FPL

L-2012-031
10 CFR 52.3

January 23, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Florida Power & Light Company
Proposed Turkey Point Units 6 and 7
Docket Nos. 52-040 and 52-041
Response to NRC Request for Additional Information Letter 1112081
(RAI 5765) Related to ESRP Section 4.2 – Water-Related Impacts

Reference:

1. NRC Letter to FPL dated December 8, 2011, Environmental Request for Additional Information Letter 1112081 Related to ESRP Section 4.2, Water-Related Impacts, for the Combined License Application Review for Turkey Point Units 6 and 7

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 4.2-1 and 4.2-3 through 4.2-10 provided in the referenced letter. The attachment identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable). The response to RAI 4.2-2 will be provided by March 23, 2012.

If you have any questions, or need additional information, please contact me at 561-691-7490.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 23, 2012.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFO

Attachment 1: FPL Response to NRC RAI No. 4.2-1 (RAI 5765)
Attachment 2: FPL Response to NRC RAI No. 4.2-3 (RAI 5765)
Attachment 3: FPL Response to NRC RAI No. 4.2-4 (RAI 5765)
Attachment 4: FPL Response to NRC RAI No. 4.2-5 (RAI 5765)
Attachment 5: FPL Response to NRC RAI No. 4.2-6 (RAI 5765)
Attachment 6: FPL Response to NRC RAI No. 4.2-7 (RAI 5765)
Attachment 7: FPL Response to NRC RAI No. 4.2-8 (RAI 5765)
Attachment 8: FPL Response to NRC RAI No. 4.2-9 (RAI 5765)
Attachment 9: FPL Response to NRC RAI No. 4.2-10 (RAI 5765)

cc:
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO
Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-1 (RAI 5765)

Provide a discussion of how storm water drainage patterns on the Turkey Point property will be modified from the current conditions during and following construction, and how they may alter freshwater flows into Biscayne Bay and into groundwater.

FPL RESPONSE:

An analysis of pre- and post-development stormwater flows, based on a 25-year, 72-hour design storm was performed by FPL in the report titled *Stormwater Management Plan and Calculations, Revision 1* (FPL 2011). This analysis was performed for the Units 6 & 7 plant area, laydown area, nuclear administration building, training building, parking area, and the reclaimed water treatment facility. It should be noted that no stormwater flows into Biscayne Bay from these areas currently, and no stormwater will flow into Biscayne Bay post-development from these areas, with the exception of the Turkey Point peninsula. A discussion of the drainage analysis is presented in the following paragraphs.

Currently, the nuclear administration building, training building, and parking area are surrounded by berms. Stormwater runoff in these sub-basins currently does not release by surface release to the industrial wastewater facility (IWWF). Stormwater in these areas remains in the sub-basins and infiltrates into the ground within the IWWF. The pre-development analysis included the Turkey Point Units 6 & 7 plant and laydown areas, which drain into the IWWF. The pre-development area was approximately 244 acres. Figure 2 of *FPL 2011* depicts the Turkey Point Unit 6 & 7 Site pre-development drainage plan. The Soil Conservation Service (SCS) runoff curve number (CN) method is used to estimate the stormwater runoff from the design storm rainfall. Based on this methodology, the pre-development design storm peak runoff for the previously discussed area was calculated to be 244.64 acre-ft.

Post-development design storm analysis considered the Units 6 & 7 plant area, laydown area, nuclear administration building, training building, and parking area. The finished Units 6 & 7 plant area will consist of the Units 6 & 7 power block, parking area, Clear Sky substation, the area outside of the power block that contains the road and swales, and makeup water reservoir. The laydown area consists of a heavy haul road that connects the plant area to the area north of the Site, the bridge over the west return canal of the IWWF, and the bridge over the canal north of the nuclear administration building, training building and parking area.

In the post-development condition, stormwater runoff from the power block, Clear Sky substation, laydown area, parking area, nuclear administration building, training building, and

parking area adjacent to those buildings would release to the IWWF. Figure 8 of *FPL 2011* depicts the proposed Turkey Point Unit 6 & 7 Site post-development condition drainage plan. The area for the makeup water reservoir is not included in post-development analysis because it is hydraulically isolated from surface water flow. The calculated post-development design storm peak runoff into the industrial wastewater facility was 241.55 acre-ft, or 3.08 acre-ft less than at the pre-development condition (Note: The difference between the pre- and post-development conditions has not been adjusted for "numerical rounding").

The stormwater management for the FPL reclaimed water treatment facility, located northwest of the Site, is discussed in the following paragraphs (FPL 2011).

The pre-development design storm (25-year, 72-hour) peak runoff for the reclaimed water treatment facility was calculated to be 43.91 acre-ft, which is released to the surrounding wetlands.

All post-development stormwater associated with industrial activity (equipment area runoff) will be captured, treated as necessary and reused in the reclaimed water treatment process. Runoff from other areas (non-equipment areas) will be routed to stormwater management facilities (basins) and released to the surrounding wetlands. These basins will be designed to handle the 25-year, 72-hour design storm event. The post-development design storm peak runoff was calculated to be 34.07 acre-ft, or 9.84 acre-ft less than pre-development conditions.

Based on the above analyses, stormwater flow into the IWWF from the plant area during the post-development design storm will be reduced by 3.08 acre-ft and stormwater flow into local drainage areas from the reclaimed water treatment facility will be reduced by 9.84 acre-ft. Due to the lower peak discharges, slightly less stormwater will flow into the IWWF and potentially local groundwater, via the seepage through the IWWF. Therefore, there will be less of an impact from stormwater flow to groundwater under post-development conditions, based on the peak discharges when compared to pre-development conditions. Additionally, since the water level in the easternmost canal is lower than that of Biscayne Bay, flow is generally toward the cooling canals at this location, and since stormwater drains directly into the IWWF or is released to surface wetlands, there will be no impact to Biscayne Bay based on these lower stormwater discharge values.

The stormwater analysis for construction for the radial collector wells and ancillary items (e.g., pipelines) on Turkey Point is not complete. However, as discussed below, best management practices will be used to ensure the protection of Biscayne Bay, particularly with regard to erosion control, for construction work performed in this area.

Construction erosion control and stormwater drainage plans, including expected stormwater discharges during construction, are not available at this time. However, a general approach to construction erosion/stormwater control, as presented in ER Sections 3.9.1.6 and 4.1.1.1.2 is summarized as follows:

- To minimize potential impacts on the cooling canals, the Units 6 & 7 plant area would be first isolated from the industrial wastewater facility by installing temporary sheet piling. Eventually additional erosion protection such as riprap would be installed along the perimeter of the plant area adjacent to the canals.

- During construction, grading and drainage would be designed to minimize erosion during the construction period. The spoils storage area would be bermed to minimize the amount of drainage from the spoils into the industrial wastewater facility. While water quality treatment is not required, sediment control devices such as hay bales or gravel filters may be used to ensure sediment from the spoils does not physically impact the cooling canals of the industrial wastewater facility.

The submission of the required construction stormwater design and necessary plans (e.g., Stormwater Management Plan and Construction Pollution Prevention Plan) will be according to state and local requirements.

This response is PLANT SPECIFIC.

References:

FPL 2011. Stormwater Management Plan and Calculations, Revision 1. Available at http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Completeness/Plant_Associated_Facilities/4th_Round_Completeness/FPL%20Response_4thCompleteness/SCA%20Appendix%2010.8%20Rev%201/Appendix%2010.8%20Rev%20001%20(final).pdf. Accessed January 18, 2012.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-3 (RAI 5765)

Discuss the possibility for, and consequences of, the cooling canals' capacity being exceeded at any time, including the effect of dewatering. Also discuss the change in head on the subsurface plume of hypersaline waters from the IWF caused by dewatering.

FPL RESPONSE:

The circulating water flow rate in the industrial wastewater facility for Units 1 through 4 is 4250 cubic feet per second (2747 million gallons per day [MGD]). The extracted groundwater from dewatering (1200 gpm or 1.7 MGD), which would be released into the cooling canals of the industrial wastewater facility, is approximately 0.06 percent of the circulating water flow rate.

Due to the circulating flow in the industrial wastewater facility, water levels are highest on the west side, in the distribution canals, and lowest on the east side, in the return canals. Based on *The Turkey Point Cooling Canal Study* (Lyerly, 1998), water levels in the industrial wastewater facility are above local sea level in the distribution canals and below local sea level in the return canals. The water elevation at the south end of the cooling canals is approximately that of local sea level. Typically, the water elevation at the plant intake is 1.4 feet below the water elevation at the south end and the water elevation at the plant outlet to the canals is 1.7 feet above the water elevation at the south end. Therefore, the average water level in the distribution canals on the west side of the industrial wastewater facility is 0.85 feet above local sea level, and the average water level in the return canals on the east side of the industrial wastewater facility is 0.70 feet below local sea level. Based on a water and a mass (dissolved solids) balance, approximately 32 MGD flows into the industrial wastewater facility through the aquifer and approximately 24 MGD flows out (Golder Associates Inc., 2008). Hydraulic conductance (C) is defined as the product of the hydraulic conductivity and cross-sectional area of flow divided by length of the flow path and relates to Darcy's law as follows: $Q = C\ \Delta h$, where Q is the flow rate and Δh is the change in head over the flow path length (McDonald and Harbaugh, 1988). The hydraulic conductance of the aquifer on the outflow (western) side of the industrial wastewater facility is estimated to be approximately 28 MGD/feet (24 MGD / 0.85 feet) and the hydraulic conductance of the aquifer on the inflow (eastern) side is estimated to be approximately 45 MGD/ft (32 MGD / 0.70 feet).

If a new source of water is added to the canals, the average water level in the canals will increase. The total dewatering rate (bounding case) is estimated to be 1200 gpm or 1.73 MGD. If 1.73 MGD of new water is added to the canals, the new equilibrium water level will be approximately 0.024 feet (1.73 MGD / (28 MGD/ft + 45 MGD/ft) or 0.29 inches higher than normal. This change is not significant to the operation of the industrial wastewater facility

because seasonal and operational water level fluctuations in the canals are 1 foot to 3 feet, or more. Based on the anticipated dewatering flow, when compared to the total cooling canal flow, and the small amount of predicted water level increase, the cooling canals have adequate capacity for dewatering release.

It should also be noted that most, if not all, the dewatering effluent will come from within the IWWF. Therefore, most of the dewatering effluent is not "new" water, rather it is recycled water that originated from within the IWWF. Consequently, the impact analysis very likely overestimates the potential change in the water level.

The predicted change in water level in the cooling canals due to dewatering release, 0.29 inches, will have minimal impact on the hypersaline subsurface plume due to the small value, or amount of recharge, when compared to normal water level fluctuations in the cooling canal and due to the fact that the excavation dewatering is temporary in nature.

This response is PLANT SPECIFIC.

References:

Golder Associates Inc., 2008. *Cooling System Modeling Report*, January 13, 2008. Available at http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Completeness/Plant_Associated_Facilities/2nd_round_Completeness/FPL_Response_Part_A_Information/Attachments/2nd%20Round%20Attachments/Attachment%202SFWMD-B-40(33)_Cooling%20Canal%20System%20Report.pdf. Accessed January 18, 2012.

McDonald, M.G., and Harbaugh, A.W., 1988. A modular three-dimensional finite-difference ground-water flow model: U.S. Geological Survey Techniques of Water-Resources Investigations, book 6 chap. A1, 586p.

Lyerly, Ray, L., 1998. *The Turkey Point Cooling Canal Study,* October, 1998. Available at http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Completeness/Plant_Associated_Facilities/3rd_Round_Completeness/FPL_Response_3rd_Round_Completeness/Round_3_Response_Attachments/3SFWMD-B-46(45)/Lyerly%20report%201998.pdf. Accessed January 18, 2012.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-4 (RAI 5765)

Characterize the typical sedimentation rates and transport patterns along the shoreline of the Turkey Point Peninsula. Explain how sedimentation patterns will change locally due to coastal construction, including, but not limited to, dredging needed for the barge-turning basin and the emplacement of pipelines along the coast. In addition, provide an aerial photo prior to the original plant's construction (preferably early 1960's) which includes the Turkey Point Peninsula and coastal Biscayne Bay near the plant, including the barge turning area.

FPL RESPONSE:

Construction impacts to sedimentation and transport will be minimal based on the amount of dredging required, the location of earthwork, and the mitigation measures proposed. Therefore, the sedimentation rates and transport patterns along the shoreline in the vicinity of the barge turning basin, Turkey Point, and along the coastline are not provided.

As discussed in the response to EIS RAI 03.01-2 (FPL 2011), the enlargement of the equipment barge unloading area would disturb approximately 0.75 acres. Dredging from a 0.1 acre area (4356 square feet) in the turning basin will be required. This construction disturbance will be isolated from the turning basin and Biscayne Bay through the use of sheet piles or other appropriate Best Management Practices (BMPs). Therefore, there will be minimal impact to sedimentation rates and transport patterns along the coastline as a result of this dredging.

The radial collector well caissons, and associated circulating water system pipelines will be installed on the Turkey Point peninsula. The water delivery pipelines from the radial collector wells will require excavation on the existing berm east of the plant area. This berm area is not located directly on the coast. According to the ER Section 4.2.1.1.8, constructing the radial collector well delivery pipelines and associated facilities would result in short-term alteration of surface flow patterns in the vicinity of the caissons and delivery pipelines. Unused excavated material would be placed in the designated spoils areas. Sedimentation barriers or other appropriate measures would be installed to limit potential impacts to surface water bodies. Once construction activities are complete, the drainage would be restored to preconstruction conditions. Impacts from hydrologic alteration of surface water because of construction activities associated with the radial collector well delivery pipelines and associated facilities would be small.

Finally, as depicted on ER Figure 2.2-5, the reclaimed water pipelines will not be located on the coastline and therefore will have no impact to sedimentation rates and transport patterns along the coast.

Aerial photographs including the Turkey Point plant property and vicinity (1963) have been included in Sheets 1 and 2.

This response is PLANT SPECIFIC.

References:

FPL 2011, Response to NRC Environmental Request for Additional Information Letter No. 1102233 (e-RAI 5482) Environmental Standard Review Plan Section 3.1 – External Appearance and Plant Layout, April 15, 2011. FPL to NRC Letter L-2011-130 (ADAMS Accession No. ML11108A146).

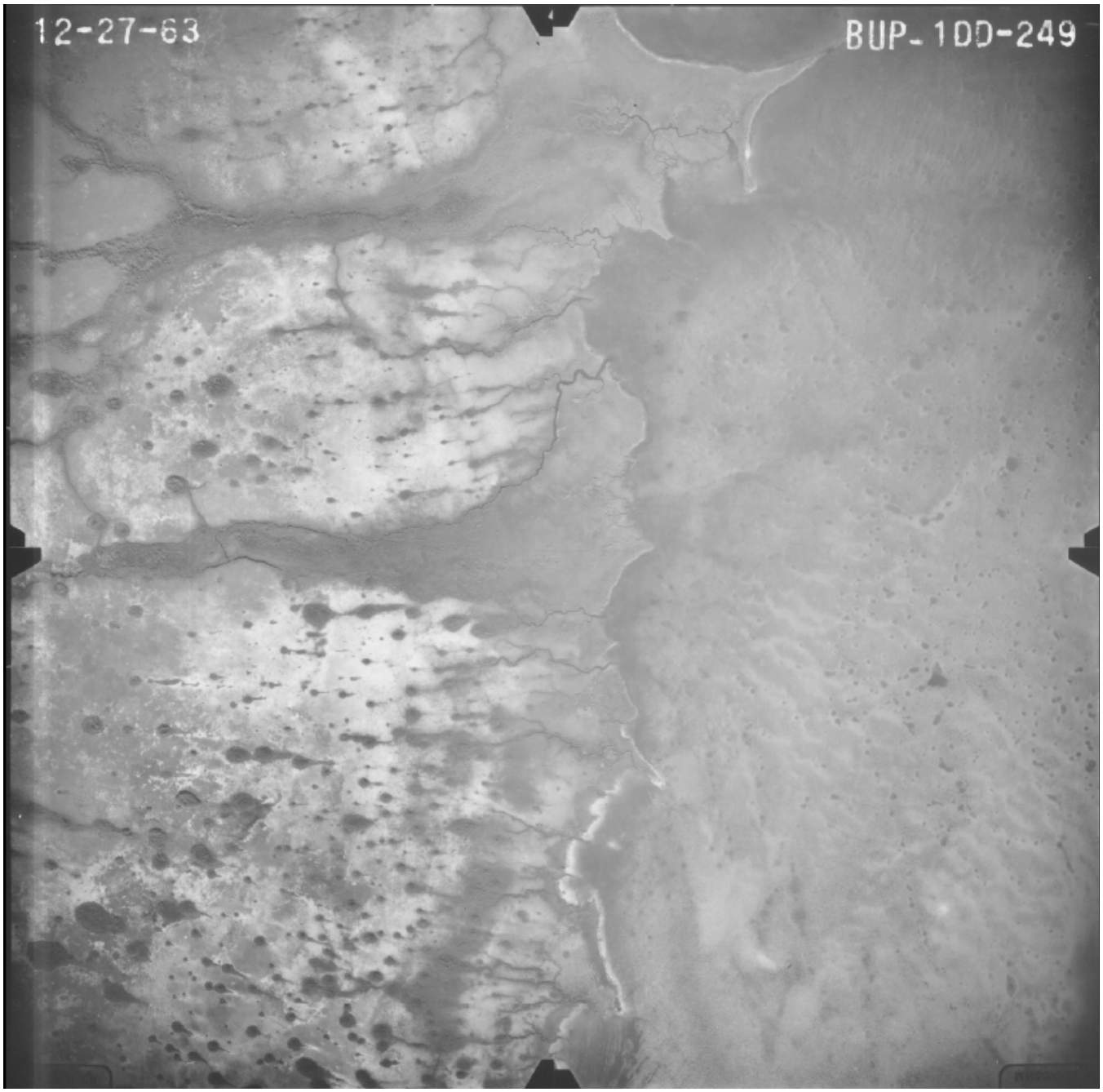
Turkey Point Plant Property and Vicinity Aerial Photograph (12/27/1963)

Sheet 1 of 2

Source: http://ufdc.ufl.edu/UF00071738/00023/129 accessed January 17, 2012.

Turkey Point Plant Property and Vicinity Aerial Photograph (12/27/1963)

Sheet 2 of 2



Source: http://ufdc.ufl.edu/UF00071738/00023/130 accessed January 17, 2012.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-5 (RAI 5765)

Provide all data being gathered for surface and ground waters associated with the Units 3 and 4 uprate monitoring program, including, but not limited to, water quality (salinity, temperature, TDS, dissolved oxygen, organics, heavy metals, nitrogen, phosphorus, carbon, tritium), velocity, and exchange measurements. The provided data should include some measures of its temporal variability and including any other sources of waste water to the cooling canals. This information is requested for the cumulative impacts analysis.

FPL RESPONSE:

The Turkey Point Units 3 & 4 Extended Power Uprate monitoring data and information is available at:
http://my.sfwmd.gov/portal/pls/portal/portal_apps.repository_lib_pkg.repository_browse?p_keywords=fpl&p_thumbnails=noT.

The *Turkey Point Plant Annual Monitoring Report, Units 3 & 4 Uprate Project* (Ecology and Environment 2011) provides an annual summary of the first year of uprate monitoring.

This response is PLANT SPECIFIC.

References:

Ecology and Environment, Inc., Turkey Point Plant Annual Monitoring Report Units 3 & 4 Uprate Project, prepared for FPL, August 2011. Available at http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/fpl_turkey_pt_2011_monitoring_rpt.pdf. Accessed January 18, 2012.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-6 (RAI 5765)

Describe the range of volumes of groundwater expected to be removed or the range of expected flow rates and durations, and describe the affected aquifers, for all anticipated dewatering activities associated with installation of pipelines, radial collector wells, transmission towers, roads, the reclaimed water treatment facility, and other buildings and facilities other than the power block excavations. Also describe specific techniques that will be used to control withdrawal rates and protect the quality of surface and groundwater.

FPL RESPONSE:

The range of volumes of groundwater expected to be removed or the range of expected flow rates and durations, and the potentially affected aquifers for all anticipated dewatering activities associated with the installation of pipelines, radial collector wells, transmission towers, roads, the reclaimed water treatment facility, and other buildings and facilities is not known at this time. However, based on the *Conceptual Earthwork and Materials Disposal Plan* (FPL 2011), the following information is available for dewatering activities, including potential areas that will require dewatering.

<u>Nuclear Administration Building, Training Building, Parking Area, Reclaimed Water Treatment Facility and Onsite Water Supply Pipeline</u>

There will be no pumping for general area dewatering activities associated with the nuclear administration building, training building, and parking areas. General area dewatering means dewatering of the entire area of interest (e.g., the nuclear administration building, training building, and parking area), or most of the area of interest, all at one time, such that significant declines in water level would be expected well away from the area of interest.

<u>Radial Collector Wells and Pipelines</u>

Some local small-scale dewatering will be required for the construction of the radial collector well caissons and the removal of water generated while drilling the laterals. In the case of local small-scale dewatering, significant drawdown would be confined to the area of interest. The areas involving dewatering may be isolated using sheet piling technology or equivalent.

Dewatering effluent from the construction of the laterals for the radial collector wells will be routed to the existing industrial wastewater facility to avoid release to surrounding surface waters or wetlands.

Temporary Access Roads Improvements, Transmission Structure Pads along SW 359th Street, Western laydown Area, Equipment Barge Unloading Area

No dewatering is anticipated at these areas.

Transmission Work Performed Within the Turkey Point Plant Property

For transmission work performed along SW 359th Street that is within the Turkey Point Plant Property, water from dewatering activities will be discharged to catch basins, temporary settling basins, or directly to water bodies if free of sediments. For transmission work performed within the cooling canal system, any water from dewatering activities will be released to the industrial wastewater facility

Other areas not specifically addressed in the *Conceptual Earthwork and Materials Disposal Plan*

No general area dewatering is anticipated at other offsite areas, including transmission pad foundations, road improvements, and potable and reclaimed water pipelines for these locations.

Where trench excavations are necessary (e.g., buried pipelines), temporary trench dewatering may be required in areas where the water table is near the ground surface. Dewatering will be conducted in accordance with best management practices to prevent erosion and avoid sand, silt, sediment or highly turbid water flowing into any wetland or waterbody. As necessary, dewatering effluent would be routed to a sediment filtration device, such as a geotextile filter bag or hay bale structure, prior to discharge in order to minimize the potential for erosion and sedimentation and comply with applicable water quality requirements. The volume of effluent will be minimized through dewatering only immediately prior to lowering-in segments of pipe within a given location. Dewatering structures will be removed as soon as possible after the completion of dewatering activities.

Where local or small scale dewatering is necessary at any area undergoing construction, dewatering plans including proposed dewatering methods, anticipated length of dewatering activities, discharge methods, specific dewatering techniques for the control of withdrawal rates, the protection of surface and groundwater quality during dewatering, etc., associated with construction activities will be available as authorized by Section 403.5113(2), F.S. ("Post Certification Amendments and Review"), and Rule 62-17.191, F.A.C ("Post Certification Compliance Review, Monitoring").

This response is PLANT SPECIFIC.

References:

FPL 2011. Florida Power & Light Company, Turkey Point Units 6 & 7 Project, *Conceptual Earthwork and Materials Disposal Plan*. Available at http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Completeness/Plant_Associated_Facilities/5th_Round_Completeness/Attachments/5-MDC-A-26-1_EarthworkMaterialDisposalPlan.pdf. Accessed January 18, 2012.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-7 (RAI 5765)

Describe the effects, if any, that groundwater pumping and discharge associated with excavation dewatering will have on the hypersaline groundwater plume from the existing cooling canals.

FPL RESPONSE:

The *Groundwater Model Report* (FPL 2011a) and the response to RAI EIS 04.02-03 discussed the deep excavation dewatering approach and several potential impacts of that dewatering. The maximum dewatering rate, on an annual basis, was 1200 gallons per minute (gpm). This groundwater would originate from beneath the industrial wastewater facility and from beneath Biscayne Bay to the east. Any change in the existing hydraulic gradient will be inwards toward the industrial wastewater facility. Thus, the areal extent of the hypersaline plume will not be increased. Additionally, as described in the response to NRC Environmental Audit Data and Information Need Items AQ-4, H-13, H-23, H-31, H-34, H-35, H-38, H-40, NR-6 (FPL 2011b) the amount of water extracted during dewatering and subsequently released to the cooling canals is small (approximately 0.06 percent) when compared to the daily flow of the canals. The annualized amount of water released to the canals is within the standard deviation of the annual rainfall to the canals, and the rise in the surface water will not be significant (0.024 feet). It should also be noted that most, if not all, the dewatering effluent will come from within the IWWF. Therefore, most of the dewatering effluent is not “new water”; rather it is recycled water that originated from within the IWWF. Additionally, the dewatering impacts will be temporary.

Since dewatering impacts on the cooling canals should be minimal, it is anticipated that there should be minimal effects on the hypersaline groundwater plume.

This response is PLANT SPECIFIC.

References:

FPL 2011a. NRC June 2010 Environmental Audit. Submittal Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Revision 1, Bechtel Power Corporation, February 28, 2011. FPL to NRC Letter L-2011-082 (ADAMS Accession No. ML110610723).

FPL 2011b. Response to NRC Environmental Audit Data and Information Need Items AQ-4, H-13, H-23, H-31, H-34, H-35, H-38, H-40, NR-6. May 18, 2011. FPL to NRC Letter L-2011-174 (ADAMS Accession No. ML11143A090).

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-8 (RAI 5765)

The construction of the proposed Units 6 and 7 will significantly alter both the surface and subsurface permeabilities of the site. Structures and paved areas will provide impervious surfaces that will preclude recharge. Unpaved areas may see either reduced or enhanced recharge. Deeply embedded structures, fill material, grouting, etc will alter the subsurface permeabilities. Provide an explanation of the changes in subsurface flow (spatial distribution of flows in terms of velocities.) beneath the site from the current condition to the post construction condition. Identify land covers expressed in terms of recharge properties over the entire site. Describe any potential changes in the subsurface movement of the hypersaline waters beneath the cooling canals.

FPL RESPONSE:

The impacts of post-construction conditions were examined using the site groundwater flow model as presented in FSAR Appendix 2CC and FPL 2011a. A summary of the model refinements to represent the post-construction conditions at the site are presented as follows:

- Excavation cut-off walls (concrete diaphragm walls) installed during construction are left in place.
- Concrete fill added within the cut-off walls between an elevation of –35 feet North American Vertical Datum of 1988 (NAVD 88) (base of excavation) and –16 feet NAVD 88 with a hydraulic conductivity of 1×10^{-8} cm/s.
- Concrete mud mat beneath the reactor building added within cut-off walls between −16 feet NAVD 88 and –14 feet NAVD 88 with a hydraulic conductivity of 1×10^{-8} cm/s.
- Reactor building modeled as inactive to flow.
- Backfill added between the reactor building and cut-off walls with a hydraulic conductivity of 0.01 cm/s.
- Muck removed from the plant area and replaced with either structural backfill within the diaphragm wall or non-structural backfill outside the wall.
- Zones of recharge at the Turkey Point Units 6 & 7 plant area defined as represented in Figure 1. The values of recharge were selected to represent the post-construction land surface.
- Water level in Biscayne Bay set to the long-term average of –0.81 feet NAVD 88.
- Recharge and evapotranspiration set to long-term average values.

- Water levels in the cooling canal system shifted to account for the change in Biscayne Bay water level.
- Mechanically stabilized earth retaining walls installed around the perimeter of the Turkey Point Units 6 & 7 plant area (excluding the makeup water reservoir) have a base at 0 feet NAVD 88 and a top ranging from 20 to 21.5 feet NAVD 88 (FSAR 2.5.4.5.1).

Additional modeling was performed in response to e-RAI 5190 (FPL, 2011b) and included the following changes to the post-construction model:

- The concrete diaphragm walls installed in the nuclear island area to facilitate construction dewatering raised to 2 feet NAVD 88 from -2 feet NAVD 88 based on the current conceptual design.
- The representation of the makeup water reservoir (MWR) revised to simulate operational water losses. The MWR was previously represented in the model with inactive flow cells (no leakage assumed).
- The hydraulic conductivity of the non-structural (or general) backfill increased from 1×10^{-2} to 1.35×10^{-2} cm/s to account for its lower compaction relative to the structural backfill.

The post-construction groundwater flow model presented in FPL 2011b includes spatially distributed recharge as presented in Figure 1. The post-construction land cover on the island includes: inactive to flow, surface water, paved, grass, and gravel areas (all muck is removed from this area during construction). The inactive-to-flow areas represent plant structures. Recharge rates for the surface water, paved, grass, and gravel areas were set to 0, 0, 2 and 10 in./yr, respectively, as discussed in FPL 2011a. In the model, approximately 44 percent of the island receives 0 in./yr of recharge, 11 percent receives 2 in./yr of recharge, 38 percent receives 10 in./yr of recharge, and 6 percent of the island land cover is inactive to flow (FPL, 2011b).

Figures 2 and 3 present the simulated groundwater contours for model layer 1 in the plant area for pre- and post-construction conditions, respectively. Model layer 1 in the pre-construction simulation represents muck in the plant area while in the post-construction simulation, model layer 1 represents fill (the muck layer has been removed). As shown in these figures, the flow direction and hydraulic gradient outside the nuclear island and MWR areas are similar. Note that because the pre- and post-construction simulations used different boundary conditions, the magnitudes of the groundwater contours differ slightly.

It is assumed that the effective porosity of the muck material equals that of the fill. The hydraulic conductivity of the general fill used in the model is approximately three times that of the muck (FPL, 2011a and 2011b). This, coupled with the assumption regarding the effective porosity of the muck and fill, indicates that the post-construction flow velocities in model layer 1 are approximately three times higher than those in the pre-construction model layer 1.

Because the saturated thickness of the muck layer is only a few feet, the overall impact to the groundwater system under post-construction conditions due to its replacement with fill is viewed as minor.

Figures 4 and 5 present the simulated groundwater contours for model layer 2 in the plant area for pre- and post-construction conditions, respectively. Model layer 2 in both the pre- and post-construction simulations represents the Miami Limestone. Figures 4 and 5 indicate the flow direction and hydraulic gradient outside the nuclear island and MWR areas are similar across the plant area under pre- and post-construction conditions. Because the hydraulic gradient is similar and the material is the same in both simulations, the spatial distribution of groundwater velocities is therefore similar under pre- and post-construction conditions.

Finally, because the pre- and post-construction groundwater flow patterns are similar, it is expected that any impact on subsurface movement of the hypersaline waters beneath the cooling canals due to construction of the facility is minimal.

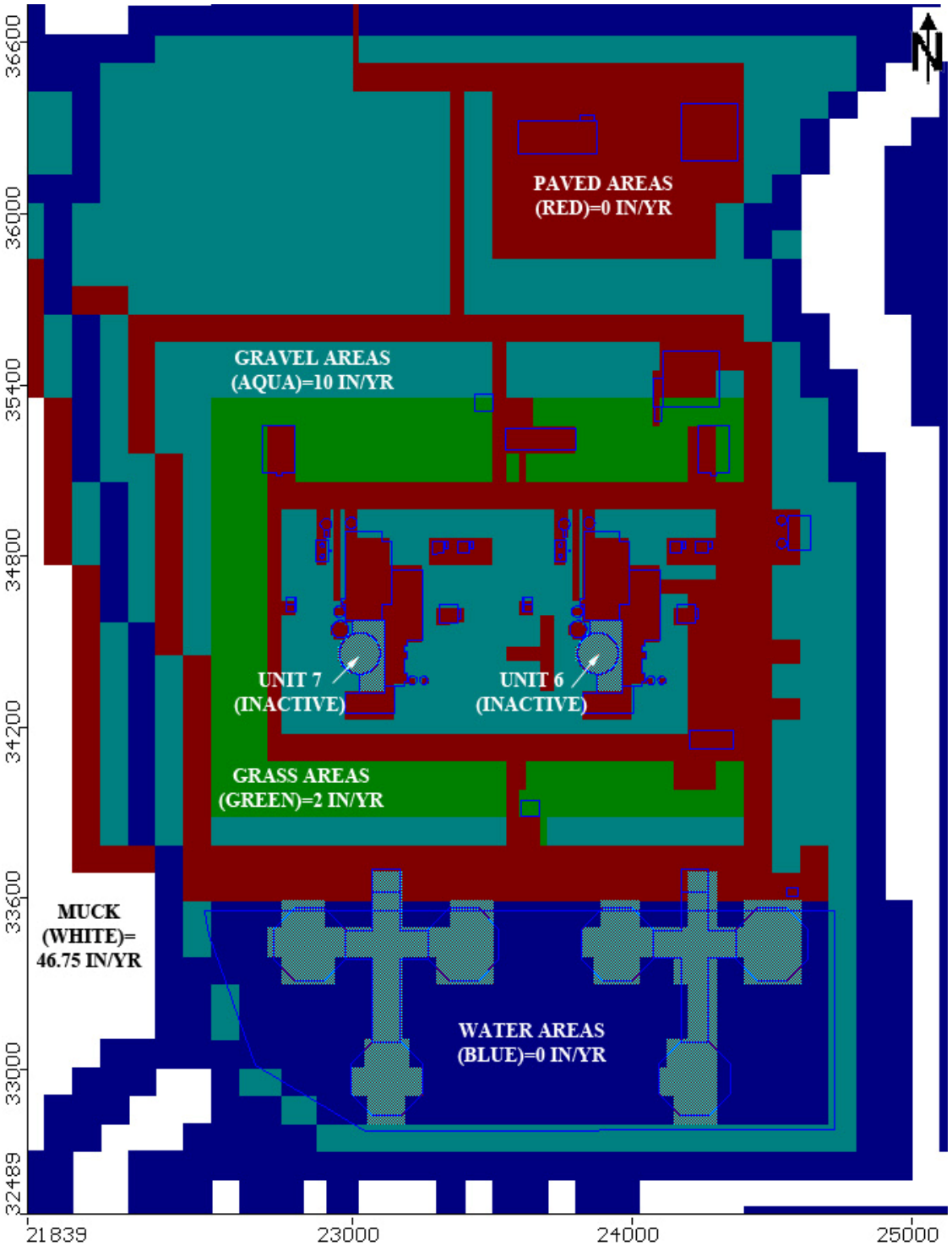
This response is PLANT SPECIFIC.

References:

FPL 2011a. NRC June 2010 Environmental Audit. Submittal Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Revision 1, Bechtel Power Corporation, February 28, 2011. FPL to NRC Letter L-2011-082 (ADAMS Accession No. ML110610732).

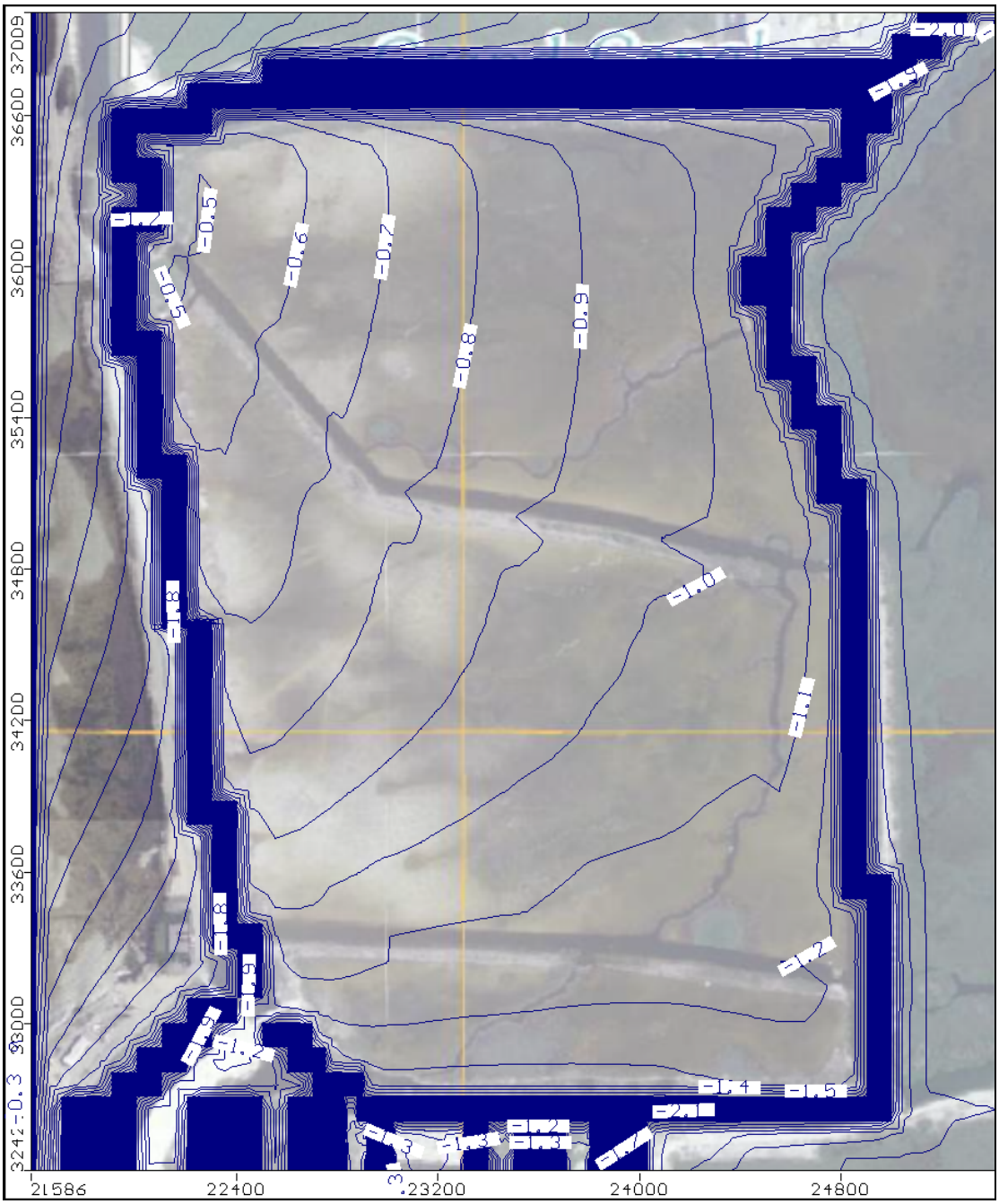
FPL 2011b. Response to Request for Additional Information 02.04.12, Letter No. 011 (e-RAI 5190) Standard Review Plan Section 02.04.12 – Groundwater, May 5, 2011. FPL to NRC Letter L-2011-165 (ADAMS Accession No. ML110129A058).

Figure 1
Post-Construction Recharge Zones (FPL, 2011b)



Vertical and horizontal axes represent model coordinates in feet.

Figure 2
Simulated Pre-Construction Groundwater Contours (feet NAVD 88) for Model Layer 1



Vertical and horizontal axes represent model coordinates in feet.
Blue shaded areas indicate river boundaries (cooling canals).

Figure 3
Simulated Post-Construction Groundwater Contours (feet NAVD 88) for Model Layer 1 (FPL, 2011b)

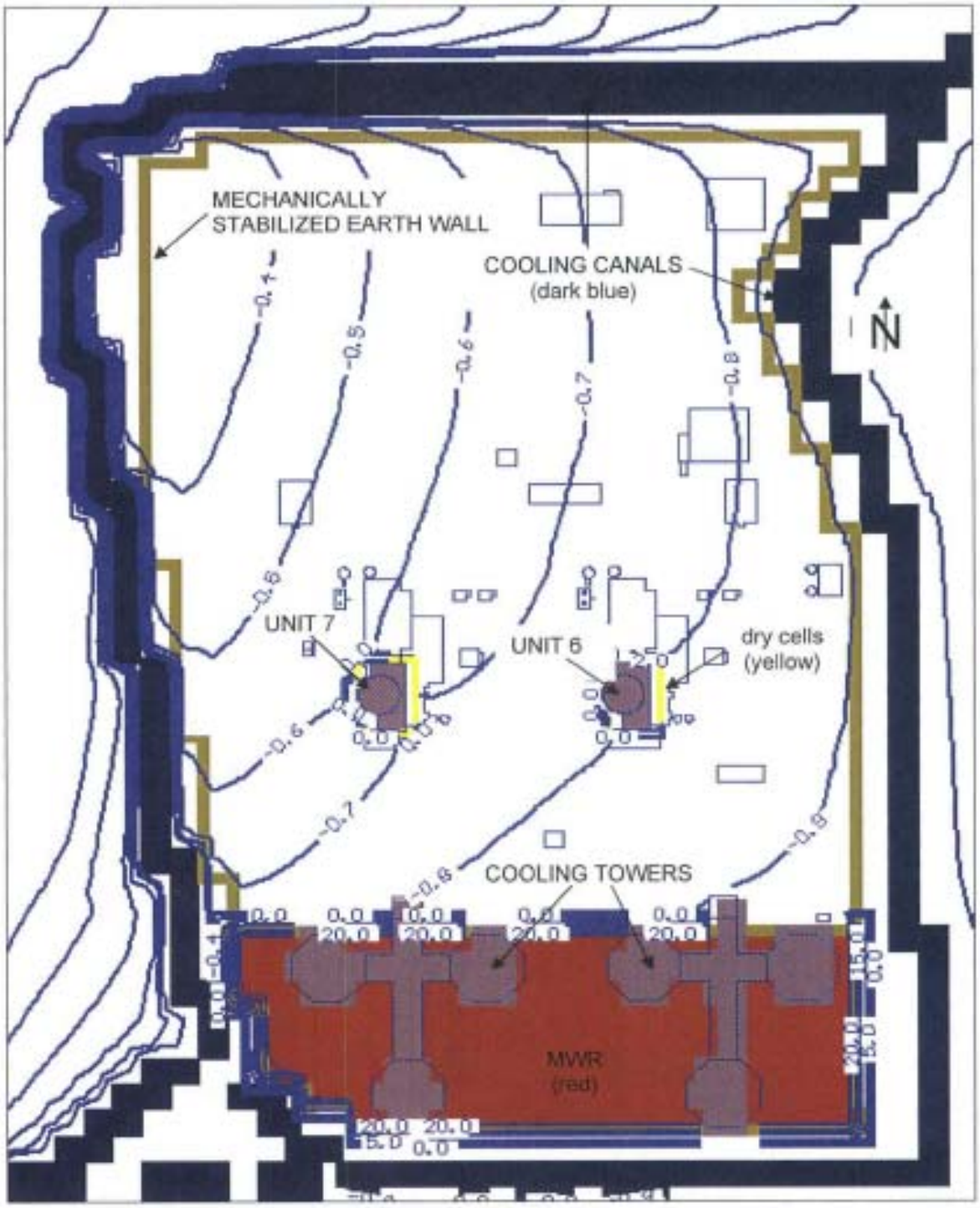
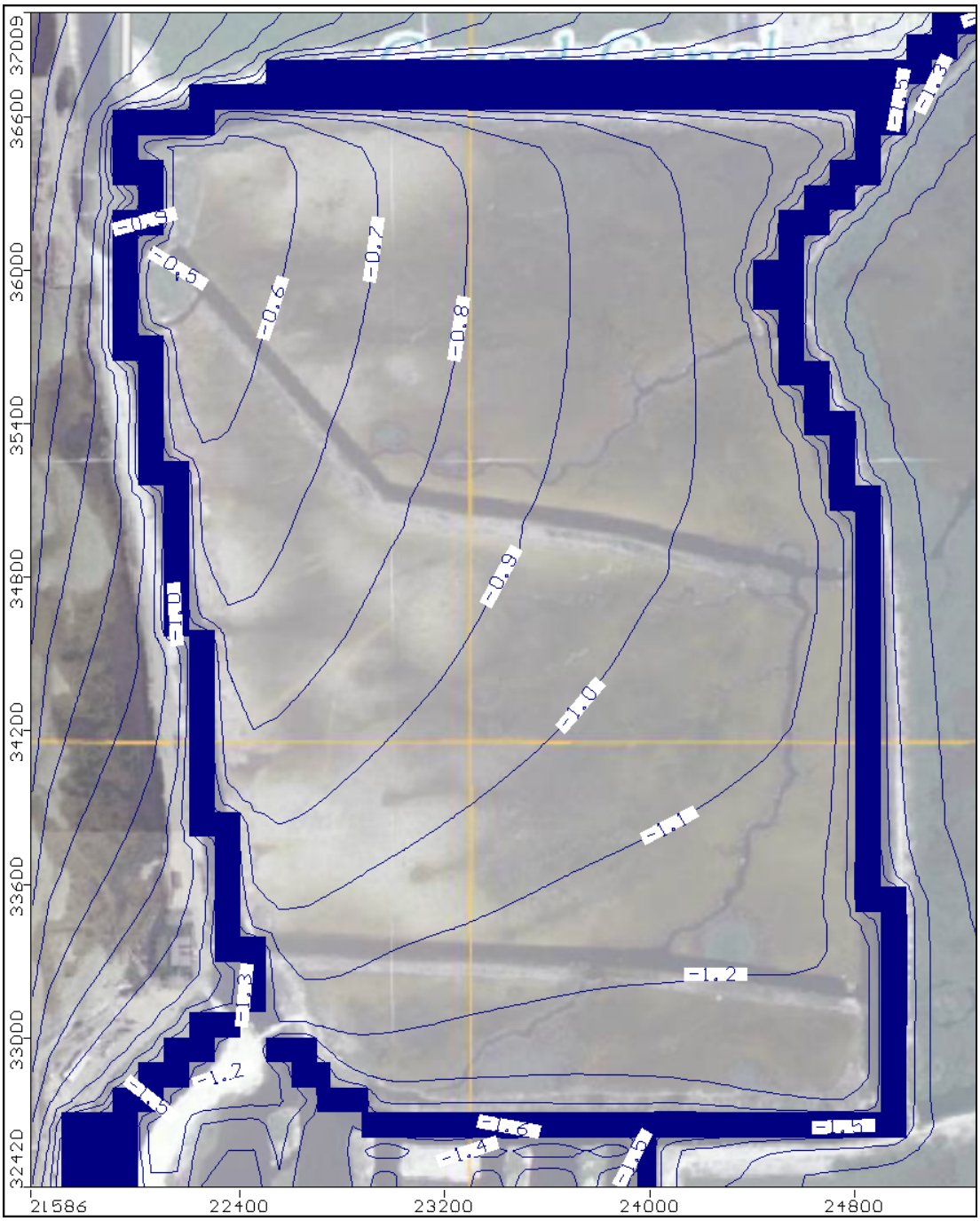
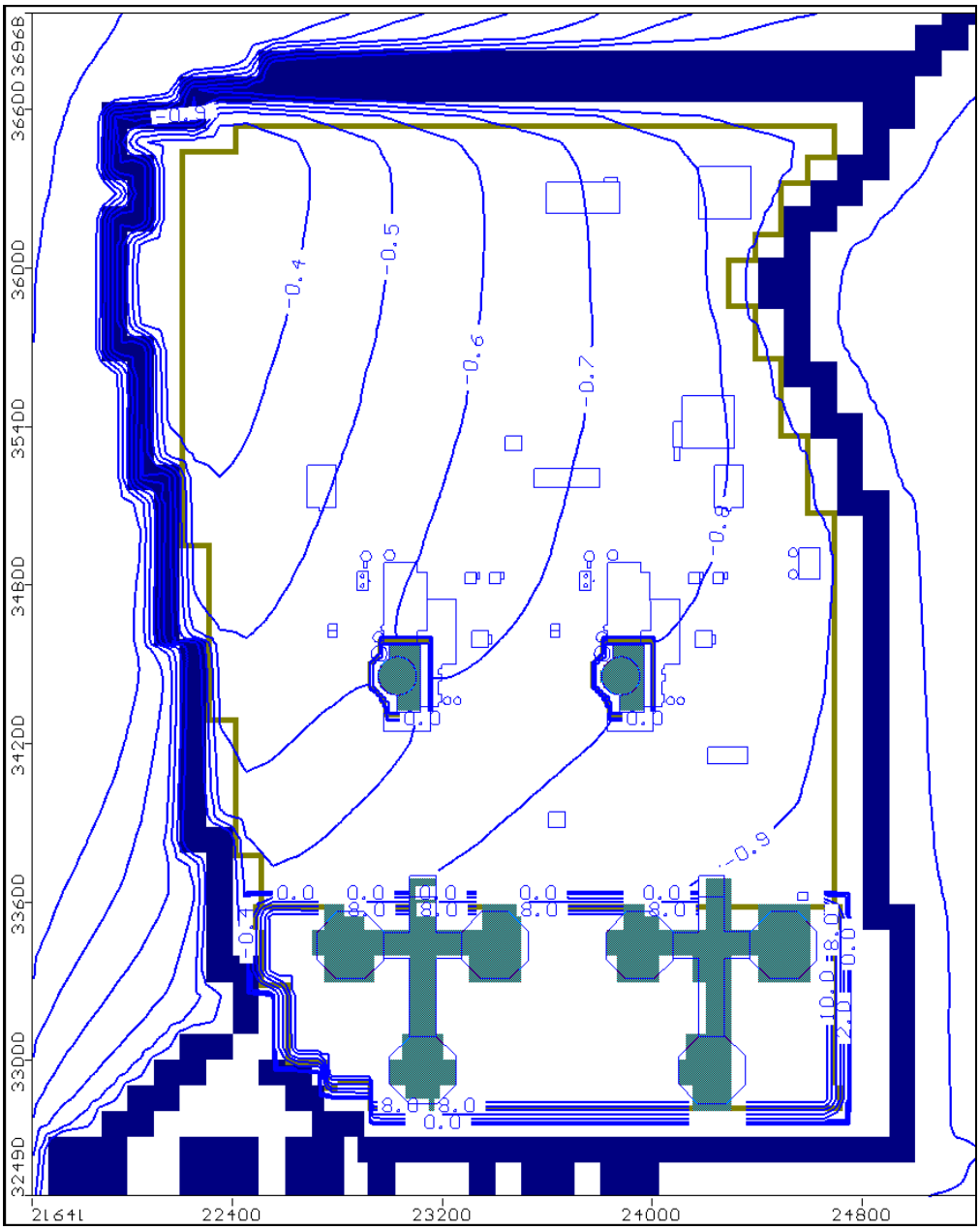


Figure 4
Simulated Pre-construction Groundwater Contours (feet NAVD 88) for Model Layer 2



Vertical and horizontal axes represent model coordinates in feet.
Blue shaded areas indicate river boundaries (cooling canals).

Figure 5
Simulated Post-Construction Groundwater Contours for Model Layer 2



Vertical and horizontal axes represent model coordinates in feet.
Blue shaded areas indicate river boundaries (cooling canals).
Blue-green shaded areas indicate inactive cells.
Tan areas indicate mechanically stabilized earth retaining walls.
Tan areas in the southern portion of the plant area indicate MWR walls.

Data source: FPL 2011b (Base case simulation)

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-9 (RAI 5765)

Provide "Hydrologic Associates 2009: Summary of Hydrologic, Geologic, and Salinity for FPL Owned Fill Source Water Mgmt Project Area (June 2009)."

FPL RESPONSE:

The report titled *Summary of Hydrologic, Geologic and Salinity Characteristics of the Florida Power and Light FPL-Owned Fill Source Water Management Project Area* (June 2009) is available at:
http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Completeness/Plant_Associated_Facilities/1st_round_Completeness/FPL_Response_1st_Incompleteness/Attached%20Reports/Hydrologic%20Associates/Report_HAI%20FPL_Report_Final%20Version_6-22-09.pdf. Accessed January 18, 2012.

This response is PLANT SPECIFIC.

References:

Hydrologic Associates, 2009. *Summary of Hydrologic, Geologic and Salinity Characteristics of the Florida Power and Light FPL-Owned Fill Source Water Management Project Area,* Hydrologic Associates USA, June 2009.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter 1112081 Dated December 8, 2011

SRP Section: EIS 4.2 – Water-Related Impacts

Question from Environmental Technical Support Branch (RENV)

NRC RAI Number: EIS 4.2-10 (RAI 5765)

Borrow areas are mentioned in Section 4.2.1 Hydrologic Alterations, which are created from excavation activities to provide fill material for building Units 6 and 7. One of those borrow areas includes a "water management feature" created at an FPL fill source and is discussed in Section 4.1.2.3 FPL-Owned Fill Source and in Section 5.2.1.2.1 Fill Borrow Areas. In Section 4.1 the "water management feature" is stated as being a "newly created lake," and according to Section 5.2 it "would be designed to store excess stormwater to complement regional wetland rehydration projects." Clarify the intended use of the "water management feature," and whether this would be a water of the state of Florida or of the United States. If the "water management feature" is to be used to store stormwater, provide the estimated average and maximum monthly discharges into the water management feature.

FPL RESPONSE:

The water management feature, if completed, will be constructed to complement and enhance regional wetland hydration projects. The water management feature would be considered an excavated lake. Therefore, it would meet the minimum requirements for protection against uncontrolled stormwater runoff entering the system from offsite lands. To accomplish this, an isolation berm will be constructed around the perimeter of the feature to prevent entry of uncontrolled runoff, including stormwater, from offsite lands. Water would be diverted from local surface water canals (e.g. C-103 canal) to serve as makeup water for the feature (CH2M Hill 2009).

As discussed in CH2M Hill 2009, the C-103 canal would be the preferred option. The volume of water available from the C-103 canal varies between the dry and wet seasons, and depends on the actual rainfall within the C-103 basin. Diversions of up to 120 cubic feet per second (cfs) of excess canal water, particularly during the wet season months (June through October), would appear feasible on a frequent basis, and for all months, low capacity diversion of up to 40 cfs would also appear feasible.

After completion, the water management feature would be considered "waters of the state" as it will be hydrologically connected to adjacent state jurisdictional wetlands to the east.

This response is PLANT SPECIFIC.

References:

(CH2M Hill 2009). FPL Turkey Point Units 6 & 7 Water Management Project Design Document, CH2M Hill, October 2009. Available at http://publicfiles.dep.state.fl.us/Siting/Outgoing/FPL_Turkey_Point/Units_6_7/Completeness/Plant_Associated_Facilities/1st_round_Completeness/FPL_Response_1st_Incompleteness/Attached%20Reports/CH2MHill/CH2MHILL%20REPORT.pdf. Accessed January 18, 2012.

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None