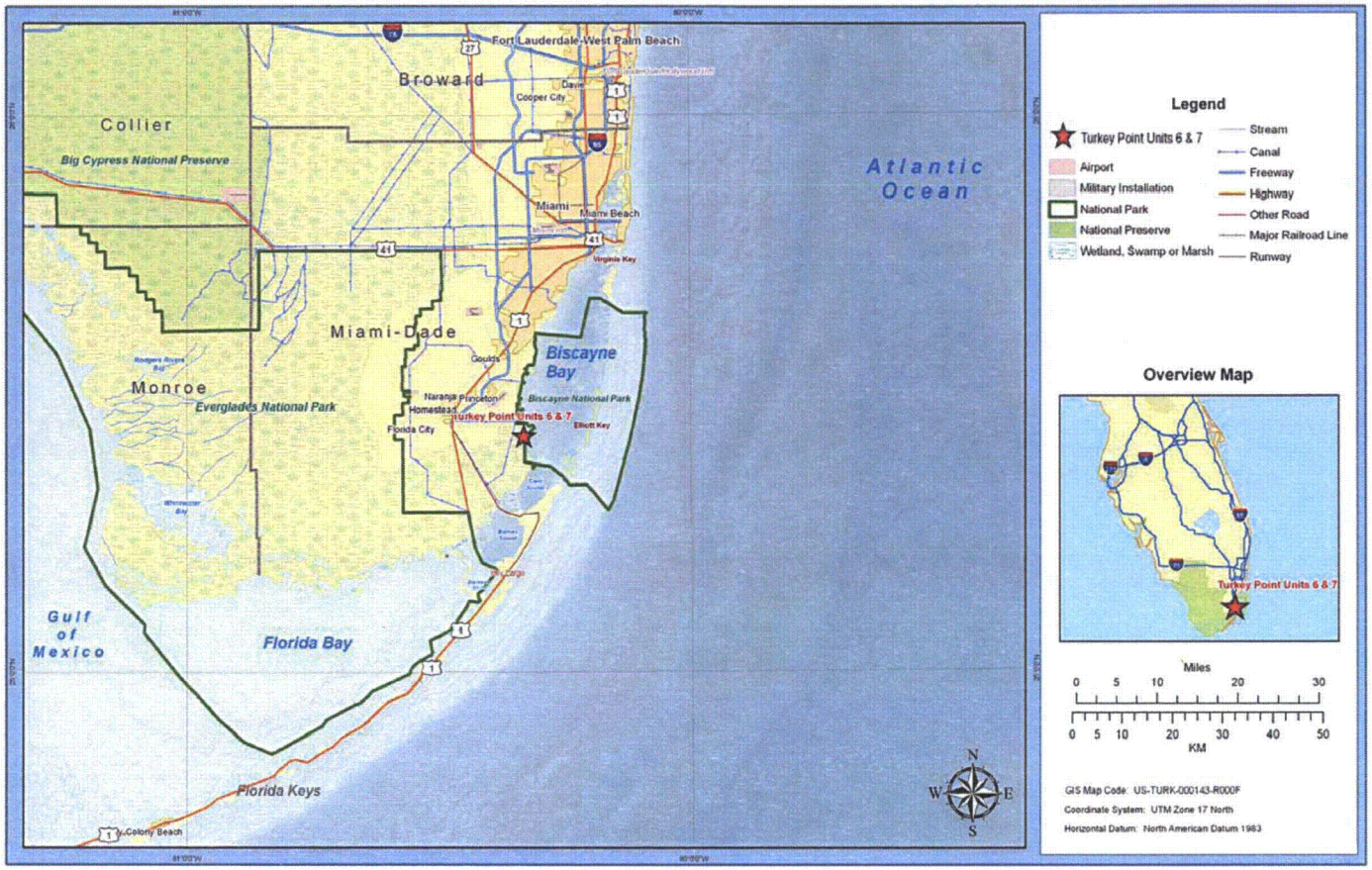
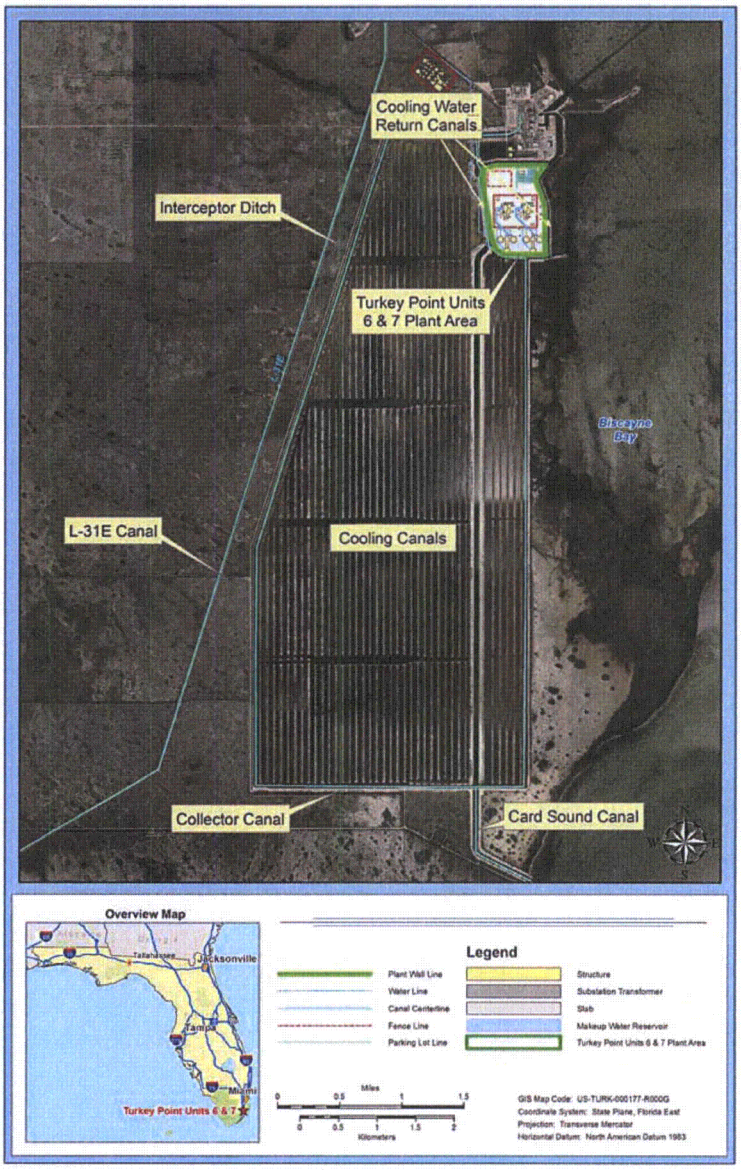
Figure 1. Location of Turkey Point Units 6 & 7 and Major Hydrological Features



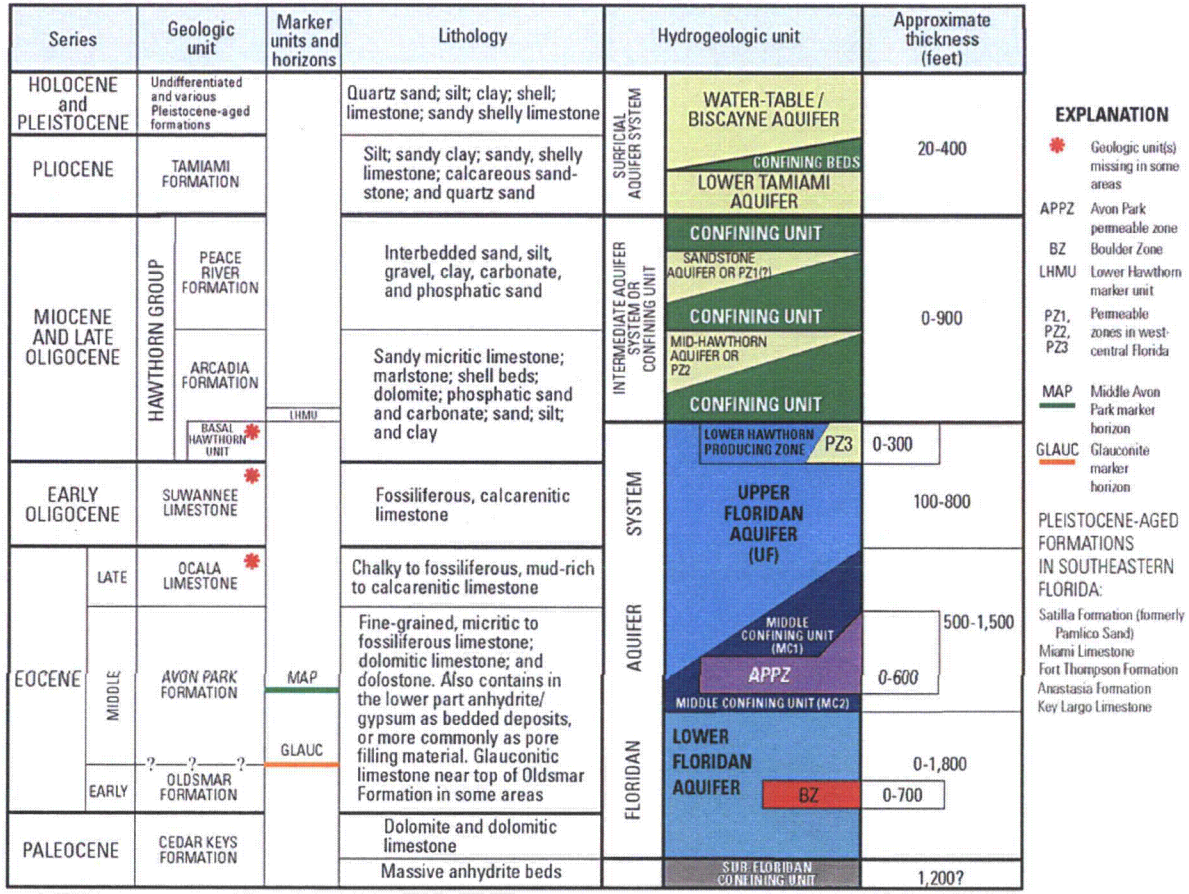
Source: Reference 42.

Figure 2. Industrial Wastewater Facility, the L-31E Canal, and the Card Sound Canal



Source: Reference 42.

Figure 3. Regional Generalized Hydrostatigraphic Column



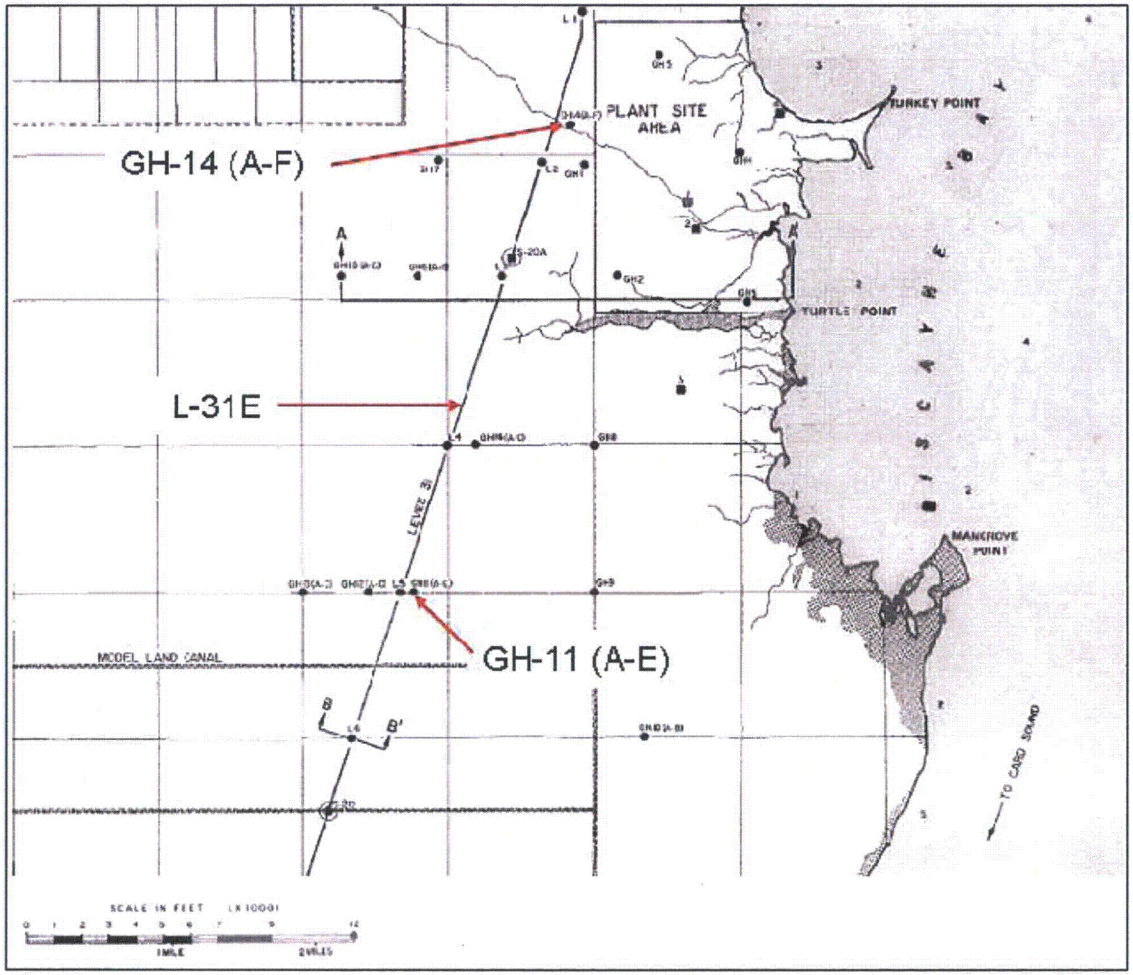
Source: Reference 42 (modified from Reference 43)

Figure 4. Site Hydrostatigraphic Column

ERATHEM	SYSTEM	SERIES	HYDRO-GEOLOGIC UNIT		STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE TOP ELEVATION (ft NAVD 88)	APPROXIMATE THICKNESS (ft)
CENEZOIC	QUATERNARY	HOLOCENE			organic muck		organic soil and silt	0	3
		PLEISTOCENE	Surficial aquifer system	Biscayne aquifer	Miami Limestone		sandy, oolitic limestone	-3	25
					Key Largo Limestone		well indurated, vuggy, coralline limestone	-28	22
					Fort Thompson Formation		poor/well indurated fossiliferous limestone	-50	65
	TERTIARY	PLIOCENE		Semi-confining unit	Tamiami Formation		sand and silt with calcarenitic limestone	-115	105
		MIOCENE	Intermediate confining unit		Hawthorn Group	Peace River Formation	silty calcareous sand and silt	*formation contact based on natural gamma signature* -220	235
						Arcadia Formation	calcareous wackestone with indurated limestones, sandstone, and sand	-455	>160
								drilling ended at -616.5 ft	

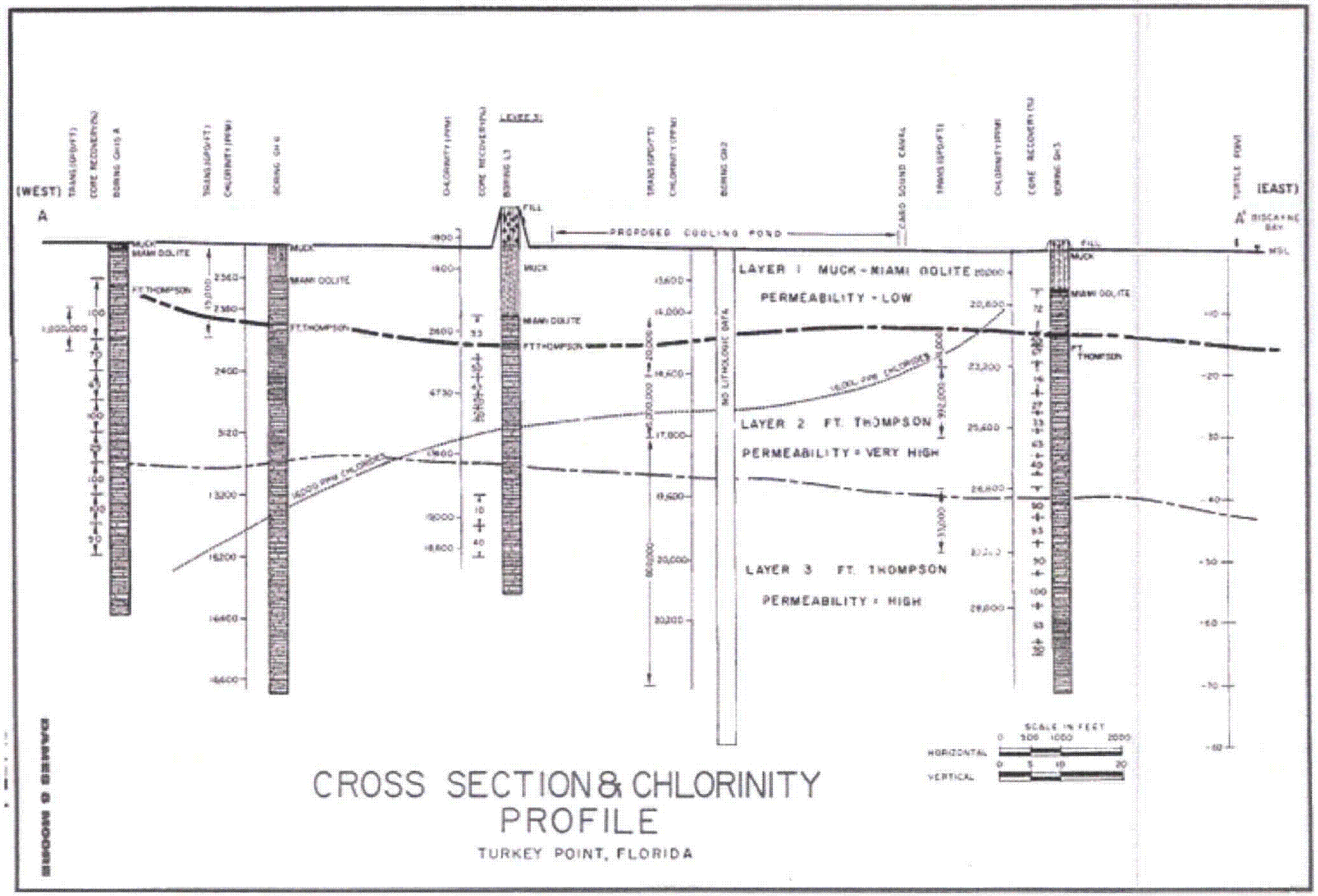
Color represents similar composition (carbonate, clastics, and organics).
Source: Reference 42.

Figure 5. Cross Section Location



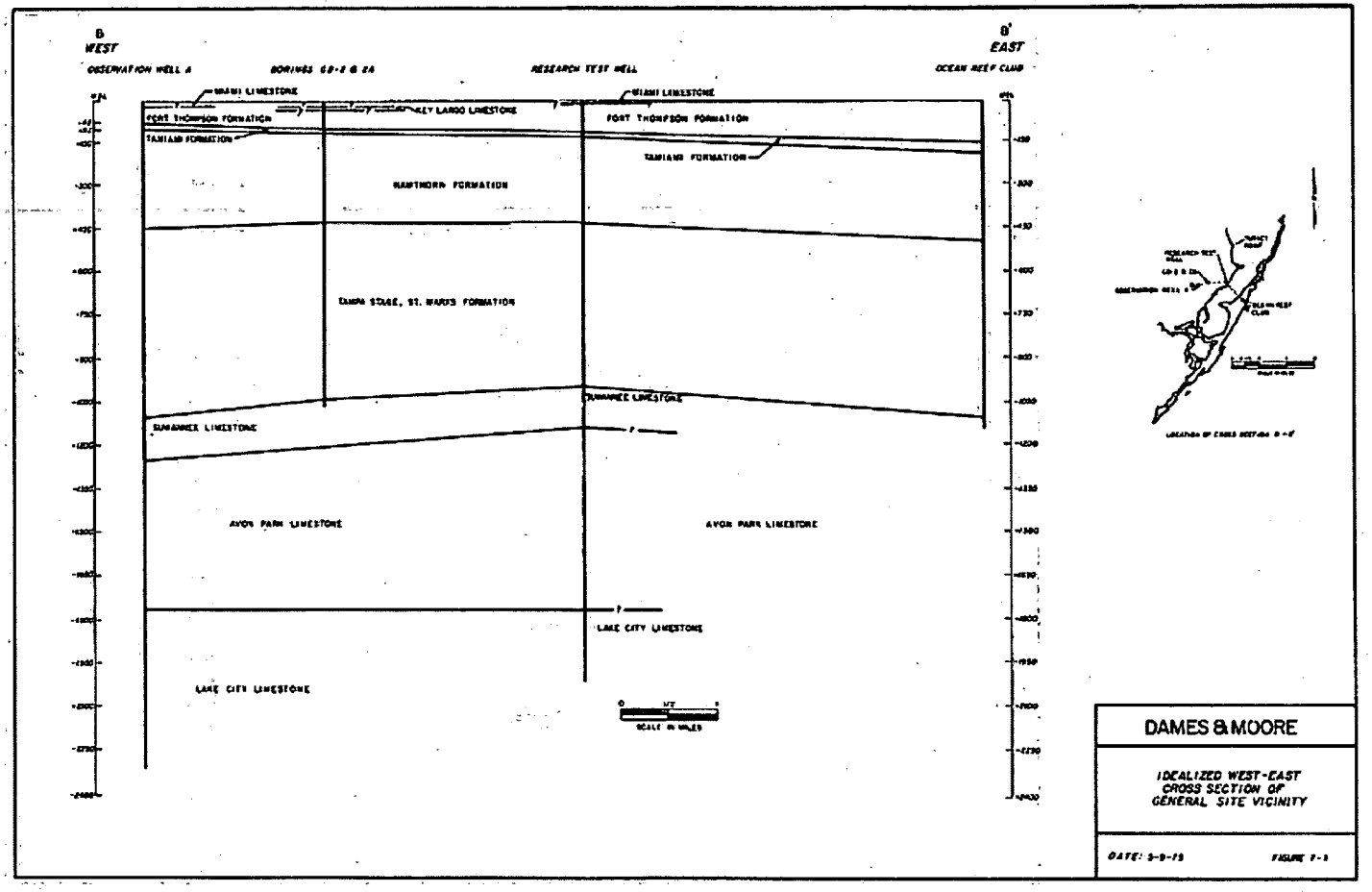
Source: Adapted from Reference 2
Note: Best available scan from original document

Figure 6. Hydrostratigraphic Cross Section A-A'



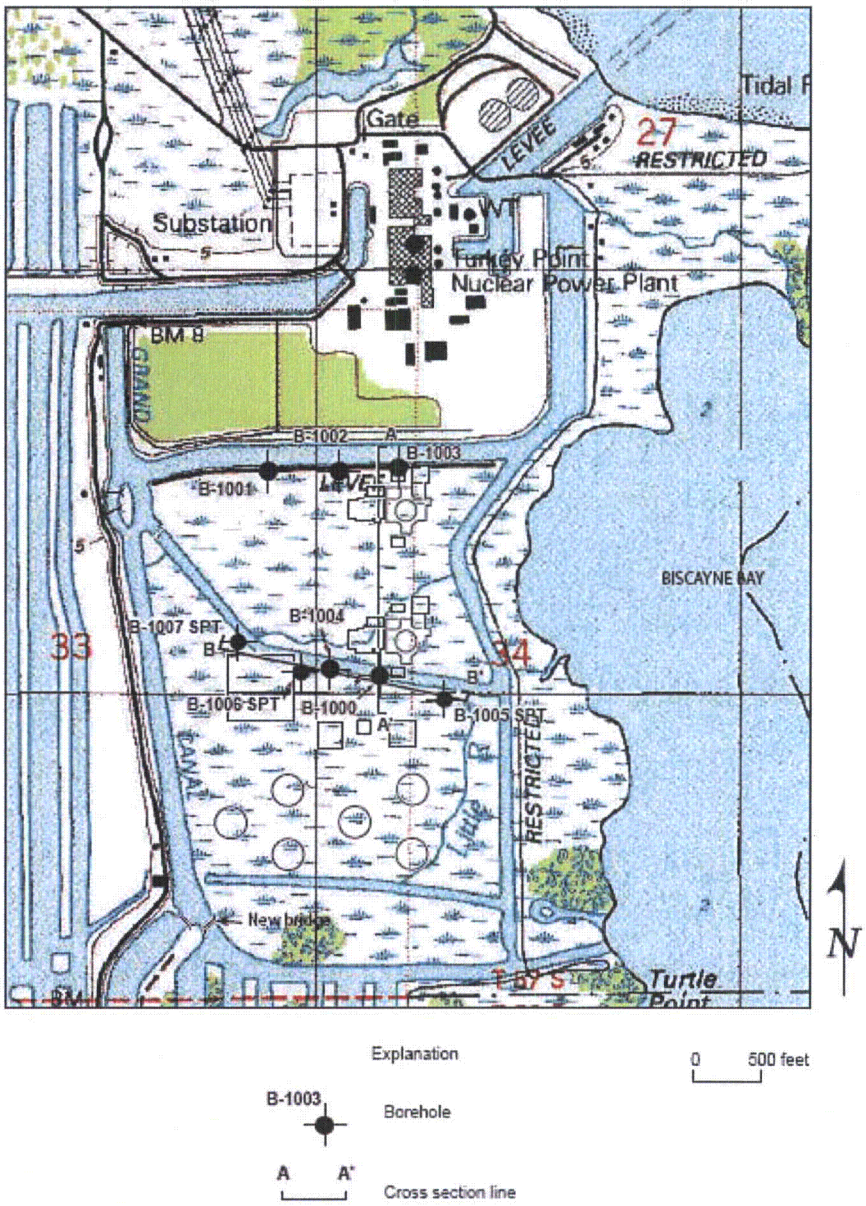
Source: Reference 2
Note: Best available scan from original document

Figure 7. West–East Cross Section in the Vicinity of the Southern End of the Turkey Point Plant Property



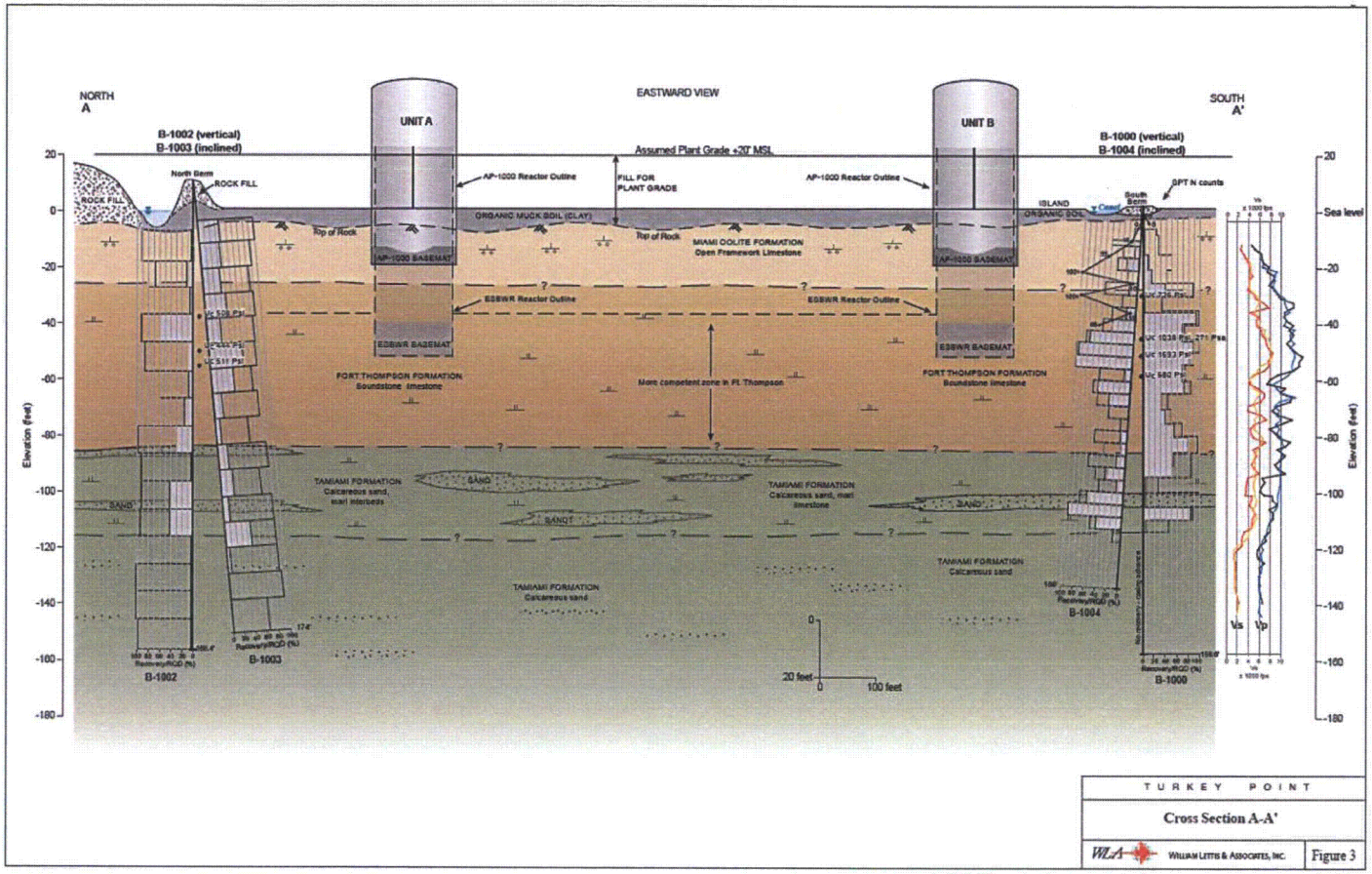
Source: Reference 6
Note: Best available scan from original document

Figure 8. Feasibility Geological Investigation of Potential Plant Site (2006) - Boring and Stratigraphic Cross Section Locations



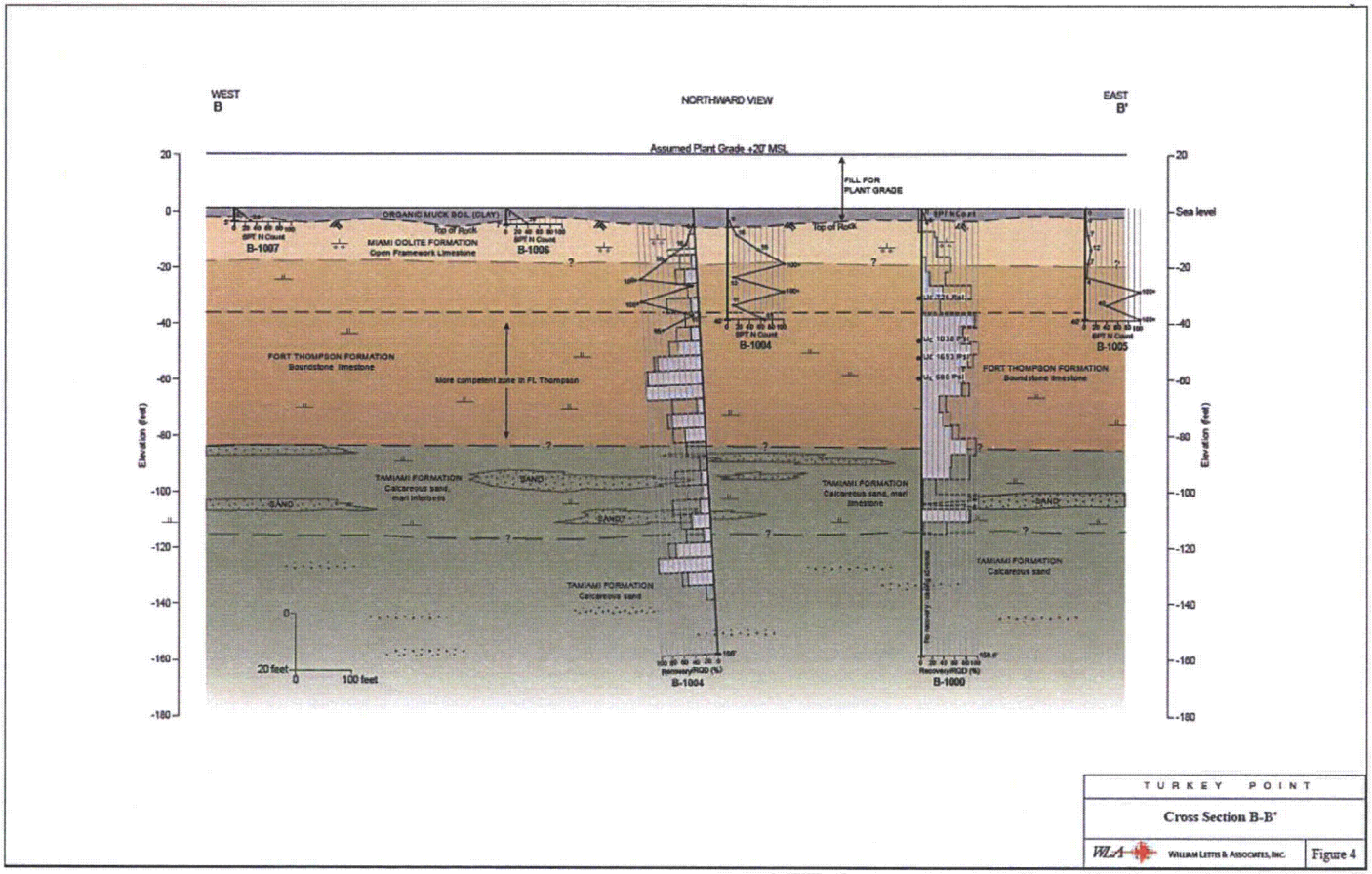
Source: Reference 7

Figure 9. Feasibility Geological Investigation of Potential Plant Site (2006) - Stratigraphic Cross Section A-A'



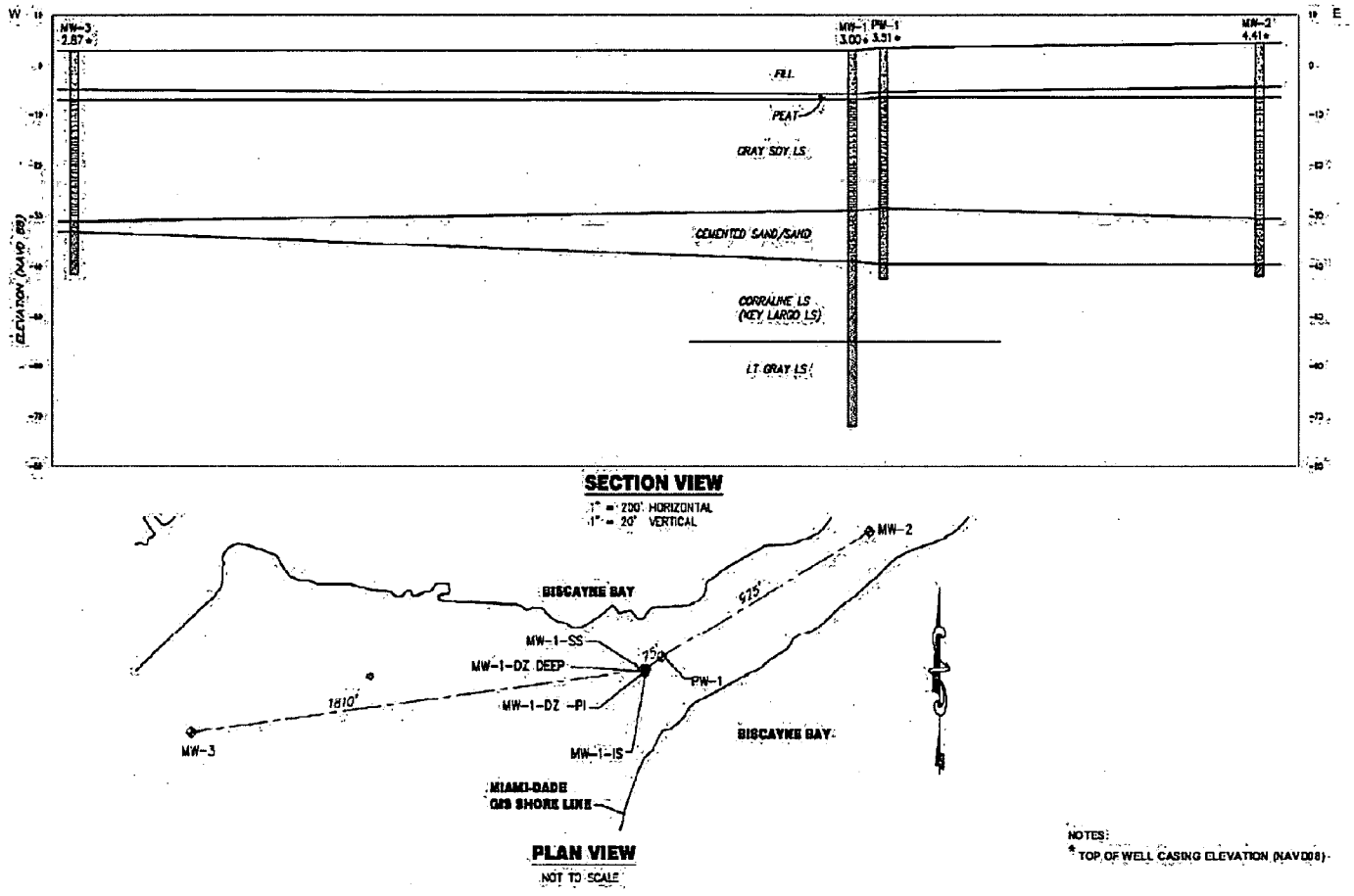
Source: Reference 7

Figure 10. Feasibility Geological Investigation of Potential Plant Site (2006) - Stratigraphic Cross Section B-B'



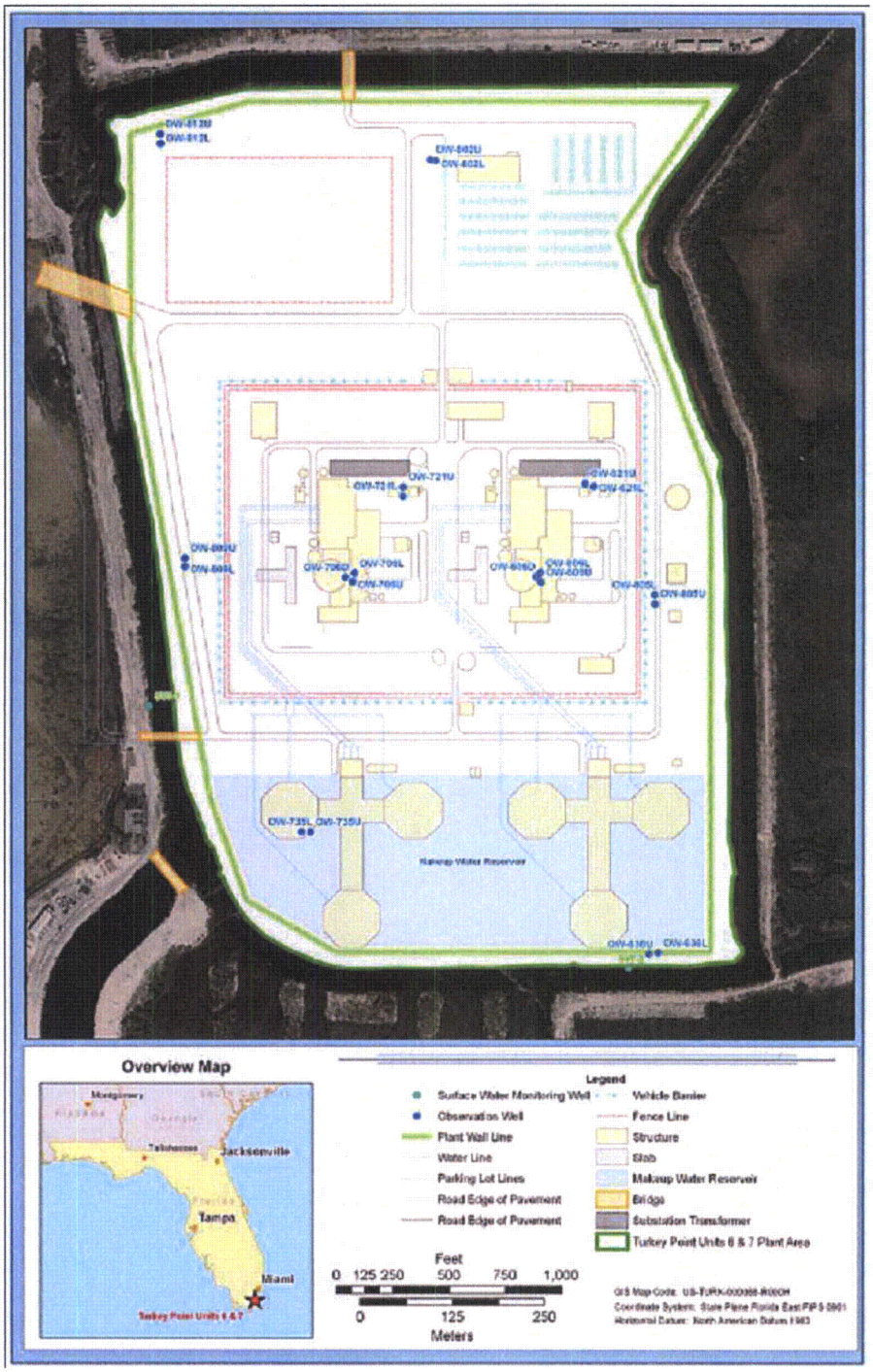
Source: Reference 7

Figure 11. Stratigraphic Cross Section from Wells Drilled for Turkey Point Peninsula Aquifer Performance Test



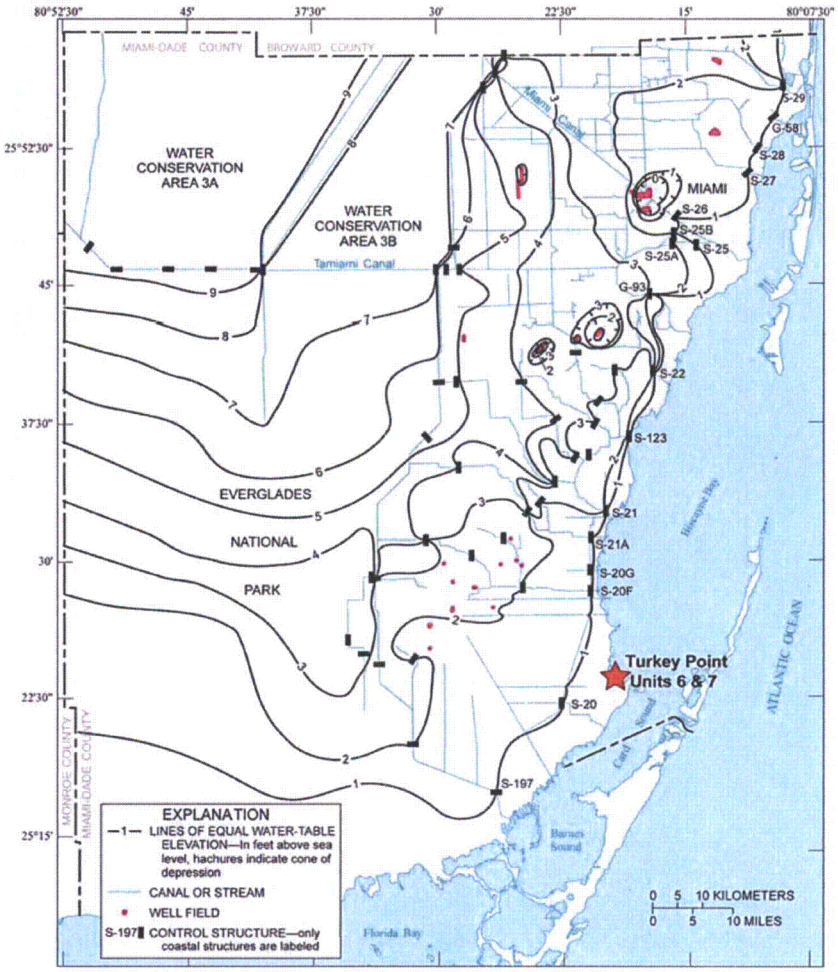
Source: Reference 4

Figure 12. Turkey Point Units 6 & 7 Site Investigation Observation Well Location Plan



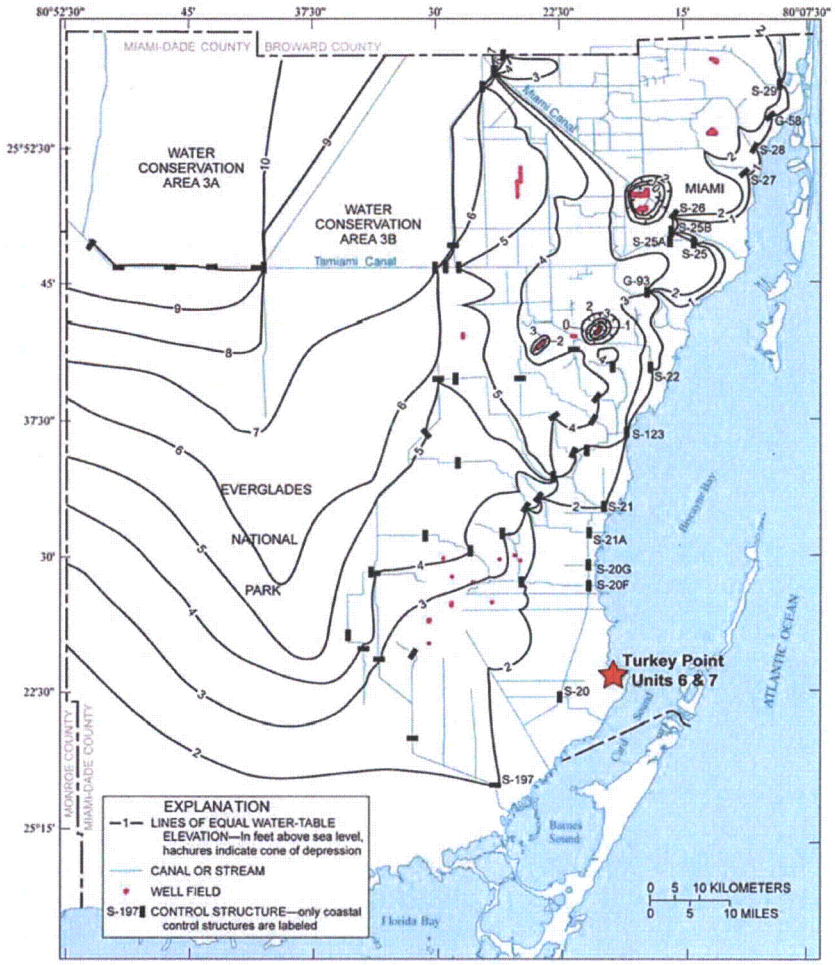
Source: Reference 42.

Figure 13. May 1993 Biscayne Aquifer Potentiometric Surface Map



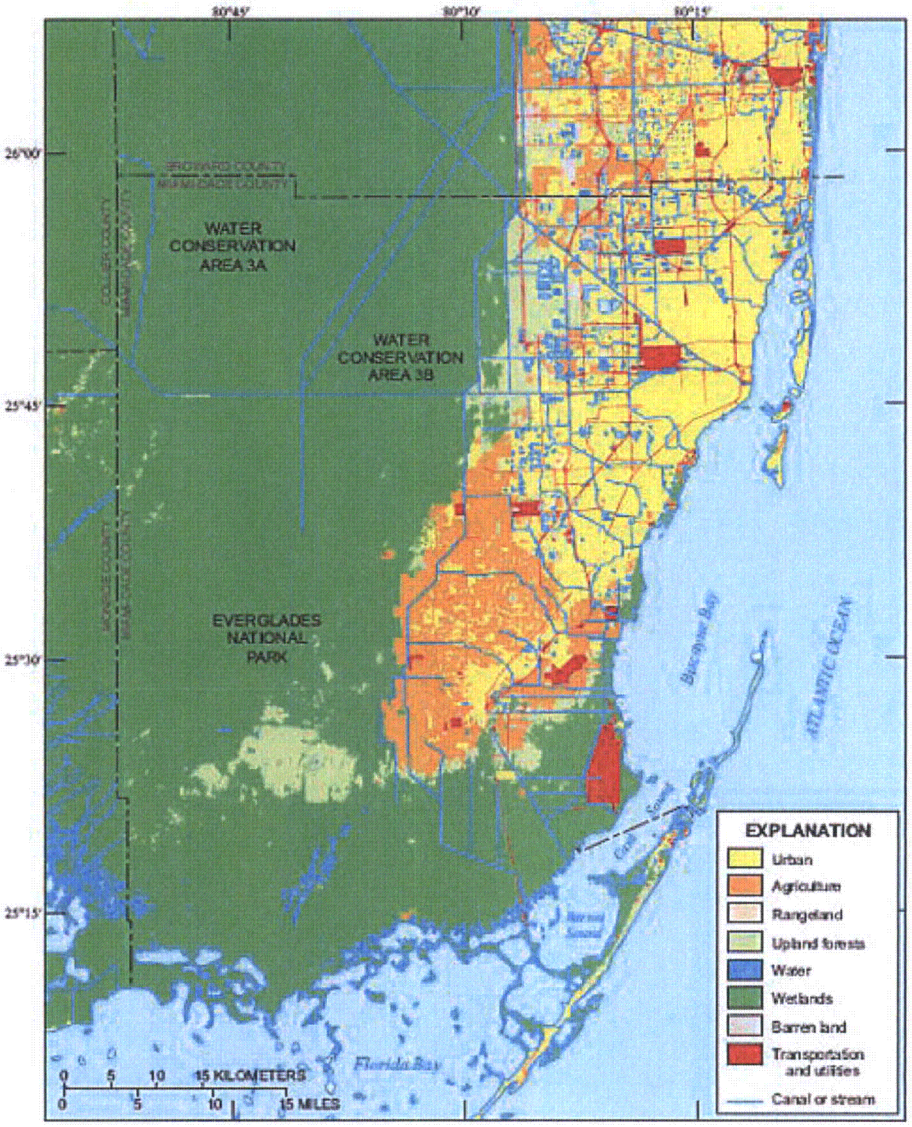
Source: Reference 42 (modified from Reference 12)

Figure 14. November 1993 Biscayne Aquifer Potentiometric Surface Map



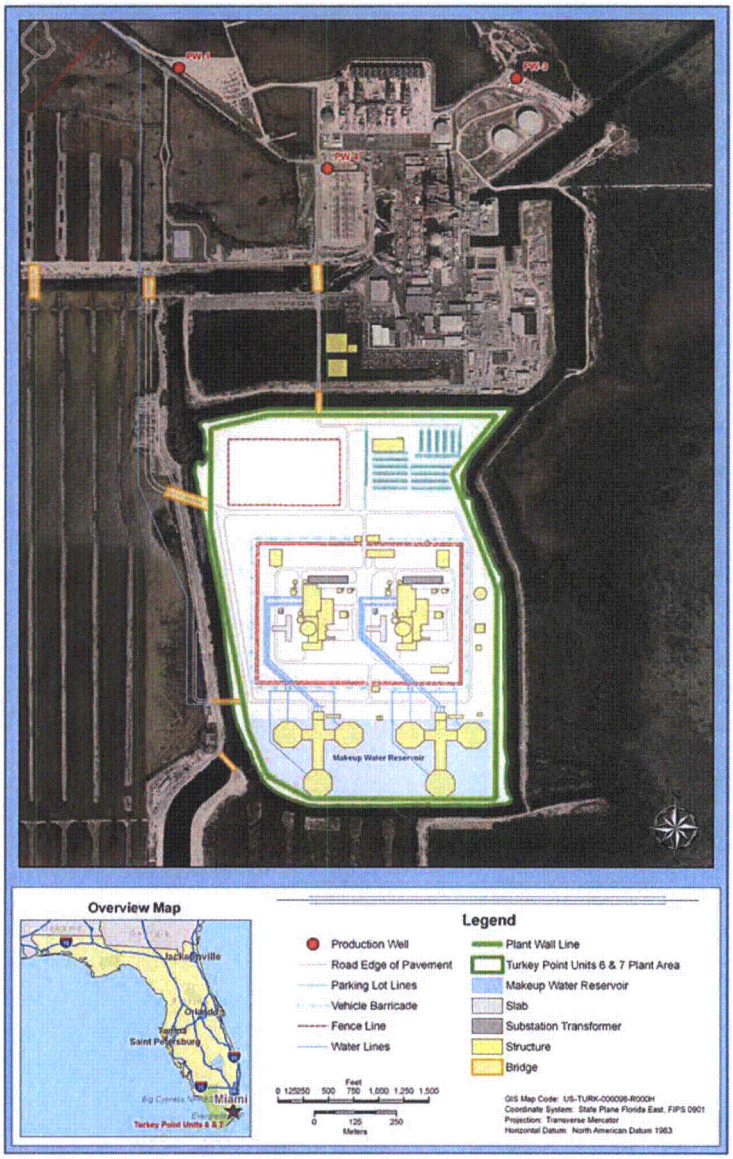
Source: Reference 42 (modified from Reference 12)

Figure 15. Land Use for Southern Florida



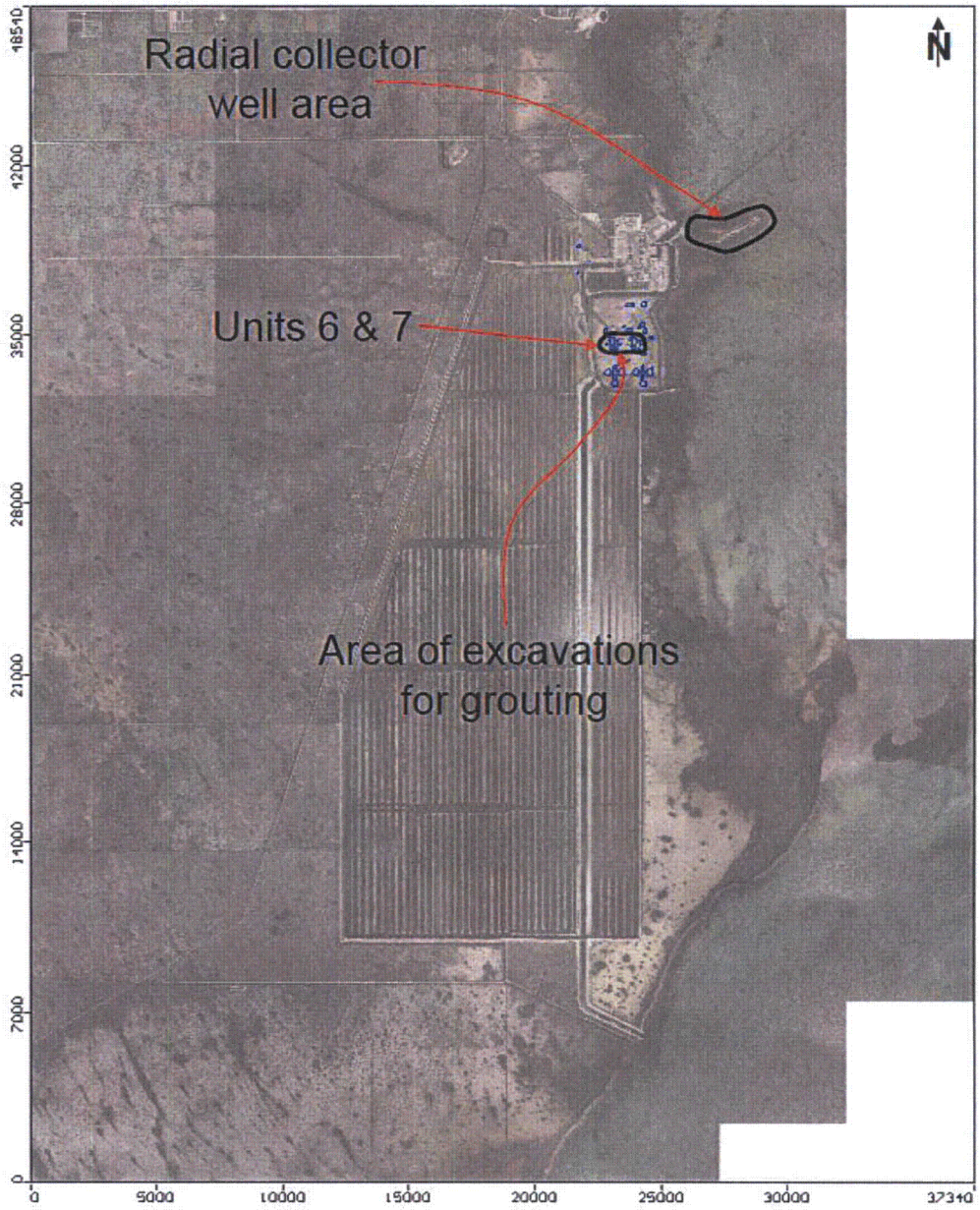
Source: Reference 12

Figure 16. Upper Floridan Aquifer Production Wells for Unit 5



Source: Reference 42

Figure 17. Numerical Model Domain



Note: Model domain identified by extents of axes, not extents of image. White portions on right side are where aerial imagery is not available.

Figure 18. Model Grid and Site Features for the Units 6 & 7 Power Block

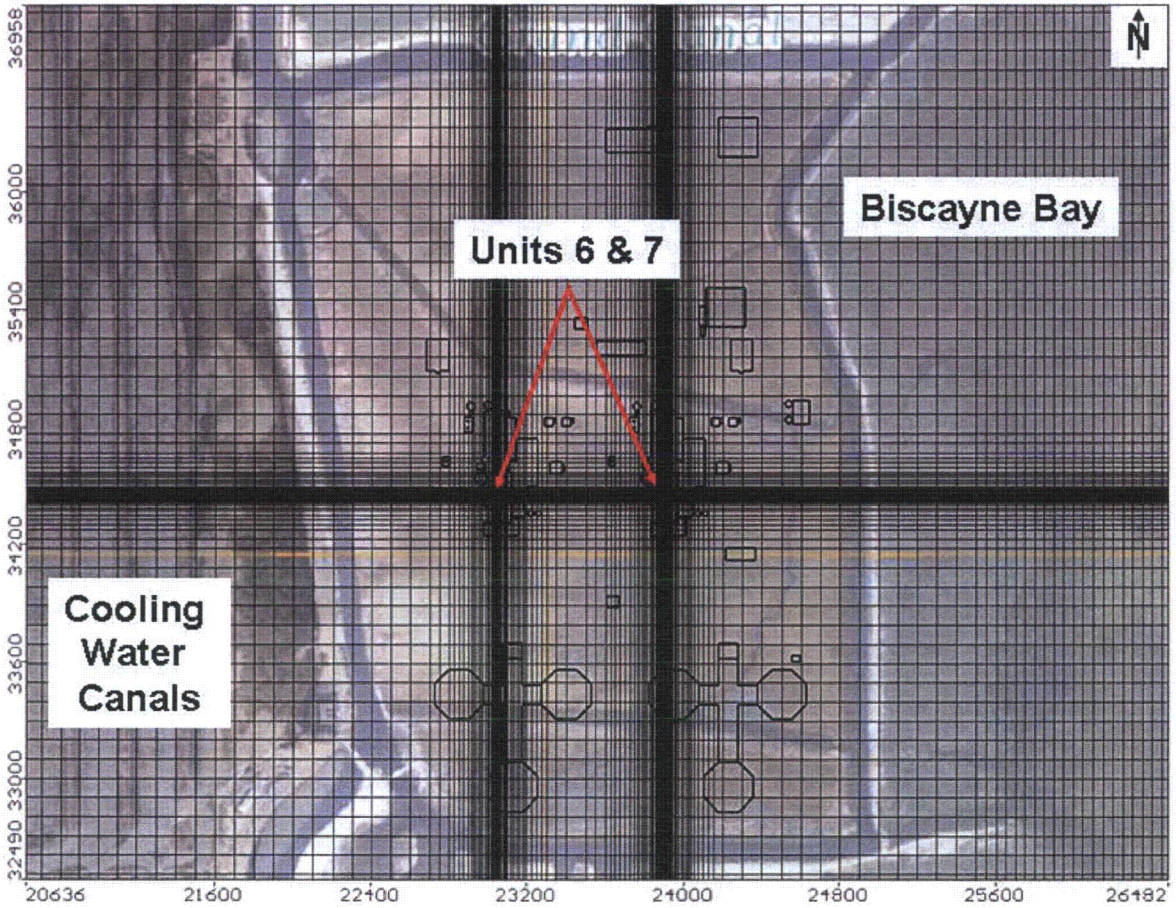
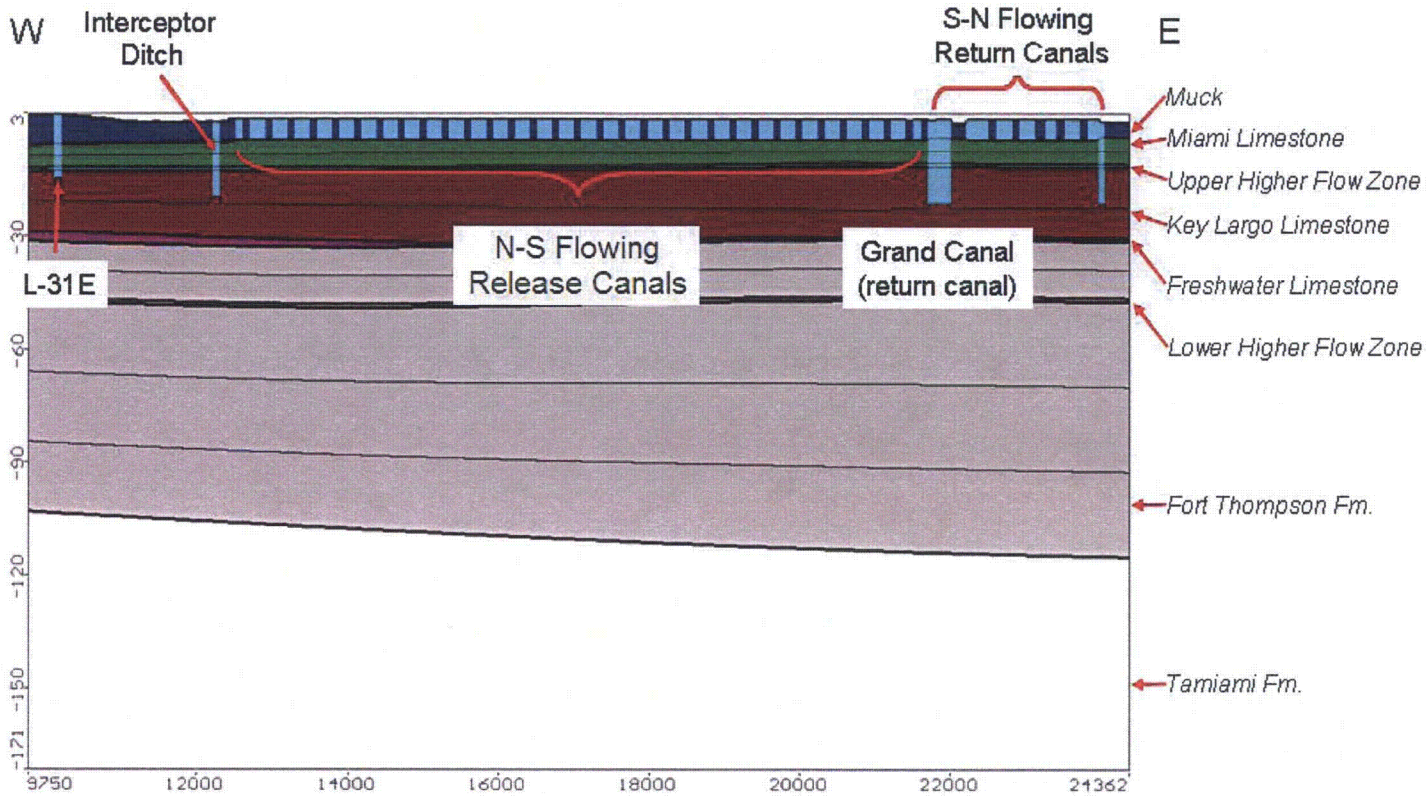
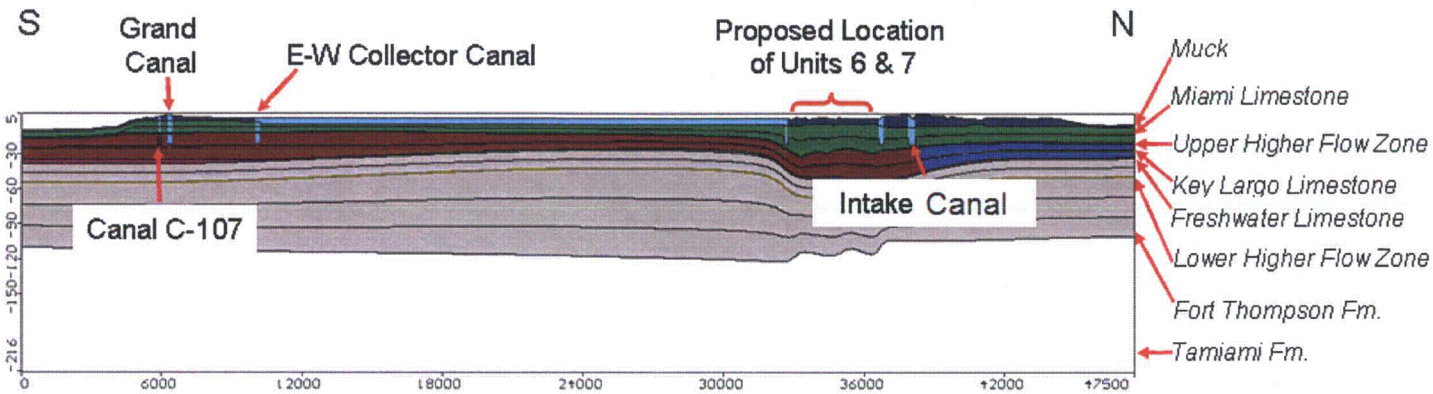


Figure 19. East-West Model Cross Section towards Southern End of the Turkey Point Cooling Canals



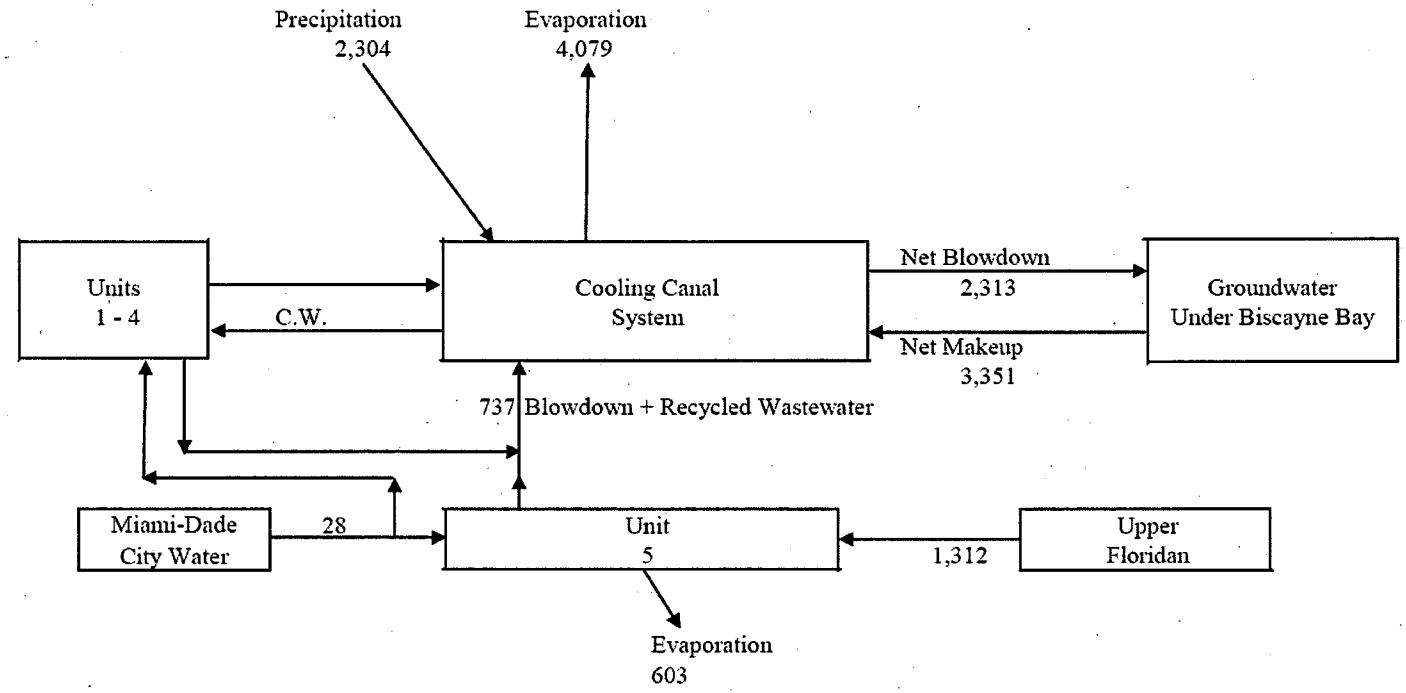
Note: Section along Row 420, vertical exaggeration 50:1

Figure 20. South-North Model Cross Section along Return Canal of Turkey Point Cooling Canals



Note: Section along Column 280, vertical exaggeration 50:1.

Figure 21. Cooling Canals Water Balance



Note: Units in acre-ft/month
Source: Reference 33

Figure 22. Extent of Freshwater Limestone and Key Largo Limestone in Model Layer 7

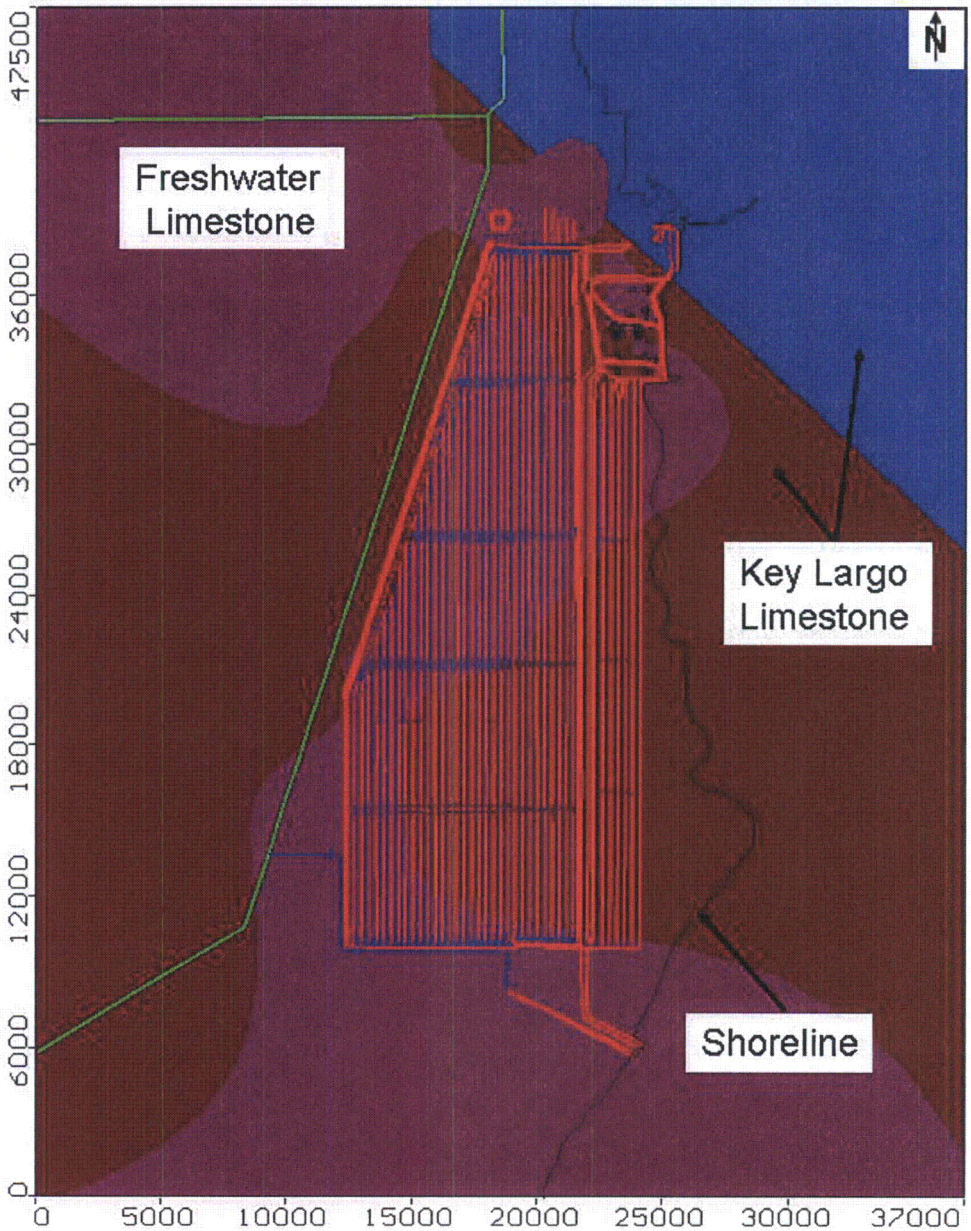
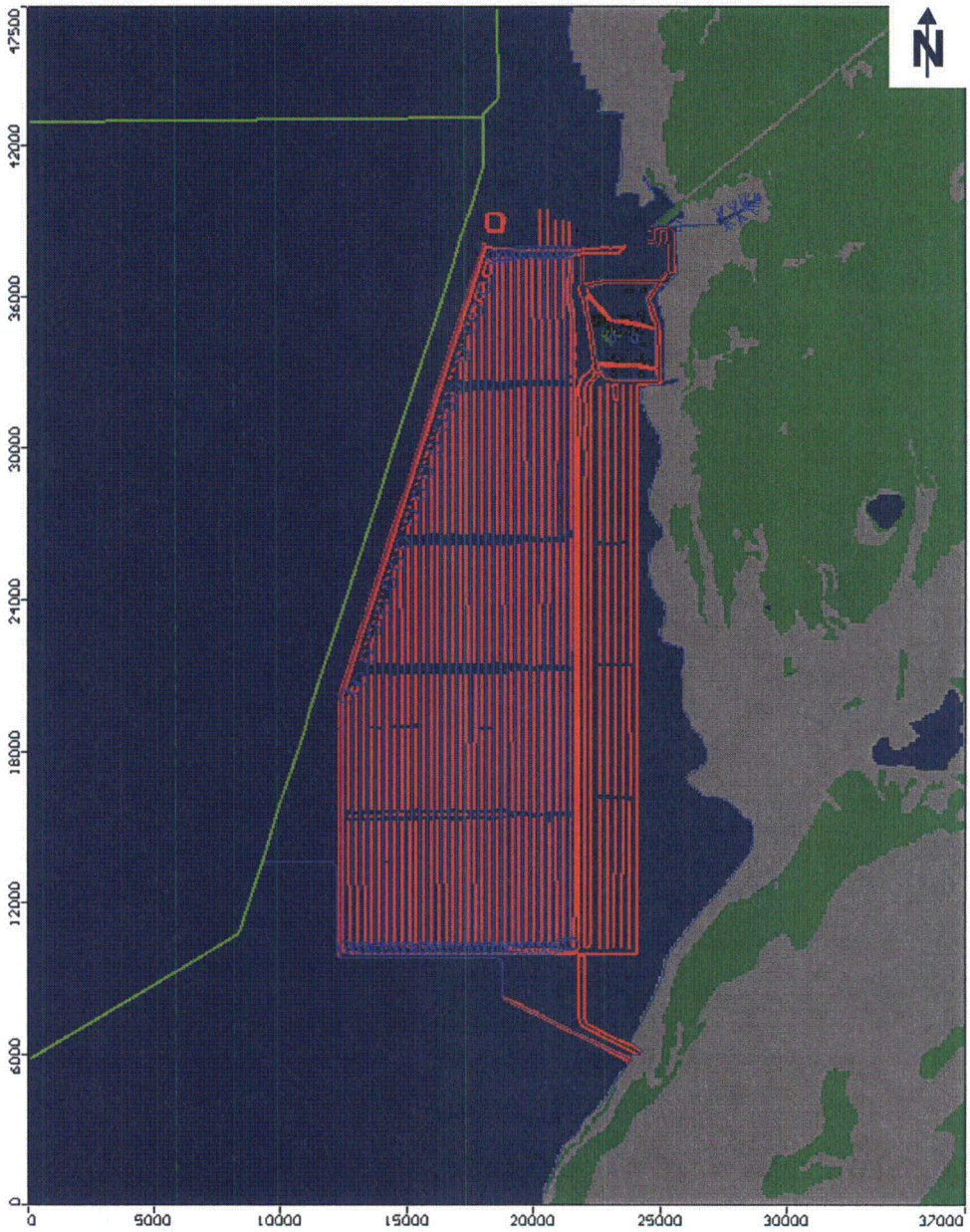
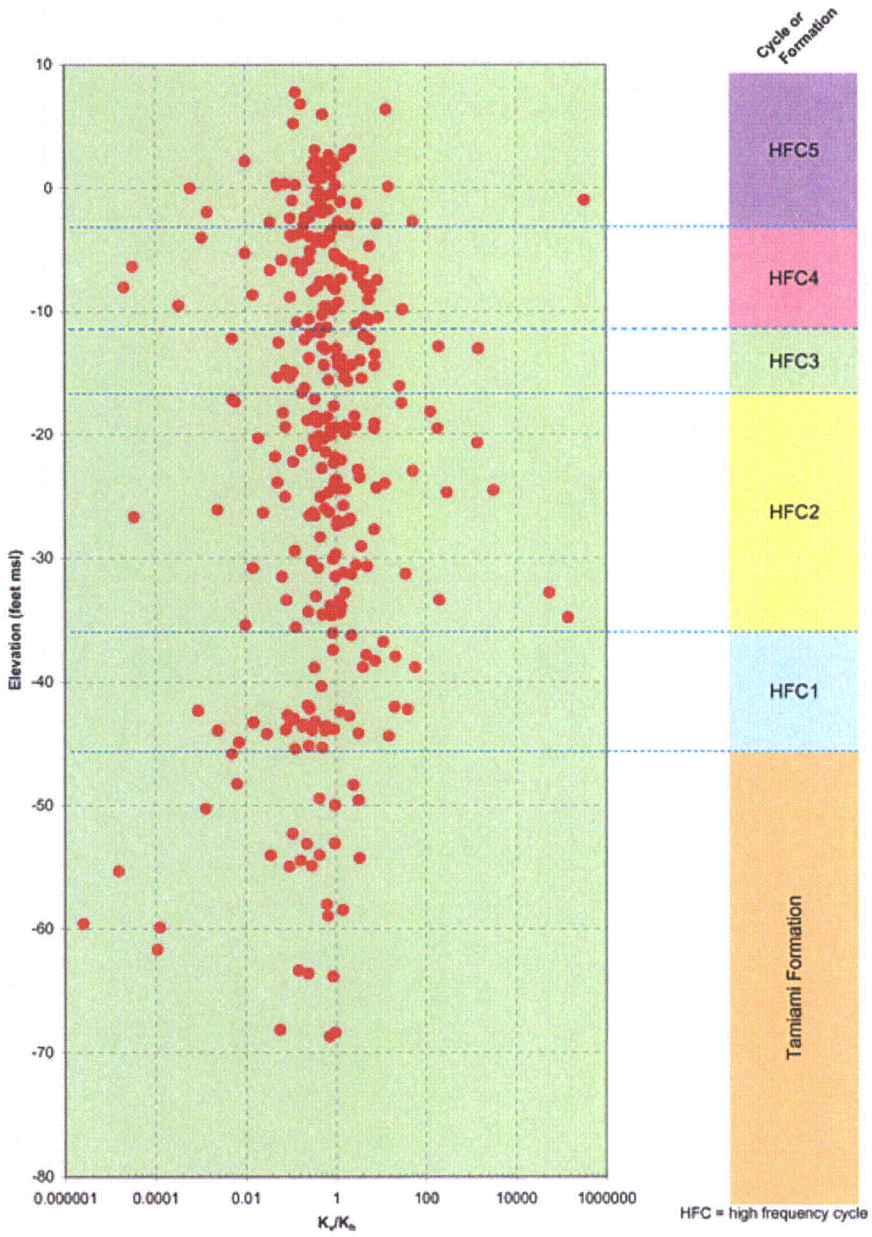


Figure 23. Material Distribution in Biscayne Bay



Note: Blue = Muck. Green = Miami Limestone. Grey = Offshore Sediment.

Figure 24. Hydraulic Conductivity Anisotropy Values in the Different Formations



Source: Reference 42 (data from Reference 23 & 24).

Figure 25. Plan and Cross-Section of Units 6 & 7 Excavations

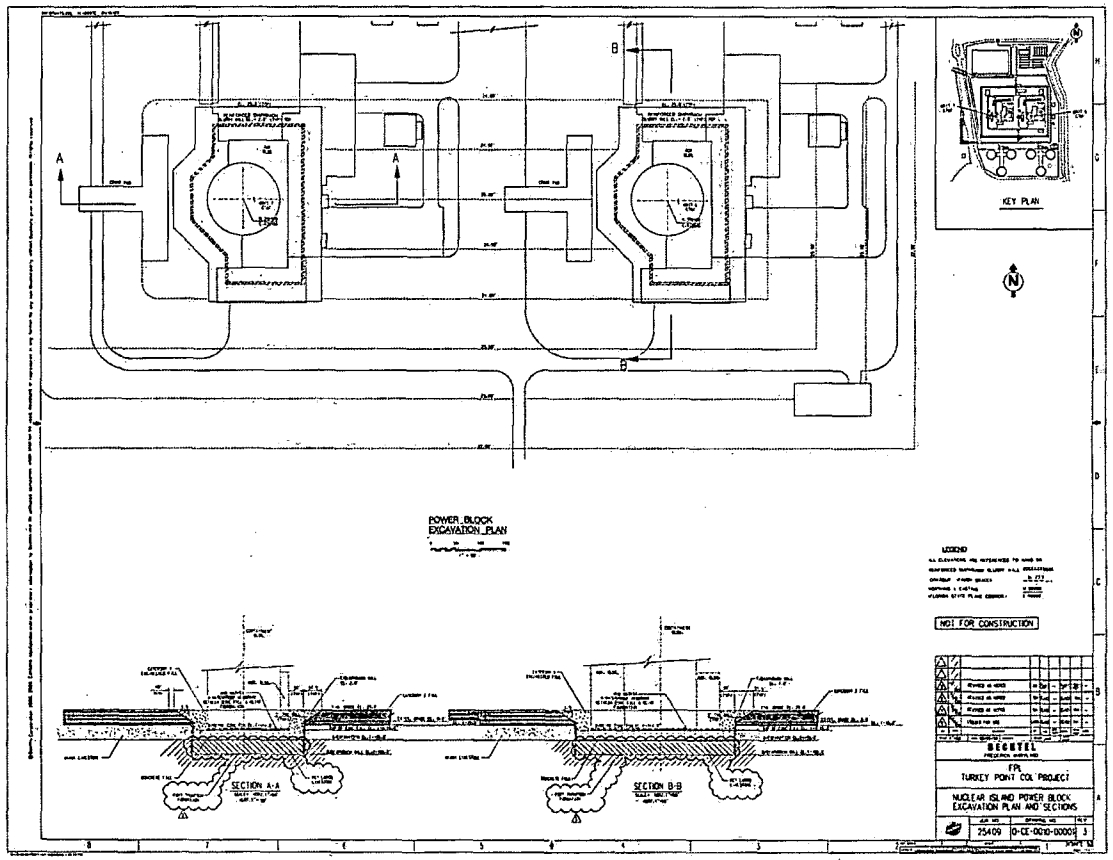
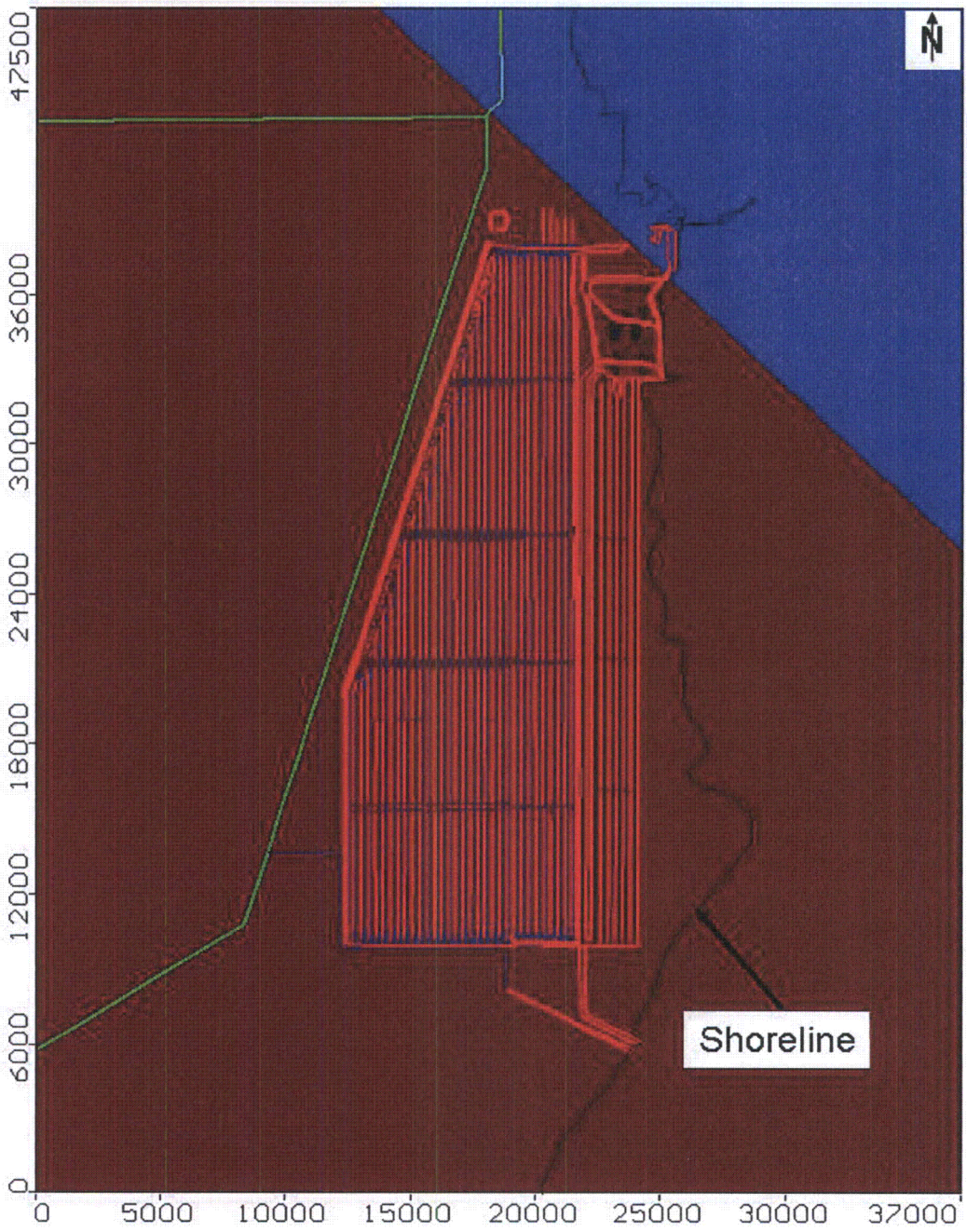


Figure 26. Planned Area of Radial Collector Well Caissons Relative to Plant Site Area

Source: Reference 42.

Figure 27. Model Calibration – Delineation of Hydraulic Conductivity Zones in the Key Largo Limestone



Legend: Dark Red = Key Largo Limestone Southwest. Blue = Key Largo Limestone Northeast. Green Lines = SFWMD Canals.

Figure 28. Model Calibration – Layout of Pumping Well and Observation Well Clusters for Pumping Tests PW-7L and PW-7U

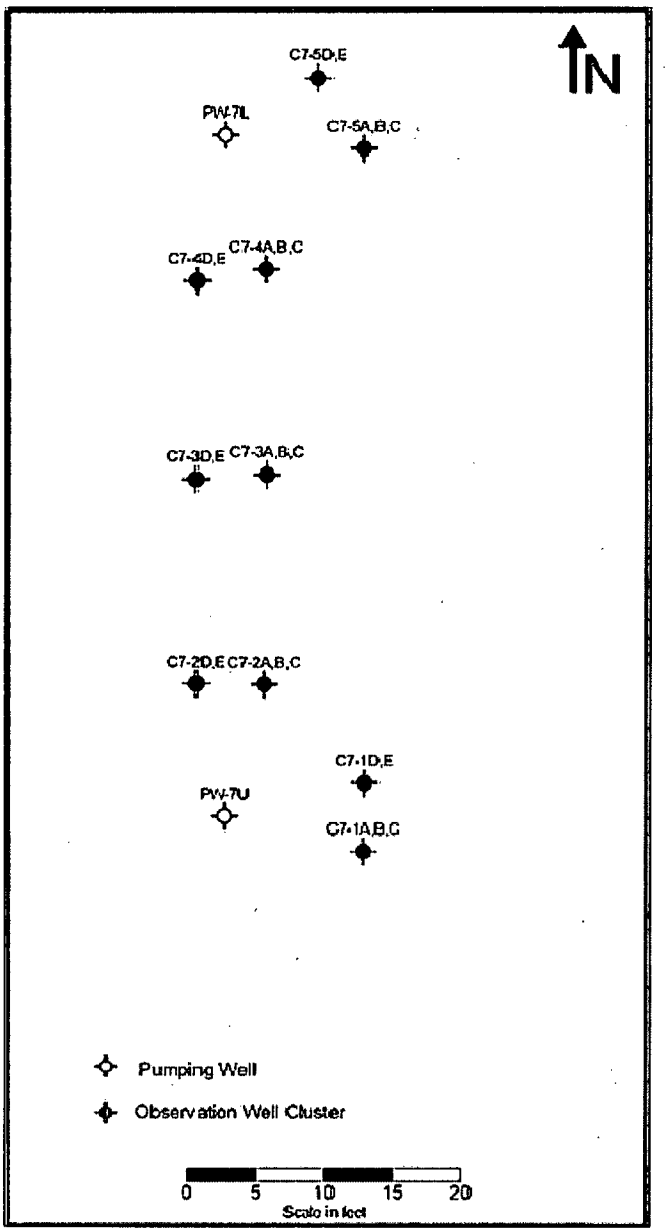
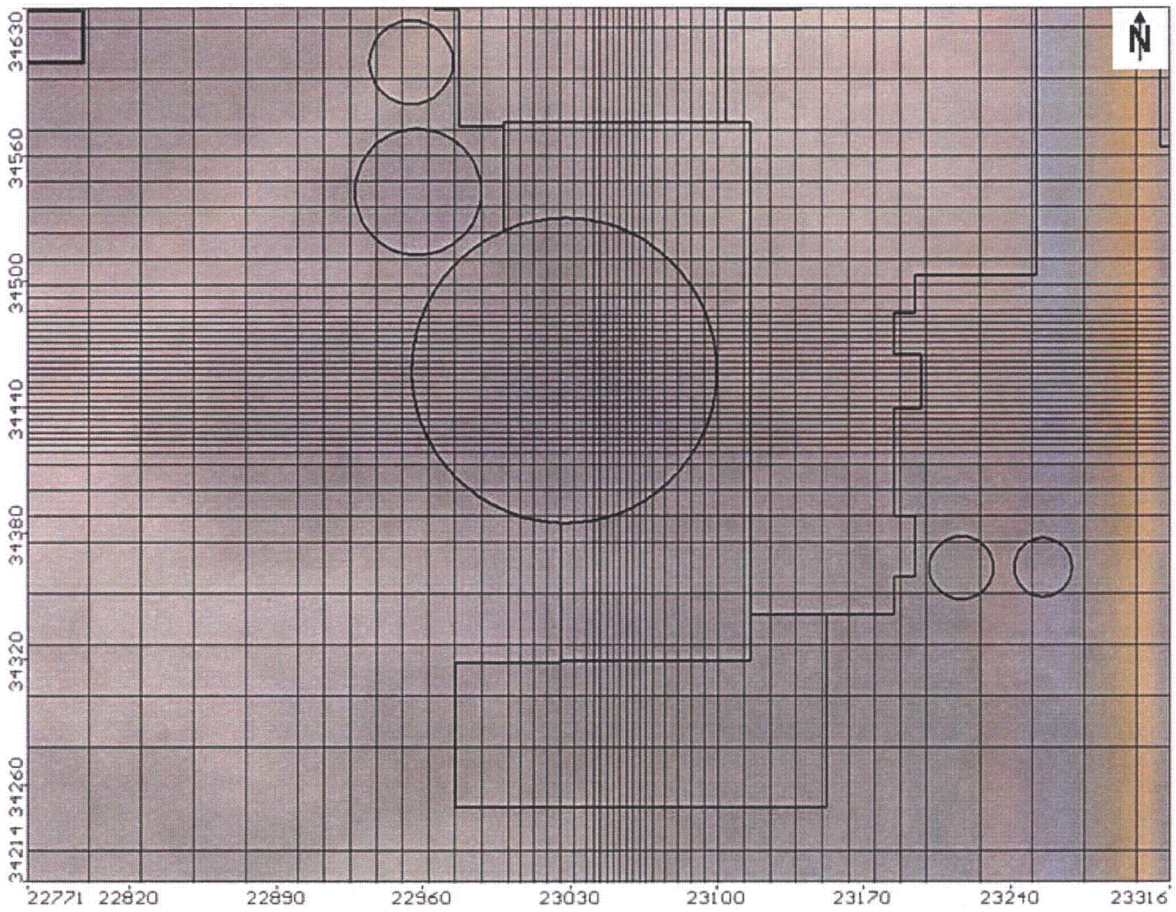
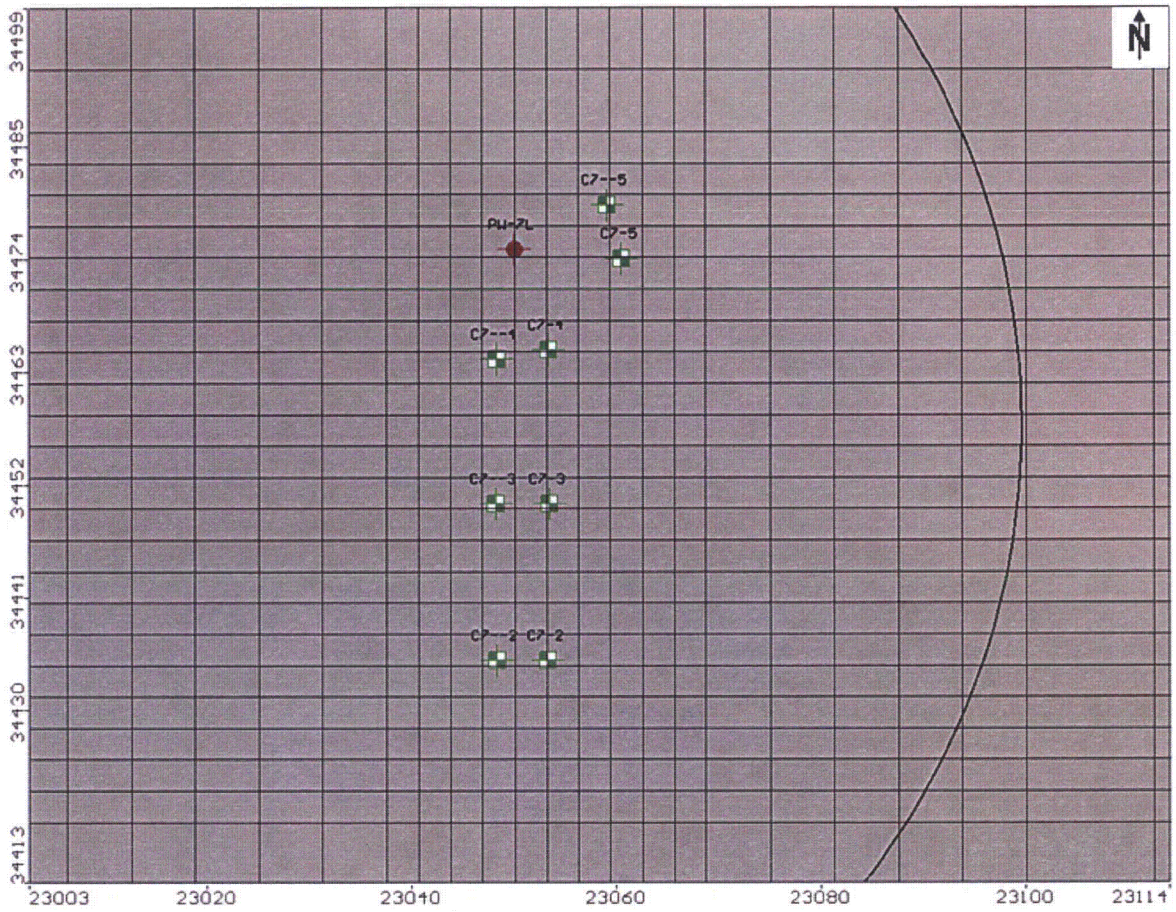


Figure 29. Grid Refinement in Vicinity of Unit 7 Reactor Footprint



Note: Black lines represent Unit 7 reactor building and associated structures.

Figure 30. Test Well PW-7L and Related Observation Wells



Note: Red symbol = pumping well. Green symbol = observation well. Black line represents eastern edge of Unit 7 reactor building.

Figure 31. Test Well PW-7L: Observed Versus Calculated Drawdowns

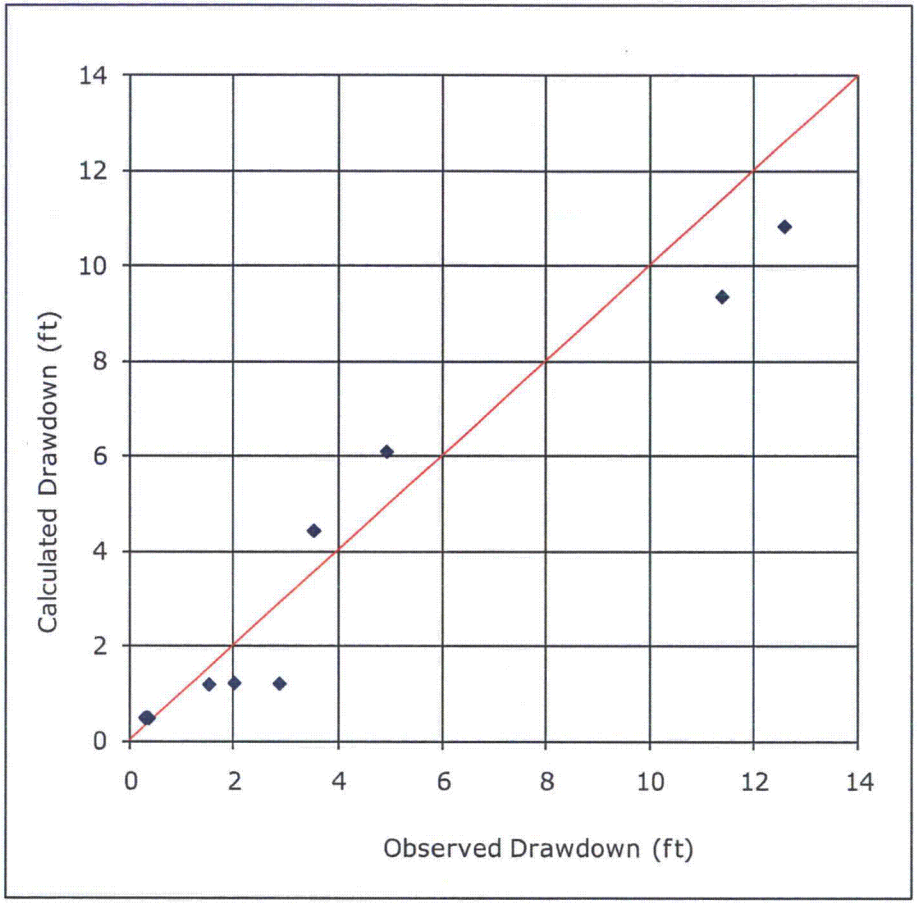
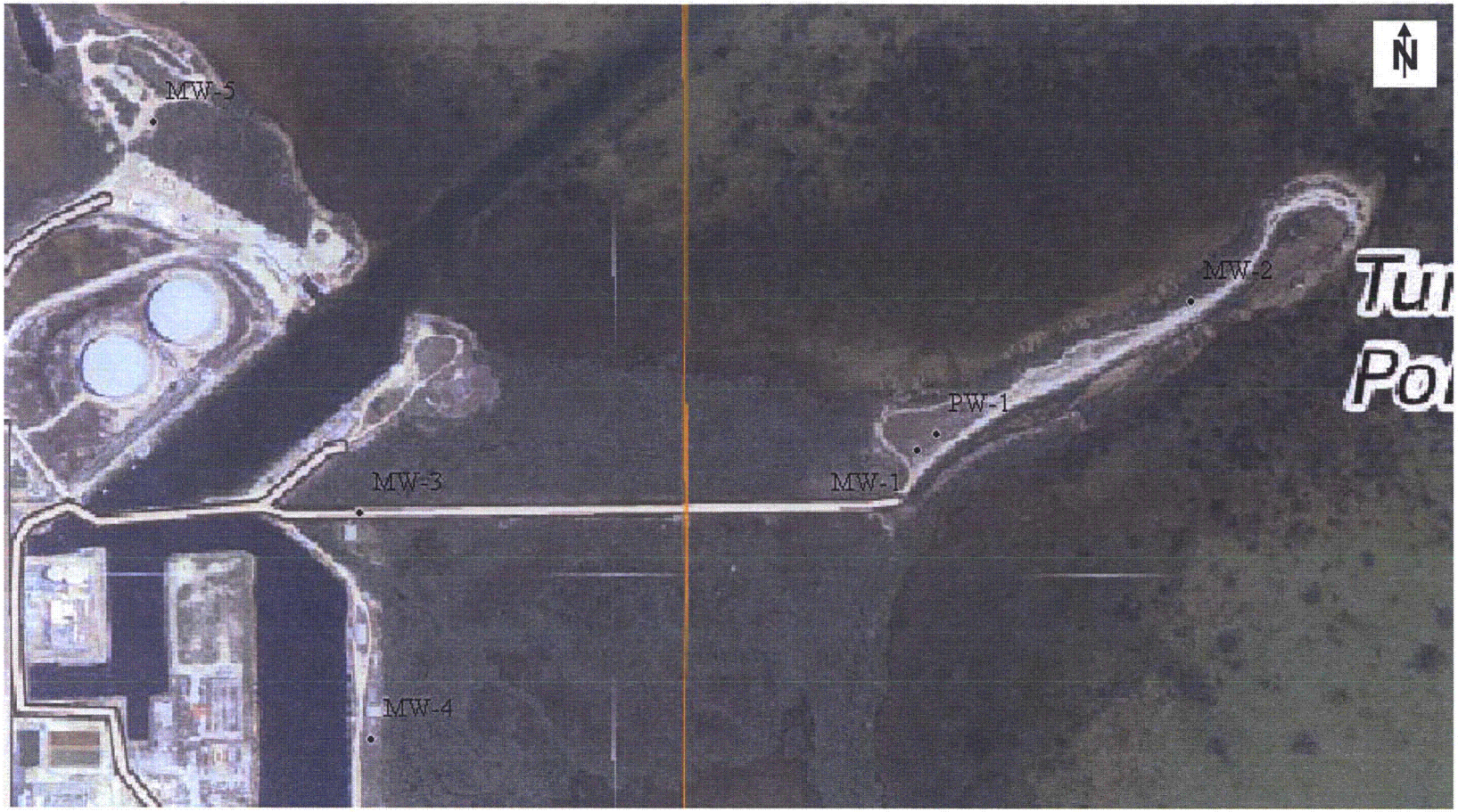


Figure 32. Model Calibration – Pumping and Monitoring Wells Layout for Pumping Test PW-1



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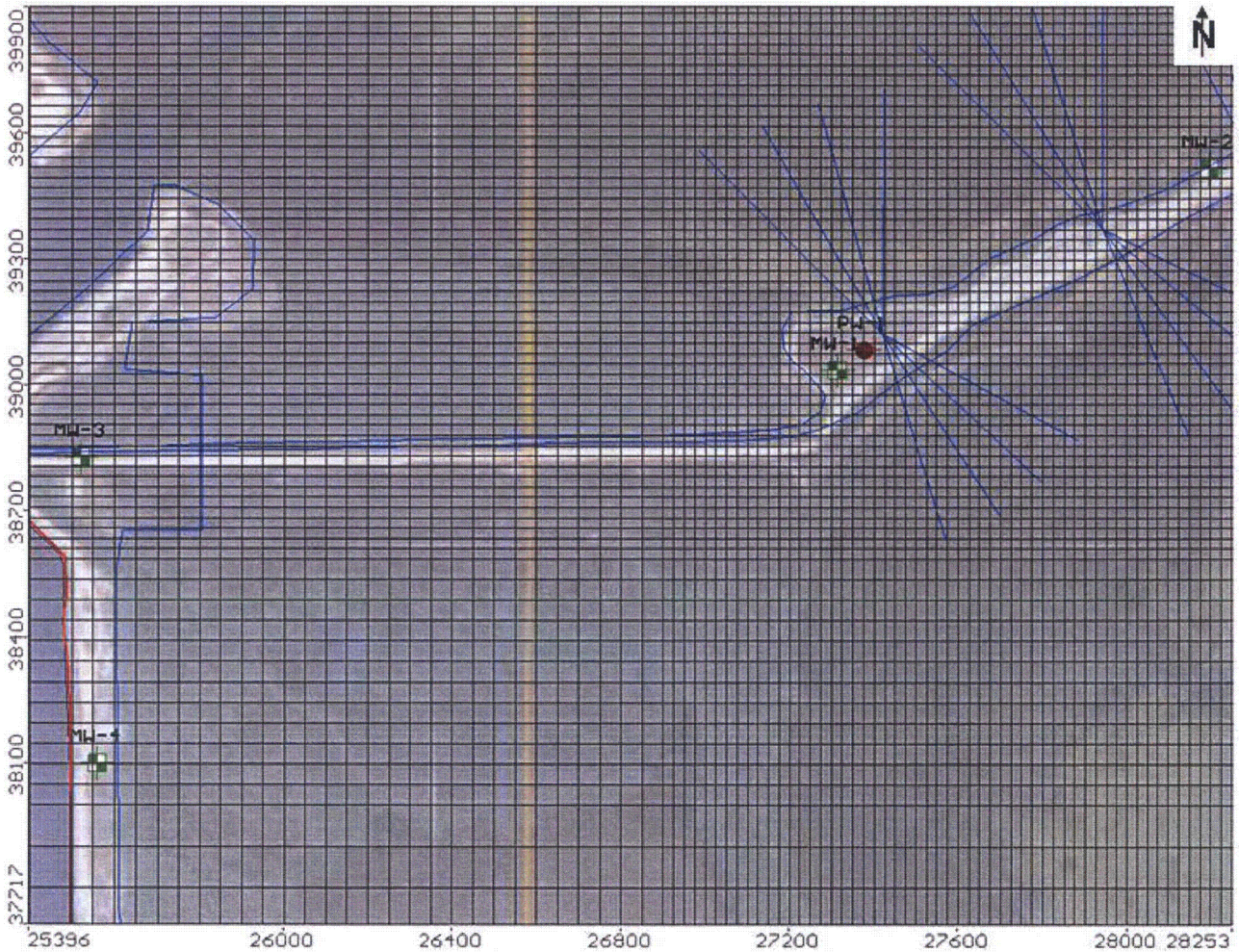
L-2011-082 Enclosure

Figure 33. Model Calibration – Finite Difference Grid and Well Layout for Test PW-1



Note: Blue line = shoreline and radial collector well arms. Red line = CCS outline. Red symbol = pumping well. Green symbol = observation well.

Figure 34. Test Well PW-1: Observed versus Calculated Drawdowns

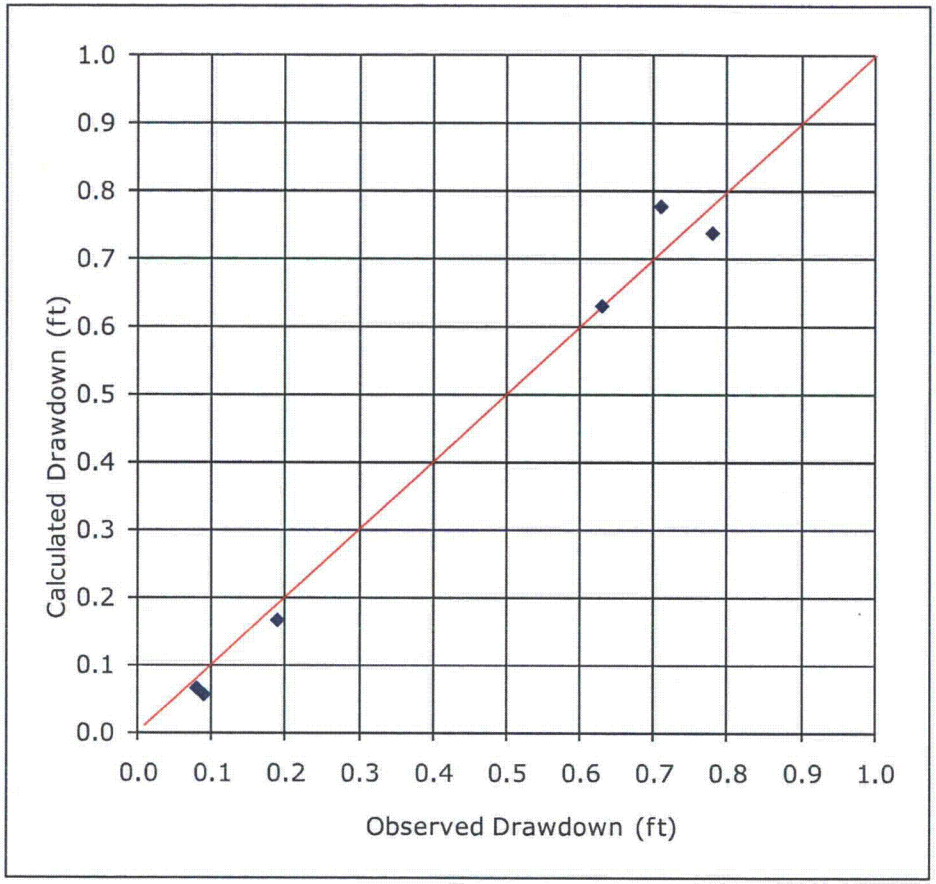
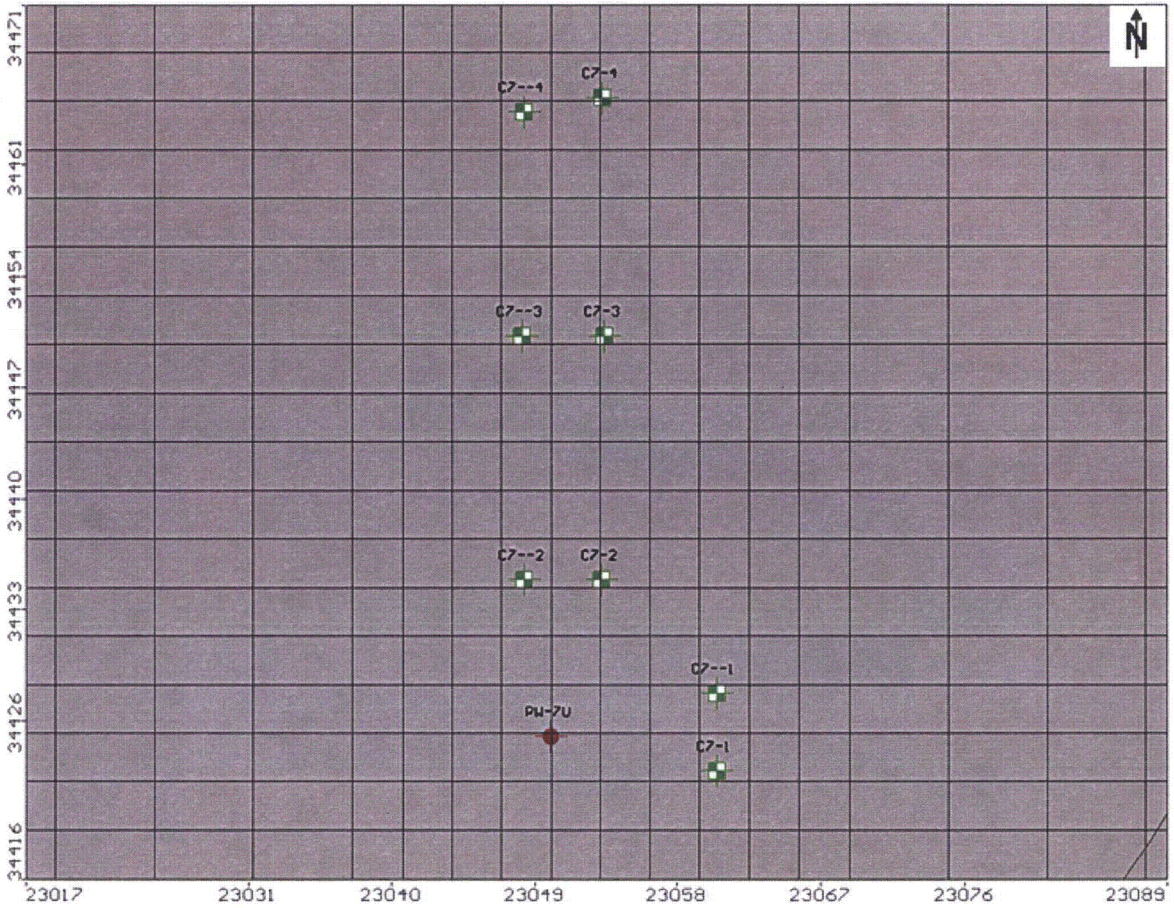


Figure 35. Model Calibration – Finite Difference Grid and Well Layout for Test PW-7U



Note: Red symbol = pumping well. Green symbol = observation well.

Figure 36. Test Well PW-7U: Observed versus Calculated Drawdowns

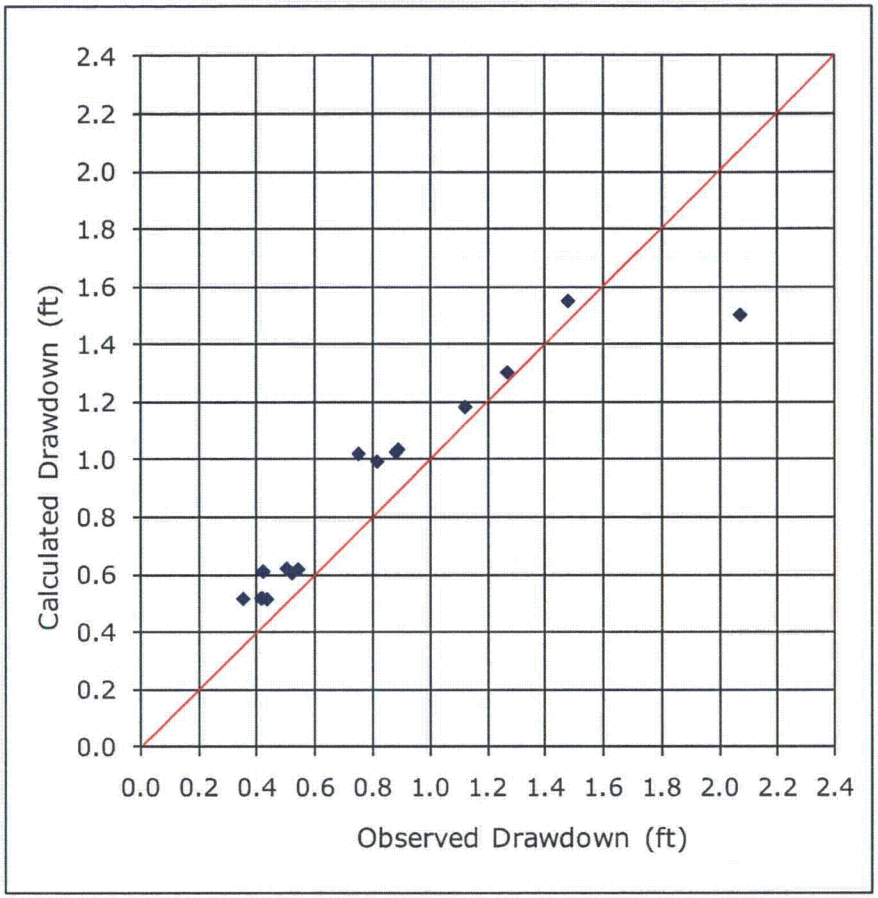
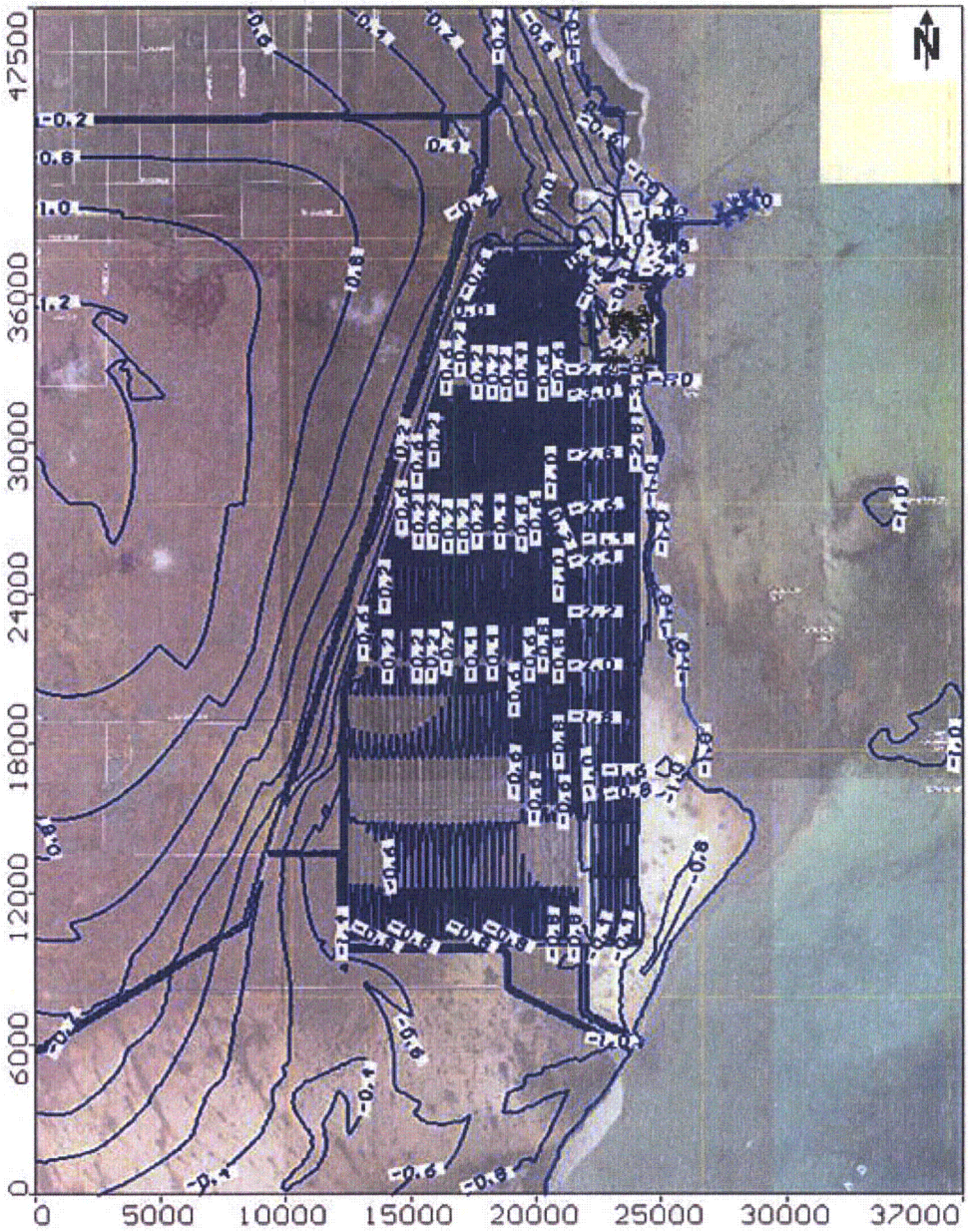
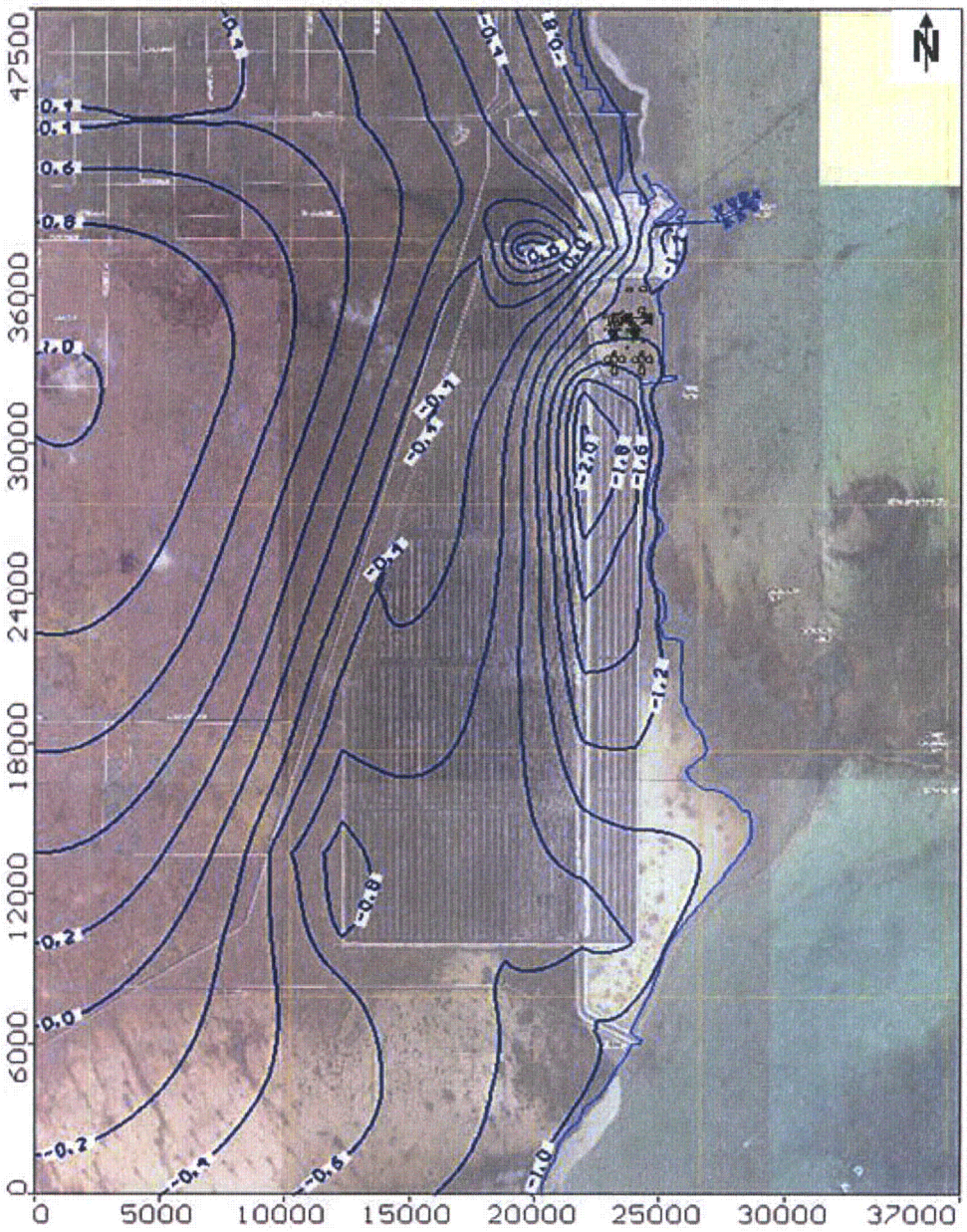


Figure 37. Simulated Groundwater Contours – Model Layer 1 – Onshore Muck and Offshore Sand/Sediments and Miami Limestone



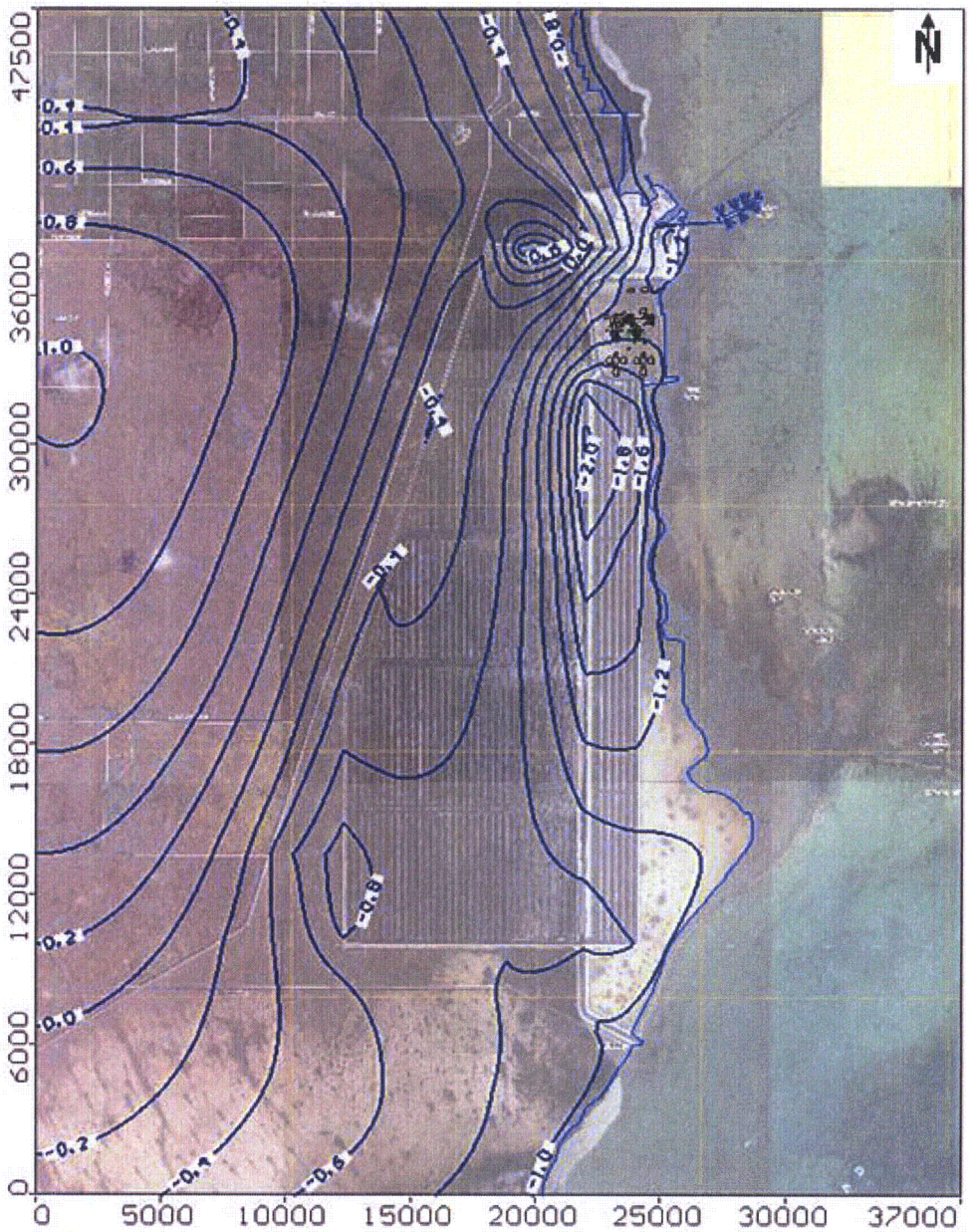
Legend: Contour interval is 0.2 feet (NAVD 88).
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 38. Simulated Groundwater Contours – Model Layer 3 – Miami Limestone



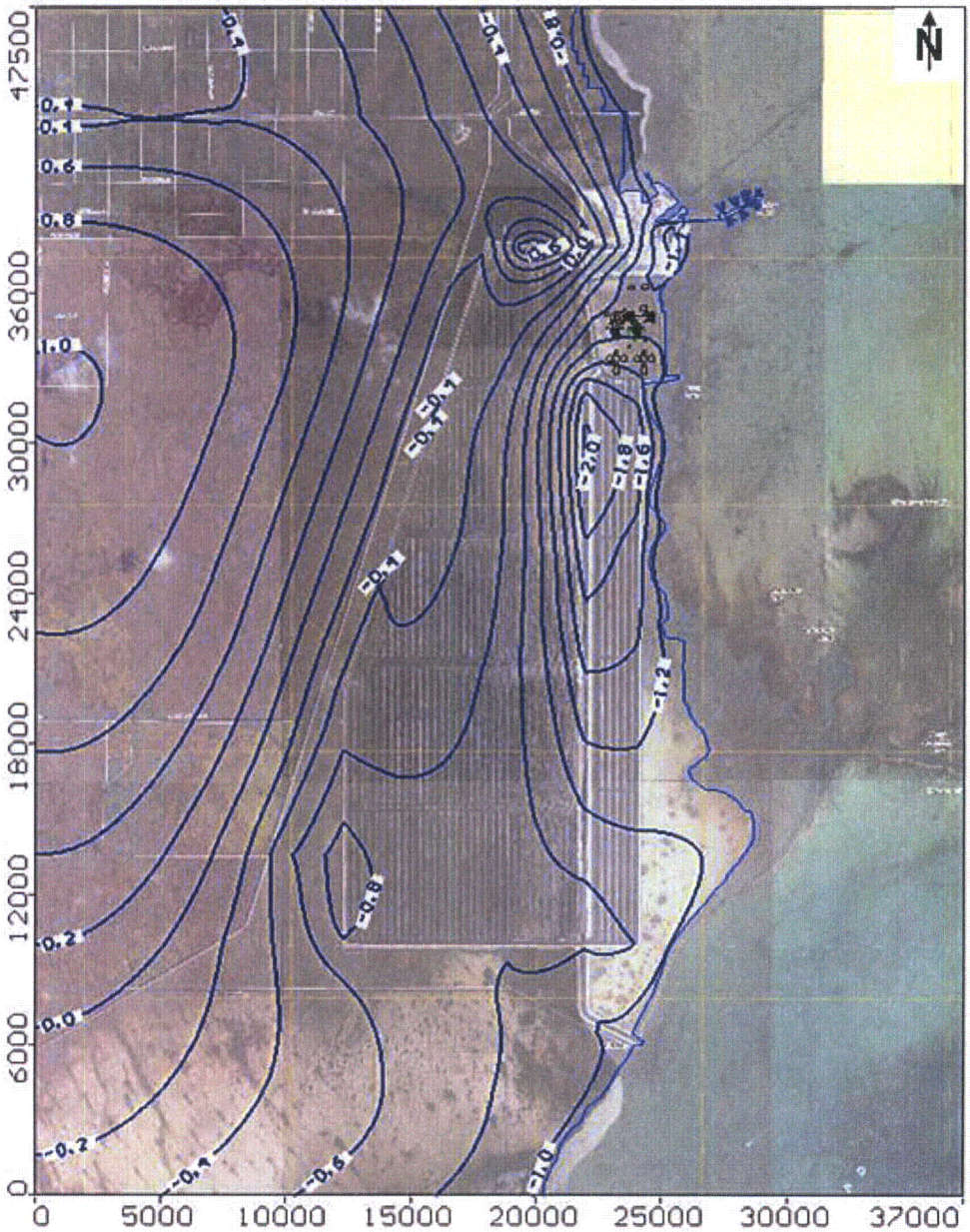
Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 39. Simulated Groundwater Contours – Model Layer 4 – Upper Higher Flow Zone



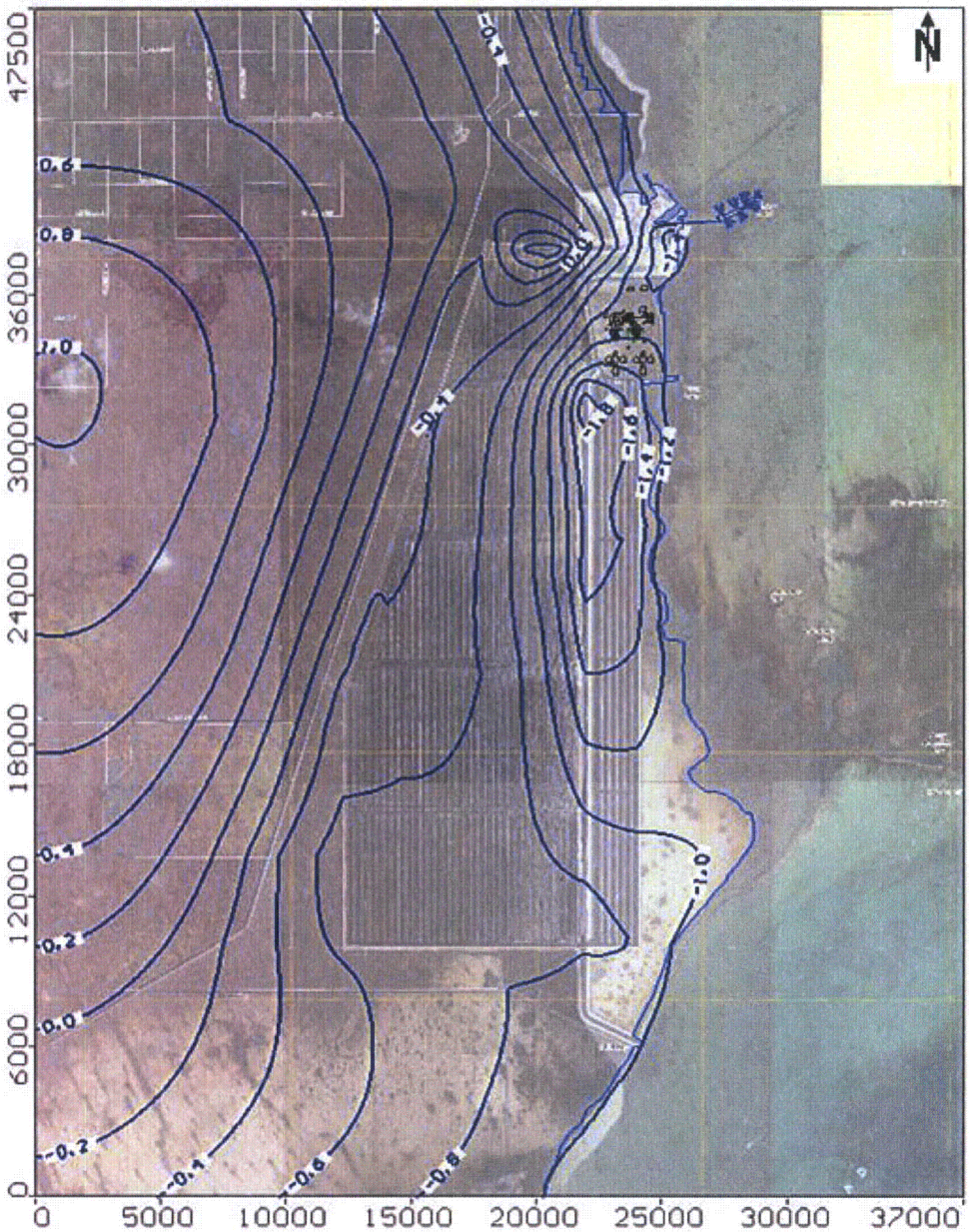
Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 40. Simulated Groundwater Contours – Model Layer 5 – Key Largo Limestone



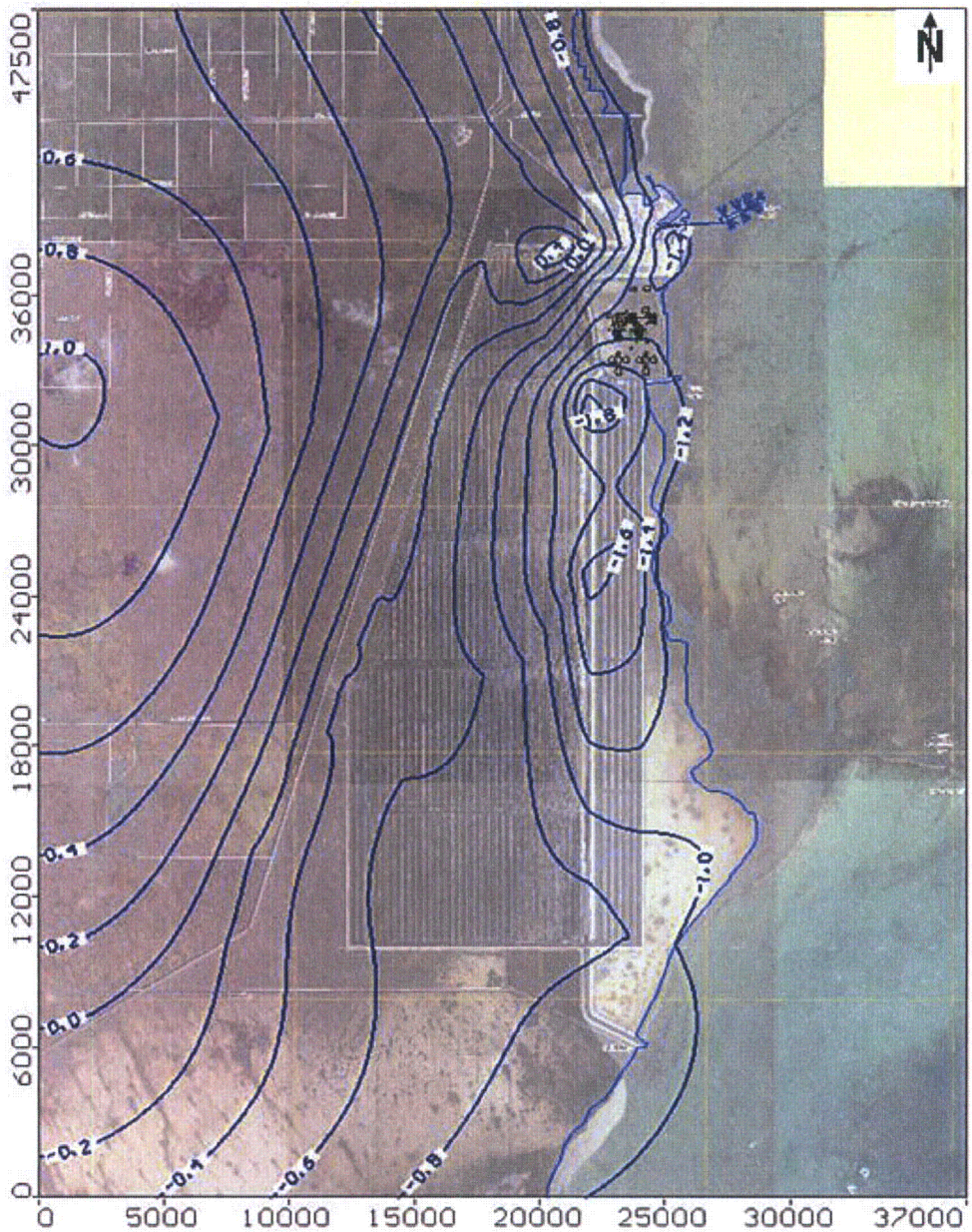
Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 41. Simulated Groundwater Contours – Model Layer 7 – Freshwater Limestone



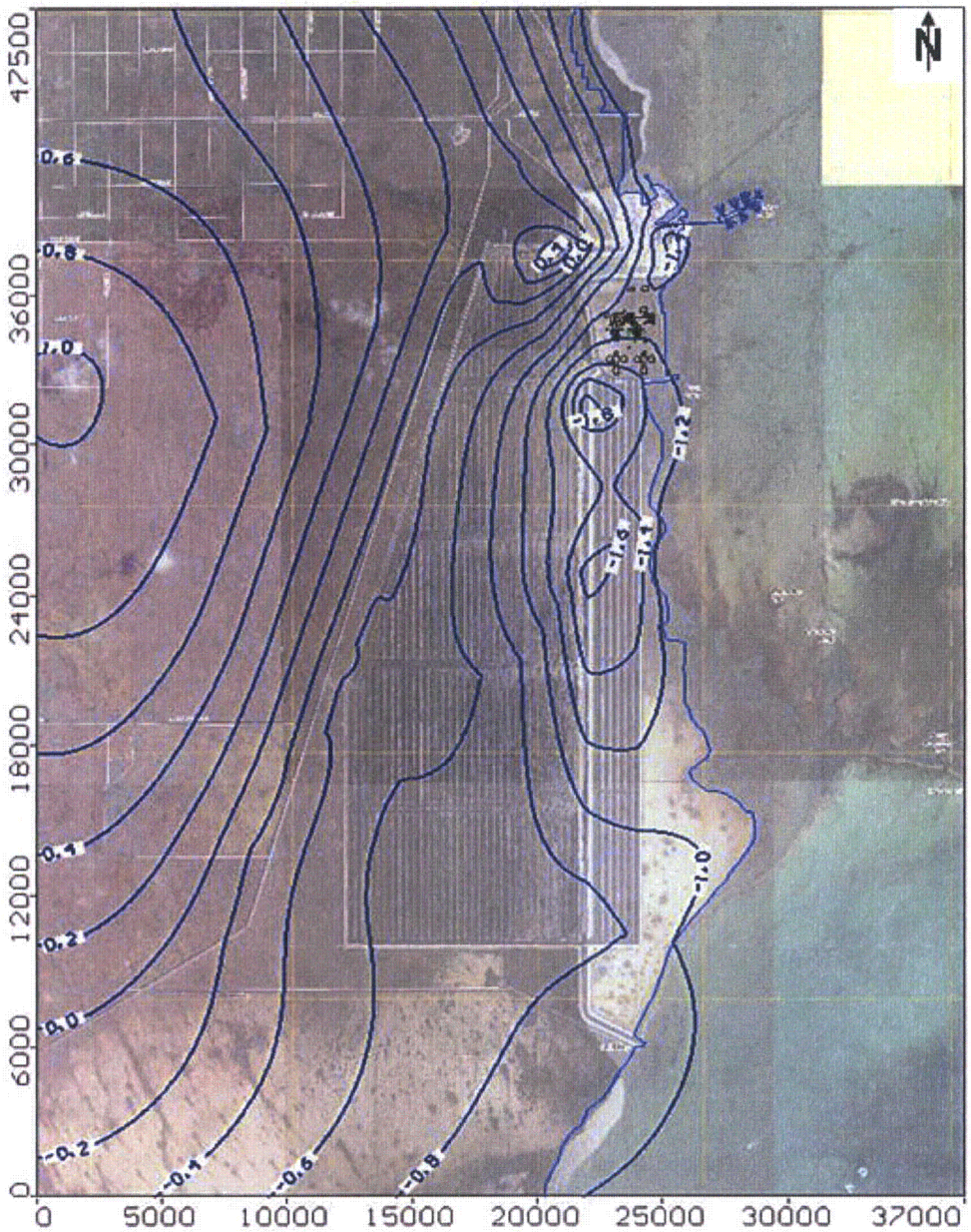
Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 42. Simulated Groundwater Contours – Model Layer 9 – Fort Thompson Formation



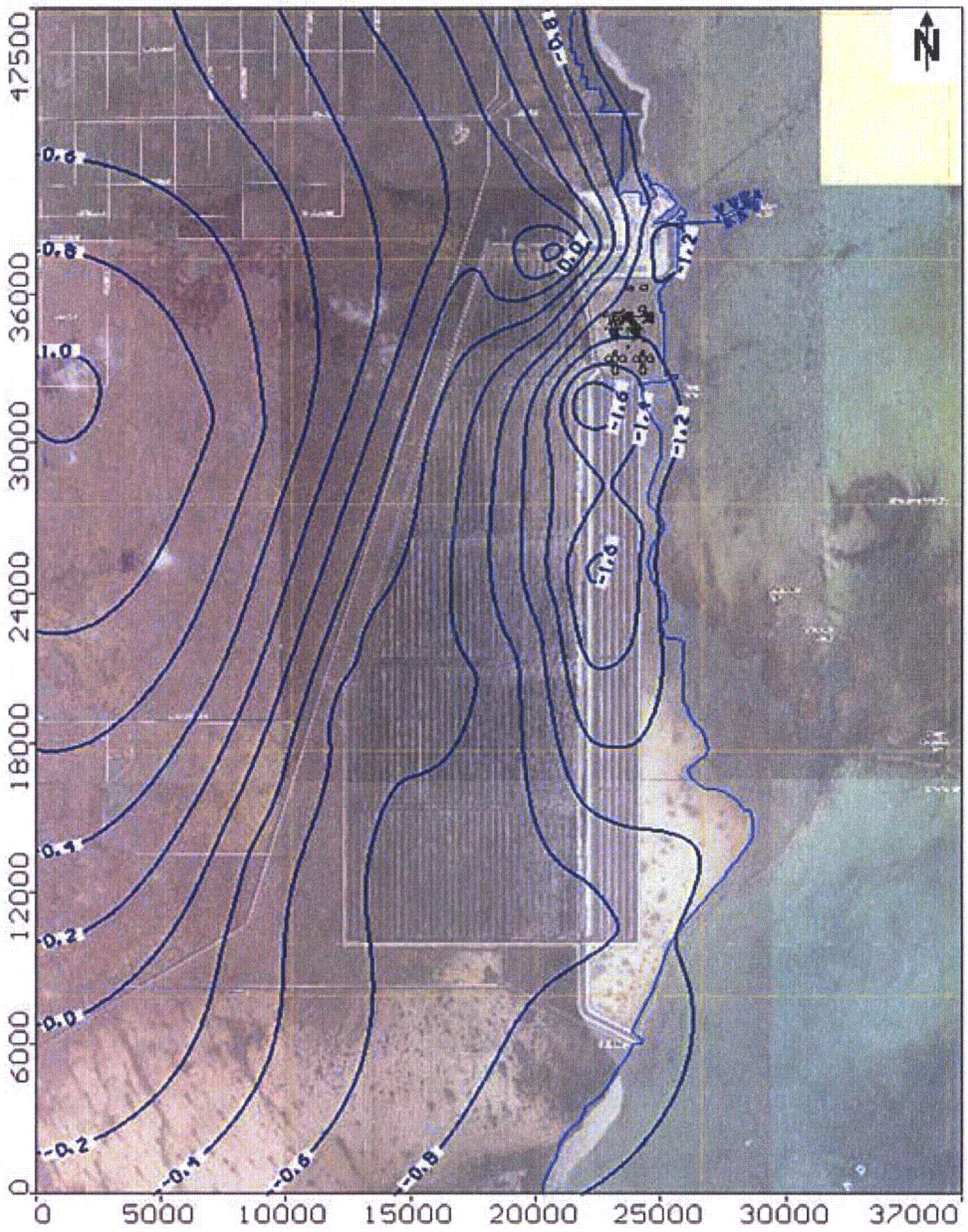
Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 43. Simulated Groundwater Contours – Model Layer 10 – Lower Higher Flow Zone



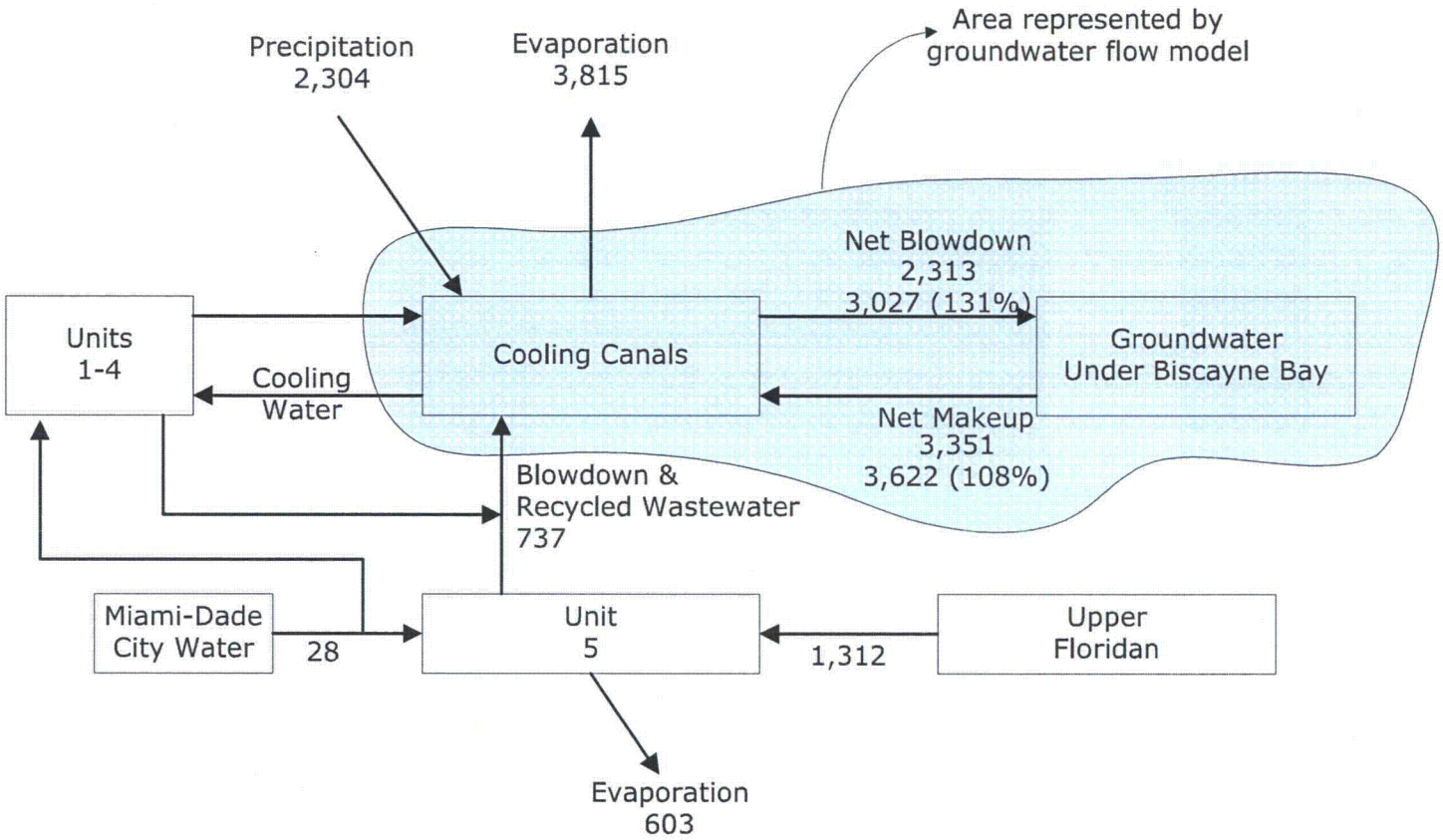
Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 44. Simulated Groundwater Contours – Model Layer 14 – Tamiami Formation



Legend: Contour interval is 0.2 feet (NAVD 88)
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 45. Existing Cooling Canals Water Balance – Comparison with Groundwater Model



Note: Values in acre-ft/month.

Top value is plant at full capacity from surface water model (Reference 33), lower value is from groundwater model at average plant conditions. Value in parentheses is percentage difference between surface water model and groundwater model.

Figure 46. Model Validation – Layout of Pumping and Observation Wells for Pumping Test PW-6U

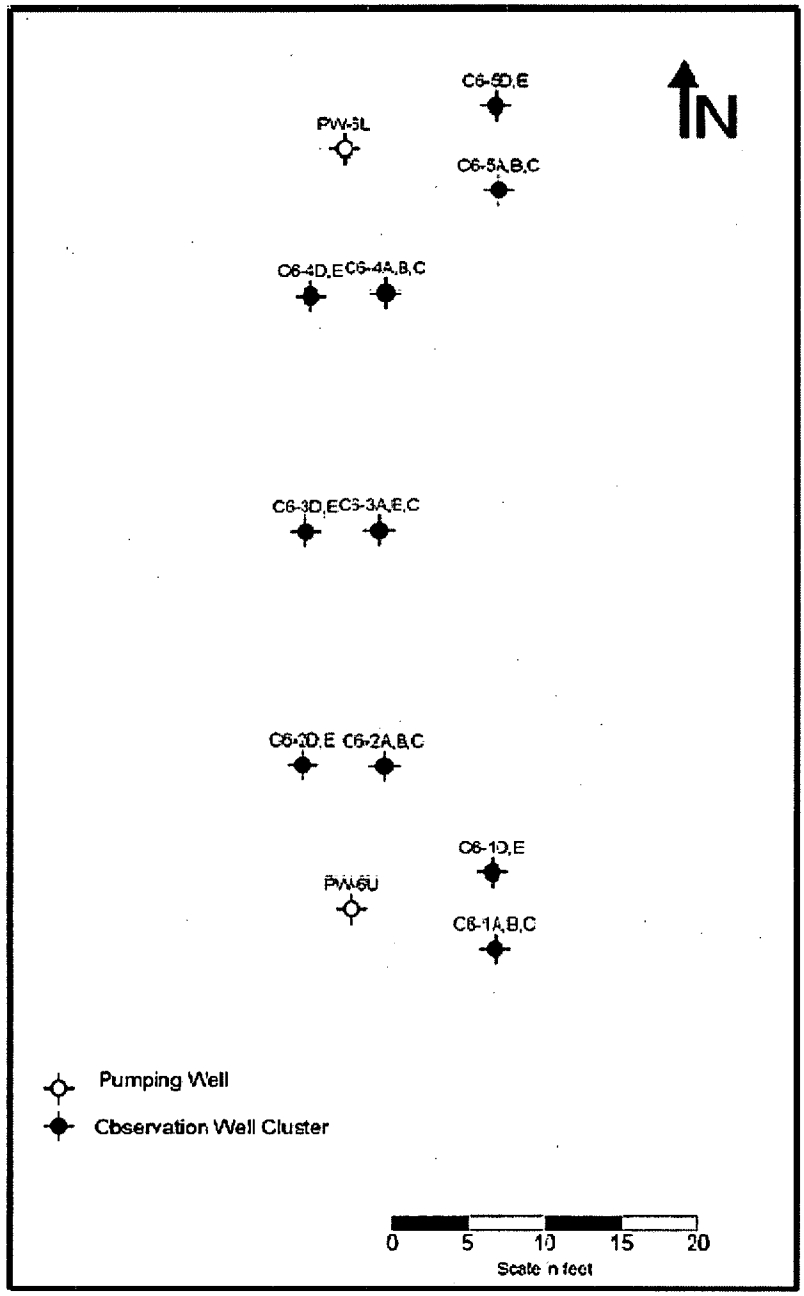


Figure 47. Test Well PW-6U: Observed versus Calculated Drawdowns

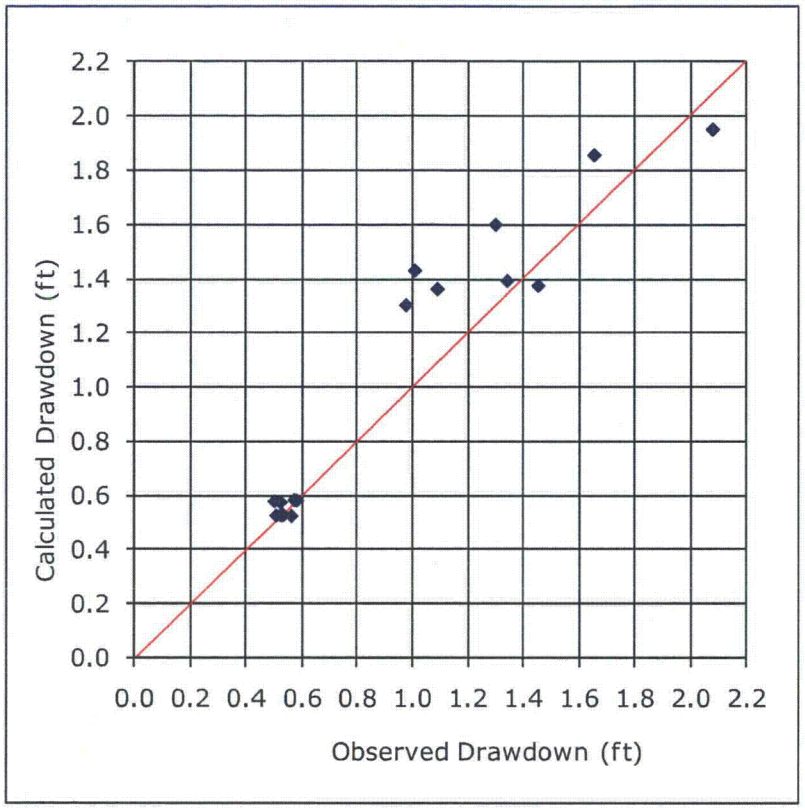
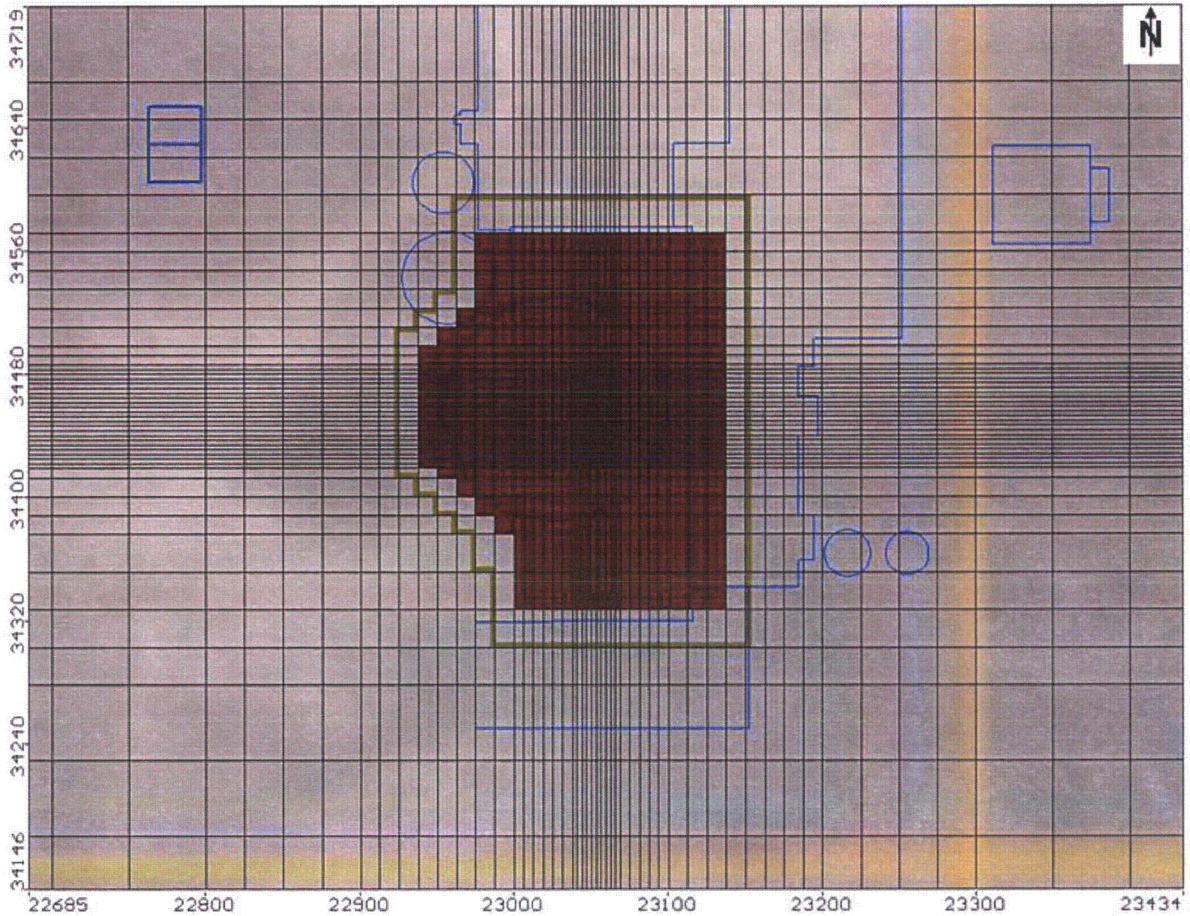


Figure 48. Location of Units 6 & 7 Construction Dewatering Cut-Off Walls

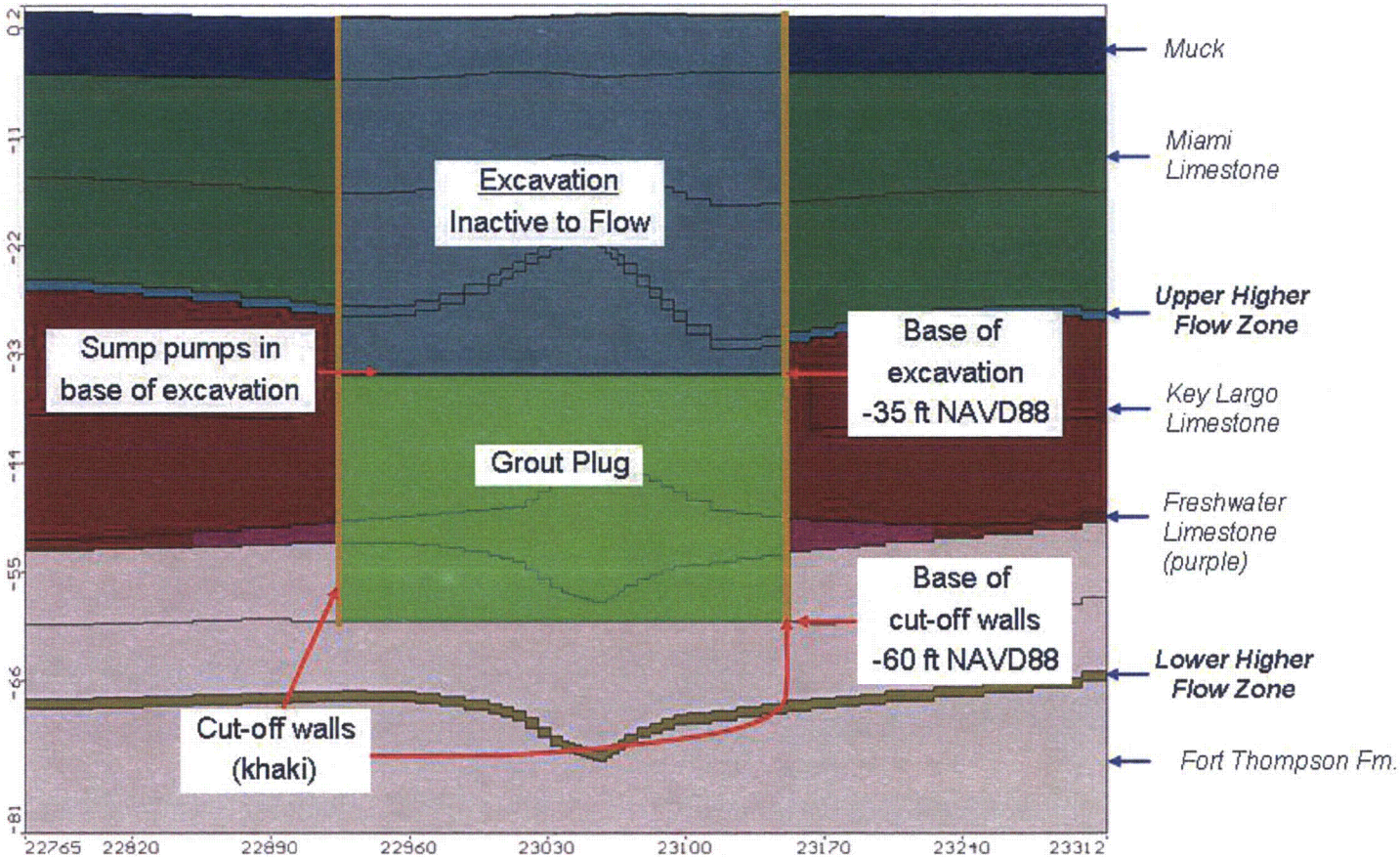
Legend: Blue lines represent cut-off walls.

Figure 49. Location of Units 6 & 7 Construction Cut-Off Walls, Simulated Sump Pumps, and Gridlines



Legend: Blue lines represent reactor building and associated structures. Khaki cells represent implementation of MODFLOW's HFB flow package in model to represent cut-off walls. Red cells represent sump pumps (inside cut-off walls).

Figure 50. Cross Section of Model Setup for Units 6 & 7 Excavations



Note: Cut-off walls extended to top of model domain for illustration only
Section Across Row 218. Vertical Exaggeration 5:1

Figure 51. Grouting Holes Spacing and Frequency during Proposed Grouting Method

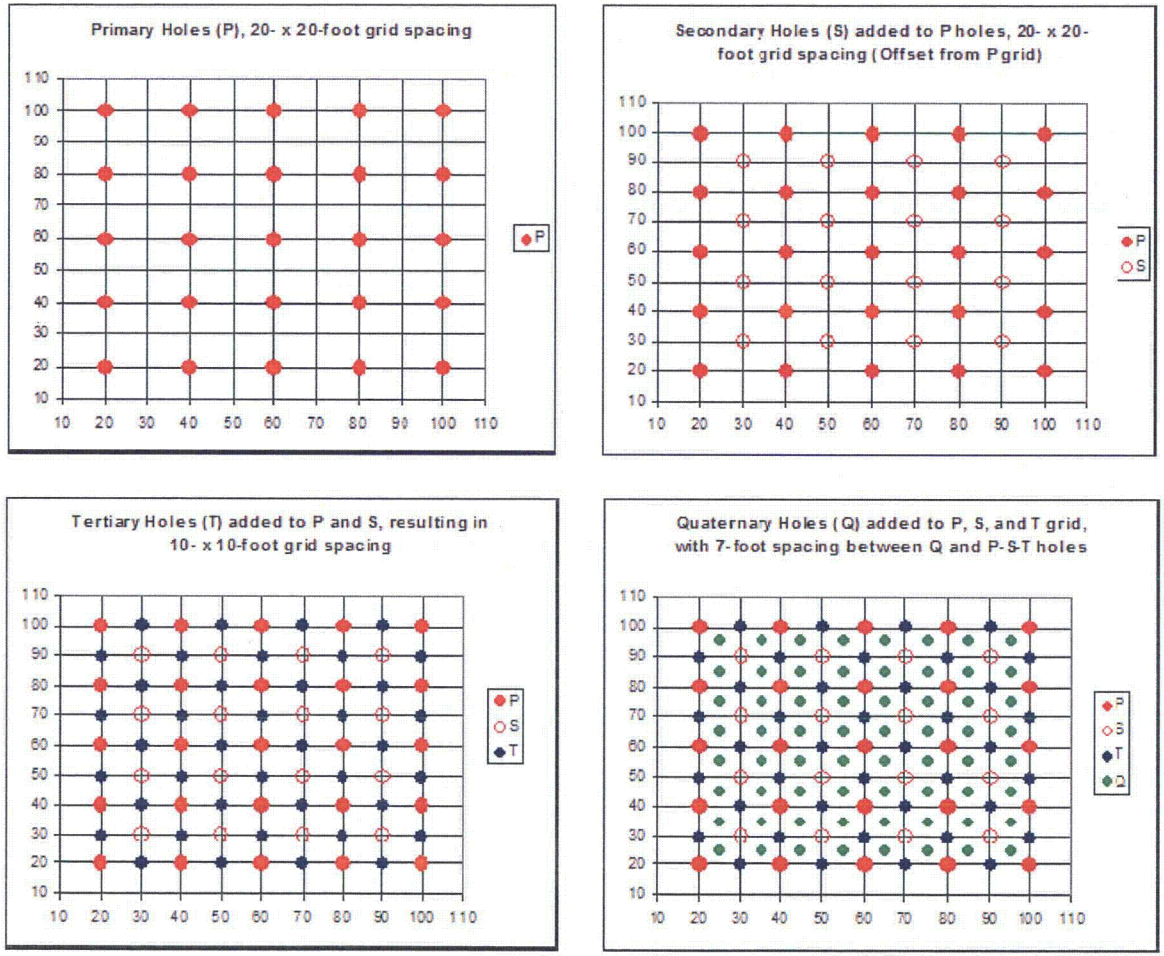


Figure 52. Comparison of Pumping Rates under Different Grouting Scenarios

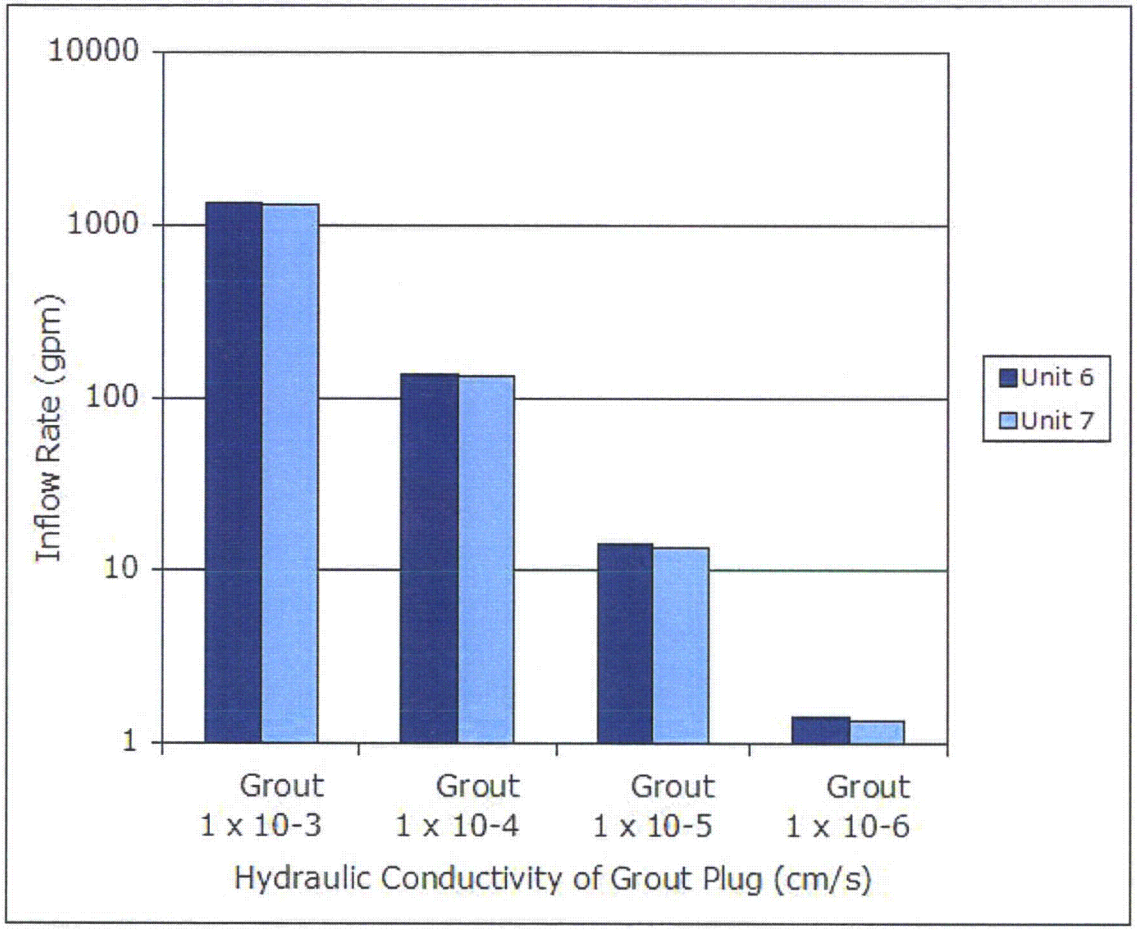


Figure 53. Post-Construction Recharge Zones for Units 6 & 7

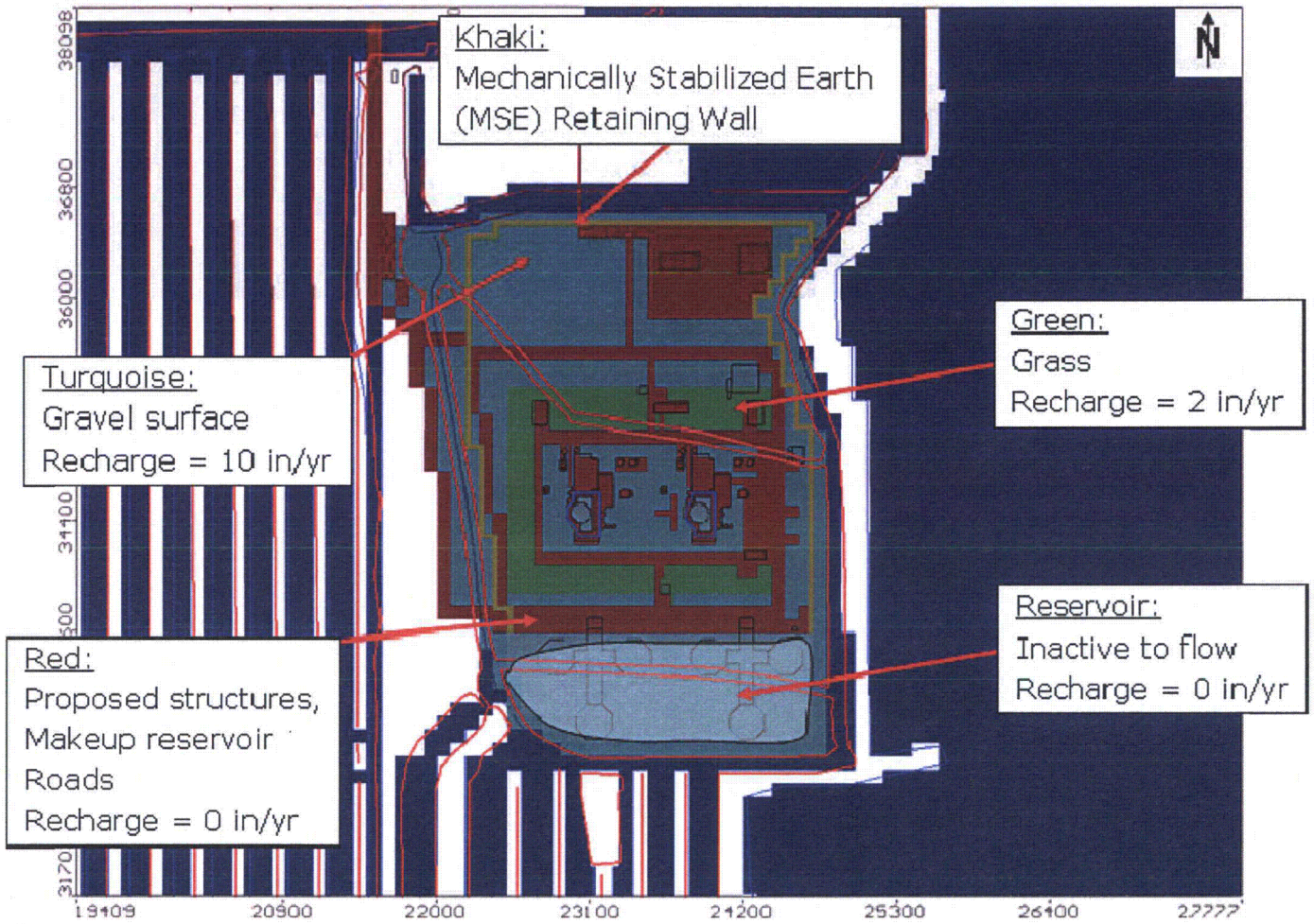
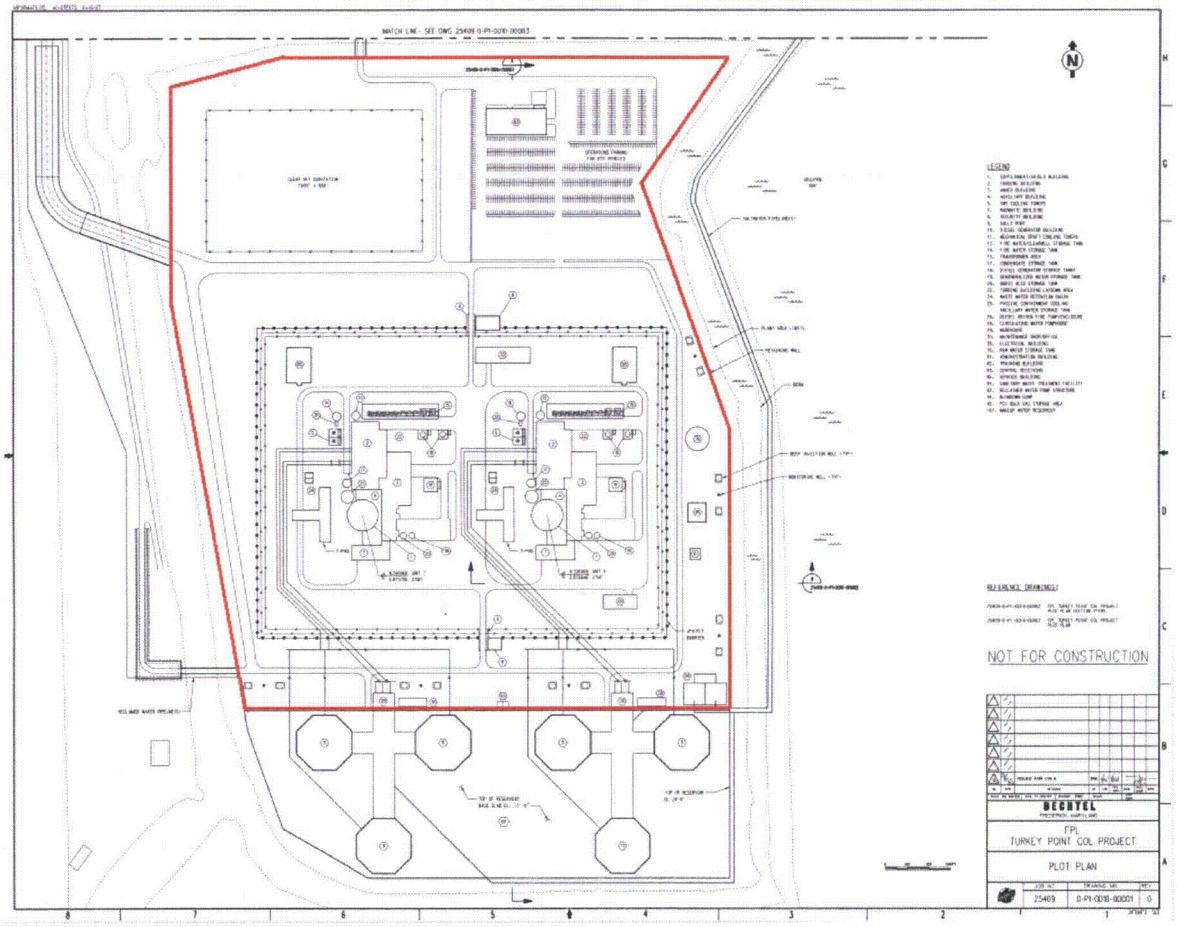
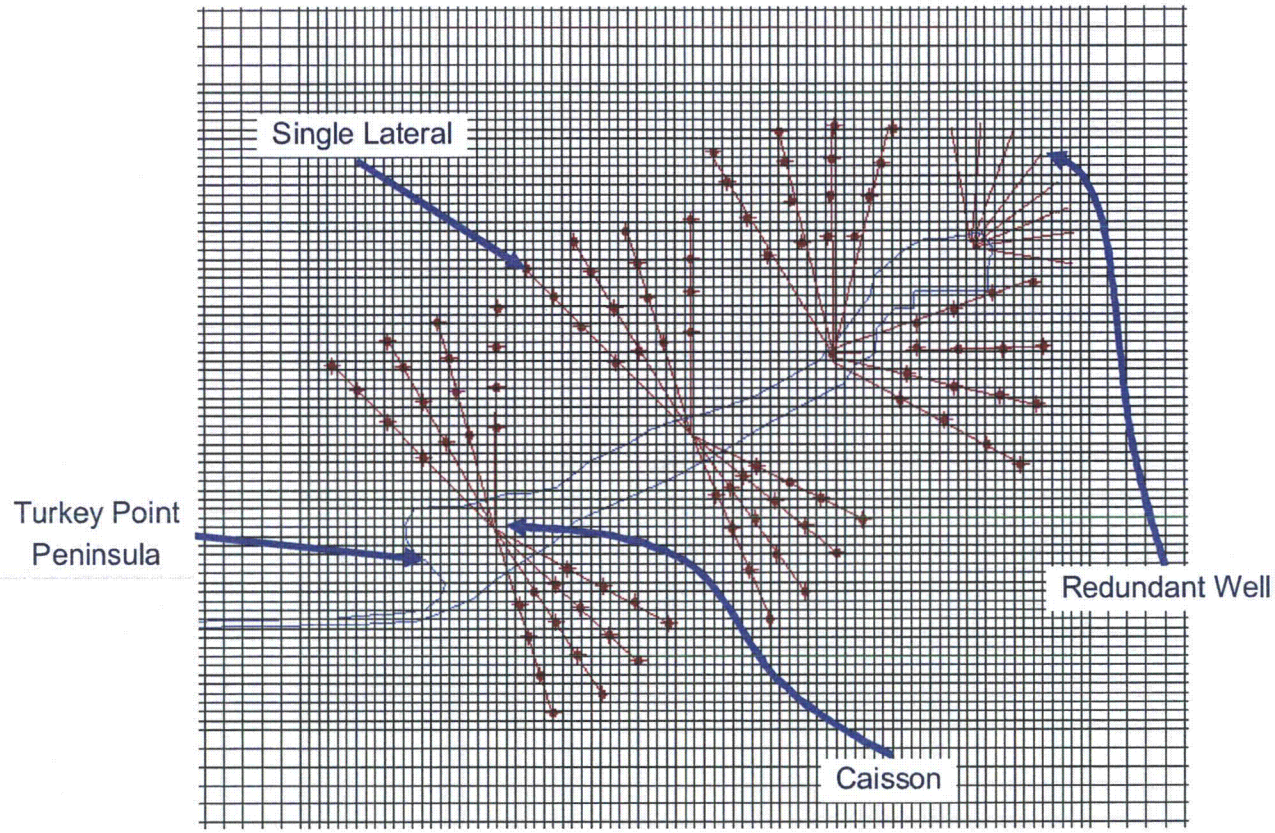


Figure 54. Location of Mechanically Stabilized Earth Retaining Walls around Perimeter of the Turkey Point Units 6 & 7 Plant Area (Excluding the Makeup Water Reservoir)



Note: Mechanically stabilized earth retaining walls highlighted in red.

Figure 55. Location of Radial Collector Wells and Laterals, with Finite-Difference Grid and Pumping Well Locations Overlaid



Note: Dark red lines = radial collector well arms. Dark red symbol = pumping well node. .

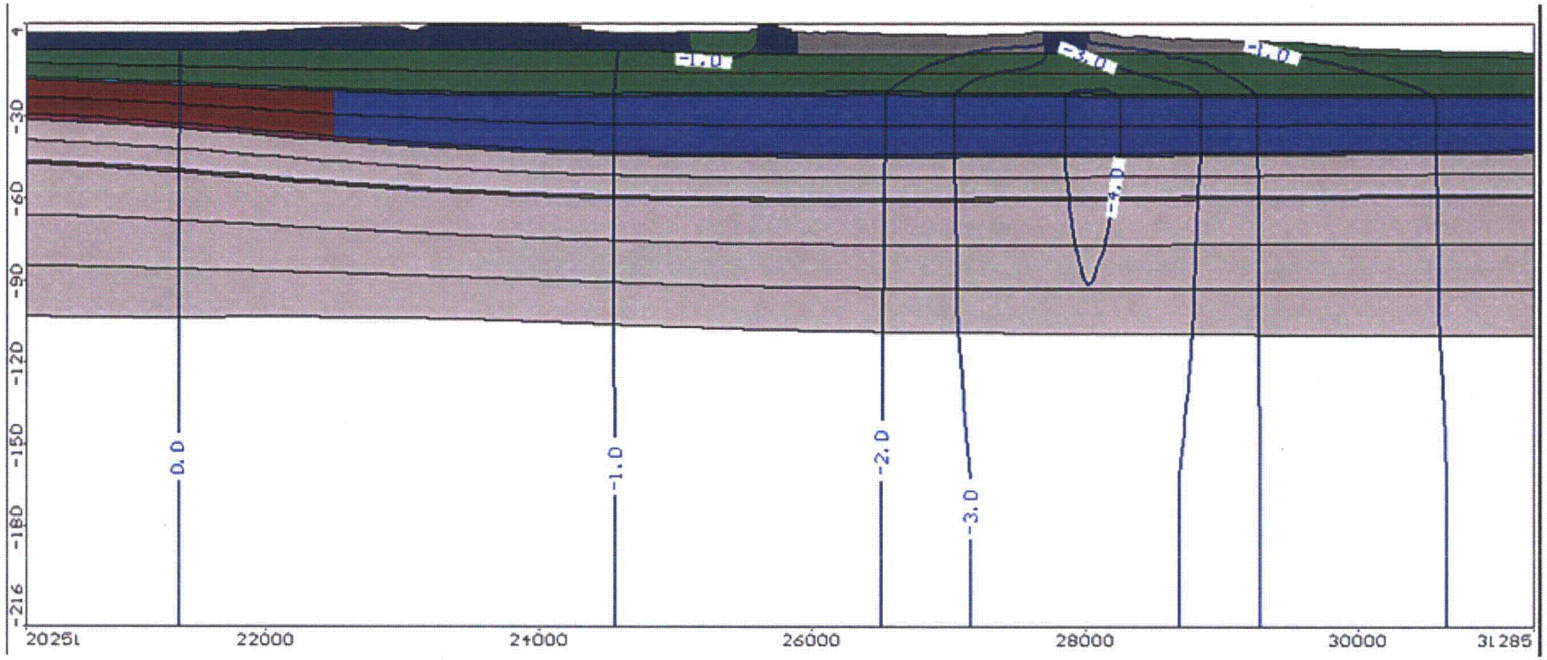
Figure 56. Potentiometric Surface within the Upper Higher Flow Zone during Radial Collector Well Simulations

Legend: Blue lines are equipotentials in 0.5 feet increments.
Note: the Upper Higher Flow Zone is above the Key Largo Limestone and is the zone from which the RCW system is pumped. Light yellow portion in top right is where aerial imagery is not available.

Figure 57. Head Contours in Layer 1 during Radial Collector Well Simulations

Legend: Blue lines are equipotentials in 1 foot increments.
Note: Light yellow portion in top right is where aerial imagery is not available.

Figure 58. Cross Section through Turkey Point Peninsula Showing Groundwater Contours Resulting from Operation of the RCW System

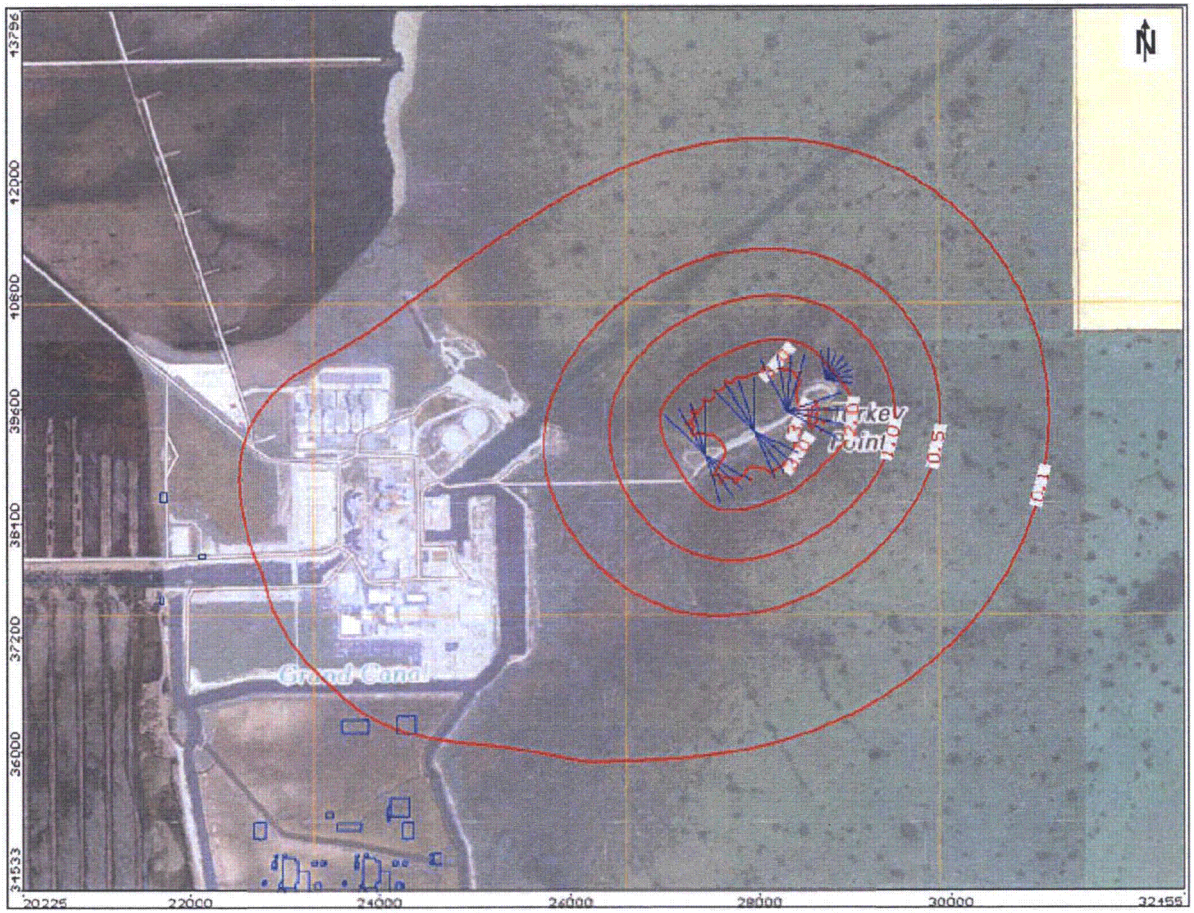


Legend: Blue lines are equipotentials in 1 foot increments.
Note: Section Across Row 120, Vertical Exaggeration = 20:1

Figure 59. RCW Drawdown within the Top Layer

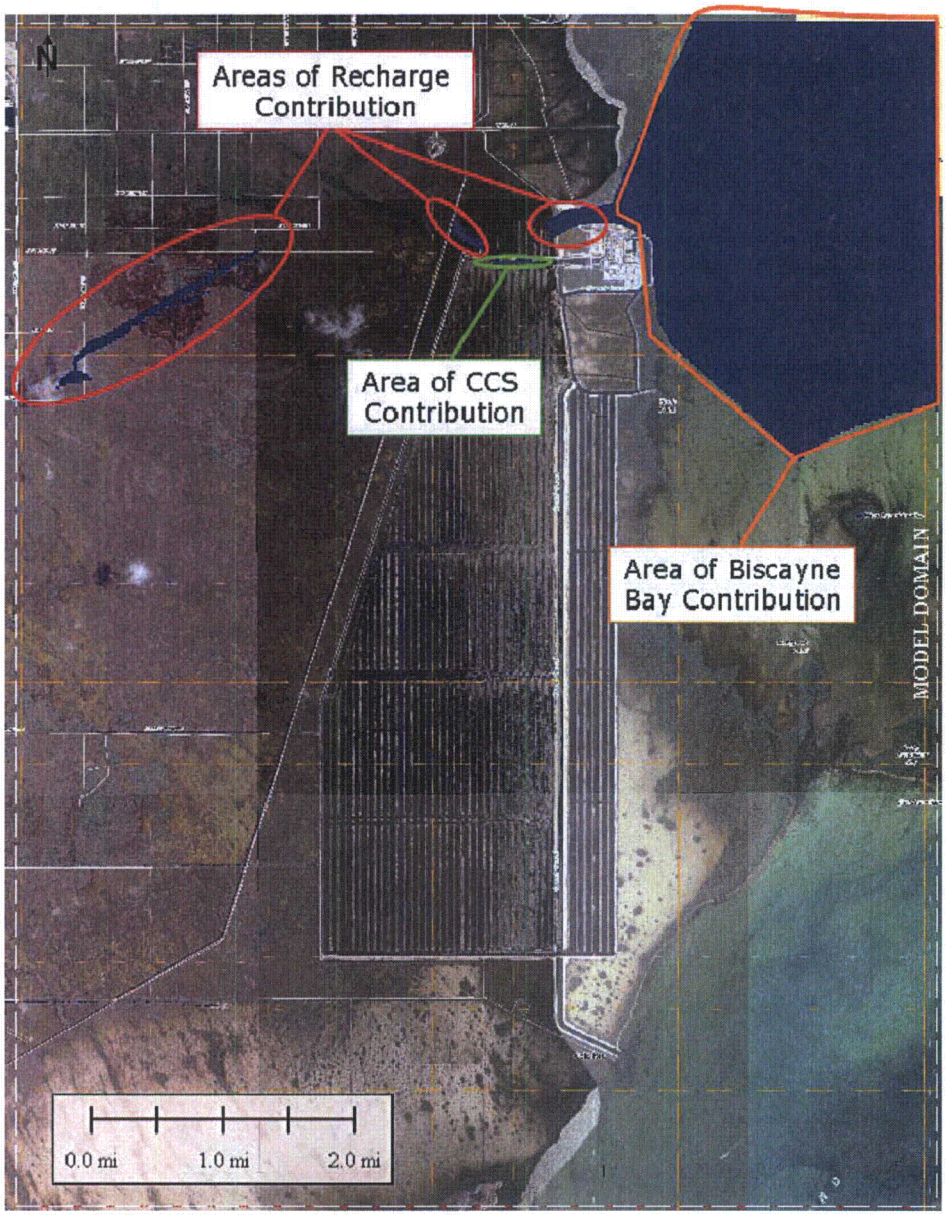
Note: Thin red line = 0.1, 0.5, 1.0, 2.0, and 3.0 foot drawdown contours. Light yellow portion in top right is where aerial imagery is not available.

Figure 60. RCW Drawdown within the Pumped Layer (Upper Higher Flow Zone)



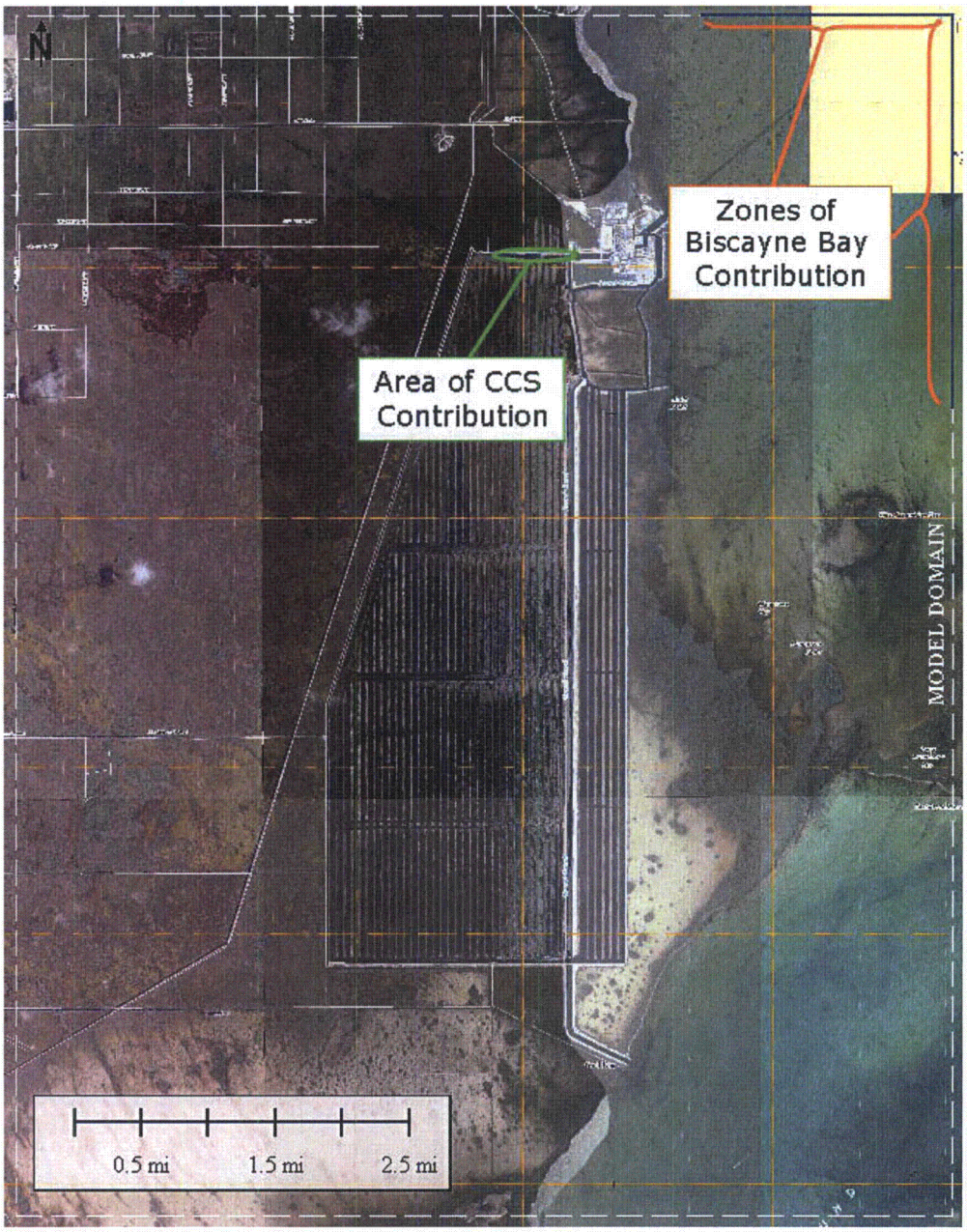
Note: Thin red line = 0.1, 0.5, 1.0, 2.0, and 3.0 foot drawdown contours. Light yellow portion in top right is where aerial imagery is not available. Approximate elevation of Upper Higher Flow Zone underneath Turkey Point Peninsula is -22 ft NAVD 88..

Figure 61. Origin of Flow to the RCW System (Layer 1)



Note: Blue areas show origins of water contributing to RCW system.

Figure 62. Origin of Flow to the RCW System (Layer 2)



Note: Blue areas show origins of water contributing to RCW system.

Figure 63. Additional Areas for RCW Approach Velocity Calculation

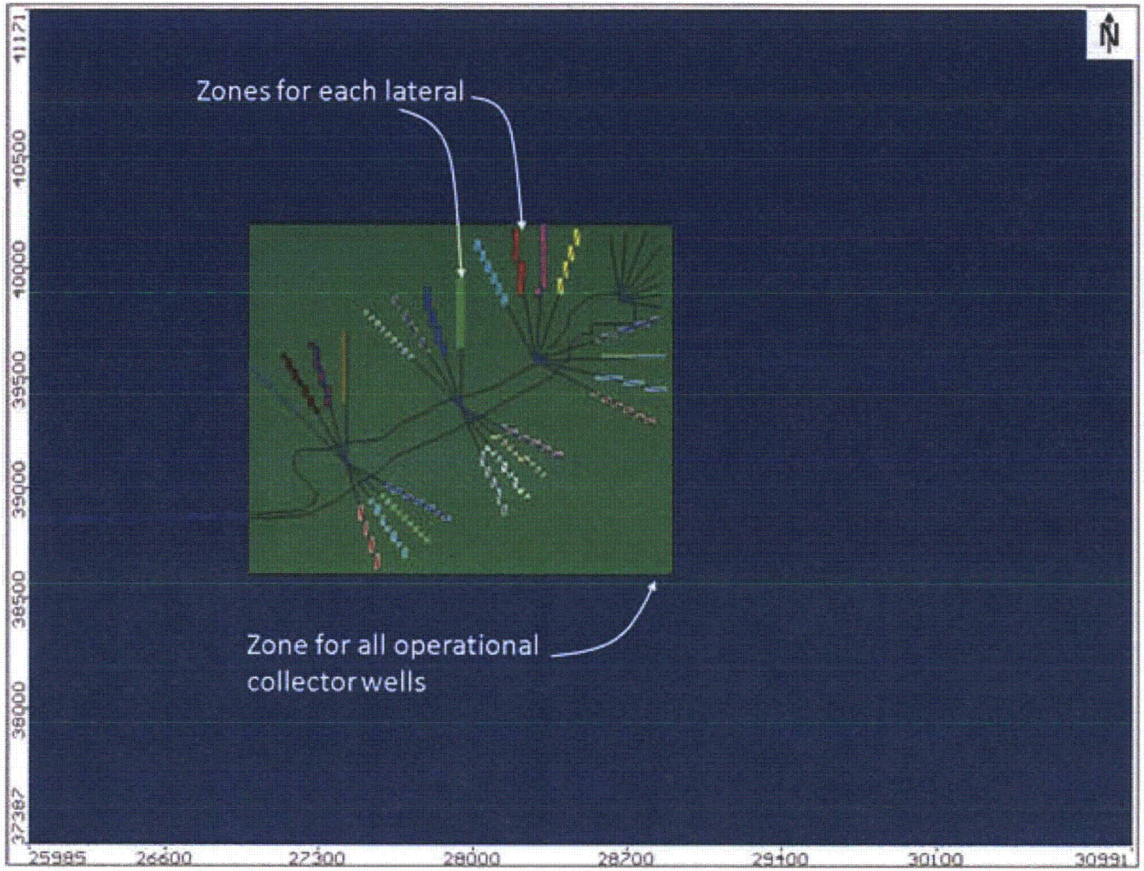
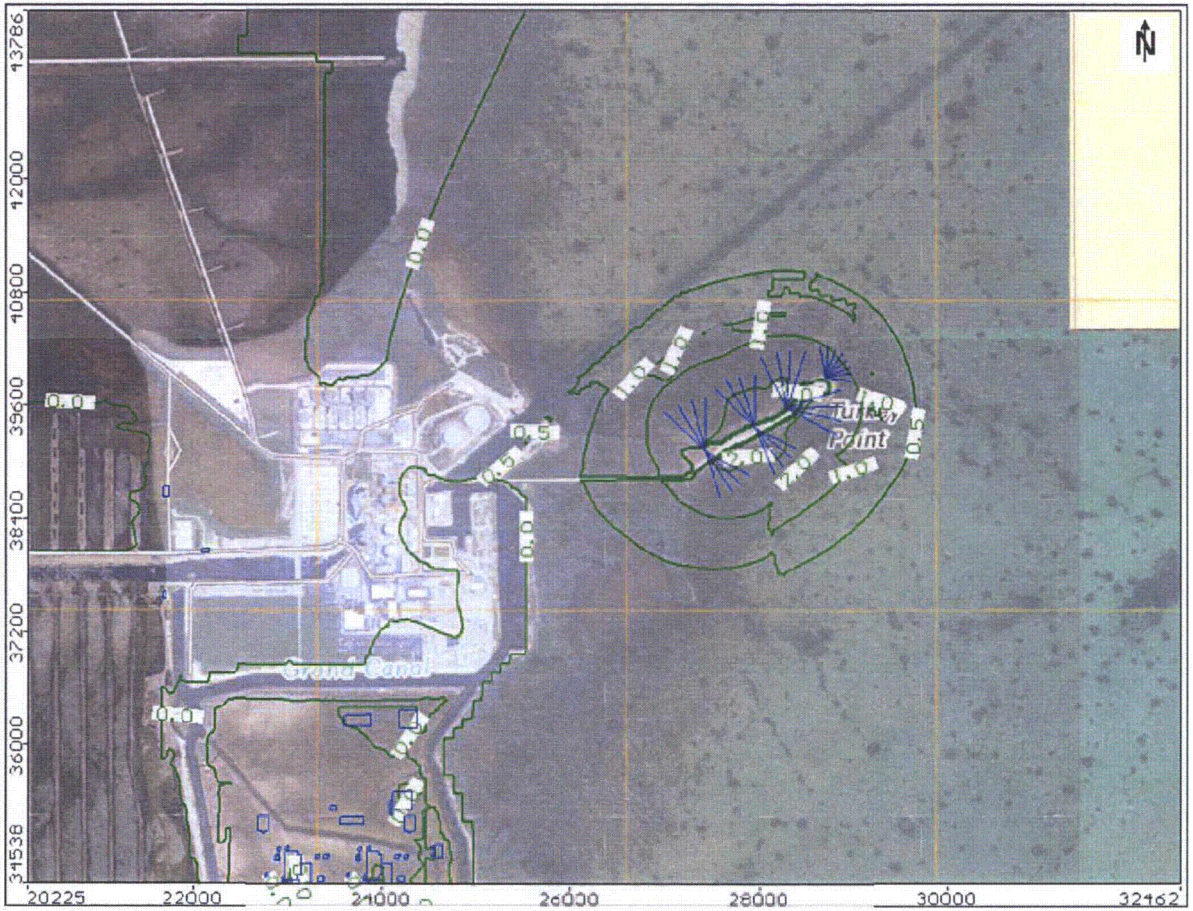


Figure 64. Calculated Flux of Water between Layers 1 and 2 (Darcy Velocity)



Notes: Units in ft/day. Light yellow portion in top right is where aerial imagery is not available.

Figure 65. RCW Drawdown within the Top Layer (0.1 ft drawdown contour) – Seasonal High and Low Water Level Biscayne Bay

Figure 66. RCW Drawdown within the Top Layer (0.1 ft drawdown contour) – Sensitivity Case Biscayne Bay Vertical Hydraulic Conductivity

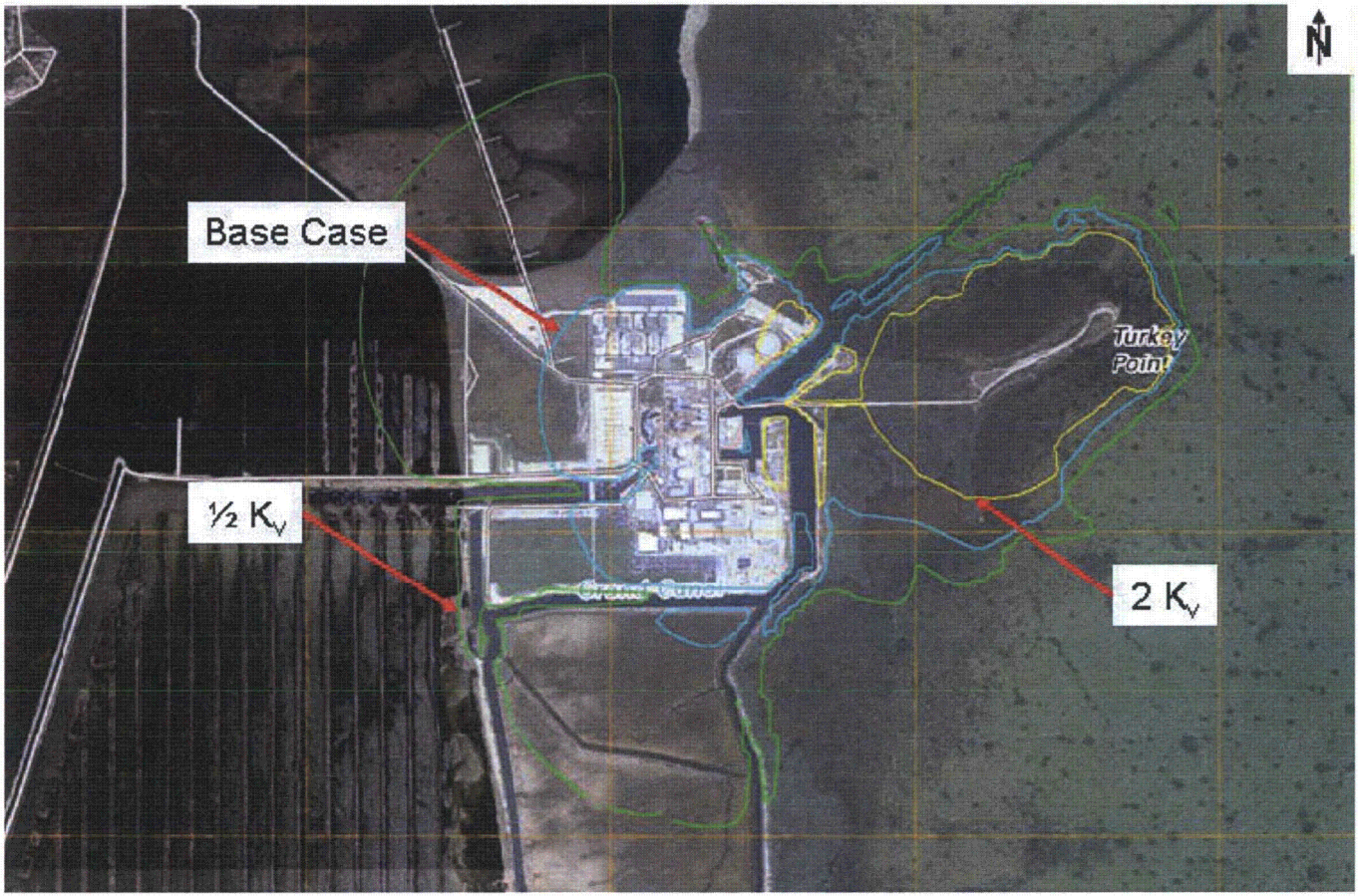
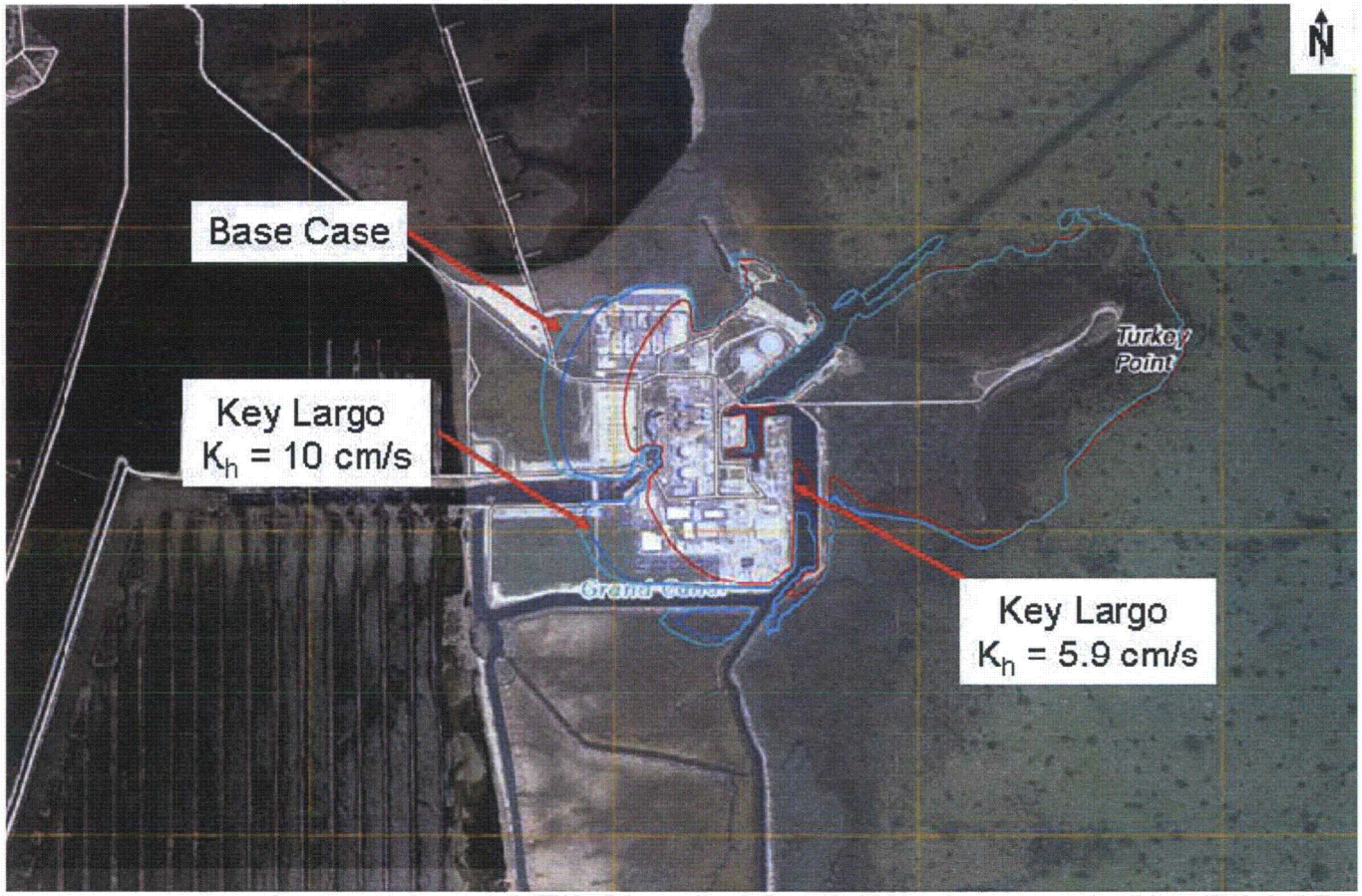



Figure 67. RCW Drawdown within the Top Layer (0.1 ft drawdown contour) – Hydraulic Conductivity of Key Largo Limestone