SO 393-07 Wicomico Airport Wetland
Grading Permit Mitigation

51829-6819

8/22/07
11/29/07
2/13/08
1/11/10

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Margaret G. McHale
Chair

Ren Serey
Executive Director

STATE OF MARYLAND
CRITICAL AREA COMMISSION
CHESAPEAKE AND ATLANTIC COASTAL BAYS
1804 West Street, Suite 100, Annapolis, Maryland 21401
(410) 260-3460 Fax: (410) 974-5338
www.dnr.state.md.us/criticalarea/

January 11, 2010

Mr. Joe Berg
Biohabitats
The Stables Building
2081 Clipper Park Road
Baltimore, MD 21121

Re: Wicomico Airport Wetland Mitigation, Monitoring 3rd Year, Phase 1 Annual Report
And 2nd Year, Phase 2 Annual Report
Permit #200560956/04-NT-2196

Dear Mr. Berg:

Thank you for forwarding the above referenced Wetland Mitigation Monitoring Reports for the Wicomico Airport Wetland Mitigation. We will continue to include these reports in our files for this project.

If you have any questions, please call me at 410-260-3476.

Sincerely,

Julie Roberts
Natural Resource Planner

Cc: SO 393-07

Martin O'Malley
Governor

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February 13, 2008

Ms. Stephanie Klein
Mr. Joe Berg
Biohabitats
The Stables Building
2081 Clipper Park Road
Baltimore, MD 21121

Re: Wicomico Airport Wetland Mitigation, Monitoring 1st Year Annual Report
Permit #200560956/04-NT-2196

Dear Ms. Klein and Mr. Berg:

Thank you for forwarding the Wetland Mitigation Monitoring 1st Year Annual Report for the Wicomico Airport Wetland Mitigation. We will include it in our files for this project and look forward to receiving them during the monitoring period.

If you have any questions, please call me at 410-260-3476.

Sincerely,

Julie Roberts
Natural Resource Planner

Cc: SO 393-07

Martin O'Malley
Governor

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November 29, 2007

Mr. Thomas Lawton
Department of Technical and Community Services
11916 Somerset Avenue
Princess Anne, MD 21853

Re: GP 07-354 – Wicomico Airport Wetland Mitigation

Dear Mr. Lawton:

Thank you for forwarding the information for Phase II of the Wicomico Airport Wetland Mitigation. Phase II of this project proposes to perform a preservation and enhancement of the existing Buffer area by performing selective invasive species control. The second aspect of this project proposes the restoration of a large non-tidal wetland which will include the planting of 17,119 shrubs and trees.

Based on the information provided, I have the following comments:

1. If not already provided, please have the applicant provide a monitoring schedule to you specifying how often the site will be checked for growth progress, as well as provisions for replanting in the event of plant mortality.
2. If this newly created forested non-tidal wetland is contiguous to tidal waters, tidal wetlands, or a tributary stream, the 100-foot Buffer from these features shall be expanded to include this wetland. In addition, there shall be a minimum 25-foot buffer from the edge of the wetland.
3. The selection of species appears appropriate for the non-tidal wetlands.
4. It appears that the only work being performed in the 100-foot Buffer is the eradication of select invasive species. A Buffer Management Plan should be submitted to the County detailing how this work will be performed and what species will be removed.

We have no further comments on this project. If you have any questions, please call me at 410-260-3476.

Sincerely,

Julie Roberts
Natural Resource Planner

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Margaret G. McHale
Chair

Ren Serey
Executive Director

STATE OF MARYLAND
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August 22, 2007

Mr. Thomas Lawton
Department of Technical and Community Services
11916 Somerset Avenue
Princess Anne, MD 21853

Re: GP 07-354 – Wicomico Airport Wetland Mitigation

Dear Mr. Lawton:

Thank you for forwarding the information on the above referenced after-the-fact grading permit. This surface excavation and grading permit are for the restoration of an agricultural field to a forested wetland as mitigation for impacts to wetlands at the Salisbury Wicomico County Airport (which is outside of the Critical Area). It is my understanding from conversations with you that this project is to take place in two phases. This project application is for Phase I and the work has been completed. Phase II permits have not yet been applied for. The planting schedule details the work that has been completed on the 43.96 acres located in the Resource Conservation Area (RCA). According to the planting details and schedules, a combination of approximately 37,400 canopy trees, understory trees, and shrubs, as well as native grasses were planted. The Limit of Disturbance (LOD) for these plantings was not within the 100-foot Buffer.

Based on the information provided, I have the following comments:

1. Please advise the applicant to secure appropriate permits and submit a project application to you prior to work being started for Phase II. All mitigation projects in the Critical Area, particularly one of this size, must be reviewed by Critical Area staff prior to the inception of work.
2. Please have the applicant provide a monitoring schedule to you specifying how often the site will be checked for growth progress and provisions for replanting due to plant mortality, if the applicant has not already provided that to you.
3. If this newly created forested non-tidal wetland is contiguous to tidal waters, tidal wetlands, or a tributary stream, the 100-foot Buffer from these features shall be expanded to include this wetland. In addition, shall be a minimum 25-foot buffer from the edge of the wetland.

Thank you for the opportunity to provide comments. If you have any questions, please call me at 410-260-3476.

Sincerely,

Julie Roberts
Natural Resource Planner

WICOMICO AIRPORT WETLAND MITIGATION

Wetland Mitigation Monitoring

3rd Year Phase 1 Annual Report
2nd Year Phase 2 Annual Report

Permit # 200560956/04-NT-2196

December 2009

Biohabitats
Incorporated

1.0 INTRODUCTION

The Wicomico County Airport Commission (WCAC) has an obligation to compensate for wetland impacts in accordance with 2005 Maryland Department of the Environment (MDE) and Army Corps of Engineers (COE) permits for airport improvements. The proposed Wicomico Regional Airport improvements consist of two activities: 1) the rehabilitation of existing runways, and 2) the extension of existing runways. The impacts for this project were filling and grading mowed emergent wetlands and mowed buffer impacts. Due to Federal Aviation Administration (FAA) safety requirements these wetlands and wetland buffer areas have been kept mowed on a regular basis for many years to suppress succession. Additional impacts to non-tidal wetlands at the airport will require the mitigation effort to compensate for total of 39.4 acres of wetland impacts.

A parcel along Bobtown Road is the site chosen to satisfy all of the wetland mitigation needs for the Wicomico Regional Airport improvements (Figure 1a, Vicinity Map of Wicomico Airport and Mitigation Site. Figure 1b, Wetland Mitigation Property Boundary). The location is adjacent to the Wicomico River, within the Chesapeake Bay Critical Area (Figure 2). The site was previously converted from wetland to agricultural land, where a high groundwater water table and areas of hydric soils still persist. Surrounding the site are additional palustrine and estuarine wetlands indicate that an improved hydrologic regime will support the achievement of successful mitigation efforts. In June of 2007, Phase 1 mitigation construction and planting of 33.16 acres of non-tidal forested wetlands was completed. Phase 2 of the mitigation effort included an additional 8.6 acres of wetland restoration construction and planting completed in April of 2008 (Figure 3).

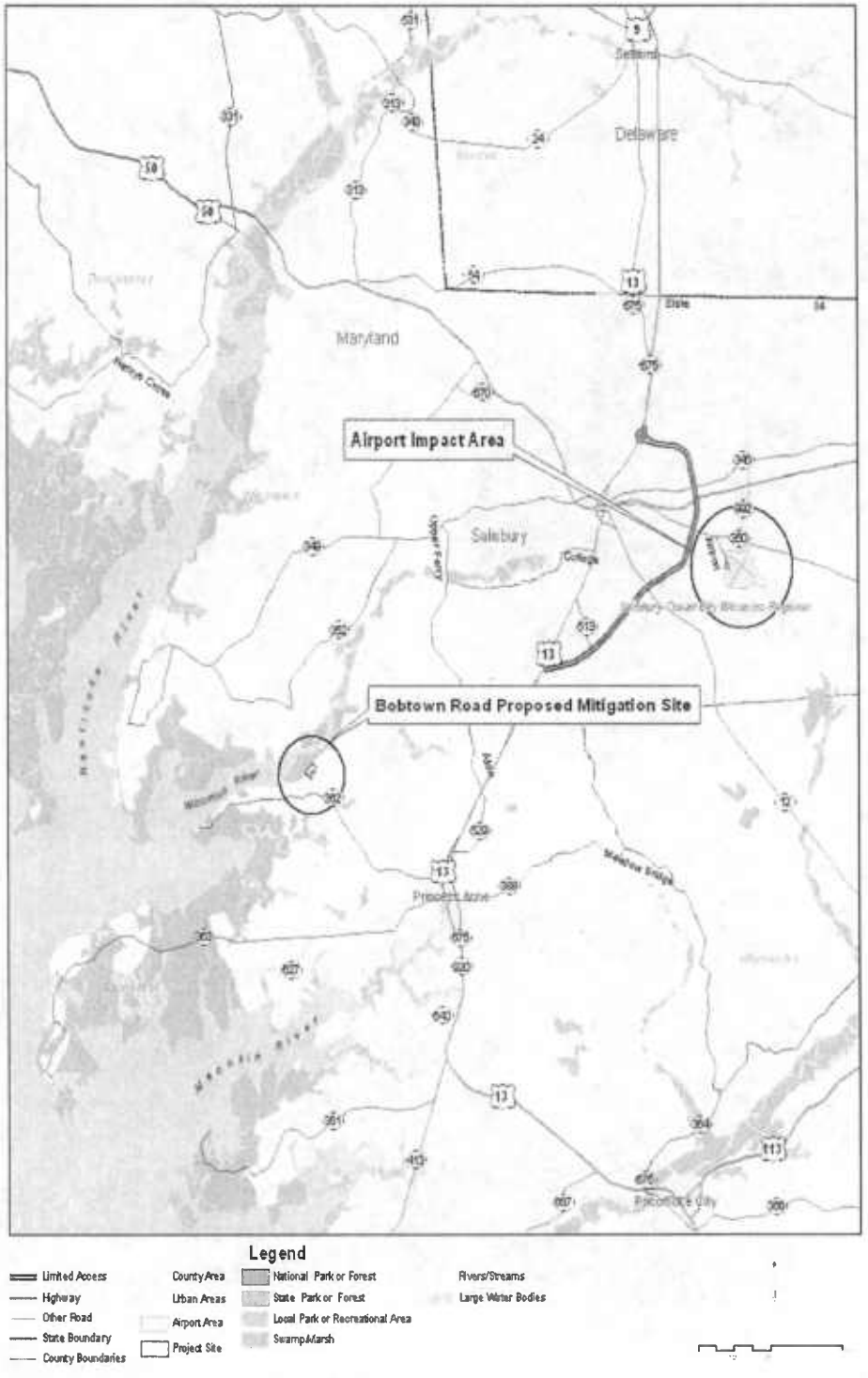

Figure 1a. Vicinity map of Wicomico Airport wetland impact area and proposed mitigation site.

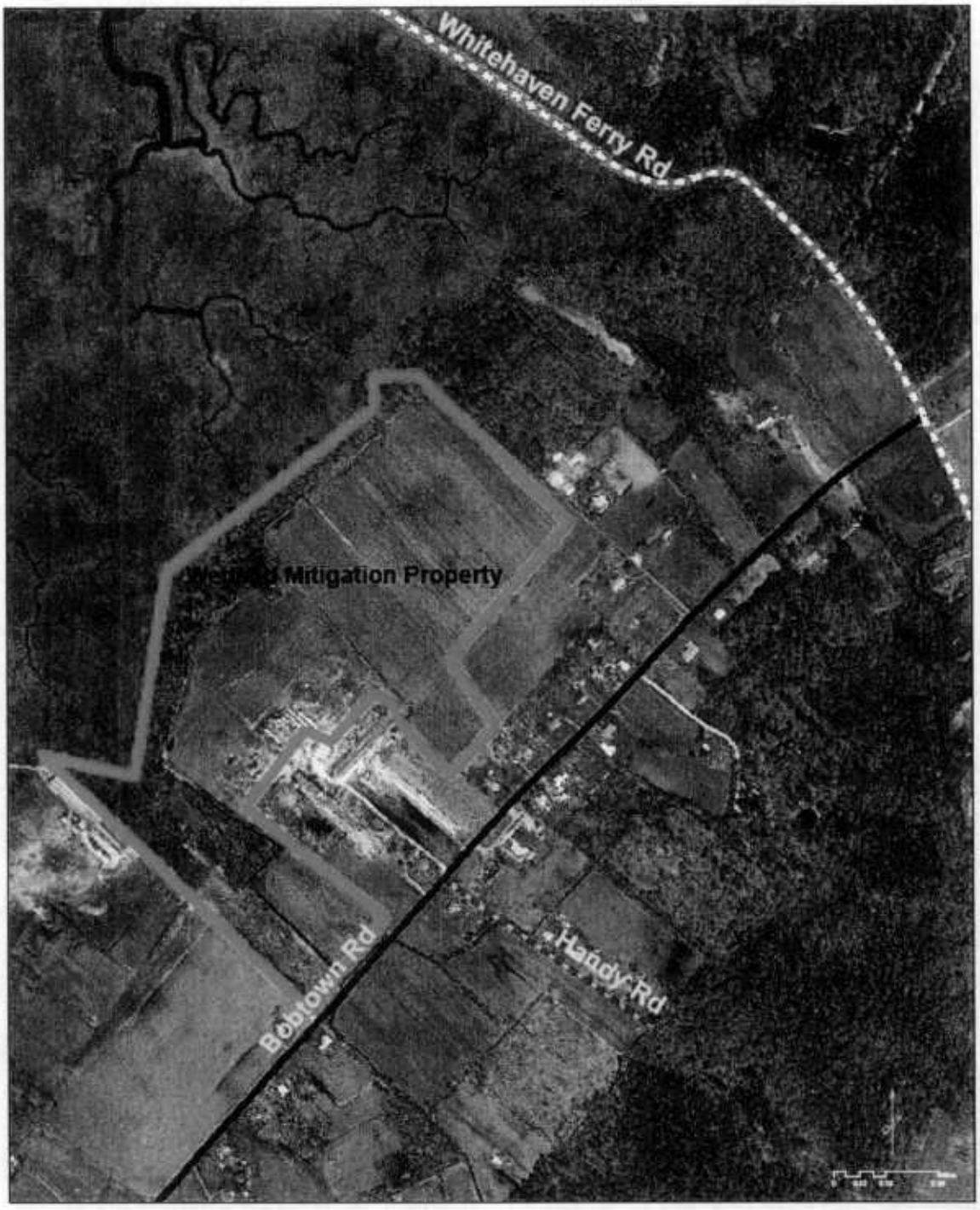

Figure 1b. Wetland Mitigation Property Boundary

Figure 2. Chesapeake Bay Critical Area

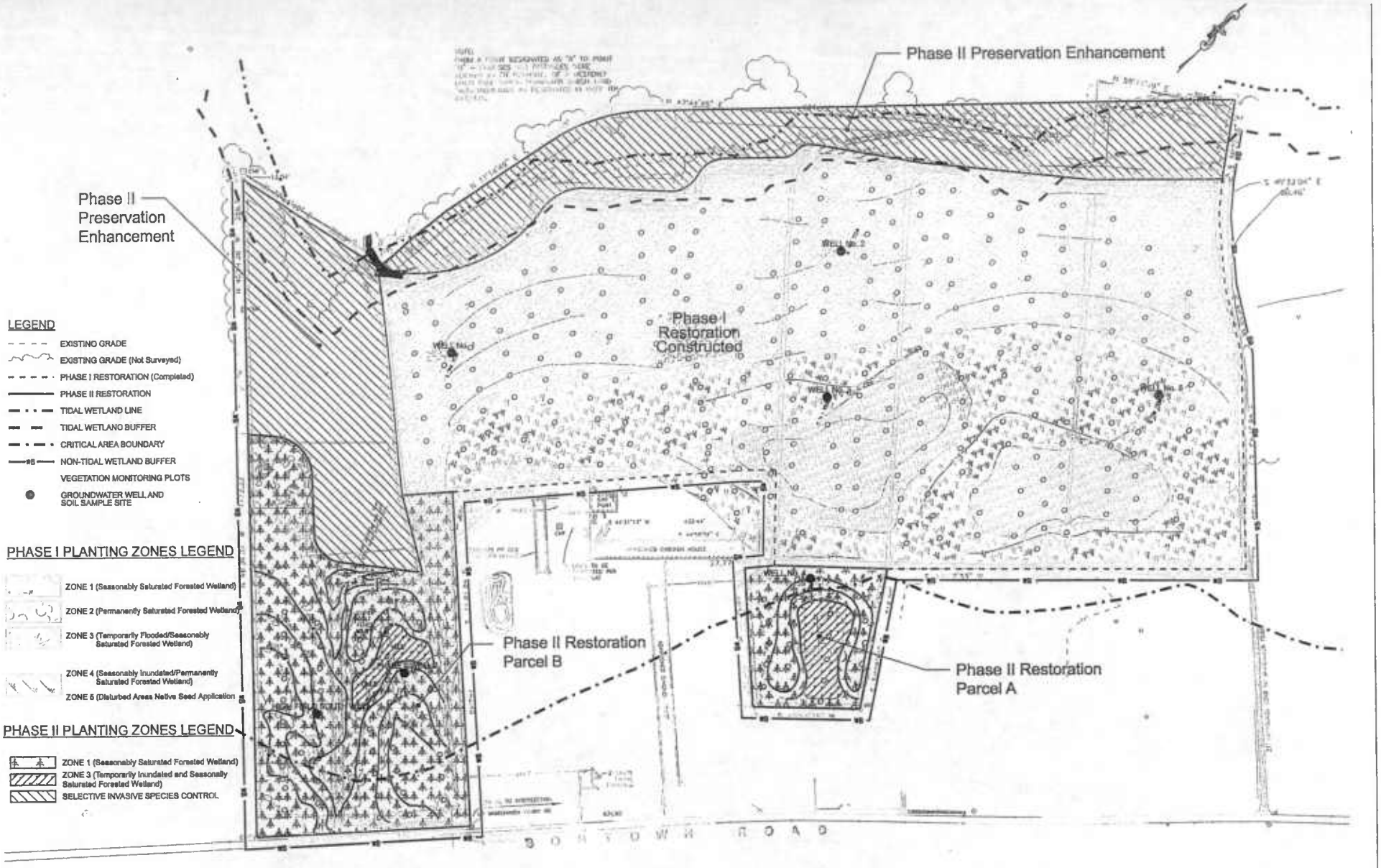

Figure 3. Monitoring Wells/Soil Sample Sites and Vegetation Plot Locations within Phase I and II Planting Zones

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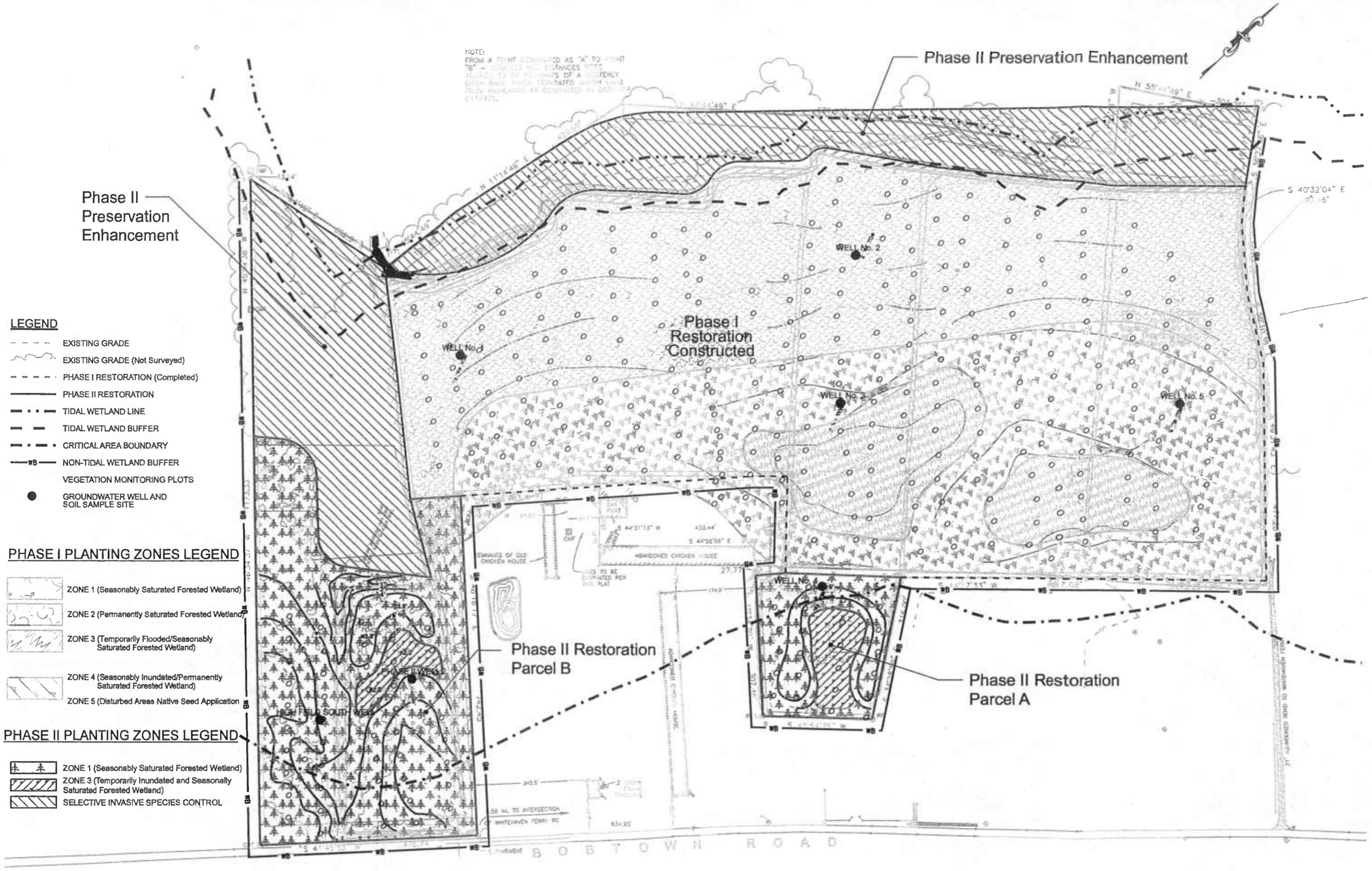

Figure 3. Monitoring Wells/Soil Sample Sites and Vegetation Plot Locations within Phase I and II Planting Zones

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2.0 METHODS

The Maryland Compensatory Mitigation Guidance Manual (IMTF 1994) was reviewed to identify the recommended sampling methodology and protocols for the non-tidal forested wetland. Performance criteria are observable or measurable attributes used to determine if the project meets established goals and objectives. The performance criteria used are based on established IMTF manual criteria with minor modifications to reflect both site-specific and permit-specific conditions.

Vegetation sampling, soil sampling and surface water monitoring began on Phase 1 after construction and planting in 2007, and will be repeated for five years. Seven wells were installed on the project site, with three wells installed in the Phase 2 mitigation area (1 well in parcel A, and 2 wells in parcel B) after construction and planting in 2008. Downloading, monitoring, inspection and maintenance occurs quarterly during the five year monitoring period. The Maryland Compensatory Mitigation Guidance Manual provided guidelines that were followed for well installation. The soil sampling locations are in the immediate vicinity of the monitoring wells (Figure 3).

As suggested in the IMTF Guidance for areas greater than 5 acres, the vegetation density measurements are conducted once between May and September annually for five years during the growing season (April 1st to October 31st). The samples incorporate species composition, dominance, and density. The first transect was placed longitudinally starting 20 ft. from the west edge of the created wetland. Each transect after was placed at 75 ft. intervals parallel to one another. Each transect has 6 ft. radius circular plots spaced 50 ft apart in all planting zones. The sampling approach for monitoring in 2009 includes 24 transects and 312 vegetation plots for the Phase 1 forested wetland and 9 transects with 72 vegetation plots for the Phase 2 forested wetland mitigation areas shown in Figure 3. The permanent transects will serve both the vegetation and surface water hydrology sampling effort.

3.0 MONITORING RESULTS

3.1 VEGETATION

Based on woody stem density, the Bobtown Road property currently meets the 538 stem/acre forested wetland plant community recommendation from the IMTF guidance. Sampling results for the plant community are summarized in Table 1.

Phase 1

In 2009, the results of Phase 1 monitoring revealed 1010 stems/acre. The Phase 1 vegetation monitoring includes three (3) planting zones including: (1) seasonally saturated, (2) permanently saturated, and (3) temporarily inundated and seasonally saturated. All planting zones have vegetation communities which include planted and volunteer trees and shrubs and a mix of annual ruderal weed species. Zone 3 includes depressional areas that pond during rain events, and these ponded areas do not support the ruderal weeds.

Zone 1 has a vegetation matrix populated by annual ruderals dominated by pigweed (*Amaranthus* sp.). These species were present before construction, but cessation of agricultural activities have let them expand, particularly in zones 1 and 2. The effects of these invasive species has been competition for light, water and nutrients, although they have provided an unintended positive effect in terms of reduced deer browse of the planted trees. Zone 1 had an average woody stem density of 702 stems/acre. The dominant woody species vegetation in zone 1 are buttonbush (*Cephalanthus occidentalis*), oak (*Quercus spp.*), sweet bay magnolia (*Magnolia virginiana),* loblolly pine (*Pinus taeda*), bald cypress *(Taxodium distichum)* and red mulberry volunteers (*Morus rubra*).

Zone 2 has an average woody stem density of 1126 stems/acre. The plants that dominate this zone are sweetgum (*Liquidambar styraciflua*), loblolly pine, wax myrtle (*Morella cerifera*), river birch (*Betula nigra*), bald cypress, Atlantic white cedar (*Chamaecyparis thyoides)* and buttonbush (*Cephalanthus occidentalis*).

Zone 3 has the least ruderal weed cover due to the ponded nature of the site. This zone had an average woody stem density of 1344 stems/acre. These areas have dominant species consisting of Atlantic white cedar, buttonbush, sweetgum and bald cypress.

In Phase 1 all zones and plots exhibit woody stem densities in excess of the goals and requirements for forested wetland mitigation. Photographs of typical vegetation status for 2009 are in Appendix A.

Phase 2

The first year of Phase 2 monitoring documented a combined average of 1071 stems/acre for both Phase 2 areas. Zone 1 parcel A near the middle of the property (Figure 3) has a woody stem density of 1074 stems/acre and is dominated by bald cypress, sweetbay magnolia, water tupelo (*Nyssa sylvatica*), and volunteer mulberry (*Morus* sp.). Zone 1 in parcel B at the southern end of the property has a woody stem density of 879 stems/acre and is dominated by bald cypress, wax myrtle, sweetgum, sweetbay magnolia and buttonbush.

Zone 3 in parcel A has an average woody stem density of 2889 stems/acre. The zone is dominated by bald cypress, sweetbay magnolia with lesser numbers of dogwood and willow oak. Zone 3 in parcel B averaged a woody density of 1444 stems/acre. Bald cypress was the clear dominant with lesser numbers of wax myrtle, buttonbush and sweetbay magnolia.

In Phase 2 all zones and plots exhibited woody stem densities in excess of the goals and requirements for forested wetland mitigation.

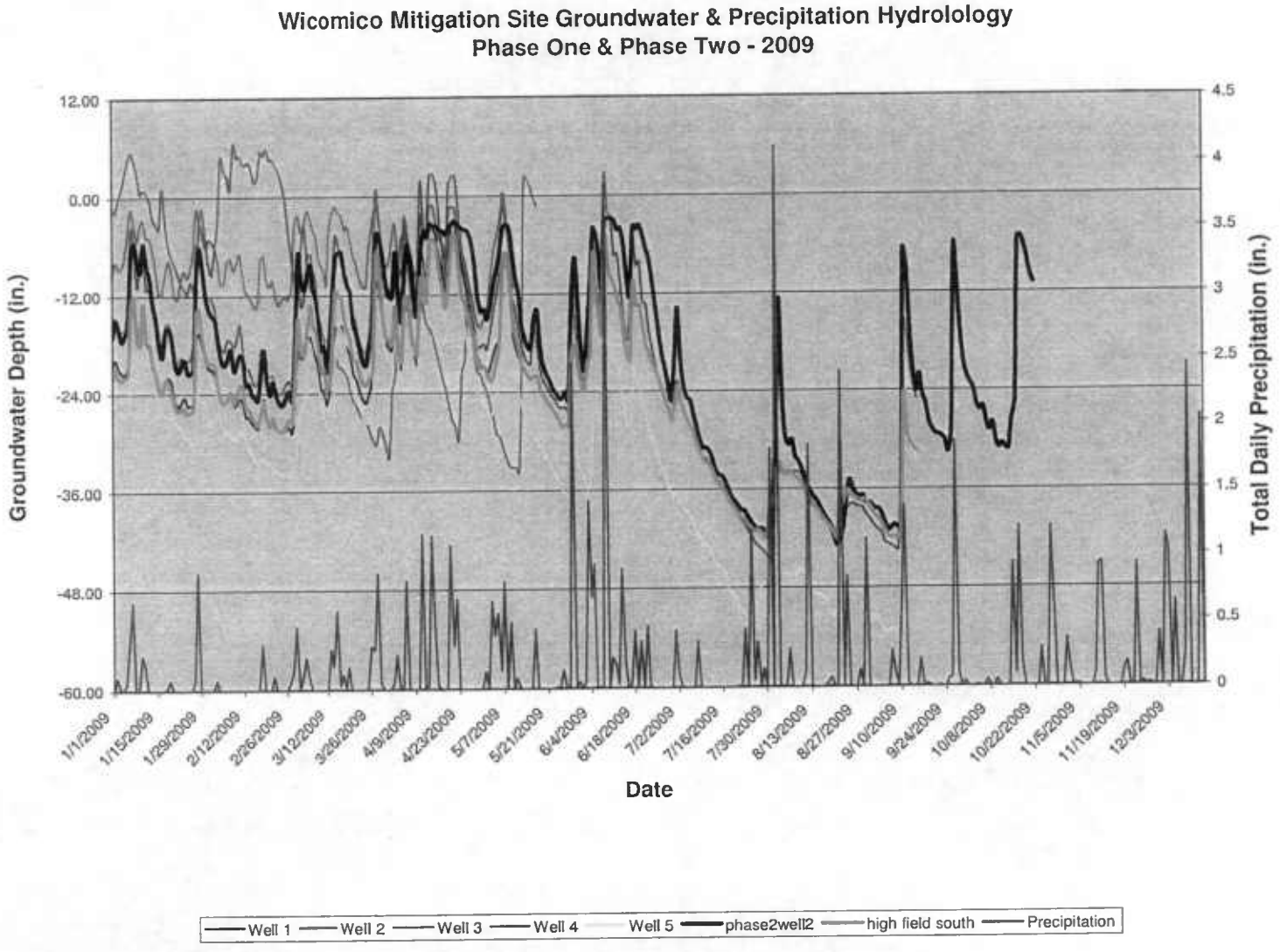

Figure 5. Combined Groundwater & Precipitation data for 2009.

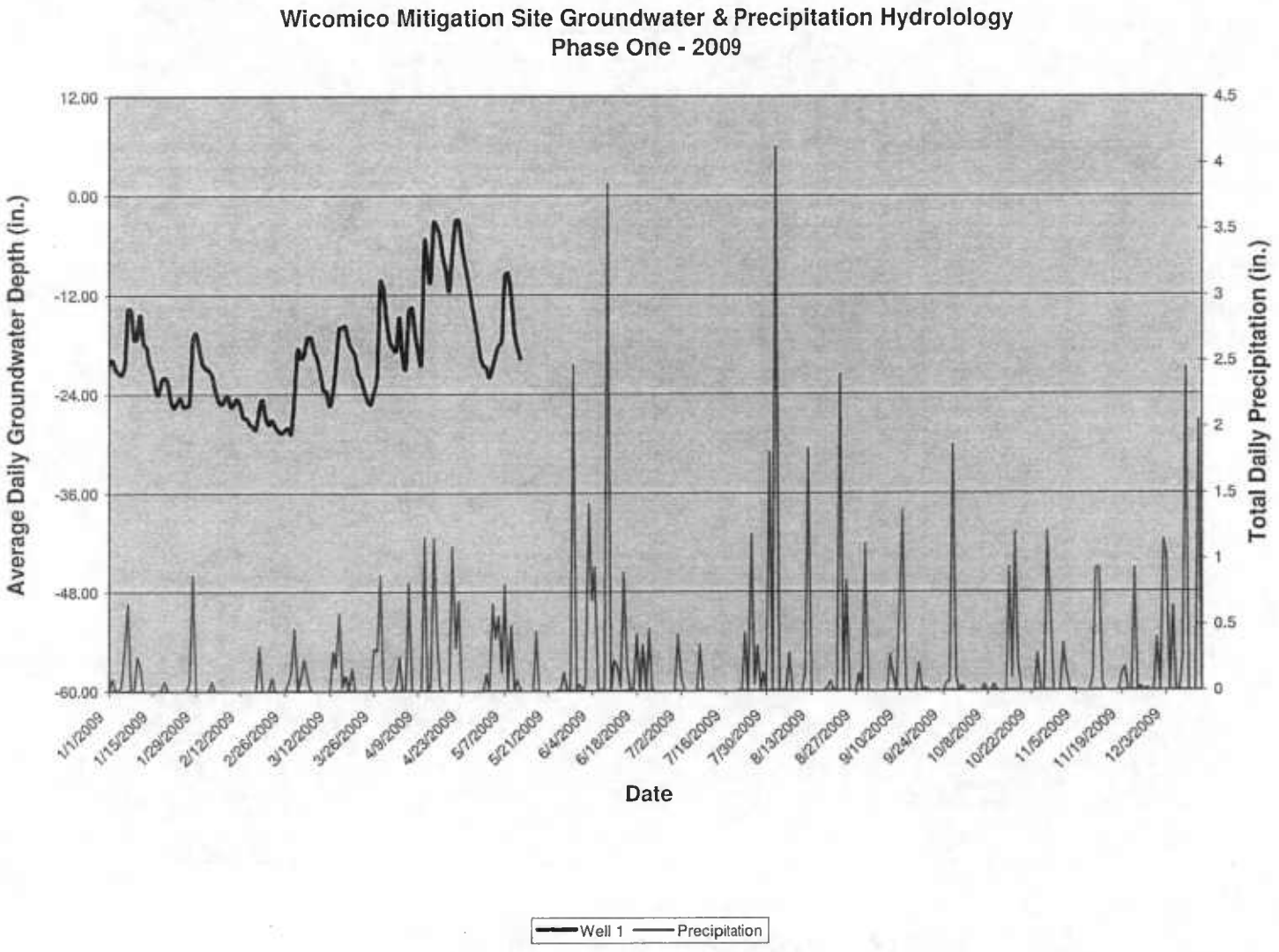

Figure 5a. Well 1 Groundwater & Precipitation data for 2009.

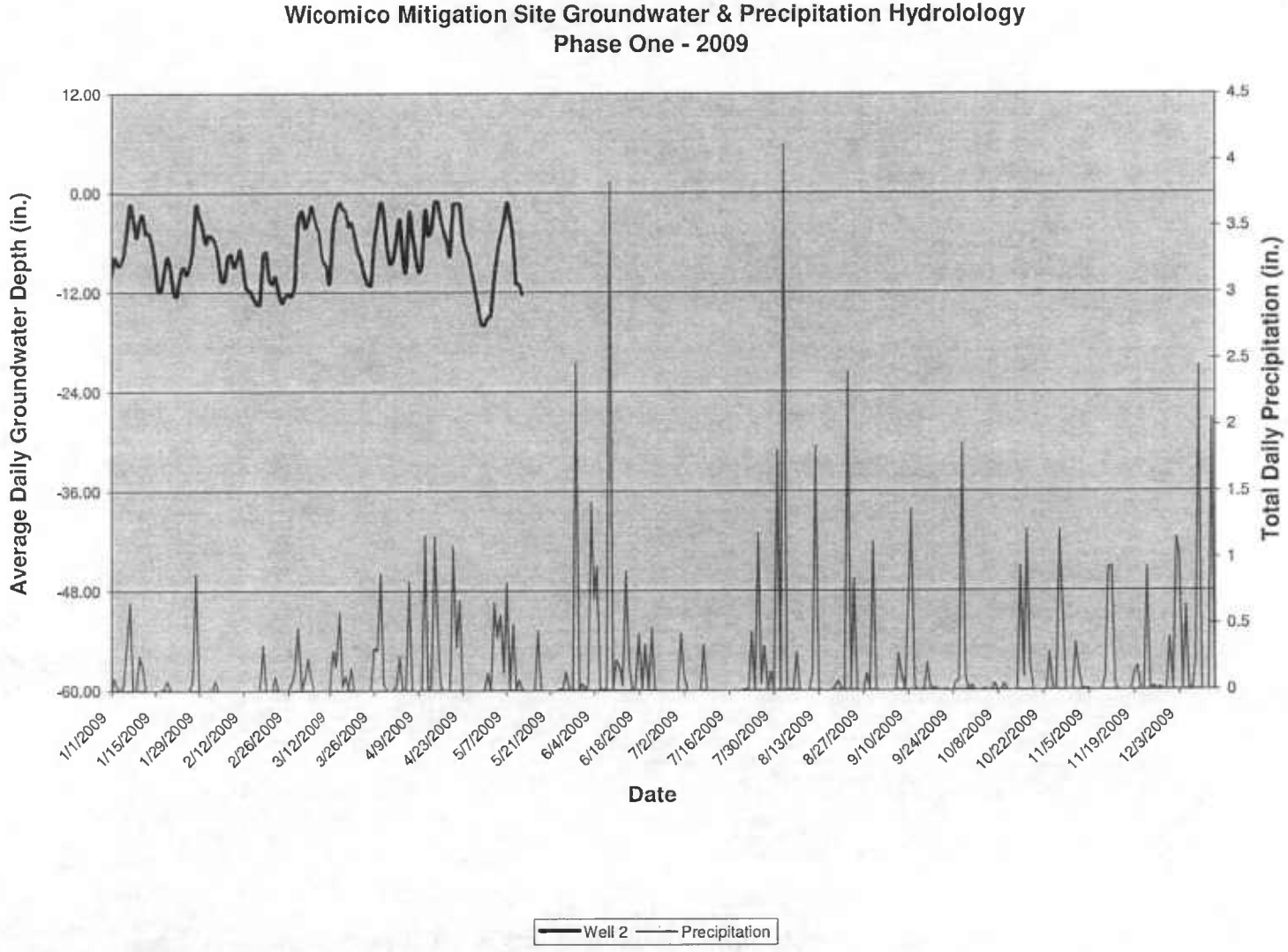

Figure 5b. Well 2 Groundwater & Precipitation data for 2009.

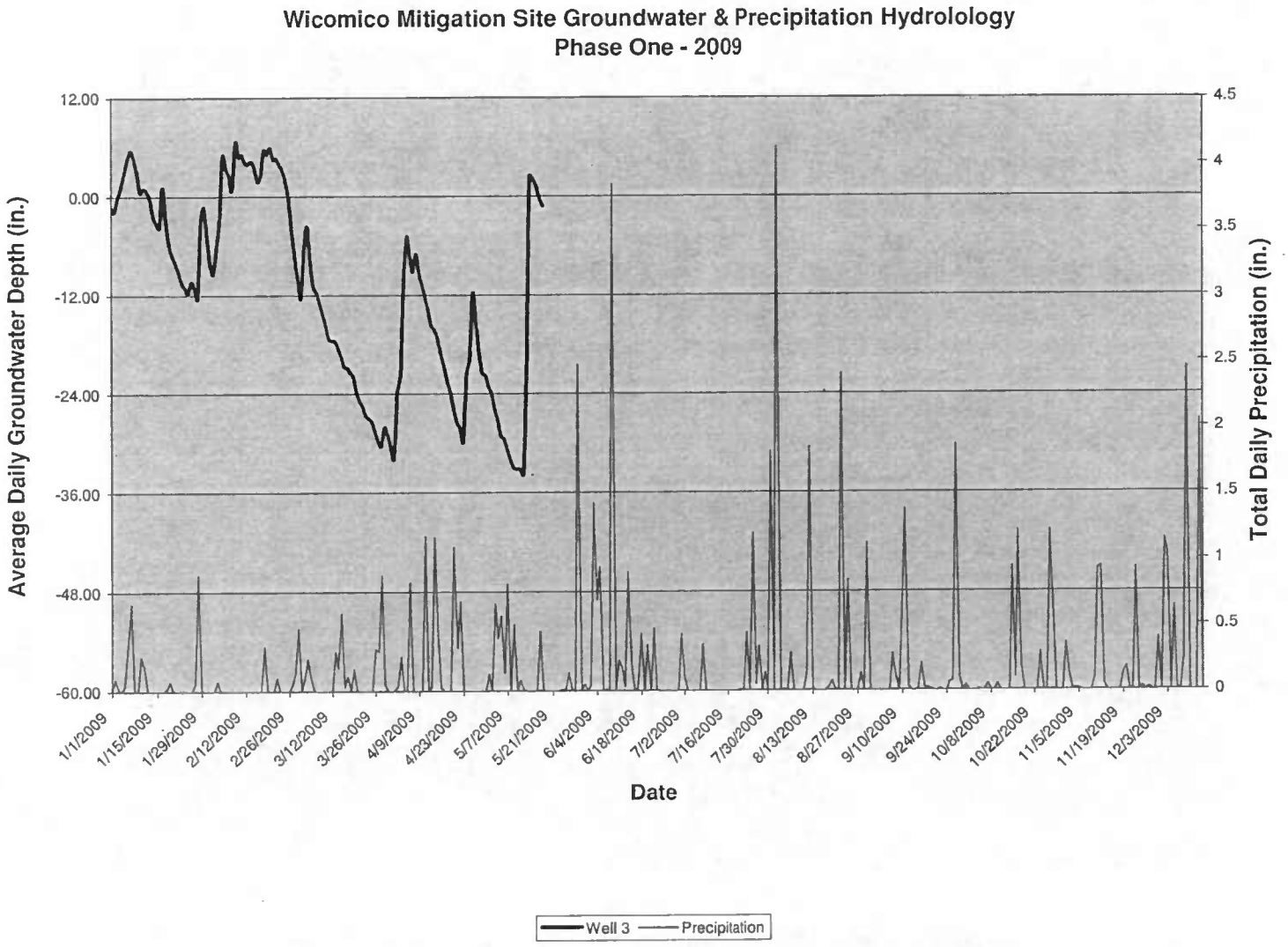

Figure 5c. Well 3 Groundwater & Precipitation data for 2009.

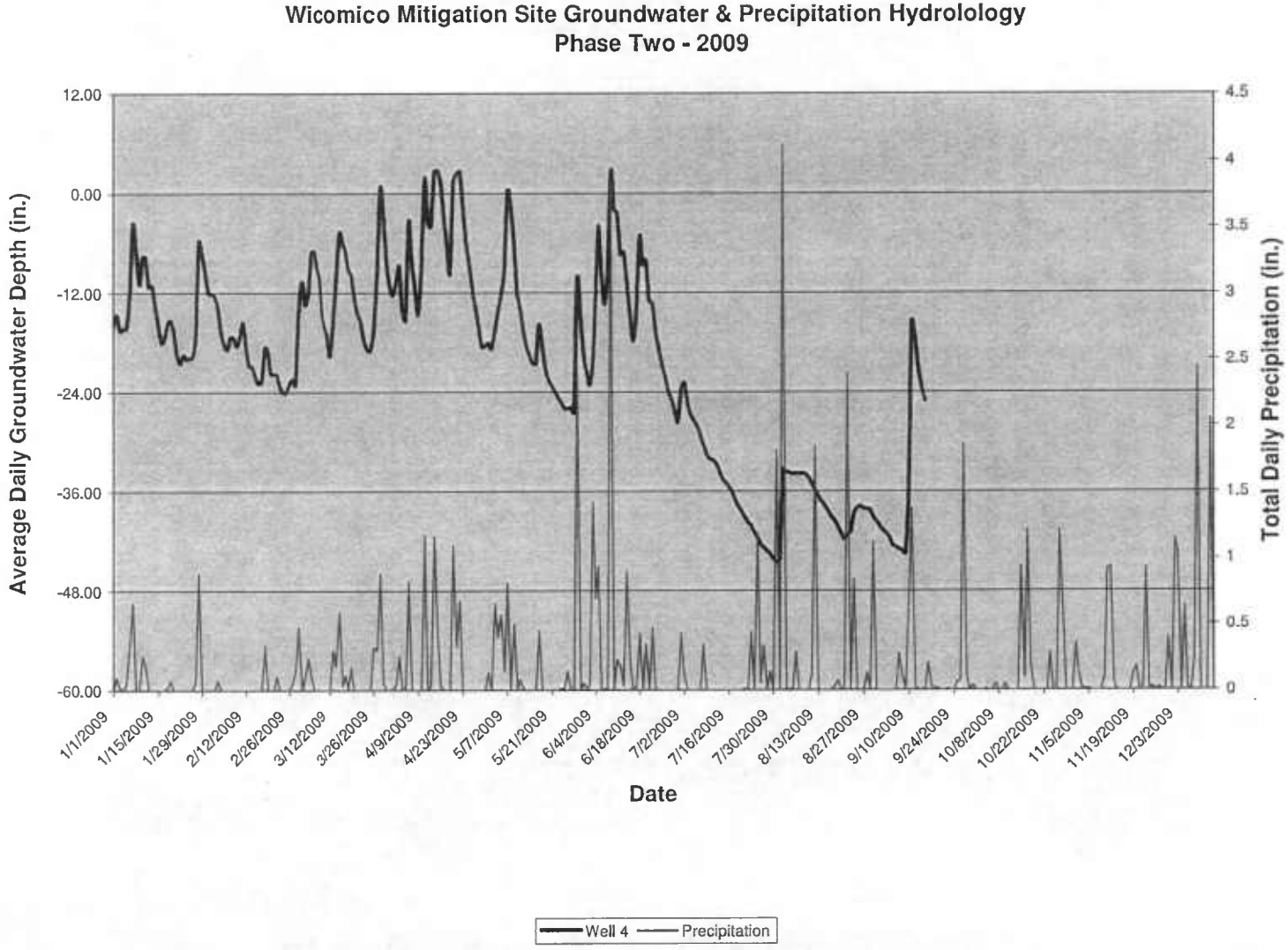

Figure 5d. Well 4 Groundwater & Precipitation data for 2009.

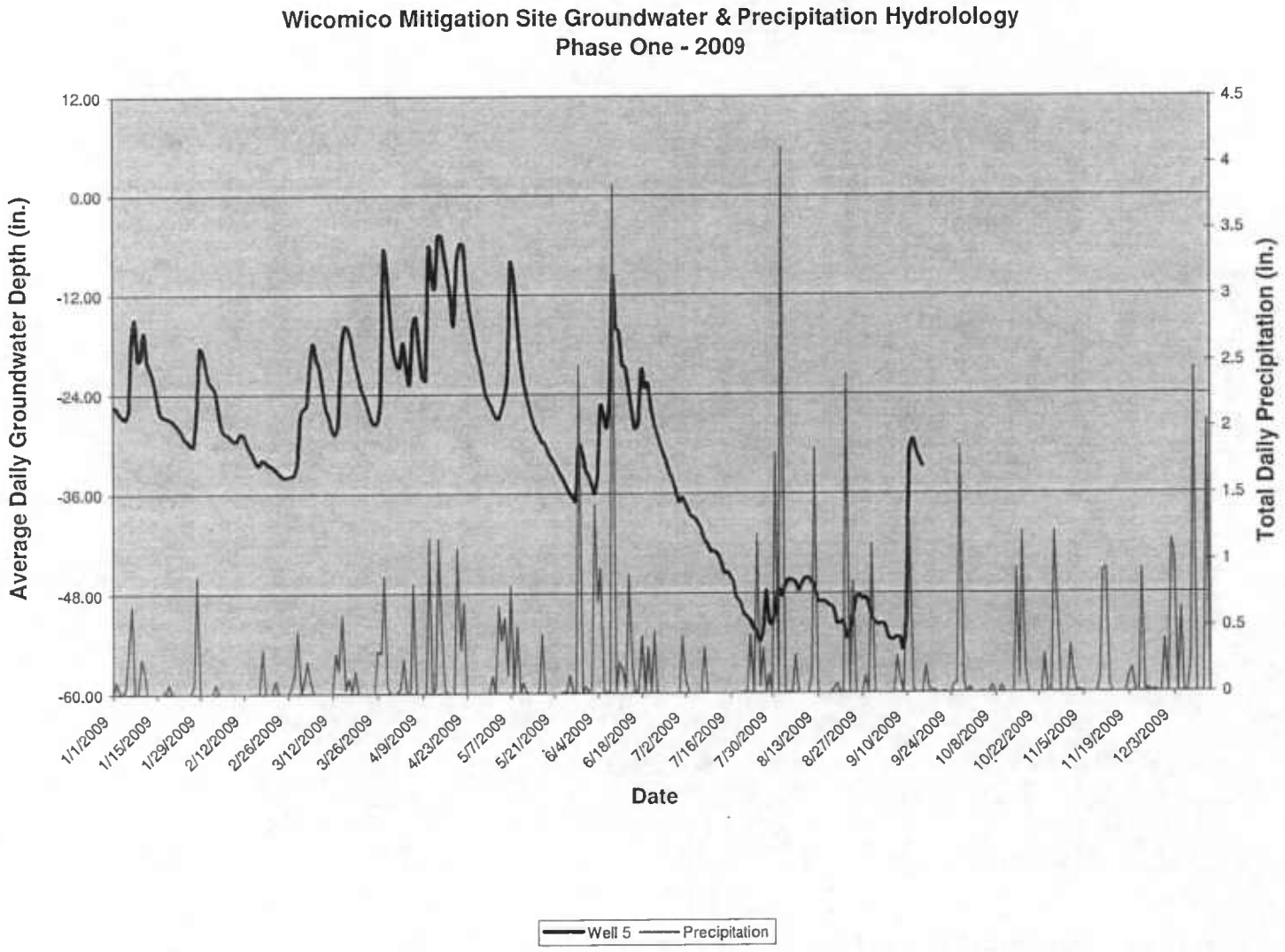

Figure 5e. Well 5 Groundwater & Precipitation data for 2009.

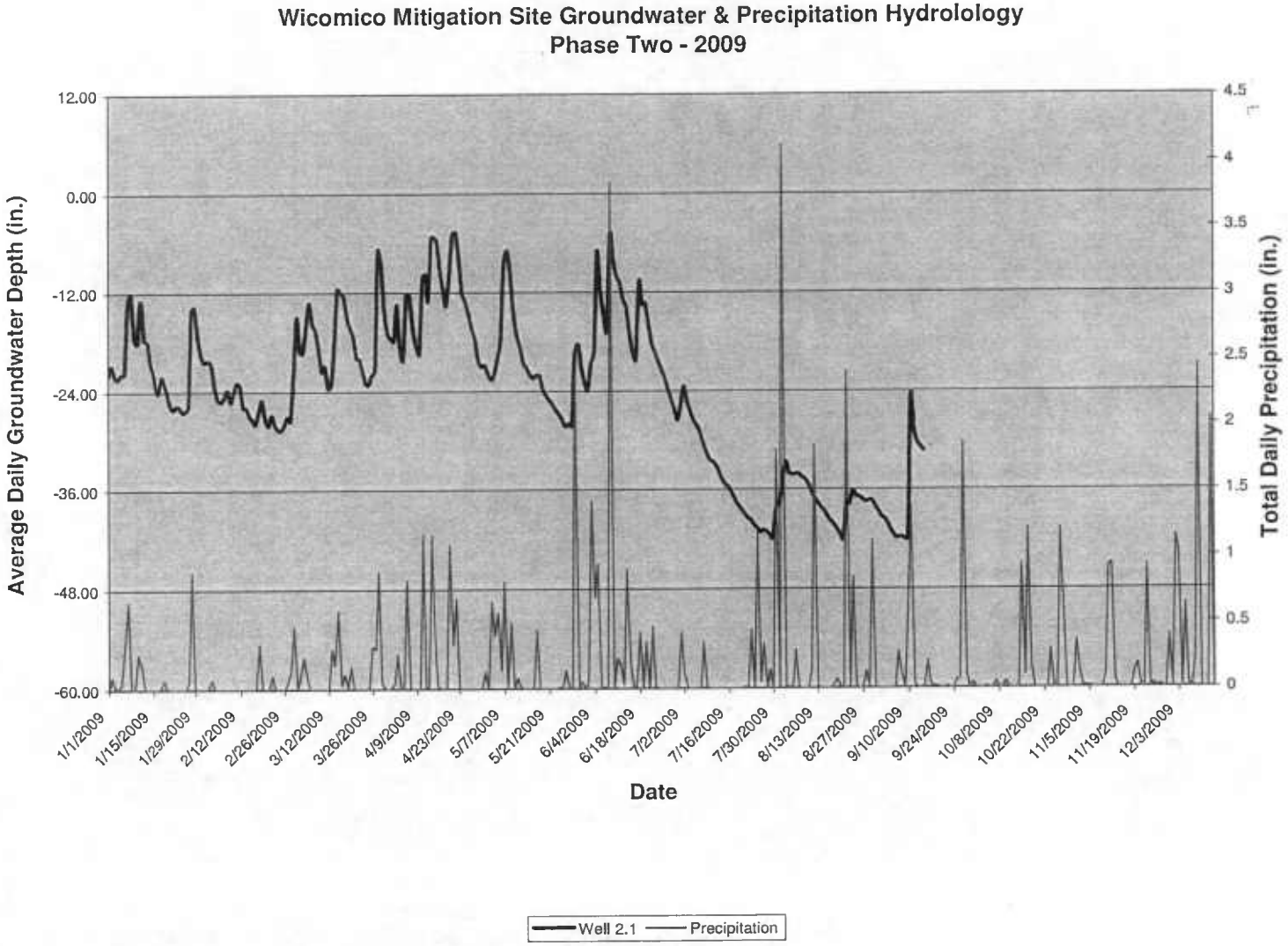

Figure 5f. Well 2.1 Groundwater & Precipitation data for 2009.

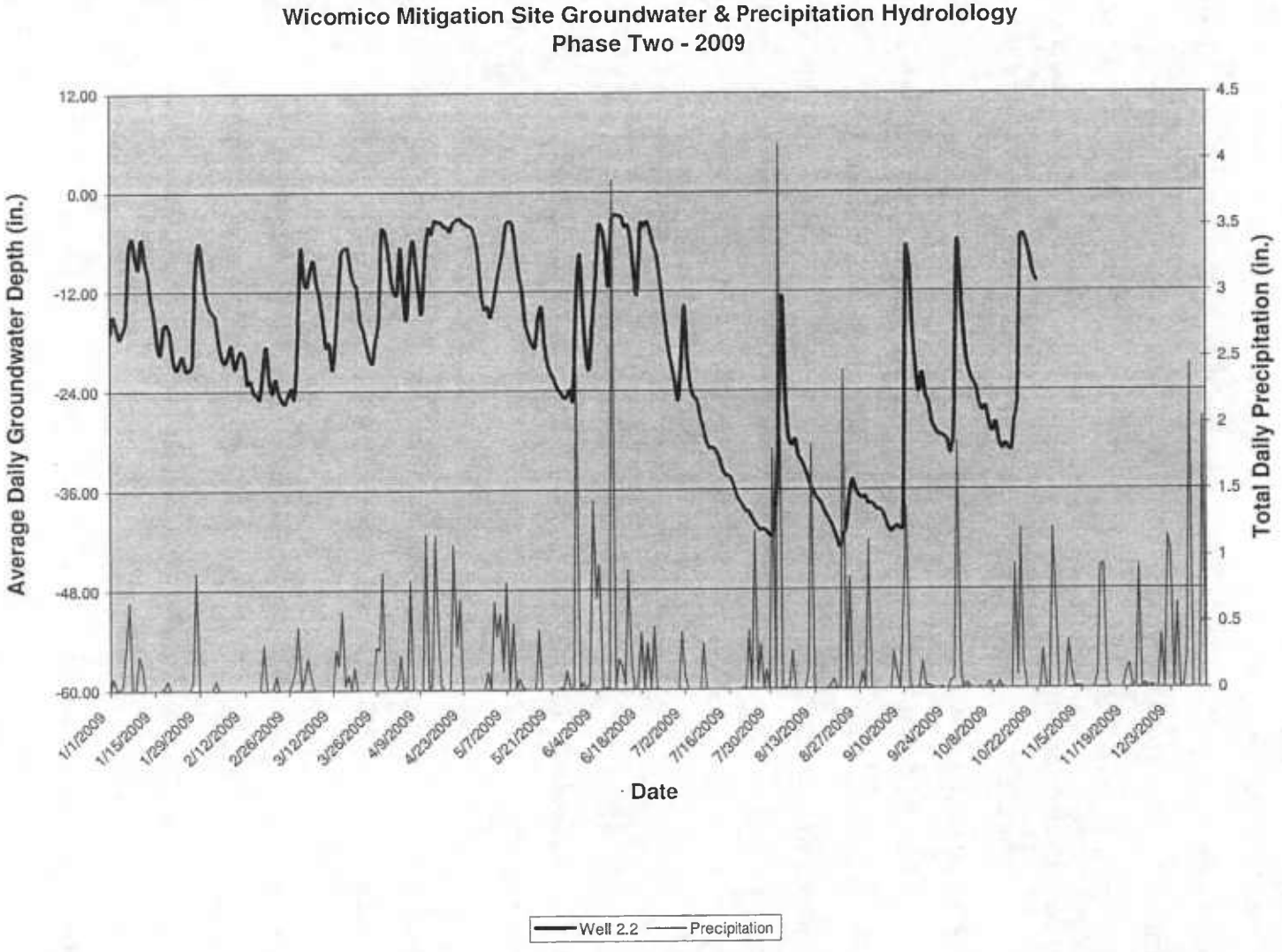

Figure 5g. Well 2.2 Groundwater & Precipitation data for 2009.

3.3 SOILS

In October 2009, soils in Phase 1 were sampled in the vicinity of groundwater monitoring wells 1, 2, 3, and 5 for the third year of wetland mitigation monitoring. Soils in Phase 2 were also sampled at this time within the vicinity of the remaining groundwater monitoring wells (well 4, well 2.2). The soils observed at the mitigation site exhibited a cultivated mineral horizon, approximately 5 to 10 inches thick, in the top horizon or layer of each soil sample. Redoximorphic (redox) concentration and/or depletion were observed in a majority of the soil samples. These redox features are a result of the water table's elevation remaining at that elevation for a duration of time within the soil profile. The areas of concentration are identified by red and orange colors resulting from the oxidation of iron-manganese minerals, indicating a fluctuating water table. The areas of depletion are identified by the grayish colors (mottle color with a chroma ≤ 2) resulting from the loss of iron and/or manganese and indicating soil saturation for long periods of time. The areas of concentrations were found as non-cemented masses. There were seven total soil samples (4 in Phase 1 and 3 in Phase 2) taken within 20ft of each groundwater monitoring well. The soil for Phase 1 and 2 are described below and photographs can be seen in Appendix C:

Phase 1 Soils

Soil at Well 1: Similar to the 2008 soil profile, this profile did not exhibit any redox features, however the depth to soil saturation occurred at 19" below the ground surface and depth to free water occurred at 17" below the ground surface. In 2007, the soil sample redox mottles were recorded at 35" and the depth to saturation was 30". From monitoring it is clear that the groundwater table has risen, but there has not been enough time for redox features to form in the soil profile.

Soil at Well 2: This profile is exhibiting redox concentrations at a depth of approximately 14" and a gley matrix color beginning at 6". Since 2007, the gley matrix color has risen within the soil profile from 10" to 6" indicating a rising water table that is saturating the soil for long periods of time reducing the iron and/or manganese in the soil.

Soil at Well 3: This soil profile exhibited redox concentrations at a depth of 24" and a gley matrix color beginning at 17". This description is similar to the redox concentrations and the gley matrix color observed at a depth of 18" in 2008. In 2009, soil saturation was observed at 8" and free water was recorded at 13", the shallowest depths observed within the soil profile to date. Based on the

soil characteristics and water table observations, the soil is experiencing a higher water table elevation in comparison to the previous 2007 and 2008 mitigation monitoring years.

Soil at Well 5: This year the soil profile exhibited redox concentrations at a depth of 15", approximately 5" higher in the profile than observed in 2008. The gley matrix color also observed higher within the soil profile (depth of 30") than in previous monitoring years. The gley matrix color in 2007 was observed at a depth of 36", while no gley matrix was observed in 2008 due to depth restriction from the auger hole collapsing under saturation. In 2009, soil saturation was observed at a depth of 14" and free water occurred at 20". The soil characteristics and water table observations in 2009 confirm the water table is present at a higher elevation in the soil profile for extended periods of time than in the 2007 and 2008 mitigation monitoring years.

Phase 2 Soils

Soil at Well 4: Similar to 2008, a gley matrix color was observed at a depth of 32" in 2009. The gley matrix color observed at approximately 30" within soil profile in 2008 and again in 2009 confirms the water table is present at a higher elevation in the soil profile for as extended period of time in comparison to 2007 observations. Although the 2007 soil profile was described during the initial mitigation monitoring year for Phase 1, this description was used as an additional reference for Phase 2. The redox concentrations in 2009 were present lower in the profile than in the previous monitoring year, potentially a result of characteristic variability among soil sample locations. In 2009, soil saturation and free water was observed significantly higher in the soil profile. Depth to soil saturation was 36" and 21" and depth to free water was 30" and 18" in 2008 and 2009, respectively. Within the mitigation monitoring timeframe (2008 and 2009), no significant soil characteristics changes were observed within the soil profiles.

Soil at Well 2.1: Similar to 2008 observation, this soil profile exhibits a gley matrix color and redox concentration at 11" indicating that the water table remains at this elevation for extended periods of time. It is apparent the water table fluctuates within 7" of the ground surface based on the presence of redox concentrations at 7" within the A2 horizon. No significant change was observed within the soil profile between 2008 and 2009.

Soil at Well 2.2: This soil profile exhibits a gley matrix color and redox concentrations at 10" indicating the presence of a water table for extended periods of time. Also similar to 2008, no

saturation or free water was observed within the soil profile. No significant change was observed within the soil profile between 2008 and 2009.

The soil descriptions and depth to saturation and free water observations in Phase 1 indicate that the soils characteristics are responding to the altered hydrology. The soils are exhibiting hydric soil characteristics (i.e. redox features and gley colors) higher in the soil profile than observed in previous mitigation monitoring years. All of the 2009 soil profiles within Phase 1 are expressing soil characteristics and/or depth to saturation and free water observations typical of a rising water table. The Phase 1 soil descriptions for 2007, 2008 and 2009 are summarized in Tables 2, 3 and 4.

It is presumed the soils in Phase 2 are exhibiting hydric characteristics as a response to the altered hydrology. In Well 4, the gley matrix color has remained at a similar depth within the soil profile indicating a stable water table elevation from 2008 to 2009. Wells 2.1 and 2.2 have similar soil profiles with gley matrix colors at approximately 10" with redox features. Redox concentrations are also present within the bottom portion to the A horizon. These redox concentrations may be recent due to a higher water table responding to the altered hydrology. This theory can be further examined during future mitigation monitoring. The Phase 2 soil descriptions for 2008 and 2009 are summarized in Tables 2 and 3. The 2007 well 4 soil descriptions, originally located in Phase 1 during the 2007 mitigation monitoring, are summarized in Table 4.

Table 2. 2009 Results of Soil Evaluations

Location	Depth (inches)	Soil layer	Matrix Color	Mottle Color	Roots (Abundance & Size)	Texture	Comments
Wicomico Mitigation Site – Phase 1							
Well 1	0-10	A	10YR4/2	-	Very fine, common	Sandy Loam	Depth to saturation 17"; depth to free water 19"
	10-19	B	10YR6/4	-	-	Sandy Loam	
	19-37+	C	10YR6/3	-	-	Sandy Loam	
Well 2	0-6	A	10YR4/2	-	Very fine, common	Loam	Depth to saturation 14"; depth to free water 12"
	6-14	Btg1	10YR4/2	-	-	Sandy clay loam	
	14-20	Btg2	10YR4/1	7.5YR5/6	-	Sandy clay loam	
	20-39+	Btg3	10YR7/1	7.5YR5/8 7.5YR5/6	-	Sandy clay loam	
Well 3	0-8	A1	10YR4/2	-	Very fine, few	Loam	depth to saturation 8"; depth to free water 13"
	8-17	A2	10YR4/2	-	-	Sandy loam	
	17-24	Bg1	10YR6/1	-	-	Sandy loam	
	24-39	Bg2	10YR6/1	7.5YR5/8 7.5YR5/6	-	Sandy clay loam	
	39-41+	Bg3	10YR6/1	7.5YR5/8 7.5YR5/6	-	Sandy loam	
Well 5	0-7	A	10YR4/3	-	Very fine, common	Loam	Depth to saturation 14"; depth to free water 20"
	7-15	B1	10YR5/4	-	-	Sandy clay loam	
	15-30	B2	10YR5/4	10YR5/6	-	Sandy loam	
	30-38+	Bg	10YR7/1	-	-	Sandy loam	
Location	**Depth (tenths)**	**Soil layer**	**Matrix Color**	**Mottle Color**	**Roots (Abundance & Size)**	**Texture**	**Comments**
Wicomico Mitigation Site – Phase 2							
Well 4*	0-11	A	10YR3/2	-	Very fine, common	Sandy loam	Depth to saturation 18"; depth to free water 21"
	11-24	B1	10YR5/4	-	-	Sandy clay loam	
	24-32	B2	10YR5/4	7.5YR5/6	-	Sandy loam	
	32-38+	Bg	10YR7/1	7.5YR5/6	-	Sandy loam	

Well 2.2	0-7	A1	10YR4/2	-	Very fine, common	Loam	Depth to saturation and free water 22"
	7-11	A2	10YR4/1	7.5YR5/8	-	Sandy clay loam	
	11-21	Btg1	10YR6/1	7.5YR5/6	-	Sandy clay loam	
	21-28+	Btg2	10YR5/1	7.5YR5/8	-	Sandy clay	
Well 2.1	0-4	A1	10YR4/2	-	Very fine, common	Loam	No saturation or free water observed
	4-10	A2	10YR4/1	-	Very fine, few	Loam	
	10-24+	Bg	10YR6/2	7.5YR5/6	-	Sandy loam	
Note: Well 4 was within the Phase 2 boundary for the 2009 mitigation monitoring.							

Table 3. 2008 Results of Soil Evaluations

Location	Depth (inches)	Soil layer	Matrix Color	Mottle Color	Roots (Abundance & Size)	Texture	Comments
Wicomico Mitigation Site – Phase 1							
Well 1	0-10	A	10YR4/2	-	Very fine, few	Sandy Loam	Depth to saturation20"; depth to free water 26"
	10-26	C1	10YR6/3	-	-	Sandy Loam	
	26-32+	C2	10YR6/3	-	-	Sandy Loam	
Well 2	0-8	A	10YR44/2	-	Very fine, common	Loam	Depth to saturation 12"; depth to free water 12"
	8-24	Btg1	10YR5/2	10YR5/8	-	Sandy clay loam	
	24-30+	Btg2	10YR6/2	10YR7/1	-	Sandy clay loam	
Well 3	0-14	A1	10YR4/2		Very fine, few	Loam	depth to saturation 22"; depth to free water 30"
	14-18	A2	10YR4/2	10YR6/6	-	Sandy loam	
	18-32	Cg1	10YR6/2	10YR5/8	-	Sandy loam	
	32-36+	Cg2	10YR7/1	-	-	Sandy clay loam	
Well 5	0-10	A	10YR4/3	-	Very fine, common	Loam	Depth to saturation 20"; no depth to free water observed
	10-20	B1	2.5Y6/4	-	-	Sandy clay loam	
	20-30+	B2	2.5Y6/4	10YR5/8 10YR7/1	-	Sandy clay loam	

Location	Depth (tenths)	Soil layer	Matrix Color	Mottle Color	Roots (Abundance & Size)	Texture	Comments
Wicomico Mitigation Site – Phase 2							
Well 4*	0-10	A	10YR3/2	-	Very fine, common	Sandy loam	Depth to saturation 30"; depth to free water 36"
	10-18	B1	10YR6/6	10YR5/8	-	Sandy clay loam	
	18-30	B2	10YR6/6	10YR5/8	-	Sandy loam	
	30-36+	Cg	10YR7/2	10YR5/8 10YR7/1	-	Sandy loam	
Well 2.2	0-8	A1	10YR4/2	-	Very fine, common	Loam	No saturation of free water
	8-12	A2	10YR4/2	10YR5/8	Very fine, few	Loam	
	12-24+	Bg	10YR6/2	10YR5/8	-	Sandy clay	
Well 2.1	0-5	A1	10YR4/2	-	Very fine, many; Fine, many	Loam	No saturation or free water
	5-10	A2	10YR5/2	10YR5/6	Very fine, common; fine, common	Loam	
	10-16	Bg1	10YR6/1	10YR5/8	-	Sandy clay loam	
	16-24	Bg2	10YR6/1	10YR5/8 7.5YR5/8	-	Sandy clay loam	
	24-26+	Cg	10YR7/1	-	-	Sand	
Note: Well 4 was within the Phase 2 boundary for the 2008 mitigation monitoring.							

Table 4. 2007 Results of Soil Evaluations

Location	Depth (tenths)	Soil layer	Matrix Color	Mottle Color	Roots (Abundance & Size)	Texture	Comments
Wicomico Mitigation Site – Phase 1							
Well 1	0-0.8	Ap	10YR4/2	-	Very fine, few roots common	Sandy loam	Abrupt horizon boundary, weak structure
	0.8-1.6	Bw	2.5Y6/4	-	Very fine, few roots	Sandy loam	Gradual horizon, weak structure
	1.6-2.9	C1	2.5Y6/4	-	-	Loamy sand	Less structure, abrupt horizon
	2.9+	C2	2.5Y6/4	7.5YR6/8[1] 10YR7/1[2]	-	Loamy sand	Less structure, few med. masses
Well 2	0-0.8	Ap	10YR4/2	-	Very fine, few common	Sandy loam	Weak structure
	.8-1.4	Bt	10YR5/2	7.5YR4/6[1] 10YR7/1[2]	Fine, few common	Sandy clay loam	Moderate structure
	1.4-2.5+	BC	10YR6/2	7.5YR5/8[1] 10YR6/2[2]	-	Sandy loam	Moderate structure
Well 3	0-1.5	Ap	10YR4/2	-	Very fine, few common	Sandy loam	Weak structure
	1.5-3	B	10YR6/3	10YR6/8[1] 10YR6/1[2]	Very fine, few common	Sandy clay loam	Less structure
	3+	Cg	10YR6/2	7.5YR5/8[1] 10YR6/1[2]	-	Loamy sand	No free water
Well 5	0-0.6	Ap	10YR4/2	-	Very fine, few roots common	Sandy loam	Abrupt horizon boundary, weak structure
	0.6-2.1	B	10YR5/4	7.5YR5/8	Very fine, few roots	Sandy clay loam	Gradual horizon, moderate structure
	2.1-3.2	BC	10YR6/3	7.5YR5/8 10YR7/1	-	Sandy loam	Weak structure
	3.2-3.5+	Cg	10YR7/1	7.5YR5/8[1]	-	sand	Less structure, common med. And course masses
Well 4*	0-.8	Ap	10YR4/2	-	Very fine, few common	Sandy loam	Weak structure
	.8-2.1	B_1	10YR5/6	7.5YR5/6	Very fine, few common	Sandy clay loam	Moderate structure, gradual boundary
	2.1-3.1	B_2	10YR5/6	7.5YR5/8[1] 10YR7/1[2]	-	Sandy loam	Moderate structure, gradual horizon boundary
	3.1+	BC	10YR6/6	7.5YR5/8[1] 10YR7/2[2]	-	Loamy sand	Less structure
*Note: Well 4 was within the Phase 1boundary during the 2007 mitigation monitoring.							

4.0 PROBLEMS OBSERVED & RECOMMENDATIONS

The Bobtown Road Wicomico Mitigation Site is currently meeting the Permit or IMTF conditions for a forested wetland. However, the site contains significant coverage of annual ruderal weeds competing with the specified planted material for light, water and nutrients. It is recommended that a pre-emergent herbicide approved for aquatic use be applied prior to the next growing season to reduce competition from undesirable species. Plant specimens for all species did meet the design specifications in regards to height. There are still patches of invasive common reed (*Phragmites australis*) and Japanese honeysuckle (*Lonceria japonica*) on the site adjacent to the agricultural ditches (Appendix, Photograph 3). Further treatment of these areas for invasive species control is recommended to accommodate the requirements as laid out in the monitoring plan in accordance with the ACE and MDE.

5.0 REFERENCES

IMTF. 1994. Maryland Compensatory Mitigation Guidance. Developed by the Interagency Mitigation Task Force, consisting of the U.S. Army Corps of Engineers (Baltimore), U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Federal Highway Administration, Maryland Department of the Environment, Maryland Department of Natural Resources, and Maryland State Highway Administration. August 1994

Appendix A – Vegetation Photos

Photo 1 3888 – Vegetation on transect 21

Photo 2 3889 – Vegetation on transect 22

Photo 3 3891 – Vegetation on transect 24

Photo 4 3895 – Vegetation on transect 24

Photo 5 3896 – Vegetation on transect 23

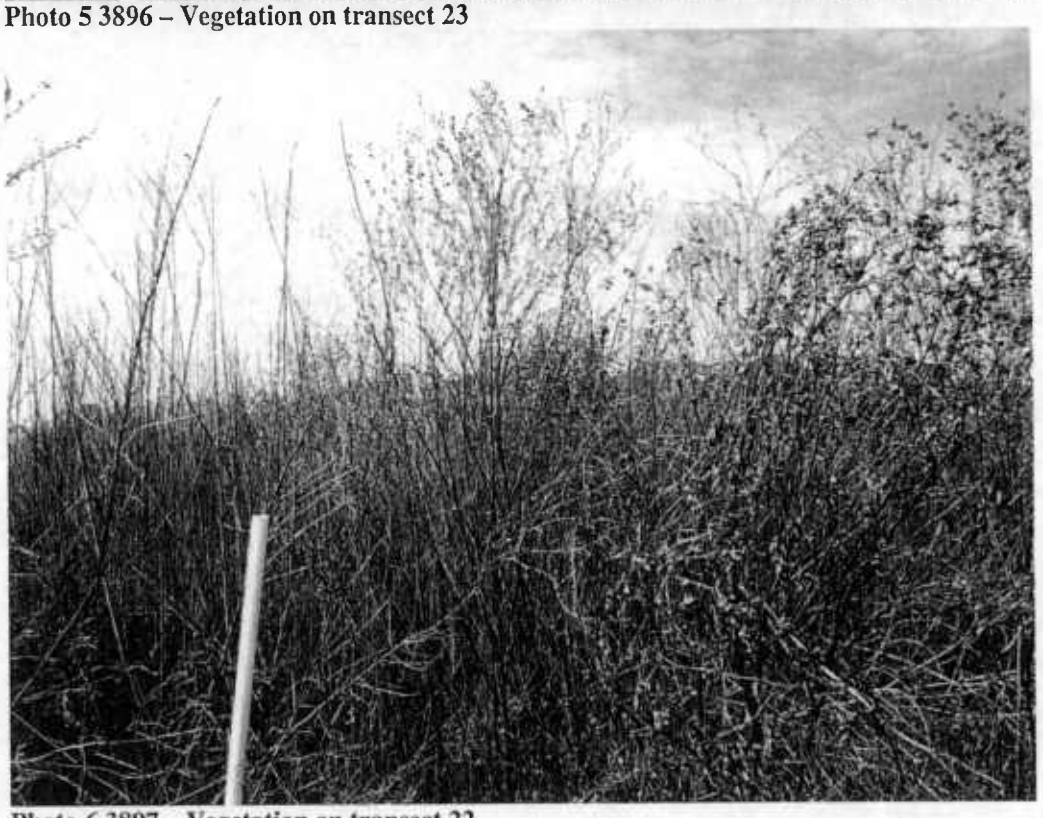

Photo 6 3897 – Vegetation on transect 22

Photo 7 3898 – Vegetation on transect 21

Photo 8 3899 – Vegetation on transect 20

Photo 9 3900 – Vegetation on transect 19

Photo 10 3901 – Vegetation on transect 18

Photo 11 3902 – Vegetation on transect 17

Photo 12 3903 – Vegetation on transect 16

Appendix B – Hydrology Photos

Photo 13 Ponding in Phase II A May 2009

Photo 14 Ponding in Phase II A May 2009

Photo 15 Ponding in Phase II A May 2009

Photo 16 Ponding in Phase II A May 2009

Photo 17 Ponding in Phase II A May 2009

Photo 18 Ponding in Phase I May 2009

Photo 19 Ponding in Phase I May 2009

Photo 20 Ponding in Phase I May 2009

Photo 21 Ponding in Phase I May 2009

Photo 22 Ponding in Phase I May 2009

Photo 23 Ponding in Phase I May 2009

Photo 24 Ponding in Phase I May 2009

Photo 25 Ponding in Phase II B May 2009

Photo 26 Ponding in Phase II B May 2009

Photo 27 Ponding in Phase II B May 2009

Photo 28 Ponding in Phase II B May 2009

Photo 29 3884 – Ponding in Phase I Oct 2009

Photo 30 3885 – Ponding in Phase I Oct 2009

Photo 31 3909 Ponding in Phase I Oct 2009

Photo 32 3910 – Ponding in Phase I Oct 2009

Appendix C – Soils Photos

Photo 33 3914 – Well 1

Photo 34 3913 – Well 1 Soil

Photo 35 3912 – Well 2

Photo 36 3911 – Well 2 Soil

Photo 37 3908 – Well 3

Photo 38 3906 – Well 3 Soil

Photo 39 3905 – Well 4

Photo 40 3904 – Well 4 Soil

Photo 41 3893 – Well 5

Photo 42 3892 – Well 5 Soil

Photo 43 3916 – Well Phase II North

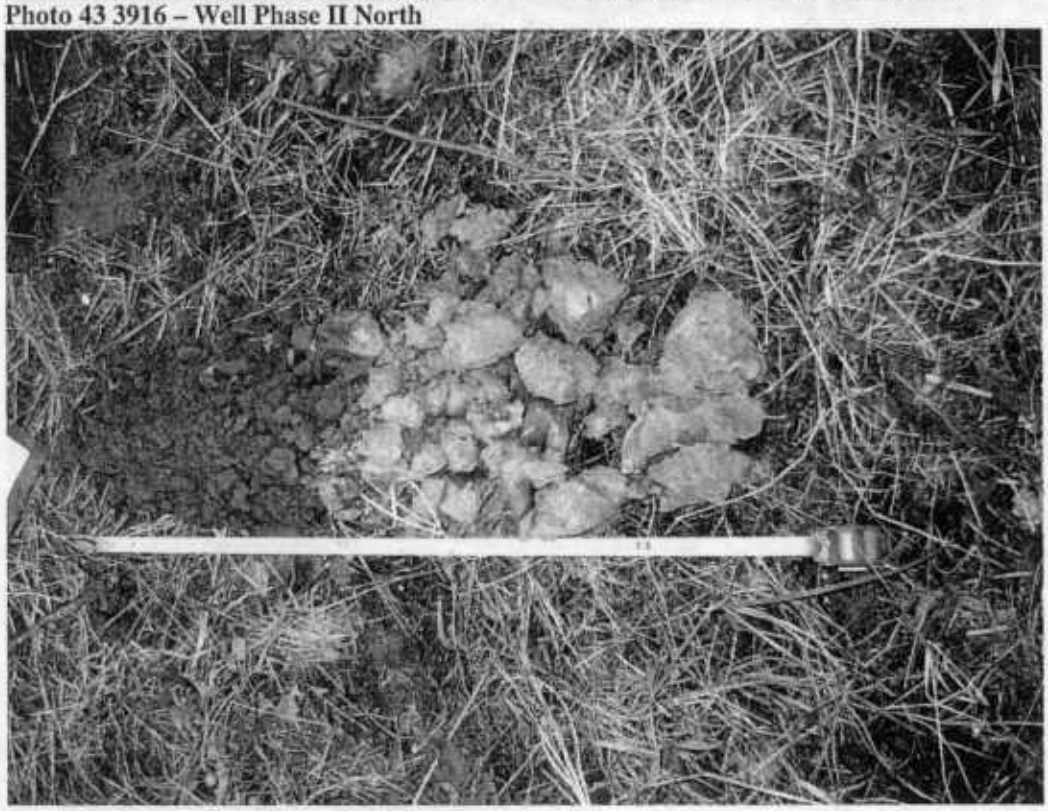

Photo 44 3915 – Well Phase II North Soil

Photo 45 3918 – Well Phase II South

Photo 46 3917 – Well Phase II South Soil

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WICOMICO AIRPORT WETLAND MITIGATION

Wetland Mitigation Monitoring
1ST Year Annual Report
Permit # 200560956/04-NT-2196

December 2007

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LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS

1.0 INTRODUCTION

The Wicomico County Airport Commission (WCAC) has an obligation to compensate for wetland impacts in accordance with 2005 Maryland Department of the Environment (MDE) and Army Corps of Engineers (COE) permits for airport mitigation. The proposed Wicomico Regional Airport improvements consist of two activities: 1) the rehabilitation of existing runways, and 2) the extension of existing runways. The proposed impacts for this project are filling and grading 29.5 acres of mowed emergent wetlands and 6.7 acres of mowed buffer impacts. Due to Federal Aviation Administration (FAA) safety requirements these wetlands and wetland buffer areas have been kept mowed on a regular basis for many years to suppress succession.
The mitigation effort compensates for 29.5 acres of these wetland impacts.

Bobtown Road is the chosen site to satisfy all of the wetland mitigation needs for the Wicomico Regional Airport improvements (Figure 1a, Vicinity Map of Wicomico Airport and Mitigation Site. Figure 1b, Wetland Mitigation Property Boundary). The location is adjacent to the Wicomico River, within the Chesapeake Bay Critical Area (Figure 2). The site was previously converted from wetland to agricultural land, where a high groundwater water table and areas of hydric soils still persist. Surrounding the site are additional palustrine and estuarine wetlands indicative that an improved hydrologogic regime will support the success of the mitigation efforts. In June of 2007, the mitigation construction and planting of 33.16 acres of non-tidal forested wetlands were completed.

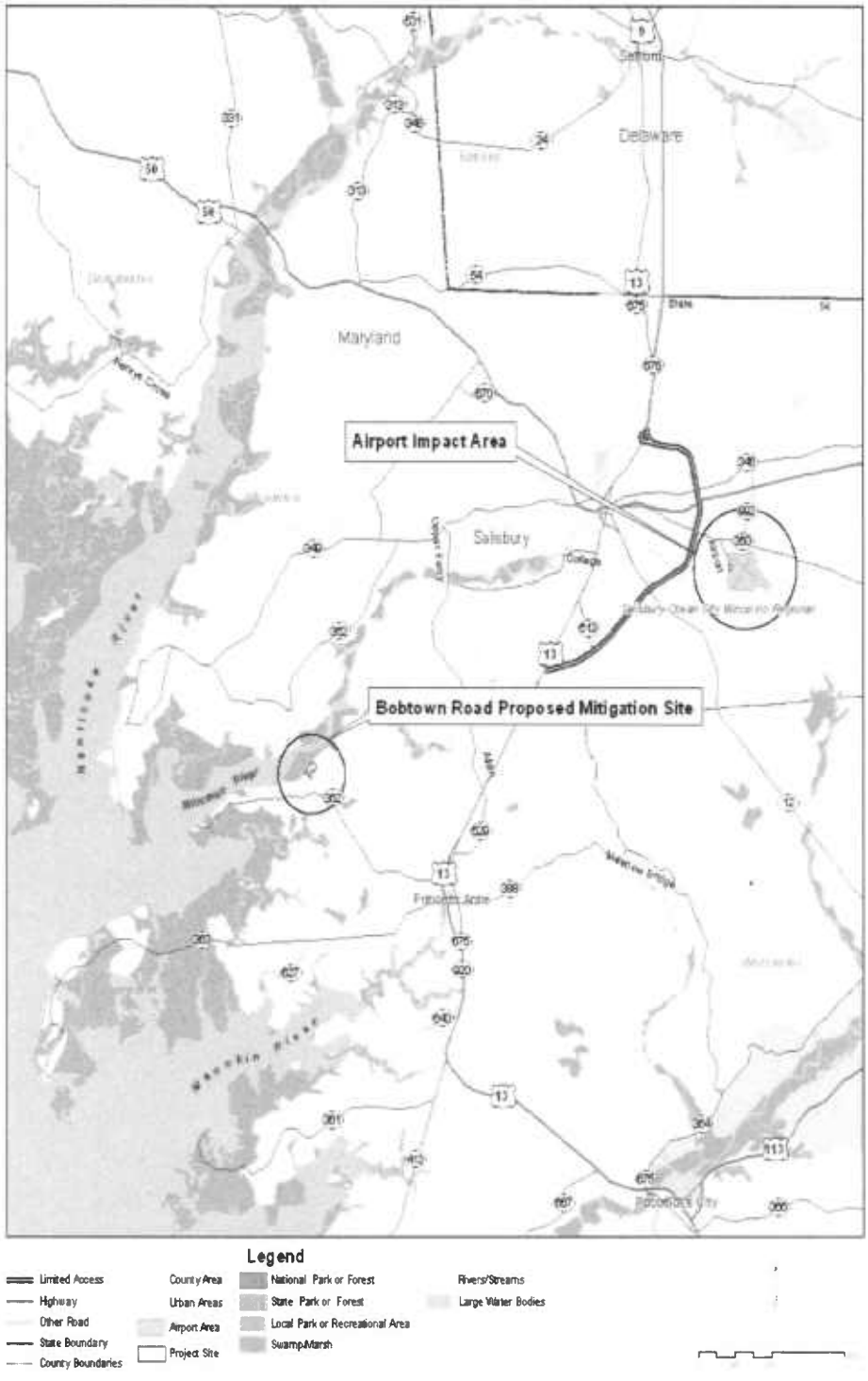


Figure 1a. Vicinity map of Wicomico Airport wetland impact area and proposed mitigation site.

Figure 1b. Wetland Mitigation Property Boundary

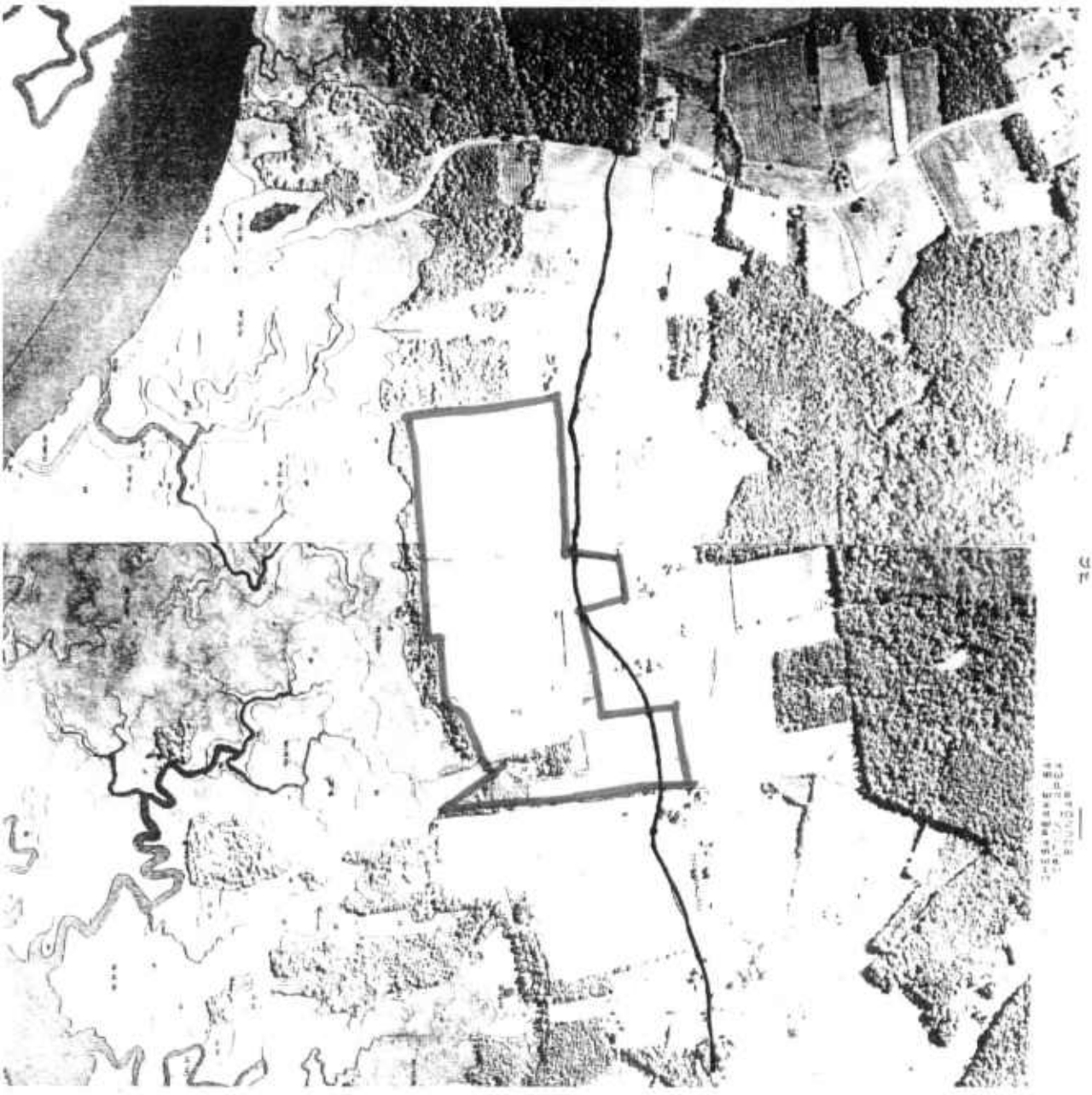


Figure 2. Chesapeake Bay Critical Area

2.0 METHODS

The Maryland Compensatory Mitigation Guidance Manual (IMTF 1994) was reviewed to identify the recommended sampling methodology and protocols for the 33.16 acres of non-tidal forested wetland. Performance criteria are observable or measurable attributes will be used to determine if the project meets established goals and objectives. The performance criteria used are based on established IMTF manual criteria with minor modifications to reflect both site-specific and permit-specific conditions.

Vegetation sampling, soil samples and surface water monitoring began after construction and planting in 2007, and will be repeated for five years. Five wells were installed on the project site and downloading, monitoring, and maintenance will occur quarterly during the five year monitoring period. The Maryland Compensatory Mitigation Guidance Manual provided guidelines that were followed for well installation. The soil sampling locations are in the immediate vicinity of the monitoring wells are shown in Figure 3a.

As suggested for areas greater than 5 acres, the vegetation density measurements will be conducted once between May and September annually for five years during the growing season. Permanent transects were placed on June 21st, 2007. The samples incorporate species composition, dominance, and density. The first transect was placed longitudinally starting 20 ft. from the west edge of the created wetland. Each transect after was placed at 75 ft. intervals parallel to one another. Each transect has 10 ft. circular plots spaced 75 ft apart in planting zone 1 and zone 2. In planting zone 3 and zone 4 plots were spaced 50 ft apart for a representative sample because these zones have less acreage. Our sampling approach includes 23 transects and 125 vegetation plots for the 33.16 acre forested wetland shown in Figure 3b. The permanent transects will serve both the vegetation and surface water hydrology sampling effort.

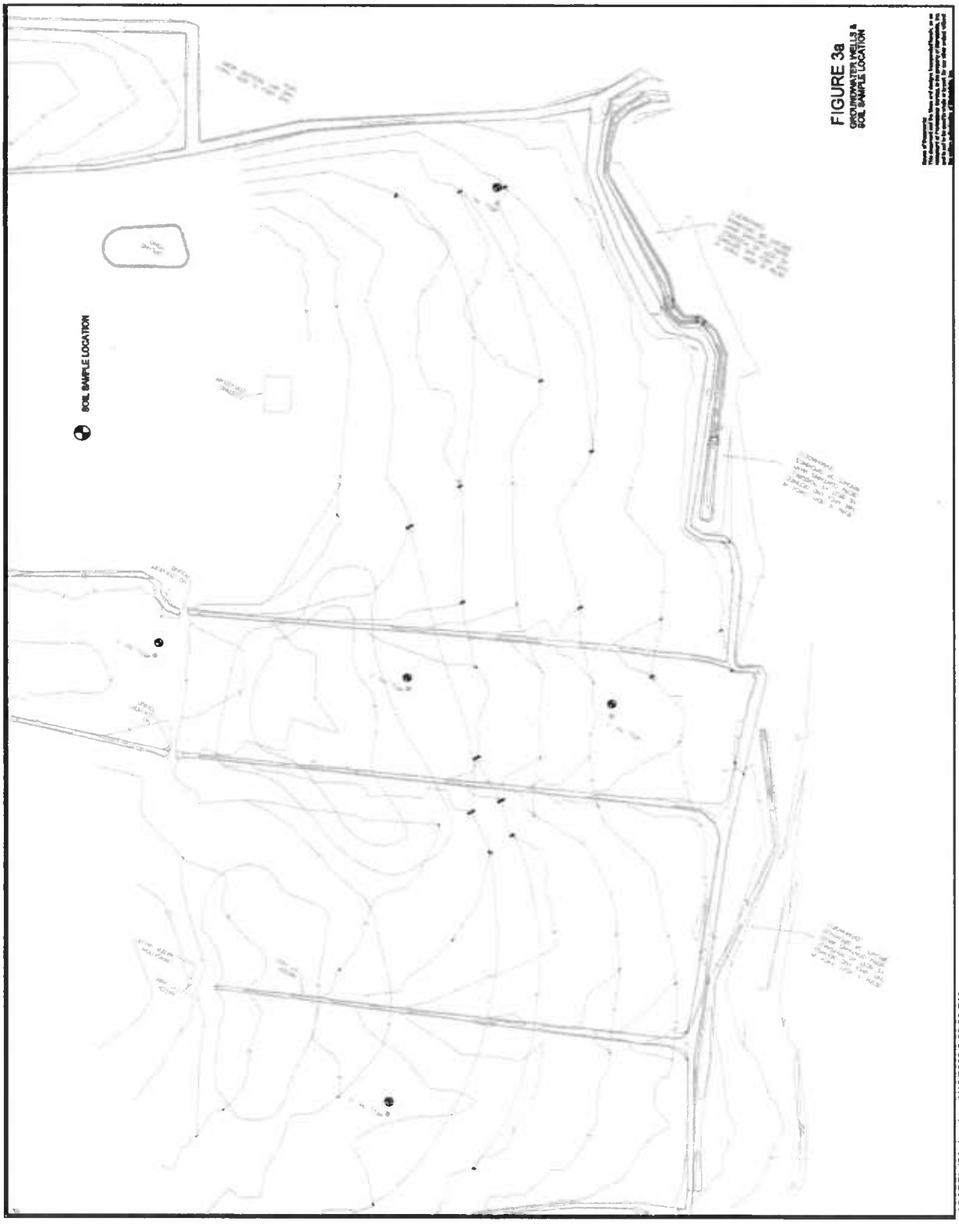


Figure 3a. Soil Sample and Groundwater Well Locations

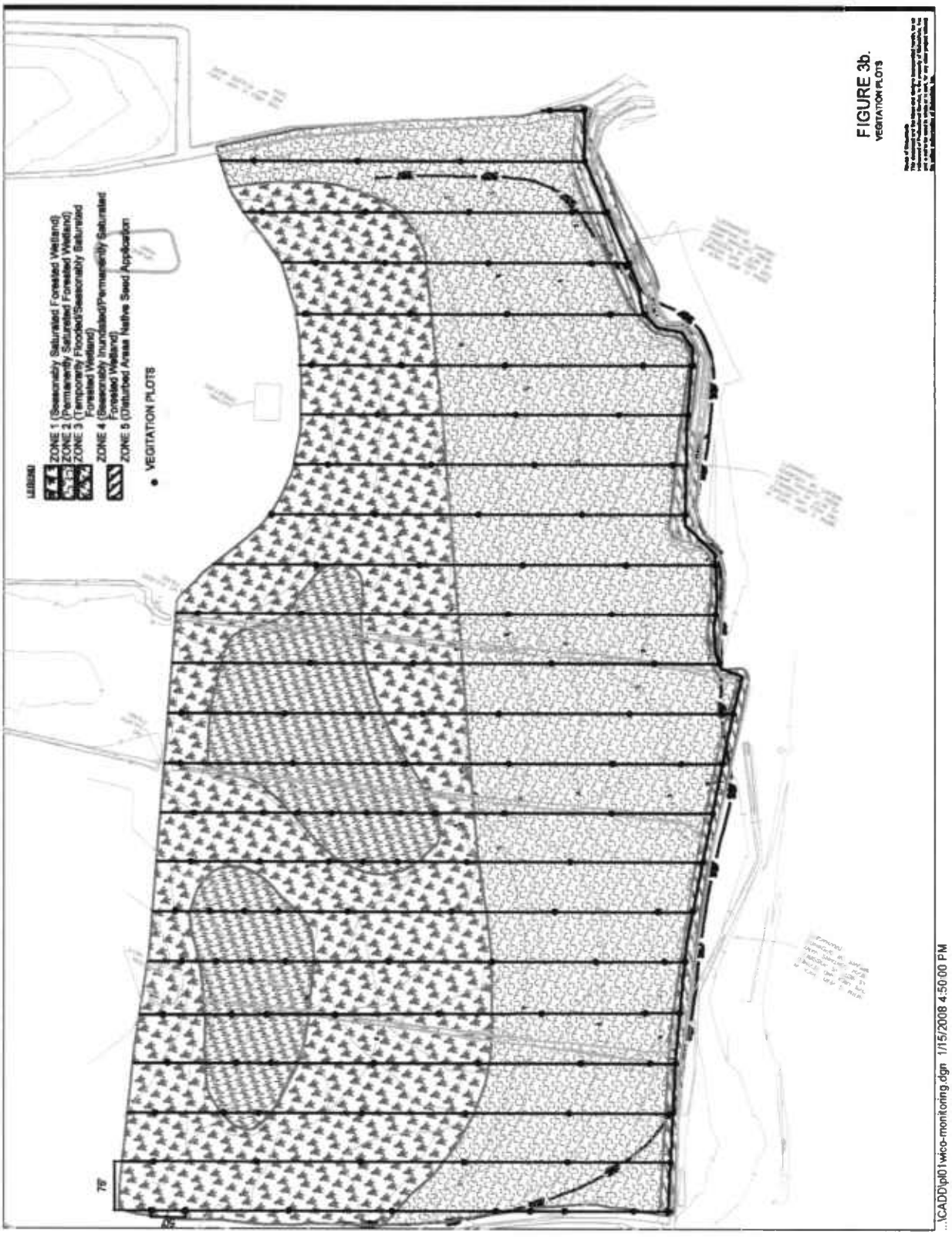


Figure 3b. Vegetation Transects and Plot Locations

3.0 MONITORING RESULTS

3.1 VEGETATION

Based on woody stem density, the Bobtown road property site for wetland mitigation currently meets the 435 stem/acre forested wetland plant community recommendation from the IMTF guidelines (Appendix, Photograph 1 & 2). Sampling results for the plant community are summarized in Table 1. The annual monitoring reported (676 stems/acre) of hydrophytic vegetation in the first monitoring year.

The site has also has volunteer sweet gale (*Myrica gale*), indicative of suitability of the restored wetland conditions. The site has four (4) planting zones including: (1) seasonally saturated, (2) permanently saturated, (3) temporarily inundated and seasonally saturated and (4) seasonally inundated and permanently saturated. Zone 1 and zone 2 have a vegetation matrix populated by agricultural weeds. Zone 3 has ponded areas that are 45% void of hydric vegetation and zone 4 is a linear band found at the southern end of the site and has the greatest species diversity.

Zone 1 has a vegetation matrix populated by agricultural weeds. Agricultural weeds that came into the site after construction activities were completed caused the planted material particularly in zone 1 to suffer from light and nutrient suppression. The dominant plants in this zone 1 are hackberry (*Celtis laevigata*), wax myrtle (*Morella cerifera)* and sweet bay magnolia (*Magnolia virginiana*).

Zone 2 also has a significant cover of agricultural weeds but had the most hydric vegetation of all the planting zones on the site. The hydric plants that dominate this zone were river birch (*Betula nigra*), silky dogwood (*Cornus amomum*), and Virginia pine (*Pinus traeda*). The Virginia pine and bald cypress (*Taxodium distichum*) plantings did not meet the 10'' height guideline requirements for woody stem counts this year; (these bare root specimens were installed at ~ 4-6'' in height).

Zone 3 has the least hydric vegetative cover and the ponded areas have dominant species consisting of: button bush (*Cephalanthus occidentalis*), Atlantic white cedar (*Chamaecyparis thyoides)*, and water tupelo *(Nyssa sylvatica).* The Atlantic white cedar did not meet the 10'' height guideline requirements for woody stem counts (these bare root specimens were installed at ~6'' in height).

Zone 4 was the most successful zone for species diversity. Common plants found in this zone are river birch, buttonbush, Virginia pine, and dogwood. Zone 1 and zone 2 are closest to the Wicomico River and suffered the least during the drought of 2007.

Table 1. Summary of the Plant Community Monitoring Results

Common Name, *Scientific Name*	Planted	Observed
Willow oak, *Quercus phellos*	X	X
Black gum, *Nyssa sylvatica*	X	X
American elm, *Ulmus americana*	X	X
Sweetgum, *Liquidambar styraciflua*	X	X
Buttonbush, *Cephalanthus occidentalis*	X	X
Hackberry, *Celtis laevigata*	X	X
Persimmon, *Diospyros virginiana*	X	X
Atlantic white cedar, Chamaecyparis thyoides*	X	X
Green ash, *Fraxinus pennsylvanica*	X	X
Pin oak, *Quercus palustris*	X	X
Sweetbay, *Magnolia virginiana*	X	X
Wax myrtle, *Morella cerifera*	X	X
Silky dogwood, *Cornus amomum*	X	
Swamp white oak, *Quercus bicolor*		X
Loblolly pine, *Pinus taeda**	X	X
Swamp tupelo, *Nyssa sylvatica var. biflora*	X	X
Cherrybark Oak, *Quercus pagodifolia*	X	X
Bald cypress, *Taxodium distichum***	X	X
River birch, *Betula nigra*	X	X

** Less than 10'' in height
* Was installed at the lowest elevation position in the planting zone

3.2 HYDROLOGY

Five groundwater monitoring wells were installed at the Bobtown Road site and were downloaded quarterly. The Bobtown Road mitigation site does not currently meet the IMTF and permit conditions for wetland hydrology due primarily to the growing season drought of 2007. The wells respond to precipitation events, however, the 2007 growing season was an unusually dry year with few precipitation events documented by the National Oceanic Atmospheric Administration (NOAA) National Weather Service, from Salisbury rain gage station (Figure 4).

The growing season of 2007, was an unusually dry year with only half the amount of the average precipitation from data dating 1971-2000 for Salisbury, Maryland. This year there were two peak rainfall events one on April 15th with 2.42 inches and 1.23 inches on June 4th. Aside from these precipitation events, rainfall during the growing season was almost absent. The groundwater at each of the five wells was found to be at least 2.5 – 4.5 ft. below the surface during the growing season (Figure 5).

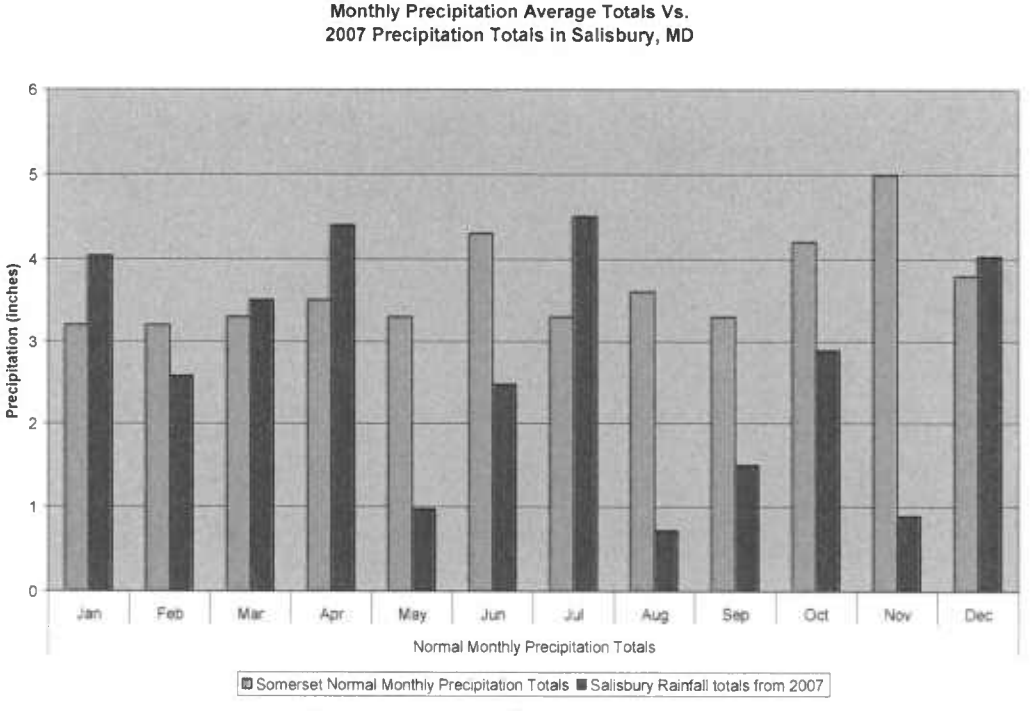


Figure 4. Monthly Precipitation Average (1971-2000) Totals vs. 2007 Monthly Precipitation Totals

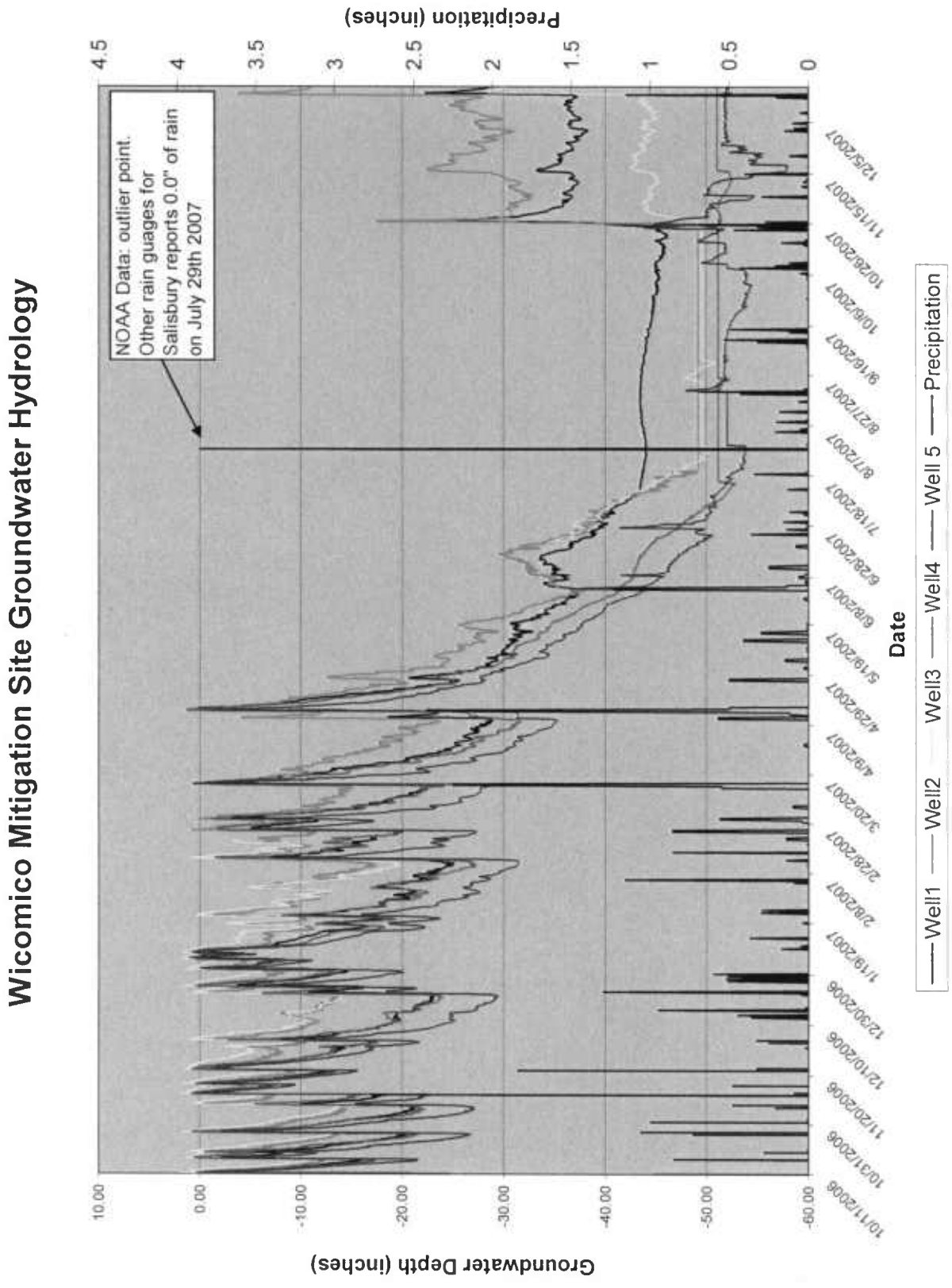


Figure 5. Groundwater Well Data

3.3 SOILS

Soils were sampled in the vicinity of each groundwater monitoring well. The soils of the mitigation site exhibited a cultivated mineral horizon in the top layer of each soil sample. There were areas of concentration and depletion in each soil sample that was taken. The areas of concentration are identified by red and orange colors indicating oxidation and black masses which are reduced. The areas of depletion are identified by the grayish colors (low chroma mottle <2) indicating a leaching effect. This is identified in Table 2 and in the photographs (Appendix, Photo 3). The areas of concentrations were found surrounding the roots in the soil sample (oxidized rhizospheres) and macropores. There were five (5) soil samples taken within 20ft of each groundwater monitoring well.

Sample1: This sample is starting to show hydric conditions ~ 2.9 ft. deep where the mottles indicate a fluctuating groundwater table and the depth to saturation was 2.5 feet.
Sample 2: This sample exhibited the strongest hydric conditions of the entire site. Depletions occurred within 0.8 tenths of a foot of the ground surface.
Sample 3: Hydric conditions are indicated by the redoximorphic mottles starting at 1.5ft. deep. There was no free water occurring with this sample, however, it appears as though the grading caused by a nearby pond could have increased the ground elevation enough so that the hydric indicators were found deeper in the soil than expected.
Sample 4: This location exhibited the least hydric characteristics of the site. Mottling occurs within 1 ft from the surface. Redox depletions occurred lower in this soil boring then compared to the other borings; indicating the water table stays at this elevation for extended periods of time. There is evidence the water table comes higher in the soil column (~.8'') with the presence of redox concentrations being recorded at .8''.
Sample 5: This sample at 3 ft deep demonstrated a reduced matrix with a chroma <2 primarily from a loss of iron.

The depth to free water in the soil boring ranged from no water to 2.5 ft deep with no boring samples showing saturation to the surface or surface water. The soil data indicate that the soils are beginning to respond to the altered hydrology, and the soils have begun

to exhibit hydric conditions in the first annual growing season after the construction was completed. The soil evaluations results are summarized in Table 2.

Table 2. Results of Soil Evaluations

Location	Depth (inches)	Soil layer	Matrix Color	Mottle Color	Roots (Abundance & Size)	Texture	Comments
Wicomico Mitigation Site							
Well 1	0-0.8''	Ap	10YR4/2		Very fine, few roots common	Sandy loam	Abrupt horizon boundary, weak structure
	0.8''-1.6'	Bw	2.5Y6/4		Very fine, few roots	Sandy loam	Gradual horizon, weak structure
	1.6'-2.9'	C1	2.5Y6/4			Loamy sand	Less structure, abrupt horizon
	2.9'+	C2	2.5Y6/4	7.5YR6/8[1] 10YR7/1[2]		Loamy sand	Less structure, few med. masses
Well 2	0-0.8''	Ap	10YR4/2		Very fine, few common	Sandy loam	Weak structure
	.8''-1.4'	Bt	10YR5/2	7.5YR4/6[1] 10YR7/1[2]	Fine, few common	Sandy clay loam	Moderate structure
	1.4'-2.5+	BC	10YR6/2	7.5YR5/8[1] 10YR6/2[2]		Sandy loam	Moderate structure
Well 3	0-1.5	Ap	10YR4/2		Very fine, few common	Sandy loam	Weak structure
	1.5'-3'	Bg	10YR6/3	10YR6/8[1] 10YR6/1[2]	Very fine, few common	Sandy clay loam	Less structure
	3'+	Cg	10YR6/2	7.5YR5/8[1] 10YR6/1[2]		Loamy sand	No free water
Well 4	0-.8''	Ap	10YR4/2		Very fine, few common	Sandy loam	Weak structure
	.8''-2.1'	B_1	10YR5/6	7.5YR5/6	Very fine, few common	Sandy clay loam	Moderate structure, gradual boundary
	2.1'-3.1'	B_2	10YR5/6	7.5YR5/8[1] 10YR7/1[2]		Sandy loam	Moderate structure, gradual horizon boundary
	3.1'+	BC	10YR6/6	7.5YR5/8[1] 10YR7/2[2]		Loamy sand	Less structure
Well 5	0-0.6''	Ap	10YR4/2		Very fine, few roots common	Sandy loam	Abrupt horizon boundary, weak structure
	0.6''-2.1'	B	10YR5/4	7.5YR5/8	Very fine, few roots	Sandy clay loam	Gradual horizon, moderate structure
	2.1'-3.2'	BC	10YR6/3	7.5YR5/8 10YR7/1		Sandy loam	Weak structure
	3.2'-3.5+	C	10YR7/1	7.5YR5/8[1]		sand	Less structure, common med. And course masses

4.0 PROBLEMS OBSERVED

The Bobtown Road Wicomico Mitigation Site is currently reaching the Permit or IMTF conditions for a forested wetland. However, the site is covered with agricultural weeds out-competing the specified planted material for light and nutrients. Plant specimens for three species did not meet the design specifications in regards to height, and replanting is suggested for Zone 1 and Zone 3. There are patches of invasive Phragmites (common reed) and Lonceria (honeysuckle) on the site adjacent to the agricultural ditches (Appendix, Photograph 3). A single application of herbicide has been made. Future applications are proposed for invasive species control to accommodate the requirements as laid out in the monitoring plan in accordance with the ACE and MDE.

The growing season of 2007, was an unusually dry year with only half the amount of the average precipitation from data dating 1971-2000 for Salisbury, Maryland.

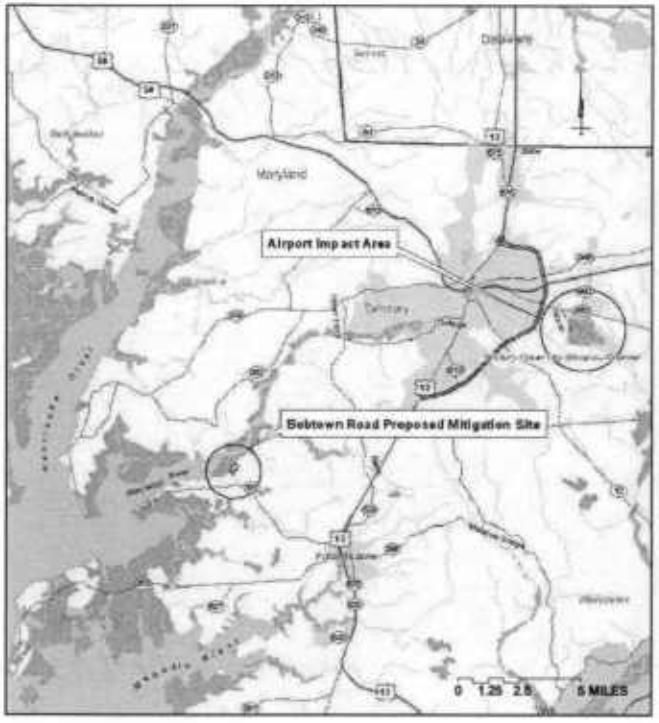
6.0 REFERENCES

IMTF. 1994. Maryland Compensatory Mitigation Guidance. Developed by the Interagency Mitigation Task Force, consisting of the U.S. Army Corps of Engineers (Baltimore), U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Federal Highway Administration, Maryland Department of the Environment, Maryland Department of Natural Resources, and Maryland State Highway Administration. August 1994

NOAA. National Weather Service Forecast Office. 10009 General Mahone Hwy Wakefield, VA 23888 http://mi.nws.noaa.gov/climate/index.php?wfo=akq

WICOMICO AIRPORT
WETLAND MITIGATION

INDEX OF SHEETS



VICINITY MAP

MITIGATION SITE

Restoration Systems, LLC

Biohabitats, Inc.

WICOMICO AIRPORT WETLAND MITIGATION

BOBTOWN ROAD
PRINCESS ANNE, MD 21853

TITLE SHEET

NOT TO SCALE

14 SEPT 2009

1 OF 8

PHASE 2 SUBMITTAL

Restoration Systems, LLC

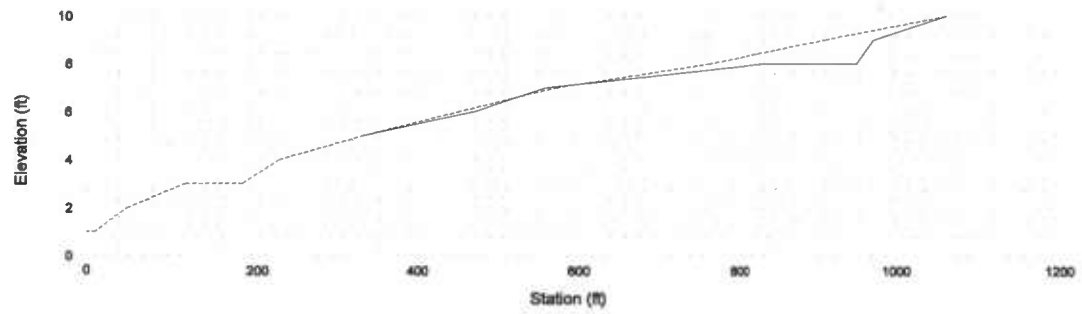
Biohabitats, Inc.

WICOMICO AIRPORT WETLAND MITIGATION

BOSTOWN ROAD
PRINCESS ANNE, MD 21853

GRADING PLAN

2 OF 8



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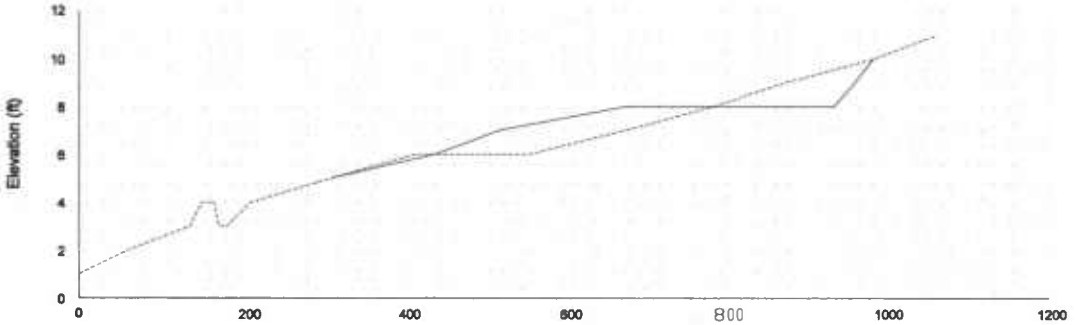

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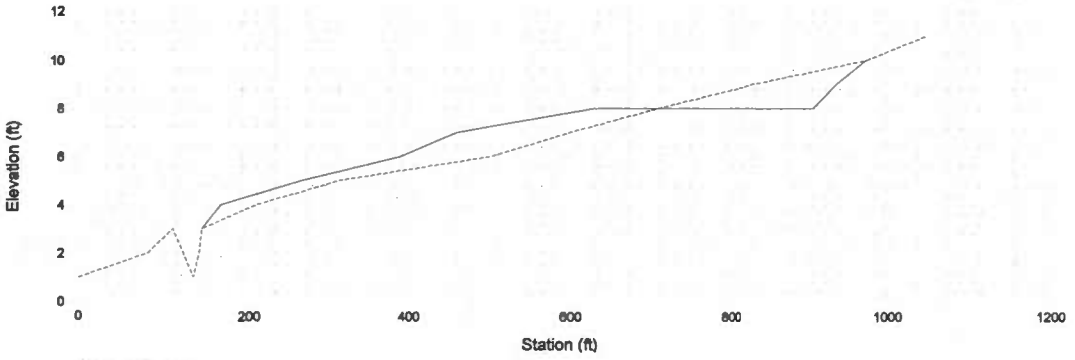

BIO X/S #3

VERT.: 1" = 2'
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Restoration Systems, LLC

Biohabitats, Inc.

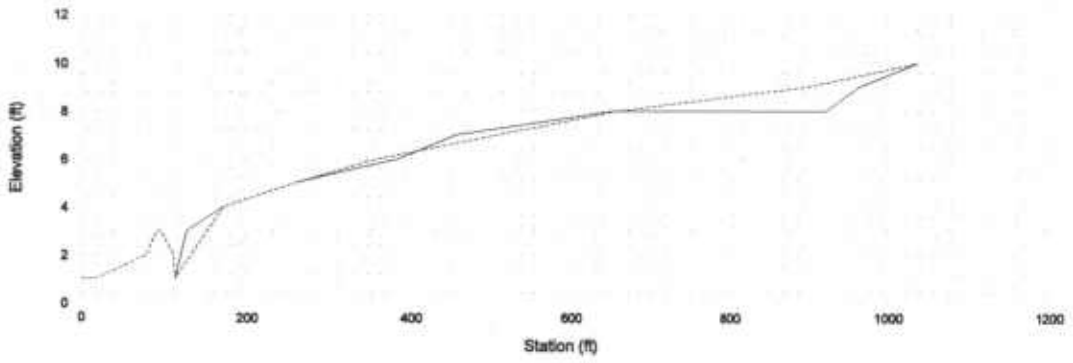
WICOMICO AIRPORT WETLAND MITIGATION

BOSTOWN ROAD
PRINCESS ANNE, MD 21853

CROSS SECTIONS

PROJECT NO.: 03070.01	SCALE: AS SHOWN
DRN.	DESIGNED BY: JNS / DRAWN BY: A.PRINC
CHECKED: SHANJAS	CHECKED: JR
DATE: 14 SEPT 2006	
DWG. NO.: 3 OF 8	

PHASE 2 SUBMITTAL



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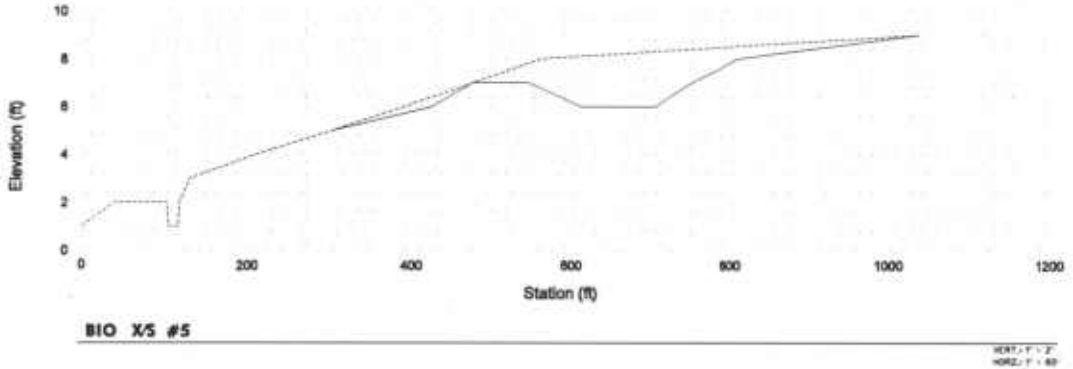

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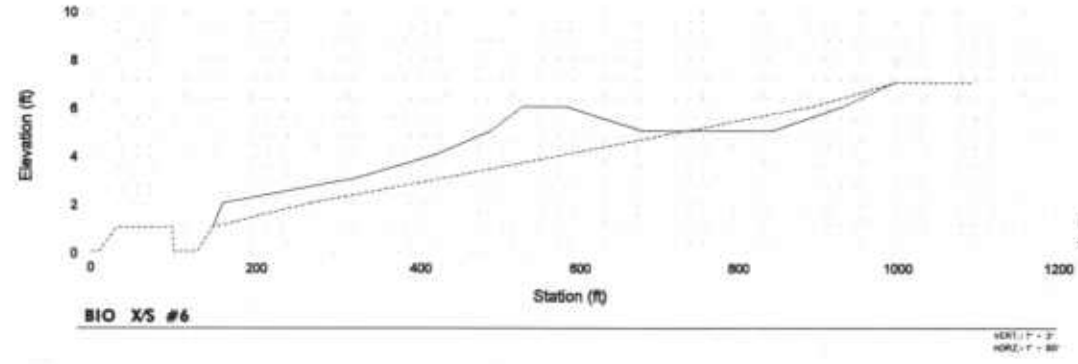


BIO X/S #6

LEGEND

EXISTING CROSS SECTION

PROPOSED CROSS SECTION

Restoration Systems, LLC

Biohabitats, Inc.

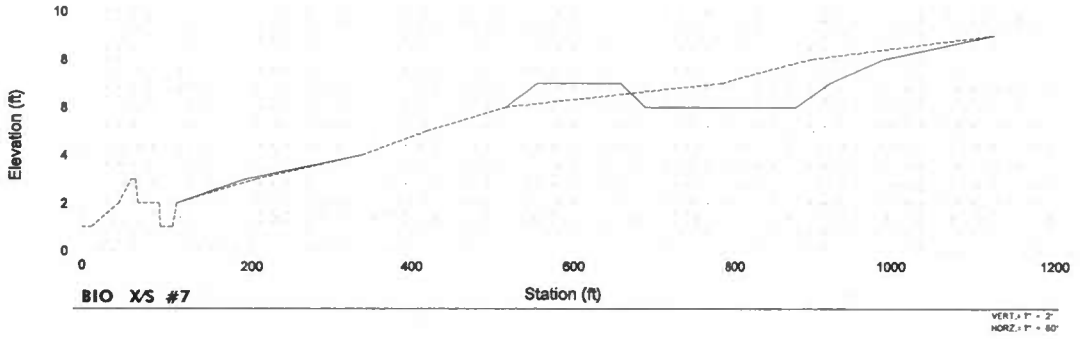
WICOMICO AIRPORT WETLAND MITIGATION

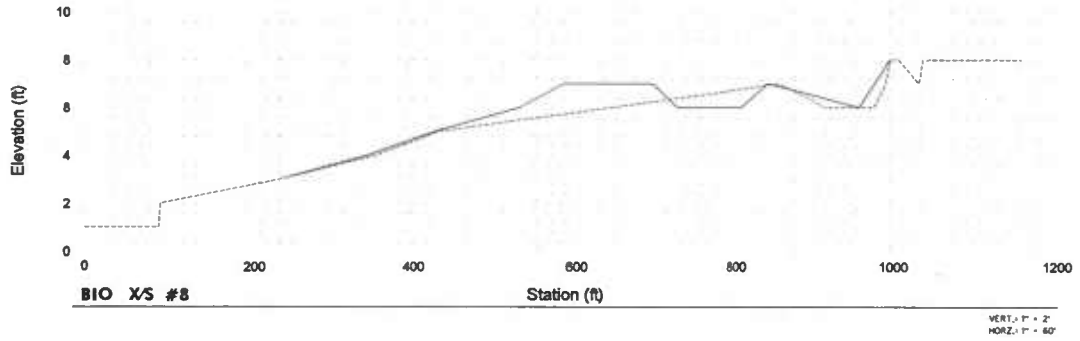
BOSTOWN ROAD
PRINCESS ANNE, MD 21853

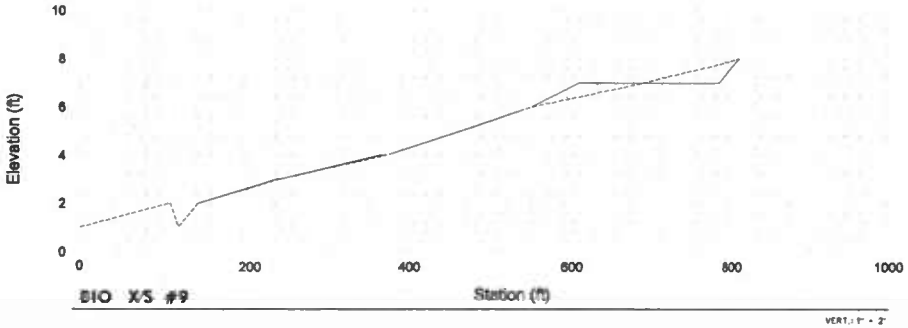
CROSS SECTIONS

4 OF 8

PHASE 2 SUBMITTAL







LEGEND

EXISTING CROSS SECTION

PROPOSED CROSS SECTION

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WICOMICO AIRPORT WETLAND MITIGATION

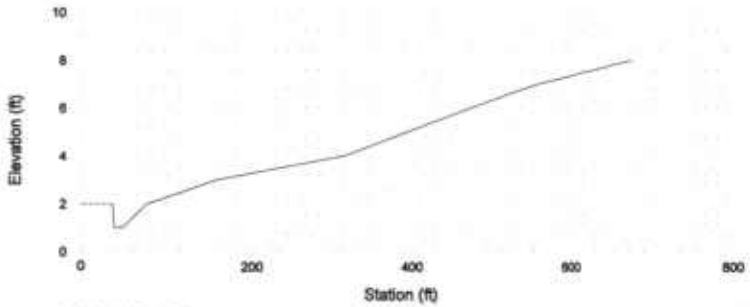
BOBTOWN ROAD
PRINCESS ANNE, MD 21853

CROSS SECTIONS

PROJECT NO.: 08010.01	SCALE: AS SHOWN
DESIGNED BY: JAS	DRAWN BY: AJP/WC
CHECKED BY: SHANJAB	APPROVED: JR
DATE: 14 SEPT 2009	

SHEET NO.: 5 OF 8

PHASE 2 SUBMITTAL



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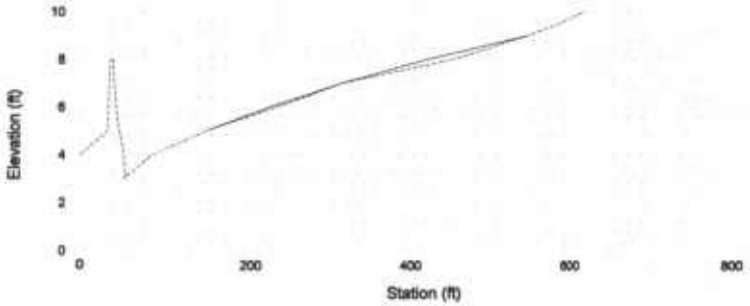

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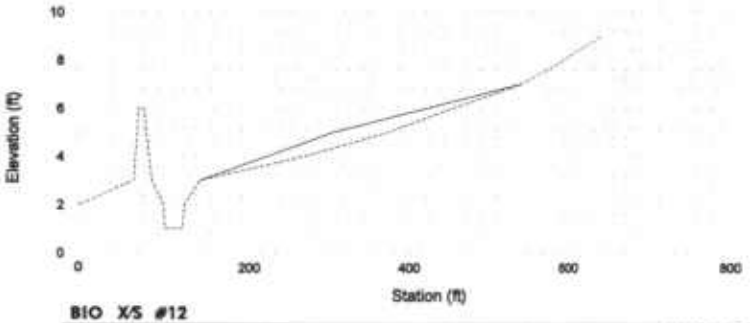

BIO X/S #12

LEGEND

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PROPOSED CROSS SECTION ——————

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AIRPORT WETLAND
MITIGATION

BOBTOWN ROAD
PRINCESS ANNE, MD 21853

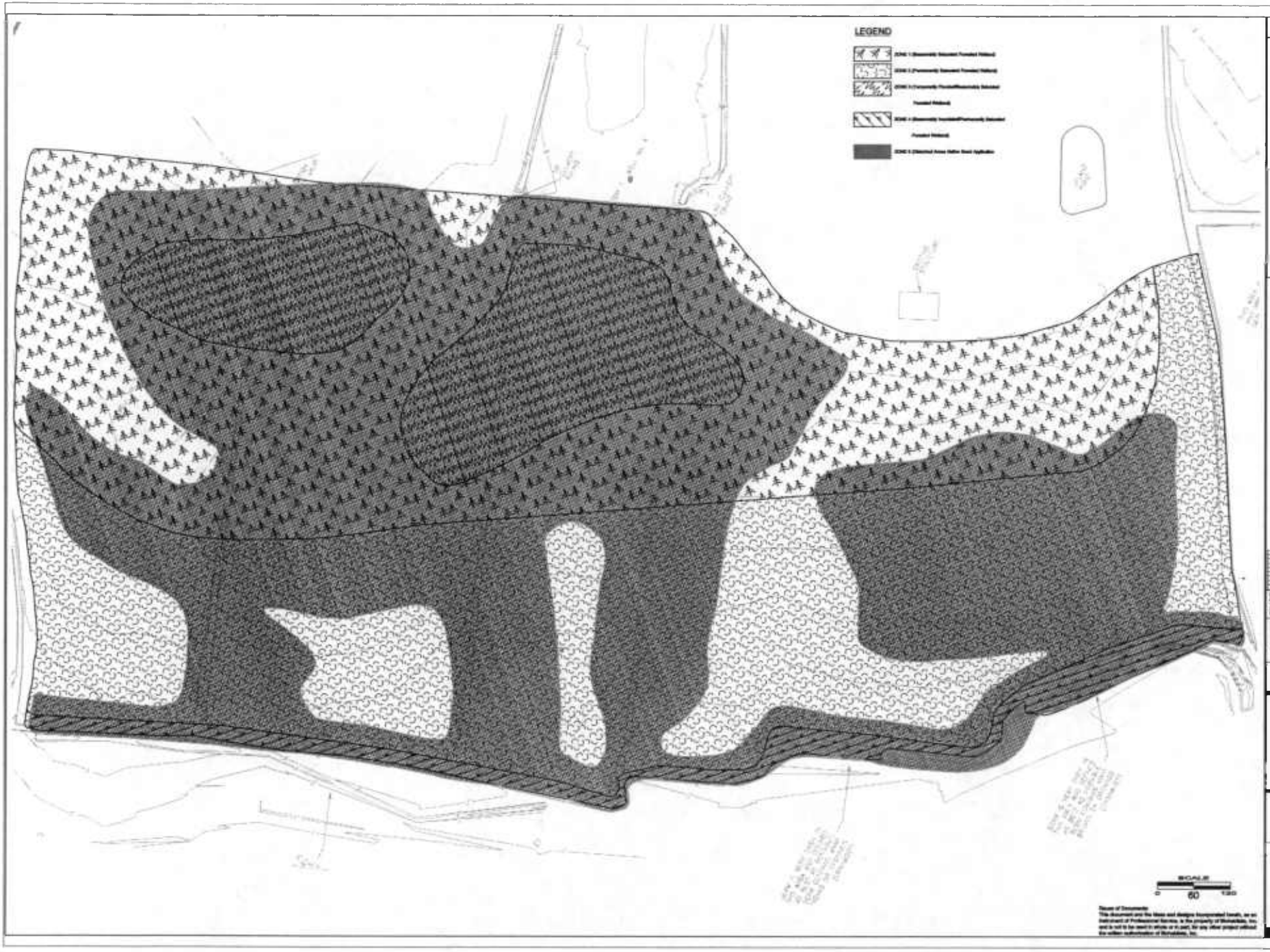
CROSS SECTIONS

6 OF 8

PHASE 2 SUBMITTAL

rec'd 6/26/07

Phase I completed - surfacing grading winter/spring



MDE
Corp of Eng.

Restoration Systems, LLC

Biohabitats, Inc.

WICOMICO
AIRPORT WETLAND
MITIGATION

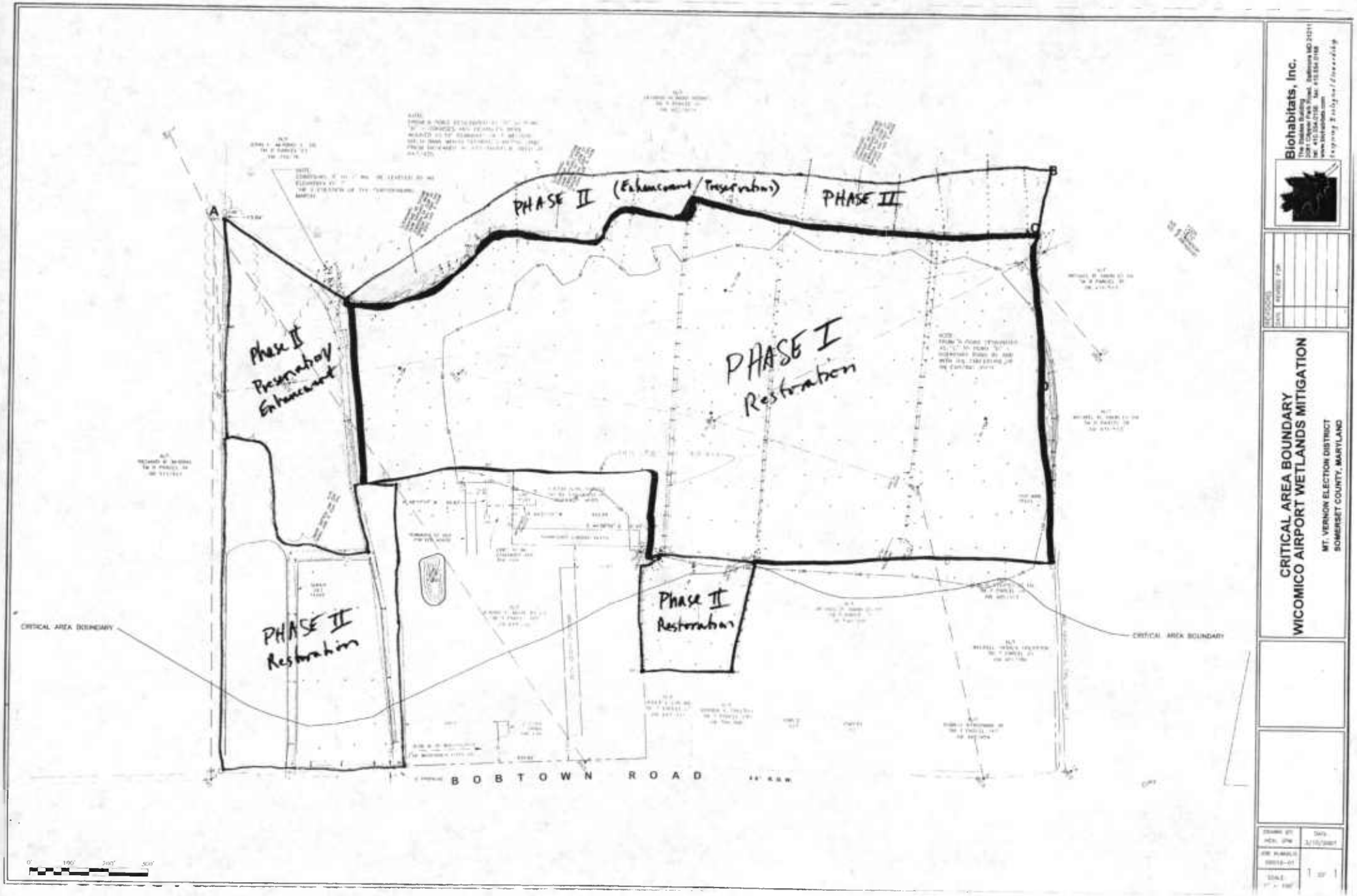
BOBTOWN ROAD
PRINCESS ANNE, MD 21853

PLANTING PLAN

7 OF 8

PHASE 2 SUBMITTAL

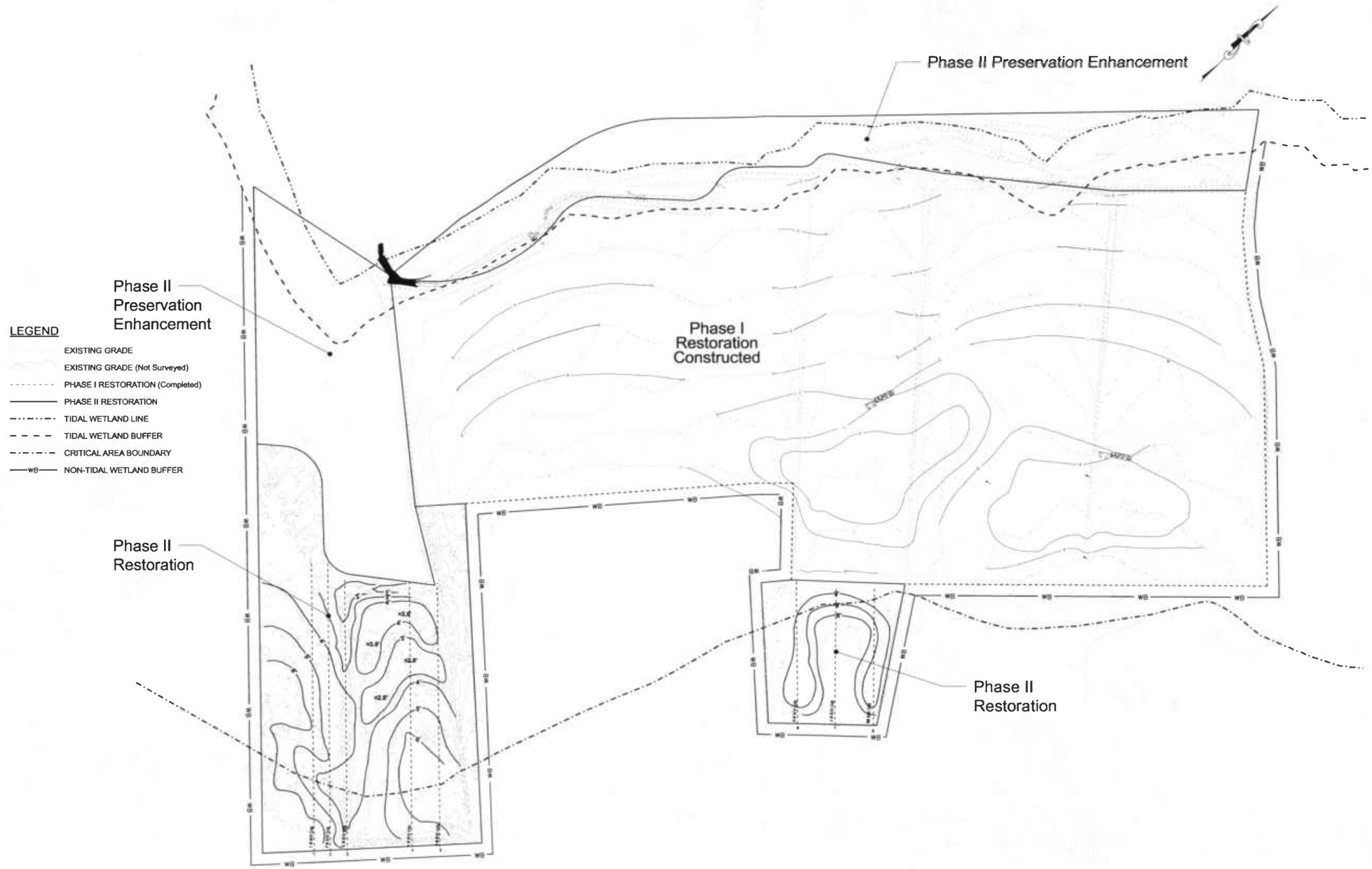
07-354



Biohabitats, Inc.
The Rubin Building
2081 Clipper Park Road, Baltimore MD 21211
ecology & design / innovation

CRITICAL AREA BOUNDARY
WICOMICO AIRPORT WETLANDS MITIGATION
MT. VERNON ELECTION DISTRICT
SOMERSET COUNTY, MARYLAND

DRAWN BY: HEN, CPW
DATE: 5/15/2007
JOB NUMBER: 05018-01
SCALE: 1" = 100'
1 OF 1



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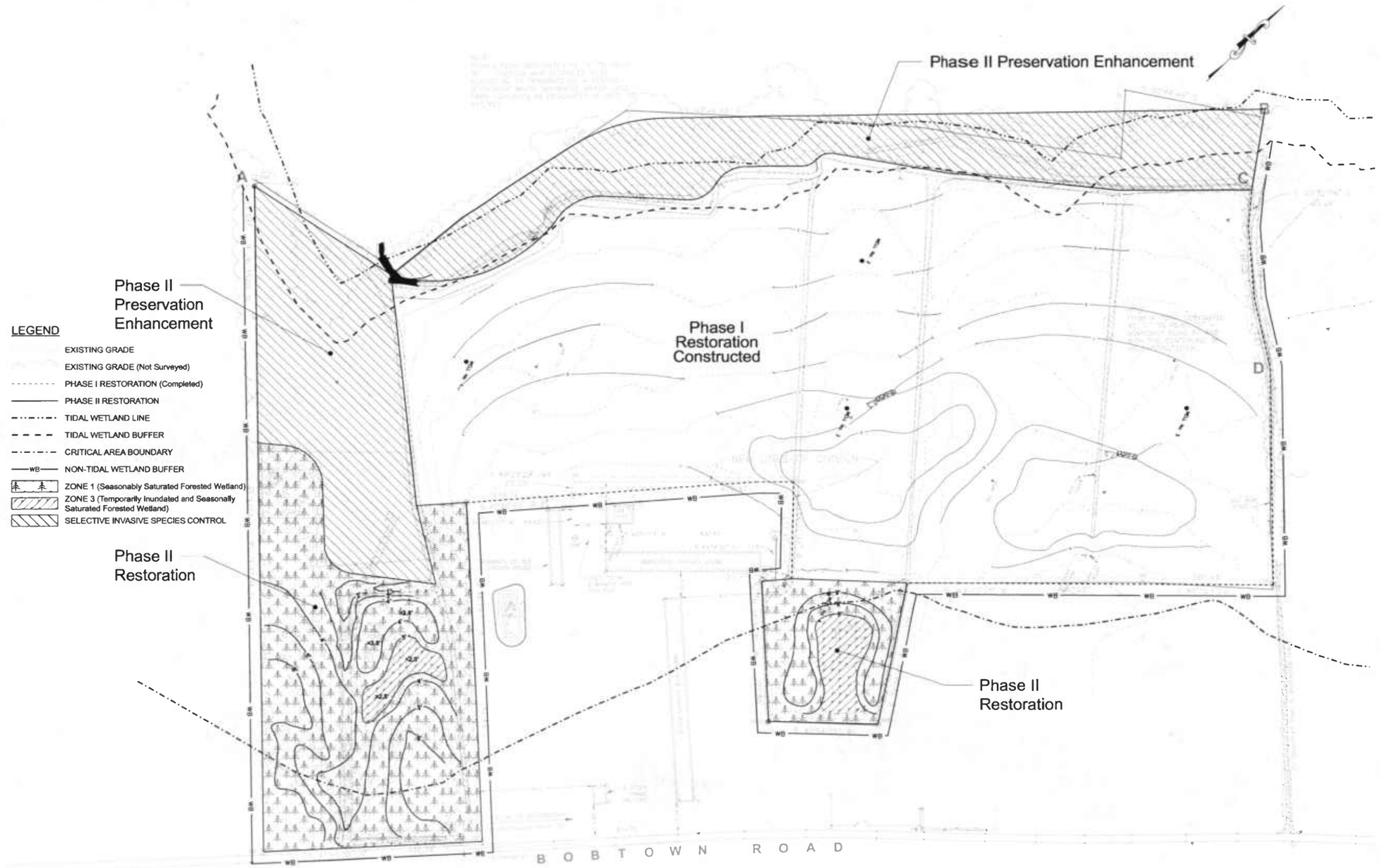
tel: 410-564-0156 Fax: 410-554-0166
www.biohabitats.com
Inspiring Ecological Stewardship

WICOMICO AIRPORT WETLAND MITIGATION

TITLE:

GRADING PLAN

PROJECT NO: 06019.01	SCALE: 1" = 100'-0"
SEAL:	DESIGNED BY: JAB / DRAWN BY: AJP/WC
	CHECKED: EWM/JAB / APPROVED: JR
	DATE: NOVEMBER 2007
	DWG. NO.: 2 OF 10



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REVISIONS			
NO.	DESCRIPTION	DATE	APP.

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Baltimore, Maryland 21211
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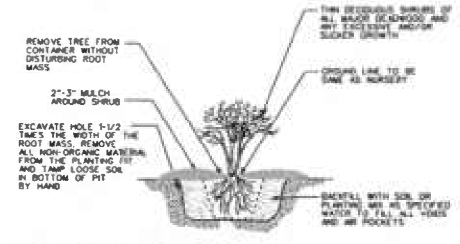
WICOMICO AIRPORT WETLAND MITIGATION

TITLE:

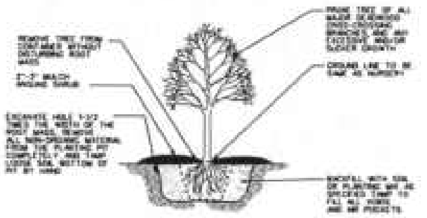
PLANTING PLAN

PROJECT NO. 06019.01	SCALE 1" = 100'-0"
SEAL:	DESIGNED BY JAB / DRAWN BY AJP/WC
	CHECKED EWM/JAB / APPROVED JR
	DATE NOVEMBER 2007
	DWG. NO. : 4 OF 10



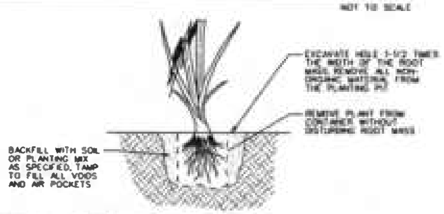
SHRUB PLANTING– CONTAINER GROWN

NOT TO SCALE



TREE PLANTING– CONTAINER GROWN

NOT TO SCALE



PERENNIAL PLANTING– CONTAINER GROWN

NOT TO SCALE

Plant and Composition Schedule

Planting Zone 6- Disturbed Areas Native Seed A Size (acres): 23.34

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
[illegible]	[illegible]			NATIVE SEED					
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	LB of P.L.S. [illegible]	[illegible]	N/A	N/A
		100							

[illegible]

Plant and Composition Schedule

Planting Zone 1 - SEASONALLY SATURATED PFO Size (acres): [illegible]

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
[illegible]	[illegible]			TREES					
		[illegible]	[illegible]	Quercus phellos	Willow oak	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Quercus palustris	Pin oak	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Nyssa sylvatica	Black gum	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Liquidambar styraciflua	Sweetgum	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Ulmus americana	American elm	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			UNDERSTORY TREES					
		[illegible]	[illegible]	[illegible]	Hackberry	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Diospyros virginiana	Persimmon	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Magnolia virginiana	Sweetbay	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			SHRUBS					
		[illegible]	[illegible]	Cornus amomum	Silky dogwood	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Myrica cerifera	Wax myrtle	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
			[illegible]	= total					

Plant and Composition Schedule

Planting Zone 2 - PERMANENTLY SATURATED PFO Size (acres): 15.4

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
[illegible]	[illegible]			TREES					
		[illegible]	[illegible]	Quercus bicolor	Swamp white oak	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Quercus palustris	Pin oak	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Pinus taeda	Loblolly pine	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Nyssa sylvatica var. biflora	Swamp tupelo	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Taxodium distichum	Bald cypress	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Nyssa sylvatica var. aquatica*	Water tupelo	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			UNDERSTORY TREES					
		[illegible]	[illegible]	Magnolia virginiana	Sweetbay	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Betula nigra	River birch	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Myrica cerifera	Wax myrtle	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			SHRUBS					
		[illegible]	[illegible]	Cornus amomum	Silky dogwood	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Cephalanthus occidentalis	Buttonbush	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	= total					
			[illegible]	= total					

* [illegible] installed at the lower elevation position in the planting zone

Plant and Composition Schedule

Planting Zone 3 - TEMPORARILY INUNDATED AND SEASONALLY SATURATED PFO Size (ac): [illegible]

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
[illegible]	[illegible]			TREES					
		100	[illegible]	Chamaecyparis thyoides	Atlantic white cedar	Cutting	Grid	[illegible]	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			UNDERSTORY TREES					
		100	[illegible]	Magnolia virginiana	Sweet bay	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			SHRUBS					
		[illegible]	[illegible]	Myrica cerifera	Wax myrtle	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Cornus amomum	Silky dogwood	Bare Root	Grid	1-3 ft	[illegible]
		[illegible]	[illegible]	Cephalanthus occidentalis	Buttonbush	Bare Root	Grid	1-3 ft	[illegible]
		100	[illegible]	= total					
			[illegible]	= total					

Plant and Composition Schedule

Planting Zone 4 - SEASONALLY INUNDATED AND PERMANENTLY SATURATED PFO Size (acres): [illegible]

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
[illegible]	[illegible]			TREES					
		[illegible]	[illegible]	Taxodium distichum	Bald cypress	Bare Root	Random	[illegible]	[illegible]
		[illegible]	[illegible]	Nyssa sylvatica var. aquatica	Water tupelo	Bare Root	Random	[illegible]	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			UNDERSTORY TREES					
		100	[illegible]	Magnolia virginiana	Sweet bay	Bare Root	Random	[illegible]	[illegible]
		100	[illegible]	= total					
[illegible]	[illegible]			SHRUBS					
		[illegible]	[illegible]	Cornus amomum	Silky dogwood	Bare Root	Random	[illegible]	[illegible]
		[illegible]	[illegible]	Cephalanthus occidentalis	Buttonbush	Bare Root	Random	[illegible]	[illegible]
		100	[illegible]	= total					
			[illegible]	= total					

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Inspiring Ecological Stewardship

WICOMICO AIRPORT WETLAND MITIGATION

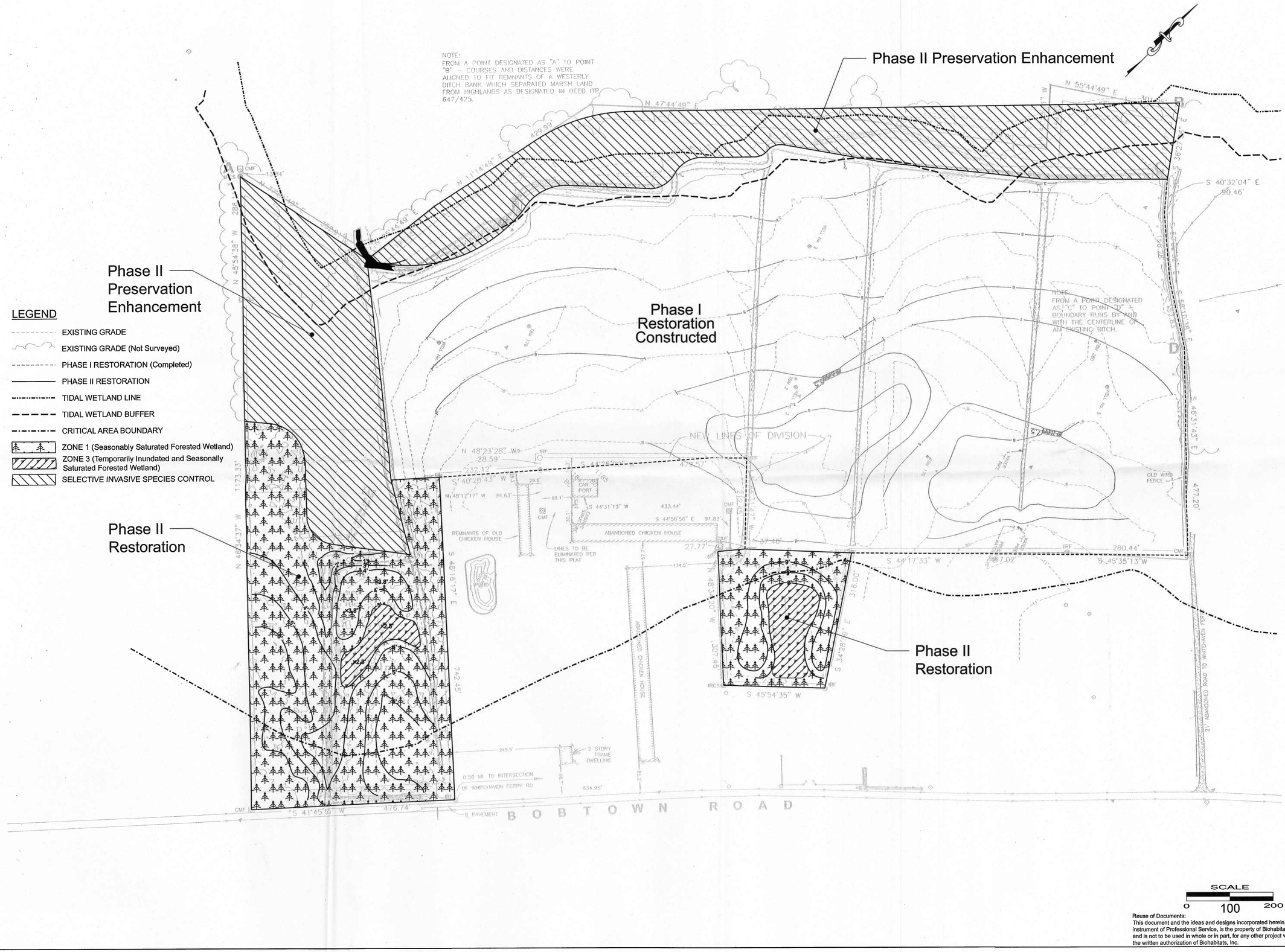
BOSTOWN ROAD
PRINCESS ANNE, MD 21853

PLANTING DETAILS AND SCHEDULES

PROJECT NO.: [illegible] SCALE: AS SHOWN
DESIGNED BY: JAS DRAWN BY: AJPWC
CHECKED: DWB/JAS APPROVED: JR
DATE: 14 SEPT 2009

2 OF 2

X SUBMITTAL



LEGEND

- EXISTING GRADE
- EXISTING GRADE (Not Surveyed)
- PHASE I RESTORATION (Completed)
- PHASE II RESTORATION
- TIDAL WETLAND LINE
- TIDAL WETLAND BUFFER
- CRITICAL AREA BOUNDARY
- ZONE 1 (Seasonably Saturated Forested Wetland)
- ZONE 3 (Temporarily Inundated and Seasonally Saturated Forested Wetland)
- SELECTIVE INVASIVE SPECIES CONTROL

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Mark	Description	Date	Appr.

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Baltimore, Maryland 21211
tel: 410-554-0156 Fax: 410-554-0168
www.biohabitats.com
Inspiring Ecological Stewardship

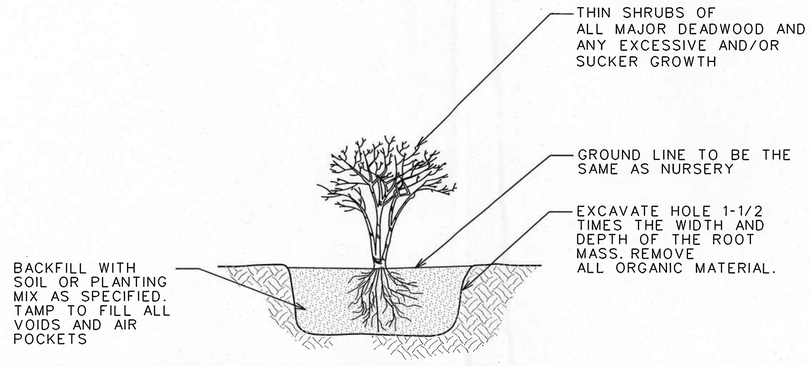
WICOMICO AIRPORT WETLAND MITIGATION

TITLE:

PLANTING PLAN

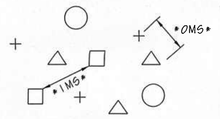
PROJECT NO.: 06019.01	SCALE: 1" = 100'-0"
SEAL:	DESIGNED BY: JAB / DRAWN BY: AJP/WC
	CHECKED: EWM/JAB / APPROVED: JR
	DATE: NOVEMBER 2007
	DWG. NO.: 4 OF 10

RECEIVED
NOV 8 2007
CRITICAL AREA COMMISSION



TREE AND SHRUB PLANTING– BARE ROOT

Not To Scale



OMS- AN OVERALL MINIMUM SPACING DISTANCE •OMS• IS ASSIGNED TO THE PLANTING CONFIGURATION •SEE PLANT SCHEDULE•

IMS- AN INDIVIDUAL MINIMUM SPACING DISTANCES •IMS• IS ASSIGNED TO EACH INDIVIDUAL SPECIES •SEE PLANT SCHEDULE•

PLANT SPACING- RANDOM

PLAN VIEW

NOT TO SCALE

Plant and Composition Schedule

Planting Zone 1 - SEASONALLY SATURATED PFO

Size (acres): 8.75

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
12	500			**TREES**					
		30	1313	Quercus phellos	Willow oak	Bare Root	Grid	1.5 ft	17
		25	1094	Quercus palustris	Pin oak	Bare Root	Grid	1.5 ft	19
		5	219	Nyssa sylvatica	Black gum	Bare Root	Grid	1.5 ft	42
		15	656	Liquidambar styraciflua	Sweetgum	Bare Root	Grid	1.5 ft	24
		15	656	Taxodium distichum	Bald cypress	Bare Root	Grid	1.5 ft	24
		10	438	Ulmus americana	American elm	Bare Root	Grid	1.5 ft	29
		100	**4376**	**= total**					
12	700			**MIDSTORY TREES**					
		5	306	Celtis laevigata	Hackberry	Bare Root	Grid	1.5 ft	35
		40	2450	Diospyros virginiana	Persimmon	Bare Root	Grid	1.5 ft	12
		55	3369	Magnolia virginiana	Sweetbay	Bare Root	Grid	1.5 ft	11
		100	**6125**	**= total**					
10	600			**SHRUBS**					
		58	3045	Cornus amomum	Silky dogwood	Bare Root	Grid	1.5 ft	11
		42	2205	Morella cerifera	Wax myrtle	Bare Root	Grid	1.5 ft	13
		100	**5250**	**= total**					

Plant and Composition Schedule

Planting Zone 3-TEMPORARILY INUNDATED AND SEASONALLY SATURATED PFO

0.76

Overall Spacing (feet off center)	Quantity per acre	Frequency (%)	Species Quantity	Vegetation Strata/ Species Name	Common Name	Unit	Spacing Type	Size	Individual Spacing (ft.)
13	500			**TREES**					
		67	255	Taxodium distichum	Bald cypress	Bare Root	Random	3 - 4 ft.	11
		33	125	Nyssa sylvatica var. aquatica	Water tupelo	Bare Root	Random	4 - 5 ft.	16
		100	**380**	**= total**					
15	700			**MIDSTORY TREES**					
		100	532	Magnolia virginiana	Sweet bay	Bare Root	Random	2 - 3 ft.	8
		100	**532**	**= total**					
15	600			**SHRUBS**					
		47	214	Cornus amomum	Silky dogwood	Bare Root	Random	2 - 3 ft.	12
		53	242	Cephalanthus occidentalis	Buttonbush	Bare Root	Random	3 - 4 ft.	12
		100	**456**	**= total**					

CON=container

* NOTE: Red numbers were the original quanitites proposed for planting as shown on the construction drawings. Black numbers are the actual quantites planted.

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REVISIONS			
Mark	Description	Date	Appr.

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WICOMICO AIRPORT WETLAND MITIGATION

BOBTOWN ROAD
PRINCESS ANNE, MD 21853

TITLE:

PLANTING PLAN DETAILS

PROJECT NO.: 06019.01		SCALE: AS SHOWN	
SEAL:		DESIGNED BY: JAB	DRAWN BY: AJP/WC
		CHECKED: EWM/JAB	APPROVED: JR
		DATE: NOVEMBER 2007	
			SWG. NO.: 9 OF 10

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CRITICAL AREA COMMISSION

% SUBMITTAL