

Belaire Environmental, Inc.
Planning · Permitting · Habitat Creation

August 1, 2004

Mr. Lloyd Mullins
U.S. Army Corps of Engineers
5151 Flynn Parkway, Suite 306
Corpus Christi, TX 78411

Dear Lloyd:

Re: Wetland Determination Report, Proposed Novus Manzano Well Pad and Access Road/Pipeline Route, Padre Island National Seashore, Kleberg County, TX

On March 12, 2004 at the request of Novus USA (Novus), Belaire Environmental, Inc. (BEI) performed a wetland determination on a proposed drilling pad (approx. 2.76 acres) and a proposed road/pipeline route (approx. 1277 ft l x 40 ft w) on the Padre Island National Seashore, Kleberg County, TX (Exhibit A). Avoidance/minimization of impacts to wetlands was a priority in selection of the location and routes. The methods and findings of BEI's wetland evaluation are discussed below.

METHODS:

To perform the determination, BEI used the "Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual" (Wetland Training Institute, Inc., 1999). The routine method for plots less than 5 acres was employed. To determine hydric soils, BEI used the 1987 COE manual along with Version 5.01 of "Field Indicators of Hydric Soils in the United States," published by the U.S. Department of Agriculture, Natural Resource Conservation Service. To determine position of various points, BEI used a sub-meter Trimble GPS Model TSCI (model no. 29673-50) with a Trimble backpack receiver (model no. 33302-51). Position coordinates were recorded and then plotted in the office with Arcview. Once BEI finalized all points in the field, a Registered Professional Land Surveyor (Frontier Surveying Co.) field recorded all points set by BEI (Exhibit A).

FINDINGS:

BEI examined land features within a proposed pad approximately 2.76 acres in size and along a proposed road/pipeline route approx 1277 ft long and approx 40 ft wide. Within these areas one distinct vegetation community was identified and was determined to be upland.

The entire pad and road/pipeline route were situated within an area of fluctuating dunes and valleys comprised of **Upland A**. The valleys were typically dominated by seacoast bluestem (*Schizachyrium scoparium*, FACU+) and gulf dune paspalum (*Paspalum monostachyum*, FACW+). Non-dominant species included prickly pear (*Opuntia compressa*, UPL), sea oats (*Uniola paniculata*, FACU), western ragweed (*Ambrosia psilostachya*, FAC-), seaside pennywort (*Hydrocotyle bonariensis*, FACW) and camphor weed (*Heterotheca subaxillaris*, UPL). The higher elevations were typically dominated by camphor weed, sea oats, and gulf dune paspalum. Non-dominant species include

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prickly pear, slimleaf dichanthelium (*Dichanthelium linearifolium*, UPL), western ragweed and seaside pennywort.

Several depressions were scattered throughout **Upland A**. BEI took sample pits in these depressions and determined them to be upland. Pit 1 (Exhibit A) was located on the proposed road/pipeline route in a depression approximately 80 ft southeast of the proposed road/existing vector road intersection. This depression was dominated by bulrush (*Scirpus americanus*, OBL), sand spikerush (*Eleocharis montevidensis*, FACW+), starrush whitetop (*Dichromena colorata*, FACW), and narrowleaf sumpweed (*Iva angustifolia*, UPL). Soils at Pit 1 were sandy from 0-20 inches. From 0-7 inches the soils were 10YR 3/3 with no mottles and no streaking. From 7-14 inches the soils were 10YR 4/2 with no mottles and no streaking. From 14-16 inches the soils were 10YR 5/2+ with no mottles and no streaking. From 16-20 inches the soils were 10YR 7/1 with no mottles and no streaking. Saturation of the soils was observed at 7 inches and standing water was observed in Pit 1 at 17 inches. Some scattered patches of thin algae were observed on the soil's surface. These hydrologic indicators were probably a result of well above average rainfall in 2002 and 2003 along with 5.79 inches of rain from January 2004 through March 2004 (Exhibit B). During 2002 and 2003, 45.1 and 43.14 inches of rainfall were recorded at PINS, or a total of 98.24 inches. Normal annual rainfall is 33.84 inches, or 69.68 inches biannually. Thus, the island's rainfall exceeded normal precipitation by 30.56 inches during 2002 and 2003. No other hydrologic indicators were present. Pit 1 was determined to be within an upland due to lack of hydric soils, and a probable lack of hydrologic indicators under normal circumstances (Exhibit B). Pit 2 (Exhibit A) was located along the proposed road/pipeline route in a depression approximately 840 ft southeast of the proposed road/existing vector road intersection. This depression was dominated by bulrush and sand spikerush. Soils at Pit 2 were sandy to 18 inches. The soil matrix was 10YR 5/3 from 0-10.5 inches and 10YR 6/1 from 10.5 to 18 inches. Mottles (10YR 4/4) were observed from 0-10.5 inches and comprised 2% of the soil's matrix. No streaking was observed from 0-18 inches. Saturation of the soils was observed at 8 inches, and standing water was observed in Pit 2 at 14 inches. Some scattered patches of thin algae were observed on the soil's surface. These hydrologic indicators were probably a result of well above average rainfall in 2002 and 2003 along with 5.79 inches of rain from January 2004 through March 2004 (Exhibit B). No other hydrologic indicators were present. Pit 1 was determined to be within upland due to a lack of hydric soils, and a probable lack of hydrologic indicators under normal circumstances (Exhibit B).

The remaining five sample pits were located at various depressions within the proposed 2.4 acre well pad (Exhibit A). Pit 3 was dominated by marshhay cordgrass (*Spartina patens*, FACW), sand spikerush, and seaside pennywort. Soils at Pit 3 were sandy from 0-18 inches with a matrix of 10YR 5/3. No mottling or streaking was observed to 18 inches. No standing water or soil saturation was observed to 18 inches. No other hydrologic indicators were observed. Pit 3 was determined to be within upland due to lack of hydric soils and hydrology (Exhibit B). Pit 4 was dominated by gulf dune paspalum and sand spikerush. Soils in Pit 4 were sandy from 0-18 inches with a matrix of 10YR 5/3. No mottling or streaking was observed to 18 inches. No standing water or

soil saturation was observed to 18 inches. No other hydrologic indicators were observed. Pit 4 was determined to be within upland due to lack of hydric soils and hydrology (Exhibit B). Pit 5 was dominated by gulf dune paspalum, sand spikerush, and marshhay cordgrass. Soils at Pit 5 were sandy from 0-18 inches with a matrix of 10YR 5/3. No mottling or streaking was observed to 18 inches. No standing water or soil saturation was observed to 18 inches. No other hydrologic indicators were observed. Pit 5 was determined to be upland due to lack of hydric soils and hydrology (Exhibit B). Pit 6 was dominated by bulrush, sand spikerush and gulf dune paspalum. The soils at Pit 6 were sandy from 0-18 inches with a matrix of 10YR 3/3. No mottling or streaking was observed to 18 inches. Soil saturation began at 13 inches below the surface. No standing water was observed to 18 inches. No other hydrologic indicators were observed. Pit 6 was determined to be upland due to lack of hydric soils and hydrology (Exhibit B). Pit 7 was dominated by bulrush, sand spikerush, gulf dune paspalum, and starrush whitetop. Soils at Pit 7 were sandy from 0-18 inches with a matrix of 10YR 5/3. No standing water or soil saturation was observed to 18 inches. No other hydrologic indicators were observed. Pit 7 was determined to be upland due to lack of hydric soils and hydrology (Exhibit B).

Novus plans to tie into the existing HPL pipeline approximately 240 ft northwest of the proposed Manzano road route/existing Vector road intersection (Exhibit A). Two options exist for the Novus tie-in: a) The preferred option as shown in Exhibit A, would be to run the pipeline southwest along the northwest side of the existing Vector road approximately 100 ft then turn northwest to run along the northeast side of the BNP Peach road for approximately 230 ft. Routing the pipeline this way would keep the route within uplands previously verified by the Corps of Engineers on November 25, 2003. If the BNP Peach well is successful and BNP lays a pipeline to tie into the HPL line at an upland location, then Novus may tie into the HPL pipeline at the same upland location as BNP's Peach pipeline, or b) Novus may tie directly into the HPL pipeline somewhere within the area shown on the project map in Exhibit A. Novus will attempt to route the Manzano pipeline through uplands beginning at the proposed road/existing vector road intersection to an upland tie-in location at the HPL pipeline (Exhibit A).

BEI personnel accompanied by PINS' National Resource Specialist Arlene Wimer, identified six culvert locations along the proposed road/pipeline route. The six culverts will be placed perpendicular to the road/pipeline route, as shown in Exhibit A, in order to insure that the hydrology in the area be maintained and/or improved. The culverts will prevent the pooling of water in low areas along the road/pipeline route and will maintain and/or improve normal surface runoff occurrences in the area.

A total of 7 sample pits were taken during the wetland determination. Wetland data forms for all 7 sample pits along with PINS' monthly rainfall data from 1967 to present are included in Exhibit B. Exhibit A includes a project vicinity/overview map and a project map overlaid onto applicable portions of USGS topographic maps for the area. Exhibit C includes a National Wetland Inventory map for the project area. Exhibit D includes a project overview overlaid onto a 2002 GLO aerial photograph. Exhibit E contains a copy of the Kleberg County Soil Survey.

The National Wetland Inventory (NWI) map of the South Bird Island SE quadrangles (Exhibit C) shows the proposed pad area, road/pipeline route and area for potential tie-in to the existing HPL pipeline as uplands.

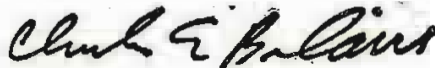
CONCLUSIONS:

Based on BEI's investigations, the proposed pad and road/pipeline route and are within uplands and are not subject to Corps of Engineers (COE) jurisdiction. As mentioned above Novus's preferred pipeline tie-in option will lie within vegetation communities previously determined to be upland by the COE on November 25, 2003. Because the proposed project will be located within the boundaries of the Padre Island National Seashore, Novus will need written verification from the COE of this determination. Please provide this verification at your earliest convenience.

If the COE would like to schedule a site visit please call Charlie Belaire at (361) 729-2948 or Jeff Nelson (361) 729-1241.

Thank you for your helpful assistance.

Sincerely,



Charles E. Belaire



Jeff Nelson

Encl.

cc: Ross Sigur
Howard Wilson
1018 Harding Street, Suite206
P.O.Box 52506
Lafayette, LA 70505-2506

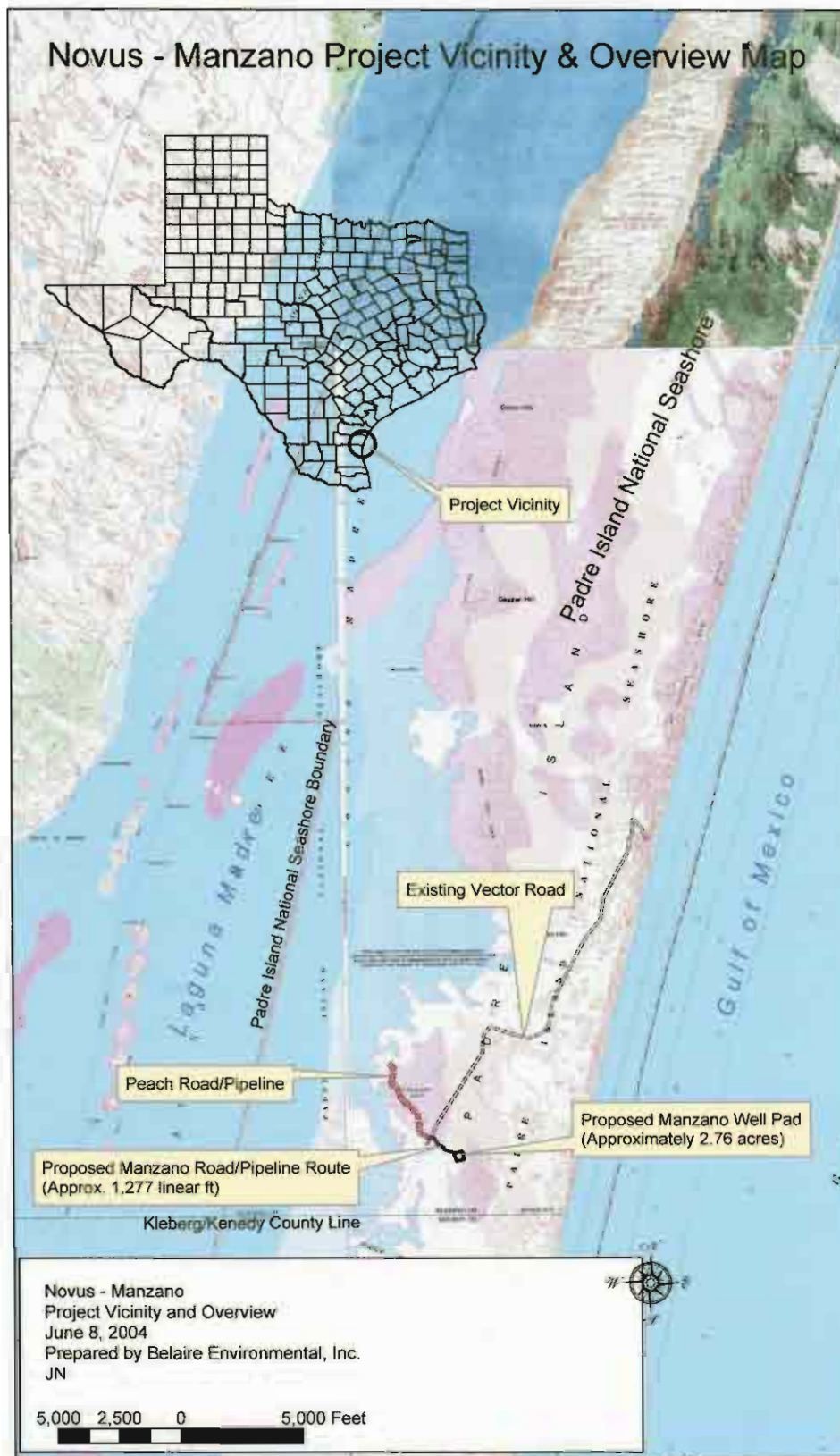
Arlene Wimer
National Park Service
Pare Island National Seashore
Division of Resource Management
P.O. Box 181300
Corpus Christi, TX 78480-1300

LITERATURE CITED

- U.S Department of Agriculture, Natural Resources Conservation Service (Wetlands Science & Soils Division). 1998. Field Indicators of Hydric Soils in the United States, Version 5.01. G.W. Hurt, Whited, P.M., and Pringle, R.F. (eds). USDA, NCRS, Ft. Worth, TX.
- U.S. Department of Agriculture, Soil Conservation Service. In cooperation with Texas Agricultural Experiment Station. 1965. Soil Survey, Kleberg County, TX. U.S. Government Printing Office. Washington, D.C.
- Wetland Training Institute, Inc. 1999. Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual. Glenwood, NM. WTI 99-1. 143 pp.

**EXHIBIT A:
VICINITY/OVERVIEW MAP & PROJECT MAP**

Novus - Manzano Project Vicinity & Overview Map



Novus - Manzano Project

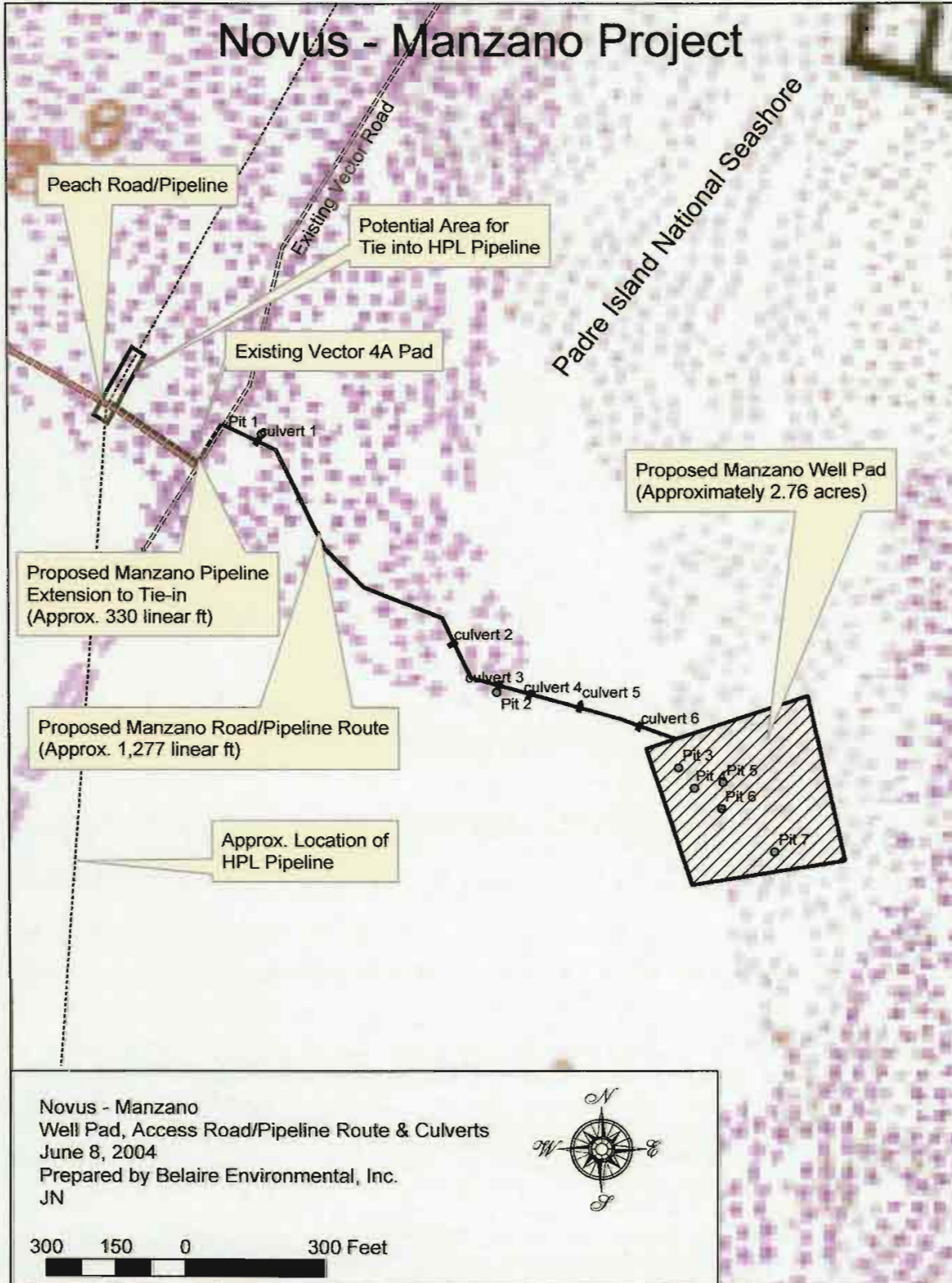


EXHIBIT B:
WETLAND DATAFORMS & PINS RAINFALL DATA

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Novus - Manzano Padre Island National Seashore</u> Applicant/Owner: <u>Novus USA</u> Investigator: <u>Charlie Belaire</u>		Date: <u>3-12-04</u> County: <u>Kleberg</u> State: <u>TX</u>
Do Normal Circumstances exist on the site? Yes ☐ No ☒ * Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒ Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)		Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 1</u>

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Scirpus americanus</u>		<u>OBL</u>	9. _____		
2. <u>Elocharis montevidensis</u>		<u>FACW+</u>	10. _____		
3. <u>Dichromena colorata</u>		<u>FACW</u>	11. _____		
4. <u>Iva angustifolia</u>		<u>UPL</u>	12. _____		
5. _____			13. _____		
6. _____			14. _____		
7. _____			15. _____		
8. _____			16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 75%

Remarks: Hydrophytic vegetation is dominant.

HYDROLOGY

___ Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other ___ No Recorded Data Available Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>17</u> (in.) Depth to Saturated Soil: <u>7</u> (in.)	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ☒ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ☒ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ___ FAC-Neutral Test ___ Other (Explain in Remarks)
Remarks: <u>Saturation was observed in the upper 12 inches probably due to above average rainfall in 2002 and 2003. Out of eight root channels checked within the upper 12" of soil none were oxidized. Some thin, scattered surface algae present.</u>	

SOILS

Pit1

Map Unit Name (Series and Phase): <u>Galveston-Mustang Sands</u>			Drainage Class: _____		
Taxonomy (Subgroup): _____			Field Observations Confirm Mapped Type? Yes No		
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-7"		10YR 3/3			Sand
7-14		10YR 4/2			Sand
14-16		10YR 5/2+			Sand
16-20		10YR 7/1			Sand
Hydric Soil Indicators:					
☐ Histosol ☐ Histic Epipedon ☐ Sulfidic Odor ☐ Aquic Moisture Regime ☐ Reducing Conditions ☐ Gleyed or Low-Chroma Colors			☐ Concretions ☐ High Organic Content in Surface Layer in Sandy Soils ☐ Organic Streaking in Sandy Soils ☐ Listed on Local Hydric Soils List ☐ Listed on National Hydric Soils List ☐ Other (Explain in Remarks)		
Remarks: Soils do not meet any of the hydric criteria as described in the 1987 COE manual or version 4.0 of Hydric Soils in the U.S. (NTCHS) for sandy soils.					

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No (Circle) Wetland Hydrology Present? ☒ Yes ☐ No Hydric Soils Present? Yes ☒ No	(Circle) Is this Sampling Point Within a Wetland? Yes ☒ No
Remarks: Pit 1 is not within a wetland due to lack of hydric soils. Hydrology is considered borderline due to the well above average rainfall in 2002 and 2003.	

Approved by HQUSACE 2/92

DATA FORM
ROUTINE WETLAND DETERMINATION
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Do Normal Circumstances exist on the site? Yes ☒ No ☐ Is the site significantly disturbed (Atypical Situation)? Yes ☒ No ☐ Is the area a potential Problem Area? Yes ☒ No ☐ (If needed, explain on reverse.)	Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 2</u>	

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. <u>Scirpus americanus</u>		<u>OBL</u>
2. <u>Elocharis montevidensis</u>		<u>FACW+</u>
3. _____		
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		

Dominant Plant Species	Stratum	Indicator
9. _____		
10. _____		
11. _____		
12. _____		
13. _____		
14. _____		
15. _____		
16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	100%
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Remarks:	Hydrophytic vegetation is dominant.
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HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake, or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ☐ Inundated ☒ Saturated in Upper 12 Inches ☐ Water Marks ☐ Drift Lines ☒ Sediment Deposits ☐ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ☐ Oxidized Root Channels in Upper 12 Inches ☐ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>14</u> (in.) Depth to Saturated Soil: <u>8</u> (in.)	
Remarks: Saturation was observed in the upper 12 inches probably due to above average rainfall in 2002 and 2003. Out of 10 root channels checked within the upper 12" of soil one was oxidized. Some thin, scattered surface algae was present.	

Pit2

WETLAND DETERMINATION

WETLAND DETERMINATION			
Hydrophytic Vegetation Present?	☒ Yes	☐ No	(Circle)
Wetland Hydrology Present?	☒ Yes	☐ No	
Hydric Soils Present?	☐ Yes	☒ No	
Is this Sampling Point Within a Wetland?			Yes ☒ No
Remarks: Pit 2 is not within a wetland due to lack of hydric soils. Hydrology is considered borderline due to the well above average rainfall in 2002 and 2003.			

DATA FORM
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Project/Site: <u>Novus - Manzano Padre Island National Seashore</u> Applicant/Owner: <u>Novus USA</u> Investigator: <u>Charlie Belaire</u>		Date: <u>3-12-04</u> County: <u>Kleberg</u> State: <u>TX</u>
Do Normal Circumstances exist on the site? Yes ☐ No ☒ * Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒ Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)		Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 3</u>

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u><i>Spartina patens</i></u>		<u>FACW</u>	9. _____		
2. <u><i>Elocharis montevidensis</i></u>		<u>FACW+</u>	10. _____		
3. <u><i>Hydrocotyle bonariensis</i></u>		<u>FACW</u>	11. _____		
4. _____			12. _____		
5. _____			13. _____		
6. _____			14. _____		
7. _____			15. _____		
8. _____			16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	<u>100%</u>
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Remarks: <u>Hydrophytic vegetation is dominant.</u>

HYDROLOGY

___ Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other ___ No Recorded Data Available Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>n/a</u> (in.) Depth to Saturated Soil: <u>n/a</u> (in.)	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ___ FAC-Neutral Test ___ Other (Explain in Remarks)
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Remarks: <u>No hydrologic indicators were observed. Out of eight root channels checked within the upper 12" of soil none were oxidized.</u>

Pit3

WETLAND DETERMINATION

WETLAND DETERMINATION	
Hydrophytic Vegetation Present?	Yes ☒ No ☐ (Circle)
Wetland Hydrology Present?	Yes ☒ No ☐
Hydric Soils Present?	Yes ☒ No ☐
Is this Sampling Point Within a Wetland? Yes ☒ No ☐	
Remarks: Pit 3 is not within a wetland due to lack of hydrology and hydric soils.	

Approved by HQUSACE 2/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Novus - Manzano Padre Island National Seashore</u> Applicant/Owner: <u>Novus USA</u> Investigator: <u>Charlie Belaire</u>		Date: <u>3-12-04</u> County: <u>Kleberg</u> State: <u>TX</u>
Do Normal Circumstances exist on the site? Yes ☐ No ☒ * Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒ Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)		Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 4</u>

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u><i>Paspalum monostachyum</i></u>		<u>FACW+</u>	9. _____		
2. <u><i>Elocharis montevidensis</i></u>		<u>FACW+</u>	10. _____		
3. _____			11. _____		
4. _____			12. _____		
5. _____			13. _____		
6. _____			14. _____		
7. _____			15. _____		
8. _____			16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).	<u>100%</u>
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Remarks: <u>Hydrophytic vegetation is dominant.</u>

HYDROLOGY

___ Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other ___ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ___ FAC-Neutral Test ___ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>n/a</u> (in.) Depth to Saturated Soil: <u>n/a</u> (in.)	
Remarks: <u>No hydrologic indicators were observed. Out of eight root channels checked within the upper 12" of soil none were oxidized.</u>	

Pit4

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No (Circle) Wetland Hydrology Present? ☐ Yes ☒ No Hydric Soils Present? ☐ Yes ☒ No	(Circle) Is this Sampling Point Within a Wetland? ☐ Yes ☒ No
Remarks: Pit 4 is not within a wetland due to lack of hydrology and hydric soils.	

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Novus - Manzano Padre Island National Seashore</u> Applicant/Owner: <u>Novus USA</u> Investigator: <u>Charlie Belaire</u>		Date: <u>3-12-04</u> County: <u>Kleberg</u> State: <u>TX</u>
Do Normal Circumstances exist on the site? Yes ☐ No ☒ * Is the site significantly disturbed (Atypical Situation)? Yes ☐ No ☒ Is the area a potential Problem Area? Yes ☐ No ☒ (If needed, explain on reverse.)		Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 5</u>

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u><i>Paspalum monostachyum</i></u>		FACW+	9. _____		
2. <u><i>Elocharis montevidensis</i></u>		FACW+	10. _____		
3. <u><i>Spartina patens</i></u>		FACW	11. _____		
4. _____			12. _____		
5. _____			13. _____		
6. _____			14. _____		
7. _____			15. _____		
8. _____			16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Hydrophytic vegetation is dominant.

HYDROLOGY

Recorded Data (Describe in Remarks): ☐ Stream, Lake, or Tide Gauge ☐ Aerial Photographs ☐ Other ☐ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ☐ Inundated ☐ Saturated in Upper 12 Inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ☐ Oxidized Root Channels in Upper 12 Inches ☐ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>n/a</u> (in.) Depth to Saturated Soil: <u>n/a</u> (in.)	
Remarks: <u>No hydrologic indicators were observed. Out of eight root channels checked within the upper 12" of soil none were oxidized.</u>	

Pit 5

WETLAND DETERMINATION

WETLAND DETERMINATION		
Hydrophytic Vegetation Present?	Yes ☒ No ☐ (Circle)	(Circle)
Wetland Hydrology Present?	Yes ☐ No ☒	
Hydric Soils Present?	Yes ☐ No ☒	
Is this Sampling Point Within a Wetland?		Yes ☐ No ☒
Remarks: Pit 5 is not within a wetland due to lack of hydrology and hydric soils.		

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Novus - Manzano Padre Island National Seashore</u> Applicant/Owner: <u>Novus USA</u> Investigator: <u>Charlie Belaire</u>		Date: <u>3-12-04</u> County: <u>Kleberg</u> State: <u>TX</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes ☐ No ☒ * Yes ☐ No ☒ Yes ☐ No ☒	Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 6</u>

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Scirpus americanus</u>		OBL	9. _____		
2. <u>Elocharis montevidensis</u>		FACW+	10. _____		
3. <u>Paspalum monostachyum</u>		FACW+	11. _____		
4. _____			12. _____		
5. _____			13. _____		
6. _____			14. _____		
7. _____			15. _____		
8. _____			16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks: Hydrophytic vegetation is dominant.

HYDROLOGY

Recorded Date (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other ___ No Recorded Date Available	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ___ FAC-Neutral Test ___ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>n/a</u> (in.) Depth to Saturated Soil: <u>13</u> (in.)	
Remarks: <u>No hydrologic indicators were observed. Out of eight root channels checked within the upper 12" of soil none were oxidized.</u>	

Pit6

WETLAND DETERMINATION

WETLAND DETERMINATION			
Hydrophytic Vegetation Present?	Yes ☒ No ☐ (Circle)		(Circle)
Wetland Hydrology Present?	Yes ☒ No ☐		
Hydric Soils Present?	Yes ☒ No ☐	Is this Sampling Point Within a Wetland?	Yes ☒ No ☐
Remarks: Pit 6 is not within a wetland due to lack of hydrology and hydric soils.			

Approved by HQUSACE 2792

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Novus - Manzano Padre Island National Seashore</u> Applicant/Owner: <u>Novus USA</u> Investigator: <u>Charlie Belaire</u>		Date: <u>3-12-04</u> County: <u>Kleberg</u> State: <u>TX</u>
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes ☐ No ☒ Yes ☐ No ☒ Yes ☐ No ☒	Community ID: <u>Upland A</u> Transect ID: _____ Plot ID: <u>Pit 7</u>

* Two years of above average rainfall. Recorded rainfall for 2002 and 2003 is 45.10 inches and 43.14 inches respectively. Average yearly rainfall from 1967 to 2003 on PINS is 33.84 inches.

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Scirpus americanus</u>		OBL	9. _____		
2. <u>Elocharis montevidensis</u>		FACW+	10. _____		
3. <u>Paspalum monostachyum</u>		FACW+	11. _____		
4. <u>Dichromena colorata</u>		FACW	12. _____		
5. _____			13. _____		
6. _____			14. _____		
7. _____			15. _____		
8. _____			16. _____		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks: Hydrophytic vegetation is dominant.

HYDROLOGY

Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other ___ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ___ FAC-Neutral Test ___ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: <u>n/a</u> (in.) Depth to Free Water in Pit: <u>n/a</u> (in.) Depth to Saturated Soil: <u>n/a</u> (in.)	
Remarks: <u>No hydrologic indicators were observed. Out of eight root channels checked within the upper 12" of soil none were oxidized.</u>	

Pit7

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes No (Circle)	
Wetland Hydrology Present?	Yes No	
Hydric Soils Present?	Yes No	Is this Sampling Point Within a Wetland? Yes No
Remarks: Pit 7 is not within a wetland due to lack of hydrology and hydric soils.		

National Park Service
U.S. Department of the Interior

U.S. Department of the Interior
National Park Service
Padre Island National Seashore
P. O. Box 181300
Corpus Christi, Texas 78480-1300
Tel. 361-949-8173 Fax 361-949-8286

FAX RECIPIENT

Jeff Nelson

FROM:

Arlene Wimer

SUBJECT:

Rainfall Data

DATE:

9 June 04

COMMENTS:

Here's what we have to date.

What kind of time line are we looking
at for the Nueces Manzano Plan?

Total Pages: 6 + cover

TAKE PRIDE
IN AMERICA 

886-3678

JAN-04

DATE	Time	Sky	Weather	Station Pressure	Wind		Precipitation	Temperature		
					Direction	Speed		Max	Min	Observ.
1	1100	cloudy		30.10	S	16	0	75	65	74
2	0800	cloudy	fog	30.08	S	10	.01	74	59	66
3	0700	cloudy	mist	29.96	S	16	.03	74	59	64
4	0745	cloudy		29.85	SE	11	.01	74	58	67
5	0943	cloudy		30.11	N	15	.02	74	54	55 @ 1210
6	0730	cloudy		30.44	N	26	0	58	45	45
7	0730	cloudy		30.48	N	25	0	51	40	45
8	0730	cloudy		30.15	NW	14	.12	56	40	50
9	0704	cloudy	mist	30.21	NE	12	.03	58	40	51
10	725	mostly clear		30.12	NE	10	0	67	34	41
11	735	mostly clear		30.39	NE	7	0	67	43	57
12	0700	mostly clear		30.31	NE	3	0	67	43	59
13	0800	cloudy		30.29	SE	3	0	69	43	61
14	0745	cloudy		30.20	SE	0	-	72	60	62
15	0730	cloudy		30.23	calm		.02	70	61	62
16	0730	cloudy		29.87	S	10	1	69	61	61
17	0730	cloudy		29.68	W	7	1.82	69	60	62
18	0745	P.C.		29.96	SW	9	.02	79	51	52
19	0700	clear		30.18	N	14	0	65	43	43
20	0700	pc		30.10	E	13	0	59	43	43
21	0800	pc		30.17	NE	14	0	66	54	59
22	0730	cloudy		30.24	NE	16	.09	63	57	57
23	0730	cloudy		30.24	NE	17	.12	62	49	60
24	0800	overcast	rain	29.94	SW	5	.05	66	59	60
25	0730	clear	fg	29.78	calm		.05	66	57	57
26	0700	mostly clear		29.85	W	7	.01	73	55	58
27	0700	clear		30.32	N	10	0	77	42	42
28	0700	pc		30.32	E	14	0	56	35	55
29	0700	cloudy	rain	29.97	SE	8	.03	63	54	60
30	0700	cloudy	mist	29.92	NW	6	.05	68	44	51
31		cloudy		29.92	NW	3	.01	67	49	30

2.54

FEB-04

DATE	Time	Sky	Weather	Station Pressure	Wind		Precipitation	Temperature		
					Direction	Speed		Max	Min	Observ.
1	0730	p.c.		29.79	SE	5	0.1	66	39	59
2	0800	cloudy		30.07	NE	19	.03	71	49	59
3	0700	p.c.		30.21	E	20	.04	66	51	52
4	0700	cloudy		29.87	E	16	0	65	54	63
5	0730	cloudy	rain	29.82	NE	23	.03	71	53	54
6	0705	cloudy		30.13	N	14	0	71	41	51
7	715	cloudy		30.43	N	3	0	65	35	45
8	720	cloudy		30.27	SE	10	0	71	43	60
9	800	cloudy		30.11	SE	10	.02	72	43	62
10	0700	cloudy	Fog	30.05	SE	9	.03	65	61	61
11	0800	cloudy		29.96	N	8	.10	66	52	54
12	0800	cloudy		30.19	N	14	.03	56	45	47
13	0730	overcast	light rain	30.29	N	10	.17	50	41	43
14	0730	cloudy	cool & windy	30.12	N	18	.20	47	38	39
15	14:00	Clear	COOL	30.18	NE	9	.03	62	38	51
16	8:00	Clear		30.32	NW	4	.00	62	39	50
17	0730	clear		30.39	calm		.03	60	40	49
18	0700	clear	patchy fog	30.38	calm		0	63	41	51
19	0700	clear		30.07	SE	20	0	70	46	58
20	0730	overcast		29.83	NE	5	T	69	47	59
21	0730	p. cloudy		30.04	NE	13	0	71	50	60
22	0730	p. cloudy		29.97	E	9	T	64	58	62
* 23	1730	m. sunny		29.74	E	8	.02	73	60	66
24	0800	overcast	breezy	29.74	N	14	.06	73	53	62
25	0800	p.c.	windy	29.87	N	37	.34	57	44	60
26	1100	clear	cool	30.20	N	10	.0	53	39	54
27	720	misty	cool	30.21	N	7	.0	67	41	57
28	430	p.c.	cool	30.03	NE	12	.01	68	40	65
29	233	p.c.	breezy	29.89	SE	110	.04	70	40	66
30										
31										

colder
turned

0.89

MAR-04

DATE	Time	Sky	Weather	Station Pressure	Wind		Precipitation	Temperature		
					Direction	Speed		Max	Min	Observ.
1	0800	cloudy		29.99	E	6	0	70	40	66
2	0800	overcast	foggy	29.99	SE	8	0	74	62	64
3										
4	0800	cloudy	4 fog	29.78	SE	12	-	74	57 ⁶²	66
5	0700	mostly cloudy	Fog	29.79	SE	4	.05	72	64	65
6	0720	pc		30.14	SE	3	.05	77	56	61
7	0731	pc	light fog	30.18		4	.05	78	52	59
8	0800	clear	Sunny	30.36	N	17	0	72	56	61
9	0700	pc		30.24	N	4	.03	68	54	56
10	0700	clear		30.17	calm		0	75	55	60
11	0730	pc		30.14	E	14	0	74	60	65
12	0730	in clouds		30.15	E	9	0 ^{0.18}	72	58	64
13	0700	in clouds	sprinkles	30.02	E	14	0	72	62	64
14	0730	in clouds		30.10	E	5	.05	74	65	67
15	1030	overcast		30.02	NE	8	2.02 ^{2.35}	74	63	66
16	0700	pc		30.01	calm		0	70	63	65
17	1030	pc		29.93	SE	11	0.12	75	64	70
18	0700	clear		29.91	SE	15	.03	75	64	67
19	0745	Fog		30.10	SE	6	.01	75	66	69
20	0730	overcast		30.17	SE	11	T	75	68	69
21	0715	in clouds	Patchy fog	30.24	calm		T	78	66	68
22	0800	pc cloudy		30.24	E	12	0	76	65	68
23	0700	clear		30.16	SE	17	.02	75	66	69
24	0700	in clouds		30.11	SE	19	0	77	68	71
25	0730	pc		30.10	SE	14	0	79	69	70
26	0730	pc		30.11	SE	15	0	78	69	70
27	0700	pc		30.03	SE	19	0	79	70	71
28	0740	pc		30.01	SE	10	0	79	71	75
29	0730	pc		30.11	NE	6	-	79	68	72
30	0700	pc		30.21	calm		.03	78	61	63
31	0700	clear		30.11	SW	10	0	76	58	60

APR-04

DATE	Time	Sky	Weather	Station Pressure	Wind		Precipitation	Temperature		
					Direction	Speed		Max	Min	Observ.
1	0730	pc		29.99	SE	14	Ø	80	59	70
2	0745	cloudy		29.89	SE	13	Ø	80	61	73
3	710	pc		29.97	NE	10	.03	78	58	68
4	721	pc		29.95	SE	11	.01	80	58	68
5	800	cloudy		29.86	E	19	2.03	80		69
6	0730	cloudy		29.86	calm		Ø	81	69	71
7	0730	m. cloudy		29.85	calm		Ø	80	67	70
8	0730	m. cloudy		29.85	calm		.03	81	66	63
9	0700	m. clear		29.87	calm	-	Ø	78	64	66
10	0715	m. cloudy		29.78	SE	12	Ø	79	66	73
11	700	overcast		29.88	NW	14	.06	80	49	58
12	0745	cloudy		29.93	NW	19	.02	59	52	54
13	0730	pc		30.25	SE	5	Ø	70	50	58
14	0745	clear		30.29	W	3	-	73	51	58
15	0700	pc		30.12	SE	18	Ø	74	58	67
16	0745	m. sunny		30.08	S	18	Ø	77	62	70
17	0715	pc. cloudy		30.13	SE	8	Ø	78	69	69
18	0730	pc. I	windy	30.18	SE	12	Ø	79	61	70
19	0745	pc. I		30.17	SE	10	-	79	69	70
20	0745	cloudy		29.96	SE	22	Ø	79	69	70
21	0700	m. cloudy		29.77	SE	17	Ø	79	70	70
22	0730	cloudy		29.72	SE	20	Ø	80	70	71
23	0730	cloudy	hazy	29.72	SE	15	Ø	81	61	71
24	0711	cloudy	hazy	29.81	E	13	.03	71	60	69
25	0730	cloudy	rain	29.91	NE	8	2.03	80	66	72
26	0800	cloudy		30.08	NE	18	.24	77	71	73
27	0700	pc		30.18	NE	9	.05	79	65	65
28	0700	m. cloudy		30.00	SE	23	Ø	79	65	71
29	0700	clear		29.90	E	17	Ø	79	70	72
30	0707	pc. I		29.81	SE	9	Ø	81	63	74
31										

Block
Fals
© 113

MAY-04

DATE	Time	Sky	Weather	Station Pressure	Wind		Precipitation	Temperature		
					Direction	Speed		Max	Min	Observ.
1	750	CLDY		29.76	SE	12	Ø	81	61	15
2	791	pc		30.11	SE	11	1.94	79	46	55
3	0800	CLDY		30.19	W	5	Ø	81	55	61
4	0744	CLDY		30.13	S	2	Ø	76	61	67
5	0700	pc		30.02	SE	21	Ø	78	67	71
6										
7	0730	mldy sprinkles		30.05	E	11	Ø		72	74
8	0730	cloudy		30.01	SE	6	1.59	79	70	73
9	0730	mldy		29.94	E	7	1.80	78	69	72
10	0700	cloudy		29.91	SE	12	Ø	81	72	74
11	1030	pcldy		29.87	S	14	.03	81	74	80
12	0700	cloudy		29.79	SE	12	Ø	83	76	77
13	0700	cloudy		29.79	SE	12	Ø	83	76	77
14	0715	mldy		29.95	E	14	2.13	88	40	72
15	0730	mldy		30.06	NE	9	.01	81	67	70
16	1330	pc		30.01	SE	9	Ø	81	166	71
17	1445	pcldy		30.01	SE	17	Ø	83	101	71
18	0730	pc		30.01	SE	18	Ø	83	76	77
19	0730	pc		30.01	SE	17	Ø	83	76	77
20	0700	pc		30.02	SE	19	Ø	83	76	77
21	0700	pc		30.04	SE	20	Ø	84	77	78
22	1245	pc		29.84	SE	20	Ø	86	78	80
23	1309	pc		29.85	SE	21	Ø	84	76	86
24	0800	pc		29.90	SE	18	Ø	84	74	76
25	0700	pc		29.85	SE	23	Ø	84	76	77
26	0730	pc		29.89	SE	16	Ø	84	76	77
27	0730	pc		29.79	SE	18	Ø	84	76	77
28	0730	pc		29.85	SE	3	—	84	74	76
29	0714	pc		29.74	SE	8	Ø	84	76	77
30	0710	pc		29.62	SE	10	Ø	84	77	78
31	0715	pc		29.67	SE	7	Ø	86	76	76

JUN-04

[illegible]

**Thirty Eight-Year Rainfall Record
Padre Island National Seashore
1967-2004**

Precipitation (inches)

YEAR	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
1967	**	**	**	**	**	**	0.965	7.51	5.3	3.13	0.32	2.47	19.70
1968	2.55	2.29	0.94	1.12	10.17	10.48	2.98	0.78	7.14	2.76	1.17	4.55	46.93
1969	0.82	3.42	0.89	0.38	2.8	0.14	0.01	2.47	2.75	7.46	8.84	0.56	30.54
1970	2.45	0.64	1.23	**	**	0.86	0.88	0.11	12.63	3.1	0.55	0.47	22.92
1971	0.19	0.46	0	2.49	0.89	0.47	0	6.79	12.83	3.07	1.04	3.74	31.97
1972	0.82	4.16	2.09	2.82	6.12	10.31	4.43	3.81	7.63	1.33	4.95	0.29	48.76
1973	3.05	1.16	0.22	0.9	1.65	10.67	0.97	2.27	12.4	9.91	1.52	0.16	44.88
1974	1.88	0.1	3.92	0.03	1.79	3.88	0.48	1.67	3.7	5.62	1.64	1.19	25.90
1975	2.67	1.05	0.11	0.12	4.85	1.22	3.69	4.59	8.33	2	**	1.19	29.82
1976	1.08	0.12	0.76	5.06	4	0.35	7.55	0.76	4.02	10.49	5.97	2.57	42.73
1977	2.77	1.53	0.62	4.14	5.55	0.91	0.14	1.57	6.03	3.71	1.73	0.18	28.88
1978	1.18	1.29	0.13	2.09	0	3.86	6.78	4.41	10.39	4.3	2.28	2.03	38.74
1979	3.49	1.01	0.47	8.46	2.73	6.11	6.59	4.2	11.5	0.14	0.38	1.31	46.39
1980	0.27	1.24	0.75	0.23	3.42	0	0	12.25	1.14	0.73	7.92	0.25	28.20
1981	1.79	4.58	1.18	0.62	3.62	2.61	3.88	3.94	2.08	7.76	7.76	2.3	42.12
1982	0.21	3.52	0.29	0.56	2.26	0	0	0.46	1.44	4.68	3.12	2.88	19.42
1983	1.87	4.1	1.9	0.07	2.77	3.13	13.21	1.06	9.24	2.44	1.07	0.92	41.78
1984	4.93	0.77	0.23	0	5.14	0.16	0.99	0.23	6.62	1.21	1.3	3.22	24.80
1985	3.14	3.09	1.21	0.5	4.24	1.91	0.13	3.25	13.16	1.96	4.77	1.51	38.87
1986	0.76	0.977	0.1	1.04	3.88	0.58	0.01	4.56	2.36	8.78	2.01	5.4	30.46
1987	1.6	4.61	0.66	0.55	1.32	9.92	2.71	1.47	4.99	2.06	1.08	0.4	31.37
1988	1.5	2.67	1.37	0.66	1.09	1.4	**	**	**	**	**	**	8.69
1989	**	**	**	**	**	**	**	**	**	**	**	**	**
1990	**	**	6.44	2.08	1.33	0.66	1.26	0.22	1.31	3.46	0.8	0.37	17.93
1991	2.47	2.81	1.2	3.58	4.35	8.88	0.39	**	10.62	3	0.45	1.35	39.10
1992	4.56	6.05	3.04	5.08	5.11	6.31	0.43	3.8	3.65	2.2	3.26	1.04	44.53
1993	1.71	3.12	4.44	5.25	7	5.1	0	1.13	3.25	4.4	2.12	6.9	44.42

YEAR	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
1994	0.65	0.75	4.92	1.71	3.05	3.8	0.5	0.33	3.56	4.66	0.63	2.77	27.33
1995	0.55	1.15	4.07	1.68	3.3	1.94	0.46	5.18	3.08	12.36	0.6	0.02	34.39
1996	0.03	0.26	0.37	1.06	1.5	0.6	0	5.63	6.11	3.47	2.45	1.31	22.79
1997	1.52	1.41	3.34	7.95	0.8	0.8	0.03	1.43	9.09	19.22	2.8	0.44	48.83
1998	4.2	4.664	2.22	0.43	0	0.05	2.801	1.35	14.13	10.06	2.28	1.15	43.34
1999	0.92	0.1	2.25	0.2	4.06	3.57	5.05	8.24	3.23	3.36	0.71	0.85	32.54
2000	0.57	1.07	4.47	0.35	3.1	1.69	0	5.26	1.26	2.38	0.51	0.17	20.83
2001	0.42	0.1	1	2	2.33	3.1	1.19	6.62	3.15	2.44	5.37	2.23	29.95
2002	0.97	1.2	0.82	0.35	1.56	8.29	5.89	1.41	5.67	10.76	4.95	3.23	45.10
2003	2.31	1.66	5.48	0.23	0	3.84	8.2	1.16	15.8	2.6	1.03	0.83	43.14
2004	2.55	0.88	2.54	**	**	**	**	**	**	**	**	**	**
Mean	1.78	1.94	1.82	1.88	3.11	3.36	2.36	3.23	6.56	4.89	2.57	1.72	33.84
Max	4.93	6.05	6.44	8.46	10.17	10.67	13.21	12.25	15.80	19.22	8.84	6.90	48.83
Min	0.03	0.10	0.00	0.00	0.00	0.00	0.00	0.11	1.14	0.14	0.32	0.02	19.42

complete yr

BOLD =August 1980 Hurricane 12" of Rain

* =incomplete data

** =missing data

**EXHIBIT C:
NATIONAL WETLAND INVENTORY MAP**

Novus - Manzano Project National Wetland Inventory

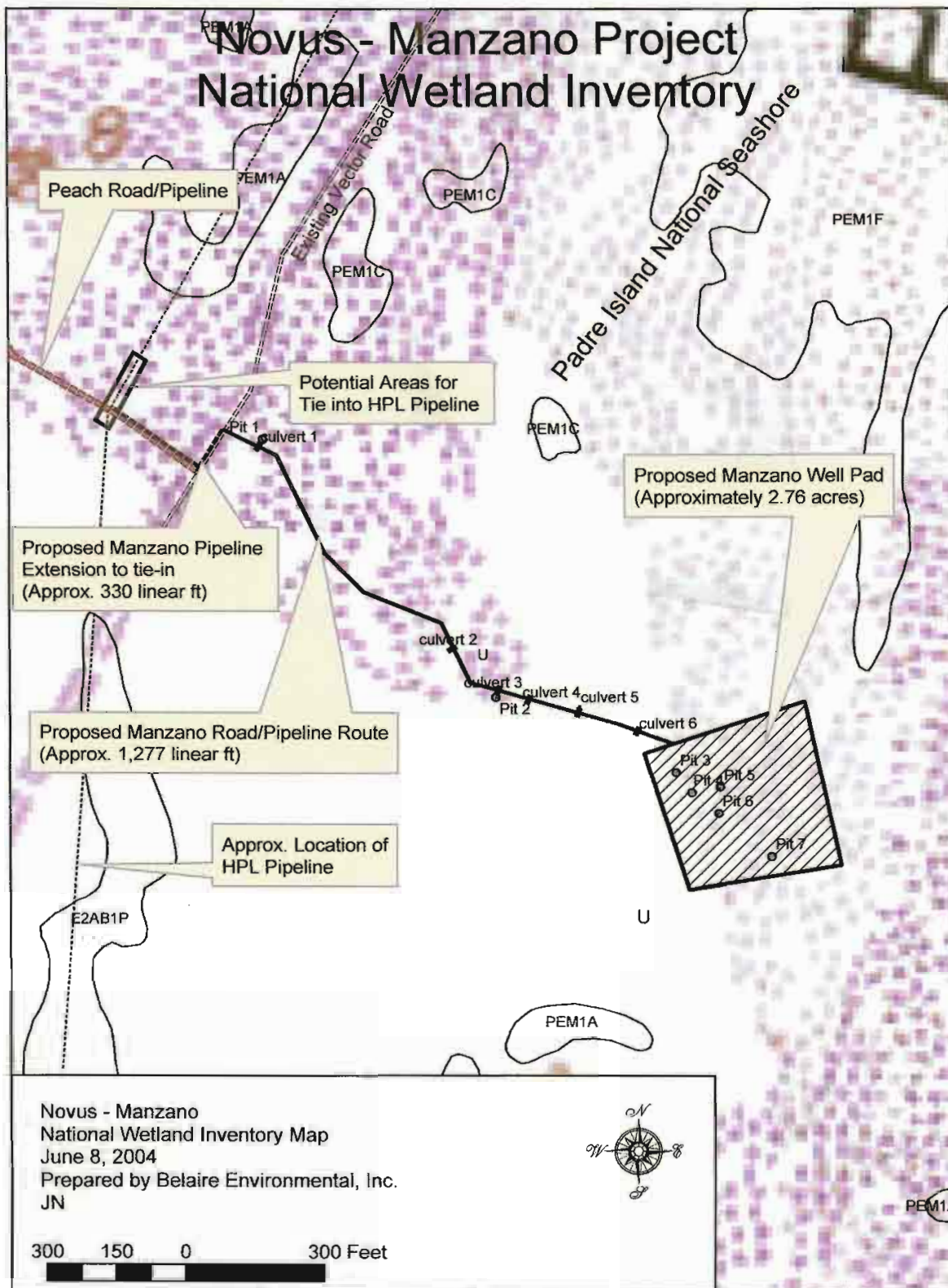


**EXHIBIT D:
AERIAL PHOTOGRAPH**

Novus - Manzano Project

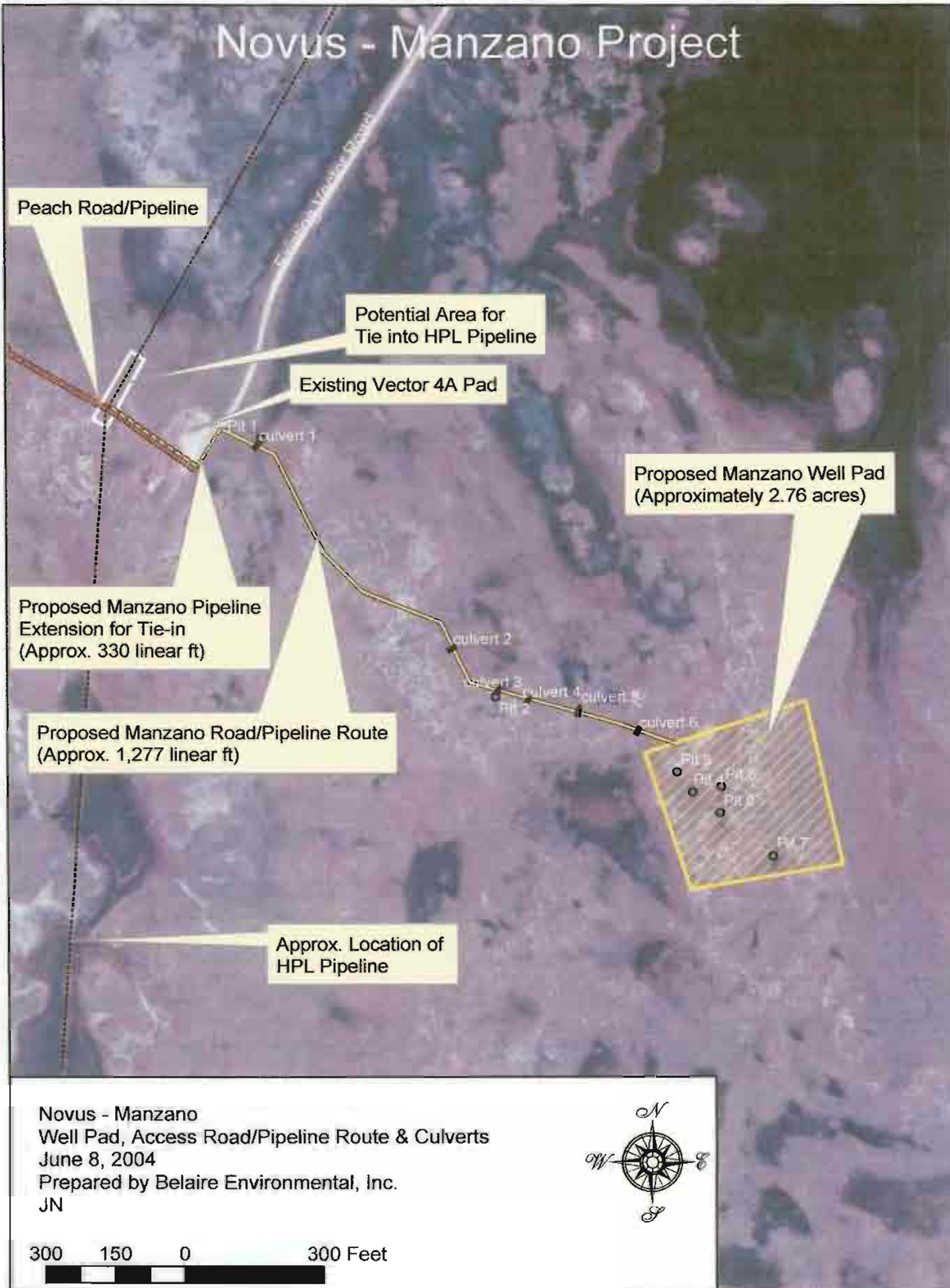
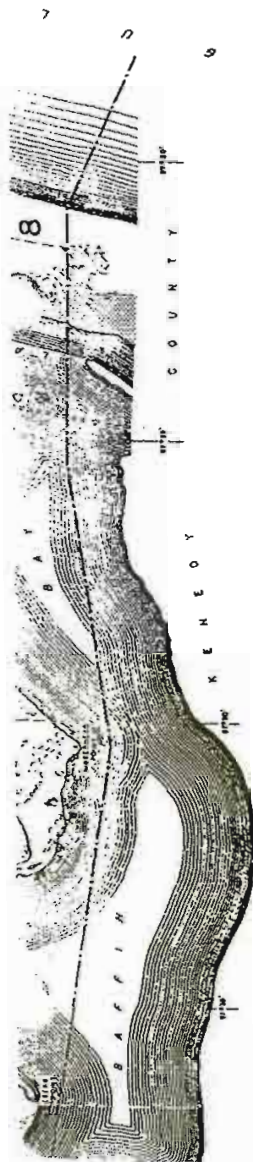


**EXHIBIT E:
USDA SOIL SURVEY MAP**



AREAS DOMINATED BY LOAMY AND SANDY SOILS ON NEARLY LEVEL TO GENTLY SLOPING UPLANDS.

ORELIA-TATTON-NARTA: Very poorly, and somewhat poorly drained or ponded loamy sands, fine sandy loams, and sandy clay loams that have rapidly and very slowly permeable lower layers with very low, low, and moderate shrink-swell potentials. This unit consists of about 60 percent Orelia soils, 10 percent Tatton soils, 10 percent Narta soils, and 20 percent other soils. Orelia soils have a friable, slightly acid, gray fine sandy loam surface layer about 5 inches thick. The next 27 inches is firm and very firm, mildly and moderately alkaline, dark gray and gray sandy clay loam with From 32 to 50 inches the soil is friable, moderately alkaline, saline, light gray sandy clay loam with soft masses and concretions of calcium carbonate. Tatton soils have a very friable, moderately alkaline, saline, light gray loamy sand surface layer about 5 inches thick. From 5 to 60 inches the soil is very friable, moderately alkaline, saline, white loamy sand. Narta soils have a friable, moderately alkaline, gray fine sandy loam surface layer about 8 inches thick. The next 28 inches is firm, moderately alkaline, saline, very dark gray and gray silty clay loam. From 36 to 60 inches the soil is firm, moderately alkaline, saline, light brownish gray and light gray clay loam with soft masses and concretions of calcium carbonate. Most of this unit is used for rangeland.

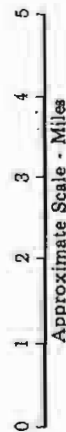
AREAS DOMINATED BY SANDY SOILS ON NEARLY LEVEL TO SLOPING COASTAL TERRACES AND BARRIER ISLANDS.

GALVESTON-MUSTANG: Poorly and somewhat excessively drained fine sands that have very rapidly and rapidly permeable lower layers with low shrink-swell potential. This unit consists of about 40 percent Galveston soils, 35 percent Mustang soils, and 25 percent other soils. Galveston soils have a loose, neutral, light gray fine sand surface layer about 4 inches thick. From 4 to 70 inches the soil is loose, mildly alkaline, white fine sand with a permanent water table between 40 and 72 inches. Mustang soils have a loose, neutral, light gray fine sand surface layer about 6 inches thick. From 6 to 72 inches the soil is loose, neutral, light gray fine sand with a permanent water table less than 40 inches. Most of this unit is used for rangeland.

GALVESTON-MUSTANG-ACTIVE SAND DUNES: Poorly and somewhat excessively drained fine sands that have very rapidly and rapidly permeable lower layers with low shrink-swell potential. This unit consists of about 35 percent Galveston soils, 25 percent Mustang soils, 20 percent Active Sand Dunes, and 20 percent other soils. Galveston soils have a loose, neutral, light gray fine sand surface layer about 4 inches thick. From 4 to 70 inches the soil is loose, mildly alkaline, white fine sand with a permanent water table between 40 and 72 inches. Mustang soils have a loose, neutral, light brownish gray fine sand surface layer about 6 inches thick. From 6 to 72 inches the soil is loose, neutral, light gray fine sand with a permanent water table less than 40 inches. Active sand dunes are loose, neutral, light gray fine sands. Most of this unit is used for rangeland and recreation.

GENERAL SOIL MAP KLEBERG COUNTY, TEXAS

SOIL CONSERVATION SERVICE
IN COOPERATION WITH
TEXAS AGRICULTURAL EXPERIMENT STATION



BASE COMPILED FROM LATEST TEXAS GENERAL
HIGHWAY MAP, POLYCONIC PROJECTION.

