APPENDICES

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APPENDIX A

GROUNDWATER MODELING

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A.0 GROUNDWATER MODELING

The groundwater modeling results summarized this Appendix were extracted from the "Draft Project Report, Herbert Hoover Dike, Phase 1A Groundwater Model, dated October 2007" produced by the Engineering Research and Development Center. This report is a draft and is currently undergoing an external Independent Technical Review. Once the report is finalized, it will be made available in its entirety.

The purpose of the HHD Phase 1A modeling effort is to develop and evaluate a Lake Okeechobee sub-regional groundwater numerical model, and evaluate the sub-regional groundwater changes associated with the introduction of the cutoff wall segments into the subsurface geologic structure underlying Herbert Hoover dike (Reaches 1 through 3), the containment levee system that defines the perimeter of Lake Okeechobee surface water storage.

A steady-state, 3-D groundwater model, was developed to qualitatively evaluate the effects of the proposed cutoff wall. The computational results from the "with project", i.e., with wall, simulations were compared to those from the "without project", i.e., no wall, simulations in order to develop order- of-magnitude estimates of changes to the sub-regional groundwater flow. The groundwater flows through 21 cross-sections, seven each in each HHD reach as proposed by ERDC and NAP and approved by SAJ, were compared in this task. These cross-sections were set parallel to the wall at a spacing of 50, 100, 200, 500, 1,000, 5,000 and 10,000 ft from the land-side toe of HHD.

Two major tools, WASH123D and GMS 6.0, were used to simulate the effects of the cutoff wall on regional groundwater. WASH123D computed subsurface flow and GMS 6.0 generated unstructured finite element meshes and set up simulation runs.

A.1 WASH123D

WASH123D [1] is a physics-based finite element numerical model that computes water flow in watershed systems that can be conceptualized as a combination of 1-D channel networks, 2-D overland regimes, and 3-D subsurface media. In the computer program of WASH123D that ERDC maintains, 1-D channel flow is computed by solving the cross-section area-averaged diffusive wave equation, 2-D overland flow by the depth-averaged diffusive wave equation, and 3-D variably saturated subsurface flow by the Richards equation. The steady-state version of the Richards equation, i.e., Eq. (1) was solved with the Galerkin finite element method [2] in WASH123D for all model runs considered in this study.

Eq. (1) $$\nabla \cdot \left[k_r \mathbf{K_s} \cdot \left(\nabla h + \nabla z \right) \right] + q = 0 \,,$$

where h is the pressure head [L]; k_r is the relative hydraulic conductivity [dimensionless]; $\mathbf{K_s}$ is the saturated hydraulic conductivity tensor [L/t]; z is the potential head [L]; q is the source/sink term [$L^3/L^3/t$].

A.2 GMS 6.0

The Department of Defense Groundwater Modeling System (GMS, http://chl.erdc.usace.army.mil/gms) is the most sophisticated groundwater modeling environment available today. The Department of Defense (DOD), in partnership with the Department of Energy, the U.S. Environmental Protection Agency, the U.S. Nuclear Regulatory Commission and 20 academic partners, has developed the DOD Groundwater Modeling System. The GMS provides an integrated and comprehensive computational environment for simulating subsurface flow, contaminant fate/transport, and the efficacy and design of remediation systems. GMS integrates and simplifies the process of groundwater flow and transport modeling by bringing together all of the tools needed to complete a successful study. GMS provides a comprehensive graphical environment for numerical modeling, tools for site characterization, model conceptualization, mesh and grid generation, geostatistics, and sophisticated tools for graphical visualization. There is a WASH123D graphic user interface (GUI) included in GMS 6.0.

A.2.1 Physical Data Input into Model

Geologic data from various sources were compiled to construct the conceptual hydro-geologic model, where 11 subsurface materials were taken into account (see A.2.3). Historical data of rainfall, evapo-transpiration (ET), groundwater head, and canal stage were used to define high, medium, and low net recharge and head boundary conditions (see A.2.4). Compiled permit capacity and specification information was used to define the high and low pumping as the sink term in the model. The high and low values of net recharge, head boundary conditions, and groundwater pumping, determined based on the historical field data, were used to mimic the extreme hydrologic conditions of the modeled system, so that the associated results would provide reasonable estimates on the cutoff wall impact.

Approximately 270 geologic borings have been logged along the HHD alignment in the vicinity of Reaches 1, 2, and 3. The ground surface elevation and depths of these borings vary; however, these borings generally do not penetrate deeper than elevation -50 feet NGVD29. The Corps Jacksonville District has developed cross-sectional representations of the shallow geologic materials along the dike alignment using these borings. Information related to the development of these cross-sections is contained in the Major Rehabilitation Reports (MRR's). Based on discussions with SAJ, these dike alignment borings and cross-sections were used to define Layers 1, 2, and 3A for the Phase 1A model.

A.2.2 Assumptions (Design of cutoff wall)

In the HHD Phase 1A modeling, one "With Project" scenario was studied. The cutoff wall tip elevation in this configuration varies between -15 and -40 feet NGVD29. This corresponds to approximate cutoff wall depths of between 47 and 72 feet, assuming that the cutoff wall is along the dike alignment and the top of the dike is approximately 32 feet NGVD29.

A.2.3 Subsurface Material Layers and Associated Conductivity Ranges

Numerous geologic interpretations have been developed to date for the Surficial Aquifer System (SAS) geology in the vicinity of this model. Layers 2-1, 3A, and L3B-2 were determined to be the most influential layers; therefore, the lowest and highest conductivity1 values for each of these materials were utilized in different runs while the remaining eight layers were held constant (the average conductivity value for each of the eight materials was used). This was done to limit the analysis to 96 scenarios, allowing the analysis to be completed in the project timeframe while analyzing the most probable scenarios with the greatest groundwater impacts. If the conductivity values (high and low values) for all eleven layers were analyzed, it would require 25,000 model runs. **Table A-5** lists the conductivity values utilized in all 11 layers.

The following subsurface material layers were utilized in the model. See **Figure A-1** for the geological layers. See **Figures A2-A9** for the spatial extent of each the layers.

1. Layer 1 - Undifferentiated Surface Soils including embankment fill for the dike
2. Layer 2-1 - Fine/Organic Layer including peat, clays and silts (East)
3. Layer 2-2 - Sands (West)
4. Layer 3A - Limestone, Rock, Sand and Shell beds
5. Layer 3B-1 – Clay Intrusion in the NW model domain
6. Layer 3B-2 – Sands to Silty Sands
7. Layer 4 - Pinecrest Sand member of Tamiami Formation
8. Layer 5 - Ochopee Limestone member of the Tamiami Formation and the Gray Limestone
9. Layer 6 - Lower Tamiami Formation sands and non-productive sands of the Miocene Peace River Formation
10. Layer 7-1
11. Layer 7-2 - Upper Hawthorn Group and Sand Stone Aquifer

[1] Hydraulic conductivity describes the ease with which water can move through a material. Hydraulic conductivity is expressed in feet per day (ft/d).

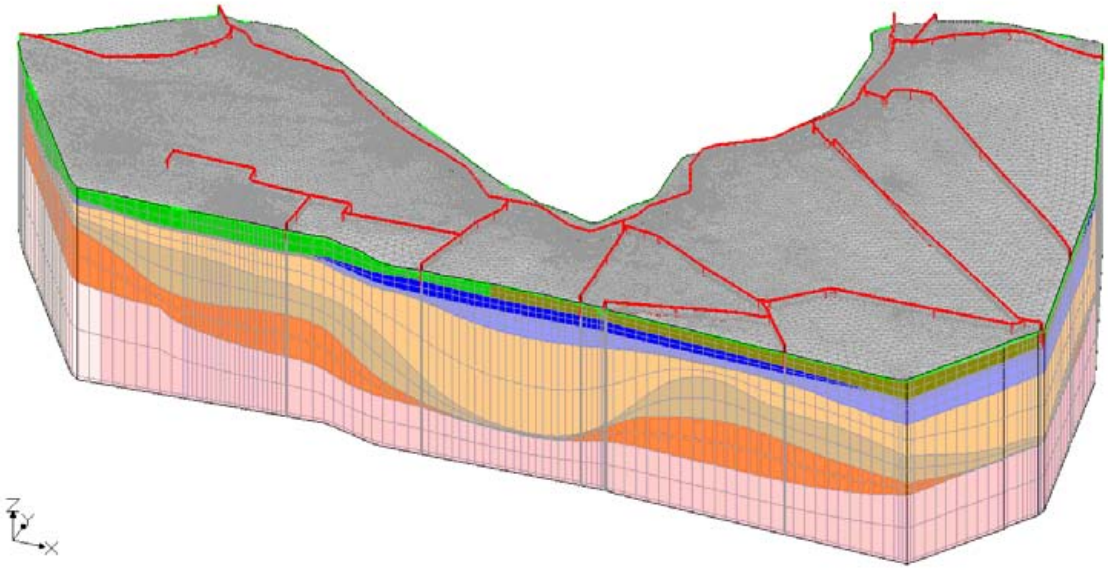
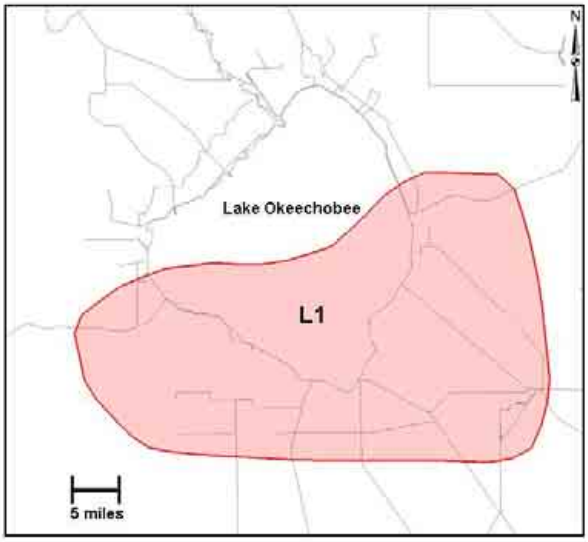


FIGURE A-1: 3-D COMPUTATIONAL MESH OF THE HHD PHASE 1A MODEL

Herbert Hoover Dike – Conceptual Hydro-Geologic Model
Layer 1 Hydraulic Conductivity



General Description
•Undifferentiated surface material
•Material layer is relatively thin

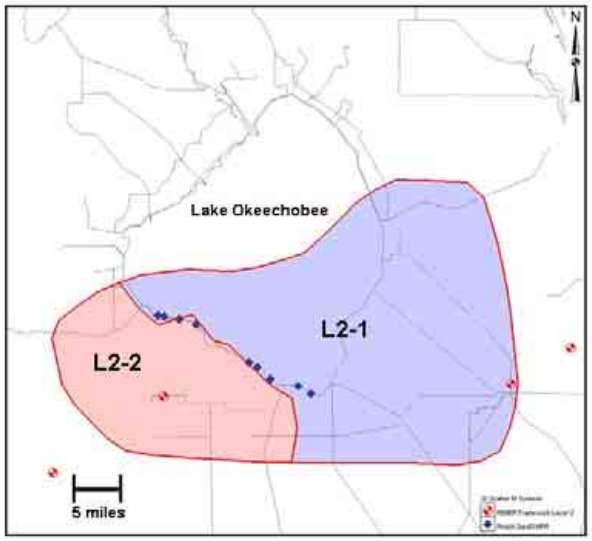
Distribution Methodology
•Uniform distribution across model domain

Conductivity Range (Kh)
•L1(Low) : 0.5 ft/day
•L1(High) : 5 ft/day

Data Source
• Reach 1 Area : Herbert Hoover Dike Major Rehabilitation Evaluation Report, Vol. 2 of 4, Appendix H, November 2000
•Reach 2/3 Area :Major Rehabilitation Evaluation Reports Supplement – Draft Appendices Herbert Hoover Dike Reaches 2 and 3, Appendix G, December 2006
•REMER Hydro-geologic Framework Report, December 2005

FIGURE A-2: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIAL L1 IN THE HHD PHASE 1A MODEL

Herbert Hoover Dike – Conceptual Hydro-Geologic Model
Layer 2 Hydraulic Conductivity



General Description
•Peats, clays, and silts to the East
•Sands to the West

Distribution Methodology
•Sectional model data from MRR's and FGS Mineral Resources mapping used to delineate between peats and sands

Conductivity Range (Kh)
•L2-1(Low) : 0.1 ft/day
•L2-1(High) : 1.0 ft/day
•L2-2(Low) : 1.0 ft/day
•L2-2(High) : 100.0 ft/day

Data Source
• Reach 1 Area : Herbert Hoover Dike Major Rehabilitation Evaluation Report, Vol. 2 of 4, Appendix H, November 2000
•Reach 2/3 Area :Major Rehabilitation Evaluation Reports Supplement – Draft Appendices Herbert Hoover Dike Reaches 2 and 3, Appendix G, December 2006
•REMER Hydro-geologic Framework Report, December 2005

FIGURE A-3: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIALS L2-1 AND L2-2 IN THE HHD PHASE 1A MODEL

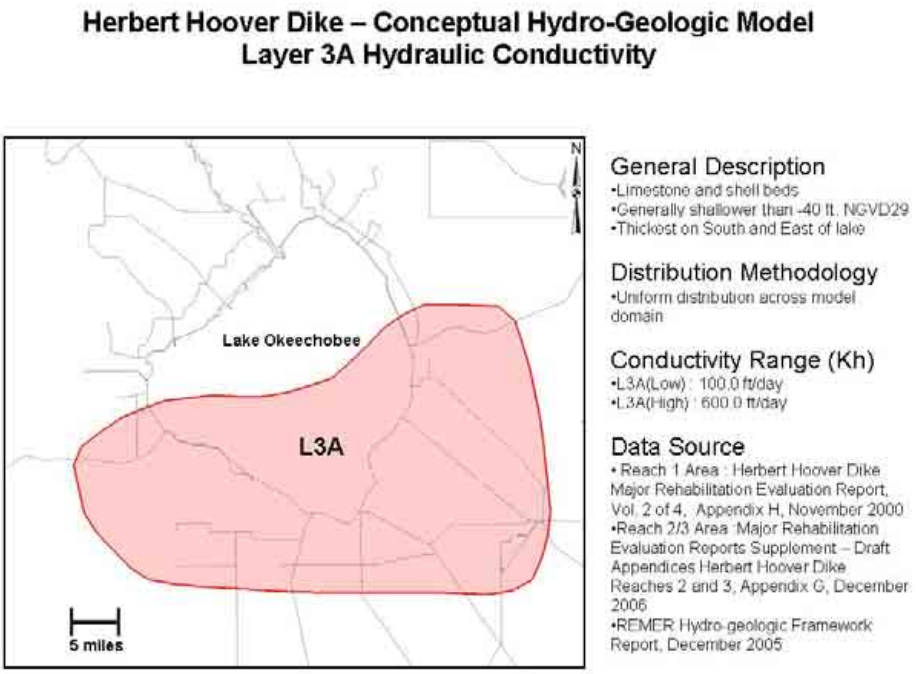


FIGURE A-4: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIAL L3A IN THE HHD PHASE 1A MODEL

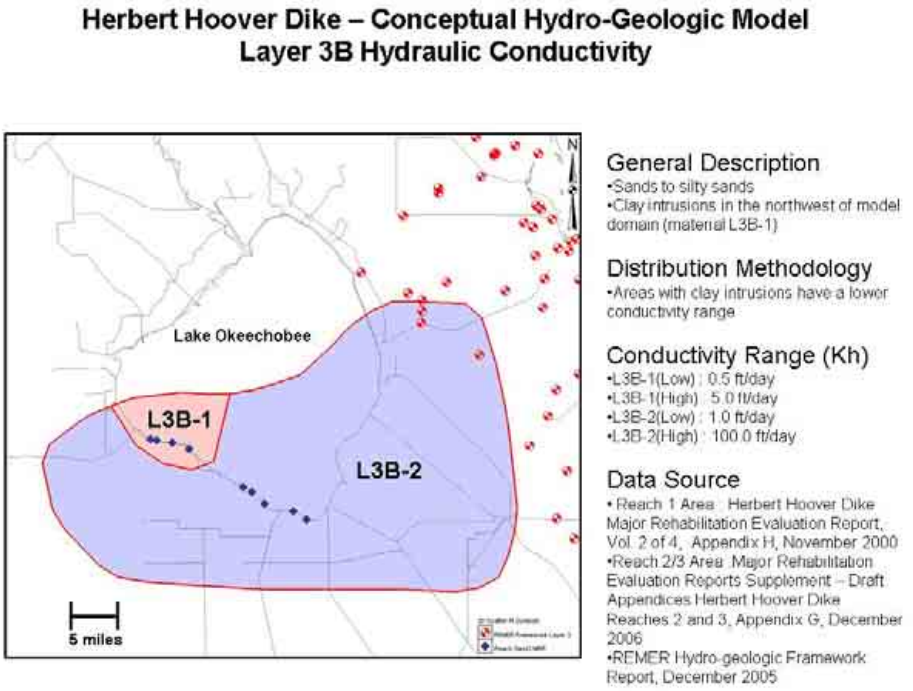
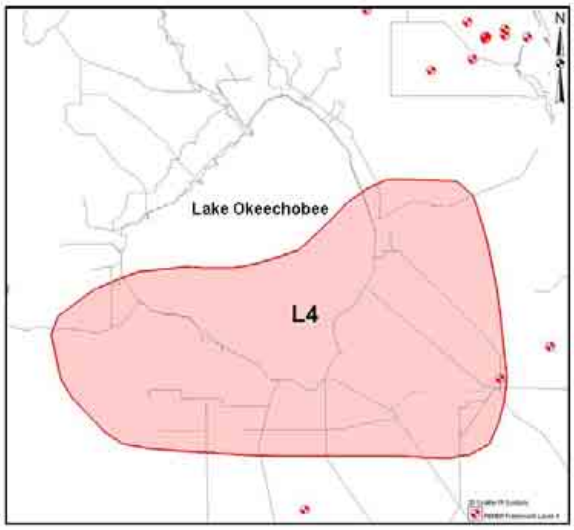


FIGURE A-5: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIALS L3B-1 AND L3B-2 IN THE HHD PHASE 1A MODEL

Herbert Hoover Dike – Conceptual Hydro-Geologic Model
Layer 4 Hydraulic Conductivity



General Description
•Sands and Limestone of the Late Pliocene Upper Tamiami Formation
•Caloosahatchee Clay

Distribution Methodology
•Uniform distribution across model

Conductivity Range (Kh)
•L4(Low) : 5.0 ft/day
•L4(High) : 30.0 ft/day

Data Source
• Reach 1 Area : Herbert Hoover Dike Major Rehabilitation Evaluation Report, Vol. 2 of 4, Appendix H, November 2000
•Reach 2/3 Area: Major Rehabilitation Evaluation Reports Supplement – Draft Appendices Herbert Hoover Dike Reaches 2 and 3, Appendix G, December 2006
•REMER Hydro-geologic Framework Report, December 2005

FIGURE A-6: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIAL L4 IN THE HHD PHASE 1A MODEL

Herbert Hoover Dike – Conceptual Hydro-Geologic Model
Layer 5 Hydraulic Conductivity

General Description
•Ochopee Limestone member of the Tamiami Formation
•Grey limestone

Distribution Methodology
•Uniform distribution across model

Conductivity Range (Kh)
•L5(Low) : 150.0 ft/day
•L5(High) : 750.0 ft/day

Data Source
•REMER Hydro-geologic Framework Report, December 2005

FIGURE A-7: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIAL L5 IN THE HHD PHASE 1A MODEL

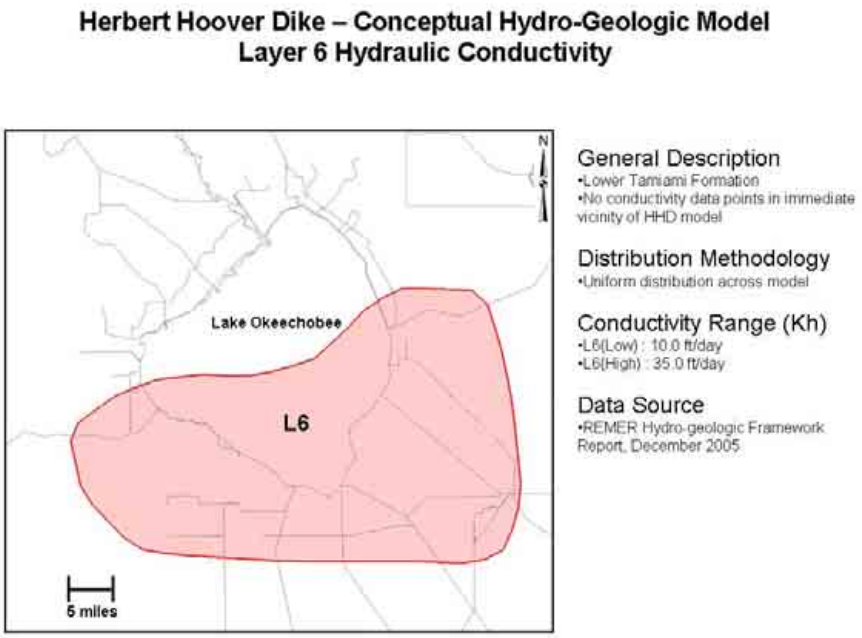


FIGURE A-8: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIAL L6 IN THE HHD PHASE 1A MODEL

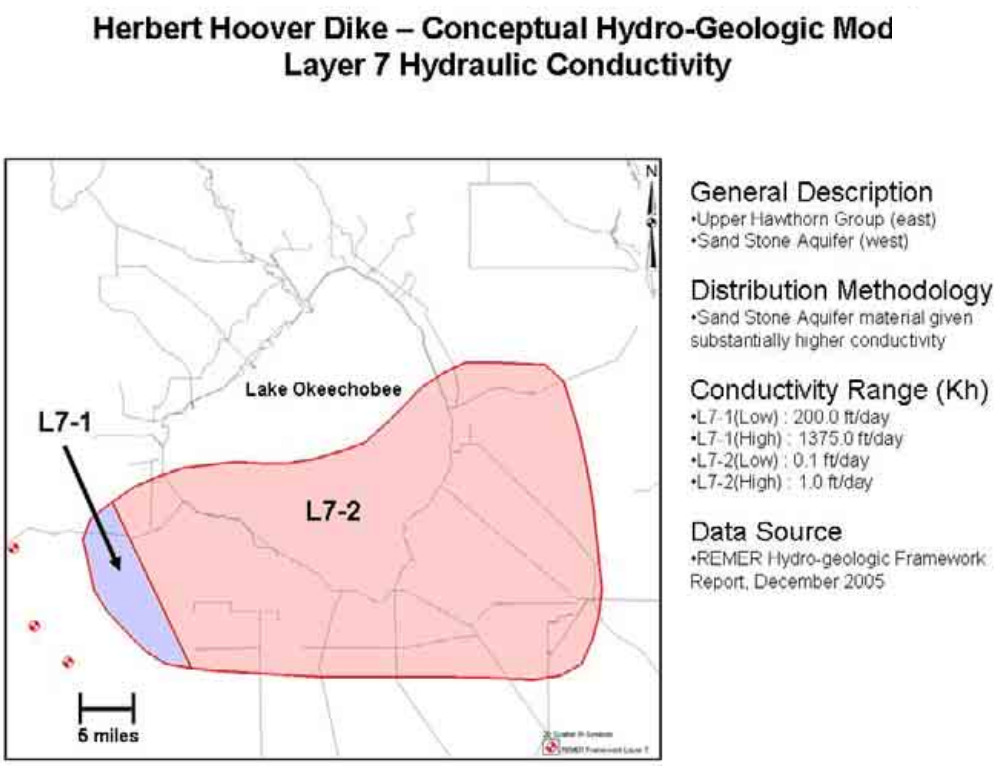


FIGURE A-9: HYDRAULIC CONDUCTIVITY CONSIDERED FOR MATERIALS L7-1 AND L7-2 IN THE HHD PHASE 1A MODEL

A.2.4 Boundary Conditions

The compiled data used to set up the boundary conditions of the HHD Phase 1A model included (1) groundwater heads, (2) canal stages, (3) Lake Okeechobee stages, and (4) rainfall and evapotranspiration.

A.2.4.1 Groundwater Heads

Figure A-10 shows the location of groundwater wells in the vicinity of the model with more than five years of record. Locations marked in red have between five and ten years of data, while locations marked in blue have more than 10 years of data. Groundwater head data was downloaded from the DBHydro data base maintained by South Florida Water Management District (SFWMD) for entire period of record available for each gage. The following description for each gage summarizes the available information. For some gages multiple agencies collected data in the same location. As a result, multiple data sets are available at these locations. **Table A-1** summarizes the canal stage gauges utilized. After screening the collected data, the value of the 95th, 50th, and 5th percentiles were determined for each well location to determine the high, medium, and low values for sensitivity analysis.

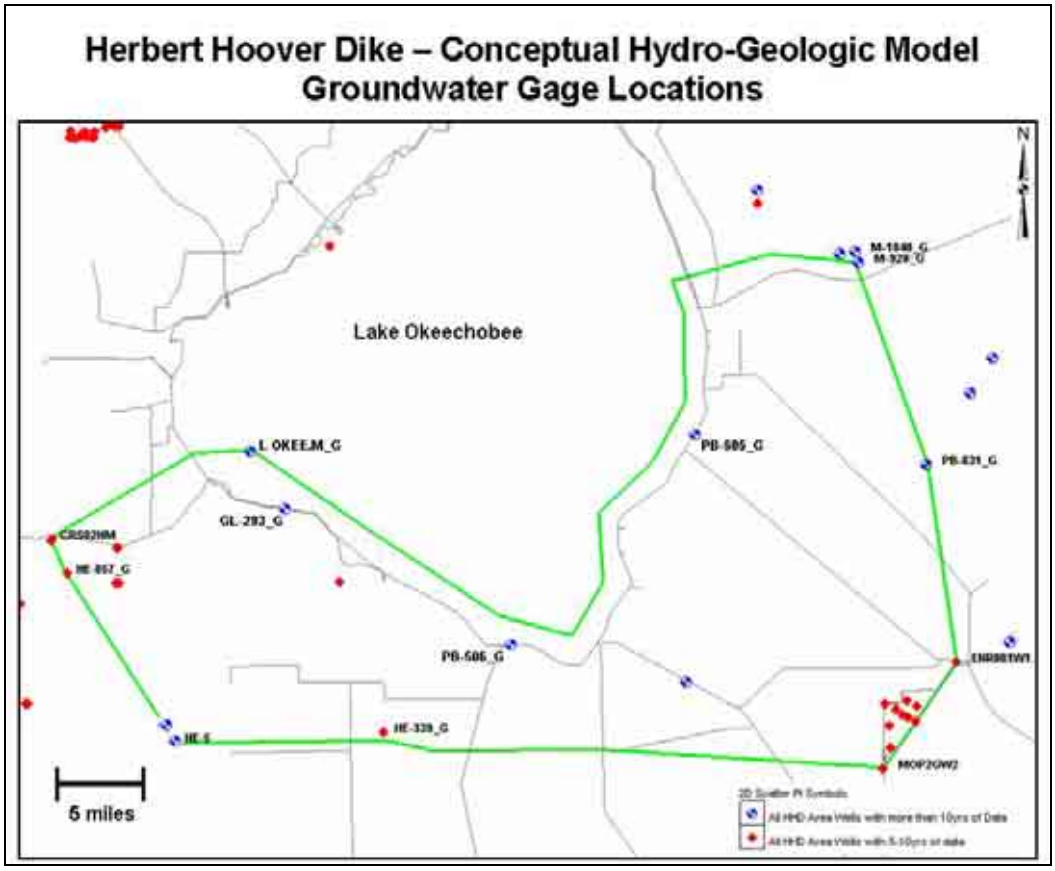


FIGURE A-10: GROUNDWATER HEAD GAGE LOCATIONS CONSIDERED IN THE HHD PHASE 1A MODEL

TABLE A-1: GROUNDWATER STAGES (5TH PERCENTILE USED FOR LOW NET BOUNDARY CONDITIONS)

Well Name	DB Key	Collection Agency	Data Type	Data Start Date	Data End Date	# of Data Values	Max Value	Min Value	95th Percentile	5th Percentile
HE-5	8322	USGS	RAND	29-Oct-80	29-Mar-88	63	26.24	22.29	25.64	22.85
HE-5	TA276	WMD_MOD1	MAX	1-Jan-81	28-Oct-83	903	26.51	22.25	25.75	22.69
HE-339_G	2500	USGS	MAX	1-Oct-73	30-Sep-79	2191	14.74	10.76	13.79	11.39
HE-339_G	2502	USGS	RAND	30-Oct-79	29-Mar-88	86	15.11	10.95	13.31	11.41
MOP2GW1	TA208	WMD_MOD1	MEAN	9-Dec-97	31-Dec-00	1119	14.49	9.5	13.88	10.32
MOP2GW1	H1967	WMD_CR10	MEAN	9-Dec-97	13-Apr-05	2683	14.49	9.5	13.76	11.33
MOP2GW2	H1970	WMD_CR10	MEAN	9-Dec-97	12-Apr-05	2682	14.46	9.49	13.76	11.36
MOP2GW3	H1971	WMD_CR10	MEAN	9-Dec-97	13-Apr-05	2683	14.59	9.4	13.96	11.55
ENR001W1	H1976	WMD_CR10	MEAN	28-Jan-98	5-Mar-07	3297	12.36	8.73	11.46	10.14
ENR001W1	TA207	WMD_MOD1	MEAN	28-Jan-98	31-Dec-00	1069	12.36	9.69	11.43	10.34
ENR001W2	H1977	WMD_CR10	MEAN	28-Jan-98	5-Mar-07	3297	12.37	12.37	11.55	10.23
PB-831_G	2811	USGS	MAX	1-Nov-74	8-Feb-07	11541	23.69	18.53	22.74	19.64
PB-831_G	P0779	WMD_MOD1	MAX	1-Jan-78	31-Dec-04	9620	23.56	18.53	22.75	19.64
M-1048_G	3021	USGS	MAX	25-Sep-74	28-Feb-07	11373	34.05	24.65	32.00	26.30
M-1048_G	TA198	WMD_MOD1	MAX	1-Jan-81	31-Dec-00	7014	33.81	25.85	32.03	26.52
M-928_G	3019	USGS	MAX	1-Oct-73	27-Apr-77	1305	31.98	26	30.98	26.22
M-928_G	3020	USGS	MEAN	20-May-57	30-Sep-73	1155	33.35	20.7	32.56	27.13
CRS02FM	L7465	WMD_CR10	MEAN	3-Nov-99	23-Feb-07	2501	15.59	10.95	14.83	11.70
CRS02FM	UD287	WMD_CR10	MEAN	3-Nov-99	11-Jan-06	2262	15.59	10.95	14.84	11.73
CRS02FS	L7464	WMD_CR10	MEAN	3-Nov-99	23-Feb-07	2587	15.37	9.22	14.36	10.26
CRS02FS	TA204	WMD_MOD1	MEAN	3-Nov-99	31-Dec-00	425	13.69	9.62	13.41	9.88
CRS02NM	L7449	WMD_CR10	MEAN	4-Nov-99	23-Feb-07	2668	14.01	10.38	13.23	11.72
CRS02NM	UD379	WMD_MOD1	MEAN	4-Nov-99	17-Oct-05	2175	13.85	10.38	13.25	11.72
CRS02NS	L7448	WMD_CR10	MEAN	4-Nov-99	23-Feb-07	2614	12.86	9.15	12.19	10.69
CRS02NS	TA205	WMD_MOD1	MEAN	4-Nov-99	31-Dec-00	424	12	10.66	11.79	10.76
HE-857_G	2755	USGS	RAND	9-Oct-85	29-Mar-88	31	20.91	18.16	20.82	18.56
PB-505_G	2830	USGS	MAX	1-Oct-73	30-Sep-86	4661	14.92	9.91	14.45	10.8
PB-506_G	2684	USGS	MAX	26-Sep-73	30-Sep-86	4254	12.6	7.44	11.10	8.86
PB-506_G	2685	USGS	MEAN	5-Nov-69	30-Sep-73	255	12.02	8.74	11.62	9.03
GL-293_G	2797	USGS	MAX	28-Sep-73	30-Sep-86	3923	14.43	8.04	13.62	10.44
GL-293_G	TA211	WMD_MOD1	MAX	9-Jan-81	30-Sep-86	1790	14.27	9.46	13.33	10.37
L OKEE.M_G	JO082	WMD_CR10	MEAN	1-Jul-99	1-Apr-07	2826	18.1	12.84	16.8	12.85
L OKEE.M_G	TA224	WMD_MOD1	MEAN	1-Jan-81	1-Jul-99	6352	18.69	10.74	17.18	11.88

HE-5: This gage is located in Hendry County in the southwestern portion of the HHD Phase 1A model domain. The well has a total depth of 13 ft and is screened at a depth of 8.7 to 13 ft. Two data sets exist in DBHydro for this gage. The maximum data set value is 26.51 ft NGVD29 and the minimum data set value is 22.25 ft NGVD29.

HE-339_G: This gage is located in Hendry County in the southern potion of the HHD Phase 1A model domain. The well has a total depth of 13 ft and is screened at a depth of 11 to 13 ft. Three data sets exist in DBHydro for this gage. The data set collected between 5APR64 and 30SEP73 appears to be significantly lower than the data collected in subsequent years. According to SAJ-EN-GG, this discrepancy may be due to survey elevation corrections with modern technology or the conversions from Price Stage Flow Meters with pen & ink instrumentation to radio control telemetry systems. Because this data appears to be suspect, it was not used in defining the model boundary conditions. For these two data sets, the maximum data set value is 15.11 ft NGVD29 and the minimum data set value is 10.76 ft NGVD29.

MOP2GW1, MOP2GW2, and MOP2GW3: This gage cluster is located in Palm Beach County at the southern end of STA1W in the southeastern potion of the HHD Phase 1A model domain. The three wells in this cluster are in essentially the same horizontal location and have varying depths. MOP2GW1 is the deepest is screened at a depth of 99.65 to 101.65 ft. MOP2GW3 is the shallowest is screened at a depth of 29.5 to 31.5 ft. MOP2GW2 is screened at a depth of 57.26 to 59.26 ft., between the other two wells in the cluster. Generally, the data shows a

slight downward gradient in this area, with the water level in the shallower well being 0.2 foot higher than the deeper well on average. This may be the result of water level fluctuations in the adjacent storm treatment area. Although this downward gradient does increase at times to approximately 0.5 foot for the purposes of this Phase 1A model the water levels in this location was treated as hydrostatic. For these three wells, the maximum data set value is 14.59 ft NGVD29 and the minimum data set value is 9.4 ft NGVD29.

ENR001W1 and ENR001W2: This gage cluster is located in Palm Beach County at the northern end of WCA1. The two wells in this cluster are in essentially the same horizontal location and have varying depths. ENR001W1 is the deeper well and is screened at a depth of 101.1 to 102.1 ft. ENR001W2 is the shallower well and is screened at a depth of 62.97 to 64.97 ft. Generally, the data shows a slight downward gradient in this area, with the water level in the shallower well being less than 0.1 foot higher than the deeper well on average. Although this downward gradient does increase at times to approximately 0.89 foot for a short period of time, for the purposes of this Phase 1A model the water levels in this location was treated as hydrostatic. For these two wells, the maximum data set value is 12.37 ft NGVD29 and the minimum data set value is 8.73 ft NGVD29.

PB-831_G: This gage is located in Palm Beach County in the eastern potion of the HHD Phase 1A model domain. The well has a total depth of 25 ft and is screened at a depth of 21 to 25 ft. Two data sets exist in DBHydro for this gage. The data sets appear to be consistent with one another, with the maximum data set value is 23.69 ft NGVD29 and the minimum data set value is 18.53 ft NGVD29.

M-1048_G and M-928_G: These gages are located in Martin County at the northeastern potion of the HHD Phase 1A model domain. These two wells are located horizontally within 100 ft of one another but have varying depths. M-1048_G appears to be the deeper well and is screened at a depth of 25 to 80 ft. M-928_G appears to be the shallower well with a total depth of 11 ft. The periods of record for these wells only overlap between 25SEP74 and 27APR77. The data from these two wells during that period appear to be relatively consistent. Consequently, the water level in this area was treated as hydrostatic. For M-1048_G, the maximum data set value is 34.05 ft NGVD29 and the minimum data set value is 24.65 ft. NGVD29. For M-928_G, the maximum data set value is 33.35 ft NGVD29 and the minimum data set value is 20.7 ft NGVD29.

CRS02FM, CRS02FS, CRS02NM and CRS02NS: This gage cluster is located in Glades County in the vicinity of Lake Hicpochee in the northwestern potion of the HHD Phase 1A model domain. The four wells are installed in clusters of two, which are approximately 350 ft apart from each another. Each well pair has varying depths. The CRS02NM and CRS02NS well pair is approximately 300 ft south of the Caloosahatchee River. CRS02NM is the deeper well of the pair and is screened at a depth of 54.01 to 59.01 ft. CRS02NS is the shallower well of the pair and is screened at a depth of 17.4 to 22.4 ft. The CRS02FM and CRS02FS well pair is approximately 650 ft south of the Caloosahatchee River. CRS02FM is the deeper well of the pair and is screened at a depth of 38.45 to 43.45 ft. CRS02FS is the shallower well of the pair and is screened at a depth of 17.43 to 22.43 ft. In both well pairs there appears to be a distinct upward gradient. In the CRS02NM and CRS02NS well pair, the

water level in the shallower well is approximately 0.94 foot lower than the deeper well on average, with differentials of up to 1.76 ft. In the CRS02FM and CRS02FS well pair, the water level in the shallower well is approximately 0.88 foot lower than the deeper well on average, with differentials of up to 1.95 ft. In addition to the differentials observed in the well pairs, the wells closer to the Caloosahatchee River (CRS02NM and CRS02NS) appear to be on average several ft lower than the wells further to the south (CRS02FM and CRS02FS). This tends to indicate that the Caloosahatchee River is a groundwater sink in this area. Due to the significant differences in the observed head within this well cluster, the water levels in the shallower wells was used to set the 3-D total head boundary conditions in Layers 1, 2, and 3, while the water levels in the deeper wells was used to set the 3-D total head boundary conditions in Layers 5 and 6.

HE-857_G: This gage is located in Hendry County in the western potion of the HHD Phase 1A model domain. The well has a total depth of 20 ft and is screened at a depth of 12 to 20 ft. Two data sets exist in DBHydro for this gage. The data set that runs between 09NOV77 and 05NOV79 shows a constantly decreasing trend, which may indicate a bad transducer. Because this data appears to be suspect, it was not be used in defining the model boundary conditions. The remaining data set is comprised of a limited number of points, bit was still considered useful for assigning boundary conditions. The maximum data set value is 20.91 ft NGVD29 and the minimum data set value for the remaining data is 18.16 ft NGVD29.

In addition to the groundwater wells discussed above, four additional gages were identified in the immediate vicinity of Lake Okeechobee. The water levels in these four wells were compared to the Lake Okeechobee stage to determine if a hydrostatic groundwater boundary condition assumption based on the Lake stage was appropriate.

PB-505_G: This gage is located in Palm Beach County along the perimeter of Lake Okeechobee, north of the L-10 canal. The well has a total depth of 15.6 ft. The maximum data set value for the well is 14.92 ft NGVD29 and the minimum data set value is 9.91 ft NGVD29. During the overlapping period of record, it appears that the water level in the well is generally below the lake stage under high stage conditions. However, as the lake stage drops, the water level in the well approaches that of the lake stage. Layer 2 is approximately 10-foot thick in this area. Because Layer 2 is comprised of lower permeability materials, it may be dampening the groundwater response to lake stage fluctuations.

PB-506_G: This gage is located in Palm Beach County along the perimeter of Lake Okeechobee, near S3 and S354. The well has a total depth of 15.3 ft and is screened at a depth of 11.4 to 15.3 ft. The maximum data set value for the well is 12.6 ft NGVD29 and the minimum data set value is 7.44 ft NGVD29. During the overlapping period of record, it appears that the water level in the well is generally below the lake stage. The thickness of Layer 2 varies between 5 and 10 ft in this area. Again, because Layer 2 is comprised of lower permeability materials, it may be dampening the groundwater response to lake stage fluctuations.

GL-293_G: This gage is located in Glades County along the perimeter of Lake Okeechobee, near S4. The well has a total depth of 9.0 ft and is screened at a depth of 5.0 to 9.0 ft. The maximum data set value for the well is 14.43 ft NGVD29 and the minimum data set value is

8.04 ft NGVD29. During the overlapping period of record, it appears that the water level in the well is generally below the lake stage under high stage conditions. However, as the lake stage drops, the water level in the well approaches that of the lake stage. The thickness of Layer 2 varies between 5 and 10 ft in this area. With lower permeability materials in Layer 2, it may be dampening the groundwater response to lake stage fluctuations.

L OKEE.M_G: This gage is located in Glades County within the perimeter of Lake Okeechobee, near the Caloosahatchee River. No depth or screen information was available. The maximum data set value for the well is 18.69 ft NGVD29 and the minimum data set value is 10.74 ft NGVD29. During the overlapping period of record, it appears that the water level in the well generally matches the lake stage, except under low stage conditions. This trend does not match that seen in the other perimeter lake wells. One reason for this discrepancy may be due to the thin to non-existent peat, clay and silt (Layer 2) in this area. This puts the lake in direct contact with the more permeable sands the well is screened in. This allows the groundwater level to fluctuate with the lake when Lake Okeechobee is acting as a source to groundwater (higher stage periods). However, as the lake level drops the regional groundwater flow begins to control the water levels in the well. During these periods, groundwater flow appears to flow into Lake Okeechobee.

Due to the differences noted above in the wells along the perimeter of Lake Okeechobee, boundary conditions assigned to the groundwater may differ from the lake stage boundary applied to the surface of the model. This variation in the application of groundwater boundary conditions is consistent with the findings of the System Wide Water Resources Program regional demonstration model developed by ERDC during 2006.

A.2.4.2 Canal Stages

Figure A-12 shows the location of the surface water canal gages in the vicinity of the model with more than five years of record. Stage data was also downloaded from the SFWMD's DBHydro data base for the available period of record for each gage. Stage data for the canals within the model domain were applied to the surface of the model as constant head boundary conditions, which allowed these canals to act as either sources or sinks to groundwater in the HHD Phase 1A model, depending on the other hydro-geologic parameters in the model. Like the groundwater head data, the surface water stage data was collected, processed, and reviewed by NAP and ERDC for its suitability in the Phase 1A model. The values for the 95th, 50th, and 5th percentiles were determined for each data set. These values are defined as the high, medium, and low values for sensitivity analysis. **Table A-2** summarizes the canal stages used for the model boundary conditions.

S153 and S308: These structures are located in Martin County at the confluence of Lake Okeechobee and the St. Lucie Canal (C-44). The headwater stage of S308 reflects the Lake Okeechobee stage, while the tail water stage reflects the stage at the eastern extent of the St. Lucie Canal. The headwater stage of S153 reflects the stage in the Lake Okeechobee exterior perimeter canal C-44A, while the tail water stage reflects the stage at the eastern extent of the St. Lucie Canal.

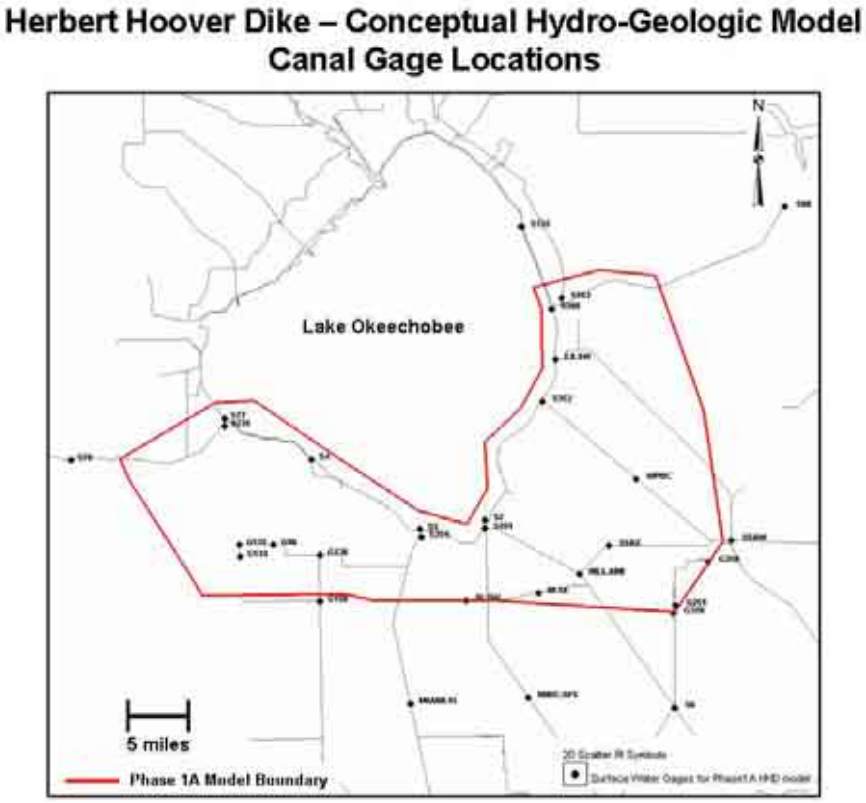


FIGURE A-11: CANAL WATER STAGE GAGE LOCATIONS CONSIDERED IN THE HHD PHASE 1A MODEL

TABLE A-2: CANAL STAGE DATA (5TH PERCENTILE USED FOR LOW NET BOUNDARY CONDITION)

Well Name	DB Key	Collection Agency	Data Type	Data Start Date	Data End Date	# of Data Values	Max Value	Min Value	95th Percentile	5th Percentile
S308_H	TA368	COE	MEAN_MOD1	29860	37621	7716	18.7	8.83	17.33	11.04
S308_T	TA310	WMD	MEAN_MOD1	29860	37621	7715	18.03	8.78	14.85	10.75
S80_H	TA256	WMD	MEAN_MOD1	32051	36891	4830	16.95	9.55	14.53	11.45
S80_T	TA259	WMD	MEAN_MOD1	32052	34739	2621	3.19	-0.83	1.53	-0.17
L8.441	P0817	WMD	MEAN_MOD1	29491	36352	9809	19.04	8.59	16.10	10.86
S352_H	TA311	WMD	MEAN_MOD1	29491	37621	9131	18.66	8.73	17.35	10.97
S352_T	TA312	WMD	MEAN_MOD1	29491	37621	9105	14.31	7.15	12.17	9.49
S5AW_H	TA360	WMD	MEAN_MOD1	31444	37621	6178	12.37	7.68	11.54	9.04
S5AW_T	TA361	WMD	MEAN_MOD1	36978	37621	644	17.62	9.45	16.02	10.11
S351_H	M7418	WMD	MEAN	36607	39146	2540	18.17	9.35	16.78	10.30
S351_T	M7419	WMD	MEAN	36607	39146	2539	12.49	8.96	11.85	9.73
S2_H	TA221	WMD	MEAN_MOD1	29587	36891	7279	14.03	8.24	12.76	10.44
S2_T	TA223	WMD	MEAN_MOD1	29587	36891	7103	18.78	9.76	17.37	11.27
S3_H	6633	WMD	MEAN_TELE	31198	39145	7852	13.03	8.14	11.85	9.84
S3_T	6634	WMD	MEAN_TELE	31228	39145	7848	18.82	9.06	17.13	11.41
S2_H	6562	WMD	MEAN_TELE	31198	39145	7864	13.15	8.87	11.87	9.86
S2_T	6566	WMD	MEAN_TELE	31198	39145	7878	18.9	9.39	17.14	11.38
S135_H	15803	WMD	MEAN_TELE	34590	39145	4554	18.67	8.86	17.47	11.10
S135_T	15802	WMD	MEAN_TELE	34590	39145	4555	14.82	8.82	13.63	11.25
S354_H	M7437	WMD	MEAN_CR10	36622	39146	2525	18.26	9.06	16.83	10.37
S354_T	M7438	WMD	MEAN_CR10	36622	39146	2517	12.73	8.83	11.69	9.64
G404_H	NV6816	WMD	MEAN_TELE	31284	39149	7866	11.86	9.39	11.28	9.79
G404_T	NV6817	WMD	MEAN_TELE	31284	39149	7866	14.77	8.42	14.40	10.47
S77_H	J8188	WMD	MEAN_OMD	35932	37626	7895	17.78	8.78	16.39	9.97
S77_T	J1497	WMD	MEAN_OMD	35932	37626	7895	11.79	8.74	11.36	9.82
S78_H	J8185	WMD	MEAN_OMD	35932	37626	7895	11.73	8.79	11.39	9.91
S78_T	J8186	WMD	MEAN_OMD	35932	37626	7865	5.09	2.18	3.37	2.70
S5AX_H	6660	WMD	MEAN_TELE	31198	38558	5325	13.88	6.22	11.85	9.61
S5AX_T	6661	WMD	MEAN_TELE	31198	36446	4836	15.61	6.27	11.72	9.86
WPBG	5579	WMD	MEAN_TELE	31290	38600	7457	12.96	7.44	11.43	9.30
BLSE	G5163	WMD	MEAN_TELE	35446	39147	3692	14.34	8.53	11.90	9.65
BLSW	G5164	WMD	MEAN_TELE	35446	39133	3267	13.4	8.84	12.16	10.25
HILL6MI	4136	WMD	MEAN_TELE	31290	38608	6865	14.08	7.54	11.61	9.64
MIAMI.15	3122	WMD	MEAN_TELE	31290	38103	6678	12.6	7.92	11.85	9.97
S6_H	6684	WMD	MEAN_TELE	31198	39146	7876	12.6	7.59	11.46	9.12
S6_T	6685	WMD	MEAN_TELE	31198	39146	7852	18.16	9.15	17.04	12.11
S8_H	6697	WMD	MEAN_TELE	31290	39140	7851	13.25	7.91	12.14	9.69
S8_T	6698	WMD	MEAN_TELE	31290	39140	7824	14.95	6.36	14.00	9.42
NNRC3FS	5581	WMD	MEAN_TELE	31444	39142	7591	13.2	7.73	11.77	9.98
S153_H	5159	WMD	MEAN_TELE	31198	39141	7931	19.75	18.01	19.24	18.69
S153_T	5163	WMD	MEAN_TELE	31198	39141	7934	17.88	8.9	14.63	11.24
S235_H	TA216	WMD	MEAN_MOD1	29587	36891	7305	14.22	7.31	12.54	10.34
S235_T	TA218	WMD	MEAN_MOD1	29587	36891	7305	12.69	8.88	11.50	10.59
S5AS_H	P N454	WMD	Mean_MOD2	29491	37986	9496	19.33	8.38	16.09	10.45
S5AS_T	6693	WMD	MEAN_TELE	31198	39180	7842	18.98	9.89	17.12	12.18
G134_H	TA243	WMD	MEAN_MOD1	31594	36117	6998	22.57	17.03	20.44	17.65
G134_T	TA245	WMD	MEAN_MOD1	31594	36117	7108	21.43	15.43	19.28	17.13
G135_H	TA250	WMD	MEAN_MOD1	31594	36117	7108	21.16	15.38	19.21	16.90
G135_T	TA251	WMD	MEAN_MOD1	31594	36117	7108	20.03	12.53	17.67	15.91
G136_H	TA235	WMD	MEAN_MOD1	30426	36117	6292	17.35	9.88	14.50	11.37
G136_T	TA237	WMD	MEAN_MOD1	30426	36117	6292	15.57	8.82	12.42	10.11
G96_H	TA252	WMD	MEAN_MOD1	31594	36117	7108	18.01	10.31	16.88	12.71
G96_T	TA253	WMD	MEAN_MOD1	31594	36117	7108	17.15	10.02	14.52	11.37
G150_H	15521	WMD	MEAN_CR10	33951	39180	4767	18.75	10.68	16.51	11.88
G150_T	15522	WMD	MEAN_CR10	33951	39180	4767	17.38	8.32	14.55	11.09
G250S_H	15810	WMD	MEAN_TELE	34556	39173	4618	11.43	6.56	8.75	7.17
G250_H	15869	WMD	MEAN_TELE	34215	39173	5001	12.12	7.45	11.52	9.19
G250_T	16217	WMD	MEAN_TELE	34215	39173	4914	14.66	6.91	13.40	11.21
G251_H	16218	WMD	MEAN_TELE	34256	39173	4890	13.64	8.12	12.32	9.77
G251_T	16219	WMD	MEAN_TELE	34249	39173	4915	18.43	12.06	17.31	14.63
G310_H	M5154	WMD	MEAN_DWR	36685	37633	1149	9.99	7.22	9.49	8.06
G310_T	M5155	WMD	MEAN_DWR	36685	37633	1149	17.95	11.51	17.25	14.03

L8.441: This gage is located in Palm Beach County at the confluence of Lake Okeechobee and the L8 canal. Since this gage is not a structure used to control flow, only one set of data is available at this gage. The data at this gage shows significantly more variability than that of the Lake Okeechobee gages in the area. These fluctuations are most likely due to fluctuations in drainage to the L8 canal and are not representative in fluctuation of the lake level.

S352: This gage is located in Palm Beach County at the confluence of Lake Okeechobee and the L10 canal. The headwater stage of S352 reflects the Lake Okeechobee stage, while the tail water stage reflects the stage at the heads of the L10 canal.

S351 and S2: These structures are located in Palm Beach County at the confluence of Lake Okeechobee, L14 and L20. S351 is a gated structure that allows water to pass from Lake

Okeechobee to the L14 and L20 canals. S2 is a pump station that pumps canal water into Lake Okeechobee. The headwater stage of S351 reflects the Lake Okeechobee stage, while the tail water stage reflects the stage of the downstream canals. The headwater stage of S2 reflects the stage of the downstream canals, while the tail water stage reflects the stage in the Lake Okeechobee.

S354 and S3: These structures are located in Palm Beach County at the confluence of Lake Okeechobee and the L25 canal. S354 is a gated structure that allows water to pass from Lake Okeechobee to the L25 canal. S3 is a pump station that pumps canal water into Lake Okeechobee. The headwater stage of S354 reflects the Lake Okeechobee stage, while the tail water stage reflects the stage of the downstream canal. The headwater stage of S3 reflects the stage of the downstream canals, while the tail water stage reflects the stage in the Lake Okeechobee.

S4: This pump station is located in Glades County at the confluence of Lake Okeechobee and the C20 perimeter canal. The headwater stage of S4 reflects the perimeter canal, while the tail water stage reflects the Lake Okeechobee stage.

S77 and S235: These structures are located in Glades County at the confluence of Lake Okeechobee and the Caloosahatchee River (C-43). The headwater stage of S77 reflects the Lake Okeechobee stage, while the tail water stage reflects the stage of the Caloosahatchee River. The headwater stage of S235 also reflects the stage of the Caloosahatchee River, while the tail water stage reflects the stage in the LD-3 perimeter canal. Because the stage data for S77 is limited, the model used the headwater data from S235 for the Caloosahatchee River and the interior lake gage, L0005, for Lake Okeechobee in this area.

BLSW, BLSE, and HILL.6MI: These gages are located in Palm Beach County along the Bolles Canal. Because these gages are not structures used to control flow, only one set of data is available at each gage.

S5AX: This gage is located in Palm Beach County along Ocean Canal. The headwater and tail water stage of S5AX are similar during the available period of record.

S5AS and S5AW: These structures are located in Palm Beach County at the northern end of Water Conservation Area 1(WCA-1). The headwater stage of S5AS reflects the stage in the L8 canal, while the tail water stage reflects the stage at in WCA-1. The headwater stage of S5AW reflects the stage in L10, while the tail water stage reflects the stage in the L8 canal. Because the tail water stage data for S5AW is limited, the model used the headwater data from S5AS for the L8 canal.

WPBC: This gage is located in Palm Beach County along the L10 canal. Because this gage is not a structure used to control flow, only one set of data is available at this gage.

G134: This gage is located in Hendry County and is a single-barreled corrugated metal pipe culvert, located about one mile below the outlet of the Montura Ranch Estates Reservoir, at

the south end of Flaghole Road, about a mile south of Canal L1. The headwater of G134 is to the south of the structure, while the tail water is to the north along the L1 canal.

G135: This gage is located in Hendry County and is a single-barreled corrugated metal pipe culvert, located at the south boundary of the Flaghole Drainage District. Control is affected by stop logs in a riser at the south end of the culvert. The headwater of G135 is to the south of the structure, while the tail water is to the north along the L1 canal.

G96: This gage is located in Hendry County and is a double-barreled, corrugated metal pipe culvert, located in a plug in the L1 borrow canal about three miles east of Flag Hole Road. The headwater of G96 is to the west of the structure, while the tail water is to the east along the L1 canal.

G136: This gage is located in Hendry County and is a three-barreled corrugated metal pipe culvert, located at the bend in L1 about three miles north of SR 832. Control is affected by stop logs in risers in each culvert. The headwater of G136 is to the west of the structure, while the tail water is to the east along the L1 canal.

G150: This gage is located in Hendry County and is a three-barreled corrugated metal pipe culvert, located at the divide line of L-1 and L-2. Control is affected by slide gates at the south side of the culverts. The headwater of G150 is to the north of the structure, while the tail water is to the south.

G251 and G310: These structures are located in Palm Beach County at the southeast corner of the Everglades Nutrient Removal Project. G310 is a pump station located at the south corner of STA-1W. The G251 pump station is located to the east of G310 and is used to pump treated agricultural runoff water from the ENR project into Water Conservation Area 1. The headwater stage of G310 is on the northern side of the pump station, while the tail water is on the southern side of the pump station. The headwater stage of G251 reflects the stage on the western side of the pump station, while the tail water stage reflects the stage on the eastern side of the pump station.

In addition to the gages discussed above, data were collected for the S78, S80, S135, G404, MIAMI_15, S6, S8, and NNRC.SFS surface water gages. Although these gages are not within the model domain, the data from these gages were interpolated to set surface water boundary conditions within the model.

A.2.4.3 Lake Stages

In addition to the structure headwater stage data mentioned above, four stage gages were used to determine lake levels in the interior of Lake Okeechobee. The locations of these gages are shown on **Figure A-12**. Although data were collected for these gages (**Table A-3**), the data was not used in the Phase 1A modeling effort. The data from these gages are similar to the headwater data of the gate structures around the lake. The headwater data for the structures were used to set the lake stage boundary conditions because the headwater data are more consistent with the heads along the model boundary.

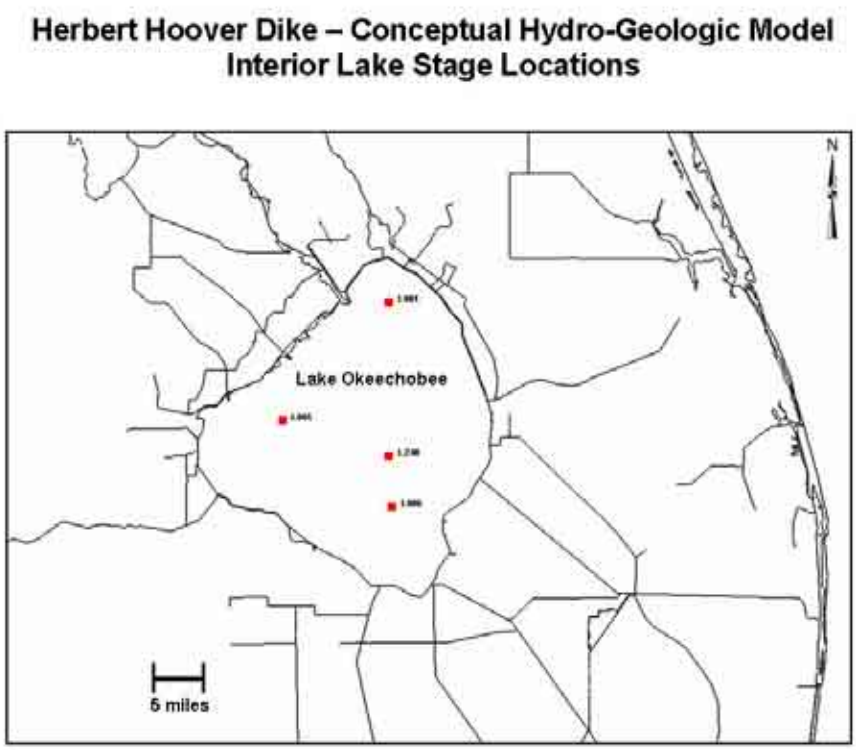


FIGURE A-12: LAKE OKEECHOBEE WATER STAGE GAGE LOCATIONS CONSIDERED IN THE HHD PHASE 1A MODEL

TABLE A-3: SUMMARY OF AVAILABLE LAKE OKEECHOBEE STAGE DATA

Well Name	DB Key	Collection Agency	Data Type	Data Start Date	Data End Date	# of Data Values	Max Value	Min Value	95th Percentile	5th Percentile
L001	16022	WMD	MEAN_CR10	34550	39174	4577	18.99	8.87	17.29	10.88
L006	12519	WMD	MEAN_CR11	33053	39171	5381	18.68	8.86	17.18	11.27
LZ40	16265	WMD	MEAN_CR12	33045	39173	5126	18.7	9.06	17.23	11.14
L005	12509	WMD	MEAN_CR13	32744	39174	5783	18.51	8.84	17.34	11.40

Well Name	DB Key	NGVD29 Maximum	NGVD29 Median	NGVD29 Minimum	Conversion Factor	NAVD88 Maximum	NAVD88 Median	NAVD88 Minimum
L001	16022	17.29	15.12	10.88	-1.217	16.08	13.90	9.66
L006	12519	17.18	15.08	11.27	-1.201	15.92	13.82	10.01
LZ40	16265	17.23	14.98	11.14	-1.26	16.00	13.75	9.91
L005	12509	17.34	15.07	11.40	-1.23	16.14	13.87	10.20

A.2.4.4 Groundwater Net Recharge

Precipitation is generally the primary mechanism for recharging the groundwater system. However, only a portion of precipitation recharges the groundwater due to evapotranspiration, surface runoff, and other factors. The net recharge is the portion of precipitation that infiltrates the groundwater table. According to Appendix A of the EAA Storage Reservoir Revised Draft PIR and EIS, dated February 2006, the average annual precipitation in this area is approximately 55 inches per year. However, this report also notes that "extensive dewatering and pumping operations greatly affect the amount of recharge able to reach the water table". Consequently, it was determined that the maximum net recharge for this area is about 5 inches per year. The low net recharge condition was assumed to be zero inches per year.

A.2.4.5 Groundwater Usage and Withdrawal

Approximately 290 groundwater pumping wells are permitted in the Surficial Aquifer System (SAS) within the Phase 1A model domain. Although actual groundwater withdrawal rates were not available for all wells, the pump capacities for these wells were available based on data obtained from SFWMD and well permits. The location of the wells within the Phase 1A model domain (outlined in red) in **Figure A-13**. A list of the wells and associated capacities included in the model are available in **Table A-4**. Since this is a steady-state model, the pump operations are not varied through time and therefore the model assumes the pumps are running at the maximum permitted capacity continuously. Each well location is color coded by the pump capacity for the well. The majority of the wells within the model domain have pump capacities below 250,000 cubic feet per day. Several wells were identified with expired permits. These wells were not modeled. For the sensitivity analysis simulation, a pumping rate of zero cubic feet per day was used as the minimum pumping value, while the pump capacity at each well was used as the maximum pumping value. The half capacity values were taken as the medium pumping values.

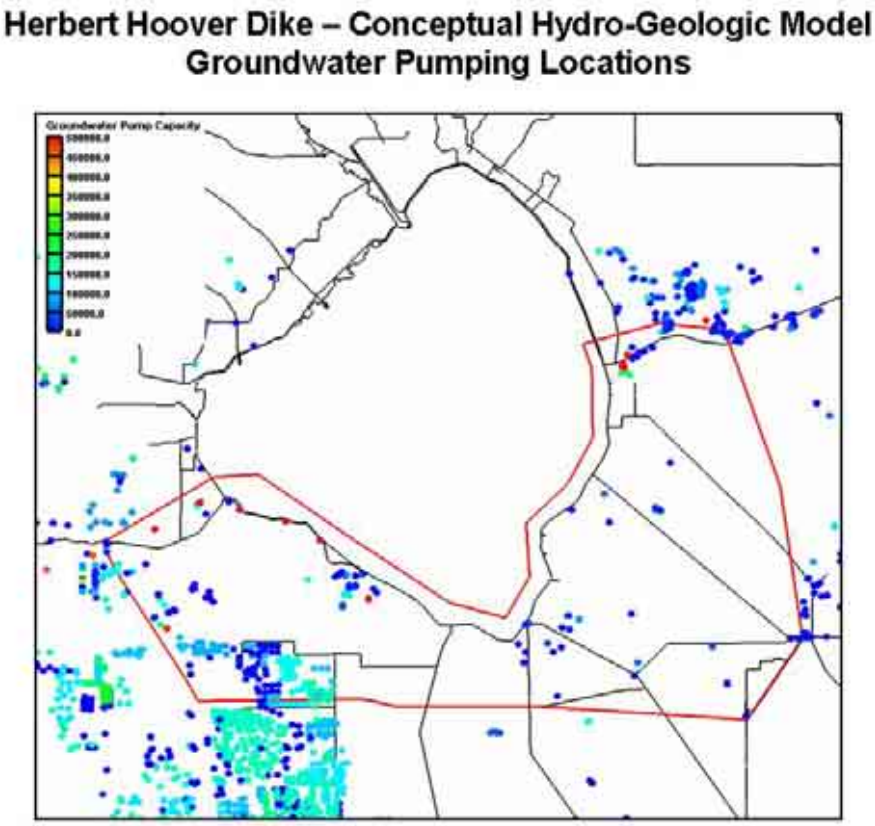


FIGURE A-13: GROUNDWATER PUMPING LOCATIONS CONSIDERED IN THE HHD PHASE 1A MODEL

TABLE A-4: WELLS UTILZED IN THE MODEL

PERMIT NO	PROJECT NAME	NAME	X	Y	AQUIFER	PUMP CAPACITY(cfd)	WELL DIAMETER(in)	CASED DEPTH (ft)	WELL DEPTH(ft)
26-00514-W	AG MECH CITRUS GROVE	1	604081	867935	Tamiami	123,209	10	75	120
26-00740-W	ALFREDO AND FABIAN GARCIA	WELL #1	608100	865972	Aquifer	1,925	4	100	120
26-00740-W	ALFREDO AND FABIAN GARCIA	WELL #2	608412	865788	Aquifer	15,401	4	100	140
26-00631-W	ALICO HILLIARD LANDS	12	610338	851580	Tamiami	96,257	10	90	120
26-00631-W	ALICO HILLIARD LANDS	13	610484	854935	Tamiami	96,257	10	90	120
26-00631-W	ALICO HILLIARD LANDS	14	611242	850344	Tamiami	96,257	10	90	120
26-00631-W	ALICO HILLIARD LANDS	15	612557	851660	Tamiami	96,257	10	90	120
43-00418-W	ALPAT GROVES	5/40/38	803643	977573	Aquifer	96,257	10	105	125
22-00220-W	ALVIN WARD BOAT RAMP FACILITY	1	629982	909556	Aquifer	3,369	4	25	40
26-00720-W	AQUALIFE USA INC	1	601785	872290	Tamiami	14,439	4	110	140
26-00720-W	AQUALIFE USA INC	2	601710	872320	Tamiami	14,439	4	110	140
26-00720-W	AQUALIFE USA INC	3	601960	872320	Tamiami	14,439	4	110	140
26-00486-W	ARBULUT TREE NURSERY	1	602257	870452	Tamiami	115,508	10	60	80
50-02925-W	ATLANTIC SUGAR ASSOCIATION	R-2	829724	836492	Aquifer	0	6	4	19
50-02925-W	ATLANTIC SUGAR ASSOCIATION	R-1	829724	836492	Aquifer	1,348	6	4	19
50-03555-W	ATLANTIC SUGAR MILL	P1	829662	836377	Aquifer	12,898	6	40	50
50-03555-W	ATLANTIC SUGAR MILL	P2	829665	836635	Aquifer	12,898	6	40	50
26-00318-W	BAYROCK GROVES	4	616548	848673	Tamiami	86,631	10	90	140
26-00318-W	BAYROCK GROVES	5	617924	848669	Tamiami	86,631	10	80	140
26-00318-W	BAYROCK GROVES	7	620572	848920	Tamiami	86,631	10	129	169
26-00318-W	BAYROCK GROVES	8	623358	852488	Tamiami	86,631	10	131	171
26-00318-W	BAYROCK GROVES	9	622782	849802	Tamiami	86,631	10	80	130
26-00318-W	BAYROCK GROVES	10	624735	851388	Tamiami	86,631	10	85	125
26-00318-W	BAYROCK GROVES	11	624632	849856	Tamiami	86,631	10	85	125
26-00318-W	BAYROCK GROVES	12	626043	849768	Tamiami	86,631	10	92	132
26-00318-W	BAYROCK GROVES	1	619921	850413	Tamiami	86,631	10	169	217
26-00318-W	BAYROCK GROVES	6	617468	852865	Tamiami	86,631	10	176	216
26-00318-W	BAYROCK GROVES	13	619327	852894	Tamiami	86,631	10	180	220
26-00318-W	BAYROCK GROVES	15	616066	851421	Tamiami	86,631	10	175	215
26-00318-W	BAYROCK GROVES	3	618019	850131	Tamiami	86,631	10	132	172
26-00318-W	BAYROCK GROVES	14	626533	851558	Tamiami	86,631	10	80	120
26-00318-W	BAYROCK GROVES	2	616880	850097	Tamiami	86,631	10	132	172
50-03513-W	BELLE GLADE ELEMENTARY SCHOOL	WELL	763622	859007	Aquifer	9,626	4	30	50
50-07373-W	BIG LAKE PLAZA	1	763418	851193	Aquifer	11,551	3	80	100
43-00732-W	BLOODS HAMMOCK GROVE - BLOCK 33	32-2	805363	978058	Aquifer	11,551	4	80	100
43-00732-W	BLOODS HAMMOCK GROVE - BLOCK 33	32-1	805466	979253	Aquifer	23,102	6	80	100
43-00732-W	BLOODS HAMMOCK GROVE - BLOCK 33	33-1	807122	978874	Aquifer	32,727	6	80	100
43-01749-W	BOOKER PARK	WELL 1	824513	977899	Aquifer	4,813		Assumed to be in Layer 3A	
43-01749-W	BOOKER PARK	WELL 2	824572	977629	Aquifer	6,738		Assumed to be in Layer 3A	
43-01749-W	BOOKER PARK	WELL 3	824368	977484	Aquifer	15,401		Assumed to be in Layer 3A	
50-03785-W	BOURNE FARM TRACTOR SHOP	1	807054	925179	Aquifer	5,775	4	50	100
50-01486-W	TREATMENT PLANT	1	780704	912627	Aquifer	61,604	12	24	42
26-00261-W	CHIPCO GROVE	1	591236	881500	Tamiami	92,406	10	70	170
26-00256-W	CITRUS NURSERY	2	675614	867920	Tamiami	38,503	10	112	146
26-00256-W	CITRUS NURSERY	1	675588	866923	Tamiami	57,754	6	112	146
26-00327-W	CLEGHORN HENDRY COUNTY FARM	2	585617	884417	Tamiami	115,508	8	90	140
26-00327-W	CLEGHORN HENDRY COUNTY FARM	4	585677	881369	Tamiami	115,508	8	90	140
26-00077-W	CLEWISTON FFA CHAPTER	1	620901	870973	Tamiami	0	4	0	55
26-00077-W	CLEWISTON FFA CHAPTER	2	622642	870336	Tamiami	0	4	0	67
26-00077-W	CLEWISTON FFA CHAPTER	3	623844	869486	Tamiami	0	4	0	42
26-00077-W	CLEWISTON FFA CHAPTER	4	622253	871180	Tamiami	0	6	30	40
26-00077-W	CLEWISTON FFA CHAPTER	5	622068	872932	Tamiami	0	6	30	45
26-00077-W	CLEWISTON FFA CHAPTER	6	622223	873651	Tamiami	0	6	30	45

PERMIT NO	PROJECT NAME	NAME	X	Y	AQUIFER	PUMP CAPACITY(cfd)	WELL DIAMETER(in)	CASED DEPTH (ft)	WELL DEPTH(ft)
26-00676-W	CLEWISTON FIELD STATION AT S-2	Well 2	748835	860241	Aquifer	1,925	4	35	50
26-00676-W	CLEWISTON FIELD STATION AT S-2	1	689144	872904	Aquifer	15,401	4		90
26-00572-W	CLEWISTON MILL COMPLEX(	PROPOSED WELL	677767	874328	Tamiami	125,134	10	50	70
26-00582-W	CLEWISTON/LABELLE SCHOOLS	CHS WELL #2	680945	875463	Tamiami	11,551	2	90	120
26-00582-W	CLEWISTON/LABELLE SCHOOLS	CHS WELL #3	679821	875391	Tamiami	11,551	2	80	120
26-00582-W	CLEWISTON/LABELLE SCHOOLS	CHS WELL #1	680941	875840	Tamiami	25,027	4	90	120
26-00383-W	COTTON CITRUS	N	628637	851662	Tamiami	77,005	8	80	160
26-00383-W	COTTON CITRUS	S	629012	848612	Tamiami	77,005	8	80	160
50-04241-W	COURSE	1	750218	860577	Aquifer	28,877	4	20	30
26-00817-W	CRISTO ES PARA TODOS	Well 1	614347	844053	Tamiami	4,813	4	100	200
26-00690-W	DIOCESE OF VENICE FLORIDA	1	622345	846900	Tamiami	2,310	4	100	120
26-00436-W	PACKING HOUSE	W-1	596878	884430	Aquifer	11,551	4	110	140
26-00436-W	PACKING HOUSE	W-2	596878	884430	Aquifer	11,551	4	110	140
26-00436-W	PACKING HOUSE	W	596640	884220	Aquifer	17,326	10	130	170
43-00894-W	DUPUIS RESERVE	5	794677	969277	Aquifer	1,155	4		85
43-00894-W	DUPUIS RESERVE	3	793111	968159	Aquifer	1,925	2		85
43-00894-W	DUPUIS RESERVE	4	796413	969856	Aquifer	1,925	2		85
43-00894-W	DUPUIS RESERVE	5	793243	967580	Aquifer	1,925	4		85
43-00894-W	DUPUIS RESERVE	2	799833	970908	Aquifer	3,850	3		100
43-00894-W	DUPUIS RESERVE	3	794927	969185	Aquifer	3,850	3		100
43-00894-W	DUPUIS RESERVE	1	799478	971605	Aquifer	6,353	4		85
43-00894-W	DUPUIS RESERVE	4	795045	969250	Aquifer	6,738	4		85
43-00894-W	DUPUIS RESERVE	8	793546	967422	Aquifer	15,401	4		85
26-00032-W	FARM	1	661437	878143	Aquifer	144,385	6	0	30
50-04221-W	FIRST FREE METHODIST CHURCH	1	794074	844909	Aquifer	48,128	2	149	149
50-04221-W	FIRST FREE METHODIST CHURCH	2	794074	844909	Aquifer	48,128	2	149	149
26-00013-W	FLAG HOLE	4	637037	850048	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	6	644741	851864	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	7	644167	850060	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	8	642507	849171	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	21	642041	844429	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	22	641970	847479	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	23	642883	847517	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	24	637682	842155	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	25	640166	840376	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	26	639109	842099	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	27	640154	842174	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	28	639014	840257	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	29	636852	838334	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	30	636679	841096	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	32	645069	840188	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	36	642161	833040	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	37	641277	834682	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	46	644916	830893	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	15	634255	844385	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	16	634147	843327	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	18	640185	843013	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	33	642018	838384	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	34	644604	835659	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	35	644591	832960	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	38	647285	835703	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	39	647338	833398	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	41	649787	835954	Tamiami	0	8	0	0

PERMIT_NO	PROJECT_NAME	NAME	X	Y	AQUIFER	PUMP CAPACITY(cfd)	WELL DIAMETER(in)	CASED DEPTH (ft)	WELL DEPTH(ft)
26-00013-W	FLAG HOLE	3	639390	848852	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	10	649548	851652	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	11	649465	849171	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	12	647130	848971	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	13	634207	847248	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	31	644496	842174	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	9	647219	851608	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	14	634255	845977	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	5	642197	851889	Tamiami	0	6	50	109
26-00013-W	FLAG HOLE	40	649393	833085	Tamiami	0	8	0	0
26-00013-W	FLAG HOLE	2	639480	851470	Tamiami	96,257	6	50	64
26-00013-W	FLAG HOLE	17	639396	847505	Tamiami	96,257	6	50	109
26-00013-W	FLAG HOLE	19	644777	847464	Tamiami	96,257	6	50	109
26-00013-W	FLAG HOLE	20	644066	844441	Tamiami	96,257	6	50	109
26-00013-W	FLAG HOLE	1	637085	851720	Tamiami	96,257	6	50	64
50-07066-W	GLADES DAY SCHOOL, INC.	Well 1	766539	858398	Aquifer	19,251	6	30	40
50-01646-W	GLADES SUGAR HOUSE	N.W.S.W	770626	862409	Aquifer	77,005	10	14	30
50-01646-W	GLADES SUGAR HOUSE	S.W.S.W	770626	862211	Aquifer	77,005	10	14	30
50-01628-W	GLADEVIEW - IRRIGATION WELL	1	824024	851548	Aquifer	38,503	2	30	50
22-00217-W	GOLF HAVEN UNIT 2	1	581522	892249	Aquifer	19,251	8	115	145
22-00217-W	GOLF HAVEN UNIT 2	2	581214	889112	Aquifer	19,251	8	115	145
50-03512-W	GOVE GLADEVIEW ELEMENTARY SCHOOL	WELL	760190	849250	Aquifer	9,626	4	30	50
50-02741-W	GREENACRES BRANCH LIBRARY	1	779072	833115	Aquifer	5,775	2	90	100
26-00777-W	DIVISION	Well 1	607447	865791	Tamiami	3,850	4	110	130
26-00777-W	DIVISION	Well 2	607786	865806	Tamiami	3,850	4	100	130
26-00777-W	DIVISION	Well 3	607910	865813	Tamiami	3,850	4	110	130
26-00747-W	GUN RANGE TRAINING FACILITY	WELL #1	589215	880859	Aquifer	6,738	4	80	205
26-00826-W	HERB'S FISH FARM	1	605968	865156	Aquifer	4,813	4	90	110
26-00826-W	HERB'S FISH FARM	2	605819	864826	Aquifer	9,626	4	90	110
26-00826-W	HERB'S FISH FARM	3	605950	864810	Aquifer	9,626	4	90	110
26-00751-W	HOLIDAY INN - CLEWISTON	WELL #1	672533	879526	Aquifer	13,476	4	130	150
22-00334-W	INDIAN HILLS FIRE DEPARTMENT	WELL #1	580845	893336	Aquifer	9,626	4	140	160
43-00041-W	INDIANTOWN COMPANY	W-4	828575	976941	Aquifer	19,251	10	115	115
43-00041-W	INDIANTOWN COMPANY	W-6	827805	977474	Aquifer	28,877	8	125	125
43-00041-W	INDIANTOWN COMPANY	W-7	827520	977692	Aquifer	28,877	8	125	125
43-00041-W	INDIANTOWN COMPANY	W-5	828167	977223	Aquifer	38,503	8	125	125
43-01750-W	INDIANTOWN MIDDLE SCHOOL	WELL 1	826694	977584	Aquifer	28,877	Assumed to be in Layer 3A		
22-00229-W	J.J. WIGGINS YOUTH CENTER	1	617741	908330	Aquifer	11,551	4	70	100
26-00419-W	JACKMAN AND SONS RANCH B	47	664126	842692	Tamiami	96,257	14	60	80
26-00419-W	JACKMAN AND SONS RANCH B	48	667014	842692	Tamiami	96,257	14	60	80
26-00419-W	JACKMAN AND SONS RANCH B	49	669748	842638	Tamiami	96,257	14	60	80
26-00419-W	JACKMAN AND SONS RANCH B	51	671450	837397	Tamiami	96,257	14	60	80
26-00419-W	JACKMAN AND SONS RANCH B	52	664693	831993	Tamiami	96,257	14	60	80
26-00419-W	JACKMAN AND SONS RANCH B	53	667272	832155	Tamiami	96,257	14	60	80
26-00419-W	JACKMAN AND SONS RANCH B	3	662991	832101	Tamiami	163,636	12	0	180
26-00419-W	JACKMAN AND SONS RANCH B	5	668252	832101	Tamiami	163,636	12	0	180
26-00419-W	JACKMAN AND SONS RANCH B	8	670057	831615	Tamiami	163,636	12	0	180
26-00419-W	JACKMAN AND SONS RANCH B	4	662681	832047	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	5	663352	831993	Tamiami	167,487	6	78	110
26-00419-W	JACKMAN AND SONS RANCH B	6	668149	830859	Tamiami	167,487	6	56	78
26-00419-W	JACKMAN AND SONS RANCH B	7	667581	831993	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	8	670418	832101	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	10	671450	834155	Tamiami	167,487	6	0	0

PERMIT_NO	PROJECT_NAME	NAME	X	Y	AQUIFER	PUMP CAPACITY(cfd)	WELL DIAMETER(in)	CASED DEPTH (ft)	WELL DEPTH(ft)
26-00419-W	JACKMAN AND SONS RANCH B	11	667788	832588	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	12	668097	833236	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	13	666663	834047	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	14	662063	836694	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	15	662939	836802	Tamiami	167,487	6	40	62
26-00419-W	JACKMAN AND SONS RANCH B	16	663765	836802	Tamiami	167,487	6	53	85
26-00419-W	JACKMAN AND SONS RANCH B	18	663713	833884	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	9	671192	832804	Tamiami	167,487	6	0	0
26-00419-W	JACKMAN AND SONS RANCH B	17	662527	833830	Tamiami	167,487	6	0	0
26-00504-W	L & L RESTAURANT	1	614660	840389	Aquifer	7,701	4	180	200
26-00082-W	LABELLE PRIVATE DRAINAGE DISTRICT	B-9	605141	858790	Hawthorn	385,027	4	560	755
26-00082-W	LABELLE PRIVATE DRAINAGE DISTRICT	B-10	605141	858790	Hawthorn	385,027	12	600	800
26-00082-W	LABELLE PRIVATE DRAINAGE DISTRICT	W-9	605069	858675	Hawthorn	481,283	12	643	900
43-01889-W	LAKE POINT LLC PROPERTY	P-1	788310	961462	aquifer	577,540	Temporary Dewatering Permit (will not be modeled)		
43-01889-W	LAKE POINT LLC PROPERTY	P-2	788264	963205	aquifer	577,540	Temporary Dewatering Permit (will not be modeled)		
43-01929-W	LAKE POINT RANCHES	P-3	787270	961014	aquifer	192,513	Assumed to be in Layer 3A		
43-01929-W	LAKE POINT RANCHES	P-4	790078	961014	aquifer	192,513	Assumed to be in Layer 3A		
43-01929-W	LAKE POINT RANCHES	P-5	790760	960177	aquifer	192,513	Assumed to be in Layer 3A		
43-01929-W	LAKE POINT RANCHES	P-1	787874	963665	aquifer	577,540	Temporary Dewatering Permit (will not be modeled)		
43-01929-W	LAKE POINT RANCHES	P-2	787979	964977	aquifer	577,540	Temporary Dewatering Permit (will not be modeled)		
22-00348-W	LIPSICK SAND MINE	Dewatering Pump-1	618604	909069	aquifer	192,513	Assumed to be in Layer 3A		
22-00348-W	LIPSICK SAND MINE	Dewatering Pump-2	618604	909069	aquifer	192,513	Assumed to be in Layer 3A		
22-00348-W	LIPSICK SAND MINE	Dewatering Pump-3	618604	909069	aquifer	1,155,080	Assumed to be in Layer 3A		
50-02632-W	LUCERNE HOMES EAST	1	779072	829115	Aquifer	5,775	2	60	70
50-01891-W	LUCERNE HOMES EAST SWIM CLUB	1	779072	829115	Aquifer	4,813	2	80	90
22-00237-W	LUNDY PRESLEY CITRUS	WELL 1	617440	907355	Aquifer	163,636	10	30	90
43-00022-W	MARTIN COUNTY POWER PLANT	10	791637	971322	Aquifer	16,364	4	115	120
26-00518-W	MARY LOU GENERAL STORE	2	615186	874311	Tamiami	3,850	4	120	140
26-00744-W	MC DONALD'S RESTAURANT	WELL #1	674063	879982	Aquifer	5,775	4	100	120
26-00389-W	MEJIA GROVE	1	631802	850272	Tamiami	28,877	Permit Expired (will not be modeled)		
26-00691-W	MILLON FAMILY	1	600099	862827	Tamiami	17,326	4	80	100
26-00691-W	MILLON FAMILY	3	600444	863011	Aquifer	17,326	4	20	40
50-02770-W	MOBIL SERVICE STATION #02-E66	1	762072	829115	Unspecified	24,064	2	35	40
50-01844-W	MOESLY NURSERIES, INC.	1	784072	829115	Aquifer	96,257	4	70	80
22-00359-W	MOORE HAVEN PLANT	Well 1	620786	904442	Aquifer	9,626	4	21	27
26-00450-W	O'CONNOR GROVE	1	602657	860224	Aquifer	173,262	8	300	450
50-03147-W	OSCEOLA COGENERATION PLANT	SW1	801117	907240	Aquifer	28,877	Permit Expired (will not be modeled)		
50-03147-W	OSCEOLA COGENERATION PLANT	SW2	801097	906116	Aquifer	28,877	10	50	80
50-03147-W	OSCEOLA COGENERATION PLANT	SW3	802257	906120	Aquifer	28,877	10	50	80
50-05733-W	SR 98	W-1	803017	905745	Aquifer	13,861	2		50
50-07615-W	PACKING HOUSE	Well 1	765815	863800	Aquifer	24,064	8	70	80
50-07615-W	PACKING HOUSE	Well 2	766338	863800	Aquifer	24,064	8	70	80
50-03880-W	PAHOKEE CLUSTER	RW-2	767422	906220	Aquifer	9,626	Permit Expired (will not be modeled)		
50-03880-W	PAHOKEE CLUSTER	RW-3	767437	906262	Aquifer	9,626	5	0	15
50-03880-W	PAHOKEE CLUSTER	RW-1	767348	906146	Aquifer	38,503	5	0	15
50-04288-W	INSTALL	1	757801	852554	Aquifer	30,802	6	60	70
50-03276-W	FACILITY	1	858137	854662	Aquifer	10,588	2	75	78
50-04654-W	TOWER	1	855337	854795	Aquifer	2,888	2	21	41
50-05906-W	PELICAN LAKE VILLAGE	Pelican Lake Village Well 1	782605	901201	Aquifer	11,551	6	95	100
50-02377-W	PINE RIDGE SOUTH VILLAGE 2	0	784072	829115	Aquifer	8,663	2	60	63
50-02199-W	PINE RIDGE VILLAGE	1	784072	829115	Aquifer	7,701	2	90	100
43-01079-W	PORT MAYACA CEMETERY IRRIGATION	1	791679	966886	Aquifer	4,813	2	90	90
43-01079-W	PORT MAYACA CEMETERY IRRIGATION	1	791679	966886	Aquifer	4,813	2	90	90

The effects of the surface drainage in the EAA must be simulated in order to reasonably replicate the groundwater flow fields within the model. In order to approximate the EAA surface drainage, a constant head boundary condition was applied to the surface of the model in the EAA.

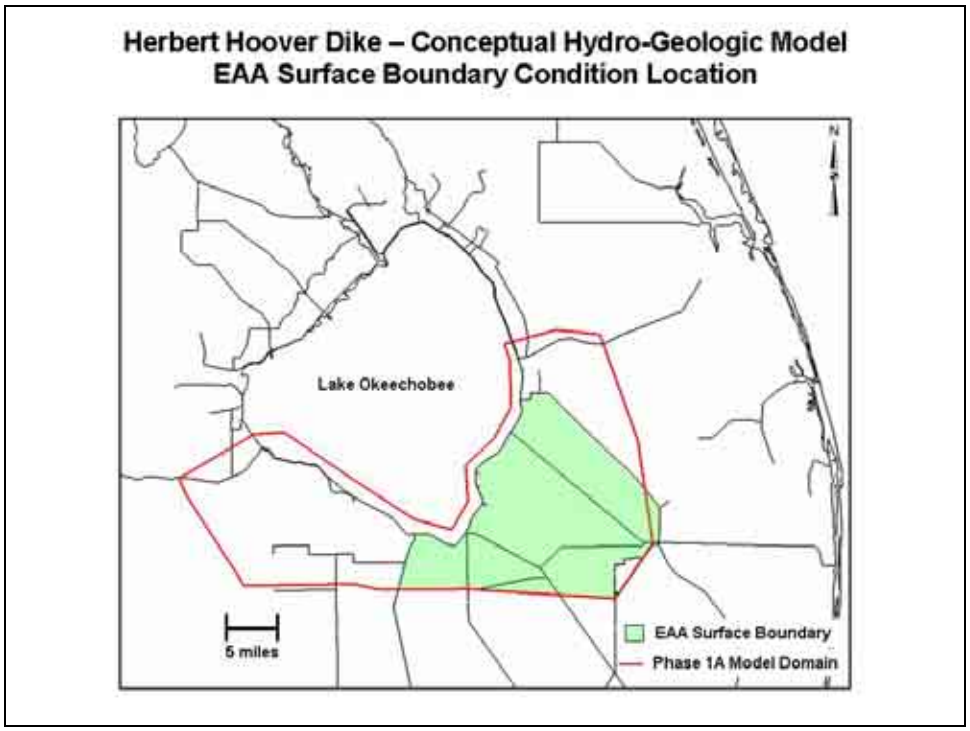


FIGURE A-14: HORIZONTAL EXTENT WITH CONSTANT HEAD BOUNDARY CONDITION APPLIED TO REFLECT WATER LEVEL RESULTING FROM SURFACE WATER PUMPING

A.2.5 Results

This project investigated how much impact the proposed cutoff wall would have on groundwater flow through the 21 specified cross sections. The 3-D steady-state subsurface flow results of the "with project" simulation runs were compared with those of the corresponding "without project" simulation runs. Factors that may affect groundwater flow through the specified cross sections include hydraulic conductivities of the hydrogeologic units, boundary condition, net recharge, and groundwater pumping. A two-stage sensitivity analysis was conducted to effectively achieve the purpose of this study.

In Stage 1, 46 model sensitivity runs were conducted to determine three hydrogeologic units that have more impact than the other eight units on the groundwater flow through the 21 cross sections, where the medium values of boundary condition, net recharge, and pumping were employed to represent an average hydrologic condition.

In Stage 2, 96 model sensitivity runs were conducted to study the change of groundwater flow through the 21 cross sections from the "without project" scenario to the "with project" scenario, where 48 runs featuring various combination of the high, medium, and low values of net

recharge and head boundary conditions, high (permit capacity) and low (zero) pumping rates, and the three most influential hydraulic conductivities determined from the Stage 1 analysis were included in each scenario.

The results from the groundwater modeling study present results as a pressure head difference. This difference is directly proportional to changes in the groundwater table. For example, if the model shows a difference in the pressure head of 2 feet, then the groundwater table in that area will be reduced by 2 feet.

A.2.5.1 Worst Case Scenarios

For brevity in this report, a low net recharge and low head boundary condition combined with high pumping rates is evaluated in this EA. This condition is likely the worst case because the steady state model simulates the pumps operating at the maximum permitted capacity continuously during a dry condition (low lake levels and low groundwater recharge). Therefore, any impacts shown in the modeling results are conservative and in reality the impacts observed would be less than simulated by the model.

The low net recharge condition assumes a net recharge of zero. The low head boundary condition utilizes the groundwater head stages and canal stages within the 5th percentile of minimum groundwater and canal stage values obtained from the groundwater and canal gages, see **Table A-1** and **Table A-2**. Since this is a steady-state model, the pump operations are not varied through time and therefore the model assumes the pumps are running at the maximum permitted capacity continuously.

There are a total of eight possible scenarios for the low net recharge and low head boundary condition with high pumping when considering both high and low conductivity values for the three most influential materials (L-2, Fine/Organic Layer including Peat, Clays and Silts, L-3A Limestone, Rock, Sand and Shell beds and L3B-2, Sands to Silty Sands). Low and high conductivity values were used for each of these materials in different combinations. However, the median value was held constant for the other eight layers (**Table A-5**).

TABLE A-5: SUBSURFACE MATERIAL CONDUCTIVITY VALUES

Layer	Subsurface Material	Horizontal Conductivity (ft/day)
L1	Undifferentiated Surface Soils including Embankment Fill for the Dike	2.8
L 2-1	Fine/Organic Layer including Peat, Clays and Silts (East)	0.10 (low), 1.00 (high)
L 2-2	Sands (West)	10.00
L 3A	Limestone, Rock, Sand and Shell beds	100.00 (low), 600.00 (high)
L 3B-1	Clay Intrusion in the NW model domain	1.0
L 3B-2	Sands to Silty Sands	1.00(low), 100.00 (high)
L 4	Pinecrest Sand member of Tamiami Formation	10.00
L 5	Ochopee Limestone member of the Tamiami Formation and Gray Limestone	400.00
L 6	Lower Tamiami Formation Sands and non-productive sands of the Miocene Peace River Formation	35.00
L 7-1	Sand Stone Aquifer	500.00
L 7-2	Upper Hawthorn Group	0.30

Table A-6 displays the eight pressure head comparisons between “with project" and “without project” runs with low net recharge and low head boundary conditions and high pumping in Stage 2 analysis.

TABLE A-6: WORST CASE MODEL RUNS

ID*	Pressure Head Comparison (w/ project - w/o project)	0.1 ≤ Diff ≤ 0.5 % Occurrences	0.5 ≤ Diff ≤ 1.0 % Occurrences	1.0 ≤ Diff ≤ 2.0 % Occurrences	Diff ≥ 2.0 % Occurrences	MA Error (ft)	RMS Error (ft)	Max Error (ft)
1	Run81 - Run33	16.248%	0.394%	0.117%	0.000%	0.0474	0.1037	1.27
2	Run82 - Run34	2.077%	0.007%	0.000%	0.000%	0.0109	0.0308	0.79
3	Run83 - Run35	16.485%	0.398%	0.110%	0.000%	0.0492	0.1043	2.19
4	Run84 - Run36	2.399%	0.016%	0.000%	0.000%	0.0120	0.0336	2.77
5	Run85 - Run37	28.672%	2.431%	0.549%	0.081%	0.1042	0.2051	3.37
6	Run86 - Run38	4.328%	0.403%	0.073%	0.001%	0.0260	0.0787	8.23
7	Run87 - Run39	32.955%	2.406%	0.638%	0.026%	0.1153	0.2112	4.20
8	Run88 - Run40	5.390%	0.606%	0.100%	0.001%	0.0306	0.0878	3.89

This EA evaluated the impacts of Run 85-Run37because this was considered the worst possible condition[2] out of the eight scenarios evaluated under the high pumping and low net recharge and low head boundary condition. This scenario utilized high conductivity values for L-2 and L-3A and a low conductivity value for L3B-2. These conditions were selected based on the following:

- the cutoff wall fully penetrates the L-2 and L-3A layers (which allow for flow)
- the cutoff wall partially penetrates the L3B-2 layer (consisting of a lower conductivity material) which restricts groundwater flow

This means that any water being transmitted through the upper two layers has to force its way into the L3B-2 layer, flow below the cutoff wall, and then flow up to recharge groundwater in the upper layers. This scenario provides the lowest amount of groundwater recharge during a time when groundwater demand will be at its peak, resulting in the largest system impacts.

Results of the Worst Case Scenario (Run 85-Run37)

The results of the model simulation (Run 85-Run 37) indicate less than 2 ft of change to the groundwater table when the cutoff wall is in place for the majority of Reach 1 (**Figure A-16**). Based on the modeling results there are no sub-regional impacts on the groundwater as a result of the partially penetrating cutoff wall. However, in some cases the possibility exists for localized groundwater impacts up to two feet immediately adjacent to the cutoff wall.

Groundwater impacts obtained from the model are provided in **Table A-9 through Table A-12** displaying the maximum distances for each of the following impact ranges: 0.1 ft, 0.5 ft, 1.0 ft and 2.0 ft. **Table A-9** (see Run 85-Run 37, ID 5) demonstrates that the there are no changes in the water table greater than 2.0 ft with implementation of a cutoff wall in Reach 1A. This change occurs at a maximum of 2,600 ft from the dike. **Table A-10** (ID 5) demonstrates that there are no changes greater than 0.5 ft with implementation of a cutoff wall in Reach 1B. This change occurs at a maximum of 1,600 ft from the dike. **Table A-11** (ID 5) demonstrates that there are no changes greater than 1 ft with implementation of a cutoff wall in Reach 1C. This change occurs at a maximum distance of 1,000 ft from the dike (when measured near pumping wells) and occurs at a maximum distance of 500 ft from the dike (when evaluating the effects of the cutoff wall). **Table A-12** (ID 5) demonstrates that there are no changes greater than 0.5 ft with implementation of a cutoff wall in Reach 1D. This change occurs at a maximum distance of 15,800 ft from the dike.

[2] Run 85-Run 37: This represents the with project scenario minus the without project scenario during a low net boundary condition and low net recharge condition with high pumping. High conductivity values for L-2 and L-3A and the low conductivity value for L3B-2 were utilized for both Run 85 and Run 37.

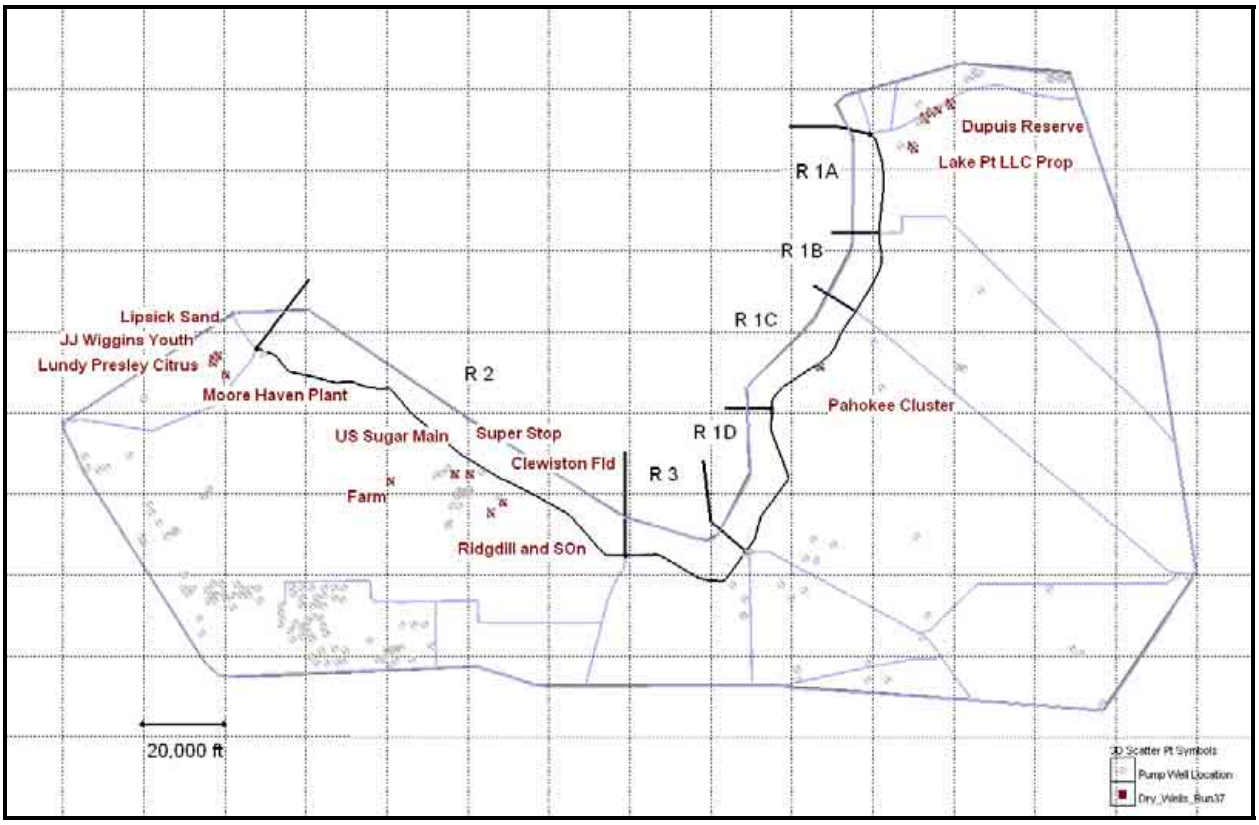


FIGURE A-15: NODAL LOCATIONS CORRESPONDING TO EXTRACTION WELLS DEWATERED DURING SIMULATION RUN 37 (W/O PROJECT)

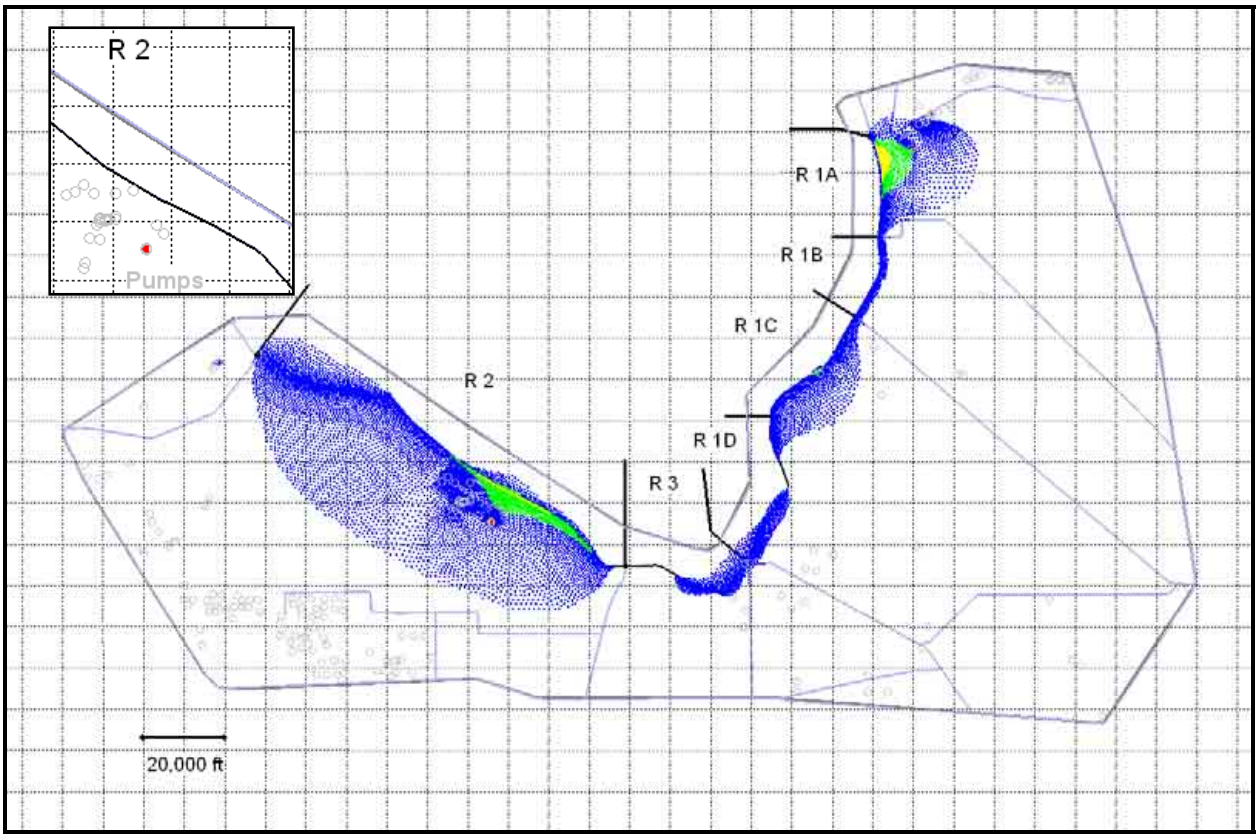


FIGURE A-16: PRESSURE HEAD COMPARISON BETWEEN "WITH PROJECT" AND "WITHOUT PROJECT": LOW NET RECHARGE AND HEAD BOUNDARY CONDITIONS, HIGH PUMPING, HIGH L2-1 K, HIGH L3A K, AND LOW L3B-2 K

0.1 ≤ Pressure Head Difference ≤ 0.5	Blue
0.5 ≤ Pressure Head Difference ≤ 1.0	Lime Green
1.0 ≤ Pressure Head Difference ≤ 2.0	Yellow
Pressure Head Difference ≥ 2.0	Red

The "without project" modeling results (Run 37) indicate that there are multiple wells that have groundwater recharge deficiencies Figure A-15; these wells are displayed in **Table A-7**. When the "with project condition" is applied, there are no additional wells that demonstrate a groundwater recharge deficiency (**Figure A-16**). With implementation of the cutoff wall no impacts are anticipated to the groundwater wells.

TABLE A-7: WELLS TRIGGERED DURING THE RUN 37 WITHOUT PROJECT CONDITIONS

Run 37 (w/o project) Dry Well Name	Florida East X-Coordinate	Florida East Y- Coordinate	Nodal Z-Coordinate	Pumping Max Rate, ft/day	Computed Pressure Head, ft
Clewiston_Fld_AT_S-2_1	689144.0	872904.0	14.708	-15401.	-22.2999
Clewiston_Fld_AT_S-2_1	689144.0	872904.0	12.255	-15401.	-19.6974
Clewiston_Fld_AT_S-2_1	689144.0	872904.0	6.735	-15401.	-13.9468
Clewiston_Fld_AT_S-2_1	689144.0	872904.0	1.214	-15401.	-8.3339
DupuisReserve_5(remove)	794677.0	969277.0	19.308	-1155.	-12.8268
DupuisReserve_5(remove)	794677.0	969277.0	18.198	-1155.	-11.6809
DupuisReserve_5(remove)	794677.0	969277.0	17.088	-1155.	-10.5287
DupuisReserve_5(remove)	794677.0	969277.0	10.912	-1155.	-2.8920
DupuisReserve_3(remove)	793111.0	968159.0	17.798	-1925.	-11.5321
DupuisReserve_3(remove)	793111.0	968159.0	16.354	-1925.	-10.0376
DupuisReserve_3(remove)	793111.0	968159.0	10.642	-1925.	-3.1715
DupuisReserve_4(remove)	796413.0	969856.0	19.038	-1925.	-11.9428
DupuisReserve_4(remove)	796413.0	969856.0	17.886	-1925.	-10.7544
DupuisReserve_4(remove)	796413.0	969856.0	11.195	-1925.	-2.8144
DupuisReserve_5	793243.0	967580.0	18.922	-1925.	-14.6395
DupuisReserve_5	793243.0	967580.0	16.351	-1925.	-11.9221
DupuisReserve_5	793243.0	967580.0	10.623	-1925.	-4.2952
DupuisReserve_2	799833.0	970908.0	21.282	-3850.	-13.4932
DupuisReserve_2	799833.0	970908.0	19.490	-3850.	-11.6612
DupuisReserve_2	799833.0	970908.0	11.739	-3850.	-3.0066
DupuisReserve_3	794927.0	969185.0	20.076	-3850.	-17.0589
DupuisReserve_3	794927.0	969185.0	18.629	-3850.	-15.4368
DupuisReserve_3	794927.0	969185.0	17.182	-3850.	-13.7923
DupuisReserve_3	794927.0	969185.0	10.942	-3850.	-4.3807
DupuisReserve_1	799478.0	971605.0	21.032	-6353.	-14.3597
DupuisReserve_1	799478.0	971605.0	19.421	-6353.	-12.6902
DupuisReserve_1	799478.0	971605.0	11.750	-6353.	-3.3365
DupuisReserve_4	795045.0	969250.0	18.737	-6738.	-36.5195
DupuisReserve_4	795045.0	969250.0	17.240	-6738.	-33.9192
DupuisReserve_4	795045.0	969250.0	10.963	-6738.	-8.6453
DupuisReserve_8	793546.0	967422.0	19.214	-15401.	-156.1089
DupuisReserve_8	793546.0	967422.0	16.456	-15401.	-147.0675
DupuisReserve_8	793546.0	967422.0	10.651	-15401.	-31.2515
Farm	661437.0	878143.0	13.398	-144385.	-21.3036
Farm	661437.0	878143.0	12.896	-144385.	-20.6126
Farm	661437.0	878143.0	12.395	-144385.	-19.6357
Farm	661437.0	878143.0	-1.151	-144385.	-4.9136
JJ_Wiggins_Youth	617741.0	908330.0	-82.059	-11551.	-55.4828
Lake_Pt_LLC_Prop_P-4	790078.0	961014.0	-5.739	-192513.	-4.1041
Lake_Pt_LLC_Prop_P-5	790760.0	960177.0	-5.625	-192513.	-4.4699
LipsickSand_combo_180-181-182	618604.0	909069.0	-15.779	-1540107.	-4364.5124
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-20.004	-163636.	-173.8924
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-21.004	-163636.	-172.8007
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-22.004	-163636.	-171.7295
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-27.004	-163636.	-150.4321
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-32.004	-163636.	-124.8357
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-38.277	-163636.	-90.0338
Lundy_Presley_Citrus_WELL_1	617440.0	907355.0	-44.551	-163636.	-57.7232
Moore_Haven_Plant_Well-1	620786.0	904442.0	-6.367	-9626.	-1.2619
Pahokee_Cluster_RW-1-2-3_combo	767437.0	906262.0	16.547	-48129.	-2082.6067
Pahokee_Cluster_RW-1-2-3_combo	767437.0	906262.0	13.784	-48129.	-2055.5511
Pahokee_Cluster_RW-1-2-3_combo	767437.0	906262.0	11.022	-48129.	-2014.2470
Pahokee_Cluster_RW-1-2-3_combo	767437.0	906262.0	3.721	-48129.	-1025.4871
Ridgdill_and_Son_Pump1	686080.0	870502.0	-4.338	-866310.	-587.8874
Ridgdill_and_Son_Pump1	686080.0	870502.0	-13.439	-866310.	-501.2616
Ridgdill_and_Son_Pump2	686080.0	870197.0	-4.055	-866310.	-584.8946
Ridgdill_and_Son_Pump2	686080.0	870197.0	-13.326	-866310.	-490.3329
SuperStop_1-2-3-4-combo	680966.0	879858.0	14.122	-5776.	-17.3918
SuperStop_1-2-3-4-combo	680966.0	879858.0	10.798	-5776.	-13.5933
US_Sugar_Main_combo(275_276)	677297.0	879942.0	-41.779	-134759.	-13.4457
Run 85 (w/ Project): identical dry wells					

A.2.5.1.1 *Pressure Head Differences for Worst Case Scenarios*

The following figures show the pressure head comparison between a pair of "with project" and "without project" runs for the low net boundary and net recharge condition with high pumping condition considered in Stage 2 analysis (eight scenarios). The specification of each pair is defined in the title of each figure. The four brackets are color coded in theses figures as shown below:

0.1 ≤ Pressure Head Difference ≤ 0.5	Blue
0.5 ≤ Pressure Head Difference ≤ 1.0	Lime Green
1.0 ≤ Pressure Head Difference ≤ 2.0	Yellow
Pressure Head Difference ≥ 2.0	Red

A color coded scatter symbol is shown in plain-view where the difference occurs.

Figures A-16 through A-23 show a head difference comparison among the eight combinations of the "k" values for Materials L2-1, L3A, and L3B-2 when both the net recharge and head boundary condition is low and the pumping condition is high.

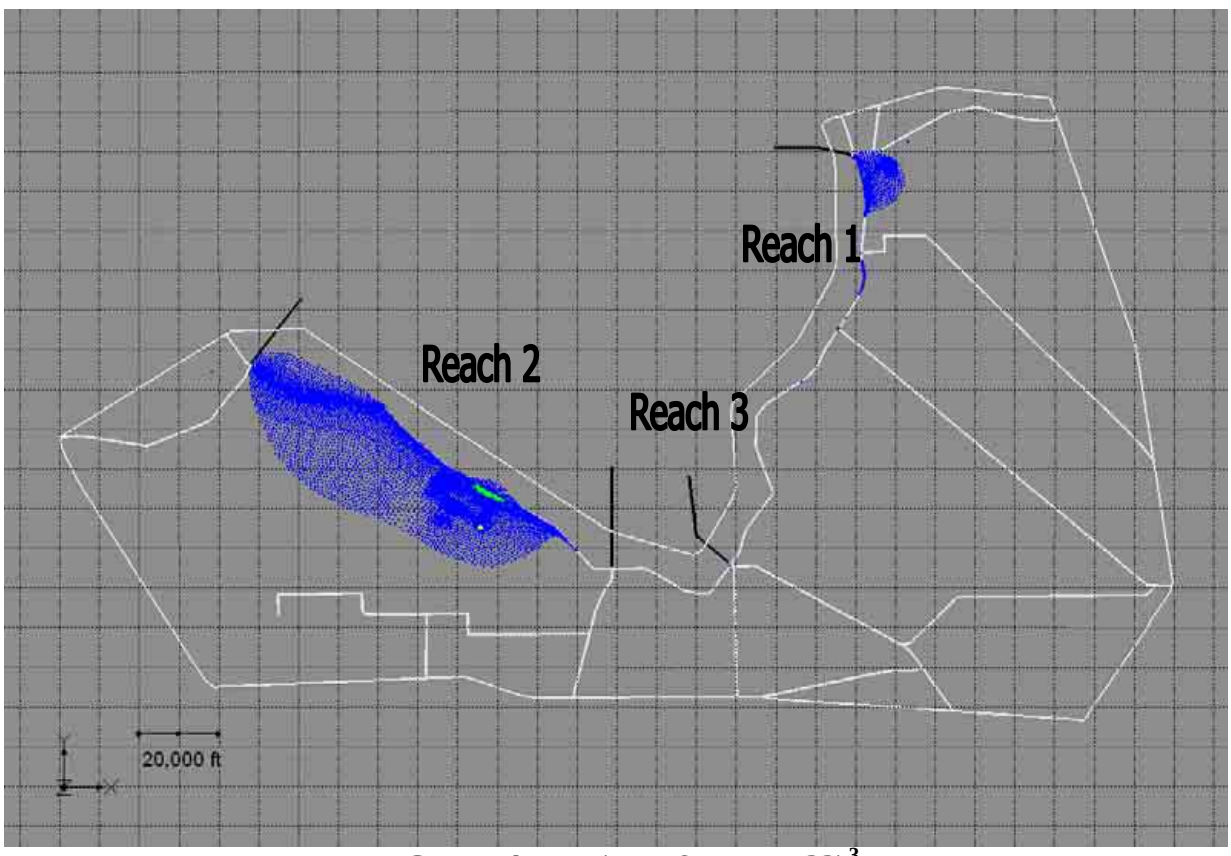


FIGURE A-17: (RUN81 - RUN33)[3]

[3] Pressure head comparison between "with project" and "with project" runs in Stage 2 analysis: low net recharge and head boundary conditions, high L3A K, and high L3B-2 K

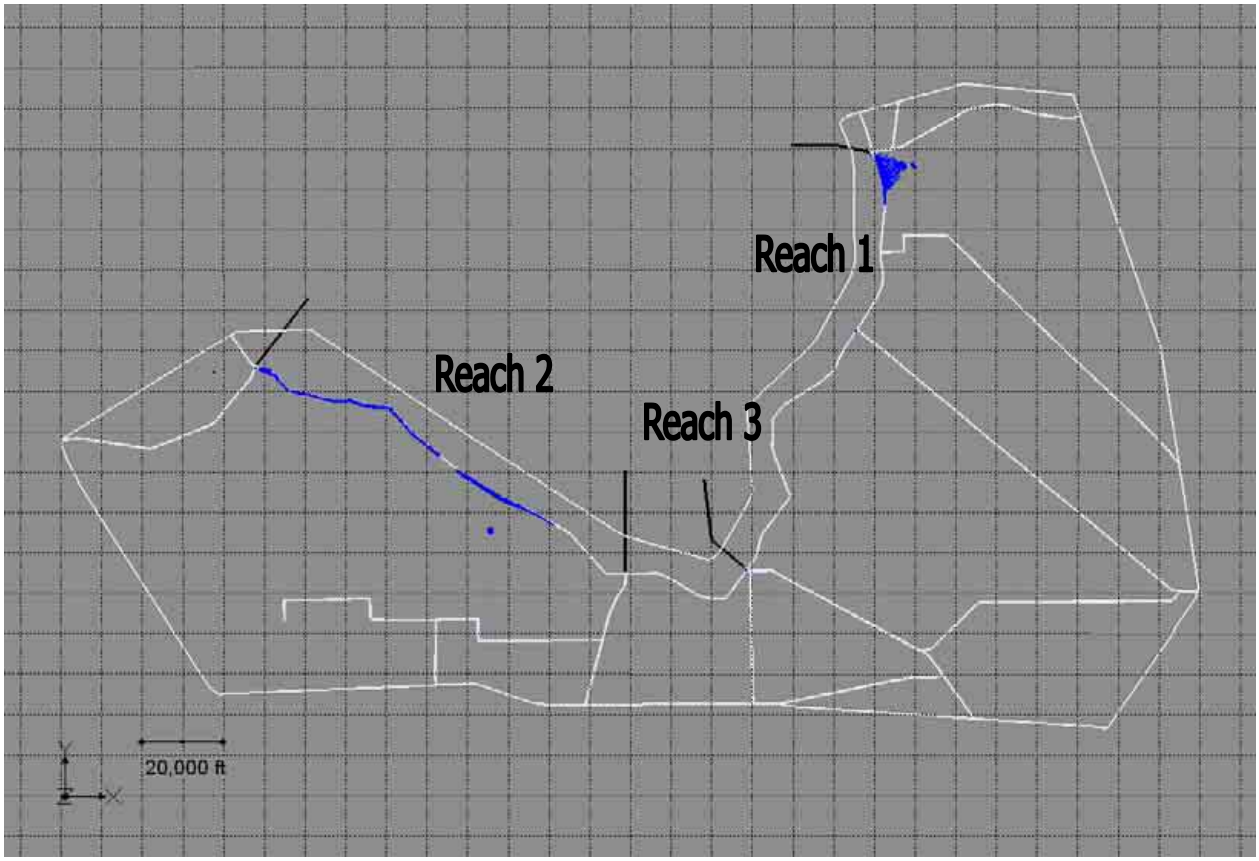


FIGURE A-18: (RUN 82 - RUN34)[4]

[4] Pressure head comparison between "with project" and “with project” runs in Stage 2 analysis: low net recharge and head boundary conditions, high pumping, high L2-1 K, low L3A K, and high L3B-2 K

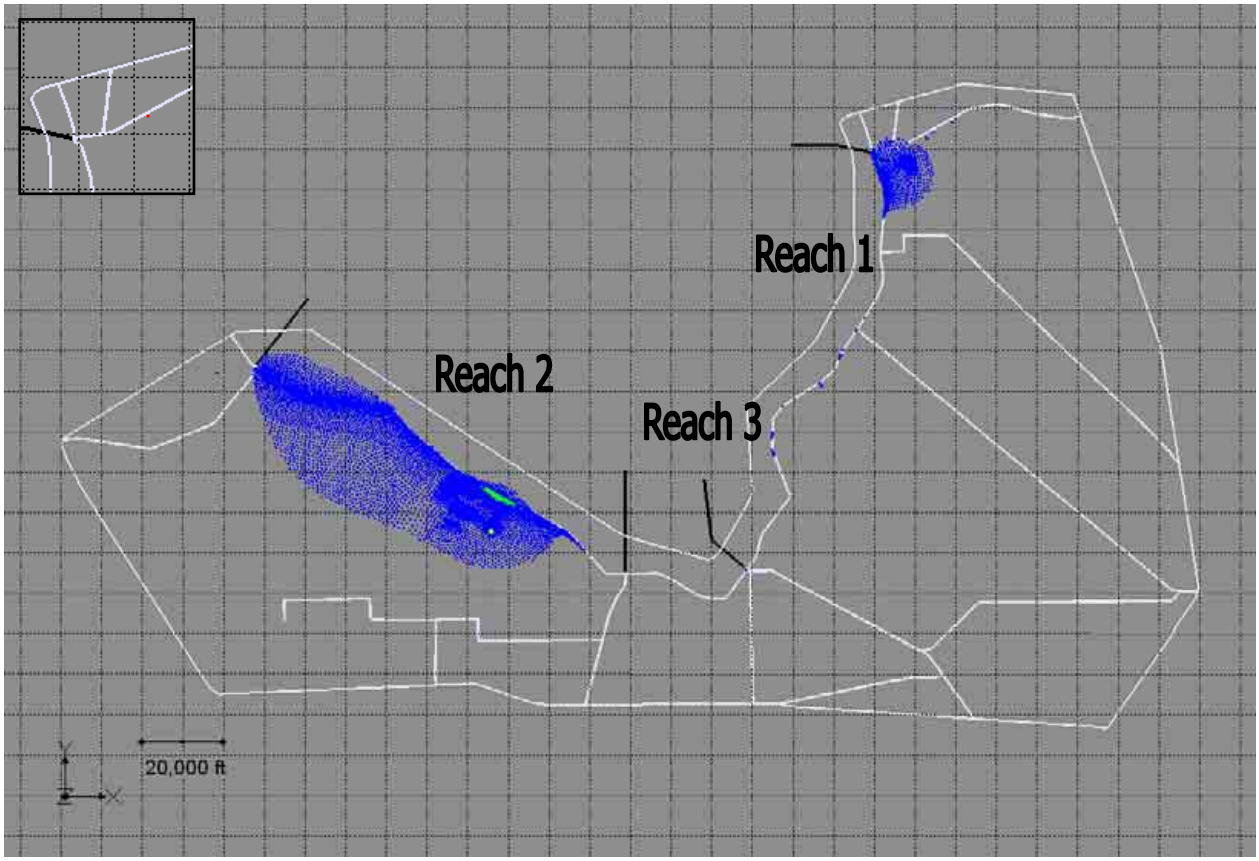


FIGURE A-19: (RUN83 - RUN35)[5]

[5] Pressure head comparison between "with project" and “with project” runs in Stage 2 analysis: low net recharge and head boundary conditions, high pumping, low L2-1 K, high L3A K, and high L3B-2 K.

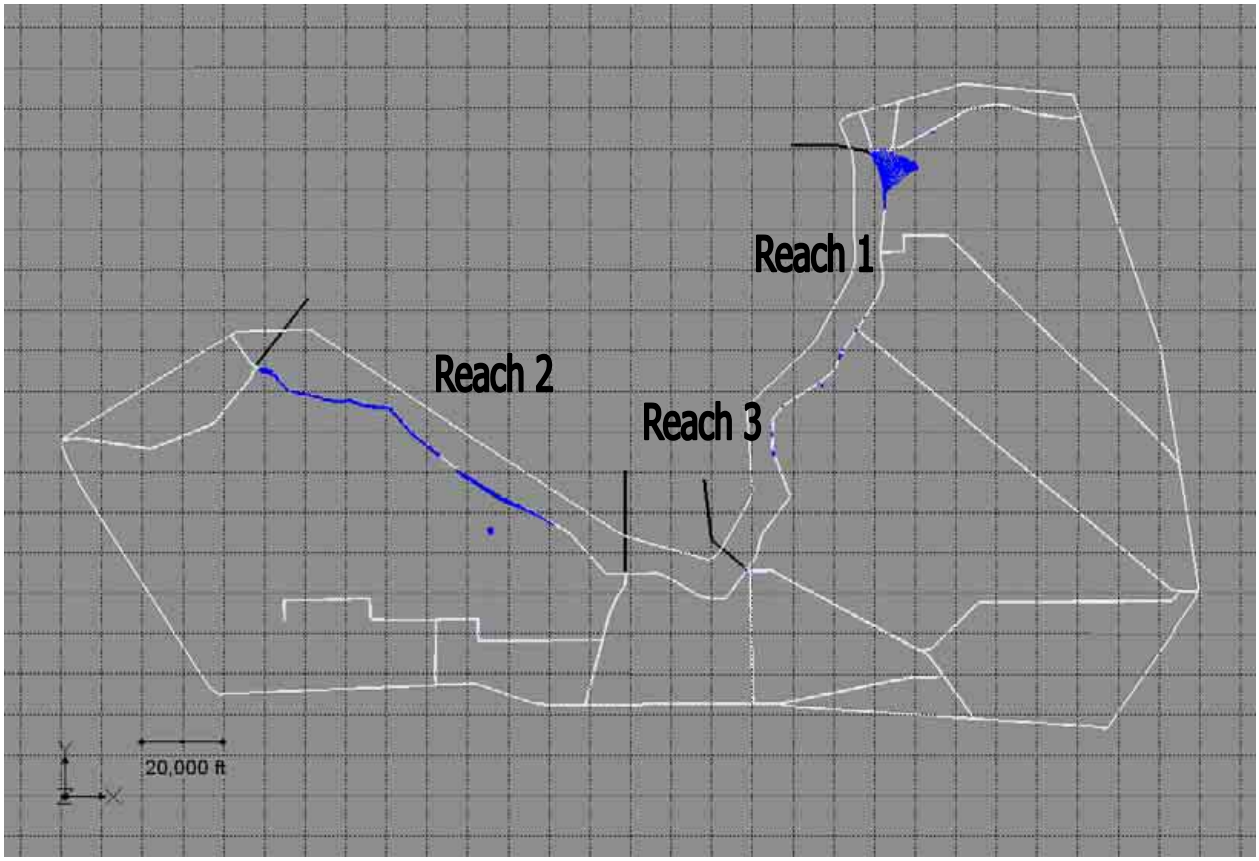


FIGURE A-20: (RUN84 - RUN36)[6]

[6] Pressure head comparison between "without project" and “with project” runs in Stage 2 analysis: low net recharge and head boundary conditions, high pumping, low L2-1 K, low L3A K, and high L3B-2 K.

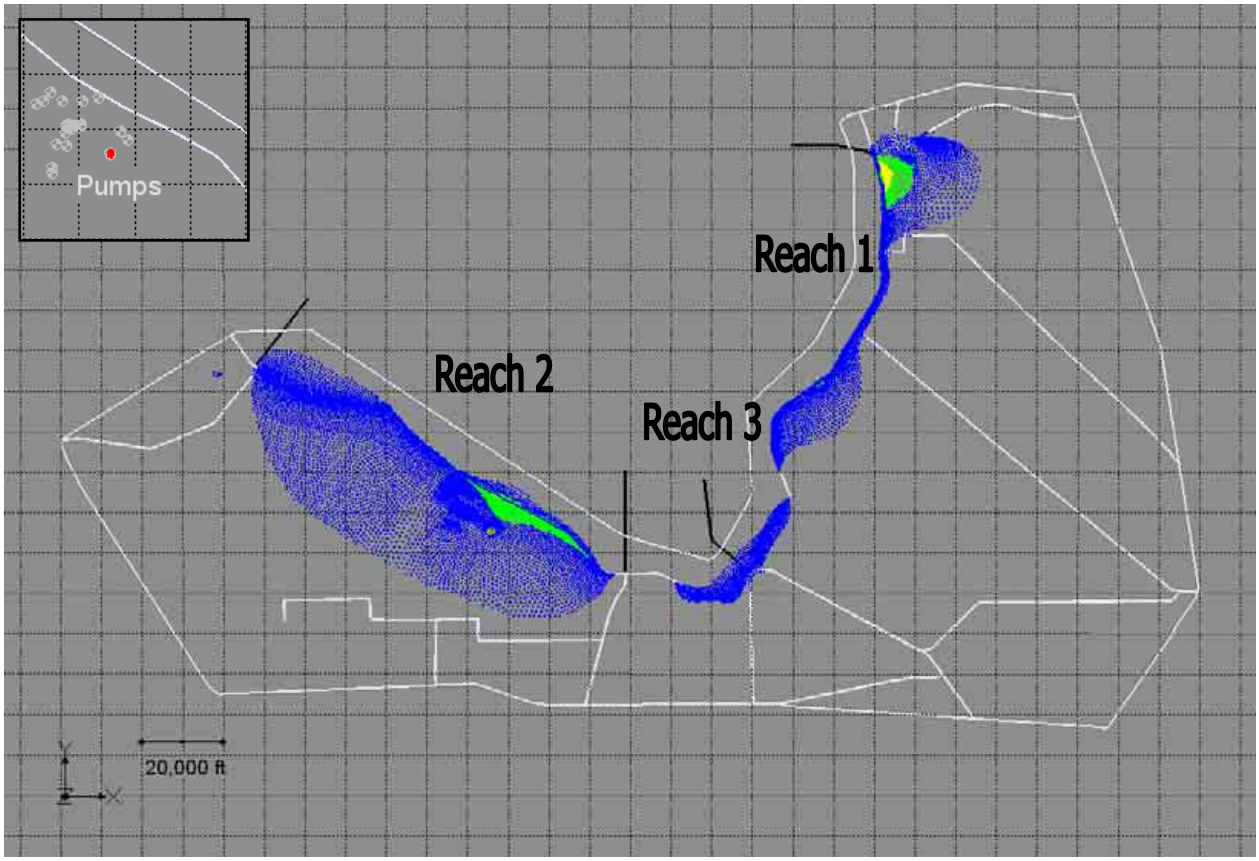


FIGURE A-21: (RUN85 - RUN37)[7]

This run was analyzed in the main body of the EA because it is considered the worst case scenario.

[7] Pressure head comparison between "without project" and “with project” runs in Stage 2 analysis: low net recharge and head boundary conditions, high pumping, high L2-1 K, high L3A K, and low L3B-2 K Run 85-Run 37.

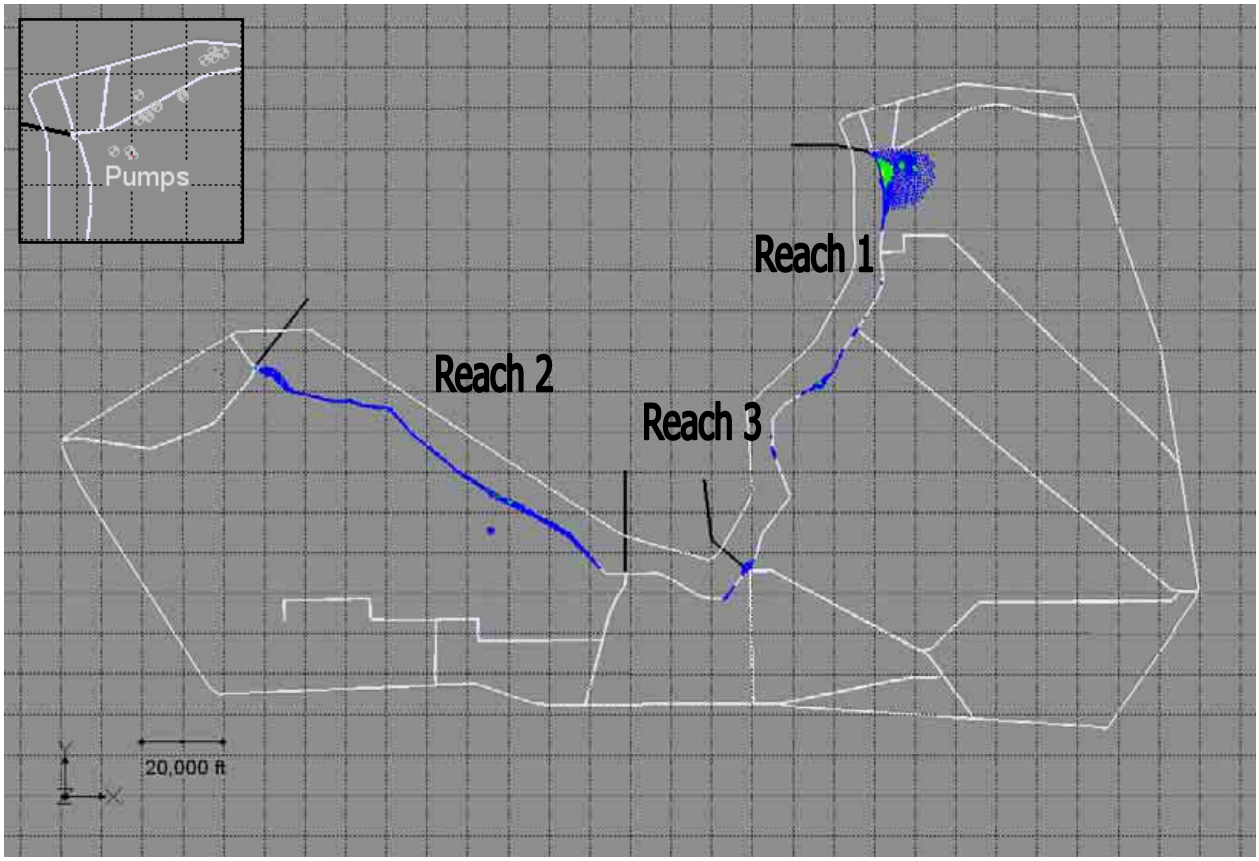


FIGURE A-22: (RUN86 - RUN38)[8]

[8] Pressure head comparison between "without project" and “with project” runs in Stage 2 analysis: low net recharge and head boundary conditions, high pumping, high L2-1 K, low L3A K, and low L3B-2 K.

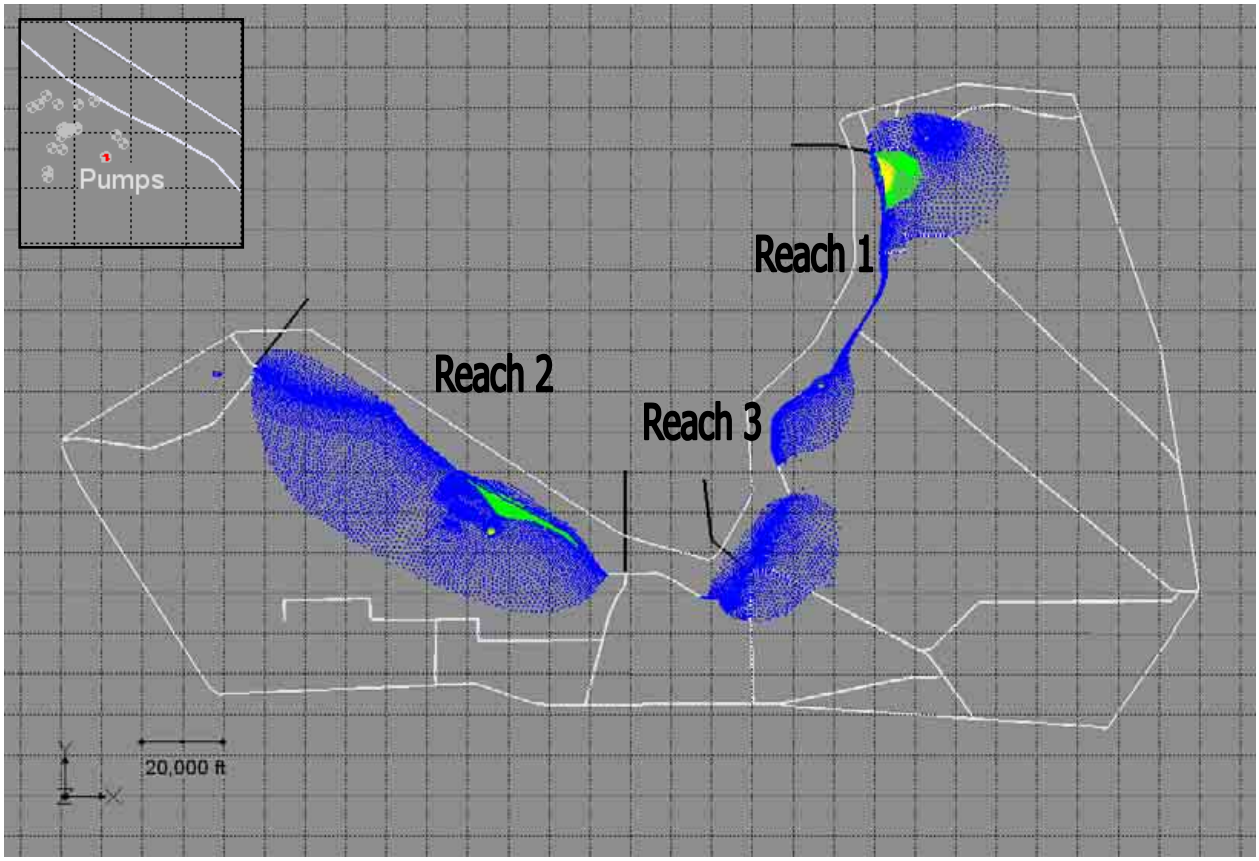


FIGURE A-23: (RUN87 - RUN39)[9]

[9] Pressure head comparison between "without project" and "with project" runs in Stage 2 analysis. Low net recharge and head boundary conditions, high pumping, low L2-1 K, high L3A K, and low L3B-2 K.

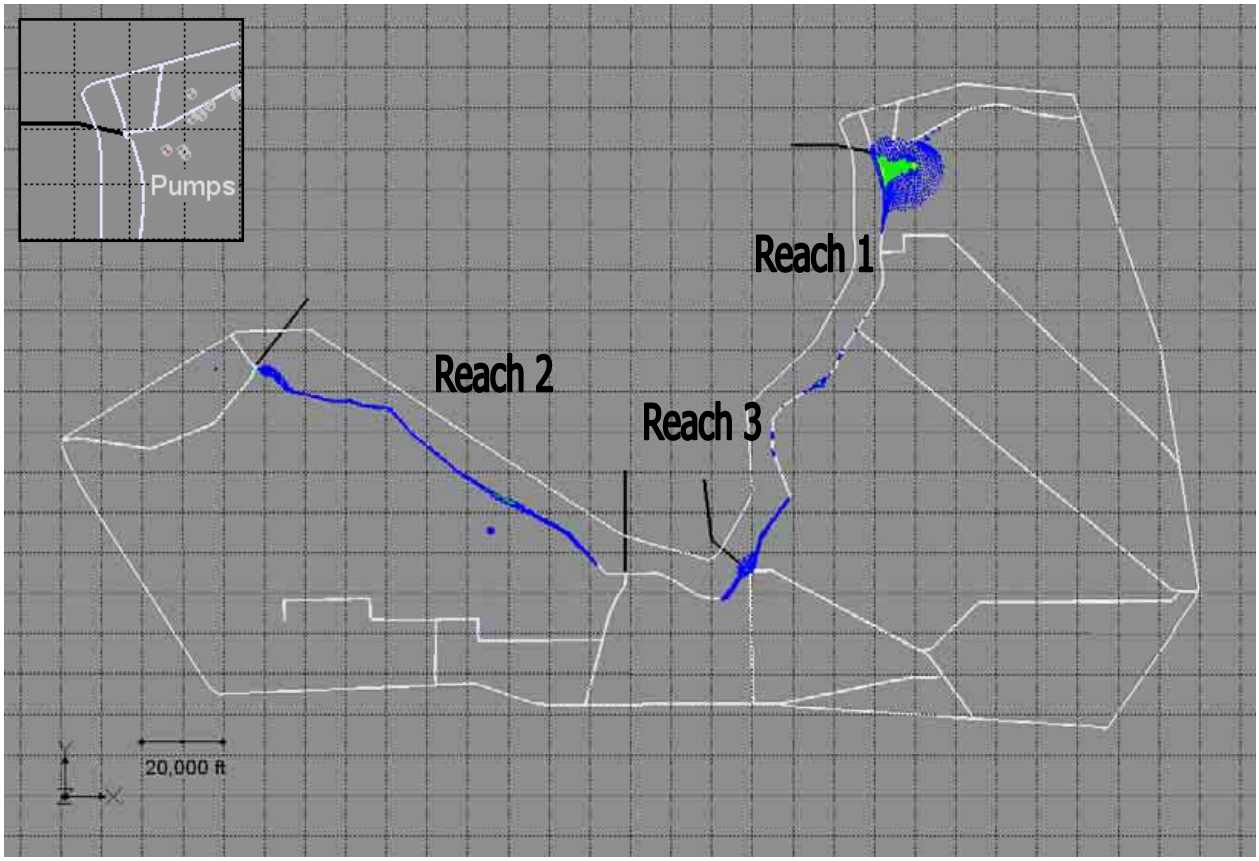


FIGURE A-24: (RUN88 - RUN40) [10]

A.2.5.1.2

[10] Pressure head comparison between "without project" and “with project” runs in Stage 2 analysis. Low net recharge and head boundary conditions, high pumping, low L2-1 K, low L3A K, and low L3B-2 K.

A.2.5.1.3 *Maximum Distances of Groundwater Impacts*

Table A-7 summarizes the maximum distances observed in each Subreach for the eight worst case scenarios run separated by the head difference ranges. Groundwater impacts obtained from the model are provided in **Tables A-8 through A-11** (corresponding to Reaches 1A through 1D) displaying the maximum distances for each of the following impact ranges: 0.1 ft, 0.5 ft, 1.0 ft and 2.0 ft. The numbers in red represent the maximum distance of the impact from the dike when measured near pumping wells. The blue number represents the maximum distance of the impact when evaluating the effects of the cutoff wall.

TABLE A-8: APPROXIMATE MAXIMUM DISTANCES OF CUTOFF WALL IMPACT WHEN THE LOW NET RECHARGE AND HEAD BOUNDARY CONDITIONS WITH HIGH PUMPING WAS CONSIDERED

Reach ID	Maximum distance of cutoff wall impact, ft			
	Head difference ≥ 0.1 ft	Head difference ≥ 0.5 ft	Head difference ≥ 1 ft	Head difference ≥ 2 ft
1A	31,100	9,500	3,500	0
1B	4,300	0	0	0
1C	13,600	800	0	0
1D	21,500	100	0	0
2	32,600	4,800	500	0
3	16,000	50	0	0

TABLE A-9: APPROXIMATE MINIMUM AND MAXIMUM DISTANCES (IN FT) FROM THE HHD TO VARIOUS HEAD DIFFERENTIAL VALUES IN REACH 1A

ID*	Pressure Head Comparison (w/ project - w/o project)	0.1 ft ≤Head ≤0.5 ft		0.5 ft ≤Head ≤1.0 ft		1.0 ft ≤Head ≤2.0 ft		Head ≥2.0 ft	
		Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max
1	Run81 - Run33	0	13700/10400	0	500	0	0	0	0
2	Run82 - Run34	0	8700/6500	0	0	0	0	0	0
3	Run83 - Run35	0	13700/12800	0	500	0	0	0	0
4	Run84 - Run36	0	9500	0	50	0	0	0	0
5	Run85 - Run37	1200	24500	0	13700/8400	0	2600	0	0
6	Run86 - Run38	0	13500	0	8850/3100		5700/700		0
7	Run87 - Run39	3200	31100	0	13700/9500	0	13700/3500		13700/0
8	Run88 - Run40	0	15700	0	9100	0	8500/200	0	0

0 0
0

TABLE A-10: APPROXIMATE MINIMUM AND MAXIMUM DISTANCES (IN FT) FROM THE HHD TO VARIOUS HEAD DIFFERENTIAL VALUES IN REACH 1B

ID*	Pressure Head Comparison (w/ project - w/o project)	0.1 ft ≤Head ≤0.5 ft		0.5 ft ≤Head ≤1.0 ft		1.0 ft ≤Head ≤2.0 ft		Head ≥2.0 ft	
		Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max
1	Run81 - Run33	0	300	0	0	0	0	0	0
2	Run82 - Run34	0	0	0	0	0	0	0	0
3	Run83 - Run35	0	0	0	0	0	0	0	0
4	Run84 - Run36	0	0	0	0	0	0	0	0
5	Run85 - Run37	1500	1600	0	0	0	0	0	0
6	Run86 - Run38	0	100	0	0	0	0	0	0
7	Run87 - Run39	400	4300	0	0	0	0	0	0
8	Run88 - Run40	0	50	0	0	0	0	0	0

Table A-11: Approximate minimum and maximum distances (in ft) from the HHD to various head differential values in Reach 1C

ID*	Pressure Head Comparison (w/ project - w/o project)	0.1 ft ≤Head ≤0.5 ft		0.5 ft ≤Head ≤1.0 ft		1.0 ft ≤Head ≤2.0 ft		Head ≥2.0 ft	
		Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max
1	Run81 - Run33	0	0	0	0	0	0	0	0
2	Run82 - Run34	0	0	0	0	0	0	0	0
3	Run83 - Run35	0	1000/0	0	0	0	0	0	0
4	Run84 - Run36	0	0	0	0	0	0	0	0
5	Run85 - Run37	1900	13300	0	1000/500	0	0	0	0
6	Run86 - Run38	0	1350	0	100	0	0	0	0
7	Run87 - Run39	700	13600	0	1000/800		1000/0		1000/0
8	Run88 - Run40	0	1000	0	1000/100		0	0	0

TABLE A-12: APPROXIMATE MINIMUM AND MAXIMUM DISTANCES (IN FT) FROM THE HHD TO VARIOUS HEAD DIFFERENTIAL VALUES IN REACH 1D

ID*	Pressure Head Comparison (w/ project - w/o project)	0.1 ft ≤Head ≤0.5 ft		0.5 ft ≤Head ≤1.0 ft		1.0 ft ≤Head ≤2.0 ft		Head ≥2.0 ft	
		Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max	Distance Min	Distance Max
1	Run81 - Run33	0	0	0	0	0	0	0	0
2	Run82 - Run34	0	0	0	0	0	0	0	0
3	Run83 - Run35	0	0	0	0	0	0	0	0
4	Run84 - Run36	0	0	0	0	0	0	0	0
5	Run85 - Run37	0	15800	0	0	0	0	0	0
6	Run86 - Run38	0	300	0	0	0	0	0	0
7	Run87 - Run39	0	21500	0	100	0	0	0	0
8	Run88 - Run40	0	1500	0	0	0	0	0	0

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APPENDIX B

CZMP EVALUATION

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B.0 FLORIDA COASTAL ZONE MANAGEMENT PROGRAM FEDERAL CONSISTENCY EVALUATION PROCEDURES

HERBERT HOOVER DIKE MAJOR REHABILIATION REACH 1

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed work project is not seaward of the mean high water line and would not affect shorelines or shoreline processes.

2. Chapters 186 and 187, State and Regional Planning. These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed work has been coordinated with the State without objection.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project purpose is to strengthen and protect the existing lake levee system, thereby ensuring adequate flood control for residents of the region. No action may result in conditions which enhance the possibility of a project failure, resulting in an emergency situation and potentially causing significant damage to persons and property. Therefore, this work would be consistent with the efforts of Division of Emergency Management.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The proposed project is the least environmentally damaging to the aforementioned resources of all the action alternatives considered. The existing habitat within the project area is of marginal quality and has largely been developed for agriculture, urban and residential uses. Impacts to wetlands have been mitigated for in Reach 1.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.
Response: At this time it is not known what lands may need to be purchased for completion of the proposed project. Initial indications are that most lands are already within the HHD levee right of way and are therefore in Federal ownership. Any lands that will need to be acquired will be covered under a future EIS when details for those plans are available.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The proposed work may affect Pahokee State Park resources due to construction access (Section 5, pg FEIS-57, dated July 2005). Municipal and county parks may be temporarily affected, however these areas would be returned to their pre-construction condition following completion of the project. Portions of the LOST may be impacted or removed from the dike levee. Impacts will be avoided and minimized to the extent practicable throughout construction activities. The Corps will prepare a letter report requesting Section 111 authorization by the Chief of Engineer's to repair damages to the LOST caused by project implementation.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: The proposed action has been coordinated with the Florida State Historic Preservation Officer in accordance with the National Historic Preservation Act and the Archeology and Historic Preservation Act. Consultation with the State Historic Preservation Officer (SHPO) was initiated August 20, 1999. In a response dated August 7, 2005, the SHPO concurred with the Corps' no adverse effect determination on Reach 1. The project will not have an adverse affect on any historic properties included in or potentially eligible for inclusion in the National Register of Historic places. Conditions to protect undiscovered resources will be implemented as follows: Language will be included in construction contract specifications outlining the steps to be taken in the event that undiscovered historical properties are encountered. An informational training session, developed by a professional archaeologist, will be conducted for the contractor's personnel to explain what kinds of archaeological/cultural materials might be encountered during construction of the impoundment, and the steps to be taken in the event these materials are encountered. A professional archaeologist will conduct periodic monitoring of the project area during construction to determine if activities are impacting unanticipated cultural resources. The proposed action is consistent with these Acts. Historic preservation compliance will be completed to meet all responsibilities under Chapter 267.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: Contribution from the study area to the State's tourism economy would not be compromised by project implementation. Temporary, short-term impacts may be realized during construction due to effects to municipal and county parks and bank fishing areas. These effects are not expected to be significant. The project would be compatible with tourism for this area and could potentially contribute to overall growth and development of the area therefore, would be consistent with the goals of this chapter.

9. Chapters 334 and 339, Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: The proposed project would not impact the existing public transportation system of the area and therefore, would be consistent with the goals of this chapter.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed HHD Major Rehabilitation project is located completely inland and would have no affect on saltwater resources either directly or indirectly through discharge downstream. The proposed project is therefore not applicable to chapter 370.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The proposed project has been coordinated with the Florida Game and Fresh Water Fish Commission (GFC) without objection. In a letter dated November 12, 1998, the GFC concurred with findings and recommendations of the U.S. Fish and Wildlife Service for fish and wildlife protection as outlined in the Final CAR (see Final EIS, HHD Major Rehabilitation Report, Martin and Palm Beach Counties, Annex A, dated July 2005). The Corps has agreed to comply with these recommendations as outlined in Section 5.00 of the above listed EIS. Therefore, the work would comply with the goals of this chapter.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: The proposed project does not involve the transportation or discharge of pollutants. Environmental protection measures will be enforced during construction to avoid inadvertent spills or other sources of pollution.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: This work does not involve the transportation or discharging of pollutants. Conditions will be placed in the contract to handle any inadvertent spill of pollutants. Therefore, the project would comply with this Act.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This work does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The work does not involve land development as described by this chapter; therefore, this chapter is not applicable.

16. 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The work would not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Protection.

Response: A Draft Environmental Assessment has been prepared and will be reviewed by the appropriate resource agencies including the Department of Environmental Protection.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: Project implementation will include appropriate erosion control plans and measures to ensure compliance.

APPENDIX C

PERTINENT CORRESPONDENCE

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C.0 PERTINENT CORRESPONDENSE

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

OCT 09 2007

To Whom It May Concern:

The Jacksonville District, U.S. Army Corps of Engineers (Corps) is gathering information to help define issues and concerns that will be addressed in two National Environmental Policy Act documents. The first report will be an Environmental Assessment (EA) for the Herbert Hoover Dike Reach 1 Cutoff Wall, Subreaches B, C and D. A previous EA was completed in May 2007 for the Reach 1 Seepage Berm and Reach 1A Test Cutoff Wall. The second report is a Draft Second Supplemental Environmental Impact Statement to the 1999 Draft Environmental Impact Statement (EIS) and 2005 Final Supplement Environmental Impact Statement (FEIS) on the Herbert Hoover Dike (HHD) Major Rehabilitation Evaluation Report. This Draft Supplement will cover the remainder of the area of Reach 1 of the HHD. Reach 1, approximately 22.5 miles (36 km) in length within Martin and Palm Beach Counties, extends from the St. Lucie Canal at Port Mayaca, south to the Hillsboro Canal at Belle Glade, Florida (Figure 1). A Major Rehabilitation Evaluation Report (MRR) was approved by Congress in the Water Resources Development act (WRDA) 2000 that addressed the need to repair the aging dike. The primary objective of this study is to implement a combination of landside rehabilitation features with the cutoff wall in Reach 1 to increase the structural integrity of the HHD.

HHD is urgently in need of repairs. We have began repairs by installing the elements common to all structural solutions, such as filling in the toe ditch in the highest risk areas. This EA for the Reach 1 Cutoff wall for Subreaches B, C and D will reduce the hydraulic pressure on the levee base and provide additional protection as well as allow work to continue along the levee.

The proposed action will be a variant of the selected plan described in the July 2005 FSEIS as it was determined that the cut-off wall with seepage berm would not work for all of Reach 1 nor did it include any lands outside of the Right of Waterway (ROW) in the analysis. The alternatives to be examined in this EIS will be a combination of one or more of the following features, dependent on the geology and adjacent land features, with the cut-off wall: Seepage Berm, Relief Trench, Soil Replacement Wedge, Relief Wells, Sand Column and Drainage Feature. It is necessary to update the July 2005 FSEIS for Reach 1 to include these new landside rehabilitation features and any impacts to lands acquired outside of the ROW.

The Corps solicits your views, comments and information about environmental and cultural resources, study objectives and important features with the described study area, as well as any suggested improvements. Letters of comments or inquiry should be addressed to the letterhead address to the attention of the Planning Division, Environmental Studies Section and received within 30 days of the date of this letter.

Sincerely,

Marie G. Burns
Acting Chief, Planning Division

Enclosures

COPY

RECEIVED
12 July 2007

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Marie G. Burns, Chief
Environmental Branch - Planning Division
Jacksonville District Corps of Engineers
Post Office 4970
Jacksonville, Florida 32232-0019

July 3, 2007

Re: DHR No. 2007-2429B / Additional Information Received: June 4, 2007
Herbert Hoover Dike Major Rehabilitation
Environmental Assessment and Proposed Finding of No Significant Impact
Martin and Palm Beach Counties

Dear Ms. Burns:

Our office reviewed the above referenced additional information to address the concerns raised by Ms. Laura Kammerer of this office during a May 30, 2007 telephone conversation with you and Mr. David Pugh of your staff regarding the proposed project.

We concur that the proposed rehabilitation on the Herbert Hoover Dike historic property will not be adversely affected. However, if the project plans/design should change, this office must be notified prior to implementation. If minor changes, contact by electronic mail or telephone will be sufficient, if major changes, consultation should occur in writing.

If you have any questions, please contact Laura Kammerer, Deputy State Historic Preservation Officer for Review and Compliance, by telephone at 850-245-6333, or by electronic mail at lkammerer at dos.state.fl.us. Thank you for your interest in protecting Florida's historic properties.

Sincerely,

Frederick P. Gaske

Frederick P. Gaske, Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6436
☐ Archaeological Research (850) 245-6444 • FAX: 245-6452
☑ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433
☐ Southeast Regional Office (561) 416-2115 • FAX: 416-2149
☐ Northeast Regional Office (904) 825-5045 • FAX: 825-5044
☐ Central Florida Regional Office (813) 272-3843 • FAX: 272-2340

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

OCT 09 2007

Mr. Christian M. Hoberg
U. S. Environmental Protection Agency, Region IV
NEPA Program Office
Office of Policy and Management
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Dear Mr. Hoberg:

I am writing on behalf of the Jacksonville District of the U.S. Army Corps of Engineers (Corps). This is in response to your email dated September 28, 2007, which included comments and concerns on the Herbert Hoover Dike (HHD) Rehabilitation Project. Your recommendations to include a cumulative impact summary for all of the HHD rehabilitation, as well as including a list of previously published NEPA documents, will be incorporated into future NEPA documents.

The Corps appreciates your continued support on the HHD rehabilitation/reconstruction projects. Due to urgency of needed repairs, the Corps' approach is to minimize the risk to populations by beginning work in the priority areas while continuing design work on the remainder of HHD. It was the HHD Task Force Commander's judgment, endorsed by the District Engineer, to immediately implement those improvements that were part of all potential future structural modifications. Improvements that can be implemented immediately include cleaning or filling the toe ditch, additional seepage berms and a cutoff wall that reduces the hydraulic pressure on the levee base.

As plans and specifications were developed for Reach 1, it became apparent that the cutoff wall with seepage berm alternative would not work for all of Reach 1. The alternative for Reach 1 will be a combination of one or more of the following features dependent on the geology and adjacent land factors with the cutoff wall: Seepage Berm, Relief Trench, Soil Replacement Wedge, Relief Wells, Drainage Feature and Sand Columns. This variability will cause each Reach of HHD to be designed individually and funding is not available to survey, plan, and design the entire repair at once. Each increment of work completed reduces the risk of failure by increasing structural stability in the affected Reaches and justifies the incremental repair schedule. Through this incremental repair plan, the Corps has been able to take action to reduce piping and increase levee integrity.

We appreciate your ongoing coordination with us in our efforts in the rehabilitation of HHD. If you have any questions or comments concerning our responses to your recommendations, please contact Ms. Nancy Allen by email nancy.p.allen@usace.army.mil or phone 904-232-3206.

Sincerely,

Kenneth R. Dugger
Chief, Environmental Branch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

January 17, 2008

Ms. Marie G. Burns
Acting Chief, Planning Division
U.S. Army Corps of Engineers
Jacksonville District
P.O. Box 4970
Jacksonville, FL 32232-0019
ATTN: Ms. Nancy Allen
Environmental Lead

Subject: EPA's NEPA Review for the Herbert Hoover Dike Major Rehabilitation – "Reach 1 Cutoff Wall"; COE Draft EA (12/07) and its Addendum (1/11/08); Martin and Palm Beach Counties, Florida

Dear Ms. Burns:

Consistent with our responsibilities under Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has reviewed the subject Draft Environmental Assessment (DEA) dated December 2007, and its Addendum dated January 11, 2008. We appreciate that the Addendum to the DEA was prepared for clarity and completeness, and subsequently distributed with additional public review time allowed (until 1/25/08). EPA has provided written review comments on several previous COE National Environmental Policy Act (NEPA) documents concerning the continued rehabilitation of the Herbert Hoover Dike.

EPA has limited our review comments to waters of the US impacts. We offer the following comments on the DEA and its Addendum:

*** DEA Review Comments**

EPA #1 Page 4-13 Environmental Factor (Wetlands – preferred Alt): Implementation of the cutoff wall from the preferred alternative will not impact any adjacent existing wetlands. However, EPA requests that the COE conduct a Uniform Mitigation Assessment Method (UMAM) on all adjacent wetlands prior to the installation of the cutoff wall. This is necessary in order to have a wetland value baseline and in case the cutoff wall affects the adjacent wetlands hydrology. Additional compensatory mitigation should be required.

*** ADDENDUM Review Comments**

Page AA-9 (AA.6.1 Wetlands in Reach 1):

EPA #2 A. The Addendum states that "It was determined that 0.74 acres of relative

functional lost units.,."). Instead, the document should state that the quarry backfilling will result in the loss of 0.74 relative functional units.

EPA #3 B. The reference to "see Section AA.10 Mitigation" should be "see Section AA.12 Mitigation".

EPA #4 C. The Addendum states that a mitigation plan has been developed and approved (see Section AA.10). Instead, it should read "see Section AA.12.1 DRAFT COMPENSATION SITE PLAN." Also, it is our understanding that the mitigation plan has not been approved or have any relative functional unit credits been established by the proposed mitigation. EPA requests that the COE provide the EPA South Florida Office (West Palm Beach) with a detailed mitigation plan for review and comment. The document should include detailed site drawings, planting plan, burn management plan, implementation timetable, success criteria, detailed baseline and monitoring reports, and a long-term management plan. The information provided in the Addendum was too general and needs to be more detailed in order to determine the proper relative functional unit credits that the mitigation will provide. It is requested that the mitigation plan and relative functional unit credits generated by the mitigation sites be approved (by the federal and state resource agencies) and incorporated in the COE's pending Reach 1 EIS prior to its proposed release in November 2008.

contract out

EPA #5

EPA #6 Page AA-10 (AA.6.2.3 Bald Eagle (*Haliaeetus leucocephalus*): The Addendum states that, "All environmental commitments previously coordinated will be upheld (see Section AA.9 Environmental Commitments)". It should instead read "see Section A11".

EPA #7 Page AA-15 (AA.6.10 Water Quality): The Addendum refers to "Best Management Practices to minimize the discharge of water containing excess turbidity (see Section AA.9 Environmental Commitments)." This should be corrected to "see Section A11".

EPA #8 Page AA-16 (AA.7.1.2.2 Fish and Wildlife): The Addendum states that "The nest tree and adjacent hardwoods will not be disturbed during implementation of quarry backfill (Section AA.9 Environmental Commitments)." Instead, it should be "see Section A11".

EPA #9 Page AA-19 (Table AA-1: SUMMARY OF WETLANDS IMPACTED IN QUARRY AREA): Column 8 reads Relative Wetland Value (Acres). "Acres" should be removed since wetland value is determined by units, not acres.

We appreciate the opportunity to review this DEA and its Addendum. If you have questions on our comments, feel free to call Chris Hoberg of my staff at 404/562-9619 or hoberg.chris@epa.gov.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JAN 31 2008

Mr. Heinz J. Mueller, Chief
NEPA Program Office
U.S. Environmental Projection Agency Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Dear Mr. Mueller:

I am writing on behalf of the Jacksonville District of the U.S. Army Corps of Engineers (Corps). This is in response to your letter dated January 17, 2008, which included comments and concerns on the Herbert Hoover Dike (HHD) Rehabilitation Project. Your recommendations on the "Draft" Compensation Plan and on the Section corrections will be incorporated in the Environmental Assessment (EA) and Addendum for the HHD Reach 1 cutoff wall.

Thank you for your input but we do not concur with your conclusions on the need for additional wetland analysis. The Corps and an interagency committee including an EPA representative conducted both WRAP and UMAM assessments of wetlands adjacent to Reach 1 of HHD in 1999, 2005 and 2007 and the assessments were discussed in the referenced EA. We have already performed mitigation to cover wetlands losses along this reach. Our calculations show we are within .74 of a functional unit of complete replacement, and we do not think this difference is significant. Additionally, the Corps' Ecosystem Research and Development Center (ERDC-formerly WES) just conducted an exhaustive and complex modeling effort to determine the likely spatial extent of wetlands impacts, outside the dike, attributable to the cutoff wall. Model results and interpretation were included as Appendix A to the referenced EA. The conclusion was that effects of the cutoff wall on wetlands were likely to be negligible.

We will again assess wetlands impacts when the full footprint (including lands yet to be acquired) of the Reach 1 "solution" is known. Completion of Reach 1 will require preparation and coordination of a new EIS if additional lands need to be acquired for its completion. We feel this EIS is the appropriate vehicle for a new UMAM assessment and discussion of total wetlands impacts and mitigation. At this time it is urgent to keep HHD repairs underway due to public safety issues. We do not agree that additional compensatory mitigation is or should be required for this EA.

We appreciate your ongoing coordination with us in our efforts in the rehabilitation of HHD. If your have any questions or comments concerning our responses to your recommendations, please contact Ms. Nancy Allen by email nancy.p.allen@usace.army.mil or phone 904-232-3206.

Sincerely,

James J. McAdams
Acting Chief, Environmental Branch

We appreciate your ongoing coordination with us in our efforts in the rehabilitation of HHD. If your have any questions or comments concerning our responses to your recommendations, please contact Ms. Nancy Allen by email nancy.p.allen@usace.army.mil or phone 904-232-3206.

Sincerely,

James J. McAdams
Acting Chief, Environmental Branch

for Allen
Allen/CESAJ-PD-ES/3206 29 Jan 08
Cintron/CESAJ-PD-ES
Rogalski/CESAJ-DR-C
McAdams/CESAJ-PD-E

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

May 9, 2007

Stuart J. Appelbaum
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service Federal Activity Code: 41420-2007-FA-0675
Date Received: April 3, 2007
Project: Herbert Hoover Dike Major Rehabilitation
Counties: Palm Beach and Martin

Dear Mr. Appelbaum:

The Fish and Wildlife Service (Service) has reviewed additional information submitted in an Environmental Assessment (EA) by the U.S. Army Corps of Engineers (Corps), dated April 28, 2007, proposing further work in Reach 1A and Reach 1 of the Herbert Hoover Dike (HHD). This EA covers the Herbert Hoover Dike Major Rehabilitation for the Reach 1 Seepage Berm and Reach 1A Test Cutoff Wall. Reach 1 is located in Palm Beach and Martin Counties, extending from the St. Lucie Canal at Port Mayaca, south to the Hillsboro Canal at Belle Glade. The proposed project area is approximately 22.5 miles along the HHD. The Flood Control Act of 1948 provided authority to construct the dike and authorized repairs and modifications.

The recommended plan for rehabilitation of the HHD consists of an integrated solution that addresses internal erosion, slope stability, and foundation vulnerabilities. The proposal includes two main features: a Reach 1 seepage berm and a Reach 1A partially penetrating cutoff wall. All work under this EA will be conducted within the Corps' existing right of way (ROW). On March 13, 2007, an interagency team of biologists from the Corps, the Environmental Protection Agency, The Florida Department of Environmental Protection, and the Service conducted an inspection of the subject reach, discussed ongoing modifications to the previously proposed design, and used the Uniform Mitigation Assessment Method (UMAM) to evaluate the quality of wetlands potentially affected by the proposed work.

The UMAM evaluation was conducted on Reach 1 to determine the functional units of the habitat to be affected. The team scored the area 150 ft. from the toe of the dike. However, this EA only covers work within the ROW. A future EIS will cover work outside of the ROW once the Corps has a project design for that area and has determined real estate acquisition needs.

TAKE PRIDE IN AMERICA

Stuart J. Appelbaum

The Corps has determined that a total of 16.6 functional units of wetland value will be impacted by the Hebert Hoover Dike project for Reach 1. This wetland value, minus credits (3.8 units) from the emergency toe ditch work already completed on the previous project phase, nets a total loss of 12.8 functional units. The Corps wishes to apply available mitigation credits (13.3 units) from the melaleuca removal project conducted in a previous project segment to cover this additional wetland impact.

If the current plans discussed by the project engineer, Jacob R. Davis, and the environmental lead, Nancy P. Allen, are approved, the Corps may further reduce potential impact on wildlife resources. In addition, certain proposed design changes may result in restored wildlife habitat and an increased amount of aquatic habitat. Because construction would be confined to the existing footprint, environmental impacts would be minimal. Impacts caused by filling wetlands along the toe ditch have been mitigated on and off site. No other long-term adverse effects of the project are anticipated.

We greatly appreciate your cooperation in this rehabilitation project and thank you for your support in the effort to protect important natural resources. If you have any questions regarding this project, please contact Agustin P. Valido at 772-562-3909, extension 298.

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

cc:
Corps, Jacksonville, Florida (Jacob R. Davis)
Corps, Jacksonville, Florida (Nancy Allen)
EPA, West Palm Beach, Florida (Ron Miedema)
FWC, West Palm Beach, Florida (Chuck Collins)
Service, Jacksonville, Florida (Miles Meyer)

ANNEX A
COORDINATION WITH U.S. FISH AND WILDLIFE SERVICES
FISH AND WILDLIFE COORDINATION ACT

Coordination Date	Information Coordinated	Coordination Determination
January 3, 2008 USFWS letter	The EA and Proposed Finding of No Significant Impact covering the Reach 1 Cutoff Wall.	No additional impacts on wetlands are anticipated. Bald eagle nests were located at the quarry in Reach 1D; at this point we recommend adhering to the Guidelines to avoid take of bald eagles.
May 2, 2007	The EA covering Reach 1 Seepage Berm within the right-of-way and Reach 1A Cutoff Wall.	Wetlands being filled along the toe ditch have been mitigated for on and off-site. No other long term adverse impacts of the project are anticipated.
January 16, 2007	The Reach 2&3 EIS for seepage berm and cutoff wall.	Resource issues are the same as Reach 1 and have been addressed in the Final CAR, dated December 2001. Only remaining issue is to identify additional wetland mitigation sites to fully compensate for toe ditch backfilling in Reaches 2&3.
November 24, 2006	The Reach 1 EA for Priority Toe Ditch Backfill, dated Jan 2007. Suspended construction cutoff wall and bench. Toe ditch backfill repairs in Reach 1 to stabilize the outer toe and prevent further deterioration.	Proposed modifications are similar to those proposed in 1999 EIS; mitigation was carried out for toe ditch backfill therefore no additional mitigation is required. Commitments for threatened, endangered and state listed species are still in effect.
April 18, 2005 USFWS letter	The Supplemental Draft EIS, with the review of the new alternative, that was also in the 30% design.	Same as previous letter. Impacts minimized; no mitigation needed at this time. Threatened and Endangered species issues have been addressed with commitments.

March 8, 2004 USFWS Supplement to FCAR	Review of 30% document that eliminates construction in the toe ditch and confines project to the existing HHD footprint	Reduces impacts previously addressed in the Dec. 20, 2001 FCAR & March 4, 2003 Supplemental FCAR. No significant impacts expected except temporary dewatering of toe ditch.
February 23, 2004 USACE letter	New 30% design, additional reduction in impacts, and information on recommended alternative	Wetland impacts have been eliminated with the exception of temporary impacts associated with construction.
October 28, 2003 USFWS letter	Letter documenting review of VE report that modified recommended plan in Sub-reach 1A to reduce impacts	Request 30% Designs to review prior to submitting a supplement to FCAR
June 27, 2003 USACE letter	VE report recommendations on Sub-reach 1A only, not entire Reach	Sub-reach 1A design changes from the original MRER recommendation, eliminating impacts in this sub-reach that has higher quality wetlands

March 4, 2003 USFWS Supplemental CAR	Review of VE report and modifications to recommended plan design	Reduces impacts on wetlands; No mitigation required. Reminder of commitments to complete bald eagle and eastern indigo snake measures
January 14, 2003 USACE letter	Results of the VE study.	Request for review
December 20, 2001 USFWS Final CAR	Review of draft EIS and impacts associated with alternatives	While filling and excavation of wetlands on landward side of HHD are of lesser concern, impacts to habitat are significant enough to require mitigation; Concerned with any construction that would be proposed on waterward side of HHD and effects to Lake; Concerned with construction impacts to burrowing owls, bald eagles, and eastern indigo snake. Measures should be implemented.
March 21, 2001 USFWS letter	Compensatory wetland mitigation plan	Supports the mitigation proposed and suggests mitigation credit for future Reaches of HHD could be banked

March 8, 2001 USACE letter	Proposal for wetland habitat loss	Agree functional value of habitat loss should be mitigated. Plan to supplement an existing exotic plant removal program by re-planting the mitigation area with native trees. Request for concurrence
October 30, 2000 USACE letter	The Corps cannot support the mitigation plan outlined by USFWS, but proposes strategy for wetland compensation	The Corps will support exotic plant removal program and investigate enhancement opportunities of existing wetland functions.
February 11, 2000 USFWS Supplement draft CAR	Results of wetland function assessment and mitigation plan proposal	Approximately 35 acres of wetland habitat will be impacted by recommended alternative. Mitigation required. Proposed sites and compensation measures listed. Results of WRAP
June 9, 1999 USFWS Section 7 determination	Determination of effects to threatened and endangered species in project area	Concur with USACE determination of not likely to adversely effect, provided recommendations for the bald eagle and eastern indigo snake are implemented

October 30, 1998 USFWS draft CAR	Draft Environmental Impact Statement	Alternatives 2 and 3 are acceptable, provided mitigation for wetlands is provided; exotic vegetation is removed; Construction avoids active bald eagle nest, protection measures for eastern indigo snake are followed, and impacts to burrowing owls are minimized

From: Robert_Pace@fws.gov [mailto:Robert_Pace@fws.gov]
Sent: Thursday, January 03, 2008 9:32 AM
To: Allen, Nancy P SAJ; Wolff, Mark E SAJ; HHDEnvironment, SAJ
Cc: Pam_Repp@fws.gov; Agustin_Valido@fws.gov
Subject:

Nancy,

Here are our comments on the EA/FONSI. Thanks for all your continued cooperation on this.

Bob

(See attached file: HHD eagles.doc)

Robert Pace
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960
Tel: 772-562-3909, ext. 239

This responds to your request for comments on the Environmental Assessment (EA) and Proposed Finding of No Significant Impact for the Herbert Hoover Dike Major Rehabilitation, Martin and Palm Beach Counties, Florida. The Service has commented on several previous environmental documents prepared by the Corps and has completed review under both the Fish and Wildlife Coordination Act and the Endangered Species Act. We consider the subject EA as a supplement to our previous coordination on this project under both of these authorities.

The work outlined in this EA does not substantially change the impacts on fish and wildlife resources, including threatened and endangered species, relative to our previous reports and letters. The revised work plan will be confined to the same area that was assessed before. No additional impacts on wetlands are anticipated; we have already participated in a team with the Corps, the Environmental Protection Agency, and the Florida Department of Environmental Protection to evaluate the wetland impacts and concur with the proposed mitigation plan. Your informal consultation under the Endangered Species Act included provisions to avoid adversely affecting two bald eagle (*Haliaeetus leucocephalus*) nests. We note that your EA recognizes that the eagle was officially removed from the list of threatened and endangered species. However, you continue your commitment to follow the previous agreements to avoid impacts on the nests. Figure 1 and Figure 2 show the general location of two nests, although the points may not be located precisely at the nest tree. As part of the protective measures, the Corps will conduct surveys to locate the nest trees ahead of construction and will avoid construction close to the nests during the nesting season.

On June 28, 2007, the Service announced the removal of the bald eagle from the list of threatened and endangered species under the Endangered Species Act (ESA). On August 9, 2007, the bald eagle was officially delisted. After the official delisting, the permitting of incidental take under the ESA is no longer necessary. However, the bald eagle is still protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). Both the Eagle Act and MBTA protect the species from a variety of harmful actions and impacts. The Service has proposed a similar permit structure under the Eagle Act to the permit structure that existed under the Endangered Species Act. The permit structure is not yet in place and the Service is still reviewing the proposal. Any final regulation the Service promulgates would ensure that permitted take of eagles is compatible with the preservation of bald and golden eagles. Under a managed take permit system, requests for bald eagle take will likely be evaluated based upon regional bald eagle populations.

The Service has developed the *Bald Eagle National Management Guidelines* (Guidelines) http://www.fws.gov/northflorida/BaldEagles/bald-eagles.htm to provide recommendations to avoid adversely affecting the bald eagle, especially during the nesting season. The Guidelines advise when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. The Service strongly encourages land owners, land managers, project proponents and those who share public and private lands with bald eagles to adhere to Guidelines in order to avoid disturbing bald eagles and ensure continued viability of eagle populations. While the Eagle Act has no provision for allowing take of bald eagles without a permit, the Service realizes that there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts. The Service's Office of Law Enforcement carries out its mission to protect eagles through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on eagles, and by encouraging others to enact such programs. Until a permit program is adopted, it is not possible to completely absolve individuals, companies, or agencies from liability even if they follow the Guidelines. However, the Office of Law Enforcement focuses its resources on investigating and prosecuting individuals and companies that may take eagles and nests without regard for their actions or without implementing the measures in the guidelines.

In summary, at this point we recommend to adhere to the Guidelines to avoid take of bald eagles. If adhering to the Guidelines is not feasible, and the proposed activity is likely to cause take of bald eagles, project proponents will need to wait until a permit mechanism under the Eagle Act is established, whereby a take statement/permit may be issued by the Service.

More specifically for the eagle nest designated as PB014, we recommend that the trees along the edge of the borrow pit be marked in advance of construction, instructing the contractors to modify construction techniques to leave as many of these trees standing as possible (Figure 2).

Figure 1 General location of bald eagle nest PB003 along Herbert Hoover Dike

Figure 2 General location of bald eagle nest PB014 along Herbert Hoover Dike. Trees between base of the dike and the borrow pit will be left in place, to the extent practicable.

RECEIVED
20 Dec 2007

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
(727) 824-5312 FAX 824-5309
http://sero.nmfs.noaa.gov

DEC 18 2007

F/SER3:TM

Ms. Marie G. Burns, Acting Chief
Planning Division Environmental Branch
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Ms. Burns:

This responds to your letter dated December 7, 2007, regarding a Draft Environmental Assessment (EA) for the Herbert Hoover Dike Major Rehabilitation for the Reach 1 Cutoff Wall in Palm Beach and Martin Counties, Florida, and a proposed Finding of No Significant Impact to the National Marine Fisheries Service (NMFS). You requested our comments on the EA.

We believe the EA adequately addresses the issues associated with threatened and endangered species under NMFS' purview. We have no additional comments. If you have any questions, please contact Mr. Robert Hoffman, fishery biologist, at (727) 824-5312, or by e-mail at Robert.Hoffman@noaa.gov.

Sincerely,

David M. Bernhart
Assistant Regional Administrator
for Protected Resources Division

File: 1514-22.F.1.FL
Ref: T/SER/2007/07858

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary - Designee

January 12, 2007

Ms. Nancy Allen
Planning Division, Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers (USACE) – Draft Environmental Assessment for the Herbert Hoover Dike (HHD) Major Rehabilitation, Modified Design in Reach 1 and Priority Toe Ditch Repairs in Reaches 1, 2, and 3 – Glades, Hendry, and Palm Beach Counties, Florida. SAI # FL200612122959C

Dear Ms. Allen:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the draft environmental assessment (EA).

The Florida Department of Environmental Protection (DEP) supports the USACE's plans to expedite the repair and rehabilitation of the dike in order to ensure the continued protection of lives and property in the communities around the lake. However, DEP staff notes that temporary adverse impacts to recreational and aesthetic resources on the Lake Okeechobee Scenic Trail (LOST) would occur as a result of implementing Alternative No. 5.. While the USACE is not currently authorized to repave the LOST, the USACE indicates that the contractor will re-grade sections of the trail disturbed by construction of the cut-off wall area. The final environmental document should address the potential impacts of not restoring the trail to its pre-construction condition. The DEP understands that the dike rehabilitation takes precedent and is critical for the safety and well-being of those living in South Florida. However, there will be significant loss of recreational opportunity and community impacts if the trail is not repaired or replaced following dike rehabilitation. Staff recommends that the USACE and DEP initiate discussions to address the post-construction repair of any impacts to the trail, while facilitating the dike's rehabilitation and protecting the environment. Please refer to the enclosed DEP memorandum for additional details and comments.

Florida State Clearinghouse

The South Florida Water Management District (SFWMD) notes that the preferred alternative involves toe ditch backfilling in the problem areas, which will not allow for the free flow of water collecting along the downstream toe. SFWMD staff requests that the USACE investigate the impact of a potential continual wet toe on dam safety, particularly in areas adjacent to structures that may be prone to seepage water breaking through the downstream bank. SFWMD staff also requests additional information on a number of items relating to structural details, the proposed repair and requested repaving of the LOST, potential future effects on the Lake Okeechobee regulation schedule and lake levels, and identification of sources of fill for the project. Please refer to the enclosed SFWMD memorandum for further information.

The Florida Department of Transportation (FDOT) Districts One and Four have concluded their review of the subject report and note that any project impacts to the LOST, including trail surface, pedestrian bridges, berms, signage, mile markers, and/or other features installed by the State of Florida must be replaced to like or higher standards by the USACE. In addition, if the proposed project results in impacts to FDOT roadways or infrastructure, the USACE will need to obtain all necessary permits from the District One or Four local operations center prior to construction activities occurring within state road rights-of-way. Please see the enclosed FDOT memorandum and contact Ms. Amie K. Goddeau, P.E., at (954) 777-4343 for additional information.

The Treasure Coast Regional Planning Council (TCRPC) notes that the study is not in conflict or inconsistent with the Strategic Regional Policy Plan. However, every effort should be made to minimize impacts to private property owners, the LOST, wetlands, listed species and navigation of the lake in the vicinity of the project. The City of Pahokee has expressed concerns in the attached letter to the TCRPC regarding the potential dislocation of homes alongside the dike as a result of USACE rehabilitation activities. If homes are to be relocated, the City indicates it could lose a significant portion of its tax base. The USACE should address the issues raised by the City as soon as appropriate.

The Florida Department of State (DOS) advises that this project could have an effect on the original design of the HHD (Site # 8PB2028), considered historically significant for its engineering design. However, the DOS concurs that the proposed necessary modifications will have no adverse effect on the characteristics qualifying this property for listing in the *National Register of Historic Places*. Please see the enclosed DOS letter.

Based on the information contained in the draft EA and the enclosed state agency comments, the state has determined that, at this stage, the proposed federal activities are consistent with the Florida Coastal Management Program (FCMP). Please continue to coordinate with DEP, SFWMD, FDOT, and local government staff regarding the issues raised above. The state's continued concurrence with the project will be based, in part, on the

adequate resolution of issues identified during this and subsequent reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting stage.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Sincerely,

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: John Outland, DEP, MS 45
Greg Knecht, DEP, MS 3560
Tim Gray, DEP, Southeast District
Gordon Romeis, DEP, South District
Jena Brooks, DEP, OGT
Jim Golden, SFWMD
Lisa Stone, FDOT
Stephanie Heidt, TCRPC
Laura Kammerer, DOS

Florida State Clearinghouse

Project Information	
Project:	FL200612122959C
Comments Due:	01/02/2007
Letter Due:	01/11/2007
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HERBERT HOOVER DIKE (HHD) MAJOR REHABILITATION, MODIFIED DESIGN IN REACH 1 AND PRIORITY TOE DITCH REPAIRS IN REACHES 1, 2, AND 3 - GLADES, HENDRY, AND PALM BEACH COUNTIES, FLORIDA.
Keywords:	ACOE - HERBERT HOOVER DIKE MAJOR REHAB, MODIFIED DESIGN, AND TOE DITCH REPAIRS
CFDA #:	12.106

Agency Comments:

SW FLORIDA RPC - SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL

No Comment

TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL

The study is not in conflict or inconsistent with the Strategic Regional Policy Plan. However, every effort should be made to minimize impacts to private property owners, the Lake Okeechobee Scenic Trail, wetlands, listed species and navigation of the lake in the vicinity of the project. The City of Pahokee has expressed concerns in the attached letter to Council regarding the potential dislocation of homes alongside the dike as a result of USACOE rehabilitation actions. If homes are to be relocated, the City indicates it could lose a significant portion of its tax base. The USACOE should address the issues raised by the City as soon as appropriate.

GLADES - GLADES COUNTY

HENDRY -

PALM BEACH -

The City of Pahokee has expressed concerns regarding the potential loss of area residences as a result of project implementation and requests that the Corps of Engineers investigate alternatives that would not impact residential structures and City revitalization efforts.

COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

NO COMMENT BY SCOTT SANDERS ON 12/18/06.

STATE - FLORIDA DEPARTMENT OF STATE

Based on a review of the information provided, the Florida Department of State (DOS) advises that this project could have an effect on the original design of the Herbert Hoover Dike (Site # 8PB2028), considered historically significant for its engineering design. However, this office concurs that the proposed necessary modifications will have no adverse effect on the characteristics qualifying this property for listing in the National Register of Historic Places.

TRANSPORTATION - FLORIDA DEPARTMENT OF TRANSPORTATION
FDOT Districts One and Four have concluded their review of the subject report and note that any project impacts to the Lake Okeechobee Scenic Trail (LOST), including trail surface, pedestrian bridges, berms, signage, mile markers, and/or other features installed by the State of Florida must be replaced to like or higher standards by the Army Corps of Engineers. If the proposed project results in impacts to FDOT roadways or associated infrastructure in Districts One or Four, the Corps of Engineers will need to obtain all necessary permits from the FDOT District local operations center prior to construction activities occurring within state road rights-of-way.
ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
The DEP supports the USACE's plans to expedite the repair and rehabilitation of the dike in order to ensure the continued protection of lives and property in the communities around the lake. However, DEP staff notes that temporary adverse impacts to recreational and aesthetic resources on the Lake Okeechobee Scenic Trail (LOST) would occur as a result of implementing Alternative No. 5.. While the USACE is not currently authorized to repave the LOST, the USACE indicates that the contractor will re-grade sections of the trail disturbed by construction of the cut-off wall area. The final environmental document should address the potential impacts of not restoring the trail to its pre-construction condition. The DEP understands that the dike rehabilitation takes precedent and is critical for the safety and well-being of those living in South Florida. However, there will be significant loss of recreational opportunity and community impacts if the trail is not repaired or replaced following dike rehabilitation. Staff recommends that the USACE and DEP initiate discussions to address the post-construction repair of any impacts to the trail, while facilitating the dike's rehabilitation and protecting the environment.
SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT
The SFWMD notes that the preferred alternative involves toe ditch backfilling in the problem areas, which will not allow for the free flow of water collecting along the downstream toe. SFWMD staff requests that the USACOE investigate the impact of a potential continual wet toe on dam safety, particularly in areas adjacent to structures that may be prone to seepage water breaking through the downstream bank. SFWMD staff also requests additional information on a number of items relating to structural details, the proposed repair and requested repaving of the LOST, potential future effects on the Lake Okeechobee regulation schedule and lake levels, and identification of sources of fill for the project.

For more information please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

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Memorandum

TO: Florida State Clearinghouse

THROUGH: Greg Knecht, Administrator
Water Quality Standards & Special Projects Program

FROM: John Outland, Gordon Romeis, Stan Ganthier, Rick Halvorsen, and Tim Gray

DATE: January 12, 2007

SUBJECT: USACE, Jacksonville District – Draft Environmental Assessment for the Herbert Hoover Dike (HHD) Major Rehabilitation, Modified Design in Reach 1 and Priority Toe Ditch Repairs in Reaches 1, 2, and 3 – Glades, Hendry, and Palm Beach Counties, Florida.

SAI #: FL06-2959C

Background

This Department of Environmental Protection previously provided comments on the Scoping Notices for Environmental Impact Statements for the Rehabilitation of Reaches 1, 2 and 3. The subject Environmental Assessment (EA) evaluates the impacts associated with the preferred alternative to rehabilitate the Herbert Hoover Dike surrounding Lake Okeechobee. The preferred alternative consists of a landside seepage berm and cutoff wall at the dike crest to provide protection at the toe of the dike to increase stability and reduce seepage. The seepage berm will extend approximately 150 feet from the toe of the dike. This EA is evaluating the environmental effects of the seepage berm within the existing right-of-way. A future EIS will be produced to assess the effects of the seepage berm outside the existing right-of-way.

To expedite the rehabilitation of the dike, the U.S. Army Corps of Engineers (Corps) has identified nine priority areas where immediate repairs should be implemented. These areas were identified based on potential safety concerns associated with the levee in these areas due to continual seepage boils during water conditions of the lake over 15 ft NGVD. Six priority areas are located in Reach 1 and one each in Reaches 2 and 3. Priority Area P-2 is a borrow pit and requires a different rehabilitation solution and is not evaluated in this EA.

Landside wetlands associated with the existing toe ditch or other low lying areas will be moderately affected by the rehabilitation. These areas are used for foraging by wading birds but no significant impacts to listed species are expected. The U.S. Fish and Wildlife Service (USFWS) and Corps have determined that four habitat units of mitigation credits are required to offset the impacts to wetlands. The Corps currently has 27 mitigation bank credits from planting wetland trees and removing exotics. Therefore, no additional mitigation is being required by the USFWS for the project.

Comments

1. The Department supports the Corps' intention to expedite the repair and rehabilitation of the dike to ensure the continued protection of lives and property in the communities around the lake. We recognize that the Corps is accelerating the work in the priority areas of Reaches 1, 2 and 3 and will move forward with the remaining work as soon as possible.

2. The preferred alternative No. 5 consists of an impermeable cutoff wall at the crest of the dike that extends approximately10 feet below the first limestone layer and a landside seepage berm that may extend approximately 150 feet from the toe of the dike. A drainage swale would also be constructed along the landward toe of the berm. Note that this environmental assessment evaluated environmental effects of the seepage berm within the existing right-of-way and that a future environmental impact statement will assess the effects of the seepage berm outside the existing right-of-way. Additional right-of-way will be acquired to fully implement alternative No. 5.

3. The Corps has proposed a finding of no significant adverse impact on the human environment as a result of implementing Alternative No. 5 within the existing right-of-way. Temporary impacts to recreational and aesthetic resources would occur during construction.

4. In Section 4 Page 33 under "RECREATION" the plan requires the contractor to replace disturbed trail elements, if any, during cut-off wall placement. In Section 4 Page 37 under "Recreation Resources" the plan states that an inventory of all park amenities and utilities prior to construction will facilitate a rapid return to pre-construction state for those areas so impacted. This section also states that the Corps does not have the Congressional authority to make repairs to such areas as the Lake Okeechobee Scenic Trail, which would be removed or impacted during construction. While the Corps is not currently authorized to repave the area, the Department understands from the Corps that the contractor will re-grade sections of the trail disturbed by construction of the cut-off wall area.

The local communities around the lake are strong advocates for a paved trail surface. The Florida Department of Transportation originally planned to only pave the trail between Moore Haven and Belle Glade. However, after concerns were expressed by the City of Pahokee, the segment of trail between Belle Glade and Pahokee was paved. This is the same paved segment of the trail that will be impacted by cut-off wall placement.

Since the trail was also awarded the Federal designation of Florida National Scenic Trail, temporary trail closure during levee rehabilitation should be accompanied with on-site signing and public notices.

Not restoring the trail to a pre-construction condition is an adverse impact that should be addressed in the final environmental document. The Department understands that the dike rehabilitation takes precedent and is critical for the safety and well-being of those living in South Florida. However, there will be significant loss of recreational opportunity and community impacts if the trail is not repaired or replaced following dike rehabilitation.

We request the Corps initiate discussions with the Department as soon as possible to determine a reasonable course of action to address the post-construction repair of any impacts to the trail.

5. Adverse impacts to wetlands have been offset by creation of wetland habitat through off-site mitigation. The Department will verify the UMAM scores and mitigation credits contained in Appendix C during an upcoming site visit on January 11, 2007.

6. If an alternative is chosen that affects land outside of the existing dike footprint, we recommend that the Corps coordinate with the Department's Division of State Lands concerning lands that may be owned by the state. Coordination with the Department's Southeast Regulatory District is recommended regarding any state permitting requirements for rehabilitation activities.

7. Drinking water intake pipes are located throughout the project area. It is imperative that the contractor be aware of the exact locations and diligently avoids impacting the pipes (i.e. damaging the pipes, creating turbid water near the intake, etc.)

8. It is recommended that the Corps and the Department continue to communicate and work cooperatively to facilitate the dike's rehabilitation while also protecting the environment.

cc: John Outland (email)
Gordon Romeis (email)
Stan Ganthier (email)
Tim Gray (email)
Rick Halvorsen (email)

Memorandum **South Florida Water Management District**

TO: Florida State Clearinghouse

FROM: James J. Golden, AICP, Senior Planner
Environmental Resource Regulation Department

DATE: January 10, 2007

SUBJECT: USACOE – DEA for Herbert Hoover Dike Major Rehabilitation, Modified Design in Reach 1 and Priority Toe Ditch Repairs in Reaches 1, 2, and 3 – Glades, Hendry, and Palm Beach Counties, Florida.
(SAI # FL200612122959C)

Please see the following SFWMD comments on the above subject proposal.

1. The preferred alternative is the toe ditch backfilling in the problem areas. The toe ditch infilling with gravel will not allow for the free draining of water collecting along the downstream toe. Previously, the water in the toe ditch allowed the farmers to draw the water for farming purposes. The farmers normally pump the water out from the ditch and route it to locations away from the toe of the dike. However, on implementation of the project, the seepage water will preferentially collect at these locations and will recede slowly following heavy rains. The USACOE should investigate the impact of a perpetual wet toe on dam safety, particularly in areas adjacent to structures, as it could be prone to seepage water breaking through the downstream bank.

2. Section 2.1.6 Page 13… What types of material will be used to encase the perforated culvert and prevent it from becoming impermeable?

3. 2.1.6 Page 13 Figure 2.6… What is the total length of the cutoff wall? Alternative 3 was abandoned because the cutoff wall was determined to impact groundwater hydrology. It appears the cutoff wall for Alternative 5 was is not much different from that described in Alternative 3 other than it begins at the crest of the levee rather than the inward toe of the levee. How does this cutoff wall significantly change the impact from that described in Alternative 3?

4. 2.1.6 Page 19 Figure 2.12… Why would Priority Area 2 and the adjacent borrow ditches be evaluated in this assessment? Due to the close proximity of the borrow ditches to the landward toe ditch this would appear to be a key area to be addressed.

5. 4.0 Page 33 Table 4.1… Lake Okeechobee Scenic Trail, "The Contractor will be required to replace trail elements disturbed, if any, during cut-off wall emplacement. Coordination with FDEP on the Florida Natural Scenic Trail (FNST) would be conducted prior to and during construction." Can this statement be interpreted as those paved portions will be repaved after construction and those shell rock portions will be restored as is? Has there been any discussion to pave the top of the levee in portions of Reach 1 that is currently unpaved? By doing so would improve recreational benefits in the area.

6. 4.3 Page 35… Lake Okeechobee Operations, "The repair and rehabilitation of the Reaches together will affect the manageability of Lake Okeechobee. Once the dike is repaired, lake levels can fluctuate without jeopardizing the stability of the dike or the persons who live, farm or work adjacent to the dike." The lake regulation schedule has been reevaluated and adjusted to provide environmental enhancement to the lake. In spite of the current and future repairs to the levee and the increased safety at higher lake stages will the new regulation schedule remain in place or will there be a tendency to revert back to higher lake stages? The subsequent statement concerning water supply might lead one to believe maintaining higher lake stages are a definite consideration once repairs have been completed. "Water Supply, This project and future work on additional Reaches of the dike are delineated to separate drainage regions. The cumulative impacts of further improvements stand to be positive rather than negative, increasing the stability and safety of the HHD system, and enhancing water resource capabilities to meet all existing needs."

7. 4.5 Page 37… Recreational Resources, On page 33 it states that the contractor will be required to replace trail elements disturbed during the levee repairs. However, on page 37 it states, "the Corps does not have authority for this project to make repairs to such areas as LOST that would be removed or impacted with construction." It also states on page 39, "(4) Continued recreation planning will be performed during detailed project engineering and design. In addition, the appropriate FDEP representative will be contacted to insure collaboration on design features with the Scenic Trail Master Plan Coordination and the Lake Okeechobee Scenic Trail. An inventory of park amenities and utilities prior to construction would facilitate a rapid return to pre-construction state for those areas so impacted. During construction, access to certain parts of the Lake Okeechobee Scenic Trail (LOST) would be restricted, and parts of the trail would be removed. Following construction, access to the trail by the public would be restored. However, the Corps is not authorized to restore the paved surface of the scenic trail following construction. Coordination with FDEP would be conducted prior to and during construction." The portion of the paved trail from Pahokee to Belle Glade has had recreational benefits in

terms of increased numbers of trail users. The State of Florida has spent millions of dollars getting this portion of the trail paved, so it's hard to believe the USACOE will not put it back as they found it. This document is somewhat contradicting as noted from the comments on page 33. Tourism to local communities could be impacted by not restoring the levee to as-built conditions.

8. 4.12.11 Page 45… Federal Water Project Recreation Act, "The effects of the proposed action on outdoor recreation have been considered and are presented in the Supplemental and Final EIS. Short-term impacts to the Lake Okeechobee Scenic Trail located on top of the dike will require close coordination with FDOT and FDEP in order to return the trail to as-built conditions and limit trail closure time. Continued recreation planning will be performed during detailed project engineering and design. The project is in full compliance." Does this mean it will be the responsibility of FDOT and FDEP to fund the return of the trail to as-built conditions, or will the USACOE do it?

9. The EA indicates that Option 5 is now the preferred option, which moves the toe of slope out 150 ft. followed by relocation of the seepage ditch. However, the EA does not identify where the USACOE is planning to get the fill for the widened embankment and for filling the existing seepage ditch. This appears to be more of a concern than the actual widening.

10. Section 4.5 of the EA states that there will be No Significant Impact on topography or soils. This may be true for where the dike is widened, since the area is all ready impacted; however, the EA does not identify where the additional fill is coming from. Reach 1 is 22.4 miles long and will require quite a bit of fill coming from somewhere. Appendix A indicates that the USACOE anticipates getting the fill material from a commercial quarry; however, no specific source has been identified. Also, it does not appear that the lengths for Reaches 2 and 3 were identified in the EA.

Florida Department of
Transportation

Memorandum

TO: **Florida State Clearinghouse**

FROM: **Larry Hymowitz, AICP**
District Four, Office of Modal Development

DATE: **January 4, 2007**

SUBJECT: **ACOE – DEA for the Herbert Hoover Dike Major Rehabilitation, Modified Design in Reach 1 and Priority Toe Ditch Repairs in Reaches 1, 2, and 3 – Glades, Hendry, and Palm Beach Counties**
SAI # FL200612122959C

The Florida Department of Transportation has reviewed the referenced document and offers the following comments:

1. While the overall map for the priority areas (Figure 2-9) does label the adjoining highway system, the individual maps (Figures 2-10 through 2-18) do not which causes some concern. Please provide this necessary level of detail on the individual priority site maps for both the adjoining roadways and railroad facilities that may be impacted by the proposed work.

2. There was no mention in the EA document of potential impact to the adjoining rail and roadway infrastructure from the proposed work. This potential impact to public infrastructure needs to be addressed in this NEPA document as well as any type of proposed mitigation.

3. In specific to priority area #3, the US 27 roadway is immediately adjacent to the site, and the associated roadway drainage ditch will in fact be impacted by the proposed work. FDOT is working with ACOE to ensure this impact will not be a negative one, but this impact needs to be documented in the report as well as the steps taken to mitigate all concerns.

4. As mentioned in the discussions between FDOT and ACOE, some type of permit or authorization will be needed for the work in the US 27 roadway right-of-way associated with priority site #3. We need to make sure there is an approved Traffic Control Plan for the work that takes into account the high speed of this adjacent roadway while providing sufficient protection for the traveling public and Dike Construction workers and associated equipment.

5. As an overall concern, FDOT provided funding for the construction and paving of portions of the Lake Okeechobee Scenic Trail (LOST) located on top of the Herbert Hoover Dike. As part of the dike rehabilitation, any associated impacts to the LOST should be fully mitigated by any necessary reconstruction to restore the trail to its current

pre-rehabilitation condition. Impacts to the LOST trail surface, pedestrian bridges, berms, signage, mile markers or other features installed by the State of Florida must be replaced to like or higher standards by the ACOE. Temporary trail closure during the rehabilitation should be accompanied with appropriate signing and public notices. Again, these potential impacts and mitigation needs to be documented in the NEPA document.

If additional information is required on these comments, please feel free to contact Ms. Amie K. Goddeau, P.E., at (954) 777-4343 or amie.goddeau@dot.state.fl.us.

City of Pahokee

City Hall • 171 North Lake Avenue • Pahokee, Florida 33476 • Phone (561) 924-5534• FAX (561) 924-7301

Office of the City Manager

J. P. Sasser
Mayor

Gary McEntire
Vice-Mayor

Allie H. Biggs
Commissioner

Henry Crawford, Jr.
Commissioner

Keith W. Babb, Jr.
Commissioner

Lillie Latimore
City Manager

Patricia McLean
City Clerk

Walton, Lantaff, et al.
City Attorney

James E. Blackford, Jr.
Chief of Police

Gary C. Burroughs
Fire Chief

Jeanie Perkins
Finance Director

Herbert Crawford
Director of Recreation

James Vaughn
Public Works Director

Alberta Fields
Human Resources

January 2, 2007

RECEIVED
JAN 08 2007
TREASURE COAST
REGIONAL PLANNING COUNCIL

Mr. Greg Vaday
ICR Coordinator
Treasure Coast Regional Planning Council
301 East Ocean Boulevard
Suite 300
Stuart, Florida 34994

Dear Mr. Vaday:

I am in receipt of two Treasure Coast Regional Planning Council Memorandums regarding the Herbert Hoover Dike.

1. Herbert Hoover Dike – Major Rehabilitation
   TCRPC Reference #06-PB-12-01
   SAI# FL200612122959C

2. Draft Supplemental Environmental Statement Herbert Hoover Dike
   TCRPC Reference #06-PB-12-03
   SAI#FL200612182971C

You should be aware that Congressman Hastings has held a town hall meeting in the City of Pahokee along with the Corps of Engineers. The citizens of the City of Pahokee expressed their displeasure with the pursuit of the process chosen by the Corps of Engineers vs. the alternative which would not cause them to lose their homes, particularly since the choice by the Corps was based on less cost.

Since this time, the City of Pahokee has begun to look closely at the projected effect on the natural, social and economic environment in the community. While the final plans are not ready, we are able to determine from the presentation by the Corps of Engineers that it will be severe. For this reason, we are not prepared to present particulars at this time. We do know that the proposed action will strip the City's ad valorem tax base, leaving behind severe destruction and economic set back from the City's attempt to revitalize.

We are encouraging the Corps of Engineers to revisit their planning and choose an alternative that will not displace citizens and erode the City's tax base which is currently at 46%.
I am interested in the impact and feedback from other cities and interested parties around the Lake.

Sincerely,

J.P. Sasser
Mayor

RECEIVED
JAN 10 2007
OIP / OLGA

Cc's on the following pages

Cc: The Honorable Members of
The City Commission

The Honorable Charlie Crist
Governor

The Honorable Alcee Hastings
United States Congressman

The Honorable Jessie Santamaria
Commissioner, Palm Beach County

The Honorable Addie Greene, Chair
Palm Beach County Commission

The Honorable J. Koone, Vice Chair
Palm Beach County Commission

The Honorable K. Marcus, Commissioner
Palm Beach County

The Honorable W. Newall, Commissioner
Palm Beach County

The Honorable M. McCarty, Commissioner
Palm Beach County

The Honorable B. Aronson, Commissioner
Palm Beach County

The Honorable B. Aronson, Commissioner
Palm Beach County

The Honorable Ellyn Bogdanoff
Florida State Representative – District 91

The Honorable Mary Brandenberg
Florida State Representative – District 89

The Honorable Susan Bucher
Florida State Representative – District 88

The Honorable Larcenia Bullard
Florida State Senator – District 39

The Honorable Ted Deutch
Florida State Senator – District 30

The Honorable Carl Domino
Florida State Representative – District 520

The Honorable Adam Hasner
Florida State Representative – District 87

The Honorable Ron Klein
Florida State Representative – District 22

The Honorable Richard Machek
Florida State Representative – District 78

The Honorable Tim Mahoney
U.S. Representative – District 16

The Honorable Ken Pruitt
Florida State Senator – District 28

The Honorable William Snyder
Florida State Representative – District 82

The Honorable Maria Sachs
Florida State Representative – District 86

The Honorable Kelly Skidmore
Florida State Representative – District 90

The Honorable Priscilla Taylor
Florida State Representative – District 84

The Honorable Shelley Vana
Florida State Representative – District 85

The Honorable Robert Wexler
U.S. Representative – District 19

All Residents directly affected by
Actions taken regarding
The Herbert Hoover Dike

FLORIDA DEPARTMENT OF STATE
Sue M. Cobb
Secretary of State
DIVISION OF HISTORICAL RESOURCES

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DEC 2 0 2006
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Ms. Lauren Milligan
Director, Florida State Clearinghouse
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 47
Tallahassee, Florida 32399-3000

December 15, 2006

RE: DHR No. 2005-10955/ Date Received: August 24, 2004
SAI No. FL200612122959C/ Jacksonville District Corps of Engineers
Herbert Hoover Dike Major Rehabilitation, Draft Environmental Assessment and Proposed Finding of No Significant Impact, Modified Design in Reach 1, and Priority Toe Ditch Repairs in Reaches 1, 2 and 3/ Glades, Hendry and Palm Beach Counties

Dear Ms. Milligan:

Our office received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act,* as amended, 36 *C.F.R.,* Part 800*: Protection of Historic Properties*, and the *National Environmental Policy Act* of 1969, as amended. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties (archaeological, architectural, and historical resources) listed, or eligible for listing, in the *National Register of Historic Places,* assessing the project's effects, and considering alternatives to avoid or minimize adverse effects.

Based on a review of the information provided, it is the opinion of this office that this project could have an effect on the original design of the Herbert Hoover Dike (8PB2028), considered historically significant for its engineering design. However, this office concurs that the proposed necessary modifications will have no adverse effect on the characteristics qualifying this property for listing in the NRHP.

If you have any questions concerning our comments, please contact Janice Maddox, Historic Sites Specialist, at jmaddox@dos.state.fl.us or (850) 245-6333. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Frederick P. Gaske

Frederick P. Gaske, Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6436
☐ Archaeological Research (850) 245-6444 • FAX: 245-6452
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☐ Northeast Regional Office (904) 825-5045 • FAX: 825-5044
☐ Central Florida Regional Office (813) 272-3843 • FAX: 272-2340

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

February 4, 2008

Ms. Nancy P. Allen
Planning Division, Jacksonville District
U.S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers – Addendum to the Draft Environmental Assessment for the Herbert Hoover Dike Major Rehabilitation, Reach 1 Cutoff Wall (Fill Quarry South of Rardin Park in Subreach 1D) – Belle Glade, Palm Beach County, Florida. SAI # FL200801173948C (Reference SAI # FL200712113899C)

Dear Ms. Allen:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16, U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4231, 4331-4335, 4341-4347, as amended, has coordinated a review of the subject Addendum to the Draft Environmental Assessment (Addendum).

Florida Department of Environmental Protection (DEP) staff notes that the Corps of Engineers submitted an environmental resource permit application on January 18, 2008 (DEP File No. EI 50-0234604-007). The proposal to fill the quarry will convert existing open water to an upland environment and impact approximately 2.2 acres of wetlands surrounding the state-owned quarry. An interagency team of biologists has assessed the impacts using the Uniform Mitigation Assessment Method and determined that 0.74 acres of relative functional loss units to the wetlands would result. [See Rule 62-345, *Florida Administrative Code*] Previous mitigation (Melaleuca removal) will be applied to the quarry backfill, and additional compensatory mitigation will be conducted upon completion of the Reach 1 EIS. The mitigation plan presented in this addendum will need to be officially submitted to the DEP Southeast District Office in West Palm Beach for review and approval.

The impacts to threatened and endangered species (including the American alligator, Eastern indigo snake, bald eagle, wood stork and Everglades snail kite) are expected to be minimal. However, the existence of an active bald eagle nest could alter construction

plans. The construction crews will also be briefed on the Okeechobee gourd, gopher tortoise, burrowing owl and crested caracara. Adverse impacts to local water supply are not anticipated. A perimeter drainage swale will connect to the existing levee toe ditch to allow for continued drainage. Water management operations may be altered for landowners adjacent to the quarry - DEP is interested in any water management alterations prompted by this project. DEP staff looks forward to continued communication and work to cooperatively facilitate the dike's rehabilitation while also protecting the environment. For additional information, please see the enclosed DEP memorandum and contact Mr. Stan Ganthier at (561) 681-6759.

The Florida Department of Transportation (FDOT) advises that any work within or adjacent to FDOT rights-of-way may require that a permit be obtained through the District Four Permits Office. Please contact Ms. Rosie Evert at (561) 370-1139 for further information and assistance.

Based on the information contained in the Addendum and the enclosed state agency comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). However, the concerns identified by our reviewing agencies must be addressed prior to project implementation. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews. The state's final review of the project's consistency with the FCMP will be conducted during the environmental permitting stage.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: John Outland, DEP, MS 45
Stacey Feken, DEP, MS 3560
Tim Gray, DEP, Southeast District

Project Information	
Project:	FL200801173948C
Comments Due:	02/01/2008
Letter Due:	02/04/2008
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - ADDENDUM TO THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HERBERT HOOVER DIKE MAJOR REHABILITATION, REACH 1 CUTOFF WALL (FILL QUARRY SOUTH OF RARDIN PARK IN SUBREACH 1D) - BELLE GLADE, PALM BEACH COUNTY, FLORIDA.
Keywords:	ACOE - HHD REHAB, REACH 1 CUTOFF WALL (FILL QUARRY IN SUBREACH 1D) - PALM BEACH
CFDA #:	12.106

Agency Comments:

TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL

The proposed study is not in conflict or inconsistent with the Strategic Regional Policy Plan.

TRANSPORTATION - FLORIDA DEPARTMENT OF TRANSPORTATION

Any work within or adjacent to FDOT rights-of-way may require that a permit be obtained through the District 4 Permits Office. Please contact Ms. Rosie Evert at (561) 370-1139 for further information and assistance.

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP staff notes that the USACE submitted an environmental resource permit application on January 18, 2008 (DEP File No. EI 50-0234604-007). The proposal to fill the quarry will convert existing open water to an upland environment and impact approximately 2.2 acres of wetlands surrounding the state-owned quarry. An interagency team of biologists has assessed the impacts using the Uniform Mitigation Assessment Method and determined that 0.74 acres of relative functional loss units to the wetlands would result. [See Rule 62-345, F.A.C.] Previous mitigation (Melaleuca removal) will be applied to the quarry backfill, and additional compensatory mitigation will be conducted upon completion of the Reach 1 EIS. The mitigation plan presented in this addendum will need to be officially submitted to the DEP Southeast District Office in West Palm Beach for review and approval. The impacts to threatened and endangered species (including the American alligator, Eastern indigo snake, bald eagle, wood stork and Everglades snail kite) are expected to be minimal. However, the existence of an active bald eagle nest could alter construction plans. The construction crews will also be briefed on the Okeechobee gourd, gopher tortoise, burrowing owl and crested caracara. Adverse impacts to local water supply are not anticipated. A perimeter drainage swale will connect to the existing levee toe ditch to allow for continued drainage. Water management operations may be altered for landowners adjacent to the quarry - DEP is interested in any water management alterations prompted by this project. The DEP looks forward to continued communication and work to cooperatively facilitate the dike's rehabilitation while also protecting the environment. If you have any questions regarding these comments, please contact Mr. Stan Ganthier at (561) 681-6759.

SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Released Without Comment

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

Copyright and Disclaimer

Memorandum

TO: Florida State Clearinghouse

THROUGH: Stacey Feken

FROM: Stan Ganthier and Tim Gray

DATE: February 1, 2008

SUBJECT: USACE – Addendum to the Draft Environmental Assessment for the Herbert Hoover Dike Major Rehabilitation, Reach 1 Cutoff Wall (Fill Quarry South of Rardin Park in Subreach 1D) – Belle Glade, Palm Beach County, Florida.

SAI #: FL08-3948C

Background:

The Department reviewed and submitted comments on the Draft Assessment for the Herbert Hoover Dike Major Rehabilitation, Reach 1 Cutoff Wall in Martin and Palm Beach Counties on January 11, 2008.

The subject Addendum to the Draft Environmental Assessment evaluates the impacts associated with the proposed filling of the abandoned state-owned quarry south of Rardin Park in Subreach 1D of the Herbert Hoover Dike (HHD). On January 18, 2008, the USACE submitted an environmental resource permit application – currently being processed as DEP File No. EI 50-0234604-007. Filling the quarry will enhance the overall safety of the HHD levee by limiting levee seepage in this portion of the dike.

Comments:

The preferred HHD repair alternative, No. 5, consists of an impermeable cutoff wall at the crest of the dike that extends 5-10 feet below the limestone layers and a landside seepage berm that may extend ~150 feet from the toe of the dike. A drainage swale would also be constructed along the landward toe of the berm. Note that this addendum evaluated the environmental effects of filling ~22 acres of state-owned quarry, which is adjacent to the existing levee right-of-way, and that a future environmental impact statement will assess the effects of the seepage berm outside of the existing right-of-way for all of Reach 1. Additional right-of-way will be acquired to fully implement Alternative No. 5.

The USACE plans to fill the quarry with a select granular fill material, consisting primarily of limestone or quartz, gravel and sand. The select fill will be placed without dewatering. If necessary, water in the quarry will be diverted to a nearby levee toe ditch to prevent overtopping of the bank. After filling, the surface will be covered with a layer of topsoil and then grassed.

Filling of the quarry will convert the open water to an upland environment. Also, approximately 2.2 acres of wetlands surrounding the state-owned quarry will be similarly impacted. An interagency team of biologists assessed the impact using the Uniform Mitigation Assessment Method and determined that 0.74 acres of relative functional loss units to the wetlands would result. Previous mitigation (Melaleuca removal) will be applied to the quarry backfill, and additional compensatory mitigation will be conducted upon completion of the Reach 1 EIS. The mitigation plan presented in this addendum will need to be officially submitted to the DEP Southeast District Office in West Palm Beach for review and approval.

The impacts to threatened and endangered species (including the American alligator, Eastern indigo snake, bald eagle, wood stork and Everglades snail kite) are expected to be minimal. However, the existence of an active bald eagle nest could alter construction plans. The construction crews will also be briefed on the Okeechobee gourd, gopher tortoise, burrowing owl and crested caracara.

Adverse impacts to local water supply are not anticipated. A perimeter drainage swale will connect to the existing levee toe ditch to allow for continued drainage. Water management operations may be altered for landowners adjacent to the quarry. The DEP is interested in any water management alterations prompted by this project.

The Department looks forward to continued communication and work to cooperatively facilitate the Dike's rehabilitation while also protecting the environment. If you have any questions regarding these comments, please contact Mr. Stan Ganthier at (561) 681-6759.

cc: John Outland (e-mail)
Stacey Feken (e-mail)
Ernie Marks (e-mail)
Chad Kennedy (e-mail)
LaDawna McDonald (e-mail)
Tim Gray (e-mail)
Annet Forkink (e-mail)
Stan Ganthier (e-mail)

COPY

RECEIVED
12 July 2007

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Marie G. Burns, Chief
Environmental Branch - Planning Division
Jacksonville District Corps of Engineers
Post Office 4970
Jacksonville, Florida 32232-0019

July 3, 2007

Re: DHR No. 2007-2429B / Additional Information Received: June 4, 2007
Herbert Hoover Dike Major Rehabilitation
Environmental Assessment and Proposed Finding of No Significant Impact
Martin and Palm Beach Counties

Dear Ms. Burns:

Our office reviewed the above referenced additional information to address the concerns raised by Ms. Laura Kammerer of this office during a May 30, 2007 telephone conversation with you and Mr. David Pugh of your staff regarding the proposed project.

We concur that the proposed rehabilitation on the Herbert Hoover Dike historic property will not be adversely affected. However, if the project plans/design should change, this office must be notified prior to implementation. If minor changes, contact by electronic mail or telephone will be sufficient, if major changes, consultation should occur in writing.

If you have any questions, please contact Laura Kammerer, Deputy State Historic Preservation Officer for Review and Compliance, by telephone at 850-245-6333, or by electronic mail at lkammerer at dos.state.fl.us. Thank you for your interest in protecting Florida's historic properties.

Sincerely,

Frederick P. Gaske

Frederick P. Gaske, Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6436
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☐ Southeast Regional Office (561) 416-2115 • FAX: 416-2149
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☐ Central Florida Regional Office (813) 272-3843 • FAX: 272-2340

PD-E

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JAN 28 2008

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Marie G. Burns, Chief
Environmental Branch - Planning Division
Jacksonville District Corps of Engineers
Post Office 4970
Jacksonville, Florida 32232-0019

January 17, 2008

Re: DHR No. 2007-9225 / Received: December 12, 2007
Herbert Hoover Dike Major Rehabilitation
Environmental Assessment and Proposed Finding of No Significant Impact
Martin and Palm Beach Counties

Dear Ms. Burns:

Our office received and reviewed the above referenced project application in accordance with Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-665), as amended in 1992; 36 C.F.R., Part 800: Protection of Historic Properties for assessment of possible adverse impact to cultural resources (any prehistoric or historic district, site, building, structure, or object) listed, or eligible for listing, in the National Register of Historic Places.

We concur that the proposed rehabilitation will not adversely affect the Herbert Hoover Dike historic property. However, if the project plans/design should change, this office must be notified prior to implementation. If minor changes, contact by electronic mail or telephone will be sufficient, if major changes, consultation should occur in writing.

If you have any questions, please contact Eric Hamilton, Historic Site Specialist by telephone at 850-245-6333, or by electronic mail at eihamilton at dos.state.fl.us. Thank you for your interest in protecting Florida's historic properties.

Sincerely,

Frederick P. Gaske

Frederick P. Gaske, Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

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☐ South Florida Regional Office (561) 416-2115 • FAX: 416-2149
☐ North Florida Regional Office (850) 245-6445 • FAX: 245-6435
☐ Central Florida Regional Office (813) 272-3843 • FAX: 272-2340

From: Allen, Nancy P SAJ
Sent: Thursday, January 03, 2008 3:57 PM
To: Ho, Tien SAJ Contractor
Subject: FW: Comments on EA for Cutoff Wall for HH Dike

Please add to documentum

Nancy Allen
Biologist
Planning Division
Environmental Branch
701 San Marco Boulevard
Jacksonville, FL 32232-0019
904-232-3206
nancy.p.allen@usace.army.mil

-----Original Message-----
From: Robin_Burgess@fpl.com [mailto:Robin_Burgess@fpl.com]
Sent: Thursday, January 03, 2008 3:55 PM
To: HHDEnvironment, SAJ
Cc: Florette_Braun@fpl.com
Subject: Comments on EA for Cutoff Wall for HH Dike

Nancy,

Thank you for the opportunity to comment on the Draft Environmental Assessment and Proposed Finding of No Significant Impact for the Reach 1 Cutoff Wall for the Herbert Hoover Dike Major Rehabilitation project.

Florida Power & Light (FPL) staff have reviewed the EA and FONSI and have no concerns at this time with the proposed federal action.

However, FPL would like to be kept informed and involved in this effort. There are FPL facilities in close proximity to the project area. FPL would like to be consulted regarding construction techniques and maximum height of construction equipment proposed for use close to FPL facilities, due to potential clearance and safety concerns.

Thank you
Robin Burgess

Environmental Services
Florida Power & Light
700 Universe Blvd.
Juno Beach FL 33408

robin_burgess@fpl.com

City of
Bonita Springs

9101 Bonita Beach Road
Bonita Springs, FL 34135
Tel: (239) 949-6262
Fax: (239) 949-6239
www.cityofbonitasprings.org

Jay Arend
Mayor

Richard Ferreira
Councilman
District One

Alex Grantt
Councilman
District Two

Patrick McCourt
Councilman
District Three

John Joyce
Councilman
District Four

Martha Simons
Councilwoman
District Five

Ben L. Nelson, Jr.
Councilman
District Six

Gary A. Price
City Manager
Tel. (239) 949-6238

Audrey E. Vance
City Attorney
Tel. (239) 949-6254

City Clerk/Treasurer
Tel: (239) 949-6250

Public Works
Tel: (239) 949-6246

Code Enforcement
Tel: (239) 949-6257

Parks & Recreation
Tel: (239) 992-2556

December 12, 2007

U.S. Army Corps of Engineers
Jacksonville District
701 San Marco Boulevard
Jacksonville, Florida 32207-8175

Re: Herbert Hoover Dike
Resolution

To whom it may concern:

Enclosed please find a copy of City of Bonita Springs Resolution No. 07-137, supporting Congressional appropriations for the funding of repairs and rehabilitation of the Herbert Hoover Dike, as adopted by City Council on December 5, 2007.

If you need anything further, or if I can be of further assistance, please feel free to call.

Very truly yours,

Dianne J. Lynn
City Clerk/Treasurer

DJL:daf
Enclosures

CITY OF BONITA SPRINGS, FLORIDA

RESOLUTION NO. 07 - 137

A RESOLUTION OF THE CITY OF BONITA SPRINGS IN SUPPORT OF CONGRESSIONAL APPROPRIATIONS FOR THE FUNDING OF THE REPAIRS AND REHABILITATION OF THE HERBERT HOOVER DIKE; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City of Bonita Springs is committed to the protection and restoration of its water resources; and

WHEREAS, Bonita Springs' surrounding estuaries and waterways receive discharges from Lake Okeechobee when water levels are high, usually for the stated purpose of protecting the integrity of the Herbert Hoover Dike; and

WHEREAS, Lake Okeechobee's importance to the entire region as a water source makes its management at seasonal high levels critical for South and Southeast Florida water supply planning for the foreseeable future; and

WHEREAS, the heightened levels increase risk to the integrity of the Herbert Hoover Dike; and

WHEREAS, Lake Okeechobee was impacted by four hurricanes during the 2004 and 2005 hurricane season; and

WHEREAS, common engineering standards for levees include the consideration of the location and construction of spillways that reduce the risk of breach, and reduce the threat of damage and loss of life to the greatest number of persons; and

WHEREAS, the Plan for the Herbert Hoover Dike repair and rehabilitation describes the perimeter of the Lake as broken up into eight parts (known as "Reaches") for planning and repair prioritization; and

WHEREAS, the priority of the Corps and District is to pursue immediate repairs for Reach 1 (Port Myakka to Belle Glade) and then Reaches 2 (Moore Haven to Clewiston) and 3 (Clewiston to Belle Glade).

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Bonita Springs, Lee County, Florida:

Section 1. The City of Bonita Springs hereby requests the Congress of the United States to appropriate funds necessary to bring the Herbert Hoover Dike into compliance with current levee protection safety standards and to expedite funding for the improvements through prompt enactment of the Energy and Water Appropriations Bill or some other mechanism.

Section 2. The City of Bonita Springs hereby requests that the rehabilitation and repair of the additional Reaches of the Lake Okeechobee Rehabilitation and Repair Plan, with associated flowways that would (1) accommodate the diversion of rapidly rising Lake waters to the south and away from populated areas, (2) divert water to and through the water conservation areas and to areas that would threaten the fewest people, and (3) preclude or severely limit any flows to the west coast and east coast estuaries.

Section 3. The City of Bonita Springs recognizes that it can only achieve its Clean Water Act obligations if seasonal high water discharges from Lake Okeechobee are reduced to levels manageable for water quality purposes, and the City supports this and other efforts that bring about such reductions.

Section 4. Copies of this Resolution shall be sent to the South Florida Water Management District, and the U. S. Army Corps of Engineers to distribute as they deem appropriate, to members of the 10 County Coalition, Southwest Florida League of Cities, and to Lee County's Congressional Delegation.

Section 5. Effective Date.

This resolution shall take effect immediately upon adoption.

DULY PASSED AND ENACTED by the City Council of the City of Bonita Springs, Lee County, Florida, this 5th day of December, 2007.

AUTHENTICATION:

Jay Arend
Mayor

Maxine J. Lyons
City Clerk

APPROVED AS TO FORM: _____
City Attorney

Vote:

Arend	Aye	McCourt	Aye
Ferreira	Aye	Nelson	Aye
Grantt	Aye	Simons	Aye
Joyce	Aye		

Date filed with City Clerk: 12-10-07

Roswell Harrington
PO Box 127
Canal Point, Fl. 33438-0127
Phone (561) 755-0114
roswell_harrington@yahoo.com

May 10, 2007

Army Corps of Engineers

To Whom It May Concern:

RE: Herbert Hoover Dike Rehabilitation EA and FONSI on Reach 1 partial seepage berm and Reach cutoff wall, May 2007

After reviewing your response to my comments, I believe a brief introduction might be in order. My father was a high school principal, before he migrated to the area in November, 1928, shortly after the storm. My mother was a school teacher at both Canal Point Elementary and later on at Pahokee Jr. Sr. High, where she taught math, but her love was Florida History. My father worked briefly for Mr. F.E. Bryant directly as a time keeper and then started farming full time. He was friends with Marvin 'Red' Mounts, former Palm Beach County Agriculture Agent and thru him, Dr. Fairchild. He served on the Palm Beach County Soil Conservation Service and the Palm Beach County School Board of Trustees. I was raised then by people who helped pioneer the area and understood it and it's history. While I have tried in my own way and have maintained the family interest in farming, community service and history, I learned from them among others. I farmed with my father from 1984 to his death. I have a Master's Degree in Guidance and Counseling and served among other things on the Palm Beach County Historic Resources Review Board. My comments were proofed by another local farmer, Dale Erickson, whose family came to the area in 1910, and who has a very practicable knowledge of the area and it's history.

I wish to respond to your response to my comments and for simplicity will use your numbering system. My original comments and your response can be found in Table 6-4, the Comment Response Matrix, pages 72 thru 79 of the final draft, whose address is noted below:
(**http://www.saj.usace.army.mil/cco/HHD/Reports/Reach1_EA_Final_May2007.pdf**
)

1. Page 72, RH-2, Not to disparage the State Historic Preservation Office, there is still an extensive local data base, which they may not have access to, as well as others that have made a career on South Florida historical and archeological sites, Dr. Robert Carr, For example, there was a Second and Third Seminole Indian War fort, Fort McCray, located either on the Lake Okeechobee Ridge or on the beach, somewhere between the St. Lucie Canal and the Palm Beach County Line. This fort was first

RH #1

mentioned in the diary that accompanies the Ives map and was erected by the Bureau of Topographical Engineers and while located on that map has since been lost. Besides this link to the Corps history, it was a way station of the Florida branch of the Trail of Tears which started at Fort Jupiter, went to Ft McCray and then across the lake to Fort Center, eventually arriving in Tampa.

2. Page 72-73 RH-3, RH - 4 There seems to be some misunderstanding here. My comment was directed at the loss of muck soils in the farm lands next to the Lake Okeechobee Ridge. You partially addressed this issue previously in the Comment Response Matrix; EPA 3, USGS – 1, USGS – 2), but did not deal with the issue I raised. How will you mitigate any soil loss that occurs thru the loss of ground water that maintains those soils? Secondly any test that occurs must take in to account the fact that the entire Basin is undergoing a severe drought, and there is not a present enough water in the lake to create the usual water 'head' that provides the seepage that maintains those soils. RH #2

3. Page 73, RH 5 I am sorry , but you did not mention that in your previous draft. I am curious, however, because in my own research, I talked with individuals in both agencies that had some of the same concerns that I had. I do maintain a strong difference of opinion with previous statements in this report that say the soil types are not unique and the farming practices are not unique. RH #3

4. Page 73, RH 6, I have to concur in part with your response. In the last 100 yrs, the highest elevation recorded was during the 1947 storm. I refer you to "Okeechobee Hurricane: Killer Storms in the Everglades" by Lawrence E Will, Chapter 30;, "The Dike is Tested" pages 190-192. In this Will recounts that the dike withstood lake levels in excess of 20 feet. It is also interesting to note that the most damage the dike has suffered other than the damage from Wilma, occurred in 1949, in the same locations, with comparable wind speeds and water elevations.

Fifteen years ago, I talked to a USGS geologist, who made a study of the Lake Okeechobee Ridge and lake levels. Unfortunately, this gentleman has since deceased, but I remember that in his conversation that he had postulated the lake ranged in elevation for 9 to 25 feet above sea level.

However this is all by the wayside in that your past and current schedules all have the lake at levels well below this. RH #4

If the schedule is maintained; where is the risk?

5. Page 75, RH – 12 As I noted they were introduced. There was a tamarind tree on my parents property since 1926,(possibly planted by the first owner, the first director of the Canal Point USDA Sugar Cane Experiment Station, Dr. Brandes) but Wilma

destroyed it. I think there is another on the grounds of the Bryant Guest House. But I have found the Tree Snails all up and down on the Ridge within the area mentioned. RH#5

6. Page 75-76 RH 13 As noted in RH 5 response above, The soils are unique and the farming practices are also unique. In fact they vary in the region based upon the type and depth of the muck 'soils'. RH#6

7. Page 76 RH 14. This severe loss has occurred in the 'muck' soils the furtherest from the lake, In the soil types I mentioned, the Torrey and Pahokee Series, there has been historically none of the loss mentioned. The basic nature of the soil is different as well as it's depth and locations. These soils have been maintain by the lake and it's seepage. RH#7

8. Page 78 RH 21 Several times in the document, it was indicated that a test would be done. It will be hard to judge the results as the current water table is severely below normal due to the current drought. I have my doubts and concerns and they are based in part to personal knowledge and research of the impact of the lake on my family's farm, and in part to my own research. RH#8

9 Page 79 RH 22 As noted you have indicated that you have had the report reviewed by people familiar with the soils, but what individuals familiar with the unique farming practices have you contacted? RH#9

Thank you very much for your kind concerns and attentions made to my other comments. If at any time any person wishes to contact me regarding the points or other issues I have raised, please feel free to do so.

Your obedient servant,

Roswell Harrington

From: Allen, Nancy P SAJ
Sent: Friday, January 04, 2008 4:08 PM
To: Ho, Tien SAJ Contractor; Dunn, Angela E SAJ
Subject: FW: Comments on December 2007 Report/Comments from Mr. Harrington

Nancy Allen
Biologist
Planning Division
Environmental Branch
701 San Marco Boulevard
Jacksonville, FL 32232-0019
904-232-3206
nancy.p.allen@usace.army.mil

-----Original Message-----
From: Roswell Harrington [mailto:roswell_harrington@yahoo.com]
Sent: Friday, January 04, 2008 4:04 PM
To: HHDEnvironment, SAJ; Riedle, Walter SAJ
Subject: Comments on December 2007 Report

To Whom It May Concern

Re: HHD Environmental Assessment of December, 2007

From: Roswell Harrington
PO Box 127
Canal Point, Fl. 33438-0127
Phone # 561-914-1061
e-mail: roswell_harrington@yahoo.com

I regret that I have taken so long in responding but I try to verify my information before I say anything.

I will us the same format for each of the corrections or questions. Page number, Section and paragraph and then the points I am raising.

Page xiv first Para
There is no similarity between New Orleans and the Lake Area.

Page 2-2 Section 2.1.2
I strongly object to this whole paragraph. There is no similarity between our Dike and the levees in and around New Orleans except for the fact they are water control structures. The geography, the hydrology, everything is totally different. In fact the current levee has dealt with at least on two previous occasions storms that exceeded Katrina's winds and rain.

Page 3-1 Section 3.1 Line 8 Sentence beginning The water table Dale Erickson and I both obtain our water from the seepage from under the Dike. The elevation of our farms is usually significantly higher than the water in the ditches. In fact we both had control structures installed to hold that water on our lands.

Page 3-3 Section 3.4
I will be glad to show anyone example of the Florida Tree snails.

Page 3-4 Table 3-1
Why no census data on South Bay or Canal Point?

Page 3-7 Section 3.11 Paragraph 2.
The Atlantic Sugar Association plant is not near Belle Glade, it was (it has been torn down) about 30 miles east of Canal Point on state Road 880. The current mills in operation are: Osceola Sugar, east of Canal Point, Sugar Cane Growers Co-op in Belle Glade, Okeelanta Sugar about 10 miles south of South Bay and USSC south of Clewiston.

Page 6-15 and 6-16 RH 3

I wish you had noted who you talked with. I talked with Dale Ericson (grows mangoes, avocados, curry, tamarind, lychees , pond apples, carambola, oriental vegetables, spices and herbs) and he stated that variety of crops, farming practices and soil is totally different from any other. His family has been farming this land since 1911.

I talked to Buddy Stien. His family has been farming in Belle Glade and on the islands since the 1920's.
His family farms vegetables and sugar cane. He repeated to me what Mr.. Erickson said.

I talked to Arthur Kirstein IV, Coordinator, Office of Agricultural Economic Development, Palm Beach County Extension. He is quite knowledgeable of the entire scope of fruits, vegetables, sugar cane and other products grown around the Lake. Mr. Kirstein sated that the Lake Area has some of the most unique soils and farming practices in the United States. In fact special tools had to be developed to farm the land. One of the oldest and first was the 'muck shoes' the horses had to wear to pull the plows and planters.
An example of another piece of equipment is the 'mole drain' which was developed specifically to allow the soils to drain and to irrigate the soil. It is still in use today.

Mr. Kirstein also stated that ' Nobody in the State has the variety of crops that the Lake Area has'.

I also talked to a geologist in the SCS who had over 20 years experience in the area and with the muck soils.
He reminded me that several of the muck soils are unique to the area and are only found here. Examples are the Torry Island series and the Pahokee series.

Lastly, my father came in here in 1928 and started farming in 1929. He pioneered a lot of the land in Reach B. He was friends with Dr. Fairchild, of Fairchild Tropical Gardens, (as was Dale Ericson's father, Floyd Erickson,) as well as Marvin Mounts, Sr.
 We commercially farmed and grew: Field corn, sweet corn, eggplant, bell pepper, onions , sunflowers, lima beans, sweet peas, green beans, broccoli, cauliflower, black-eye peas, acorn squash, among others. He pioneered some of these crops in the area and was frequently consulted by farmers, IFAS and the USDA regarding how to grow in the Glades.

I disagree in whole with your statement and contentions. Check my sources.

Page A-22 Figure A-13

I note the disparity of ground water pumping locations noted in Reaches A & D and Reaches B & C. There is considerable differences in the geology in the reaches

Sincerely Yours,

Roswell Harrington

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APPENDIX D

HTRW SURVEY

D.0 PRELIMINARY HTRW SURVEY OF POTENTIAL PROJECT LANDS WITHIN 500 FT OF THE REACH 1 HHD LEVEE ALIGNMENT

D.1 INTRODUCTION

A desktop database and windshield survey of hazardous, toxicological, radioactive waste (HTRW) sites was conducted along Reach 1 of the Herbert Hoover Dike in December of 2007. Reach 1 extends from Port Mayaca in the Northeast side of Lake Okeechobee to the S-351 in Belle Glades. The purpose of the survey was to preliminarily identify potential contamination sites within 500 ft of the HHD levee alignment. Given the size of the survey area and the fact that the final footprint of lands to be acquired has not been determined the information presented here is preliminary and must be followed up with parcel specific environmental audits to define the degree of contamination and to estimate the cost of remediation.

D.2 METHODOLOGY

The HTRW survey was conducted using aerial imagery provided by Google and a contaminated site and petroleum storage site database compiled by the Florida Department of Environmental Protection. Figures 1 through 6, generated using Google Map, show aerial images of the project area. These figures provide some indication of the land uses within the survey area. Figures 7 through 11 are GIS generated maps that indicate the locations of known HTRW / petroleum storage and/or contamination sites. Figure 12 shows the map legend associated with Figures 7 through 11. A windshield survey was conducted in December of 2007 to field verify the findings of the desktop survey.

D.3 SURVEY FINDINGS

D.3.1 Port Mayaca to Structure C-14

This section of Reach 1 is shown in **Figure 1**. **Figure 7** shows the known HTRW and petroleum storage sites in the area. The present and past land use of the northern most portion of Reach 1 is agricultural. The 500 ft survey width includes Highway 98/441 and a railroad alignment from the portion from C-16 to C-14. Between Port Mayaca and the C-16 structure, and there are approximately 12 residential house structures located on the east side of the highway. Some of these houses are within the 500 ft survey width and the properties appear to be associated with farming operations. Though none of these properties appear on the DEP list of petroleum storage sites or contamination sites, it is possible that normal small amounts of household petroleum or pesticide contamination is present on the property. At the very minimum, each of the houses has a septic tank and drain field. The railroad alignment presents some potential contamination issues associated with PAH contaminated creosote preserved rail ties as well as with soils immediately affected in the proximity of the ties. These ties would likely have to be disposed of in a lined landfill per current Florida regulations.

D.3.2 Structure C-14 to North of Canal Point

This portion of Reach 1 is shown in **Figure 2**. **Figure 7** shows the known HTRW and petroleum storage sites in the area. This section of Reach 1 includes two residential structures that are located between the HHD Levee and the railroad alignment. There are no registered petroleum storage sites or leaking underground storage tanks in this portion of Reach 1. There are two residential structures located between the railroad alignment and the levee. These structures likely have septic tanks and drainage fields though other than normal household waste no other potential contamination is likely. Just north of Canal Point, there are two large agricultural operations with buildings that may be within the 500 ft survey width. In addition to septic tanks these buildings may likely also have residual pesticide and petroleum storage contamination.

D.3.3 Canal Point to North Pahokee

Figures 3 shows the area between Canal Point and North Pahokee. This area is characterized by residential and small business land uses. Figure 8 shows the known HTRW and petroleum storage sites in the area. There is at least one active underground petroleum storage tank located at a convenience store just south of the center of Canal Point. In the area south of Canal Point, there is a junk yard and a trailer park. Given the apparent age of the junk yard, it is likely that there is some soil and groundwater petroleum contamination associated with the storage of broken vehicles in this area. The railroad grade is adjacent to the levee alignment in this area until just south of the Canal Point trailer park where it curves southeast away from the levee. In this area south of the trailer park, there appears to be a railroad siding where unused rail cars appear to have been parked for some time. There are several automobile car repair and/or mechanical repair shops that lie close to the 500 ft width. These properties pose a potential soil petroleum contamination problem with a limited potential for groundwater contamination. In the Canal Point area, there are two small commercial properties abutting the levee alignment that appear to have been used in the past as produce packing operations. The contamination potential of these types of property uses is limited. Between Canal Point and north Pahokee, there are more than 10 houses that lie between the highway and the HHD levee alignment. These appear to be mostly residential properties which pose limited environmental contamination potential as discussed above with the exception of the septic systems.

D.3.4 Pahokee to Belle Glades Airport

Figures 4 shows an aerial image of the Pahokee to airport section of the HHD levee alignment. **Figure 9** shows the known HTRW and petroleum storage sites in this area. In this area, a review of the DEP records indicates that there are as many as 10 leaking underground storage tank (LUST) sites near Pahokee. Though many of these LUST sites appear to be located near the HHD levee, it is unclear how many of them are within 500 ft of the levee. Along this stretch of the levee alignment, there are at least 30 houses that lie between the highway and the levee. These houses pose a limited potential for environmental contamination as discussed above; however, individual surveys would have to be conducted to confirm this preliminary assessment determination. North of the Belle Glades airport there is one LUST site as well as an active petroleum storage tank at the airport; however, this tank is likely located outside of the 500 ft survey distance.

D.3.5 Belle Glades Airport to Pelican Bay

Figures 5 shows an aerial image of the HHD levee from the Belle Glades Airport to Pelican Bay. **Figure 10** shows the known HTRW sites in the area. The land use east of the levee alignment for this stretch of Reach 1 is agricultural with most of the land being used to cultivate sugar cane. Adjacent to the southern end of Pelican Bay, there is a sand / rock quarry borrow pit that was excavated in the 1960s apparently by the County or State to obtain road base materials. The Corps conducted a Phase I/II environmental audit of this quarry in the Spring of 2007. Testing of the water in the quarry and of the sediments at the bottom of the quarry pit was done. Though testing did indicate the presence of fecal and total coliform in the quarry water, these results were not in excess of state surface water quality criteria. The coliform may be present in the quarry as a result of septic discharges from the nearby trailer park; however, the coliform count in the quarry water is very similar to levels measured in Lake Okeechobee. The testing of the bottom sediments indicated that these sediments were not contaminated. A diving survey was conducted as part of this environmental audit to determine if trash or junk automobiles were dumped into the quarry. This diving survey did not detect the presence of solid wastes in the bottom of the quarry. The trailer park adjacent to the quarry likely poses some limited contamination potential associated with septic tanks and drain fields in close proximity to each other.

D.3.6 Pelican Bay to S-351 Structure

Figures 6 shows an aerial image of the portion of the HHD levee from Pelican Bay to the S-351 Structure which is the southern terminus of Reach 1. **Figure 11** shows the known HTRW and petroleum storage sites in the area. Within this portion of Reach 1, most of the adjacent land use is agriculture with sugar cane cultivation the predominant crop. There is limited or little potential contamination within 500 ft of the levee alignment in this portion of Reach 1.

D.4 SUMMARY

With the exception of those portions of the HHD levee in the vicinity of Okeechobee City, the Reach 1 portion of the levee has the greatest potential for the presence of environmental contamination due to the its proximity to commercial/industrial and rural residential land uses. The two most apparent and widespread environmental contamination problems are the presence of a large number of creosote preserved railroad ties and approximately 30 to 50 septic systems within 500 ft of the levee alignment. The creosote preservative applied to the railroad ties contains polyaromatic hydrocarbon (PAH) compounds that are known carcinogens. Florida environmental regulations currently allow these ties to be disposed of in lined landfills. Soils beneath the railroad alignment may also be contaminated with PAHs. The septic tanks located on parcels acquired and included in the HHD rehabilitation project footprint would have to be decommissioned by pumping them empty, removing the tanks, or filling them with clean sands. The drainage fields would not have to be removed as part of the environmental clean up but might be removed for geotechnical reasons. In the towns of Canal Point and Pahokee there are as many as 10 LUST sites within 500 ft of the levee alignment. The status of these sites is unknown. Also, there are several small commercial/industrial parcels (junk yard, packing plants,

water treatment plant, police station/fire house) that are likely to have limited HTRW contamination problems.

As access to many of the residences and businesses was limited in this study more site specific Phase 1 audits may be necessary for commercial properties immediately in the impact area. As of December 2007, the width of the extended levee toe is not known with certainty. Once the final toe berm design has been established, more detailed Phase II environmental audits of the problem areas detailed above can be performed on those suspect parcels within the project footprint. The cost of these audits can be shared by the Corps and the project co-sponsor. However, in accordance with Corps of Engineers Civil Works policy, the cost of remediating civil works project lands is solely the responsibility of the local project co-sponsor.

FIGURE D-1: PORT MAYACA TO STRUCTURE C-14

FIGURE D-2: STRUCTURE C-14 TO NORTH OF CANAL POINT

FIGURE D-3: CANAL POINT TO NORTH PAHOKEE

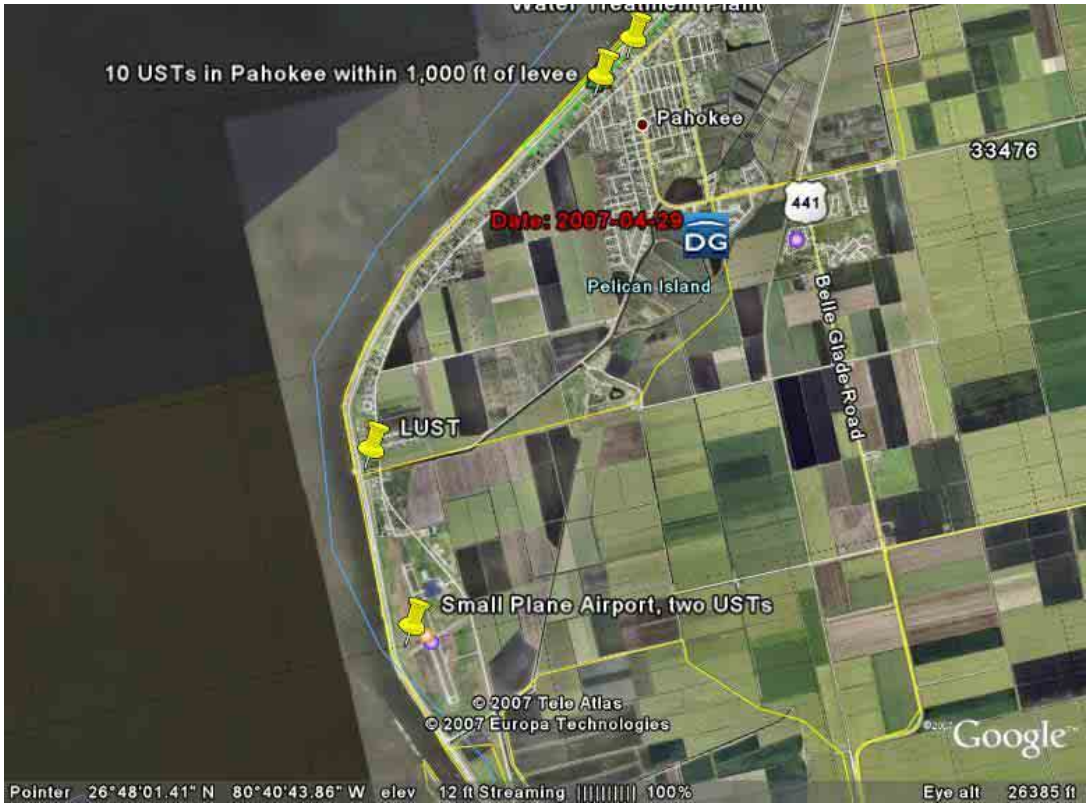

FIGURE D-4: PAHOKEE TO BELLE GLADES AIRPORT

FIGURE D-5: BELLE GLADE AIRPORT TO PELICAN BAY

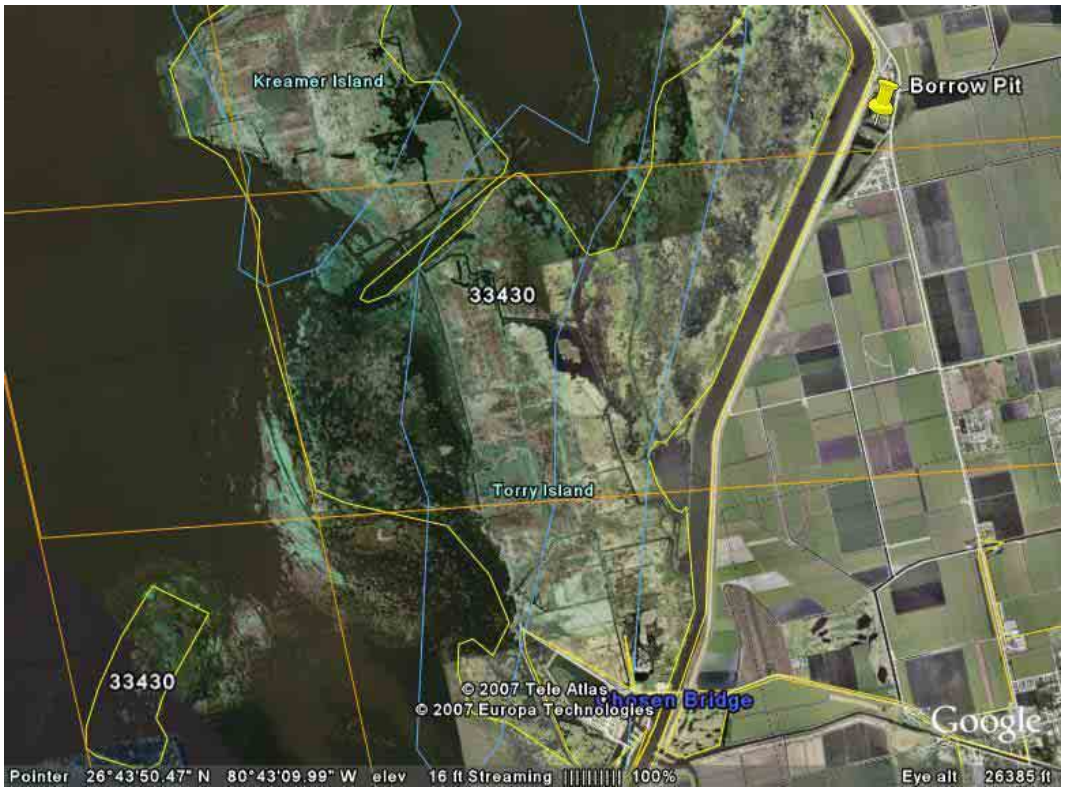

FIGURE D-6: SOUTH PELICAN BAY TO S-351 IN BELLE GLADE

FIGURE D-7: LOCATION OF KNOWN HTRW SITES (PORT MAYACA TO PAHOKEE)

FIGURE D-8: LOCATION OF KNOWN HTRW SITES (PAHOKEE TO BELLE GLADES AIRPORT)

FIGURE D-9: LOCATION OF KNOWN HTRW SITES (BELLE GLADES AIRPORT TO NORTH PELICAN BAY)

FIGURE D-10: LOCATIONS OF KNOWN HTRW SITES (PELICAN BAY)

FIGURE D-11: LOCATIONS OF KNOWN HTRW SITES (VICINITY OF S-351 STRUCTURE)

FIGURE D-12: LEGEND FOR HTRW LOCATION MAPS