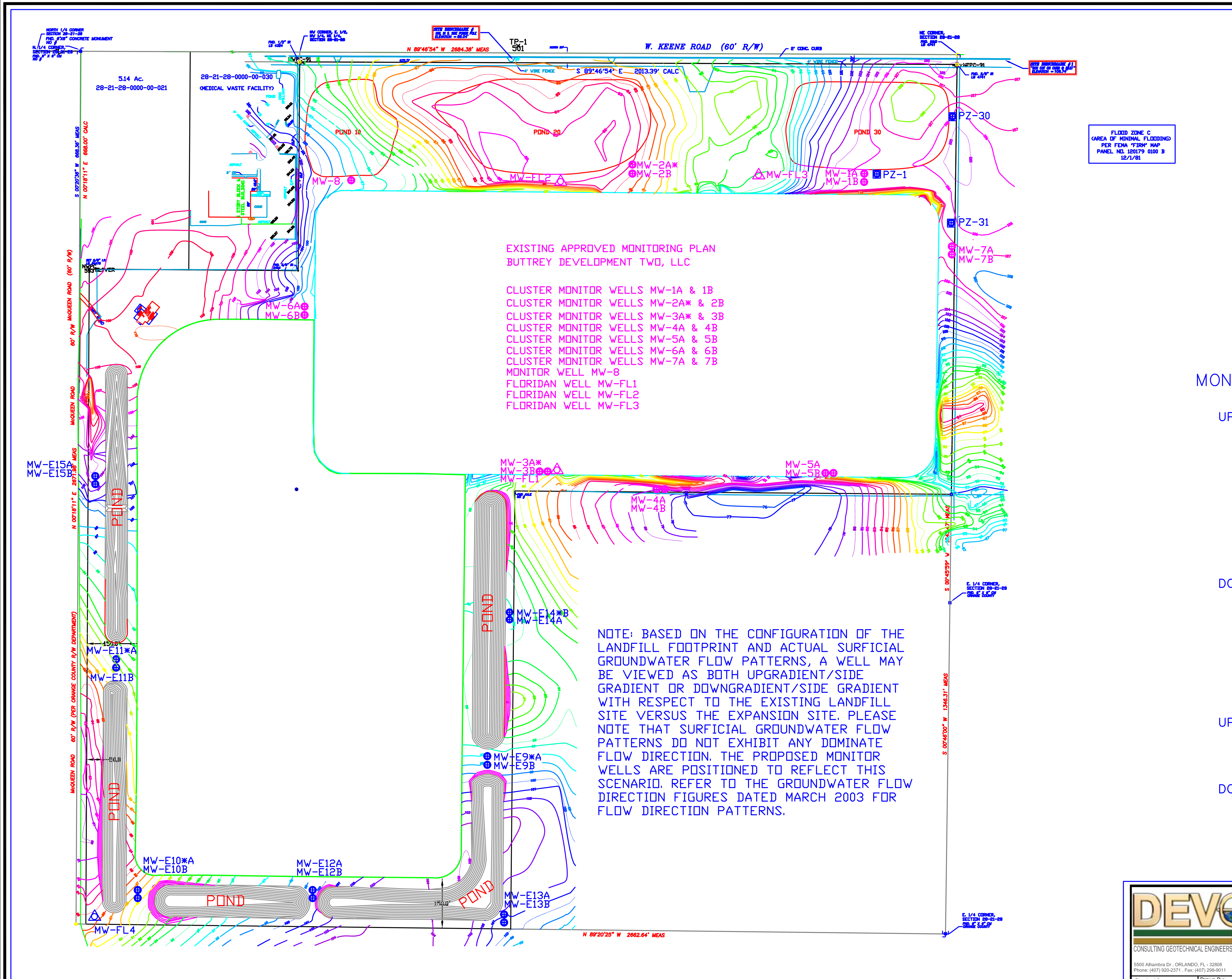
Figure Name: **CROSS-SECTION G-G'**

Project Name: BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	AZ	04/16/03	N.T.S.	02-398.01	FIGURE 3.8



NORTH

GRAPHIC SCALE
1 INCH = 300 FEET
150 0 75 150 300 600

LEGEND:

- GROUND WATER MONITORING WELL
- FLORIDAN AQUIFER MONITORING WELL
- GROUND WATER LEVEL PIEZOMETER
- * DENOTES EXISTING WELL

MONITOR WELL DESIGNATIONS

UPGRADIENT/SIDE GRADIENT SURFICIAL

MW–1 A & B
MW–2 A & B
MW–8
MW–6 A & B
MW–7 A & B
MW–E9 A & B
MW–E12 A & B
MW–E13 A & B

DOWNGRADIENT/SIDE GRADIENT SURFICIAL

MW–3 A & B
MW–4 A & B
MW–5 A & B
MW–E10 A & B
MW–E11 A & B
MW–E14 A & B
MW–E15 A & B

UPGRADIENT FLORIDAN

MW–FL4
MW–FL1

DOWNGRADIENT FLORIDAN

MW–FL2
MW–FL3

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Figure Name: MONITOR WELL LOCATION PLAN

Project Name: BUTTREY DEVELOPMENT THREE L.L.C. LANDFILL EXPANSION

Checked & Approved by:	Drawn By:	Date:	Scale:	Proj. #	
DS	AZ	04/16/03	N.T.S.	02-398.01	FIGURE 4.1

APPENDIX A
CONTINUOUS SIMULATION HYDROGRAPH

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
1-Jan-82	0.00	0	0.00	Dormant	28.462	0
2-Jan-82	0.00	0	0.00	Dormant	28.462	0
3-Jan-82	0.00	0	0.00	Dormant	28.462	0
4-Jan-82	0.08	0	0.00	Dormant	28.462	0
5-Jan-82	0.00	0	0.08	Dormant	28.462	0
6-Jan-82	0.00	0	0.08	Dormant	28.462	0
7-Jan-82	0.00	0	0.08	Dormant	28.462	0
8-Jan-82	0.00	0	0.08	Dormant	28.462	0
9-Jan-82	0.00	0	0.08	Dormant	28.462	0
10-Jan-82	0.00	0	0.00	Dormant	28.462	0
11-Jan-82	0.00	0	0.00	Dormant	28.462	0
12-Jan-82	0.00	0	0.00	Dormant	28.462	0
13-Jan-82	1.05	0	0.00	Dormant	28.462	0
14-Jan-82	0.56	0	1.05	Dormant	12.222	0
15-Jan-82	0.00	0	1.61	Dormant	5.385	0
16-Jan-82	0.00	0	1.61	Dormant	5.385	0
17-Jan-82	0.00	0	1.61	Dormant	5.385	0
18-Jan-82	0.00	0	1.61	Dormant	5.385	0
19-Jan-82	0.00	0	0.56	Dormant	12.222	0
20-Jan-82	0.00	0	0.00	Dormant	28.462	0
21-Jan-82	0.00	0	0.00	Dormant	28.462	0
22-Jan-82	0.00	0	0.00	Dormant	28.462	0
23-Jan-82	0.00	0	0.00	Dormant	28.462	0
24-Jan-82	0.03	0	0.00	Dormant	28.462	0
25-Jan-82	0.00	0	0.03	Dormant	28.462	0
26-Jan-82	0.00	0	0.03	Dormant	28.462	0
27-Jan-82	0.00	0	0.03	Dormant	28.462	0
28-Jan-82	0.00	0	0.03	Dormant	28.462	0
29-Jan-82	0.00	0	0.03	Dormant	28.462	0
30-Jan-82	0.00	0	0.00	Dormant	28.462	0
31-Jan-82	0.00	0	0.00	Dormant	28.462	0
1-Feb-82	0.03	0	0.00	Dormant	28.462	0
2-Feb-82	0.06	0	0.03	Dormant	28.462	0
3-Feb-82	0.00	0	0.09	Dormant	28.462	0
4-Feb-82	0.00	0	0.09	Dormant	28.462	0
5-Feb-82	0.04	0	0.09	Dormant	28.462	0
6-Feb-82	0.01	0	0.13	Dormant	28.462	0
7-Feb-82	0.00	0	0.11	Dormant	28.462	0
8-Feb-82	0.00	0	0.05	Dormant	28.462	0
9-Feb-82	0.39	0	0.05	Dormant	28.462	0
10-Feb-82	0.12	0	0.44	Dormant	28.462	0
11-Feb-82	0.00	0	0.52	Dormant	12.222	0
12-Feb-82	0.27	0	0.51	Dormant	12.222	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
13-Feb-82	0.00	0	0.78	Dormant	12.222	0
14-Feb-82	0.00	0	0.78	Dormant	12.222	0
15-Feb-82	0.00	0	0.39	Dormant	28.462	0
16-Feb-82	0.00	0	0.27	Dormant	28.462	0
17-Feb-82	0.42	0	0.27	Dormant	28.462	0
18-Feb-82	0.00	0	0.42	Dormant	28.462	0
19-Feb-82	0.00	0	0.42	Dormant	28.462	0
20-Feb-82	0.00	0	0.42	Dormant	28.462	0
21-Feb-82	0.00	0	0.42	Dormant	28.462	0
22-Feb-82	0.00	0	0.42	Dormant	28.462	0
23-Feb-82	0.00	0	0.00	Dormant	28.462	0
24-Feb-82	0.00	0	0.00	Dormant	28.462	0
25-Feb-82	0.00	0	0.00	Dormant	28.462	0
26-Feb-82	0.00	0	0.00	Dormant	28.462	0
27-Feb-82	0.00	0	0.00	Dormant	28.462	0
28-Feb-82	0.00	0	0.00	Dormant	28.462	0
1-Mar-82	0.00	0	0.00	Dormant	28.462	0
2-Mar-82	0.00	0	0.00	Dormant	28.462	0
3-Mar-82	0.00	0	0.00	Dormant	28.462	0
4-Mar-82	0.00	0	0.00	Dormant	28.462	0
5-Mar-82	0.22	0	0.00	Dormant	28.462	0
6-Mar-82	0.89	0	0.22	Dormant	28.462	0
7-Mar-82	0.77	0	1.11	Dormant	5.385	0
8-Mar-82	0.00	0	1.88	Dormant	5.385	0
9-Mar-82	0.00	0	1.88	Dormant	5.385	0
10-Mar-82	0.00	0	1.88	Dormant	5.385	0
11-Mar-82	0.09	0	1.66	Dormant	5.385	0
12-Mar-82	0.00	0	0.86	Dormant	12.222	0
13-Mar-82	0.00	0	0.09	Dormant	28.462	0
14-Mar-82	0.00	0	0.09	Dormant	28.462	0
15-Mar-82	0.00	0	0.09	Dormant	28.462	0
16-Mar-82	0.00	0	0.09	Dormant	28.462	0
17-Mar-82	0.00	0	0.00	Dormant	28.462	0
18-Mar-82	0.00	0	0.00	Dormant	28.462	0
19-Mar-82	0.00	0	0.00	Dormant	28.462	0
20-Mar-82	0.00	0	0.00	Dormant	28.462	0
21-Mar-82	0.00	0	0.00	Dormant	28.462	0
22-Mar-82	0.00	0	0.00	Dormant	28.462	0
23-Mar-82	0.00	0	0.00	Dormant	28.462	0
24-Mar-82	0.80	0	0.00	Dormant	28.462	0
25-Mar-82	0.60	0	0.80	Dormant	12.222	0
26-Mar-82	0.00	0	1.40	Dormant	5.385	0
27-Mar-82	0.00	0	1.40	Dormant	5.385	0
28-Mar-82	1.13	0	1.40	Dormant	5.385	188
29-Mar-82	0.35	0	2.53	Dormant	5.385	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
30-Mar-82	0.00	0	2.08	Dormant	5.385	0
31-Mar-82	0.00	0	1.48	Dormant	5.385	0
1-Apr-82	0.00	0	1.48	Dormant	5.385	0
2-Apr-82	0.00	0	1.48	Dormant	5.385	0
3-Apr-82	0.00	0	0.35	Dormant	28.462	0
4-Apr-82	0.00	0	0.00	Dormant	28.462	0
5-Apr-82	0.00	0	0.00	Dormant	28.462	0
6-Apr-82	0.00	0	0.00	Dormant	28.462	0
7-Apr-82	0.00	0	0.00	Dormant	28.462	0
8-Apr-82	0.10	0	0.00	Dormant	28.462	0
9-Apr-82	3.03	0	0.10	Dormant	28.462	0
10-Apr-82	0.04	0	3.13	Dormant	5.385	0
11-Apr-82	0.71	0	3.17	Dormant	5.385	0
12-Apr-82	0.00	0	3.88	Dormant	5.385	0
13-Apr-82	0.00	0	3.88	Dormant	5.385	0
14-Apr-82	0.00	0	3.78	Dormant	5.385	0
15-Apr-82	1.03	0	0.75	Dormant	12.222	0
16-Apr-82	0.00	0	1.74	Dormant	5.385	0
17-Apr-82	0.00	0	1.03	Dormant	12.222	0
18-Apr-82	0.00	0	1.03	Dormant	12.222	0
19-Apr-82	0.00	0	1.03	Dormant	12.222	0
20-Apr-82	0.00	0	1.03	Dormant	12.222	0
21-Apr-82	0.00	0	0.00	Dormant	28.462	0
22-Apr-82	0.05	0	0.00	Dormant	28.462	0
23-Apr-82	0.00	0	0.05	Dormant	28.462	0
24-Apr-82	0.12	0	0.05	Dormant	28.462	0
25-Apr-82	0.00	0	0.17	Dormant	28.462	0
26-Apr-82	0.18	0	0.17	Dormant	28.462	0
27-Apr-82	0.00	0	0.35	Dormant	28.462	0
28-Apr-82	0.00	0	0.30	Dormant	28.462	0
29-Apr-82	1.01	0	0.30	Dormant	28.462	0
30-Apr-82	0.00	0	1.19	Dormant	5.385	0
1-May-82	0.00	0	1.19	Dormant	5.385	0
2-May-82	0.09	0	1.01	Dormant	12.222	0
3-May-82	0.00	0	1.10	Dormant	12.222	0
4-May-82	0.00	0	1.10	Dormant	12.222	0
5-May-82	0.00	0	0.09	Dormant	28.462	0
6-May-82	0.00	0	0.09	Dormant	28.462	0
7-May-82	0.00	0	0.09	Dormant	28.462	0
8-May-82	0.00	0	0.00	Dormant	28.462	0
9-May-82	0.00	0	0.00	Dormant	28.462	0
10-May-82	0.00	0	0.00	Dormant	28.462	0
11-May-82	0.00	0	0.00	Dormant	28.462	0
12-May-82	0.00	0	0.00	Dormant	28.462	0
13-May-82	0.00	0	0.00	Dormant	28.462	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
14-May-82	0.00	0	0.00	Dormant	28.462	0
15-May-82	0.00	0	0.00	Dormant	28.462	0
16-May-82	0.00	0	0.00	Dormant	28.462	0
17-May-82	0.00	0	0.00	Dormant	28.462	0
18-May-82	0.00	0	0.00	Dormant	28.462	0
19-May-82	0.00	0	0.00	Dormant	28.462	0
20-May-82	0.00	0	0.00	Dormant	28.462	0
21-May-82	0.40	0	0.00	Dormant	28.462	0
22-May-82	0.62	0	0.40	Dormant	28.462	0
23-May-82	0.07	0	1.02	Dormant	12.222	0
24-May-82	0.31	0	1.09	Dormant	12.222	0
25-May-82	0.13	0	1.40	Dormant	5.385	0
26-May-82	0.66	0	1.53	Dormant	5.385	0
27-May-82	0.44	0	1.79	Dormant	5.385	0
28-May-82	0.00	0	1.61	Dormant	5.385	0
29-May-82	0.03	0	1.54	Dormant	5.385	0
30-May-82	0.90	0	1.26	Dormant	5.385	0
31-May-82	1.64	0	2.03	Dormant	5.385	19,351
1-Jun-82	0.00	0	3.01	Growing	5.385	0
2-Jun-82	0.11	0	2.57	Growing	5.385	0
3-Jun-82	0.00	0	2.68	Growing	5.385	0
4-Jun-82	0.06	0	2.65	Growing	5.385	0
5-Jun-82	0.31	0	1.81	Growing	12.222	0
6-Jun-82	0.00	0	0.48	Growing	28.462	0
7-Jun-82	0.00	0	0.48	Growing	28.462	0
8-Jun-82	0.00	0	0.37	Growing	28.462	0
9-Jun-82	0.00	0	0.37	Growing	28.462	0
10-Jun-82	0.00	0	0.31	Growing	28.462	0
11-Jun-82	0.09	0	0.00	Growing	28.462	0
12-Jun-82	0.07	0	0.09	Growing	28.462	0
13-Jun-82	0.09	0	0.16	Growing	28.462	0
14-Jun-82	0.00	0	0.25	Growing	28.462	0
15-Jun-82	0.12	0	0.25	Growing	28.462	0
16-Jun-82	0.16	0	0.37	Growing	28.462	0
17-Jun-82	2.45	0	0.44	Growing	28.462	0
18-Jun-82	1.70	0	2.82	Growing	5.385	23,458
19-Jun-82	0.00	0	4.43	Growing	5.385	0
20-Jun-82	0.70	0	4.43	Growing	5.385	0
21-Jun-82	0.06	0	5.01	Growing	5.385	0
22-Jun-82	0.00	0	4.91	Growing	5.385	0
23-Jun-82	0.04	0	2.46	Growing	5.385	0
24-Jun-82	0.01	0	0.80	Growing	28.462	0
25-Jun-82	0.00	0	0.81	Growing	28.462	0
26-Jun-82	0.09	0	0.11	Growing	28.462	0
27-Jun-82	0.00	0	0.14	Growing	28.462	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
28-Jun-82	0.00	0	0.14	Growing	28.462	0
29-Jun-82	0.00	0	0.10	Growing	28.462	0
30-Jun-82	0.00	0	0.09	Growing	28.462	0
1-Jul-82	0.00	0	0.09	Growing	28.462	0
2-Jul-82	3.44	0	0.00	Growing	28.462	0
3-Jul-82	0.01	0	3.44	Growing	5.385	0
4-Jul-82	0.11	0	3.45	Growing	5.385	0
5-Jul-82	0.03	0	3.56	Growing	5.385	0
6-Jul-82	0.02	0	3.59	Growing	5.385	0
7-Jul-82	0.45	0	3.61	Growing	5.385	0
8-Jul-82	0.02	0	0.62	Growing	28.462	0
9-Jul-82	0.00	0	0.63	Growing	28.462	0
10-Jul-82	0.02	0	0.52	Growing	28.462	0
11-Jul-82	0.00	0	0.51	Growing	28.462	0
12-Jul-82	0.00	0	0.49	Growing	28.462	0
13-Jul-82	0.00	0	0.04	Growing	28.462	0
14-Jul-82	0.00	0	0.02	Growing	28.462	0
15-Jul-82	0.00	0	0.02	Growing	28.462	0
16-Jul-82	0.13	0	0.00	Growing	28.462	0
17-Jul-82	0.02	0	0.13	Growing	28.462	0
18-Jul-82	0.00	0	0.15	Growing	28.462	0
19-Jul-82	0.39	0	0.15	Growing	28.462	0
20-Jul-82	2.02	0	0.54	Growing	28.462	0
21-Jul-82	0.18	0	2.56	Growing	5.385	0
22-Jul-82	0.71	0	2.61	Growing	5.385	0
23-Jul-82	0.25	0	3.30	Growing	5.385	0
24-Jul-82	0.08	0	3.55	Growing	5.385	0
25-Jul-82	3.75	0	3.24	Growing	5.385	321,898
26-Jul-82	0.14	0	4.97	Growing	5.385	0
27-Jul-82	0.03	0	4.93	Growing	5.385	0
28-Jul-82	0.00	0	4.25	Growing	5.385	0
29-Jul-82	0.01	0	4.00	Growing	5.385	0
30-Jul-82	0.00	0	3.93	Growing	5.385	0
31-Jul-82	0.00	0	0.18	Growing	28.462	0
1-Aug-82	0.04	0	0.04	Growing	28.462	0
2-Aug-82	0.27	0	0.05	Growing	28.462	0
3-Aug-82	0.00	0	0.32	Growing	28.462	0
4-Aug-82	0.00	0	0.31	Growing	28.462	0
5-Aug-82	0.00	0	0.31	Growing	28.462	0
6-Aug-82	0.37	0	0.31	Growing	28.462	0
7-Aug-82	0.19	0	0.64	Growing	28.462	0
8-Aug-82	0.00	0	0.56	Growing	28.462	0
9-Aug-82	0.00	0	0.56	Growing	28.462	0
10-Aug-82	1.05	0	0.56	Growing	28.462	0
11-Aug-82	0.35	0	1.61	Growing	12.222	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
12-Aug-82	0.25	0	1.59	Growing	12.222	0
13-Aug-82	0.00	0	1.65	Growing	12.222	0
14-Aug-82	0.00	0	1.65	Growing	12.222	0
15-Aug-82	0.23	0	1.65	Growing	12.222	0
16-Aug-82	0.00	0	0.83	Growing	28.462	0
17-Aug-82	0.07	0	0.48	Growing	28.462	0
18-Aug-82	0.34	0	0.30	Growing	28.462	0
19-Aug-82	0.00	0	0.64	Growing	28.462	0
20-Aug-82	1.11	0	0.64	Growing	28.462	0
21-Aug-82	0.00	0	1.52	Growing	12.222	0
22-Aug-82	0.00	0	1.52	Growing	12.222	0
23-Aug-82	0.39	0	1.45	Growing	12.222	0
24-Aug-82	0.00	0	1.50	Growing	12.222	0
25-Aug-82	0.00	0	1.50	Growing	12.222	0
26-Aug-82	0.09	0	0.39	Growing	28.462	0
27-Aug-82	0.17	0	0.48	Growing	28.462	0
28-Aug-82	0.00	0	0.65	Growing	28.462	0
29-Aug-82	0.09	0	0.26	Growing	28.462	0
30-Aug-82	0.02	0	0.35	Growing	28.462	0
31-Aug-82	0.00	0	0.37	Growing	28.462	0
1-Sep-82	0.00	0	0.28	Growing	28.462	0
2-Sep-82	0.00	0	0.11	Growing	28.462	0
3-Sep-82	0.00	0	0.11	Growing	28.462	0
4-Sep-82	0.00	0	0.02	Growing	28.462	0
5-Sep-82	0.36	0	0.00	Growing	28.462	0
6-Sep-82	0.00	0	0.36	Growing	28.462	0
7-Sep-82	0.21	0	0.36	Growing	28.462	0
8-Sep-82	0.01	0	0.57	Growing	28.462	0
9-Sep-82	0.72	0	0.58	Growing	28.462	0
10-Sep-82	0.06	0	1.30	Growing	28.462	0
11-Sep-82	0.02	0	1.00	Growing	28.462	0
12-Sep-82	0.01	0	1.02	Growing	28.462	0
13-Sep-82	0.00	0	0.82	Growing	28.462	0
14-Sep-82	0.00	0	0.81	Growing	28.462	0
15-Sep-82	0.00	0	0.09	Growing	28.462	0
16-Sep-82	0.00	0	0.03	Growing	28.462	0
17-Sep-82	0.00	0	0.01	Growing	28.462	0
18-Sep-82	0.00	0	0.00	Growing	28.462	0
19-Sep-82	0.00	0	0.00	Growing	28.462	0
20-Sep-82	1.11	0	0.00	Growing	28.462	0
21-Sep-82	1.50	0	1.11	Growing	28.462	0
22-Sep-82	0.16	0	2.61	Growing	5.385	0
23-Sep-82	0.00	0	2.77	Growing	5.385	0
24-Sep-82	0.26	0	2.77	Growing	5.385	0
25-Sep-82	0.70	0	3.03	Growing	5.385	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
26-Sep-82	1.28	0	2.62	Growing	5.385	2,679
27-Sep-82	0.00	0	2.40	Growing	5.385	0
28-Sep-82	0.00	0	2.24	Growing	5.385	0
29-Sep-82	0.00	0	2.24	Growing	5.385	0
30-Sep-82	0.56	0	1.98	Growing	12.222	0
1-Oct-82	0.00	0	1.84	Growing	12.222	0
2-Oct-82	0.00	0	0.56	Growing	28.462	0
3-Oct-82	0.00	0	0.56	Growing	28.462	0
4-Oct-82	0.00	0	0.56	Growing	28.462	0
5-Oct-82	0.50	0	0.56	Growing	28.462	0
6-Oct-82	0.03	0	0.50	Growing	28.462	0
7-Oct-82	0.00	0	0.53	Growing	28.462	0
8-Oct-82	0.00	0	0.53	Growing	28.462	0
9-Oct-82	0.00	0	0.53	Growing	28.462	0
10-Oct-82	0.00	0	0.53	Growing	28.462	0
11-Oct-82	0.04	0	0.03	Growing	28.462	0
12-Oct-82	0.00	0	0.04	Growing	28.462	0
13-Oct-82	0.00	0	0.04	Growing	28.462	0
14-Oct-82	0.00	0	0.04	Growing	28.462	0
15-Oct-82	0.00	0	0.04	Growing	28.462	0
16-Oct-82	0.00	0	0.04	Growing	28.462	0
17-Oct-82	0.00	0	0.00	Growing	28.462	0
18-Oct-82	0.00	0	0.00	Growing	28.462	0
19-Oct-82	0.00	0	0.00	Growing	28.462	0
20-Oct-82	0.00	0	0.00	Growing	28.462	0
21-Oct-82	0.00	0	0.00	Growing	28.462	0
22-Oct-82	0.00	0	0.00	Growing	28.462	0
23-Oct-82	0.13	0	0.00	Growing	28.462	0
24-Oct-82	0.00	0	0.13	Growing	28.462	0
25-Oct-82	0.00	0	0.13	Growing	28.462	0
26-Oct-82	0.00	0	0.13	Growing	28.462	0
27-Oct-82	0.00	0	0.13	Growing	28.462	0
28-Oct-82	0.00	0	0.13	Growing	28.462	0
29-Oct-82	0.00	0	0.00	Growing	28.462	0
30-Oct-82	0.00	0	0.00	Growing	28.462	0
31-Oct-82	0.04	0	0.00	Growing	28.462	0
1-Nov-82	0.00	0	0.04	Dormant	28.462	0
2-Nov-82	0.29	0	0.04	Dormant	28.462	0
3-Nov-82	0.04	0	0.33	Dormant	28.462	0
4-Nov-82	0.06	0	0.37	Dormant	28.462	0
5-Nov-82	0.00	0	0.43	Dormant	28.462	0
6-Nov-82	0.00	0	0.39	Dormant	28.462	0
7-Nov-82	0.00	0	0.39	Dormant	28.462	0
8-Nov-82	0.00	0	0.10	Dormant	28.462	0
9-Nov-82	0.00	0	0.06	Dormant	28.462	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
10-Nov-82	0.00	0	0.00	Dormant	28.462	0
11-Nov-82	0.00	0	0.00	Dormant	28.462	0
12-Nov-82	0.00	0	0.00	Dormant	28.462	0
13-Nov-82	0.12	0	0.00	Dormant	28.462	0
14-Nov-82	0.00	0	0.12	Dormant	28.462	0
15-Nov-82	0.00	0	0.12	Dormant	28.462	0
16-Nov-82	0.00	0	0.12	Dormant	28.462	0
17-Nov-82	0.00	0	0.12	Dormant	28.462	0
18-Nov-82	0.00	0	0.12	Dormant	28.462	0
19-Nov-82	0.00	0	0.00	Dormant	28.462	0
20-Nov-82	0.00	0	0.00	Dormant	28.462	0
21-Nov-82	0.00	0	0.00	Dormant	28.462	0
22-Nov-82	0.00	0	0.00	Dormant	28.462	0
23-Nov-82	0.00	0	0.00	Dormant	28.462	0
24-Nov-82	0.00	0	0.00	Dormant	28.462	0
25-Nov-82	0.00	0	0.00	Dormant	28.462	0
26-Nov-82	0.02	0	0.00	Dormant	28.462	0
27-Nov-82	0.00	0	0.02	Dormant	28.462	0
28-Nov-82	0.00	0	0.02	Dormant	28.462	0
29-Nov-82	0.00	0	0.02	Dormant	28.462	0
30-Nov-82	0.00	0	0.02	Dormant	28.462	0
1-Dec-82	0.15	0	0.02	Dormant	28.462	0
2-Dec-82	0.00	0	0.15	Dormant	28.462	0
3-Dec-82	0.00	0	0.15	Dormant	28.462	0
4-Dec-82	0.00	0	0.15	Dormant	28.462	0
5-Dec-82	0.00	0	0.15	Dormant	28.462	0
6-Dec-82	0.00	0	0.15	Dormant	28.462	0
7-Dec-82	0.28	0	0.00	Dormant	28.462	0
8-Dec-82	0.06	0	0.28	Dormant	28.462	0
9-Dec-82	0.00	0	0.34	Dormant	28.462	0
10-Dec-82	0.00	0	0.34	Dormant	28.462	0
11-Dec-82	0.00	0	0.34	Dormant	28.462	0
12-Dec-82	0.39	0	0.34	Dormant	28.462	0
13-Dec-82	0.00	0	0.45	Dormant	28.462	0
14-Dec-82	0.00	0	0.39	Dormant	28.462	0
15-Dec-82	0.00	0	0.39	Dormant	28.462	0
16-Dec-82	0.12	0	0.39	Dormant	28.462	0
17-Dec-82	0.00	0	0.51	Dormant	12.222	0
18-Dec-82	0.00	0	0.12	Dormant	28.462	0
19-Dec-82	0.00	0	0.12	Dormant	28.462	0
20-Dec-82	0.00	0	0.12	Dormant	28.462	0
21-Dec-82	0.00	0	0.12	Dormant	28.462	0
22-Dec-82	0.00	0	0.00	Dormant	28.462	0
23-Dec-82	0.00	0	0.00	Dormant	28.462	0
24-Dec-82	0.01	0	0.00	Dormant	28.462	0

DETAILED CONTINUOUS SIMULATION HYDROGRAPH - Keene Rd Site

Date	Rainfall (inch)	Runoff Volume from DCIA into Lake (cubic feet)	Total 5-day Antecedent Rainfall (inch)	Season	Potential Storage Adjusted for Antecedent Rainfall (in)	Runoff Volume from Pervious Area into Lake (cubic feet)
25-Dec-82	0.00	0	0.01	Dormant	28.462	0
26-Dec-82	0.00	0	0.01	Dormant	28.462	0
27-Dec-82	0.00	0	0.01	Dormant	28.462	0
28-Dec-82	0.00	0	0.01	Dormant	28.462	0
29-Dec-82	0.00	0	0.01	Dormant	28.462	0
30-Dec-82	0.00	0	0.00	Dormant	28.462	0
31-Dec-82	0.00	0	0.00	Dormant	28.462	0
	51.61	0				367,574

Runoff volume	367,574	cubic feet
Total rainfall on basin	18,734,430	cubic feet
% runoff	1.96%	
Rainfall runoff	1.01	inches

APPENDIX B
ANALYSIS OF LEAKAGE COEFFICIENT

SOIL LAYERS BELOW ELEVATION + 60.0

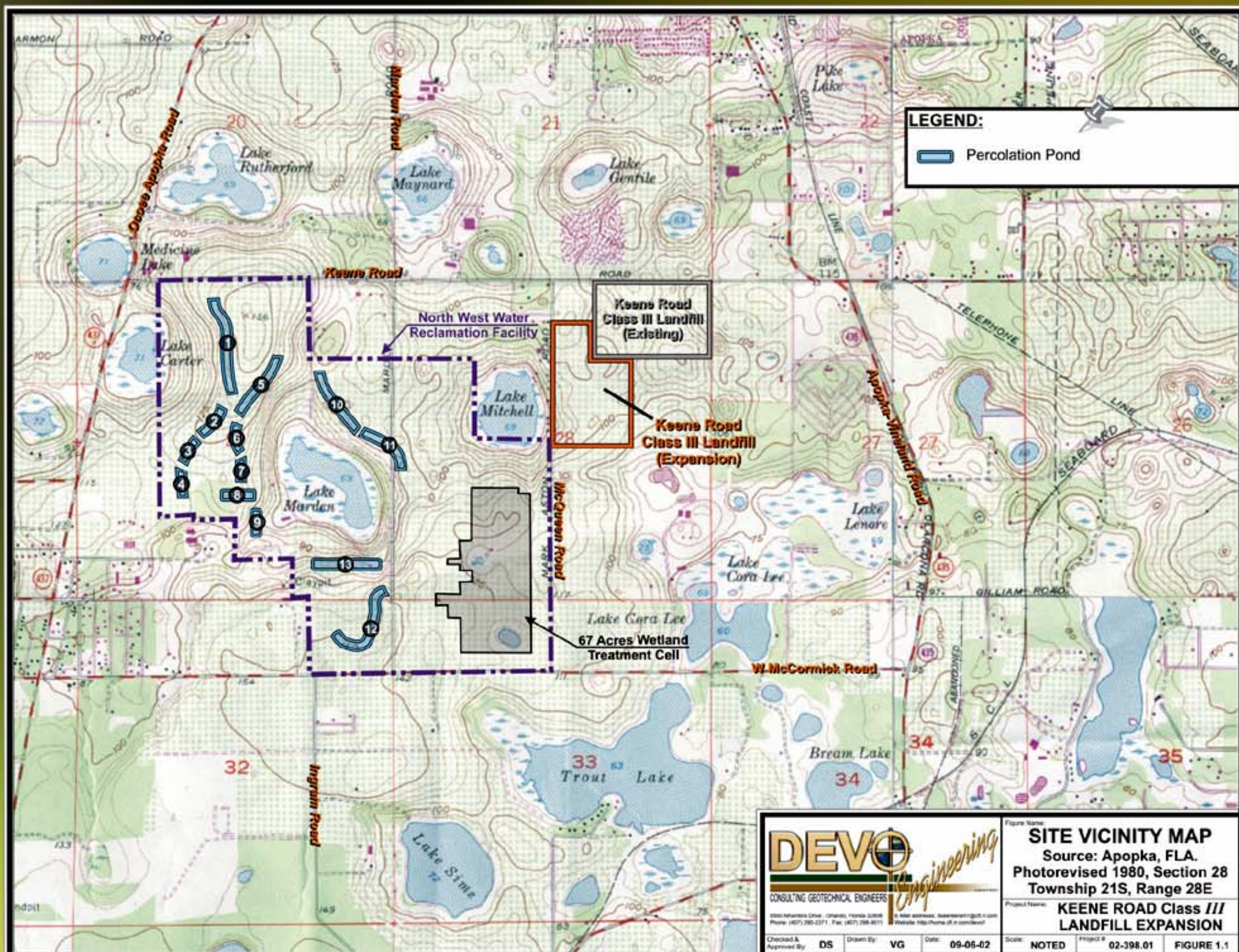
Boring	Layer 1			Layer 2			Layer 3			Layer 4			Layer 5			CUM
No.	Thkn's t (ft)	Soil Type	K (ft/day)	Thkn's t (ft)	Soil Type	K (ft/day)	Thkn's t (ft)	Soil Type	K (ft/day)	Thkn's t (ft)	Soil Type	K (ft/day)	Thkn's t (ft)	Soil Type	K (ft/day)	$\frac{1}{b/k}$
PZ-D1	10	3	1.15E-03													0.000115
EB-3	10	2	5.95E-01	12	3	1.15E-03										0.000096
PZ-E3	20	3	1.15E-03													0.000058
PZ-E4	5	3	1.15E-03	20	2	5.95E-01	17	3	1.15E-03	20	6	1.56E-02				0.000049
EB-5	20	3	1.15E-03	12	6	1.56E-02	15	3	1.15E-03							0.000032
EB-6	12	3	1.15E-03	46	6	1.56E-02	15	3	1.15E-03							0.000038
EB-7	2	3	1.15E-03	10	6	1.56E-02	25	3	1.15E-03							0.000041
EB-8	8	2	5.95E-01	8	3	1.15E-03	8	2	1.56E-02	12	3	1.83E-03				0.000071
EB-9	15	3	5.33E-03	10	2	5.95E-01	43	3	5.33E-03							0.000092
EB-10	8	3	1.15E-03	5	2	5.95E-01										0.000144
EB-11	60	3	1.15E-03													0.000019
EB-13	27	2	5.95E-01	33	3	9.44E-04										0.000029
EB-14	30	3	1.58E-02	30	3	9.44E-04										0.000030
EB-15	30	3	1.15E-03													0.000038

Vertical leakance 0.000061

Estimate of Seasonal High Groundwater Elevation,
Bishop & Buttrey Class III Landfill Expansion (BD3 Site) by
Devo Engineering, October 2002

ESTIMATE OF SEASONAL HIGH GROUNDWATER ELEVATION

BISHOP & BUTTREY CLASS *III* LANDFILL EXPANSION (BD3 SITE)



KEENE RD. & MCQUEENRD., ORANGE COUNTY, FLORIDA

Prepared for

BISHOP & BUTTREY, INC.
6239 Edgewater Drive, Suite D-1
Orlando, FL 32810

Prepared by

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

DEVO SEEREERAM, PH.D., P.E.
5500 ALHAMBRA DR., ORLANDO, FL-32808
PHONE: (407) 290-2371 - FAX: (407) 298-9011

October 2002

DEVO SEEREERAM, PH.D., P.E.
CONSULTING GEOTECHNICAL ENGINEER
FLORIDA REGISTRATION NO. 48303

GEOTECHNICAL ENGINEERING • GROUND WATER MODELING • SOFTWARE DEVELOPMENT • SUBCONTRACT DRILLING

5500 ALHAMBRA DRIVE ❈ ORLANDO, FLORIDA 32808 ❈ PHONE: 407-290-2371 ❈ FAX: 407-298-9011

e-mail: devo@devoeng.com | www.devoeng.com

Date: October 21, 2002	*Devo's Project Number:* 02-398.01
to: Bishop & Buttrey, Inc. 6239 Edgewater Drive, Suite D-1 Orlando, Fl 32810 phone: 407-296-0016 fax: 407-294-8090 attention: **Ed Chesney, P.E.** **Staff Engineer**	

Ref:

ESTIMATE OF SEASONAL HIGH GROUNDWATER ELEVATION
BISHOP & BUTTREY CLASS III LANDFILL EXPANSION (BD3 SITE)
KEENE ROAD & MCQUEEN ROAD, ORANGE COUNTY, FLORIDA

Dear Mr. Chesney:

The purpose of the attached report is to present a professional opinion and supporting data for the estimated seasonal high water table altitude within the footprint of the above-captioned Class III landfill expansion. This information will be used to select a bottom elevation for the landfill to ensure adequate vertical separation from the water table.

Based on the information presented in this report, it is our opinion that the seasonal high water table within the portion of the BD3 landfill footprint below elevation +100 ft and within the area of high leakance shown in Figure 2.1 will not exceed +65 ft NGVD. This estimate takes into account the artificial recharge from the adjacent Orange County NW Reclaimed Water Facility.

SITE LOCATION

Figure 1.1 (attached) shows the "BD3" Class III landfill footprint on the USGS Apopka 7.5 minute series quadrangle map. Also shown on this figure are the locations of the existing, adjacent Keene Road landfill and the limits of Orange County's Northwest Water Reclamation Facility (NWWRF).

NWWRF

Due to its proximity, water table mounding impacts from the NWWRF recharge facility will have to be considered in this seasonal high water table assessment.

The NWWRF comprises thirteen (13) percolation ponds and a 67± acre treatment wetland at the locations shown in Figure 1.1. This facility is permitted to dispose of 7.5 mgd although current flows are on the order of 4 mgd.

Note that the wetland treatment cell will be "lined" to minimize seepage losses and the treated discharge will be directed to Lake Marden (see Figure 1.1). Of the 3.3 mgd entering the wetland, 3.0 mgd is projected to discharge to Lake Marden and 0.3 mgd seeps infiltrates into the aquifer. An additional 4.5 mgd is applied to the percolation ponds comprising 37.5 acres.

The following modeling report documents the mounding impacts in the surficial and the Floridan aquifers:

> PB Water. August 2000. Groundwater Modeling in Support of Reclaimed Water Recharge Capacity Expansion at Northwest Water Reclamation Facility for Orange County Utilities. prepared for PBS&J and Orange County Utilities.

This report indicates that the computed water table mound height in the surficial aquifer is on the order of 1.0 to 2.0 ft (refer to Figure 5.2.4 of the subject report) while the simulated mound height in the Floridan aquifer is approximately 1.0 ft (Figure 5.2.5 of PB Water report).

Section 2 of the modeling report also present an overview of the hydrogeology of the study area and this description is not repeated herein.

TOPOGRAPHY

An October 2001 topographic contour map of the BD2 and BD3 landfills is presented in Figure 1.2. This map shows 1 ft interval ground surface contours. Note that there is a low spot in the western portion of the existing BD2 landfill which is as low as +59 ft NGVD and it is dry.

The general configuration of the land surface prior to excavation of the existing landfill is shown on the 1 ft aerial topographic in Figure 2.1.

Note that the existing BD2 landfill is permitted to place waste to a minimum elevation of +67 ft. The expansion site (BD3) is proposing to place waste to a minimum elevation of +73 ft.

SITE-SPECIFIC GEOTECHNICAL DATA

A grid of geotechnical borings were drilled within the footprint of the BD3 landfill and this data was previously submitted to the FDEP together with cross-sectional views. The geotechnical borings and monitor well data are contained in the following reports:

UNIVERSAL ENGINEERING SCIENCES. FEBRUARY 4, 2002.
BORROW PIT 125 - KEENE ROAD LANDFILL EXPANSION, ORANGE COUNTY, FLORIDA
PROJECT NO. 10942-002-01, REPORT NO. 209519
Report prepared for Buttrey Development, LLC

UNIVERSAL ENGINEERING SCIENCES. FEBRUARY 27, 2002.
B & B BORROW PIT 125 - KEENE ROAD LANDFILL EXPANSION, ORANGE COUNTY, FLORIDA
PROJECT NO. 10942-002-01, REPORT NO. 212723
Report prepared for Bishop Development, LLC

MEASURED GROUND WATER ALTITUDES

To provide site-specific data for this assessment, several surficial aquifer piezometers and monitor wells were installed over the course of time within the "BD3" expansion and the contiguous areas. The water level in an existing Floridan aquifer 4"-diameter potable well was also read to provide site-specific data on the potentiometric surface altitude of the underlying Floridan aquifer.

Water levels have been measured at five (5) different periods during 2002:

① February/March 2002 (see spot measurements in Figure 2.1)
② July 2002 (see spot measurements in Figure 2.2)
③ August 27, 2002 (see spot measurements in Figure 2.3)
④ September 5, 2002 (see spot measurements in Figure 2.4)
④ September 17, 2002 (see spot measurements & contours in Figure 2.5)

Note the following with respect to Figures 2.1 through 2.5:

❶ The wells outside the landfill property (existing and expansion) are on Orange County property and they were only read during the Feb/Mar period since Bishop & Buttrey, Inc. did not have permission to access the wells on the other dates.

❷ The piezometers PZ-D1, PZ-D2, and PZ-D3 within the BD3 landfill expansion were installed in August 2002 and therefore they are not shown in Figures 2.1 (Feb/Mar 2002) and 2.2 (July 2002). Completion details for these piezometers are presented in Figures 3.1 and 3.2.

❸ The Floridan aquifer 4" well on the BD3 site was only read on September 5, 2002 (Figure 2.4). As noted in Figure 2.4, the water level in the Floridan well was approximately the same as the water table altitude in the surficial aquifer piezometers PZ-D1 and PZ-D2.

❹ The water table is significantly and consistently lower within the limits of "high leakage" noted in Figures 2.1 to 2.5.

❺ A contour map of the water table is presented in Figure 2.5.

Published Potentiometric Surface Of Upper Floridan Aquifer

Figure 4.1 shows the published potentiometric surface map of the Upper Floridan aquifer for September 1995. This is a period of very high water levels (above normal) following a long-term period of above-average rainfall. The map shows that the potentiometric surface altitude in the area of the site was approximately +58 ft during this time of above normal high water levels.

Note that the potentiometric surface on the site was measured at +51.8 on September 5, 2002 which is about 6 ft below the September 1995 levels.

Estimated Seasonal High Water Table

The drastic change in measured water table elevation in the surficial aquifer over relatively short horizontal distances is explained by the difference in hydraulic connectivity between the surficial aquifer and the underlying Floridan aquifer. This is not an unusual geologic characteristic in such karstic terrain, especially along land surface contours corresponding to an ancient sea level stand. These shorelines are explained in the following publication:

> Ancient Sea Level Stands in Florida, by E.C. Pirkle, W.H. Yoho, and C.W. Hendry, Jr., 1970. Florida Geological Survey, Bulletin 52.

Where the leakage is higher, the inter-aquifer head difference between the surficial aquifer and the Floridan aquifer will be smaller. A minimum area of high leakage has been defined in Figures 2.1 through 2.4. Note that this area of leakage is larger but we have conservatively drawn the outline based on the available readings.

The leakage rate and the inter-aquifer head difference is a function of the gross vertical permeability of the "semi-confining unit" above the Floridan aquifer. The +100 ft land surface contour represents an ancient sea level stand and an ancient ridge shoreline. Deposition of sediments over the limestone would therefore be different below that elevation and it is not unusual to see changes in vertical leakage across these ancient sea levels.

It is therefore not unreasonable to assume that the high water table elevation will be at least equal to the Sept 1995 pot surface measurement plus an additional 7 ft to account for NWWRF-induced mounding and natural head difference between the surficial and Floridan aquifers. We therefore recommend a seasonal high water table of +65 ft NGVD for designing the base of the landfill in the expansion area. Note that this recommendation applies only to the expansion area.

REPORT CERTIFICATION

We trust that this report provides a clear explanation of the data and rational for estimation of the seasonal high water table.

Feel free to contact us if there are any questions or if any clarifications are needed.

Sincerely,

H
Devo Seereeram, Ph.D., P.E.
Florida Registration No. 48303
Date: October 21, 2002

LIST OF ATTACHED FIGURES

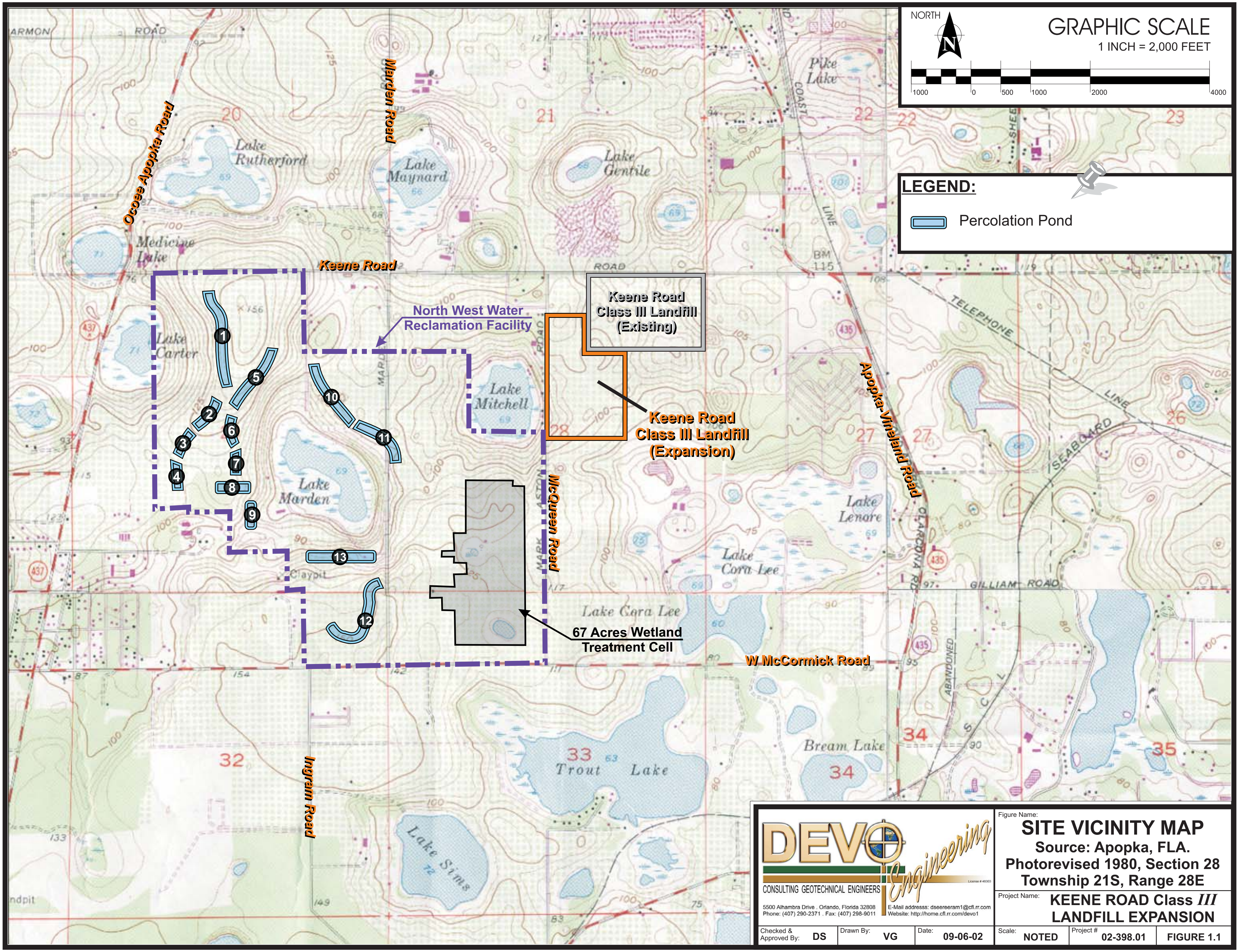
Figure 1.1 Site Vicinity Map
Figure 1.2 Site-Specific Topographic Data (survey date: Oct 2001)

Figure 2.1 Well Locations and Ground Water Altitude Readings for Feb/Mar 2002
Figure 2.2 Well Locations and Ground Water Altitude Readings for Jul 2002
Figure 2.3 Well Locations and Ground Water Altitude Readings for Aug 27, 2002
Figure 2.4 Well Locations and Ground Water Altitude Readings for Sep 5, 2002
Figure 2.5 Well Locations and Ground Water Altitude Readings for Sep 17, 2002

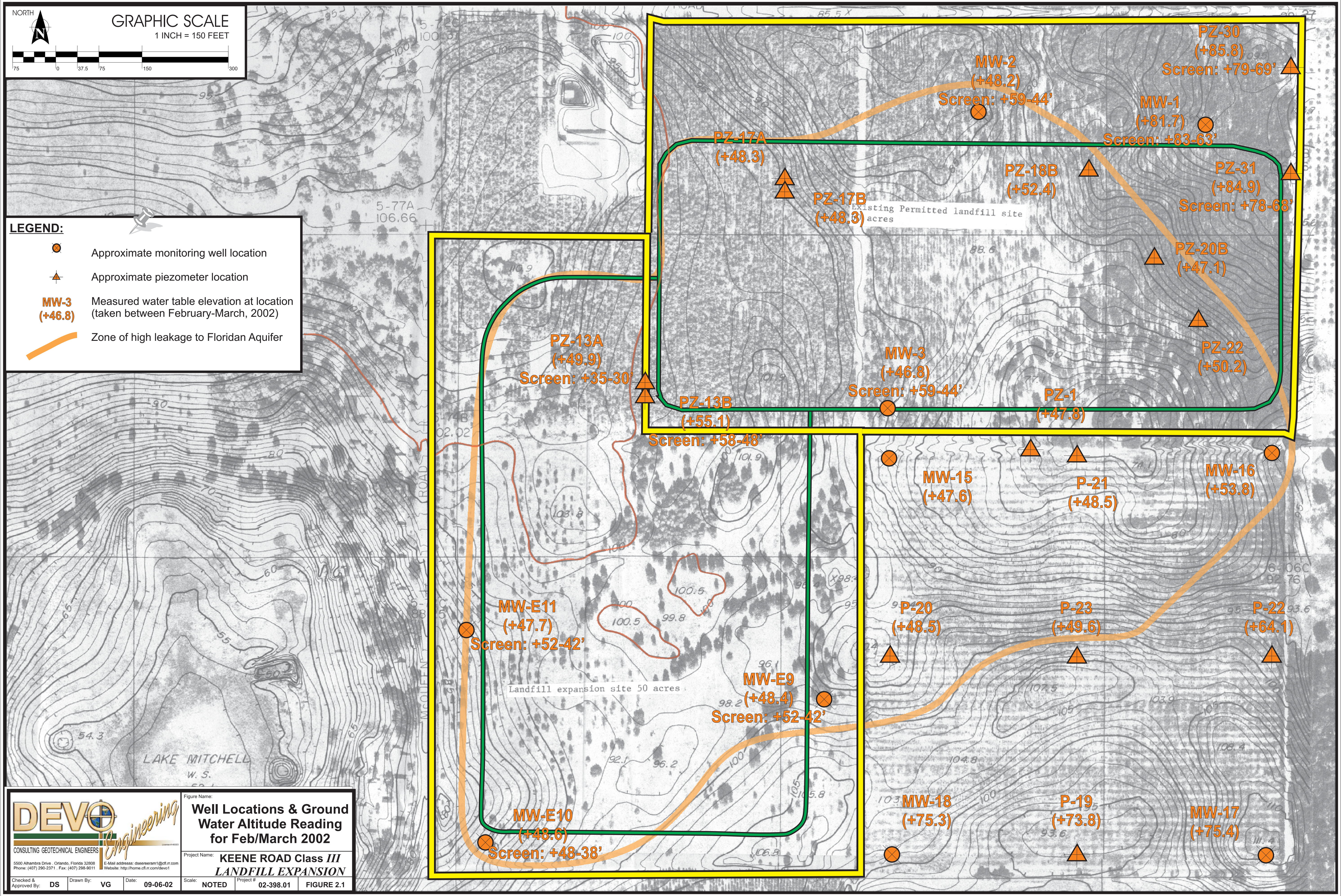
Figure 3.1 Piezometer Construction Details for Devo-1 Piezometer
Figure 3.2 Piezometer Construction Details for Devo-2 and Devo-3 Piezometers

Figure 4.1 Potentiometric Surface Map of Upper Floridan aquifer (Sept 1995)

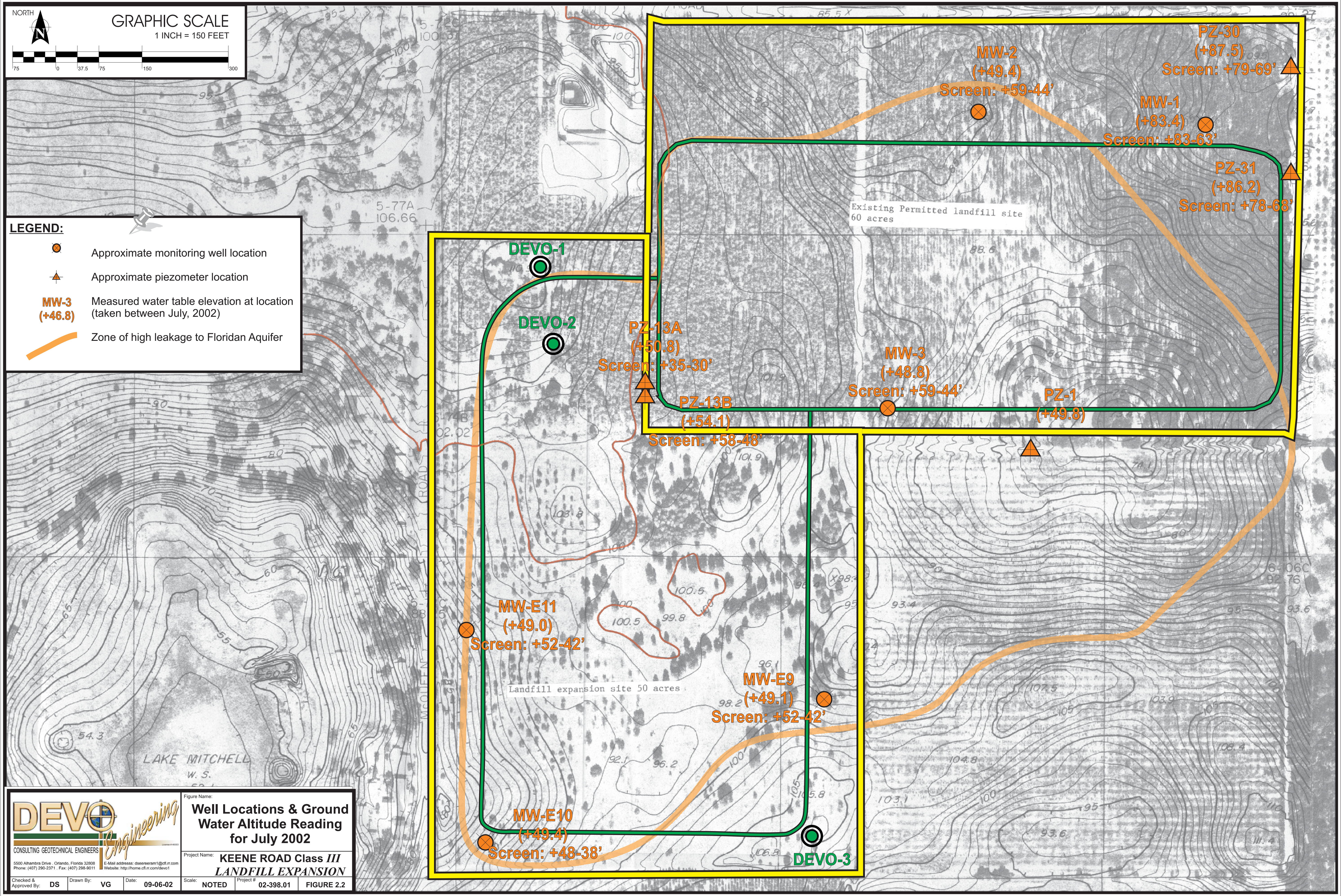
FIGURES

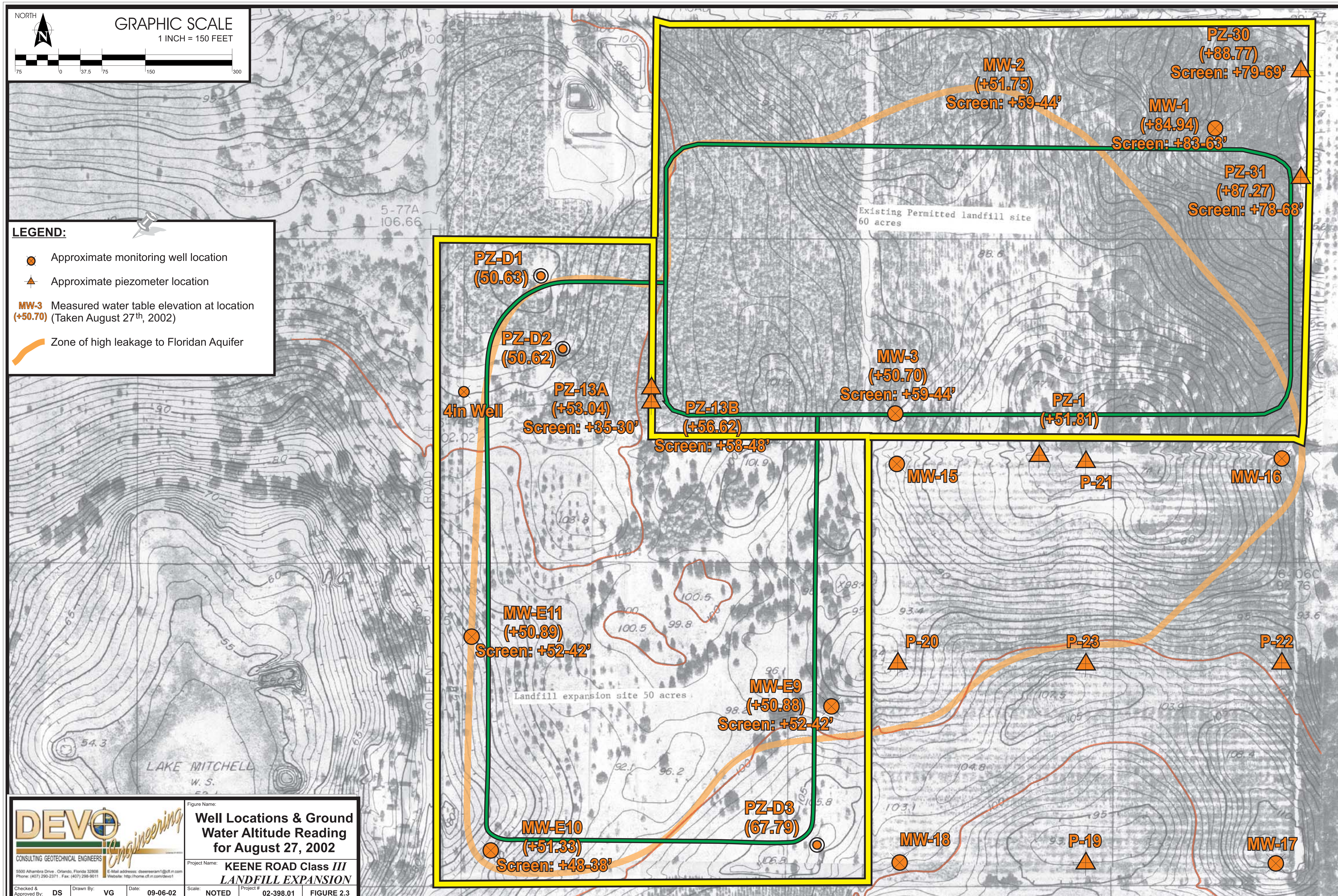


NORTH
N
GRAPHIC SCALE
1 INCH = 2,000 FEET
1000 0 500 1000 2000 4000
LEGEND:
Percolation Pond
Ocoee Apopka Road
Marden Road
Keene Road
North West Water Reclamation Facility
Keene Road Class III Landfill (Existing)
Keene Road Class III Landfill (Expansion)
McQueen Road
Apopka-Vineland Road
67 Acres Wetland Treatment Cell
W McCormick Road
Ingram Road
1
2
3
4
5
6
7
8
9
10
11
12
13
Lake Rutherford
Lake Maynard
Lake Gentile
Pike Lake
Medicine Lake
Lake Carter
Lake Mitchell
Lake Marden
Lake Lenore
Lake Cora Lee
Trout Lake
Bream Lake
Lake Sims
Claypit
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1
Figure Name:
SITE VICINITY MAP
Source: Apopka, FLA.
Photorevised 1980, Section 28
Township 21S, Range 28E
Project Name:
KEENE ROAD Class III
LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 09-06-02
Scale: NOTED
Project # 02-398.01
FIGURE 1.1

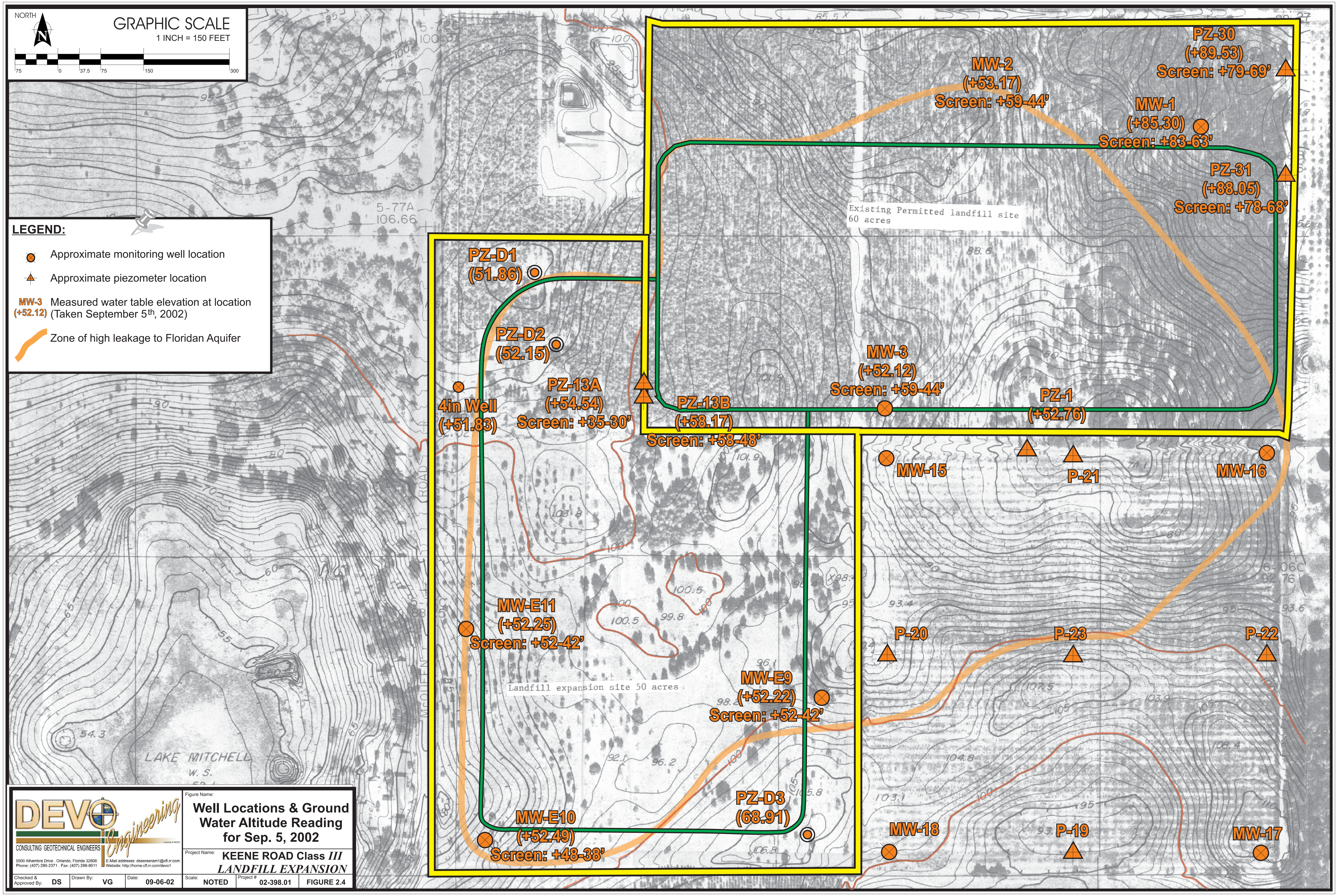


NORTH
N
GRAPHIC SCALE
1 INCH = 150 FEET
75
0
37.5
75
150
300
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3
(+46.8)
Measured water table elevation at location
(taken between February-March, 2002)
Zone of high leakage to Floridan Aquifer
MW-2
(+48.2)
Screen: +59-44'
PZ-30
(+85.8)
Screen: +79-69'
MW-1
(+81.7)
Screen: +83-63'
PZ-17A
(+48.3)
PZ-17B
(+48.3)
Existing Permitted landfill site
acres
PZ-18B
(+52.4)
PZ-31
(+84.9)
Screen: +78-68'
PZ-20B
(+47.1)
PZ-22
(+50.2)
PZ-13A
(+49.9)
Screen: +35-30'
PZ-13B
(+55.1)
Screen: +58-48'
MW-3
(+46.8)
Screen: +59-44'
PZ-1
(+47.8)
MW-15
(+47.6)
P-21
(+48.5)
MW-16
(+53.8)
MW-E11
(+47.7)
Screen: +52-42'
P-20
(+48.5)
P-23
(+49.6)
P-22
(+64.1)
Landfill expansion site 50 acres
MW-E9
(+48.4)
Screen: +52-42'
MW-E10
(+48.6)
Screen: +48-38'
MW-18
(+75.3)
P-19
(+73.8)
MW-17
(+75.4)
5-77A
106.66
LAKE MITCHELL
W. S.
54.3
100.5
99.8
103.8
88.6
92.1
96.2
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: dsenseram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1
Figure Name:
Well Locations & Ground Water Altitude Reading for Feb/March 2002
Project Name:
KEENE ROAD Class III LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 09-06-02
Scale: NOTED
Project #: 02-398.01
FIGURE 2.1

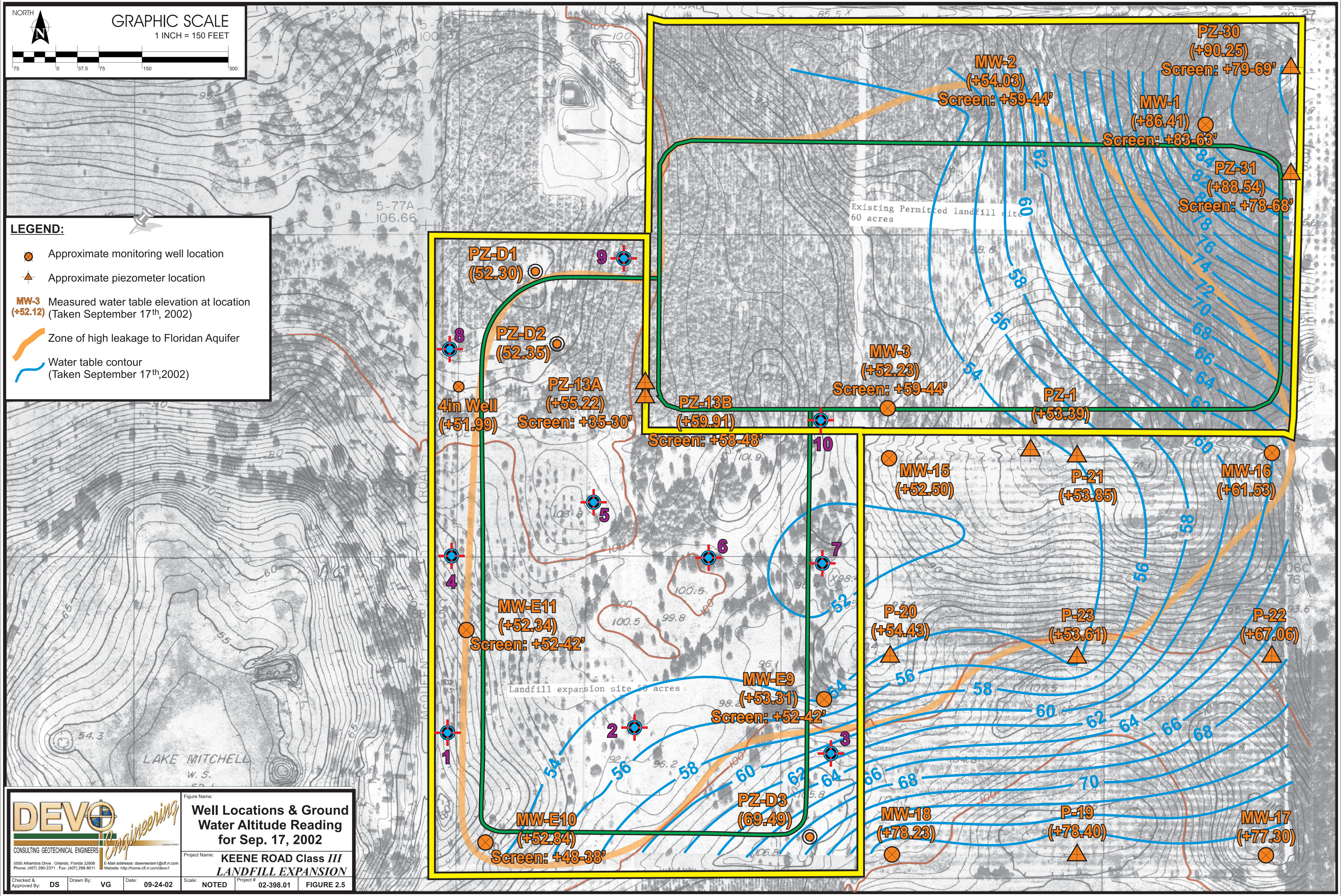

NORTH
N
GRAPHIC SCALE
1 INCH = 150 FEET
75
0
37.5
75
150
300
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3
(+46.8)
Measured water table elevation at location (taken between July, 2002)
Zone of high leakage to Floridan Aquifer
MW-2
(+49.4)
Screen: +59-44'
PZ-30
(+87.5)
Screen: +79-69'
MW-1
(+83.4)
Screen: +83-63'
PZ-31
(+86.2)
Screen: +78-68'
Existing Permitted landfill site
60 acres
DEVO-1
DEVO-2
PZ-13A
(+50.8)
Screen: +35-30'
PZ-13B
(+54.1)
Screen: +58-48'
MW-3
(+48.8)
Screen: +59-44'
PZ-1
(+49.8)
MW-E11
(+49.0)
Screen: +52-42'
Landfill expansion site 50 acres
MW-E9
(+49.1)
Screen: +52-42'
MW-E10
(+49.4)
Screen: +48-38'
DEVO-3
LAKE MITCHELL
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail address: devoengineering1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1
Figure Name:
Well Locations & Ground Water Altitude Reading for July 2002
Project Name:
KEENE ROAD Class III LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 09-06-02
Scale: NOTED
Project #: 02-398.01
FIGURE 2.2



NORTH
N
GRAPHIC SCALE
1 INCH = 150 FEET
75
0
37.5
75
150
300
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3 (+50.70) Measured water table elevation at location (Taken August 27th, 2002)
Zone of high leakage to Floridan Aquifer
Existing Permitted landfill site 60 acres
Landfill expansion site 50 acres
LAKE MITCHELL
W. S.
PZ-30 (+88.77) Screen: +79-69'
MW-2 (+51.75) Screen: +59-44'
MW-1 (+84.94) Screen: +83-63'
PZ-31 (+87.27) Screen: +78-68'
PZ-D1 (50.63)
PZ-D2 (50.62)
4in Well
PZ-13A (+53.04) Screen: +35-30'
PZ-13B (+56.62) Screen: +58-48'
MW-3 (+50.70) Screen: +59-44'
PZ-1 (+51.81)
MW-15
P-21
MW-16
MW-E11 (+50.89) Screen: +52-42'
P-20
P-23
P-22
MW-E9 (+50.88) Screen: +52-42'
PZ-D3 (67.79)
MW-E10 (+51.33) Screen: +48-38'
MW-18
P-19
MW-17
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail addresss: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1
Figure Name:
Well Locations & Ground Water Altitude Reading for August 27, 2002
Project Name:
KEENE ROAD Class III LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 09-06-02
Scale: NOTED
Project # 02-398.01
FIGURE 2.3



NORTH
N
GRAPHIC SCALE
1 INCH = 150 FEET
75
0
37.5
75
150
300
LEGEND:
Approximate monitoring well location
Approximate piezometer location
MW-3
(+52.12)
Measured water table elevation at location
(Taken September 5th, 2002)
Zone of high leakage to Floridan Aquifer
Existing Permitted landfill site
60 acres
Landfill expansion site 50 acres
LAKE MITCHELL
PZ-30
(+89.53)
Screen: +79-69'
MW-2
(+53.17)
Screen: +59-44'
MW-1
(+85.30)
Screen: +83-63'
PZ-31
(+88.05)
Screen: +78-68'
PZ-D1
(51.86)
PZ-D2
(52.15)
4in Well
(+51.83)
PZ-13A
(+54.54)
Screen: +35-30'
PZ-13B
(+58.17)
Screen: +58-48'
MW-3
(+52.12)
Screen: +59-44'
PZ-1
(+52.76)
MW-15
P-21
MW-16
MW-E11
(+52.25)
Screen: +52-42'
P-20
P-23
P-22
MW-E9
(+52.22)
Screen: +52-42'
PZ-D3
(68.91)
MW-E10
(+52.49)
Screen: +48-38'
MW-18
P-19
MW-17
DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
Figure Name:
Well Locations & Ground Water Altitude Reading for Sep. 5, 2002
Project Name:
KEENE ROAD Class III LANDFILL EXPANSION
Checked & Approved By: DS
Drawn By: VG
Date: 09-06-02
Scale: NOTED
Project #: 02-398.01
FIGURE 2.4

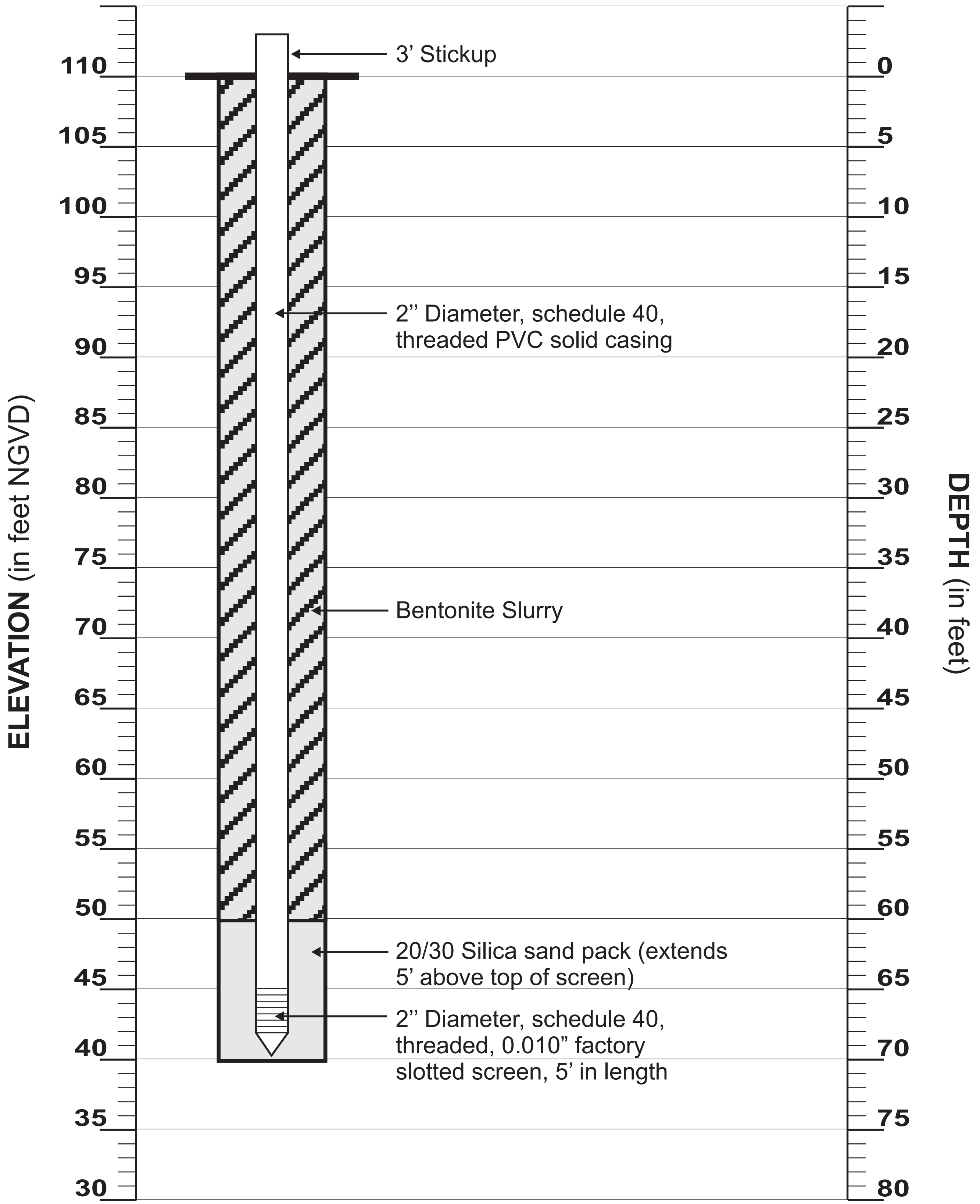


DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
License # 48303
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail addresss: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name: **Well Locations & Ground Water Altitude Reading for Sep. 17, 2002**

Project Name: **KEENE ROAD Class *III* *LANDFILL EXPANSION***

Checked & Approved By: DS	Drawn By: VG	Date: 09-24-02	Scale: NOTED	Project # 02-398.01	FIGURE 2.5



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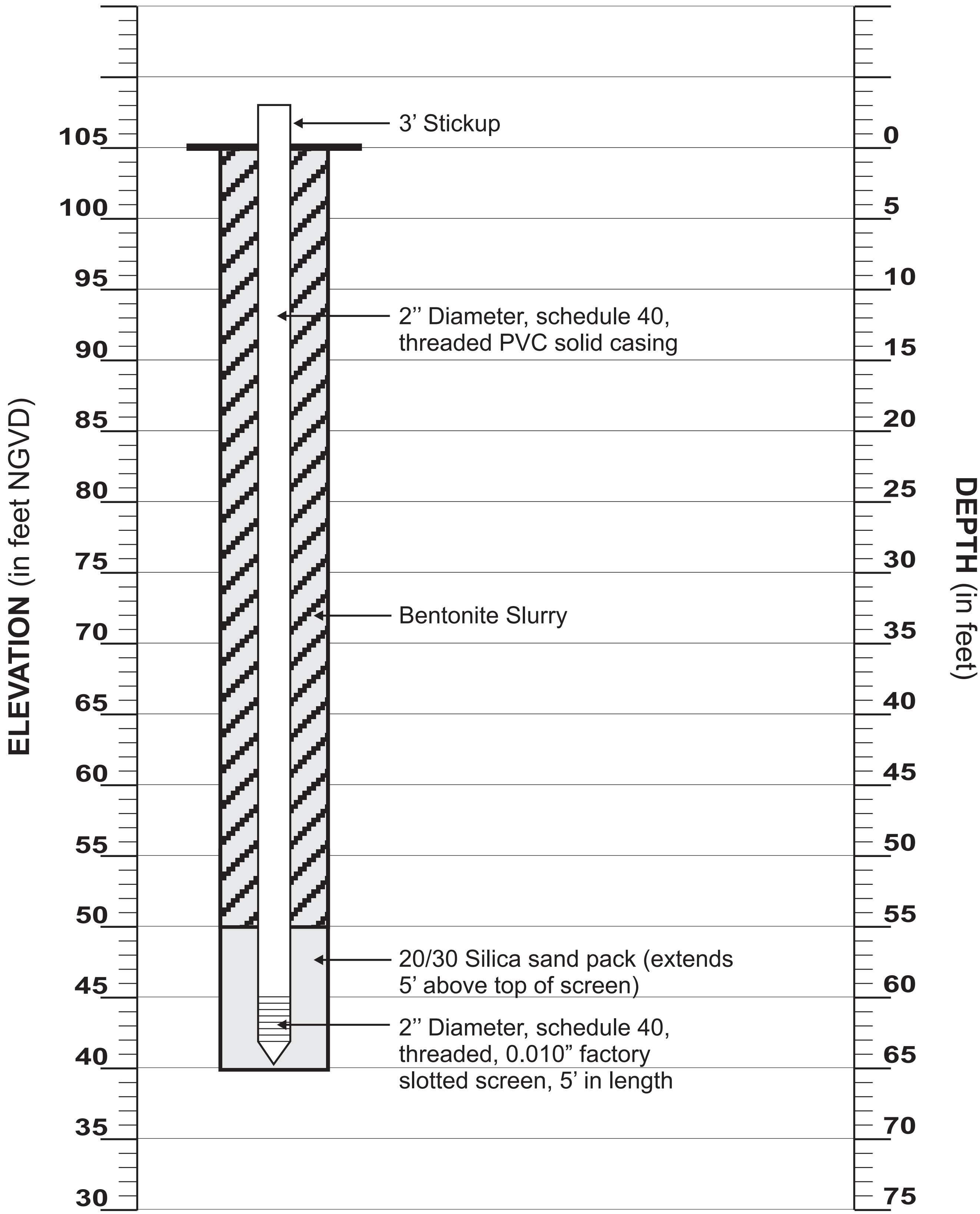
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail addresss: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name:

Piezometer Construction Details for Devo-1

Project Name: **KEENE ROAD Class *III* *LANDFILL EXPANSION***

Checked & Approved By: DS	Drawn By: DC	Date: 09-06-02	Scale: NTS	Project # 02-398.01	FIGURE 3.1



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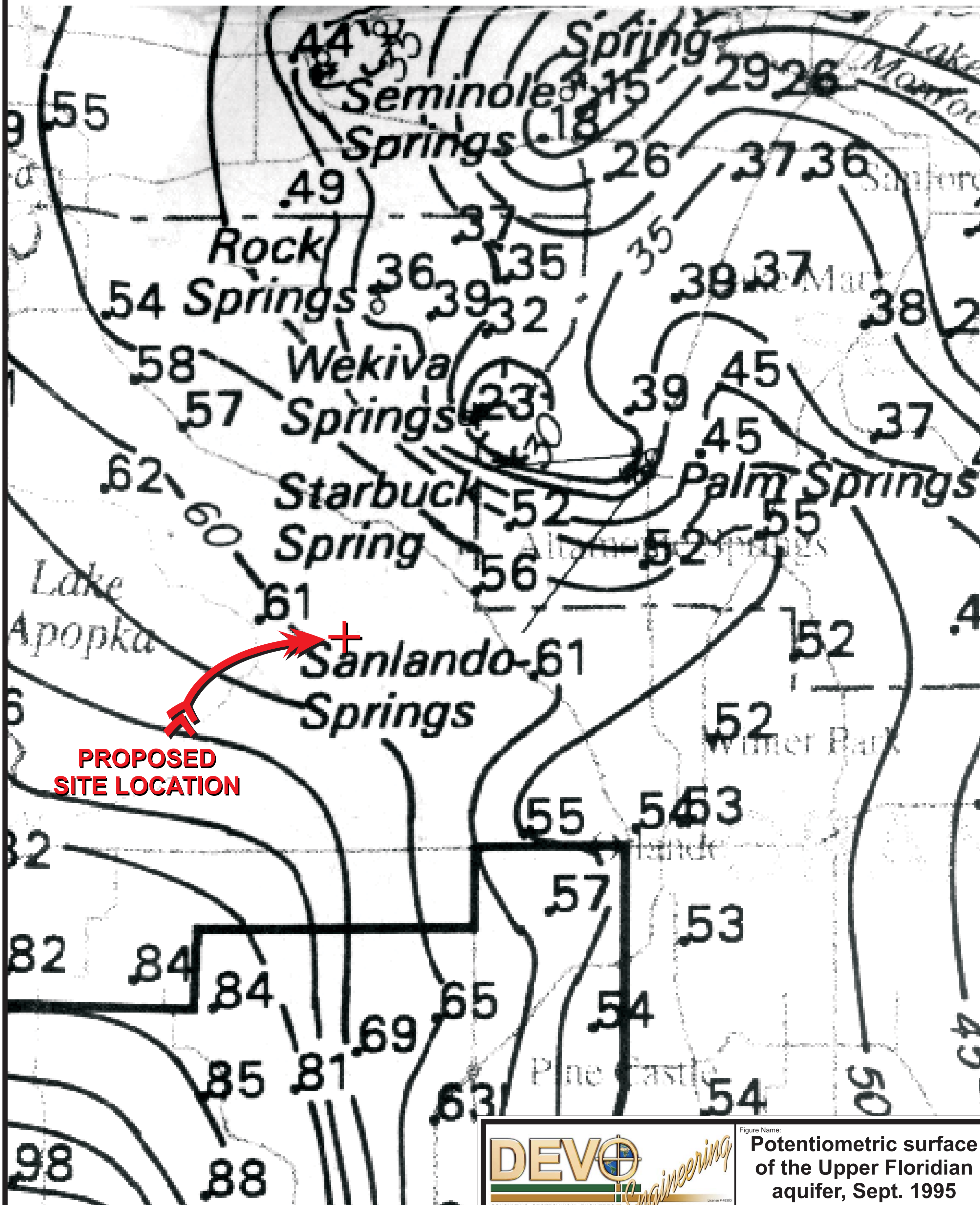
License # 48303
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail addresss: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name:

Piezometer Construction Details for Devo-2 & Devo-3 Piezometer

Project Name: **KEENE ROAD Class *III* *LANDFILL EXPANSION***

Checked & Approved By: DS	Drawn By: DC	Date: 09-06-02	Scale: NTS	Project # 02-398.01	FIGURE 3.2



DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS
5500 Alhambra Drive . Orlando, Florida 32808
Phone: (407) 290-2371 . Fax: (407) 298-9011
E-Mail addresss: dseereeram1@cfl.rr.com
Website: http://home.cfl.rr.com/devo1

Figure Name:	Potentiometric surface of the Upper Floridian aquifer, Sept. 1995
Project Name:	KEENE ROAD Class *III* *LANDFILL EXPANSION*

Checked & Approved By:	Drawn By:	Date:	Scale:	Project #	
DS	VG	09-06-02	NTS	02-398.01	FIGURE 4.1

Attachment C

Full Size, Signed and Sealed
Revised Drawings:

Final Grading and Drainage Plan
(Drawing 2)

Post Developed Contributing Drainage Basin Maps
(Drawings 4 and 5)

Interim Pre-Consumer Vegetative Waste Organic Recycling Facility
Grading and Drainage Plan
(Drawing 9)

and

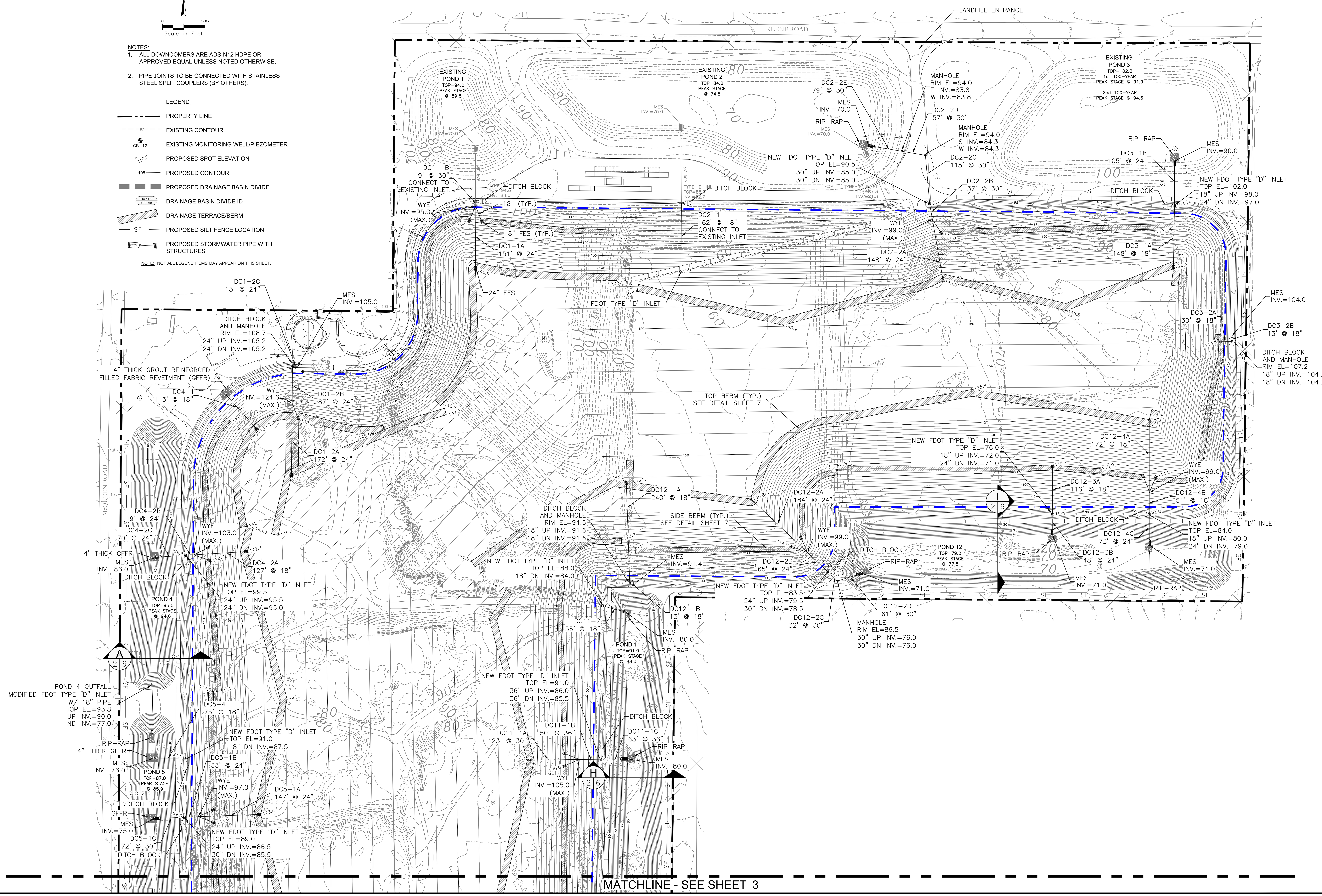
One Complete Set with Revisions
Reduced Size (11” X 17”)

NOTES:
1. ALL DOWNCOMERS ARE ADS-N12 HDPE OR APPROVED EQUAL UNLESS NOTED OTHERWISE.
2. PIPE JOINTS TO BE CONNECTED WITH STAINLESS STEEL SPLIT COUPLERS (BY OTHERS).

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- CB-12 EXISTING MONITORING WELL/PIEZOMETER
- 110.2 PROPOSED SPOT ELEVATION
- 105 PROPOSED CONTOUR
- PROPOSED DRAINAGE BASIN DIVIDE
- DA 1C3 0.33 Ac. DRAINAGE BASIN DIVIDE ID
- DRAINAGE TERRACE/BERM
- SF PROPOSED SILT FENCE LOCATION
- PROPOSED STORMWATER PIPE WITH STRUCTURES

NOTE: NOT ALL LEGEND ITEMS MAY APPEAR ON THIS SHEET.



Signature
Chris M. Schumacher, P.E.
Florida Registration # 46666
Date

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DESIGNED	DRAWN	CHECKED
CMS	KFM	CMS

DATE: JANUARY 2011
JOB NO. 10-2141
SCALE 1"=100'

WASTE MANAGEMENT INC. of FLORIDA

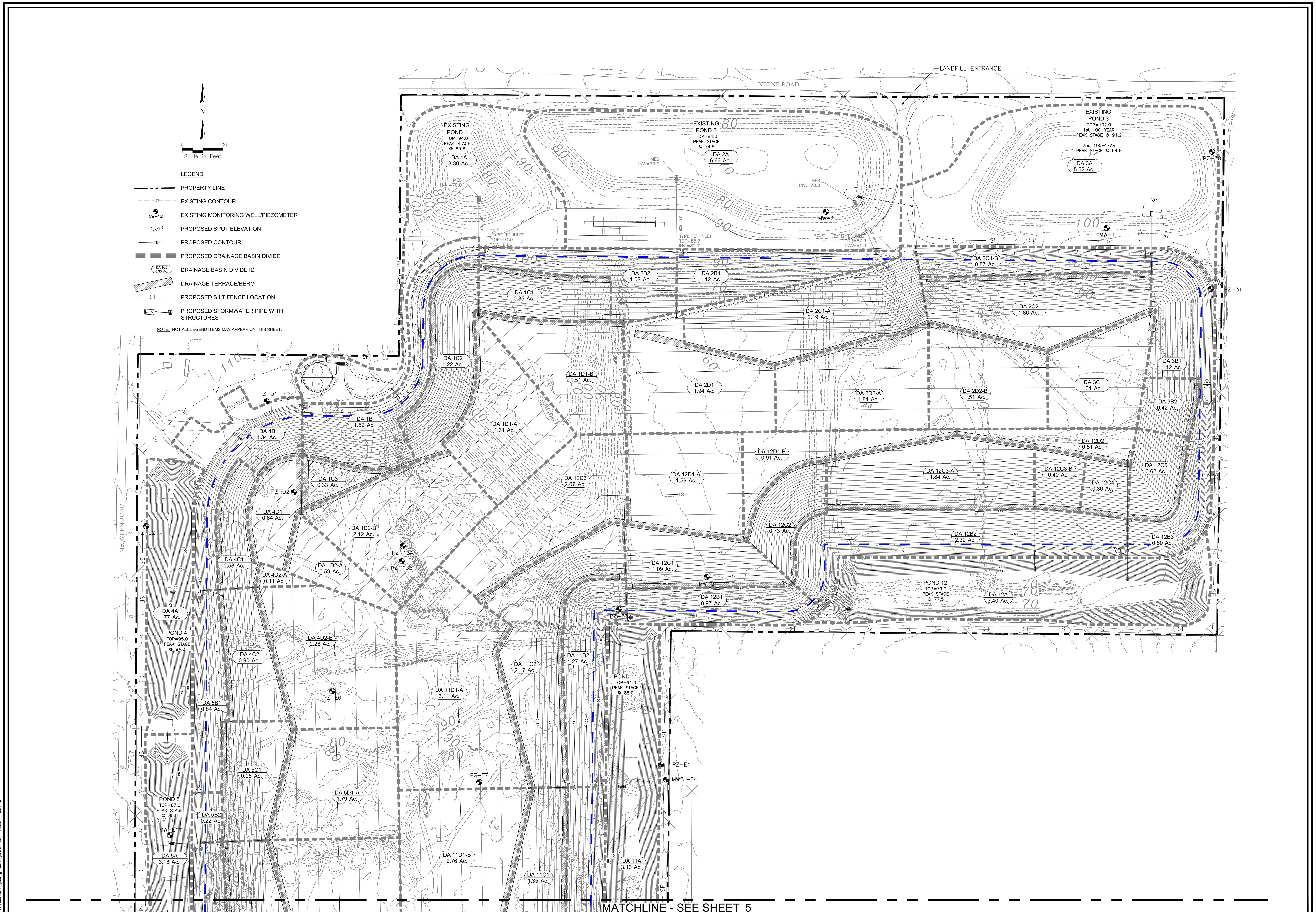
FINAL GRADING AND DRAINAGE PLAN

VISTA LANDFILL, APOPKA, FLORIDA

Applied Technology & Management, Inc.
ATM APPLIED TECHNOLOGY & MANAGEMENT
5550 NW 111th Blvd
Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669

DRAWING NUMBER
2
SHEET: OF

10-2141 Vista Grading.dwg site map north 2/22/2011 10:30 AM



WASTE MANAGEMENT INC. of FLORIDA

POST DEVELOPED CONTRIBUTING DRAINGE BASIN MAP

VISTA LANDFILL, APOPKA, FLORIDA

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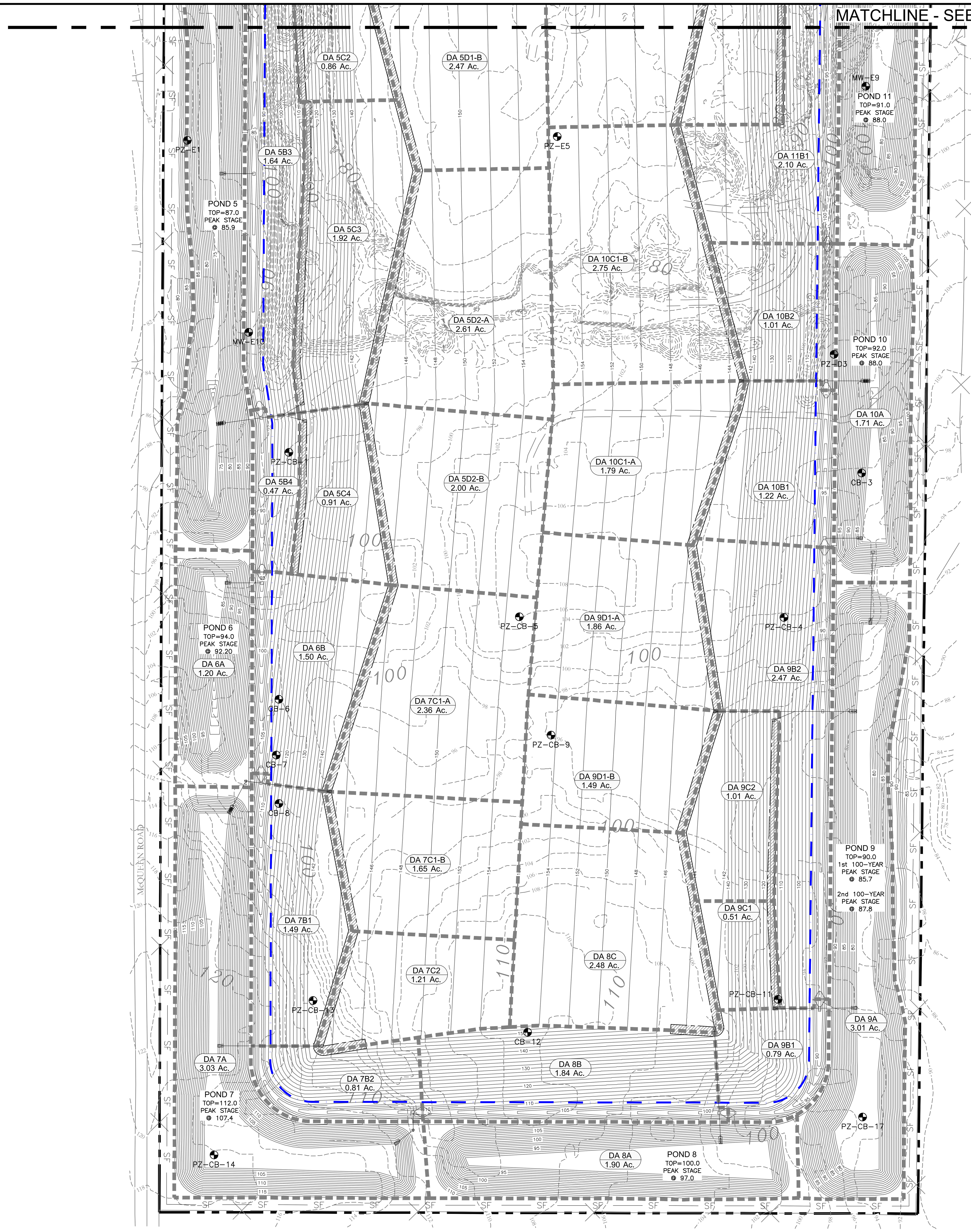
Signature
Chris M. Schumacher, P.E.
Florida Registration # 46666
Date

Applied Technology & Management, Inc.[SM]
5550 NW 111th Blvd
Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669
ATM APPLIED TECHNOLOGY & MANAGEMENT

DRAWING NUMBER
4
SHEET: OF

10-2141 Vista Drainage.dwg drainage map north 2/22/2011 9:54 AM

MATCHLINE - SEE SHEET 4



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- EXISTING MONITORING WELL/PIEZOMETER (CB-12)
- PROPOSED SPOT ELEVATION (110.2)
- PROPOSED CONTOUR (105)
- PROPOSED DRAINAGE BASIN DIVIDE
- DRAINAGE BASIN DIVIDE ID (DA 1C3 0.33 Ac.)
- DRAINAGE TERRACE/BERM
- PROPOSED SILT FENCE LOCATION (SF)
- PROPOSED STORMWATER PIPE WITH STRUCTURES

NOTE: NOT ALL LEGEND ITEMS MAY APPEAR ON THIS SHEET.

Signature
Chris M. Schumacher, P.E.
Florida Registration # 46666

Date

REV. No.	DATE	DRAWN BY	CHKD BY	REMARKS

DESIGNED	DRAWN	CHECKED
CMS	KFM	CMS

DATE: JANUARY 2011
JOB NO. 10-2141
SCALE: 1"=100'

WASTE MANAGEMENT INC. of FLORIDA

POST DEVELOPED CONTRIBUTING DRAINGE BASIN MAP

VISTA LANDFILL, APOPKA, FLORIDA

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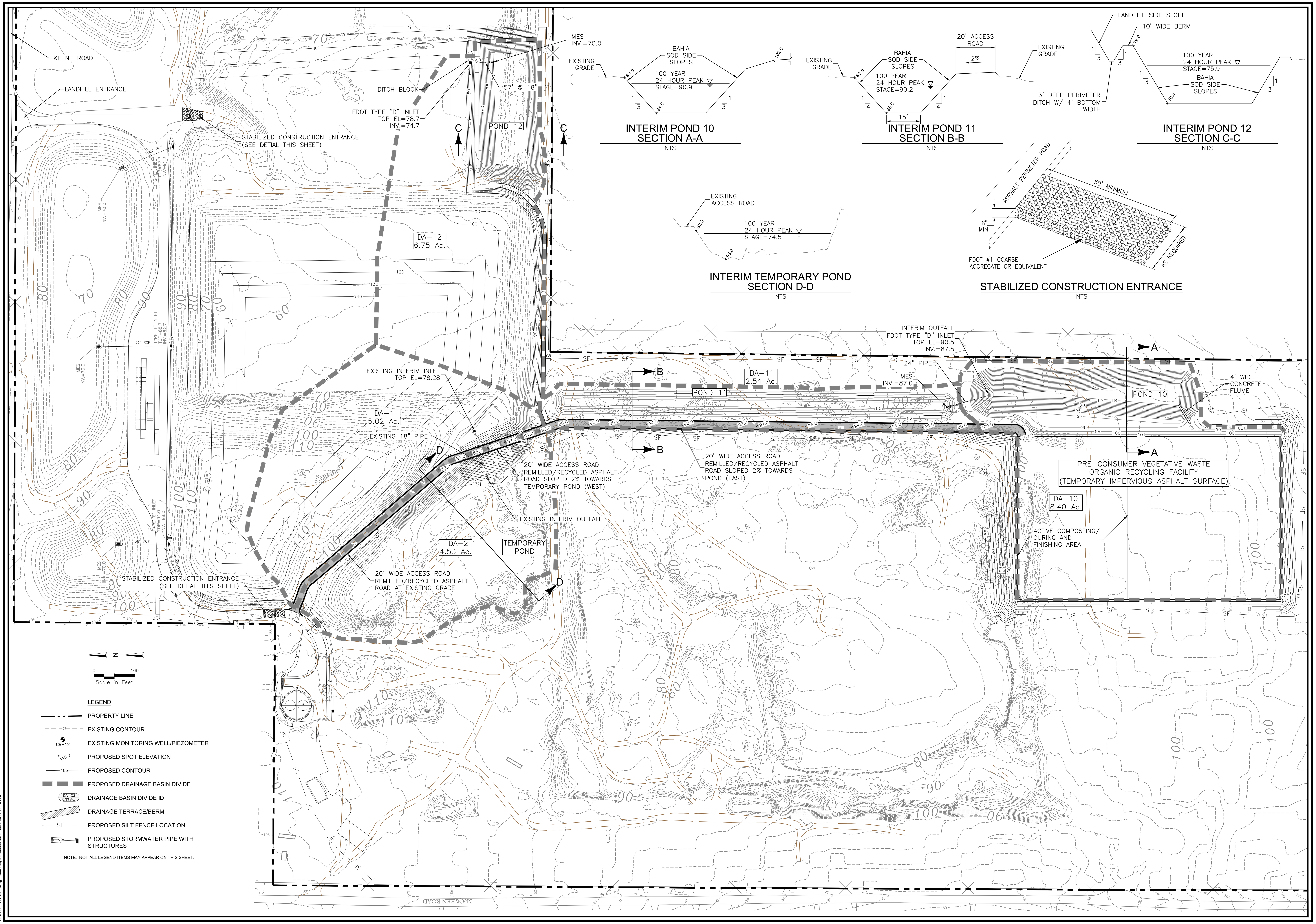
Certificate of Authorization #4669

DRAWING NUMBER
5
SHEET: OF

10-2141 Vista Drainage.dwg drainage map south 2/22/2011 9:54 AM



WASTE MANAGEMENT INC. of FLORIDA

INTERIM PRE-CONSUMER VEGETATIVE WASTE ORGANIC RECYCLING FACILITY GRADING AND DRAINAGE PLAN (5 YEAR PLAN)

VISTA LANDFILL, APOPKA, FLORIDA

DESIGNED CMS | DRAWN KFM | CHECKED CMS
DATE: JANUARY 2011
JOB NO: 10-2141
SCALE: 1"=100'

Applied Technology & Management, Inc.
5550 NW 111th Blvd
Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669

DRAWING NUMBER 9
SHEET: OF

10-2141 PVW-ORF.dwg food recycle access road 2/22/2011 10:15 AM

CONSTRUCTION PLANS
IN SUPPORT OF THE
ENVIRONMENTAL RESOURCES PERMIT APPLICATION
AND
CITY OF APOPKA COMMUNITY DEVELOPMENT DEPARTMENT
FOR THE
VISTA LANDFILL
INTERIM AND FINAL BUILDOUT PHASES
(FORMERLY CALLED BUTTREY LANDFILL)

JANUARY 2011
ATM PROJECT 10-2141

SITE LOCATION MAP

SUBMITTED TO:

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
3319 MAGUIRE BOULEVARD, SUITE 232
ORLANDO, FL. 32803
(407) 894-7555

CITY OF APOPKA
COMMUNITY DEVELOPMENT DEPARTMENT
120 EAST MAIN STREET
APOPKA, FL 32703
(407) 703-1712

INDEX OF SHEETS	
SHEET	TITLE
1	COVER SHEET
2	FINAL GRADING AND DRAINAGE PLAN
3	FINAL GRADING AND DRAINAGE PLAN
4	POST DEVELOPED CONTRIBUTING DRAINGE BASIN MAP
5	POST DEVELOPED CONTRIBUTING DRAINGE BASIN MAP
6	POND SECTIONS
7	DETAILS
8	DETAILS
9	INTERIM PRE-CONSUMER VEGETATIVE WASTE ORGANIC RECYCLING FACILITY (PVW-ORF) GRADING AND DRAINAGE PLAN (5 YEAR PLAN)

SUBMITTED BY: APPLIED TECHNOLOGY & MANAGEMENT, INC.
5550 NW 111th Blvd.
GAINESVILLE, FL 32653
(386) 418-6401

SUBMITTED FOR: WASTE MANAGEMENT INC. of FLORIDA
VISTA LANDFILL
255 WEST KEENE ROAD,
APOPKA, FLA. 32703
(407) 886-2920

Signature
Chris M. Schumacher, P.E.
Florida Registration # 46698
Date

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DESIGNED	DRAWN	CHECKED
CMS	KFV	CMS

DATE: JANUARY 2011
JOB NO. 10-2141
SCALE: NONE

WASTE MANAGEMENT INC. of FLORIDA
COVER SHEET
VISTA LANDFILL, APOPKA, FLORIDA

Applied Technology & Management, Inc.
5550 NW 111th Blvd
Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669

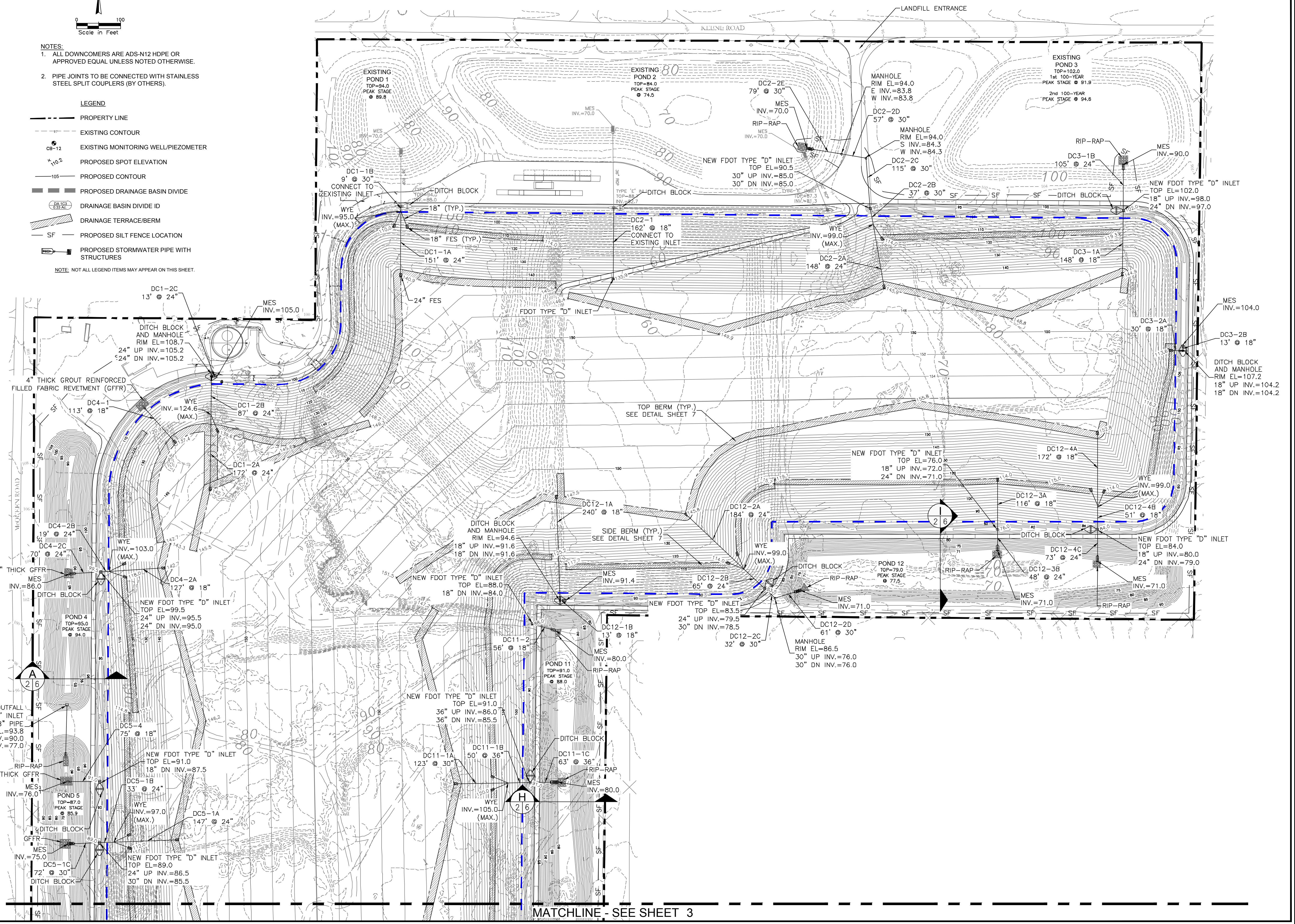
DRAWING NUMBER
1
SHEET: OF

NOTES:
1. ALL DOWNCOMERS ARE ADS-N12 HDPE OR APPROVED EQUAL UNLESS NOTED OTHERWISE.
2. PIPE JOINTS TO BE CONNECTED WITH STAINLESS STEEL SPLIT COUPLERS (BY OTHERS).

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- EXISTING MONITORING WELL/PIEZOMETER
- PROPOSED SPOT ELEVATION
- PROPOSED CONTOUR
- PROPOSED DRAINAGE BASIN DIVIDE
- DRAINAGE BASIN DIVIDE ID
- DRAINAGE TERRACE/BERM
- PROPOSED SILT FENCE LOCATION
- PROPOSED STORMWATER PIPE WITH STRUCTURES

NOTE: NOT ALL LEGEND ITEMS MAY APPEAR ON THIS SHEET.



WASTE MANAGEMENT INC. of FLORIDA

FINAL GRADING AND DRAINAGE PLAN

VISTA LANDFILL, APOPKA, FLORIDA

DESIGNED	DRAWN	CHECKED
CHS	KTV	CMS

DATE: JANUARY 2011
JOB NO.: 10-2141
SCALE: 1"=100'

Signature
Chris M. Schumacher, P.E.
Florida Registration # 46888
Date

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Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669

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2
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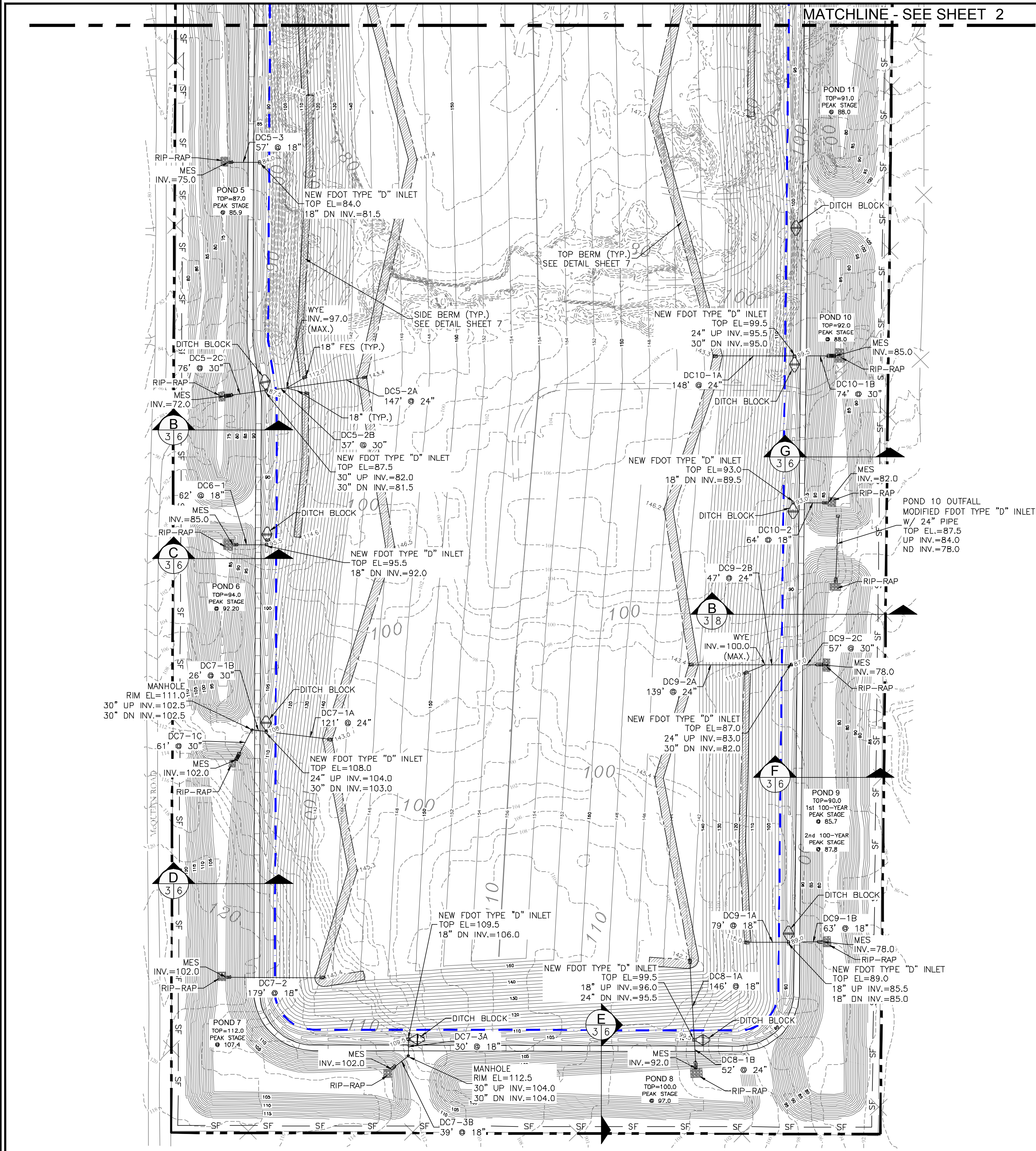
MATCHLINE - SEE SHEET 2



N

0 100
Scale In Feet

NOTES:
1. ALL DOWNCOMERS ARE ADS-N12 HDPE OR APPROVED EQUAL UNLESS NOTED OTHERWISE.
2. PIPE JOINTS TO BE CONNECTED WITH STAINLESS STEEL SPLIT COUPLERS (BY OTHERS).

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- CB-12 EXISTING MONITORING WELL/PIEZOMETER
- 110.2 PROPOSED SPOT ELEVATION
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- DRAINAGE TERRACE/BERM
- SF PROPOSED SILT FENCE LOCATION
- PROPOSED STORMWATER PIPE WITH STRUCTURES

NOTE: NOT ALL LEGEND ITEMS MAY APPEAR ON THIS SHEET.

Signature
Chris M. Schumacher, P.E.
Florida Registration # 46668
Date

REV. NO.	DATE	DRAWN BY	CHK'D BY	REMARKS

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DATE: JANUARY 2011
JOB NO.: 10-2141
SCALE: 1"=100'

WASTE MANAGEMENT INC. of FLORIDA

FINAL GRADING AND DRAINAGE PLAN

VISTA LANDFILL, APOPKA, FLORIDA

Applied Technology & Management, Inc.
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Gainesville, Florida 32653
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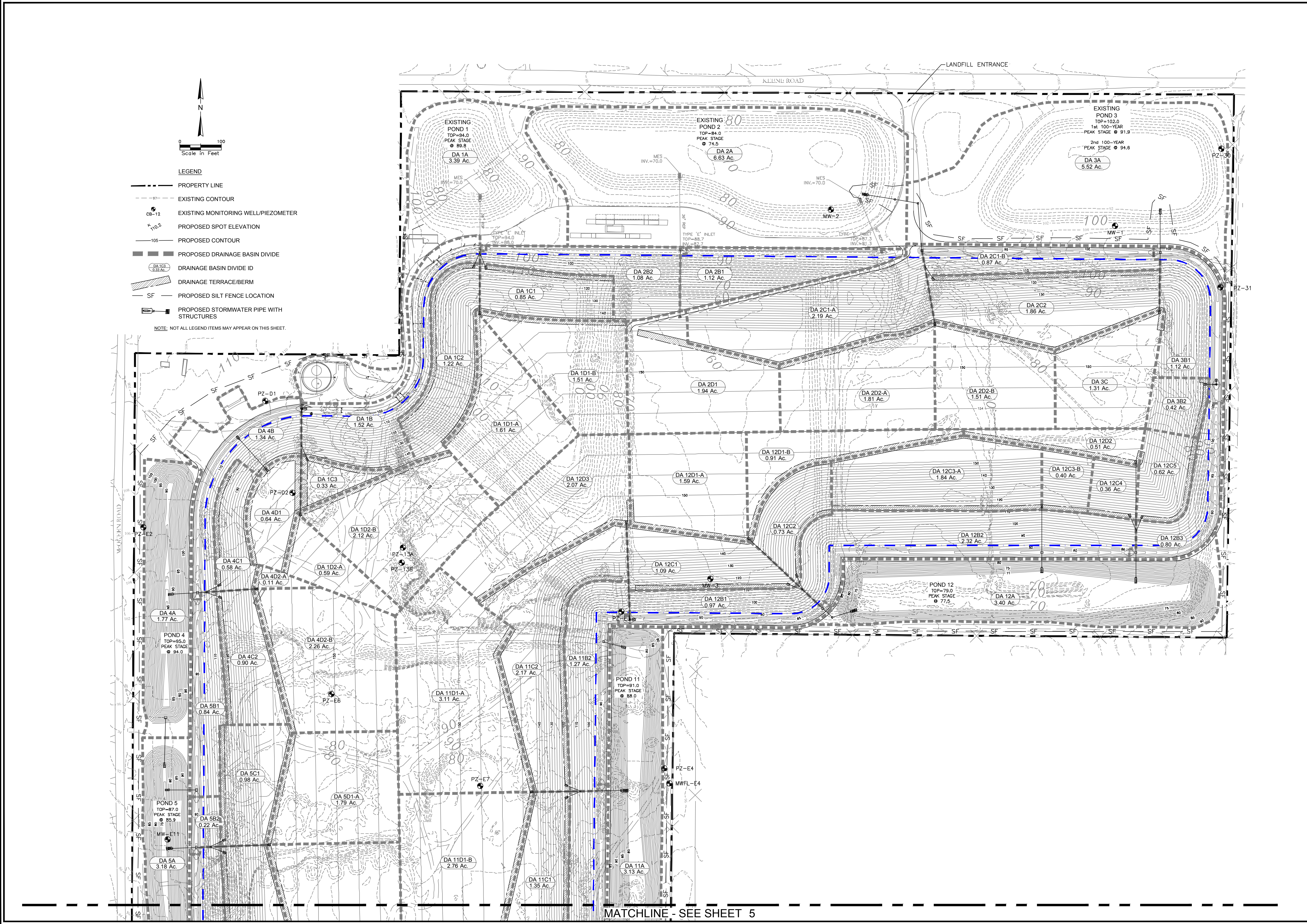

WASTE MANAGEMENT INC. of FLORIDA

POST DEVELOPED CONTRIBUTING DRAINGE BASIN MAP

VISTA LANDFILL, APOPKA, FLORIDA

DESIGNED	DRAWN	CHECKED
CMS	KTW	CMS

DATE: JANUARY 2011
JOB NO.: 10-2141
SCALE: 1"=100'

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Chris M. Schumacher, P.E.
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Date

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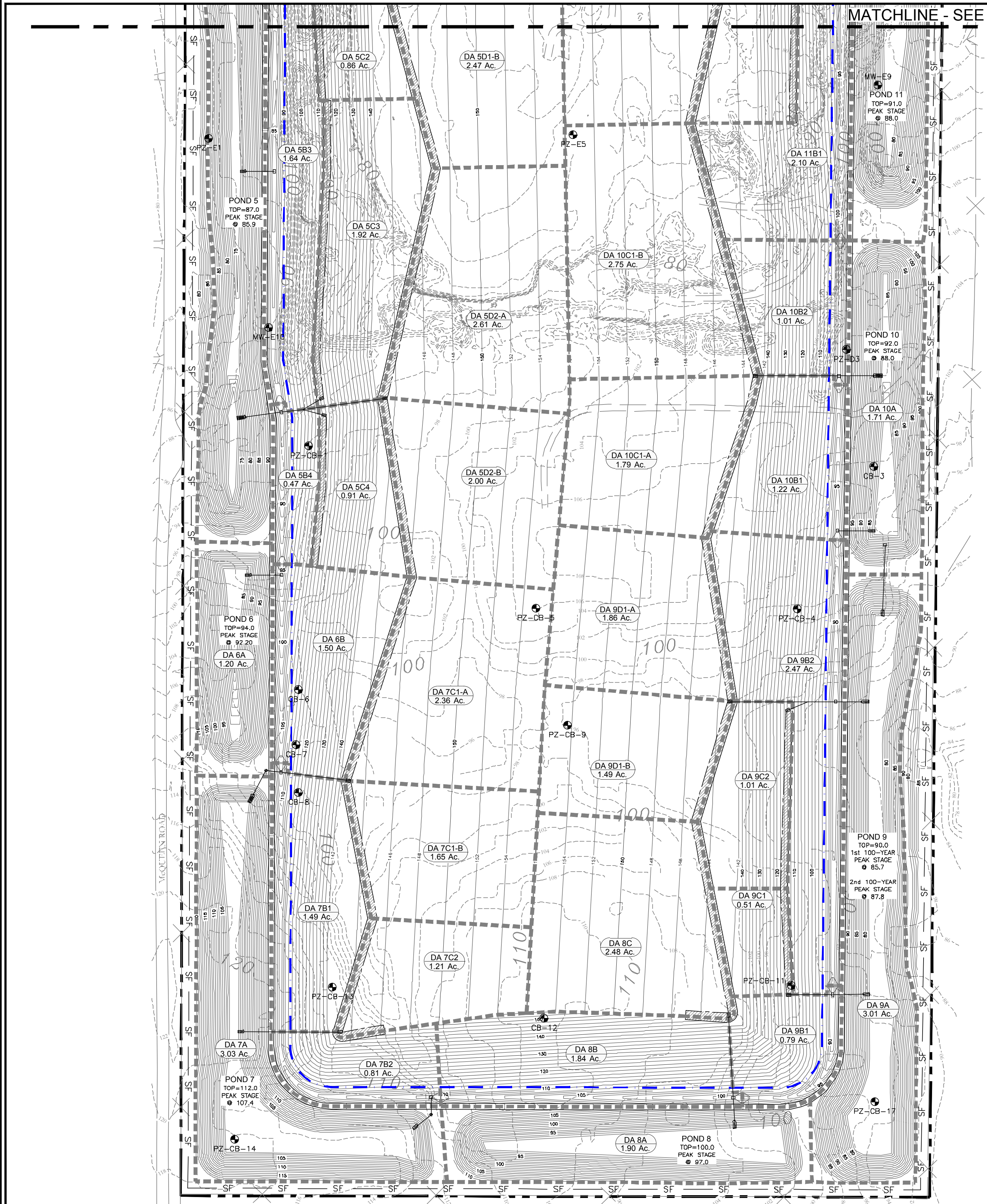

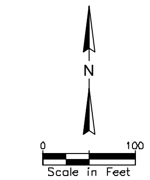

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- CB-12 EXISTING MONITORING WELL/PIEZOMETER
- 110.2 PROPOSED SPOT ELEVATION
- 105 PROPOSED CONTOUR
- PROPOSED DRAINAGE BASIN DIVIDE
- DA 1C3 0.33 Ac. DRAINAGE BASIN DIVIDE ID
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- SF PROPOSED SILT FENCE LOCATION
- PROPOSED STORMWATER PIPE WITH STRUCTURES

NOTE: NOT ALL LEGEND ITEMS MAY APPEAR ON THIS SHEET.

Signature
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Florida Registration # 46668
Date

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DESIGNED: CMS | DRAWN: KTV | CHECKED: CMS
DATE: JANUARY 2011
JOB NO.: 10-2141
SCALE: 1"=100'

WASTE MANAGEMENT INC. of FLORIDA

POST DEVELOPED CONTRIBUTING DRAINGE BASIN MAP

VISTA LANDFILL, APOPKA, FLORIDA

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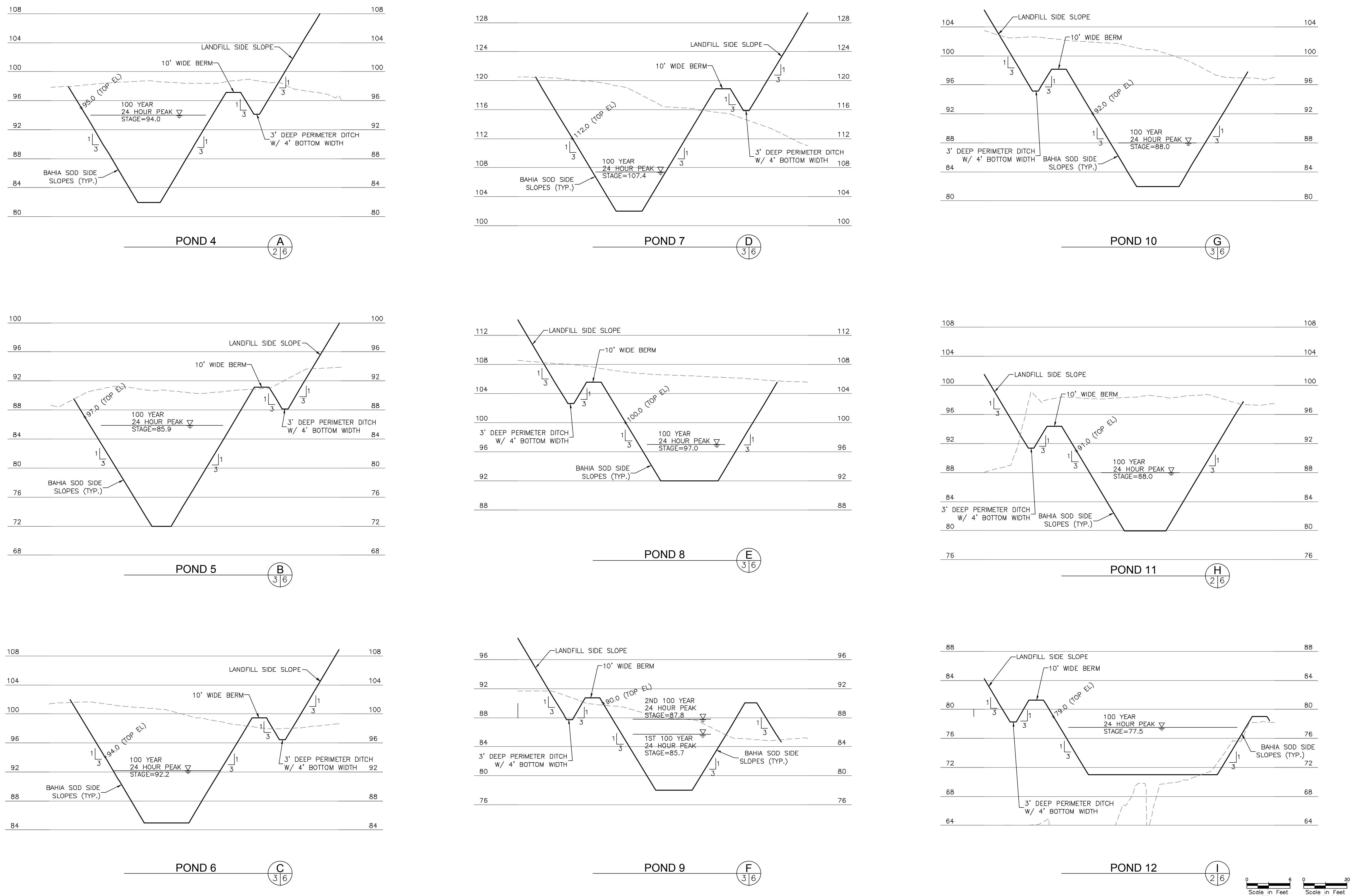

Signature
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Florida Registration # 46068
Date

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DESIGNED	DRAWN	CHECKED
CMS	KTV	CMS

DATE: JANUARY 2011
JOB NO.: 10-2141
SCALE: AS NOTED

WASTE MANAGEMENT INC. of FLORIDA

POND SECTIONS

VISTA LANDFILL, APOPKA, FLORIDA

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5550 NW 111th Blvd
Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669

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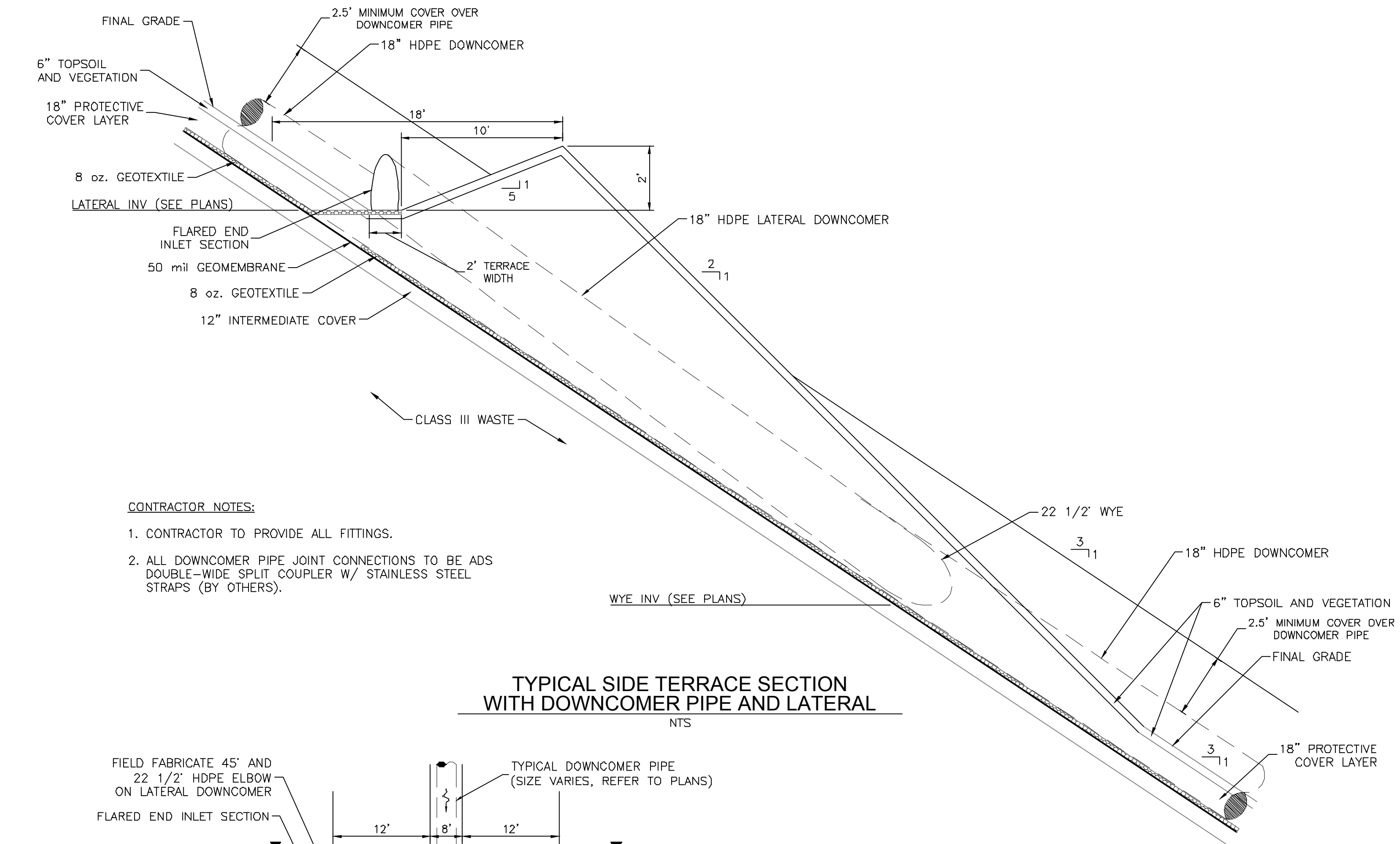
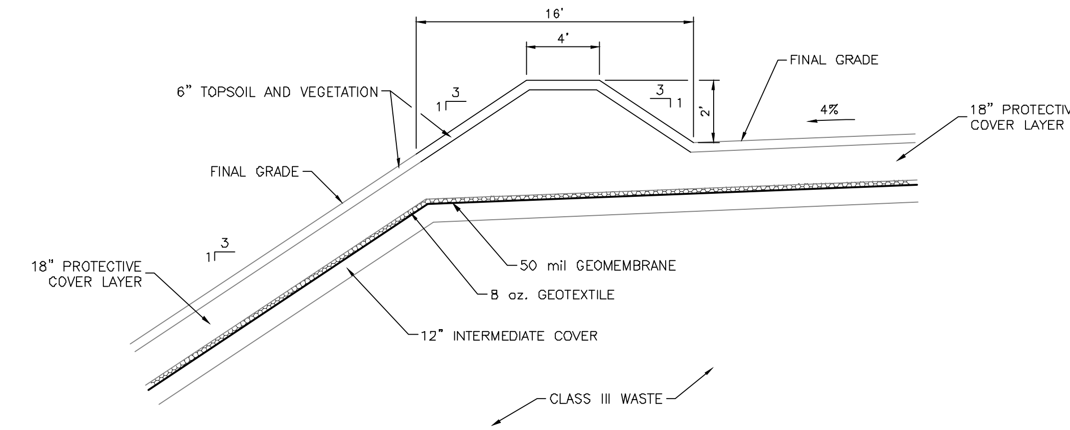


CONTRACTOR NOTES:

1. CONTRACTOR TO PROVIDE ALL FITTINGS.
2. ALL DOWNCOMER PIPE JOINT CONNECTIONS TO BE ADS DOUBLE-WIDE SPLIT COUPLER W/ STAINLESS STEEL STRAPS (BY OTHERS).

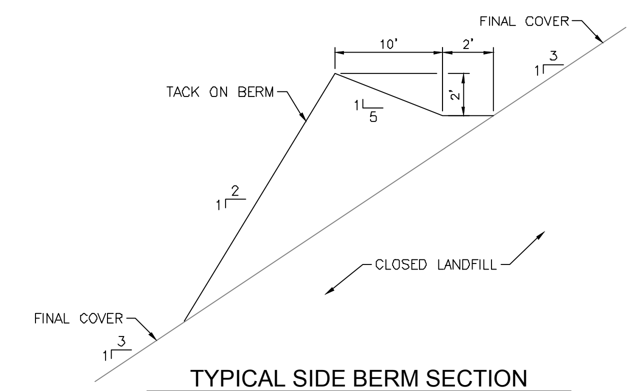
TYPICAL SIDE TERRACE SECTION WITH DOWNCOMER PIPE AND LATERAL

NTS



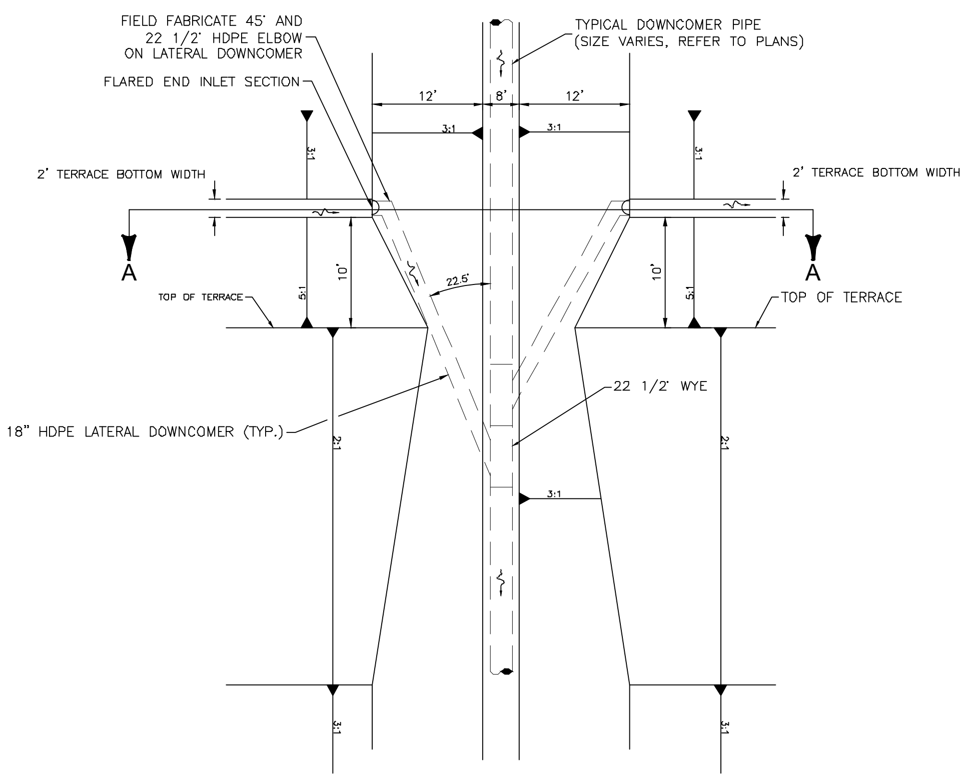
TYPICAL TOP BERM SECTION

NTS

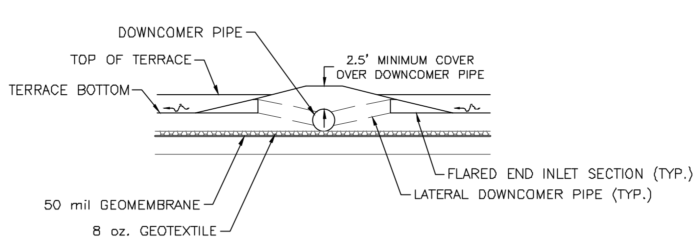


TYPICAL SIDE BERM SECTION

NTS



PLAN



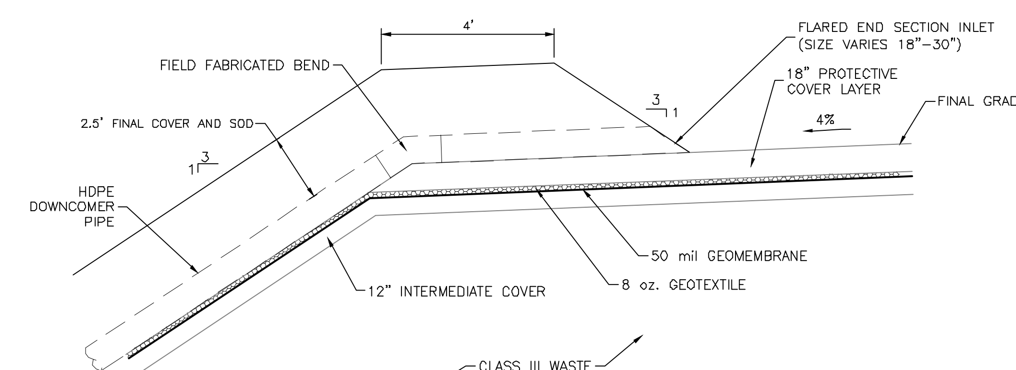
SECTION A-A

TYPICAL INLINE LATERAL DETAIL

NTS

DOWNCOMER TABLE				
PIPE ID	DIA. (in.)	LENGTH (ft.)	UP INV.	DN INV.
POND 1				
DC1-1A	24	151	140.9	95.0
DC1-1B	30	9	95.0	88.0
DC1-2A	24	172	142.7	124.6
DC1-2B	24	87	124.6	105.2
DC1-2C	24	13	105.2	105.0
POND 2				
DC2-1	18	162	135.9	82.7
DC2-2A	24	148	145.9	99.0
DC2-2B	30	37	99.0	85.0
DC2-2C	30	115	85.0	84.3
DC2-2D	30	57	84.3	83.8
DC2-2E	30	79	83.8	70.0
POND 3				
DC3-1A	18	148	144.9	98.0
DC3-1B	24	105	97.0	90.0
DC3-2A	18	30	113.6	104.2
DC3-2B	18	13	104.2	104.0
POND 4				
DC4-1	18	113	137.4	104.0
DC4-2A	18	127	142.7	103.0
DC4-2B	24	19	103.0	95.5
DC4-2C	24	70	95.0	86.0
POND 5				
DC5-4	18	75	87.5	76.0
DC5-1A	24	147	143.5	97.0
DC5-1B	24	33	97.0	86.5
DC5-1C	30	72	85.5	75.0
DC5-2A	24	147	143.4	97.0
DC5-2B	30	37	97.0	82.0
DC5-2C	30	76	81.5	72.0
DC5-3	18	57	81.5	75.0
POND 6				
DC6-1	18	62	92.0	85.0
POND 7				
DC7-1A	24	121	143.0	104.0
DC7-1B	30	26	103.0	102.5
DC7-1C	30	61	102.5	102.0
DC7-2	18	179	143.4	102.0
DC7-3A	18	30	106.0	104.0
DC7-3B	18	39	104.0	102.0

DOWNCOMER TABLE				
PIPE ID	DIA. (in.)	LENGTH (ft.)	UP INV.	DN INV.
POND 8				
DC8-1A	18	146	142.1	96.0
DC8-1B	24	52	95.5	92.0
POND 9				
DC9-1A	18	79	115.0	85.5
DC9-1B	18	63	85.0	78.0
DC9-2A	24	139	143.4	100.0
DC9-2B	24	47	100.0	83.0
DC9-2C	30	57	82.0	78.0
POND 10				
DC10-1A	24	148	143.3	95.5
DC10-1B	30	74	95.0	85.0
DC10-2	18	64	89.5	82.0
POND 11				
DC11-1A	30	123	143.3	105.0
DC11-1B	36	50	105.0	86.0
DC11-1C	36	63	85.5	75.0
DC11-2	18	56	84.0	80.0
POND 12				
DC12-1A	18	240	147.6	91.6
DC12-1B	18	13	91.6	91.4
DC12-2A	24	184	145.8	99.0
DC12-2B	24	65	99.0	79.5
DC12-2C	30	32	78.5	76.0
DC12-2D	30	61	76.0	70.0
DC12-3A	18	116	114.0	72.0
DC12-3B	24	48	71.0	70.0
DC12-4A	18	172	152.8	99.0
DC12-4B	18	51	99.0	80.0
DC12-4C	24	73	79.0	70.0



TYPICAL TOP BERM INLET DETAIL

NTS

Signature
Chris M. Schumacher, P.E.
Florida Registration # 46698
Date

REV. No.	DATE	DRAWN BY	CHKD BY	REMARKS

DESIGNED	DRAWN	CHECKED
CMS	KTV	CMS

DATE: JANUARY 2011
JOB NO. 10-2141
SCALE: AS NOTED

WASTE MANAGEMENT INC. of FLORIDA

DETAILS

VISTA LANDFILL, APOPKA, FLORIDA

Applied Technology & Management, Inc.
ATM APPLIED TECHNOLOGY & MANAGEMENT
5550 NW 111th Blvd
Gainesville, Florida 32653
(386) 418-6400
Certificate of Authorization #4669

DRAWING NUMBER
7
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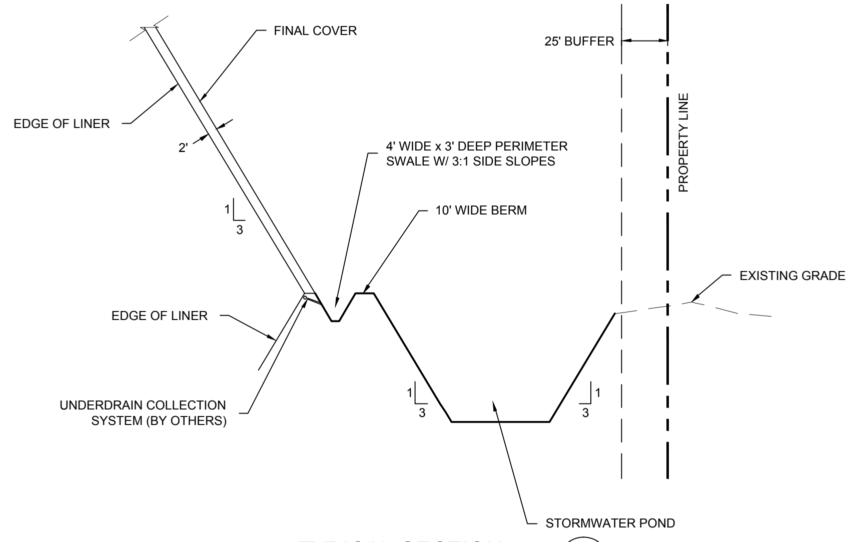
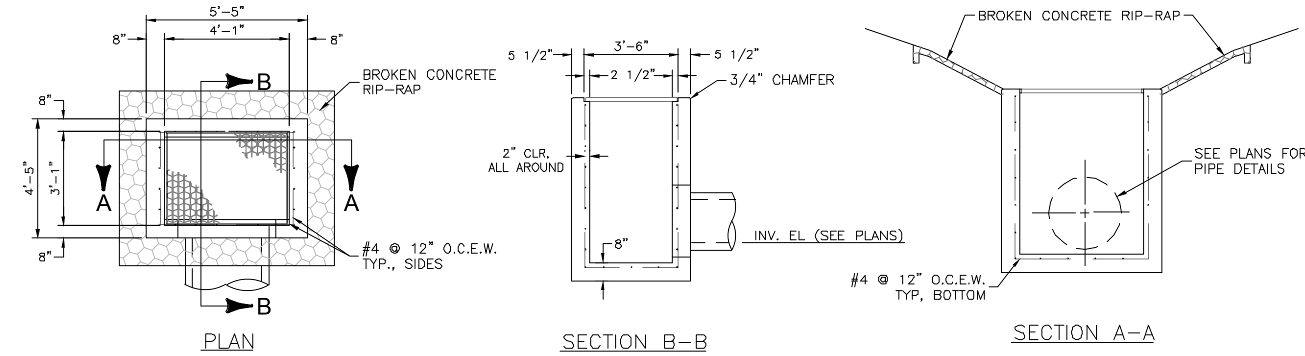
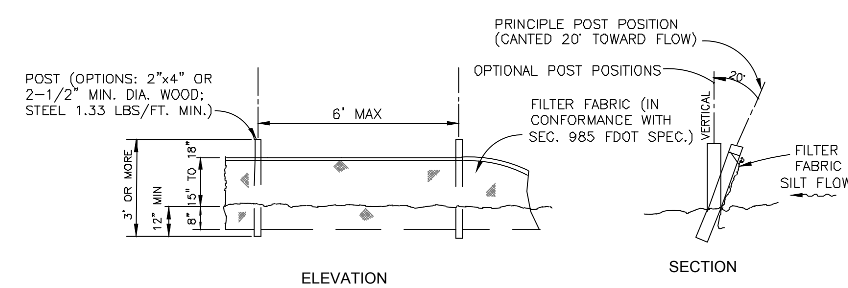
10-2141 Vista Details.dwg Details (1) 1/10/2011 9:30 AM
Xrefs Attached= xr-border [..\Ex\Ref\DWG\xr-border.dwg]



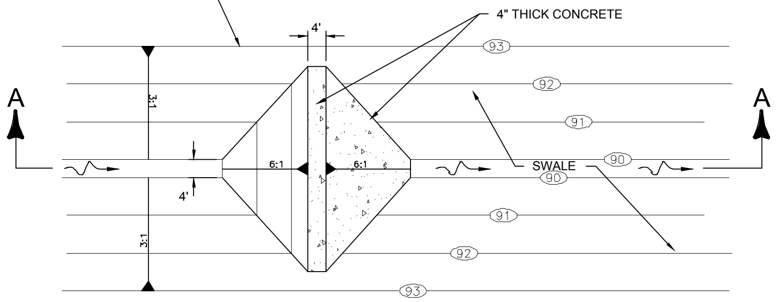
TYPICAL SECTION B 3 8
NTS



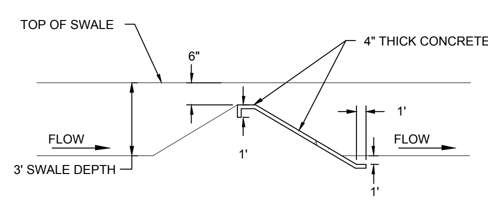
FDOT TYPE "D" INLET DETAIL
NTS



SILT FENCE DETAIL
NTS



PLAN



SECTION A-A

DITCH BLOCK DETAIL
NTS

TEMPORARY AND PERMANENT EROSION CONTROL PLAN

1. CONTRACTOR IS RESPONSIBLE FOR CONTAINING SILT LADEN RUNOFF FROM LEAVING THE SITE BY UTILIZING BEST MANAGEMENT PRACTICES AS NEEDED FROM THE FLORIDA EROSION AND SEDIMENT CONTROL MANUAL.
2. CONTRACTOR IS TO ERECT SILT FENCES AT THE PERIMETER OF THE SITE AS SHOWN ON THE PAVING AND GRADING PLAN LOCATIONS AND AS SHOWN ON THE DETAILS PAGE PRIOR TO ANY GRADING ACTIVITIES AS A MINIMUM FOR CONTAINING RUNOFF.
3. STORM WATER PONDS SHALL BE ROUGHED IN A HALF OF A FOOT ABOVE FINAL DESIGN GRADE INITIALLY TO SERVE AS A SEDIMENT TRAP FOR RUNOFF.
4. ALL DISTURBED AREAS SHALL BE GRASSED WITHIN A WEEK AFTER FINAL GRADING AS SPECIFIED BELOW.
5. ALL SLOPES 6:1 OR FLATTER SHALL BE SEEDED AND MULCHED WITH A MIXTURE OF SHORT TERM AND LONG TERM VEGETATION AT THE FOLLOWING MIXES:
   70 LBS / ACRE FOR LONG TERM VEGETATION (PENSACOLA BAHIA)
   20 LBS / ACRE FOR SHORT TERM VEGETATION

   APRIL THRU SEPTEMBER USE MILLET FOR SHORT TERM
   OCTOBER THRU MARCH USE WINTER RYE FOR SHORT TERM VEGETATION

6. ALL SLOPES STEEPER THAN 6:1 SHALL BE STAPLE SODDED WITH BAHIA
7. ALL DISTURBED AREAS SHALL BE STABILIZED WITH GRASS AND SOD AS SOON AS POSSIBLE (WITHIN A WEEK) AFTER GRADING ACTIVITIES
8. CONTRACTOR TO MAINTAIN STATE WATER QUALITY STANDARDS TO ALL DOWNSTREAM RECEIVING WATER BODIES BY CONTROLLING SILT AND EROSION AS NEEDED TO MAINTAIN THE WATER BODY TO WITHIN 29 NTU'S OF BACKGROUND.

OPERATION AND MAINTENANCE PLAN

1. INSPECT THE STORMWATER MANAGEMENT SYSTEM WEEKLY OR AFTER RAIN EVENTS OF 0.5" OR MORE FOR SIGNS OF EROSION.
2. ALL ERODED AREAS STEEPER THAN 6:1 SHALL BE SODDED TO ORIGINAL DESIGN GRADES.
3. ALL ERODED AREAS 6:1 OR FLATTER SHALL BE REPAIRED TO DESIGN GRADES AND SEEDED AND MULCHED.
4. ALL PIPES AND INLETS SHALL BE CHECKED FOR BLOCKAGES AND AND ANY ACCUMULATED DIRT OR DEBRIS SHALL BE REMOVED
5. MOW THE PONDS PERIODICALLY TO PREVENT OVERGROWTH.
6. WASTE MANAGEMENT, INC. TO KEEP RECORDS OF ALL O&M ACTIVITIES.

WASTE MANAGEMENT INC. of FLORIDA

DETAILS

VISTA LANDFILL, APOPKA, FLORIDA

REV. NO.	DATE	DRAWN BY	CHKD BY	REMARKS

DESIGNED	DRAWN	CHECKED
CMS	KTV	CMS

DATE: JANUARY 2011
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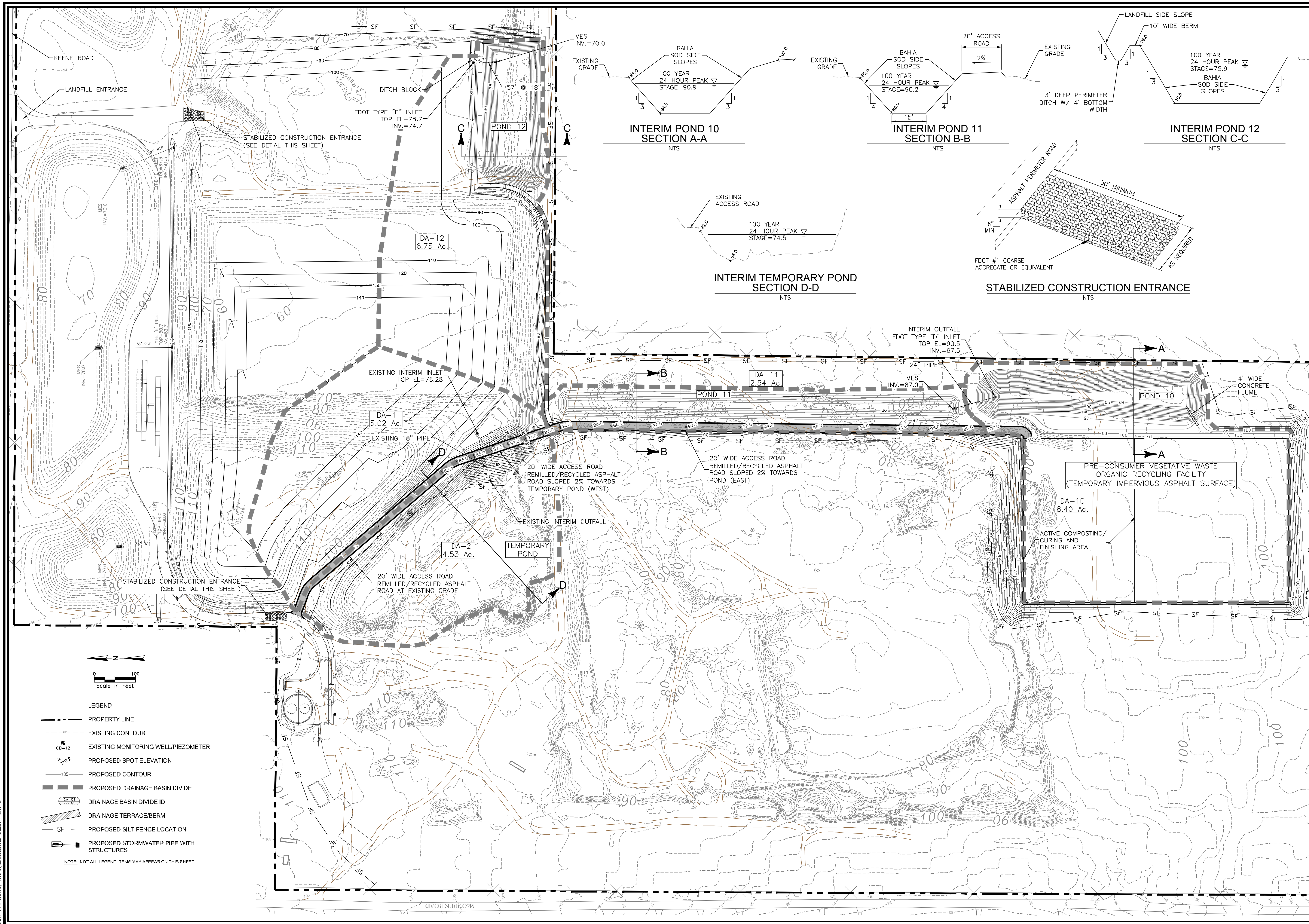

WASTE MANAGEMENT INC. of FLORIDA

INTERIM PRE-CONSUMER VEGETATIVE WASTE ORGANIC RECYCLING FACILITY GRADING AND DRAINAGE PLAN (5 YEAR PLAN)

VISTA LANDFILL, APOPKA, FLORIDA

DATE: JANUARY 2011
JOB NO.: 10-2141
SCALE: 1"=100'

Applied Technology & Management, Inc.
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