STORMWATER MANAGEMENT PLAN AND CALCULATIONS

Submitted by:

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10.8 Stormwater Management and Calculations

Appendix 10.8 demonstrates that the surface water management systems for the Turkey Point Site and associated non-linear facilities will be designed to meet all applicable requirements. This analysis utilizes a 25-year, 72-hour design storm (12.6 inches) as required by applicable regulations.

The Site stormwater management system is designed to release stormwater runoff into the existing industrial wastewater facility. The stormwater runoff from the nuclear administration building, training building, and parking area will also be released to the industrial wastewater facility. The industrial wastewater facility currently has sufficient capacity and will not be impacted by Turkey Point Units 6 & 7 during the post-development condition.

All stormwater associated with industrial activity from the FPL reclaimed water treatment facility (equipment area runoff) will be captured, treated as necessary and reused within the reclaimed water treatment process. Runoff from other areas (non-equipment areas) will be routed to stormwater management facilities and released to local drainage. The surface water management system will be designed to meet all applicable requirements.

10.8.1 Stormwater Runoff Calculation

This section examines the changes in stormwater runoff in the post-development condition of the Turkey Point Units 6 & 7 plant area and laydown area (Turkey Point Site); nuclear administration building, training building, and parking area; and FPL reclaimed water treatment facility. The runoff volumes into the industrial wastewater facility at existing conditions are calculated and compared to the runoff volumes at post-development conditions. The runoff volume and peak discharges from the FPL reclaimed water treatment facility at existing conditions to the surrounding area is calculated and compared to the runoff volume and peak discharges at post-development conditions. In

addition, applicable stormwater detention and discharge criteria and management practices for the FPL reclaimed water treatment facility are discussed.

10.8.1.1 Runoff Volume at Turkey Point Site

The Site is located south of the existing Turkey Point Units 3 and 4 and within the northeast portion of the existing industrial wastewater facility as shown in Figure 1. The Site includes the plant area and the laydown area to the west of the plant area across the west return canal of the industrial wastewater facility. The plant area is approximately 198.3 acres, and the laydown area is approximately 46.0 acres as shown in Figure 2. The total area of the Site used for stormwater analysis is 244.3 acres.

Runoff Volume at Existing Condition

Stormwater runoff from the Site currently drains to the existing industrial wastewater facility and will continue to do so during operation of Units 6 & 7. The sub-basin area of the Site is shown in Table 1 (Figure 2).

Table 1: Sub-basin Area of Units 6 & 7 Site at Existing Condition

Sub-basin	Sub-basin Area		
	sq. ft	acres	sq. mi.
Site	10,643,728	244.3	0.382

Hydrologic soil groups are used to determine the runoff curve numbers (CN). The soil survey for the plant area of Miami-Dade County as presented by United States Department of Agriculture (USDA) is shown in Figure 3 (Reference 1).

Map units 31 and 32 in Figure 3 indicate Pennsuco marl (tidal) and Terra Ceia muck (tidal), respectively (Reference 1), as listed in Table 2. These are the soil types that make up the plant area. Pennsuco marl is deep, nearly level, very poorly drained soil, and is subject to tidal flooding. Under natural conditions, Pennsuco marl remains saturated and the water table fluctuates with the tides. The soil is moderately saline or saline. Permeability is moderately low. Terra Ceia muck (tidal) is deep, level, very poorly

drained soil in saltwater swamps and marshes, and is subject to tidal flooding. Under natural conditions, the Terra Ceia remains saturated (Reference 1).

Table 2: Index to Soil Survey Map Units

Soil Legend	
2	Biscayne gravelly marl, drained
3	Lauderhill muck, depressional
4	Pennsuco marl, drained
5	Pennsuco marl
6	Perrine marl, drained
7	Krome very gravelly loam
9	Udorthents-water complex
10	Udorthents, limestone substratum-Urban land complex
11	Udorthents, marl substratum-Urban land complex
12	Perrine marl
13	Biscayne marl
14	Dania muck, depressional
15	Urban land
16	Biscayne marl, drained
18	Tamiami muck, depressional
20	Cardsound-Rock outcrop complex
22	Opalocka-Rock outcrop complex
23	Chekika very gravelly loam
24	Matecumbe muck
25	Biscayne-Rock outcrop complex
26	Perrine marl, tidal
28	Demory-Rock outcrop complex
30	Pahokee muck, depressional
31	Pennsuco marl, tidal
32	Terra Ceia muck, tidal
33	Plantation muck
34	Hallandale fine sand
35	Margate fine sand
37	Basinger fine sand
38	Rock outcrop-Vizcaya-Biscayne complex
39	Beaches
40	Pomello sand
41	Dade fine sand
42	Udorthents, limestone substratum, 0 to 5 percent slopes
45	Canaveral sand
47	St. Augustine sand
48	Kesson muck, tidal

Terra Ceia muck is classified as hydrologic soil group or type B/D according to USDA's Technical Release (TR)-55 indicating that drained Terra Ceia muck is in Type B and the undrained Terra Ceia muck is in type D (Reference 2). Type B soils have moderate infiltration rates when thoroughly wetted and consist mainly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. Type D soils have high runoff potential. They have low infiltration rates when thoroughly wetted and consist of clay soils with a permanent high water table. High water table may cause a drainage problem, and some soils in areas of high water table may be classified as type D (Reference 2).

The existing elevation of the plant area ranges from -2.8 ft to -1 ft NAVD 88 in the eastern perimeter to a range of -1.6 ft to -0.5 ft NAVD 88 in the western perimeter, and ranges from 2.1 ft to 2.21 ft NAVD 88 in the northern perimeter to a range of -1.7 ft to -1.0 ft NAVD 88 in the southern perimeter. The soils in the plant area are saturated and would have low permeability; thus, the soils in the plant area would be classified as D (Reference 2). Some of the areas are submerged by water while other areas are composed of vegetation; thus, the ground cover percentage is estimated as shown in Table 3. The Runoff Curve Number (CN) values for different soil covers are obtained from Reference 2.

Table 3: Runoff Curve Number for the Site at Existing Condition

Subbasin	Ground Cover Percentage				Composite CN
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	
	98	91	100	84	
Site	0%	0%	70%	30%	95.20

The Soil Conservation Service (SCS) runoff Curve Number (CN) method is used to estimate the stormwater runoff from the design storm rainfall. The SCS runoff equation is (Reference 2):

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

Where

Q = runoff (in);
P = rainfall (in);
S = potential maximum retention after runoff begins (in); and
I_a = initial abstraction (in)

S is the function of the soil and cover condition of the watershed through CN (Reference 2):

$$S = \frac{1000}{CN} - 10$$

$$I_a = 0.2S$$

Accordingly, the runoff volumes for the drainage areas are calculated using the SCS runoff equation. Table 4 shows the stormwater runoff volume from the plant area at the existing condition, for the 25-year, 72-hour rainfall of 12.6 inches.

Table 4: Runoff Volume of the Site at Existing Condition

Sub-basin	Composite CN	S	Ia	Q	Runoff Volume, ac-ft
		in	in	in	
Site	95.20	0.50	0.10	12.01	244.64

Note: The values in the table are rounded up to two decimal places

Runoff Volume at Post-Development Condition

Site includes the Units 6 & 7 plant area and the laydown area (Figure 4). 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 as shown in Figures 5 through 7. 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 industrial wastewater facility, and the bridge over the canal north of nuclear administration building, training building and parking area.

In the post-development condition, stormwater runoff from the power block, Clear Sky substation and parking area would release to the industrial wastewater facility. The sub-basin areas of the Units 6 & 7 power block, Clear Sky Substation, and parking area are shown in Table 5 (Figure 8). The area for the makeup water reservoir is not included in

the sub-basin area because it does not contribute to post-development runoff as discussed below.

Table 5: Sub-basin Areas of the Plant Area at Post-Development Condition

Sub-basin	Sub-basin Area		
	sq. ft	acres	sq. mi.
Units 6 & 7 Power Block & Exterior area	4,855,792	111.5	0.174
Clear Sky Substation	1,153,777	26.5	0.041
Parking Area	1,034,900	23.8	0.037
Total	**7,044,469**	**161.7**	**0.253**

The total drainage areas for the Units 6 & 7 power block catch basins will include buildings, paved roads and grassed surfaces. The Clear Sky substation area will include a gravel yard, gravel road and some seeded areas that are not credited in this calculation. The parking area consists of a paved area. The area outside of the power block consists of paved road and grassed swale. The composite runoff curve numbers calculated for all catch basins in the Units 6 & 7 power block, substation, parking area, and the area outside of the power block are presented in Table 6. Type D soil has been considered for all areas during the operational phase condition. Type D soil yields higher runoff values; therefore it is more conservative.

Table 6: Plant Area Runoff Curve Number for Post-Development Phase

Sub-basin	Ground Cover Percentage				Composite CN
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	
	98	91	100	84	
Units 6 & 7 Power Block & Exterior area	90%	0%	0%	10%	96.60
Clear Sky Substation	0%	100%	0%	0%	91.00
Parking Area	100%	0%	0%	0%	98.00

Accordingly, the runoff volumes for the drainage areas are calculated using the SCS runoff equation for the design storm event and are shown in Table 7:

Table 7: Runoff Volume for Plant Area for Post-Development Phase

Sub-basin	Composite CN	S	Ia	Q	Runoff Volume
		in	in	in	Ac-ft
Units 6 & 7 Power Block & Exterior area	96.60	0.35	0.07	12.19	113.21
Clear Sky Substation	91.00	0.99	0.20	11.49	25.35
Parking Area	98.00	0.20	0.04	12.36	24.47
				Total	**163.03**

Note: The values in the table are rounded up to two decimal places.

In addition to the plant area, the Site includes the laydown area across the west return canal of the industrial wastewater facility. Stormwater runoff from the laydown area currently drains to the industrial wastewater facility and will continue to do so during the operation of Units 6 & 7. The heavy haul road and the new bridge in the laydown area as shown in the Construction Site Utilization Plan (Figure 9) would increase the imperviousness, and is considered in the post-development runoff volume calculation. The existing road north of the Site will be improved to serve as a heavy haul road. The drainage area and imperviousness of the road will remain the same with the improvement of the road; therefore the changes in stormwater runoff would be minimal. Drainage area of the laydown area is shown in Table 8. The composite runoff curve number for the laydown area is shown in Table 9.

Table 8: Sub-Basin Area of the Laydown Area West of Units 6 & 7 Plant Area

Subbasin	Subbasin Area		
	sq. ft	acres	sq. mi.
Laydown Area	2,004,128	46.0	0.072

Table 9: Laydown Area Runoff Curve Number for Post-Development Phase

Subbasin	Ground Cover Percentage				Composite CN
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	
	98	91	100	84	
Laydown Area	50%	50%	0%	0%	94.50

Accordingly, the runoff volumes for the drainage areas are calculated using the SCS runoff equation and are shown in Table 10:

Table 10: Runoff Volume for Laydown Area for Post-Development Phase

Subbasin	Composite CN	S	Ia	Q	Runoff Volume
		in	in	in	Ac-ft
Laydown Area	94.50	0.58	0.12	11.93	45.73

Note: The values in the table are rounded up to two decimal places

Table 11 compares the runoff at the Site at the existing and post-development condition and shows that the runoff into the industrial wastewater facility decreases at the post-development condition. The area for the makeup water reservoir (36.6 acres) is not included in the sub-basin area because it does not contribute to post-development runoff as discussed below.

Table 11: Comparison of Existing and Post-Development Runoff Volume at the Site

Runoff	Existing Condition	Post-Development Condition		Net Change
		Units 6 & 7 Plant Area	Construction Laydown Area	
Ac-ft	244.64	163.03	45.73	-35.88

Runoff from the potentially oil-contaminated areas (containment area for transformers, and other oil-containing or handling equipment) will be first directed through oil/water separators and then released to the industrial wastewater facility.

The makeup water reservoir is designed to retain reclaimed water as a storage pond. This area collects rainfall but does not contribute to the stormwater runoff to the industrial wastewater facility. Table 12 shows the storage area of the makeup water reservoir.

Table 12: Area of the Makeup Water Reservoir for Post-Development Phase

Subbasin	Subbasin Area		
	sq. ft	acres	sq. mi.
Makeup water reservoir	1,595,131	36.6	0.057

The design rainfall will add 12.6 inches of water into the makeup water reservoir. The maximum storage level of the makeup water reservoir is 22.5 ft NAVD 88 and the top of the retaining wall is at elevation 24 ft NAVD 88. Therefore, during the design storm, the water will be completely contained within the makeup water reservoir.

10.8.1.2 Runoff Volume at Nuclear Administration Building, Training Building, and Parking Area

The nuclear administration building, training building, and parking area are located north of the Units 6 & 7 plant area as shown in Figure 4. The post-development runoff from the nuclear administration building, training building, and parking area will release to the industrial wastewater facility. The following discussion compares the release from the sub-basin areas at pre- and post-development conditions.

Runoff Volume at Existing Condition

Table 13 presents the sub-basin areas of the nuclear administration building, training building, and parking area (Figure 8); and Figure 2 shows the existing condition of these areas.

Table 13: Sub-Basin Areas of the Nuclear Administration Building, Training Building, and Parking Area at Existing Condition

Subbasin	Subbasin Area		
	sq. ft	acres	sq. mi.
Nuclear Administration Building, Training Building and Parking Area (West)	989,979	22.7	0.0355
Nuclear Administration Building, Training Building and Parking Area (East)	397,094	9.1	0.0142

Currently, the areas for 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 discharge to the industrial wastewater facility. Stormwater in these

areas remains in the sub-basins and infiltrates into the ground within the industrial wastewater facility.

Runoff Volume at Post-Development Condition

The post-development runoff from the nuclear administration building, training building and parking area will be released to industrial wastewater facility. For the purposes of this calculation, the drainage area for the nuclear administration building, training building, and parking area consist of impervious ground covers. The composite runoff curve numbers calculated for the catch basins are presented in Table 14. Type D soil has been considered for all areas during the post-development condition. The CN values for different soil covers are obtained from Reference 2.

Table 14: Runoff Curve Number for the Nuclear Administration Building, Training Building, and Parking Area for Post-Development Phase Condition

Subbasin	Ground Cover Percentage				Composite CN
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	
	98	91	100	84	
Nuclear Administration Building, Training Building and Parking Area (West)	100%	0%	0%	0%	98.00
Nuclear Administration Building, Training Building and Parking Area (East)	100%	0%	0%	0%	98.00

Since it is assumed that there is no direct runoff into the industrial wastewater facility from the nuclear administration building, training building, and parking area at the existing condition, the surface runoff in the post-development condition would increase. With the estimated CN, runoff volume for the nuclear administration building, training building, and parking area is evaluated as shown in Table 15.

Table 15: Runoff Volume for the Nuclear Administration Building, Training Building, and Parking Area for Post-Development Phase Condition

Subbasin	Subbasin Area	Composite CN	S	Ia	Q	Runoff Volume
	acres		in	in	in	Ac-ft
Nuclear Administration Building, Training Building and Parking Area (West)	22.7	98.00	0.20	0.04	12.36	23.41
Nuclear Administration Building, Training Building and Parking Area (East)	9.1	98.00	0.20	0.04	12.36	9.39
Total	**31.8**				**Total**	**32.79**

Note: The values in the table are rounded up to two decimal places

Runoff from the potentially oil-contaminated areas such as the parking area will first be directed through oil/water separators and then released to the industrial wastewater facility.

In Section 10.8.1.1 and this section, stormwater runoff into the industrial wastewater facility at the existing condition and post-development condition are discussed. The net change in the runoff volume can be estimated by comparing the runoff into the industrial wastewater facility from the Site and the nuclear administration building, training building and parking area at the existing condition and post-development condition. Table 16 shows that the runoff into the industrial wastewater facility decreases at the post-development condition.

Table 16: Runoff Volume into the Industrial Wastewater Facility at the Existing and Post-Development Condition

Runoff	Existing Condition	Post-Development Condition		Net Change
		Units 6 & 7 Site	Nuclear Administration Building, Training Building and Parking Area	
Ac-ft	**244.64**	**208.76**	**32.79**	**-3.08**

10.8.1.3 Runoff Volume at FPL Reclaimed Water Treatment Facility and Stormwater Management Basins

The FPL reclaimed water treatment facility will be located northwest of the Site. The minimum elevation of the FPL reclaimed water treatment facility will be 14 ft NAVD 88. The area is presently tidally influenced and affected by the water level of the Biscayne Bay. The 100-year flood level at the site of the FPL reclaimed water treatment facility is 9.6 ft NAVD 88 (11.2 ft NGVD 29, Reference 3). The area is flat and consists of poorly drained and saturated soil under natural conditions; therefore, the runoff would remain as sheet flow in all directions. The stormwater runoff in post-development condition will discharge to the surrounding wetland area.

All stormwater associated with industrial activity (equipment area runoff) will be captured, treated as necessary and reused within the reclaimed water treatment process. Runoff from other areas (non-equipment areas) will be routed to stormwater management facilities and released to local drainage.

The runoff volumes and the peak discharges at the existing condition and post-development condition are compared in this section. In addition, the facility will be designed to comply with the applicable state and local stormwater regulations. This section examines the criteria set forth by the state and local stormwater regulations and describes FPL's proposed stormwater management practices to comply with applicable regulations.

Runoff Volume at Existing Condition

Figure 10 shows the soil survey of the area (Reference 1) and Table 2 shows the index to the soil survey map. The soil survey map shows that the location of the proposed FPL reclaimed water treatment facility is composed of Pennsuco marl, tidal (map unit 31) and Terra Ceia muck, tidal (map unit 32). The soils in this area are poorly drained and saturated under natural conditions. Therefore the permeability is moderately low. The soils in this area would be classified as Type D.

The area of the FPL reclaimed water treatment facility is shown in Table 17.

Table 17: Sub-Basin Area of the FPL Reclaimed Water Treatment Facility

Subbasin	Subbasin Area		
	sq. ft	acres	sq. mi.
Existing Condition FPL Reclaimed Water Treatment Facility	1,894,860	43.5	0.0679

As shown in Figure 11, the area consists of wetland where the permeability is low. Thus, the runoff curve number for the area is estimated as shown in Table 18 and runoff volume is estimated as shown in Table 19.

Table 18: Runoff Curve Number for the FPL Reclaimed Water Treatment Facility at Existing Condition

Subbasin	Ground Cover Percentage				Composite CN
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	
	98	91	100	84	
Existing Condition FPL Reclaimed Water Treatment Facility	0%	0%	75%	25%	96

Table 19: Runoff Volume of the FPL Reclaimed Water Treatment Facility at Existing Condition

Subbasin	Composite CN	S	Ia	Q	Runoff Volume
		in	in	in	Ac-ft
Existing Condition FPL Reclaimed Water Treatment Facility	96.00	0.42	0.08	12.11	43.91

Note: The values in the table are rounded up to two decimal places

Runoff Volume at Post-Development Condition

The FPL reclaimed water treatment facility will consist of open ponds, clarifiers, containment areas with tanks and pumps, filters, open tanks, covered facilities, roads, and parking areas as shown in Figure 11.

All stormwater associated with industrial activity (equipment area runoff) will be captured, treated as necessary and reused within the reclaimed water treatment process. Runoff from other areas (non-equipment areas) will be routed to stormwater management facilities and released to local drainage.

Approximately 8.0 acres of the FPL reclaimed water treatment facility consists of equipment areas and open basin structures. These areas do not contribute to the total runoff. The post-development drainage area of 35.5 acres (43.5 acres minus 8.0 acres) is shown in Table 20. Accordingly, the total post-development drainage areas including the drainage areas in the reclaimed water treatment facility minus the open basin structures and the seeded fill slope as shown in the Figure 12 is presented in Table 20.

Table 20: Sub-basin Area for the FPL Reclaimed Water Treatment Facility

Sub-Basin	Area* (ft^2)	Area* (ac)	Area* (mi^2)
Post-Development FPL Reclaimed Water Treatment Facility	1,546,816	35.5	0.055

*Total drainage area subtracted by the open structures areas that do not contribute to runoff

The land cover percentages for the post-developed condition have been estimated in Table 21. Since the drainage area excludes the open basin structures, they are not included in the CN number computation. The reclaimed water treatment facility consists of covered water treatment units and components, and storage tanks that are impervious and the gravel-filled grounds. The seeded fill slope of the reclaimed water treatment facility is grass-covered. The calculations of composite runoff curve numbers for the areas are shown in Table 21:

Table 21: Runoff Curve Number for the FPL Reclaimed Water Treatment Facility

Subbasin	Ground Cover Percentage				Composite CN
	Impervious CN	Gravel CN(Type D)	Pond CN	Grass CN(Type D, fair)	
	98	91	100	84	
Post-Development FPL Reclaimed Water Treatment Facility	20.8%	46.5%	6.5%	26.2%	91

Accordingly, the runoff volumes for the drainage area are calculated using the SCS runoff equation and are shown in Table 22:

Table 22: Runoff Volume of the FPL Reclaimed Water Treatment Facility

Subbasin	Composite CN	S	Ia	Q	Runoff Volume
		in	in	in	Ac-ft
Post-Development FPL Reclaimed Water Treatment Facility	91	0.96	0.19	11.51	34.07

Note: The values in the table are rounded up to two decimal places

Table 23 compares the existing and post-development runoff volume at the FPL reclaimed water treatment facility.

Table 23: Comparison of Existing and Post-Development Runoff Volume at FPL Reclaimed Water Treatment Facility

Runoff	Existing Condition	Post-Development Condition	Net Change
Ac-ft	43.91	34.07	-9.84

Existing Condition Peak Discharge

The existing condition peak discharges for the reclaimed water treatment facility area are calculated using NRCS methodology using the computer program HEC-HMS (Reference 4). The calculation details are shown in Attachment A and the model outputs are provided in Attachment B. The subbasin areas for drainage areas A and B are 24.1 and 19.4 acres, respectively, and are shown on Figure 13. Excluding the grass covered slope portion of the post-developed areas, the effective sub-basin areas for drainage areas A

and B are 19.4 and 14.8 acres respectively. The results are summarized in the following table, Table 24.

Table 24: Existing Condition Peak Discharges

Subbasin	Subbasin Area	Lag Time	Composite CN Number	Peak outflow, cfs			
				2-yr	5-yr	10-yr	25-yr
	acres	min					
Drainage Area A	19.4	11.4	96.0	57.1	75.2	89.9	108.0
Drainage Area B	14.8	9.9	96.0	45.0	59.3	70.8	85.1

Stormwater Management Basins

The runoff from the FPL reclaimed water treatment facility will be collected in stormwater management basins (SWB A and SWB B) as shown in Figure 12. The basins will be designed to handle the design storm event, a 25-year, 72-hour storm.

The design criteria for stormwater management of the FPL reclaimed water treatment facility include the following:

- Provide dry detention volume equal to 75 percent of the amounts computed for wet detention; wet detention volume is calculated as either the first inch of runoff from the developed project, or the total runoff of 2.5 inches times the percentage of imperviousness, whichever is greater (for this Project, the first inch of runoff is the controlling condition);
- Provide detention basin capacity for the first 0.5 inch of runoff for projects with drainage areas less than 100 acres, and an additional level of treatment equal to 50 percent of the treatment criteria specified; and
- Size the gravity control devices based upon a maximum design discharge of 0.5 inches of the detention volume in 24 hours, with a dimension no smaller than six square inches of cross-sectional area.
- The storm water basins also satisfy the Miami-Dade County (MDC) criterion to detain a water quality treatment volume equivalent to the first one inch of storm water runoff from the area.
- The post-development peak discharges from the storm water basins are below the existing condition peak discharges for the 2-, 5-, 10-, and 25-year, 72-hour design storm events.

The stormwater basins (SWBs) are designed to provide the required detention volumes satisfying the design criteria. The stage-area-volume information of the basins is provided in Tables 25 and 26.

Table 25: Stage-Area-Storage for the Stormwater Basin (SWB A)

Elevation	Surface Area	Surface Area	Incremental Volume	Storage Volume	Storage Volume
(ft, NAVD 88)	(ft^2)	(ac)	(ft^3)	(ft^3)	(acre-ft)
7	18512.0	0.425			
8	22509.0	0.517	20510.5	20510.5	0.471
9	26851.0	0.616	24680.0	45190.5	1.037
10	31587.0	0.725	29219.0	74409.5	1.708
10.5	33965.0	0.780	16388.0	90797.5	2.084
11	36378.0	0.835	17585.8	108383.3	2.488
12	41460.0	0.952	38919.0	147302.3	3.382
13	47193.0	1.083	44326.5	191628.8	4.399
14	53047.0	1.218	50120.0	241748.8	5.550

Table 26: Stage-Area-Storage for the Stormwater Basin (SWB B)

Elevation	Surface Area	Surface Area	Incremental Volume	Storage Volume	Storage Volume
(ft, NAVD 88)	(ft^2)	(ac)	(ft^3)	(ft^3)	(acre-ft)
9	18486.0	0.424	0.0	0.0	0.000
10	22500.0	0.517	20493.0	20493.0	0.470
10.5	24625.0	0.565	11781.3	32274.3	0.741
11	26769.0	0.615	12848.5	45122.8	1.036
11.5	29057.0	0.667	13956.5	59079.3	1.356
12	31345.0	0.720	15100.5	74179.8	1.703
13	36314.0	0.834	33829.5	108009.3	2.480
14	41488.0	0.952	38901.0	146910.3	3.373
15	47198.0	1.084	44343.0	191253.3	4.391

The stormwater basins will have dry detention storage volume below the riser crest. Table 27 shows the available and required detention volumes. The calculation of the volumes is shown in Attachment A.

Table 27: Available and Required Detention Volumes for the SWBs

Storm Water Basin	Available Detention: Volume between riser crest and orifice invert		SFWMD Required Dry Detention		MDC Required Detention (1 inch runoff volume)*	
	ft^3	ac-ft	ft^3	ac-ft	ft^3	ac-ft
SWB A	70,287	1.61	43,573	1.00	58098	1.33
SWB B	38,586	0.89	27,862	0.64	37149	0.85
Total =	108,873	2.50	71,435	1.64	95,247	2.2

*** Note:** One inch over the developed acres excluding the slope and open areas

Discharge hydrographs were developed using Natural Resources Conservation Service (NRCS) methodology (Reference 2) for the 2-, 5-, 10-, and 25-year, 72-hour design storm events. The HEC-HMS computer program (Reference 4) is used as the tool to generate the hydrographs and route them through the stormwater basins.

Tables 28 and 29 summarize the peak stormwater discharges and water levels in the SWB A and SWB B and also the corresponding existing condition peak discharges. Attachment A shows the calculations.

Table 28: Peak Stormwater Discharge and Water Level in the SWB A

Storm	SWB A Peak Inflow (cfs)	SWB A Peak Outflow (cfs)	SWB A Peak Water Level (ft, NAVD 88)	Existing Condition Peak Discharge (cfs)
2-yr	50.4	42.0	11.4	57.1
5-yr	66.6	56.6	11.6	75.2
10-yr	79.8	68.7	11.7	89.9
25-yr	95.9	84.3	11.9	108.0

Table 29: Peak Stormwater Discharge and Water Level in the SWB B

Storm	SWB B Peak Inflow (cfs)	SWB B Peak Outflow (cfs)	SWB B Peak Water Level (ft, NAVD 88)	Existing Condition Peak Discharge (cfs)
2-yr	32.1	25.3	12.2	45.0
5-yr	42.5	35.6	12.3	59.3
10-yr	50.9	43.2	12.5	70.8
25-yr	61.3	52.9	12.6	85.1

The capacity of the emergency spillways provided in stormwater basins has been checked by passing the 100-year, 72-hour storm through the spillway. The SWB A spillway has a width of 30 ft with its crest elevations at 12.0 ft NAVD 88. The SWB B spillway has a width of 30 ft with its crest elevations at 13.0 ft NAVD 88. These details are also shown on Figures 14 and 15. Table 30 shows that the spillways are sized to pass 100-year discharge without overtopping the banks.

Table 30: Peak Stormwater Discharge and Water Level for 100-year Storm

SWB	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Water Level (ft, NAVD 88)	Top of the Basin (ft, NAVD 88)
Drainage Area A	145.1	138.9	12.3	14.0
Drainage Area B	92.9	83	13.0	15.0

Hydraulic calculations indicate that, at end of riprap protection, the residual flow velocities will be at 1 ft/sec or less, which is not expected to cause local erosion to the receiving wetlands. The calculated discharge velocity from the stormwater treatment ponds at the end of the riprap (0.71-0.99 ft/sec) is well below the permissible velocity of 2.5 ft/sec designed to avoid erosion impact to the receiving wetlands (Reference 5).

The stormwater design will comply with the applicable regulatory standards. Runoff from the potentially oil-contaminated areas (oil-containing components) will be routed through oil/water separators that are designed to meet the applicable standards.

10.8.2 Erosion and Sediment Control

This section describes the effort to minimize erosion and retain sediment in order to control the nonpoint source pollutants associated with the construction activities.

Erosion control measures such as silt fences, hay bales, etc. will be installed during the construction phase to intercept and detain small amounts of sediment from disturbed

areas during construction, and to decrease the velocity of sheet flows and low-to-moderate level channel flows (Reference 6).

Temporary basins/traps with a controlled stormwater release structure will be installed as necessary to detain sediment-laden runoff from disturbed areas. The best locations for the temporary sediment basins are generally low areas and natural drainage way below disturbed areas (Reference 6).

Plant Area

As the fill activity begins on the plant area, temporary sediment basins will be placed to trap the sediment-laden runoff before it enters the industrial wastewater facility that surrounds the plant area. In order to effectively divert the sediment-laden stormwater runoff from a disturbed area to the temporary sediment basins, temporary diversion dikes may be constructed (Reference 6).

The center of the plant area will become the high point of the Site after the fill activity is completed (Figure 6). As the plant area is being filled, temporary fill diversions may be placed to divert the stormwater runoff away from the exposed slopes surrounding the plant area to a stabilized outlet or the temporary sediment basins. The temporary fill diversion will provide some slope protection on a daily basis until the final elevations are reached and a more permanent measure can be constructed (Reference 6).

FPL Reclaimed Water Treatment Facility

During construction of the FPL reclaimed water treatment facility, temporary sediment basins will be placed to trap the sediment-laden runoff in addition to installation of silt fences. Temporary diversion dikes and fill diversions will be placed to divert the stormwater runoff away from the exposed slopes during the fill activities (Reference 6). The surface water runoff from the FPL reclaimed water treatment facility at the existing condition flows to the surrounding wetlands. In addition to the temporary erosion and sedimentation control measures such as silt fences, and/or other impermeable barriers

(e.g. Fabriform, soil, cement bags, and sheet piling), temporary sediment basins/traps will be installed to capture the sediment-laden runoff during construction. Temporary erosion and sedimentation control measures will be designed to prevent the sediment from being displaced and carried off-site by the construction runoff. As necessary, the sediment collected during the construction will be removed. All temporary sediment and erosion control measures will be removed at the end of construction or at an appropriate time. Construction stormwater discharges released into waters of the state from associated non-linear facilities will be addressed through compliance with Rule 62-621.300(4) [General Permit for Stormwater from Large and Small Construction Activities].

Radial Collector Wells

The construction activities for the radial collector wells and delivery pipeline would be performed in accordance with the required local, state, and federal guidelines and accepted industry practices. Installation of the wells and delivery pipeline to the Units 6 & 7 plant area would cause short-term changes in the surface water drainage in the vicinity of the wells and pipeline route during the construction activities. Sedimentation barriers and sedimentation traps would be installed to minimize the potential impacts to the surface water bodies in accordance with FDEP regulations. The drainage characteristics would be restored to preconstruction conditions once the construction activities are completed. Construction stormwater discharges released into waters of the state from associated non-linear facilities will be addressed through compliance with Rule 62-621.300(4) [General Permit for Stormwater from Large and Small Construction Activities].

10.8.3 Conclusions

The stormwater runoff from the Turkey Point Site (plant area and laydown area) and the nuclear administration building, training building, and parking area will be released to the industrial wastewater facility.

Stormwater runoff from the 25-year, 72-hour design storm into the industrial wastewater facility from the Site and nuclear administration building, training building, and parking area will decrease by 3.08 acre-ft at the post-development condition. Thus, the industrial wastewater facility currently has sufficient capacity and will not be impacted by Turkey Point Units 6 & 7 during the post-development condition.

Stormwater runoff from the FPL reclaimed water treatment facility discharges to the surrounding wetland area. The runoff from the 25-year, 72-hour design storm will decrease by approximately 9.84 acre-ft during the operational phase compared to the existing condition runoff. The stormwater management basins are designed (a) to maintain the water quality volume of 0.75 inch of runoff for dry detention as required by the applicable detention/retention criteria; and (b) to provide the capacity for the first 0.5 inch of runoff, plus an additional 50 percent for treatment. The outlet structures are sized to release the maximum design discharge in 24 hours, and (c) to satisfy the Miami-Dade County (MDC) criterion to detain a water quality volume equivalent to the first one inch of stormwater runoff.

10.8.4 References

1. U.S. Department of Agriculture, Natural Resources Conservation Services, *Soil Survey of Dade County Area, Florida*, http://soils.usda.gov/ , Accessed 12/16/2008 and 1/12/2011.
2. U.S. Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division, *Technical Release 55: Urban Hydrology for Small Watersheds*, June 1986.
3. Flood Insurance Study, Miami-Dade County, Florida and Incorporated Areas, Federal Emergency Management Agency. September 2009.
4. HEC-HMS Hydrologic Modeling System, Version 3.2.0 User's Manual, U.S. Army Corps of Engineers, April 2008.
5. *Open Channel Hydraulics*, V. T. Chow, McGraw-Hill International Book Company, 1959.
6. Environmental Resource Permit Information Manual Volume IV, Environmental Resource Regulation Department South Florida Water Management District, 2010.
7. An Overview of Urban Stormwater Management Practices in Miami-Dade County, Florida, Chin, David A., prepared in cooperation with the South Florida Water Management District, 2004.
8. Bechtel calculation *FPL Reclaimed Water Treatment Facility Storm Water Basin Sizing* Rev 003, December 2010.

10.8.5 Reference Drawings

1. 25409-0-CG-0010-00007 Rev.0: Site Pre-development Drainage Plan (Figure 2)
2. 25409-0-C2-0010-00001 Rev.5: Site Plan (Figure 5)
3. 25409-0-CG-0010-00002 Rev.3: Site Finish Grading Plan (Figure 6)
4. 25409-0-CG-0010-00001 Rev.3: Nuclear Island Power Block Finish Grading Plan (Figure 7)
5. 25409-0-CG-0010-00006 Rev.0: Site Post-development Drainage Plan (Figure 8)
6. 25409-0-C2-0010-00002 Rev.F: Construction Site Utilization Plan (Figure 9)
7. 25409-0-CG-0010-00005 Rev.0: Reclaimed Water Treatment Facility Post-development Drainage Plan (Figure 12)
8. 25409-0-CG-0010-00004 Rev.0: Reclaimed Water Treatment Facility Pre-development Drainage Plan (Figure 13)

9. 25409-0-CG-0010-00003 Rev.2: Reclaimed Water Treatment Facility Finish Grading Plan (Figure 14)
10. 25409-0-CG-0090-00001 Rev.0: Reclaimed Water Treatment Facility Storm Water Basin and Sections Details (Figure 15)

Figure 1: Turkey Point Site and Surrounding Area

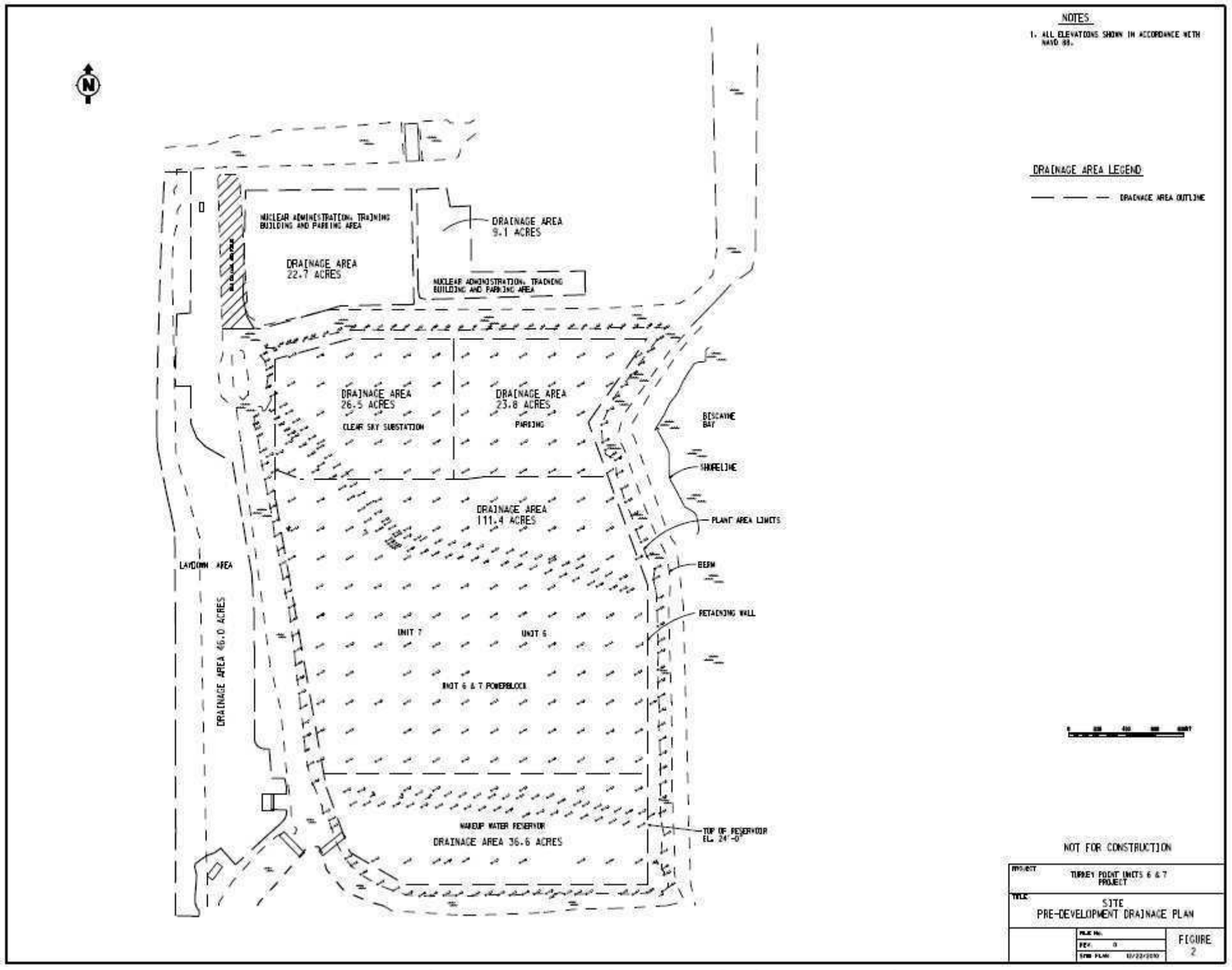


Figure 2 : Turkey Point Unit 6 & 7 Site Existing Condition Drainage Plan

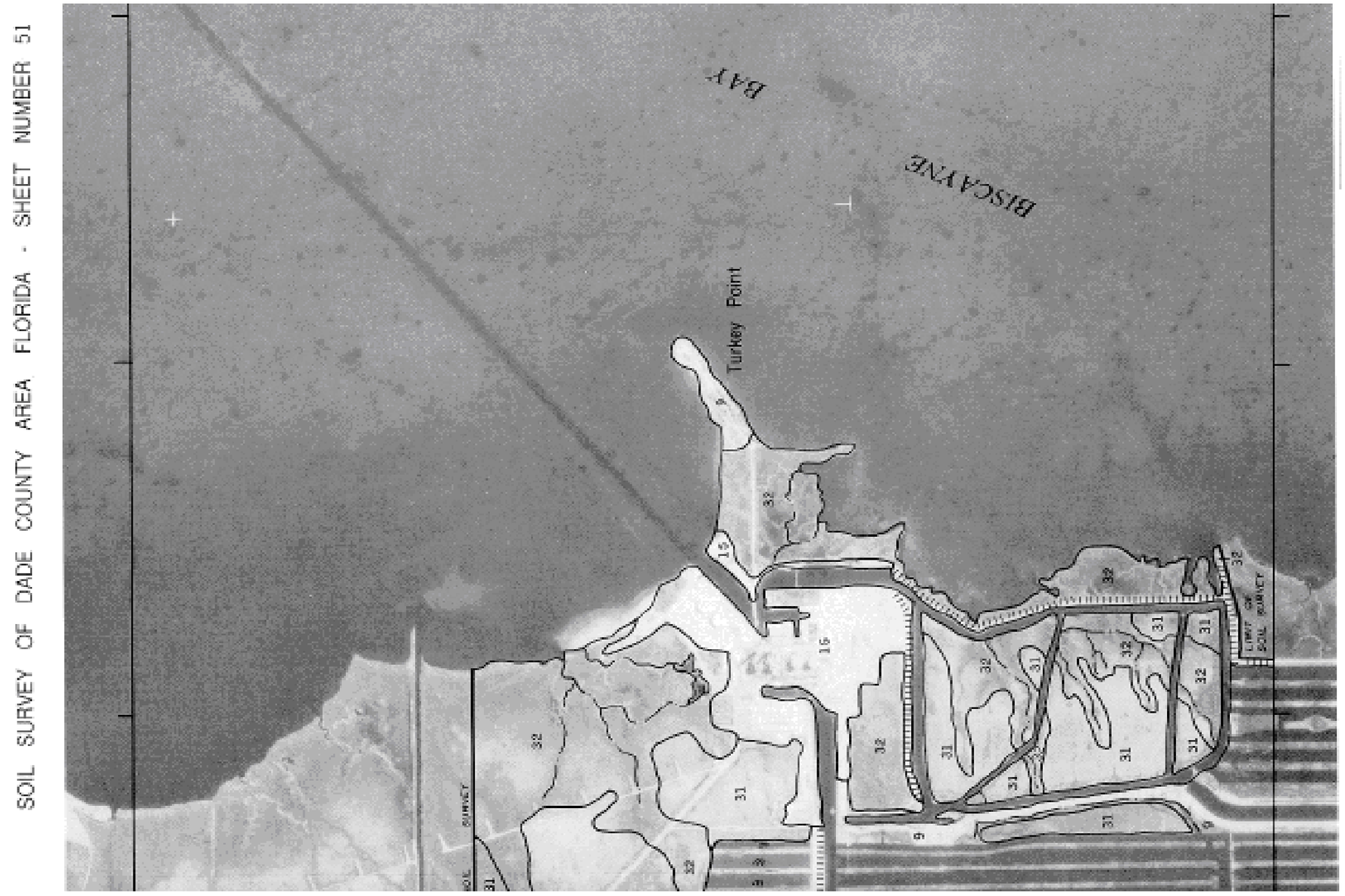


Figure 3: Site Soil Survey of Miami-Dade County, Florida

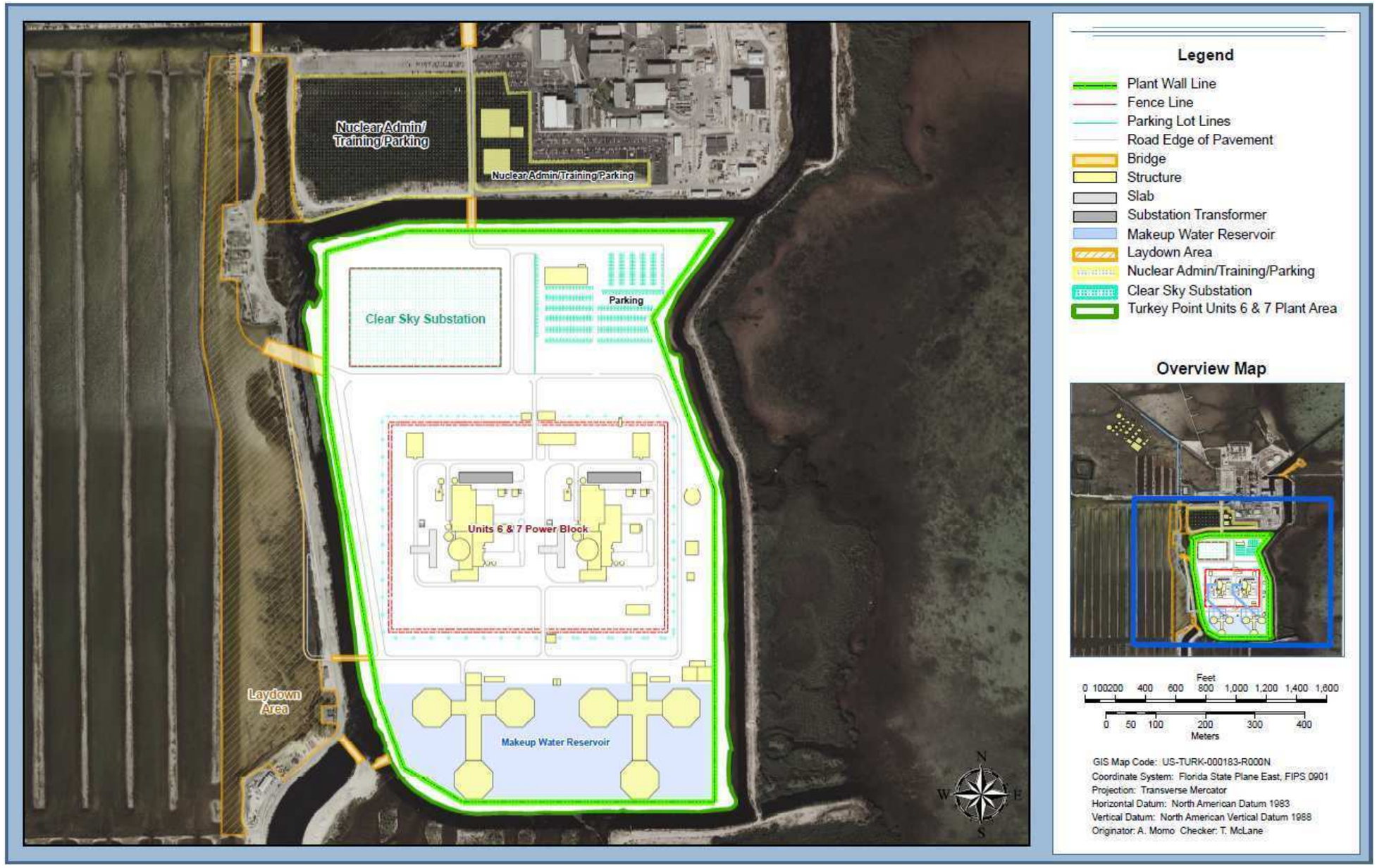


Figure 4: Turkey Point Units 6 & 7 Site and Nuclear Administration Building, Training Building, and Parking Area

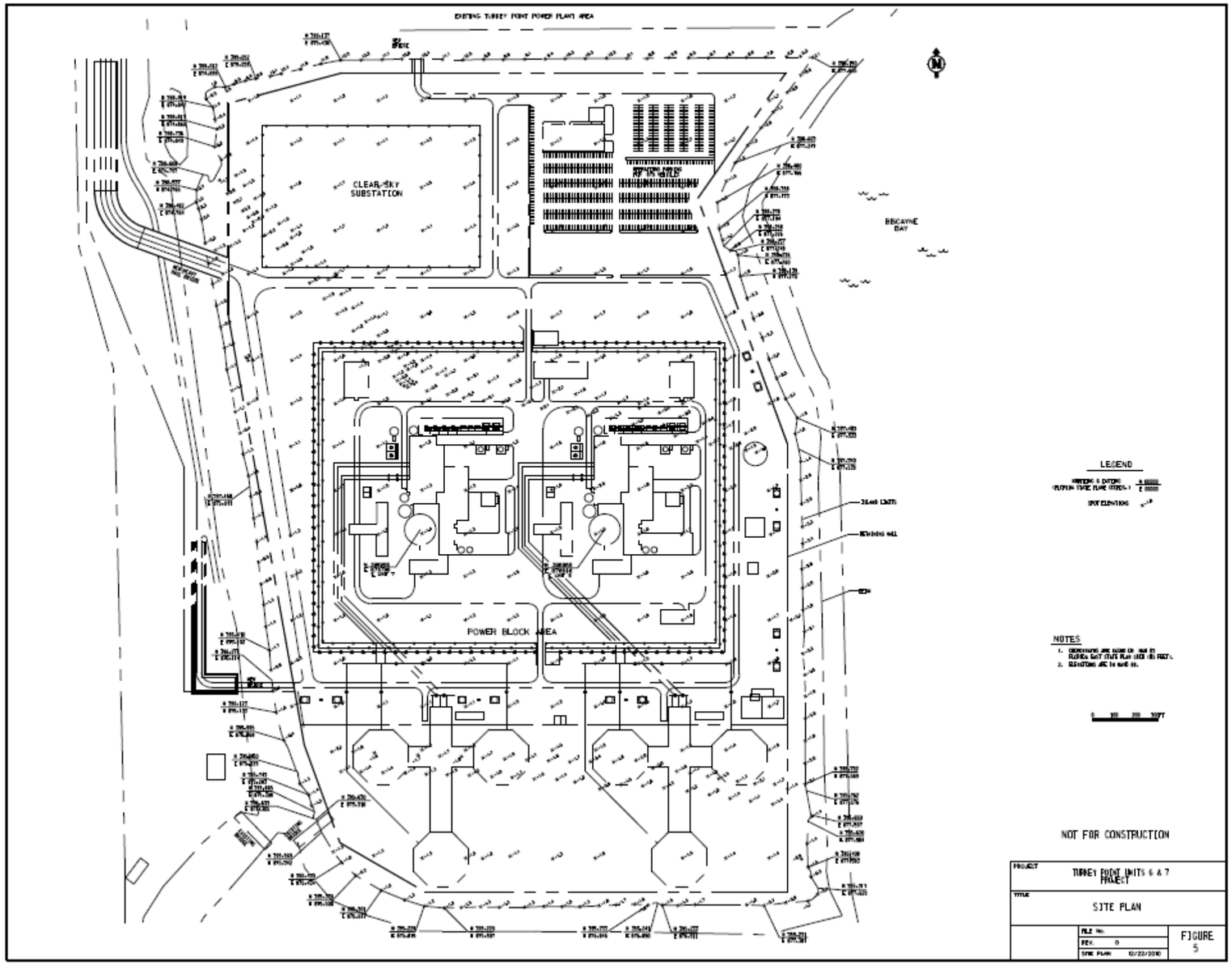


Figure 5 : Turkey Point Unit 6 & 7 Site Plan

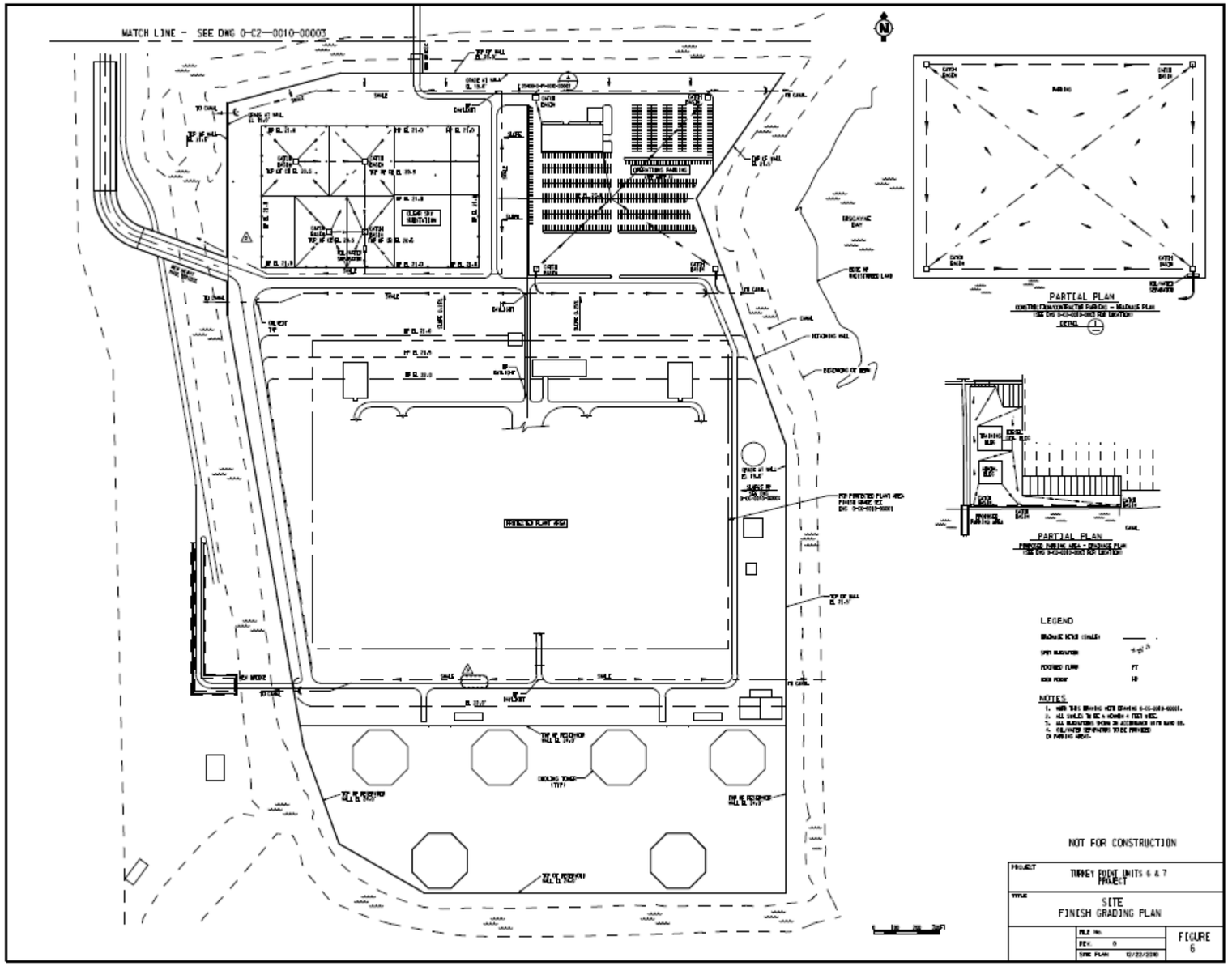


Figure 6 : Turkey Point Unit 6 & 7 Site Finish Grading Plan

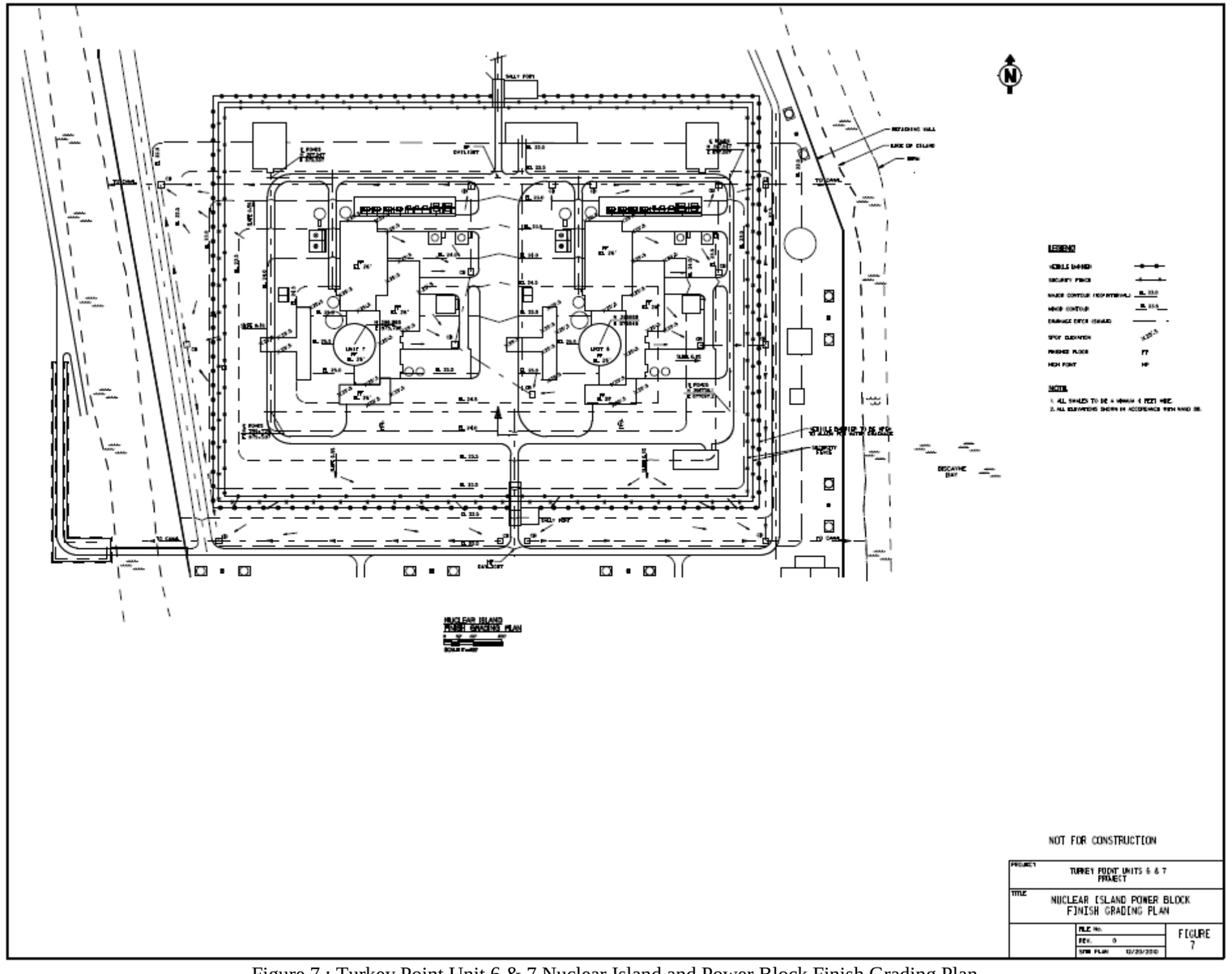


Figure 7 : Turkey Point Unit 6 & 7 Nuclear Island and Power Block Finish Grading Plan

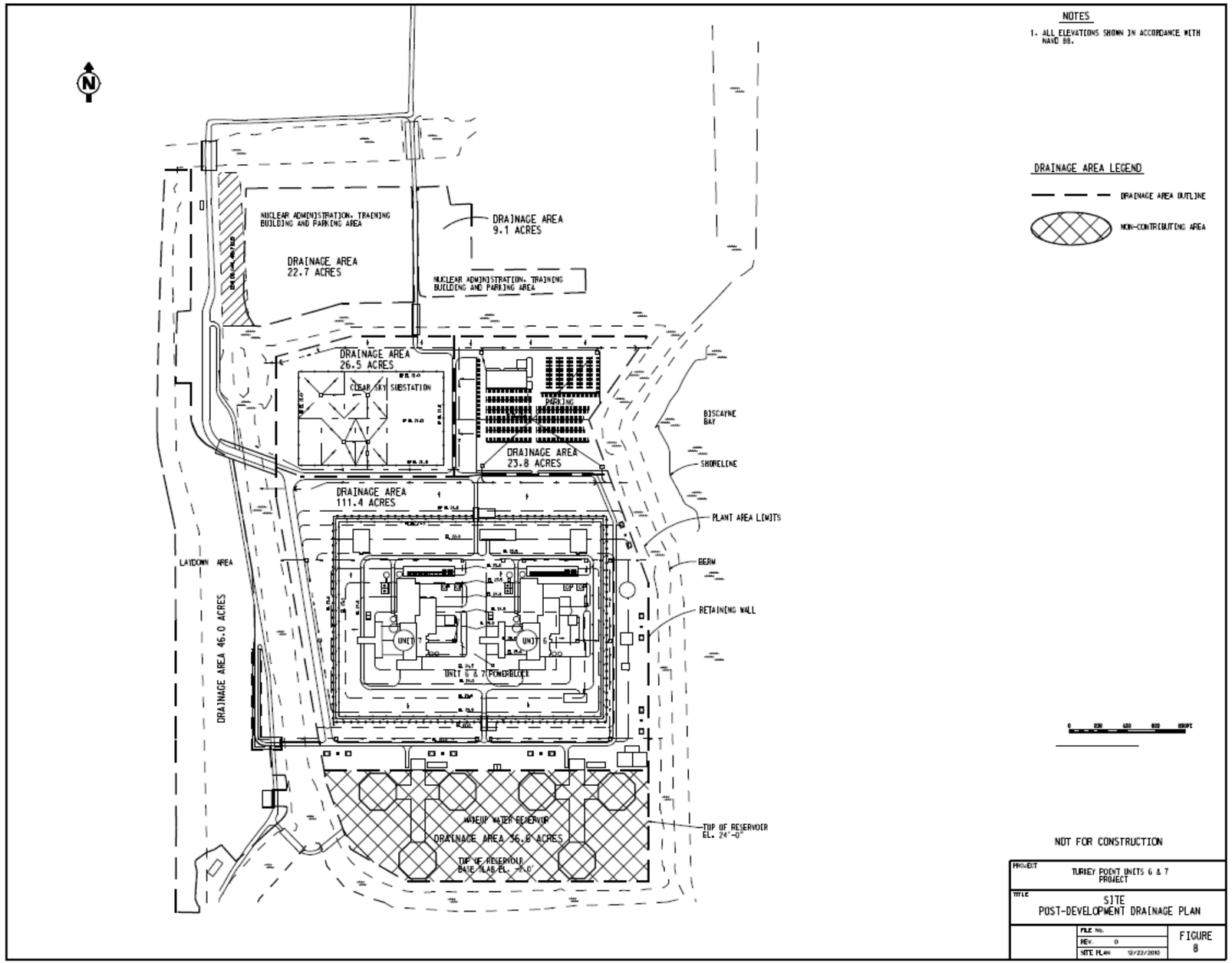


Figure 8 : Turkey Point Unit 6 & 7 Site Post-development Drainage Plan

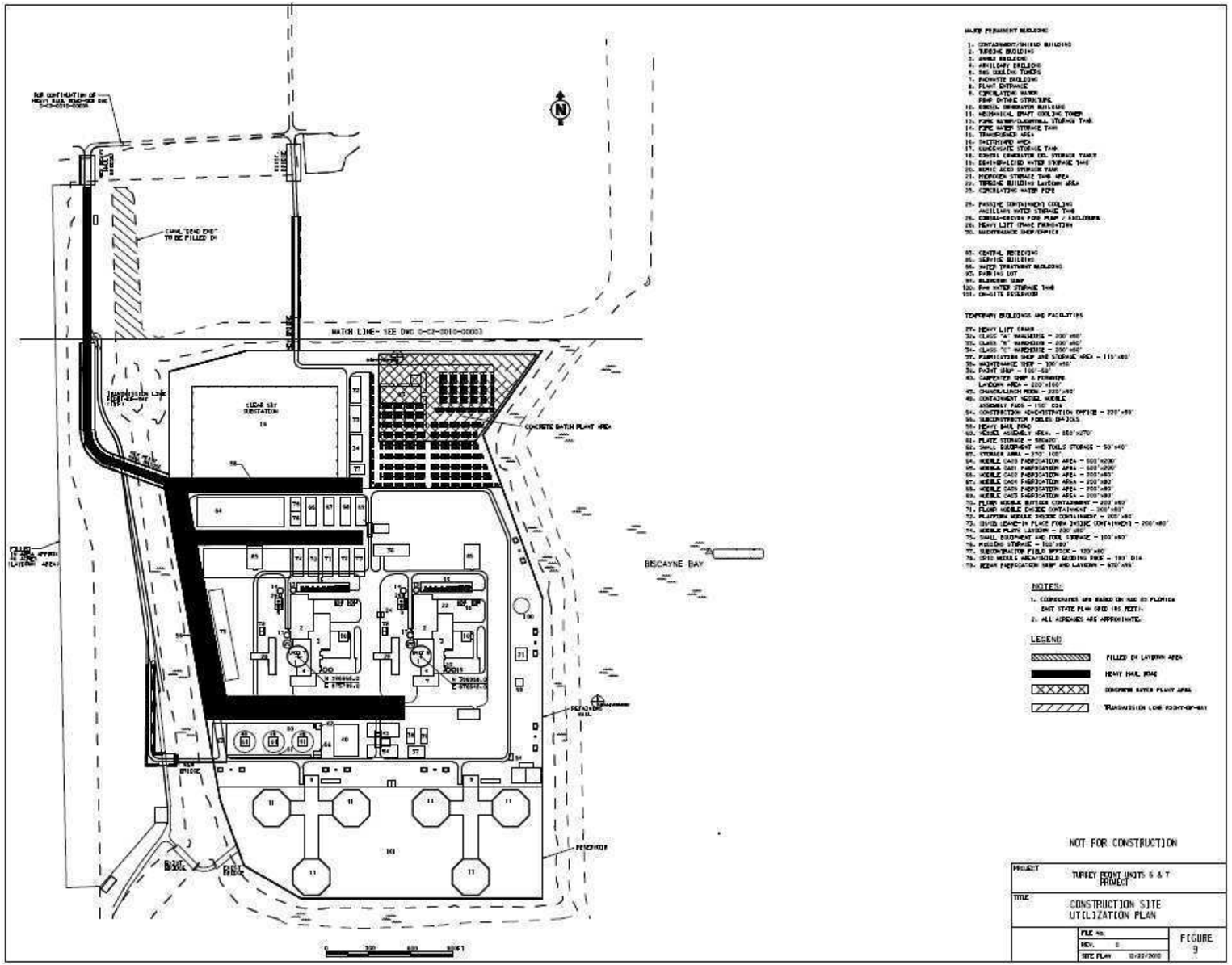


Figure 9 : Turkey Point Unit 6 & 7 Construction Site Utilization Plan

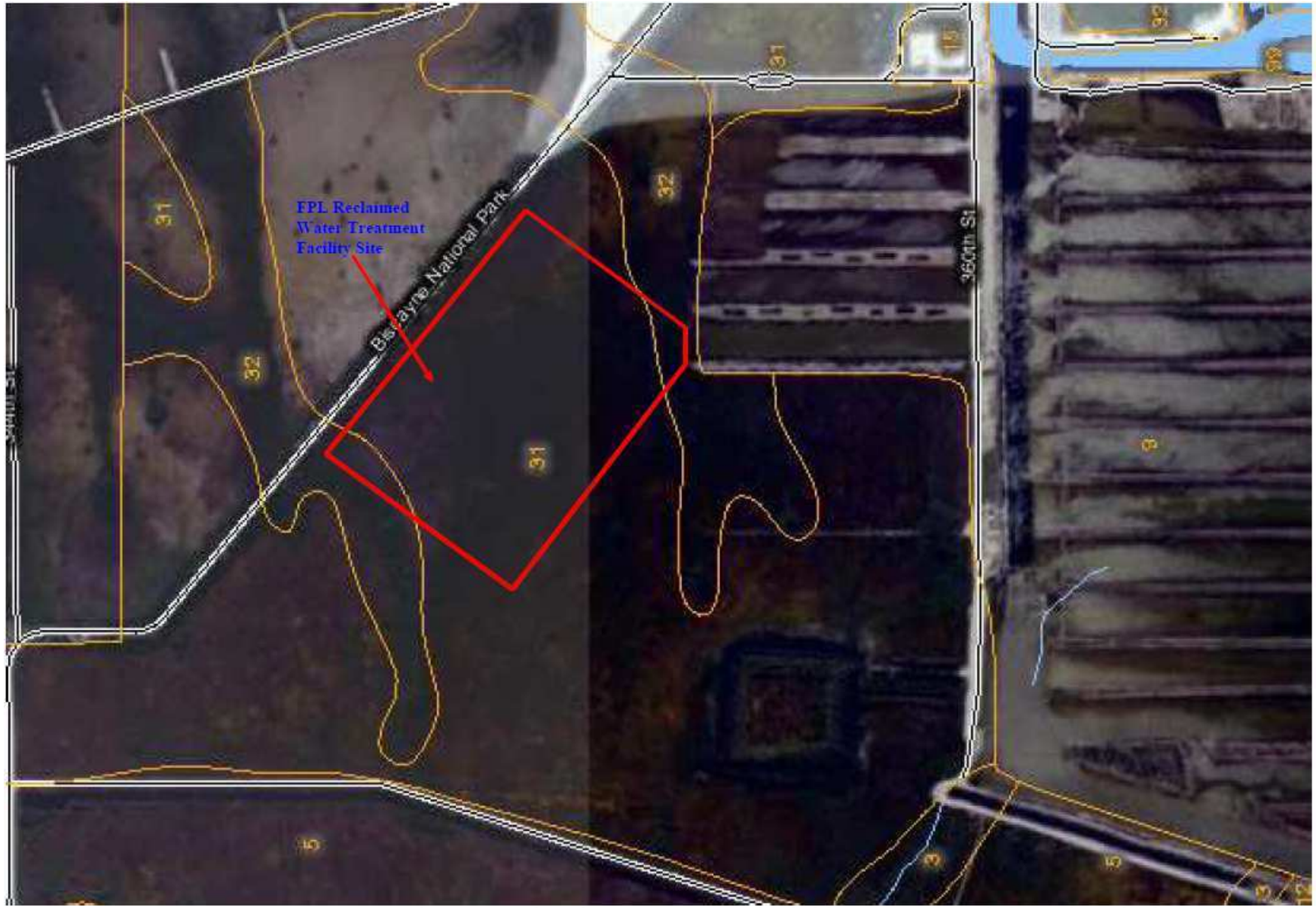


Figure 10: FPL Reclaimed Water Treatment Facility Soil Survey of Miami-Dade County Area, Florida

Figure 11: Layout of the FPL Reclaimed Water Treatment Facility

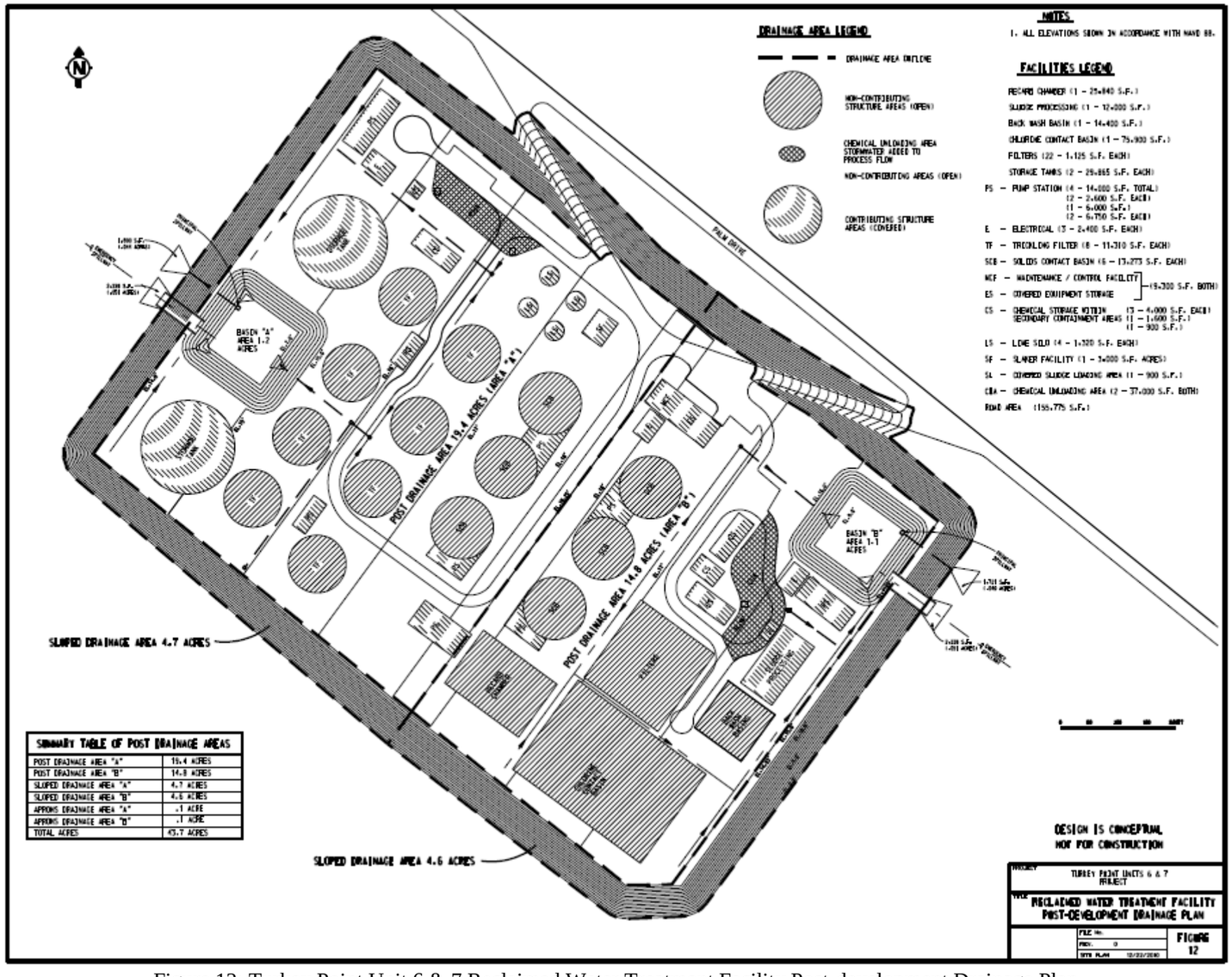


Figure 12: Turkey Point Unit 6 & 7 Reclaimed Water Treatment Facility Post-development Drainage Plan

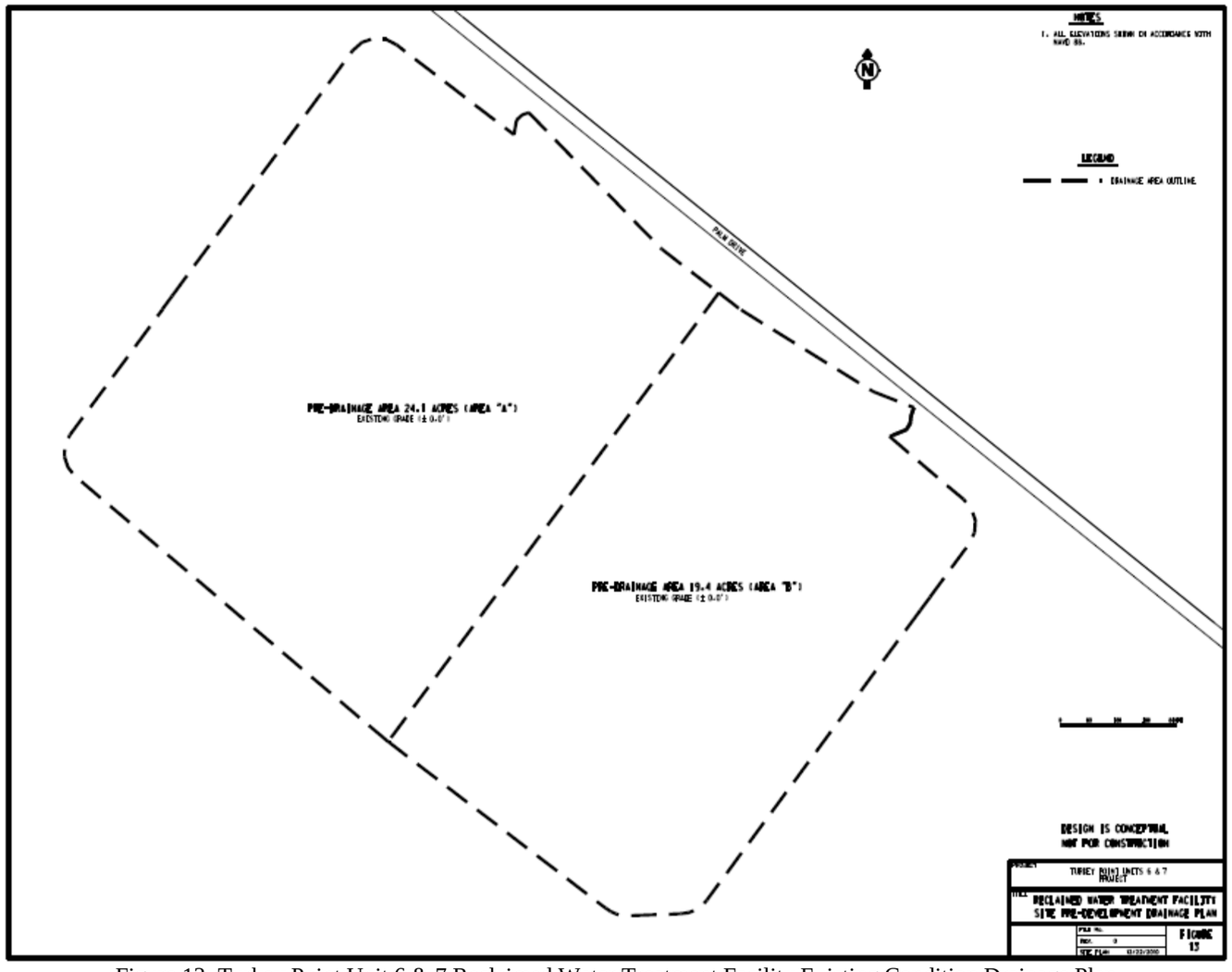


Figure 13: Turkey Point Unit 6 & 7 Reclaimed Water Treatment Facility Existing Condition Drainage Plan

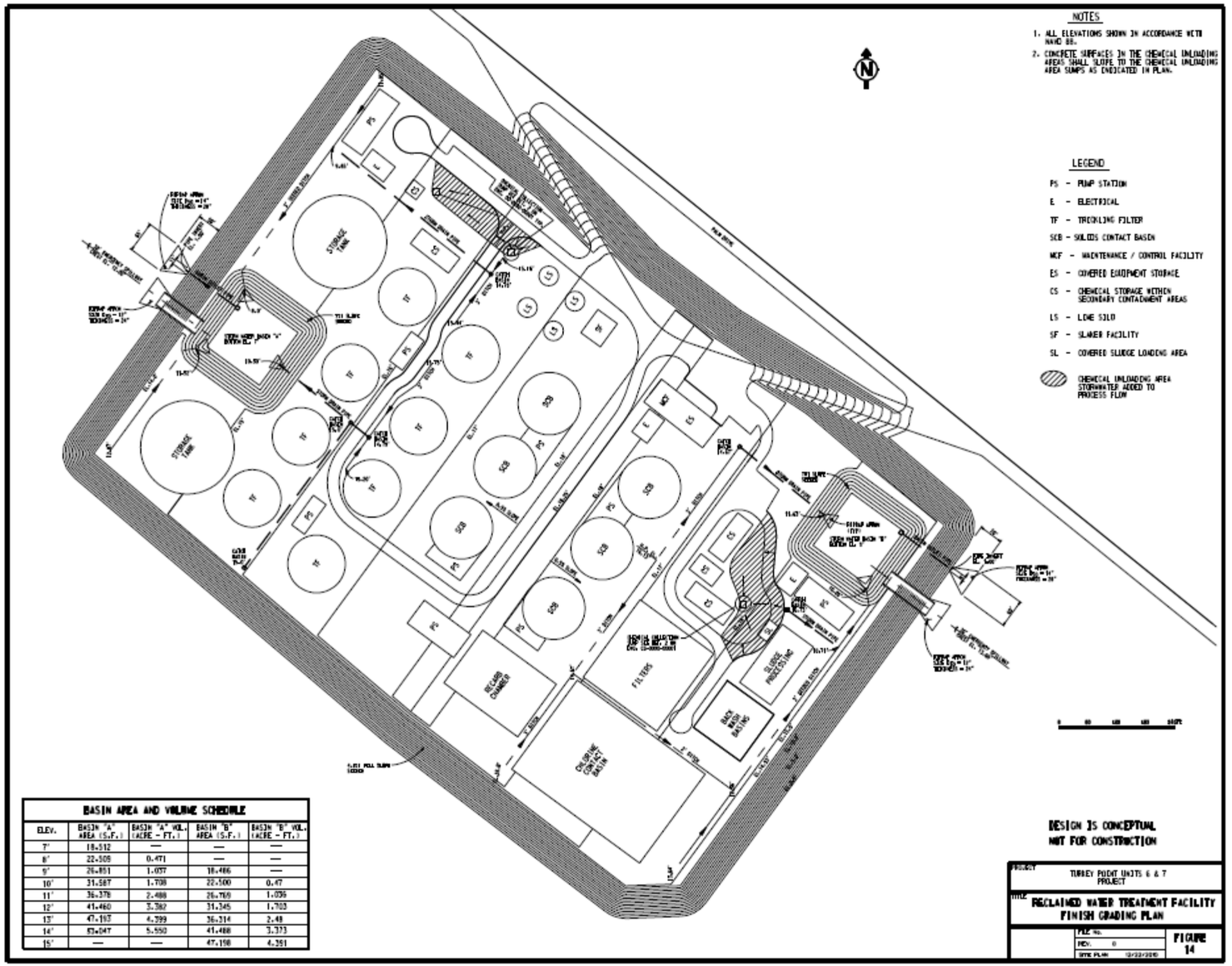


Figure 14: Turkey Point Unit 6 & 7 Reclaimed Water Treatment Facility Finish Grading Plan

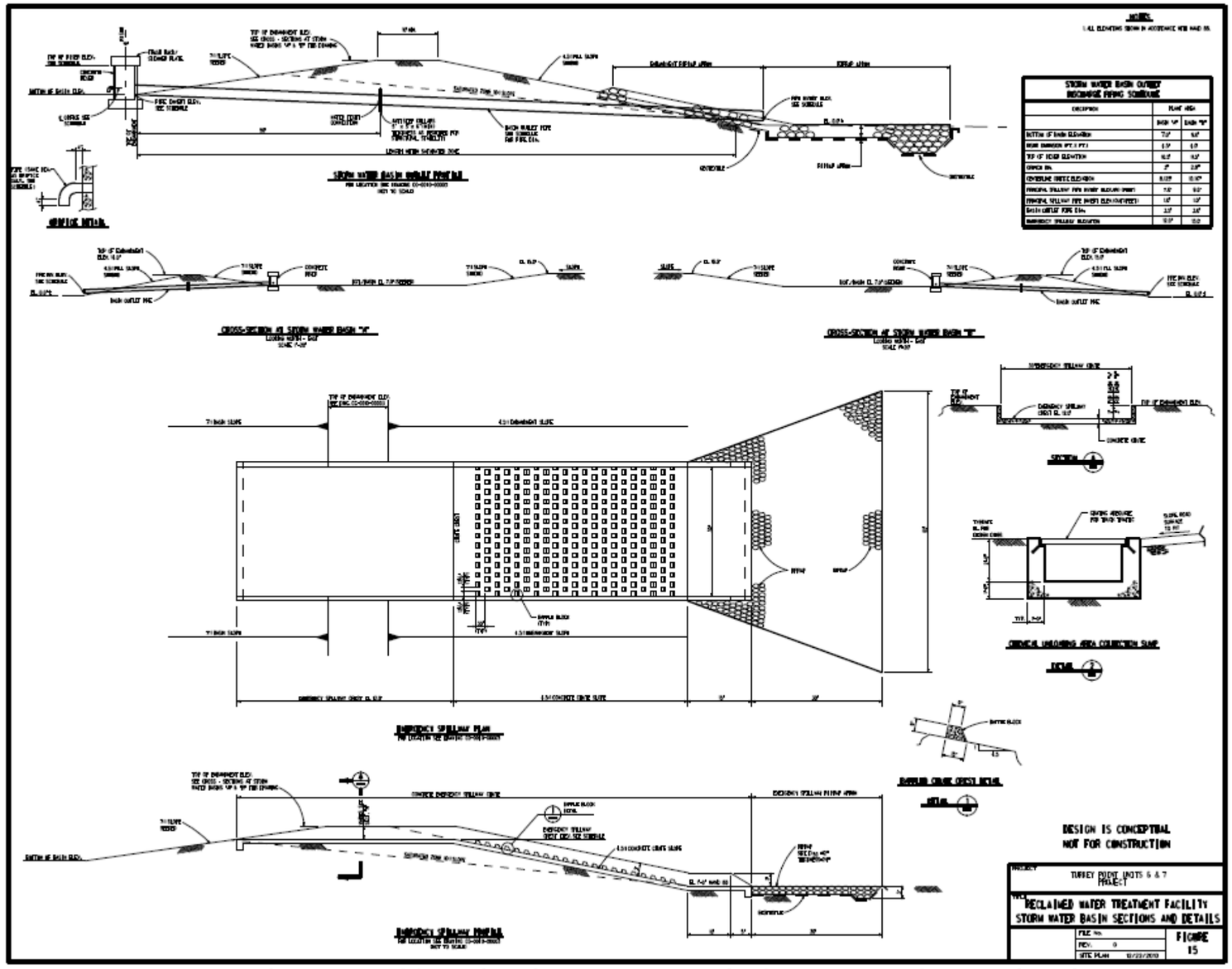


Figure 15: Turkey Point Unit 6 & 7 Reclaimed Water Treatment Facility Stormwater Basin Sections and Details

This Attachment presents the inputs, calculation details and the outputs of the stormwater basin design for the FPL Reclaimed Water Treatment Facility (RWTF).

The storm water basins (SWBs) are designed to provide the required detention of the storm water runoff to comply with applicable regulations. The computation also includes the calculation of existing and post development condition peak discharge summary for the design storm events.

The inputs, outputs and the details of the calculations are presented in the following sections.

72-Hour Rainfall Depths

A cumulative depth rainfall hyetograph distribution (Reference 7) is used in the HEC-HMS program to develop the rainfall hyetographs for the design rainfall events using the rainfall depths. The 72-hour rainfall depths for different frequencies are given in Table A-1.

Table A-1: 72-Hour Rainfall Depths for the FPL Reclaimed Water Treatment Facility Site

Frequency	2-year	5-year	10-year	25-year	100-year
Depth (in)	6.7	8.8	10.5	12.6	19.0

EXISTING CONDITION PEAK DISCHARGE

The existing condition peak discharges for the reclaimed water treatment facility are calculated for 2-, 5-, 10-, and 25- year 72 hour design storms. HEC-HMS modeling tool has been used to calculate the peak discharge. Followings are the HEC-HMS inputs used for the existing condition.

Drainage Areas

A large portion of the existing area is presently tidally influenced, and is inundated under high tide.

The drainage areas considered for the existing condition peak discharge calculation are extended to the outline of the drainage areas for the post-development storm water basin calculation. The existing condition area is divided in to two areas as shown in Figure 14.

Because the RWTF is constructed on fill, the grass covered slope portions of the post-development drainage areas will not discharge to the stormwater management basins. Thus, for comparison of existing condition peak discharges to the post-development peak discharges, only the portion of the drainage area that will contribute to the stormwater management basins are included in Table A-2 and in the existing condition peak discharge calculation.

Table A-2: Existing Condition Drainage Areas

Sub-Basin	Subbasin Area		
	sq. ft	acres	sq. mi.
Drainage Area A	845,064	19.40	0.030
Drainage Area B	644,688	14.80	0.023

Runoff Curve Number

TableA-3: Existing Condition Runoff Curve Number

Sub-basin	Ground Cover Percentage				
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	Composite CN
	98	**91**	**100**	**84**	
Existing Condition FPL RWTF	0%	0%	75%	25%	96

Lag Time

The HEC-HMS program uses the lag time rather than Tc directly in calculating the peak discharge. The lag time is calculated as 60% of the time of concentration (Tc) for each sub-basin (Reference 4).

Time of Concentration

Each flow path is divided into sheet flow, and shallow concentrated flow segments. The sheet flow and shallow concentrated flow segments for each flow path are determined using Natural Resources Conservation Service (NRCS) procedures outlined in Reference 2. The ditch or pipe flow segment travel time is determined by estimating the flow velocity and computing the travel time
The equations used for sheet flow and shallow concentrated flow are shown below.

Sheet Flow:

$$T_i = \frac{0.007(nL)^{0.8}}{P_2^{0.5} S^{0.4}}$$

Where:

n = surface roughness coefficient for sheet flows (n = 0.011 for bare soil, used for existing condition where ground cover includes ponding in most of the area)
L = flow path length, ft (maximum = 100 ft)
P = 2-yr, 24-hr rainfall = 6 inches (Reference 8)
S = Flow path slope

Shallow Concentrated Flow:

From Reference 2, page F-1, Velocity,

V = 16.1345 S0.5 (for unpaved surfaces)

$$T_i = \frac{L}{3600 \cdot V}$$

The Tc and lag time calculation for the existing condition is shown in the following Table.

Table A-4: Existing Tc and Lag Time Calculation

	Sheet Flow				Shallow Concentrated Flow				Pipe/Ditch Flow				
	(Segment A-B)				(Segment B-C)					(Segment C-D)		Calculated	Calculated
Sub-Basin	Length, L (ft)	Manning's Coefficient, n	Slope, S	T1 (hr)	Length, L (ft)	Slope, S	Calculated Velocity, V (fps)	T2 (hr)	Length, L (ft)	Est. Velocity, V (fps)	T3 (hr)	Time of Concentration (min)	Lag Time (min)
Drainage Area A	100	0.011	0.0001	0.123	800	0.005	1.14	0.195				19.1	11.4
Drainage Area B	100	0.011	0.0001	0.123	620	0.005	1.14	0.151				16.4	9.9

Existing Condition Peak Discharge

The existing condition peak discharges are calculated using HEC-MHS. The model outputs are presented on Attachment B and the results are summarized in the following table.

Table A-5: Existing Condition Peak Discharges

Subbasin	Subbasin Area	Lag Time	Composite CN Number	Peak outflow, cfs			
				2-yr	5-yr	10-yr	25-yr
	acres	min					
Drainage Area A	19.4	11.4	96.0	57.1	75.2	89.9	108.0
Drainage Area B	14.8	9.9	96.0	45.0	59.3	70.8	85.1

POST-DEVELOPMENT STORMWATER MANAGEMENT

The post-development condition for the RWTF site is shown in Figure 10. The runoff from the area will be collected in the trenches/ditches and storm water management basins as shown. The detention capacity and outfall structures will control the discharge from the basins to the surrounding area. The peak discharges from the post-development areas are calculated in this section.

Discharge hydrographs are developed using Natural Resources Conservation Service (NRCS) methodology (Reference 2) for the 2-, 5-, 10-, 25-and 100-year, 72-hour design storm events for the post-development conditions. The HEC-HMS computer program is used as the tool to generate the hydrographs. A SFWMD 72-hour rainfall distribution is used in the HEC-HMS program to develop the rainfall hyetographs for the design rainfall events using the rainfall depths.

Drainage Areas

The FPL reclaimed water treatment facility consists of storage tanks, pump stations, and other reclaimed water treatment components and units as shown in Table A-6.The post-development drainage areas are shown in Figure 15. Runoffs from the drainage areas A and B drain into the SWB A and SWB B, respectively and their areas are 19.4 acres and 14.8 acres, respectively. Open basin structures capture the rainfall and do not contribute to the total runoff. The areas consisting of the open basin structures in the drainage area A and B are approximately 3.42 acres and 4.57 acres, respectively. Thus, the post-development drainage areas are calculated by subtracting the open basin structures accordingly as shown in Table A-7.

Table A-6: FPL Reclaimed Water Treatment Facility Components

Component / Unit Process	No. of Units	Open / Covered	Dimensions, each	Height, each (above grade)	Abbreviation
Storage Tanks (Reclaimed Water from MDWASD)	2	Covered	195-ft diameter	47.2-ft water depth	Storage Tank
Trickling Filters Pump Station Return Flow/Chemical addition	2	Covered	75-ft by 35-ft	16-ft	PS
Trickling Filters	8	Open	120-ft diameter	35-ft	TF
Chemical Unloading Areas, stormwater from these areas is pumped to the back wash basin and is then added to the process flow stream	2	Open	37,000 sq. ft. (total area for 2)	curbed area	CUA
Solids Contact Basin	6	Open	130-ft diameter	4-ft	SCB
Sludge Pump Stations	4	Covered	14,000 sq. ft (total area for 2)	14-ft	PS
Ferric Chloride Storage Tanks	3	Covered	14-ft diameter	27-ft-4-in	*
Containment Area w/Pumps	1	Slab	40-ft by 100-ft	4-ft (walls)	CS
Recarbonation Tanks	1	Open	136-ft by 190-ft	10-ft	Recarb Chamber
Filter and Pump Station	1	Covered	50-ft by 120-ft	16-ft	PS
Filters	22	Open	15-ft by 75-ft	18-ft	Filters
Filter Gallery (between 2 rows of Filters)	1	Covered	40-ft by 190-ft	18-ft	Filters
Methanol Storage Tanks	4	Covered	14-ft diameter	23-ft	*
Containment Area w/Pumps	1	Slab	40-ft by 100-ft	4-ft (walls)	CS
Waste Backwash Basin	1	Open	120-ft by 120-ft	3-ft (berms)	Back Wash Basin
Chlorine Contact Basin	1	Open	230-ft by 330-ft	10-ft	Chlorine Contact Basin
Sodium Hypochlorite Storage Tanks	3	Covered	12-ft diameter	25-ft	*
Containment Area w/Pumps	1	Slab	40-ft by 100-ft	4-ft (walls)	CS
Treated Water Pump Station	2	Covered	135-ft by 50-ft	16-ft	PS
Sludge Processing Facility	1	Covered	80-ft by 150-ft	25-ft	Sludge Processing
Sludge Truck Loading Canopy	1	Covered	900 sq.ft total area	25-ft	SL
Electrical	3	Covered	40-ft by 60-ft	14-ft	E
Roads and Parking Areas	1	N/A	155,775 sq.ft total area	0	
Maintenance/Control Facility and Covered Equipment Storage	1	Covered	60-ft by 155-ft	20-ft	ES
Lime Silos	4	Covered	41-ft diameter	64-ft	LS
Housekeeping Area	1	Slab	100-ft by 100-ft	2-ft (walls)	
Slaker Facility	1	Covered	60-ft by 50-ft	16-ft	SF
Sodium Bisulfite Tank	1	Covered	12-ft diameter	19-ft-1-in	*
Containment Area w/Pumps	1	Slab	30-ft by 30-ft	4-ft (walls)	CS
Polymer	2	Covered	totes included in Sludge Processing	n/a	
Acid	1	Covered	12-ft diameter	19-ft	*
Containment Area w/Pumps	1	Slab	40-ft by 40-ft	4-ft (walls)	CS

* Contained within dedicated CS

Note: Secondary containment provided (110 percent of largest container) for all chemical storage areas.

Table A-7: Post-development Drainage Areas for Storm Water Basins

Sub-Basin	Area (ft^2)	Area (ac)	Area (mi^2)
Drainage Area A	697,175	16.00	0.025
Drainage Area B	445,791	10.23	0.016

Runoff Curve Numbers

During the post-development condition, the soil type for all the developed areas are assumed as Type D soil for the runoff analysis as the site will consist of compacted fill. The land cover percentages for the post-developed condition have been estimated based on the FPL Reclaimed Water Treatment Facility site components and units as shown in Table A-6. The calculations of composite runoff curve numbers for the areas are shown in Table A-8.

Table A-8: Post-development CN Number Calculation for Storm Water Basins

Sub-basin	Ground Cover Percentage				
	Impervious CN	Gravel CN (Type D)	Pond CN	Grass CN (Type D, fair)	Composite CN
	98	**91**	**100**	**84**	
Drainage Area A	35.7%	56.7%	7.6%	0.0%	94
Drainage Area B	16.6%	72.8%	10.6%	0.0%	93

Lag Time

The HEC-HMS program uses the lag time rather than Tc directly in calculating the peak discharge. The lag time is calculated as 60% of the time of concentration (Tc) for each sub-basin.

Time of Concentration

Each flow path is divided into sheet flow, and shallow concentrated flow segments. The sheet flow and shallow concentrated flow segments for each flow path are determined using Natural Resources Conservation Service (NRCS) procedures. The ditch or pipe flow segment travel time is determined by estimating the flow velocity and computing the travel time

The equations used for sheet flow and shallow concentrated flow are shown below.

Sheet Flow:

$$T_i = \frac{0.007(nL)^{0.8}}{P_2^{0.5} S^{0.4}}$$ Where:

n = surface roughness coefficient for sheet flows (n = 0.011 for concrete, asphalt, gravel or bare soil)
L = flow path length, ft (maximum = 100 ft)
P = 2-yr, 24-hr rainfall = 6 inches
S = Flow path slope

Shallow Concentrated Flow:

Velocity V = 20.3282 $S^{0.5}$ (for paved/gravel surfaces)

$$T_i = \frac{L}{3600 \cdot V}$$

The time of concentration values and lag times for each basin are summarized in Table A-9.

Table A-9 Post-development Tc and Lag Time Calculation

	Sheet Flow				Shallow Concentrated Flow				Pipe/Ditch Flow				
	(Segment A-B)				(Segment B-C)					(Segment C-D)		Calculated	Calculated
Sub-Basin	Length, L (ft)	Manning's Coefficient, n	Slope, S	T1 (hr)	Length, L (ft)	Slope, S	Calculated Velocity, V (fps)	T2 (hr)	Length, L (ft)	Est. Velocity, V (fps)	T3 (hr)	Time of Concentration (min)	Lag Time (min)
Drainage Area A	100	0.011	0.005	0.026	340	0.005	1.44	0.066	545	5.00	0.030	7.3	4.4
Drainage Area B	100	0.011	0.005	0.026	150	0.005	1.44	0.029	1130	5.00	0.063	7.0	4.2

Basin Stage-Storage

The stage-area-storage relationships for storm water basins are shown in the following Tables A-10 and A-11. The elevations and areas for each basin are measured from finished grade drawing.

Table A-10: Stage-Storage for Stormwater Basin (SWB A)

Elevation	Surface Area	Surface Area	Incremental Volume	Storage Volume	Storage Volume
(ft)	(ft^2)	(ac)	(ft^3)	(ft^3)	(acre-ft)
7	18512.0	0.425			
8	22509.0	0.517	20510.5	20510.5	0.471
9	26851.0	0.616	24680.0	45190.5	1.037
10	31587.0	0.725	29219.0	74409.5	1.708
10.5	33965.0	0.780	16388.0	90797.5	2.084
11	36378.0	0.835	17585.8	108383.3	2.488
12	41460.0	0.952	38919.0	147302.3	3.382
13	47193.0	1.083	44326.5	191628.8	4.399
14	53047.0	1.218	50120.0	241748.8	5.550

Table A-11: Stage-Storage for Stormwater Basin (SWB B)

Elevation	Surface Area	Surface Area	Incremental Volume	Storage Volume	Storage Volume
(ft)	(ft^2)	(ac)	(ft^3)	(ft^3)	(acre-ft)
9	18486.0	0.424	0.0	0.0	0.000
10	22500.0	0.517	20493.0	20493.0	0.470
10.5	24625.0	0.565	11781.3	32274.3	0.741
11	26769.0	0.615	12848.5	45122.8	1.036
11.5	29057.0	0.667	13956.5	59079.3	1.356
12	31345.0	0.720	15100.5	74179.8	1.703
13	36314.0	0.834	33829.5	108009.3	2.480
14	41488.0	0.952	38901.0	146910.3	3.373
15	47198.0	1.084	44343.0	191253.3	4.391

Detention Volume Calculation

The bottom elevations for the SWB A is at 7 ft NAVD 88 and for the SWB B is at 9 ft NAVD 88. Since the ground water level in the area is approximately the same as the water level in Biscayne Bay, and the mean water level in Biscayne Bay is at Elevation 0, the SWBs are dry detention ponds. The required detentions for the respective areas are calculated by multiplying the first inch of the runoff by the area of the RWTF, or multiplying the first 2.5 inches to the impervious area. The higher value is considered as the required volume. The required detention for the dry detention pond is 75% of the wet detention requirement. The calculation of the required detention is shown in Table A-12.

Table A-12 Detention Volume Computation

2.5" over the impervious area					
SWB A			SWB B		
Total impervious area =	248,563	ft^2	Total impervious area =	73,872	ft^2
	5.71	ac		1.70	ac
Wet detention =	51784	ft^3	Wet detention =	15390	ft^3
	1.19	ac-ft		0.35	ac-ft
Dry detention =	38838.03	ft^3	Dry detention =	11542.53	ft^3
	0.89	ac-ft		0.26	ac-ft

First inch of runoff from the developed project					
SWB A			SWB B		
Total area=	697,175	ft^2	Total area=	445,791	ft^2
	16.00	ac		10.23	ac
Wet detention =	58098	ft^3	Wet detention =	37149	ft^3
	1.33	ac-ft		0.85	ac-ft
Dry detention =	43573.47	ft^3	Dry detention =	27861.96	ft^3
	1.00	ac-ft		0.64	ac-ft

Computation of the required detentions for the SWBs in Table A-12 shows that the runoff detention requirements from the first inch of runoff from the contributing area are greater. Table A-13 compares the provided storages of the SWBs with the detention requirement from the first inch of runoff from the Reclaimed Water Treatment Facility area.

Table A-13: Available and Required Detentions Volumes for the SWBs

Storm Water Basin	Available Detention: Volume between riser crest and orifice invert		SFWMD Required Dry Detention		MDC Required Detention (1 inch runoff volume)*	
	ft^3	ac-ft	ft^3	ac-ft	ft^3	ac-ft
SWB A	70,287	1.61	43,573	1.00	58098	1.33
SWB B	38,586	0.89	27,862	0.64	37149	0.85
Total* =	108,873	2.50	71,435	1.64	95,247	2.2

*** Note:** One inch over the 26.16 developed acres (43.5 total acres minus 9.3 acres of grass slope, minus 8.0 acres of non-contributing area).

Therefore, the SWB A and SWB B satisfy the detention requirements.

150% Treatment

The following computation shows that the SWB A and B provide enough storage for detention of the first 0.5 inch of runoff for the FPL reclaimed water treatment facility area, plus an additional 50% treatment.

SWB A

Drainage Area=		16.00	ac		
		697175	ft^2		
Required detention=	1/2 inches * 1.5 =	3/4	inches		
Required WQ Volume=		1	ac-ft		
		43573	ft^3		
Volume between riser crest (10.5 ft) and orifice invert (8 ft)=		1.61	ac-ft	**OK**	(As shown on Table A-10)
		70287	ft^3	**OK**	(As shown on Table A-10)

SWB B

Drainage Area=		10.23	ac		
		445791	ft^2		
Required detention =	1/2 inches * 1.5 =	3/4	inches		
Required WQ Volume=		0.64	ac-ft		
		27862	ft^3		
Volume between riser crest (10.5 ft) and orifice invert (8 ft)=		0.89	ac-ft	**OK**	(As shown on Table A-11)
		38586	ft^3	**OK**	(As shown on Table A-11

Orifice size calculation

The gravity control devices shall be sized based upon a maximum design discharge of 0.5 inch of the detention volume in 24 hours. The outlet orifices are sized to maintain the required water quality.

SWB A Orifice size calculation

Design runoff =	1/2	inches
Water quality volume to be drained in 24 hours (ft^3) =	29049	ft^3
Volume between riser crest (10.5 ft) and pond bottom=	70287	ft^3
Allowable Discharge (for 24 hour) =	0.336	cfs
Select 3" dia orifice with invert El at 8'		
Head above orifice (for crest elevation) =	2.50	ft (from Table15)
Discharge =	0.374	cfs
Pond volume at riser crest - 1/2 inch runoff =	61748.5	ft^3
Elevation for riser crest - 1/2 inch runoff	9.567	ft (by interpolation from Table15)
Head above orifice (for crest - 1/2 inch volume) =	1.567	ft (by interpolation from Table15)
Discharge =	0.296	cfs
Average discharge =	0.335	cfs < 0.336 cfs **OK**

SWB B Orifice size calculation

Design runoff =	1/2	inches
Water quality volume to be drained in 24 hours (ft^3) =	18575	ft^3
Volume between riser crest (10.5 ft) and pond bottom=	38586	ft^3
Allowable Discharge (for 24 hour) =	0.215	cfs
Select 2.8" dia orifice with invert El at 9'		
Head above orifice (for crest elevation) =	1.50	ft (from Table16)
Discharge =	0.252	cfs
Pond volume at riser crest - 1/2 inch runoff =	40504.6	ft^3
Elevation for riser crest - 1/2 inch runoff	10.820	ft (by interpolation from Table16)
Head above orifice (for crest - 1/2 inch volume) =	0.820	ft (by interpolation from Table16)
Discharge =	0.186	cfs
Average discharge =	0.219	cfs ≈ 0.215 cfs **OK**

Above computation shows that the use of 3-inch diameter orifice for SWB A and 2.8 inch diameter orifice for SWB B are adequate to comply with applicable stormwater criteria.

Basin Stage-Discharge Curve

A summary table of the outlet elevations and sizes, as well as the stage-discharge relationship is shown for each storm water basin on the Tables A-14 and A-15.

Table A-14: Stage-discharge calculation for the SWB A basin Outlet structure

SWB A

Riser Dim (ft x ft)	4.5	Riser Crest EL.(ft)	10.5	Riser Crest Length (ft)	18.00
Pipe Diameter (ft)	3.5	Outlet Inv. EL.(ft)	1.00	Pipe Length (ft)	120
Em Spillway Crest EL (ft)	12.0	Pipe Area (sq ft)	9.621	Top of the basin(ft)	14
		Em Spillway Width (ft)	30.0	Bottom of the basin(ft)	7

Orifice Diameter (ft)	0.25
Orifice Area (sq ft)	0.049
Orifice Invert EL.(ft)	8.0
Orifice center EL.(ft)	8.125
No. of orifice	1

	Orifice Flow		Riser Discharge			Total	Pipe Flow		Spillway Flow		Total Basin
Elevation	h	Q	H	Q_{weir}	$Q_{orifice}$	Riser Flow*	h	Q	H	Q	Flow**
(ft)	(ft)	(cfs)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(cfs)
7.00	0.00	0.00				**0.00**	0.00	0.00			0.00
8.00	0.00	0.00				**0.00**	3.50	102.16			0.00
8.50	0.38	0.14				**0.14**	4.00	109.21			0.14
9.00	0.88	0.22				**0.22**	4.50	115.84			0.22
10.00	1.88	0.32				**0.32**	5.50	128.06			0.32
10.50	2.38	0.36	0.00	0.00	0.00	**0.36**	6.00	133.76			0.36
11.00	2.88	0.40	0.50	17.82	68.95	**18.22**	6.50	139.22			18.22
11.50	3.38	0.43	1.00	50.40	97.50	**50.83**	7.00	144.48			50.83
11.75			1.25	70.44	109.01	**70.44**	7.25	147.03			70.44
12.00			1.50	92.59	119.42	**92.59**	7.50	149.55	0.00	0.00	92.59
12.75			2.25	170.10	146.25	**146.25**	8.25	156.85	0.75	54.56	200.81
13.00			2.50	199.22	154.17	**154.17**	8.50	159.21	1.00	84.00	238.17
13.50			3.00	261.89	168.88	168.88	9.00	**163.82**	1.50	154.32	318.14
14.00			3.50	330.01	182.41	182.41	9.50	**168.31**	2.00	237.59	405.90

* Riser Discharge = Smaller one between Q_{weir} and $Q_{orifice}$; Total Riser Flow = Orifice + Riser Discharge

** Total Basin Flow is determined by adding either the Total Riser Flow or the Pipe Flow, which ever is controlling (bold type face indicates controlling flow), to the spillway flow

Table A-15: Stage-discharge calculation for the SWB B basin Outlet structure

SWB B

Riser Dim (ft x ft)	4	Riser Crest EL.(ft)	11.5	Riser Crest Length (ft)	16.00
Pipe Diameter (ft)	3	Outlet Inv. EL.(ft)	1.00	Pipe Length (ft)	130
Em Spillway Crest EL (ft)	13.0	Pipe Area (sq ft)	7.069	Top of the basin(ft)	15
		Em Spillway Width (ft)	30.0	Bottom of the basin(ft)	7

Orifice Diameter (ft)	0.233
Orifice Area (sq ft)	0.043
Orifice Invert EL.(ft)	10.0
Orifice center EL.(ft)	10.117
No. of orifice	1

	Orifice Flow		Riser Discharge			Total	Pipe Flow		Spillway Flow		Total Basin
Elevation	h	Q	H	Q_{weir}	$Q_{orifice}$	Riser Flow*	h	Q	H	Q	Flow**
(ft)	(ft)	(cfs)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(cfs)
9.00	0.00	0.00				**0.00**	0.00	0.00			0.00
9.50	0.00	0.00				**0.00**	5.50	90.44			0.00
10.00	0.00	0.00				**0.00**	6.00	94.46			0.00
10.50	0.38	0.13				**0.13**	6.50	98.31			0.13
11.00	0.88	0.19				**0.19**	7.00	102.02			0.19
11.50	1.38	0.24	0.00	0.00	0.00	**0.24**	7.50	105.61			0.24
12.00	1.88	0.28	0.50	15.84	68.95	**16.12**	8.00	109.07			16.12
12.50	2.38	0.32	1.00	44.80	97.50	**45.12**	8.50	112.43			45.12
13.00			1.50	82.30	119.42	**82.30**	9.00	115.69	0.0	0.00	82.30
13.50			2.00	126.71	137.89	126.71	9.50	**118.86**	0.5	29.70	148.55
14.00			2.50	177.09	154.17	154.17	10.00	**121.94**	1.0	84.00	205.94
15.00			3.50	293.35	182.41	182.41	11.00	**127.89**	2.0	237.59	365.48

* Riser Discharge = Smaller one between Q_{weir} and $Q_{orifice}$; Total Riser Flow = Orifice + Riser Discharge

** Total Basin Flow is determined by adding either the Total Riser Flow or the Pipe Flow, which ever is controlling (bold type face indicates controlling flow), to the spillway flow

Storm Water Management Basin Discharge Summary

The post-development peak discharges from the basins as well as the peak water levels are determined for the 2-, 5-, 10-, and 25-year, 72-hour storm using the computer program HEC-HMS. The schematic of the model, model inputs and model outputs are contained in Attachment B, and are summarized in Tables A-16 and A-17.

Table A-16 Post Development SWB A Discharge Summary

`	SWB A Peak Inflow (cfs)	SWB A Peak Outflow (cfs)	SWB A Peak Water Level (ft, NAVD 88)	Existing Condition Peak Discharge (cfs)
2-yr	50.4	42.0	11.4	57.1
5-yr	66.6	56.6	11.6	75.2
10-yr	79.8	68.7	11.7	89.9
25-yr	95.9	84.3	11.9	108.0

Table A-17 Post Development SWB B Discharge Summary

Storm	SWB B Peak Inflow (cfs)	SWB B Peak Outflow (cfs)	SWB B Peak Water Level (ft, NAVD 88)	Existing Condition Peak Discharge (cfs)
2-yr	32.1	25.3	12.2	45.0
5-yr	42.5	35.6	12.3	59.3
10-yr	50.9	43.2	12.5	70.8
25-yr	61.3	52.9	12.6	85.1

Emergency Spillway Capacity

The capacity of the emergency spillways provided in storm water basins have been checked by passing the 100-year, 72-hour storm through the spillway. The simulation results presented in Attachment B and are also summarized in Table A-18.

Table A-18 Post Development Basin Discharge Summary for 100-year, 72-hour Storm

SWB	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Water Level (ft, NAVD 88)	Top of the Basin (ft, NAVD 88)
Drainage Area A	145.1	138.9	12.3	14.0
Drainage Area B	92.8	82.9	13.0	15.0

SCREEN CAPTURES OF HEC-HMS SCREEN FOR HYDROLOGIC ANALYSIS:

Pre-Development

Post-Development

HEC-HMS INPUT FILES

Text contents of Basin input file
Pre-Development

```
Basin: RWTF
     Last Modified Date: 17 December 2010
     Last Modified Time: 18:10:18
     Version: 3.2
     Unit System: English
     Missing Flow To Zero: No
     Enable Flow Ratio: No
     Allow Blending: No
     Compute Local Flow At Junctions: No

     Sediment Grade Scale: NONE
     Enable Sediment Routing: No
     Fall Velocity Method: UNSPECIFIED
End:

Subbasin: PreSubbasin-A
     Canvas X: -1741.573033707864
     Canvas Y: 1535.5805243445693
     Label X: -37.0
     Label Y: -27.0
     Area: 0.030

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 0.0
     Curve Number: 96

     Transform: SCS
     Lag: 11.4

     Baseflow: None

     Erosion: None
End:

Subbasin: PreSubbasin-B
     Canvas X: 823.6648559229197
     Canvas Y: 1318.2661569758343
     Label X: -39.0
     Label Y: -24.0
     Area: 0.023

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 0.0
     Curve Number: 96

     Transform: SCS
     Lag: 9.9

     Baseflow: None

     Erosion: None
End:

Basin Schematic Properties:
     Last View N: 5000.0
     Last View S: -5000.0
     Last View W: -5000.0
     Last View E: 5000.0
     Maximum View N: 5000.0
     Maximum View S: -5000.0
```

```
     Maximum View W: -5000.0
     Maximum View E: 5000.0
     Extent Method: Elements
     Buffer: 0
     Draw Icons: Yes
     Draw Icon Labels: Yes
     Draw Gridlines: Yes
     Draw Flow Direction: No
     Fix Element Locations: No
End:
```

Post-Development

```
Basin: RWTF
     Last Modified Date: 19 November 2010
     Last Modified Time: 17:03:27
     Version: 3.2
     Unit System: English
     Missing Flow To Zero: No
     Enable Flow Ratio: No
     Allow Blending: No
     Compute Local Flow At Junctions: No

     Sediment Grade Scale: NONE
     Enable Sediment Routing: No
     Fall Velocity Method: UNSPECIFIED
End:

Reservoir: Pond-A
     Canvas X: -4699.453551912569
     Canvas Y: 9.107468123861509
     Label X: -2.0
     Label Y: 0.0

     Route: Modified Puls
     Routing Curve: Elevation-Area-Outflow
     Initial Elevation: 8
     Elevation-Area Table: Pond A
     Elevation-Outflow Table: Pond A
     Primary Table: Elevation-Outflow
End:

Reservoir: Pond-B
     Canvas X: 3886.2559241706167
     Canvas Y: 1824.6445497630334
     Label X: -8.0
     Label Y: 3.0

     Route: Modified Puls
     Routing Curve: Elevation-Area-Outflow
     Initial Elevation: 10
     Elevation-Area Table: Pond B
     Elevation-Outflow Table: Pond B
     Primary Table: Elevation-Outflow
End:

Subbasin: Subbasin-A
     Canvas X: -1729.9578059071737
     Canvas Y: 1835.4430379746832
     Label X: -37.0
     Label Y: -27.0
     Area: 0.025
     Downstream: Pond-A

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 0.0
     Curve Number: 94

     Transform: SCS
     Lag: 4.4
```

```
     Baseflow: None

     Erosion: None
End:

Subbasin: Subbasin-B
     Canvas X: 957.5092513481122
     Canvas Y: -265.07650396868394
     Label X: -39.0
     Label Y: -24.0
     Area: 0.016
     Downstream: Pond-B

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 0.0
     Curve Number: 93

     Transform: SCS
     Lag: 4.2

     Baseflow: None

     Erosion: None
End:

Basin Schematic Properties:
     Last View N: 5000.0
     Last View S: -5000.0
     Last View W: -5000.0
     Last View E: 5000.0
     Maximum View N: 5000.0
     Maximum View S: -5000.0
     Maximum View W: -5000.0
     Maximum View E: 5000.0
     Extent Method: Elements
     Buffer: 0
     Draw Icons: Yes
     Draw Icon Labels: Yes
     Draw Gridlines: Yes
     Draw Flow Direction: No
     Fix Element Locations: No
End:
```

Text contents of meteorological input file

```
Meteorology: T02
     Last Modified Date: 27 October 2010
     Last Modified Time: 13:54:02
     Version: 3.2
     Unit System: English
     Precipitation Method: Specified Average
     Snowmelt Method: None
     Use Basin Model: RWTF
End:

Precip Method Parameters: Specified Average
     Allow Depth Override: No
     Set Missing Data to Zero: Yes
End:

Subbasin: Subbasin-A
     Gage: southflorida_2yr
End:

Subbasin: Subbasin-B
     Gage: southflorida_2yr
End:

Meteorology: T05
```

```
     Last Modified Date: 27 October 2010
     Last Modified Time: 13:54:21
     Version: 3.2
     Unit System: English
     Precipitation Method: Specified Average
     Snowmelt Method: None
     Use Basin Model: RWTF
End:

Precip Method Parameters: Specified Average
     Allow Depth Override: No
     Set Missing Data to Zero: Yes
End:

Subbasin: Subbasin-A
     Gage: southflorida_5yr
End:

Subbasin: Subbasin-B
     Gage: southflorida_5yr
End:

Meteorology: T10
     Last Modified Date: 27 October 2010
     Last Modified Time: 13:53:22
     Version: 3.2
     Unit System: English
     Precipitation Method: Specified Average
     Snowmelt Method: None
     Use Basin Model: RWTF
End:

Precip Method Parameters: Specified Average
     Allow Depth Override: No
     Set Missing Data to Zero: Yes
End:

Subbasin: Subbasin-A
     Gage: southflorida_10yr
End:

Subbasin: Subbasin-B
     Gage: southflorida_10yr
End:

Meteorology: T25
     Last Modified Date: 21 October 2010
     Last Modified Time: 17:43:10
     Version: 3.2
     Unit System: English
     Precipitation Method: Specified Average
     Snowmelt Method: None
     Use Basin Model: RWTF
End:

Precip Method Parameters: Specified Average
     Allow Depth Override: No
     Set Missing Data to Zero: Yes
End:

Subbasin: Subbasin-A
     Gage: southflorida_25yr
End:

Subbasin: Subbasin-B
     Gage: southflorida_25yr
End:

Meteorology: T100
     Last Modified Date: 21 October 2010
     Last Modified Time: 17:57:38
     Version: 3.2
     Unit System: English
     Precipitation Method: Specified Average
```

```
     Snowmelt Method: None
     Use Basin Model: RWTF
End:

Precip Method Parameters: Specified Average
     Allow Depth Override: No
     Set Missing Data to Zero: Yes
End:

Subbasin: Subbasin-A
     Gage: Southflorida_100yr
End:

Subbasin: Subbasin-B
     Gage: Southflorida_100yr
End:
```

Text contents of Run data file

Pre-Development

```
Run: 10-yrPre
     Default Description: Yes
     Log File: 10_yrPre.log
     Basin: RWTF
     Precip: T10
     Control: SWM
     Precip Last Execution Date: 20 December 2010
     Precip Last Execution Time: 18:23:02
     Basin Last Execution Date: 20 December 2010
     Basin Last Execution Time: 18:23:04
End:

Run: 25-yrPre
     Default Description: Yes
     Log File: 25_yrPre.log
     Basin: RWTF
     Precip: T25
     Control: SWM
     Precip Last Execution Date: 17 December 2010
     Precip Last Execution Time: 18:18:48
     Basin Last Execution Date: 17 December 2010
     Basin Last Execution Time: 18:18:49
End:

Run: 2-yrPre
     Default Description: Yes
     Log File: 2_yrPre.log
     Basin: RWTF
     Precip: T02
     Control: SWM
     Precip Last Execution Date: 20 December 2010
     Precip Last Execution Time: 18:22:39
     Basin Last Execution Date: 20 December 2010
     Basin Last Execution Time: 18:22:42
End:

Run: 5-yrPre
     Default Description: Yes
     Log File: 5_yrPre.log
     Basin: RWTF
     Precip: T05
     Control: SWM
     Precip Last Execution Date: 20 December 2010
     Precip Last Execution Time: 18:22:52
     Basin Last Execution Date: 20 December 2010
     Basin Last Execution Time: 18:22:53
End:
```

Post-Development

```
Run: 100-yearpost
     Default Description: Yes
     Log File: 100_yearpost.log
     Basin: RWTF
     Precip: T100
     Control: SWM
     Precip Last Execution Date: 24 November 2010
     Precip Last Execution Time: 16:12:44
     Basin Last Execution Date: 27 October 2010
     Basin Last Execution Time: 13:30:00
End:

Run: 10-yrPost
     Default Description: Yes
     Log File: 10_yrPost.log
     Basin: RWTF
     Precip: T10
     Control: SWM
     Precip Last Execution Date: 24 November 2010
     Precip Last Execution Time: 16:44:36
     Basin Last Execution Date: 24 November 2010
     Basin Last Execution Time: 16:44:39
End:

Run: 25-yearpost
     Default Description: Yes
     Log File: 25_yearpost.log
     Basin: RWTF
     Precip: T25
     Control: SWM
     Precip Last Execution Date: 24 November 2010
     Precip Last Execution Time: 16:46:56
     Basin Last Execution Date: 24 November 2010
     Basin Last Execution Time: 16:46:59
End:

Run: 2-yrPost
     Default Description: Yes
     Log File: 2_yrPost.log
     Basin: RWTF
     Precip: T02
     Control: SWM
     Precip Last Execution Date: 19 November 2010
     Precip Last Execution Time: 17:05:23
     Basin Last Execution Date: 19 November 2010
     Basin Last Execution Time: 17:05:43
End:

Run: 5-yrPost
     Default Description: Yes
     Log File: 5_yrPost.log
     Basin: RWTF
     Precip: T05
     Control: SWM
     Precip Last Execution Date: 24 November 2010
     Precip Last Execution Time: 15:53:56
     Basin Last Execution Date: 24 November 2010
     Basin Last Execution Time: 15:54:24
End:
```

Text contents of pdata

```
Paired Data Manager: Postdevelopment
     Version: 3.2
End:

Table: Pond A
     Table Type: Elevation-Area
     Last Modified Date: 20 October 2010
     Last Modified Time: 15:00:59
```

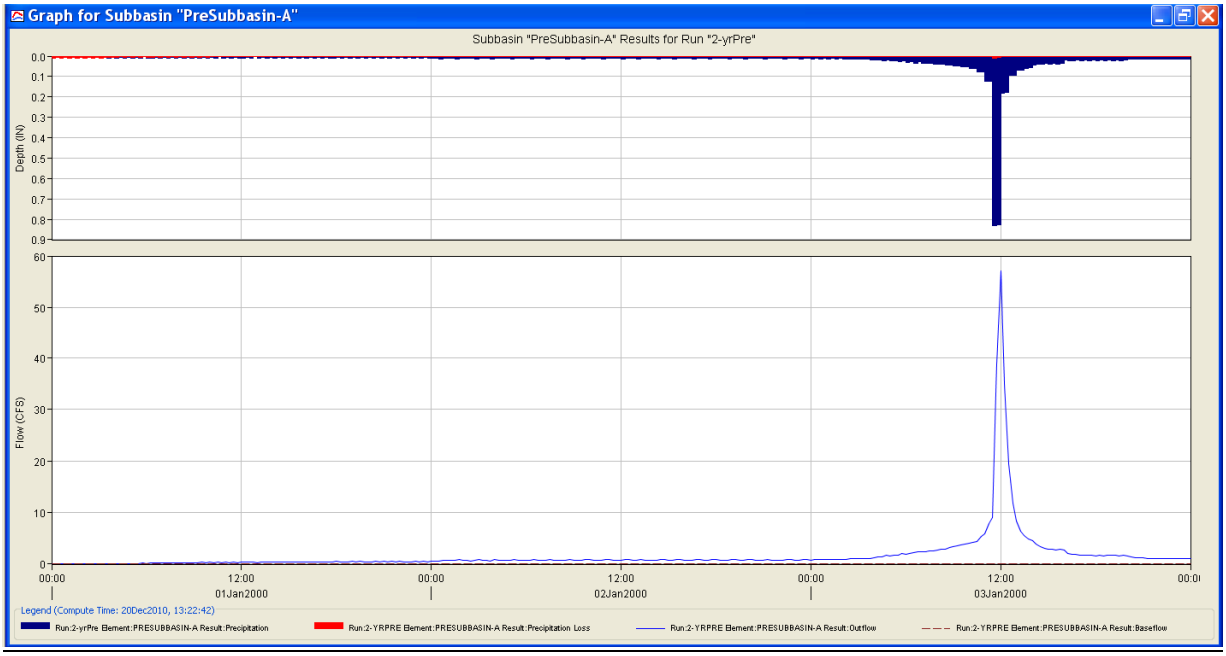
```
     X-Units: FT
     Y-Units: ACRE
     Use External DSS File: NO
     DSS File: Postdevelopment.dss
     Pathname: //Pond A/ELEVATION-AREA///TABLE/
End:

Table: Pond B
     Table Type: Elevation-Area
     Last Modified Date: 19 November 2010
     Last Modified Time: 17:03:26
     X-Units: FT
     Y-Units: ACRE
     Use External DSS File: NO
     DSS File: Postdevelopment.dss
     Pathname: //Pond B/ELEVATION-AREA///TABLE/
End:

Table: Pond A
     Table Type: Stage-Flow
     Last Modified Date: 2 November 2010
     Last Modified Time: 14:28:32
     X-Units: FT
     Y-Units: CFS
     Use External DSS File: NO
     DSS File: Postdevelopment.dss
     Pathname: //Pond A/STAGE-FLOW///TABLE/
End:

Table: Pond B
     Table Type: Stage-Flow
     Last Modified Date: 3 November 2010
     Last Modified Time: 14:37:53
     X-Units: FT
     Y-Units: CFS
     Use External DSS File: NO
     DSS File: Postdevelopment.dss
     Pathname: //Pond B/STAGE-FLOW///TABLE/
End:
```

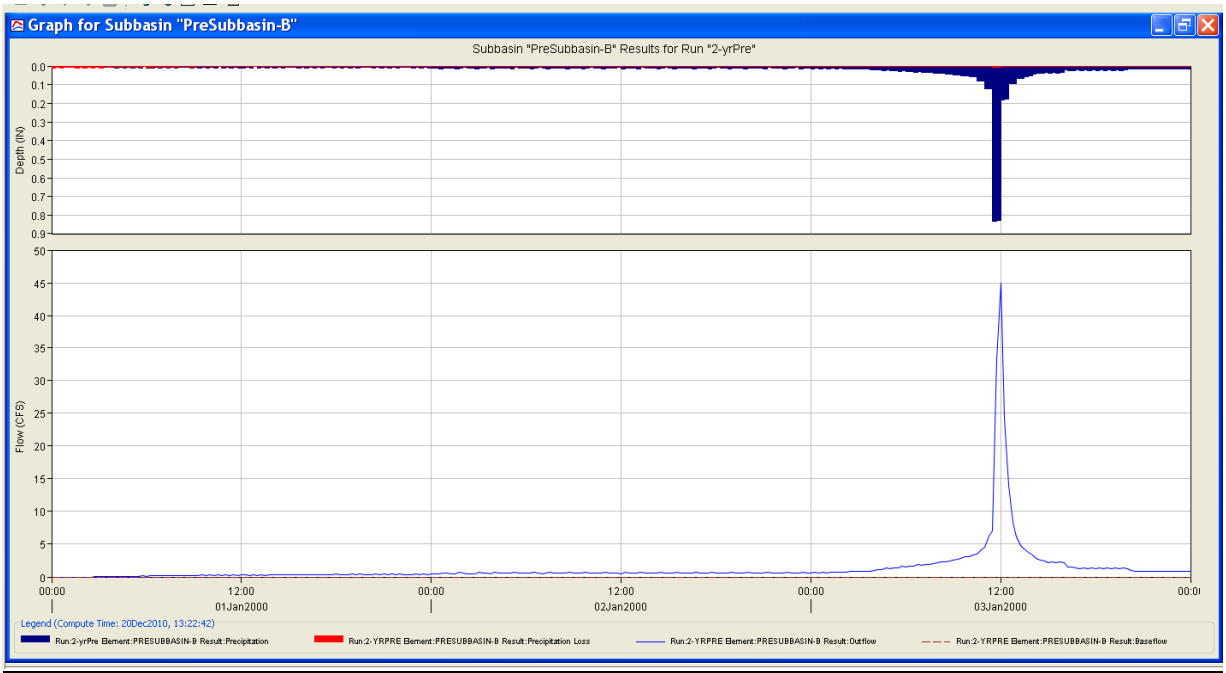
Text contents of SWM.control

```
Control: SWM
     Description: Design Storm
     Last Modified Date: 27 October 2010
     Last Modified Time: 14:10:46
     Start Date: 1 January 2000
     Start Time: 00:00
     End Date: 4 January 2000
     End Time: 00:00
     Time Interval: 15
End:
```

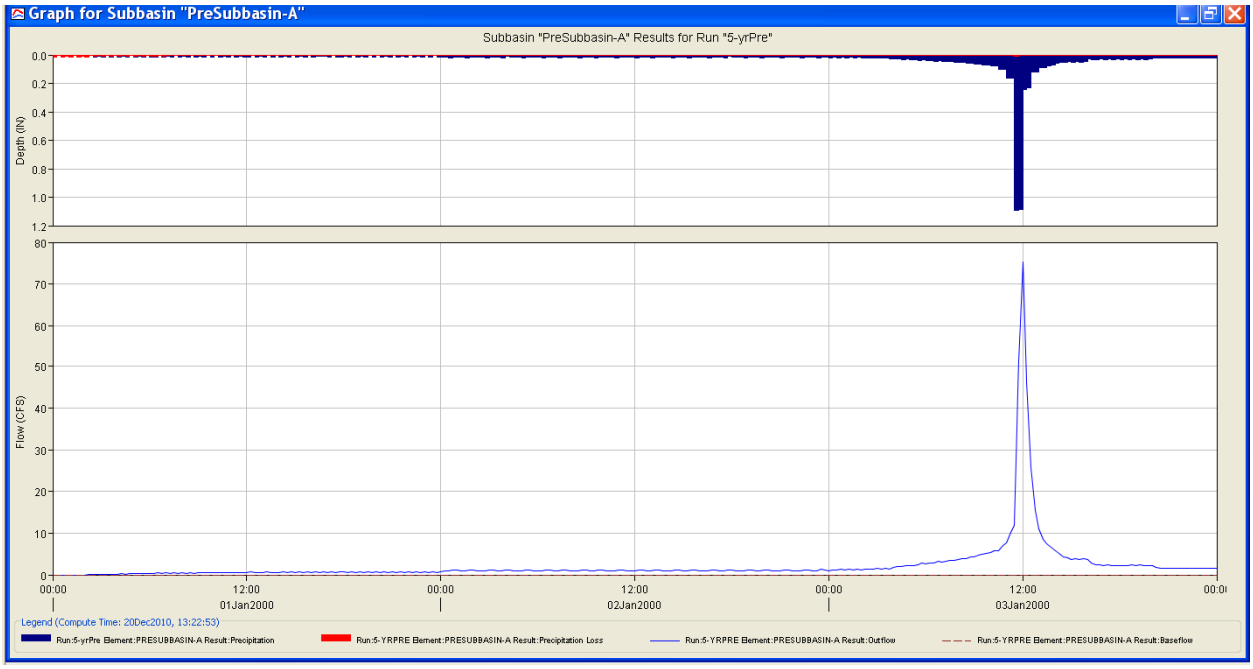
RUNOFF HYDROGRAPHS FOR DRAINAGE BASINS:
Pre-Development

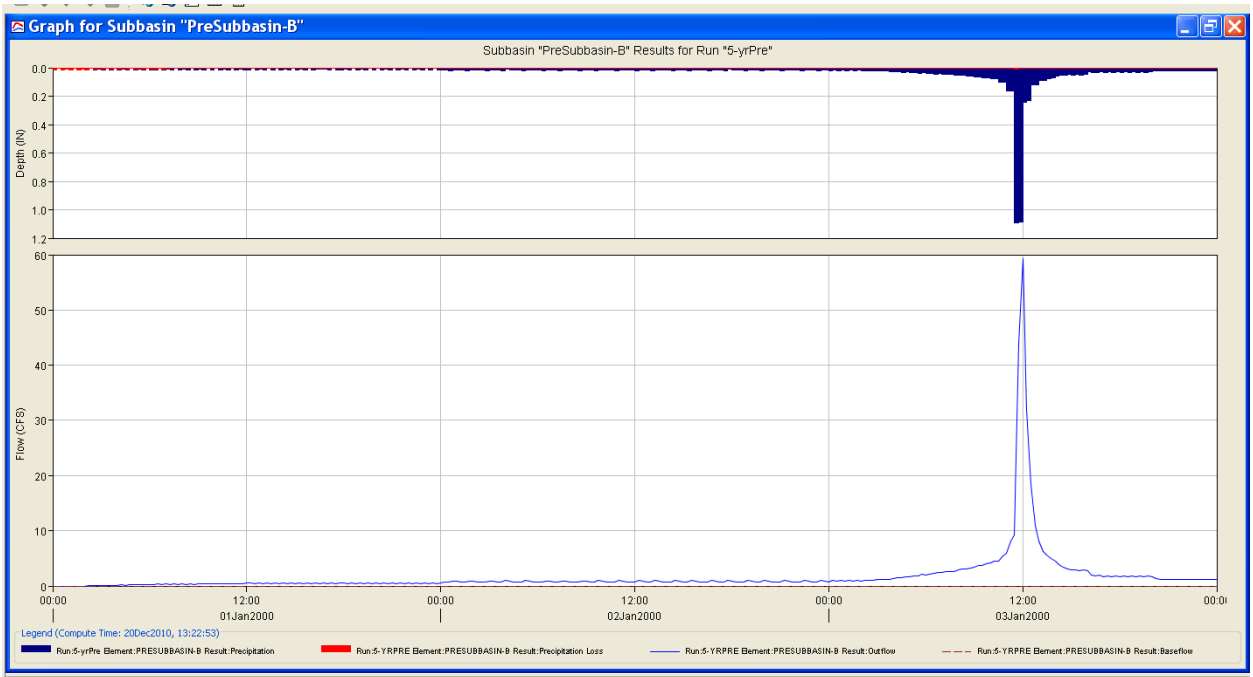
2-YEAR Pre





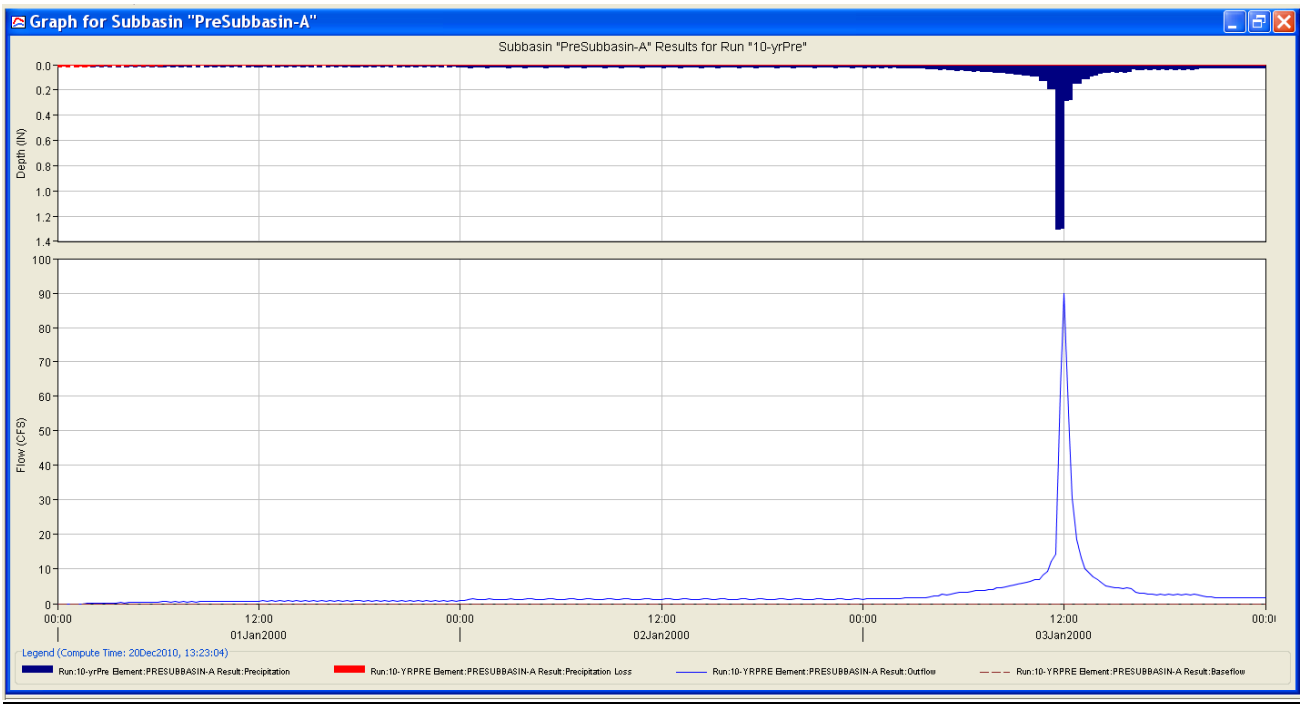
5-YEAR Pre

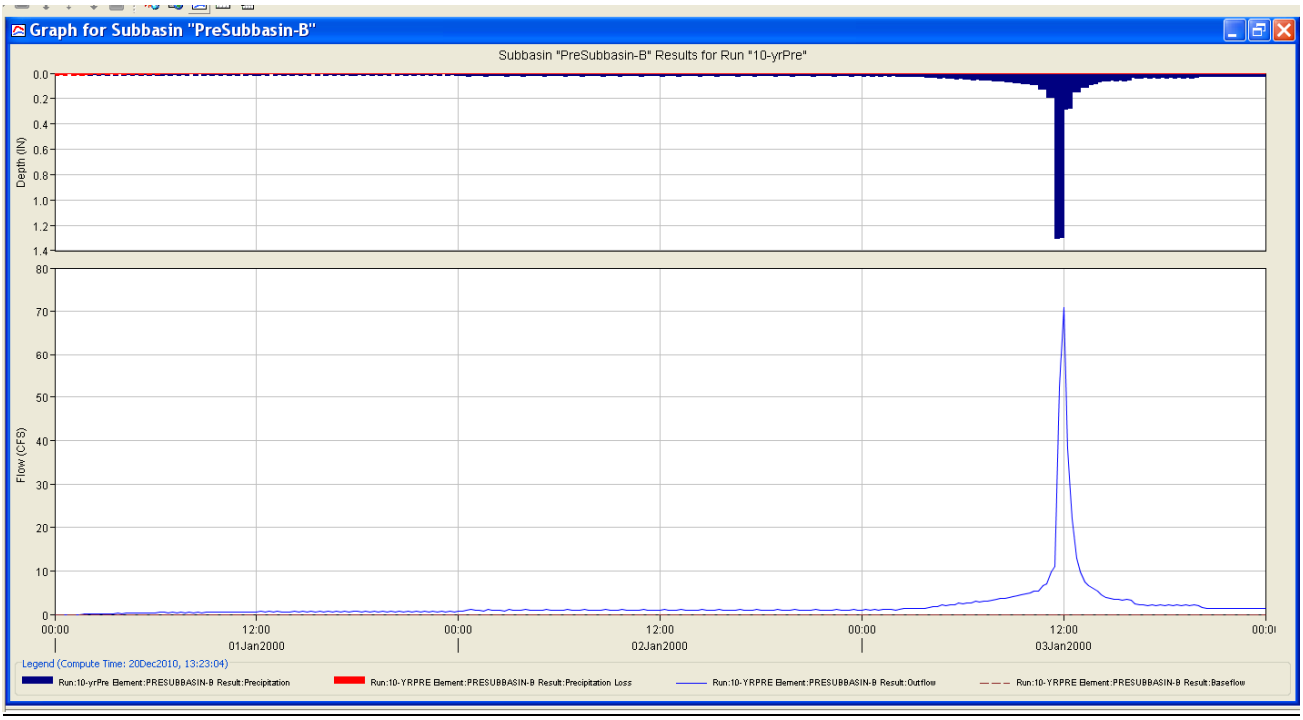




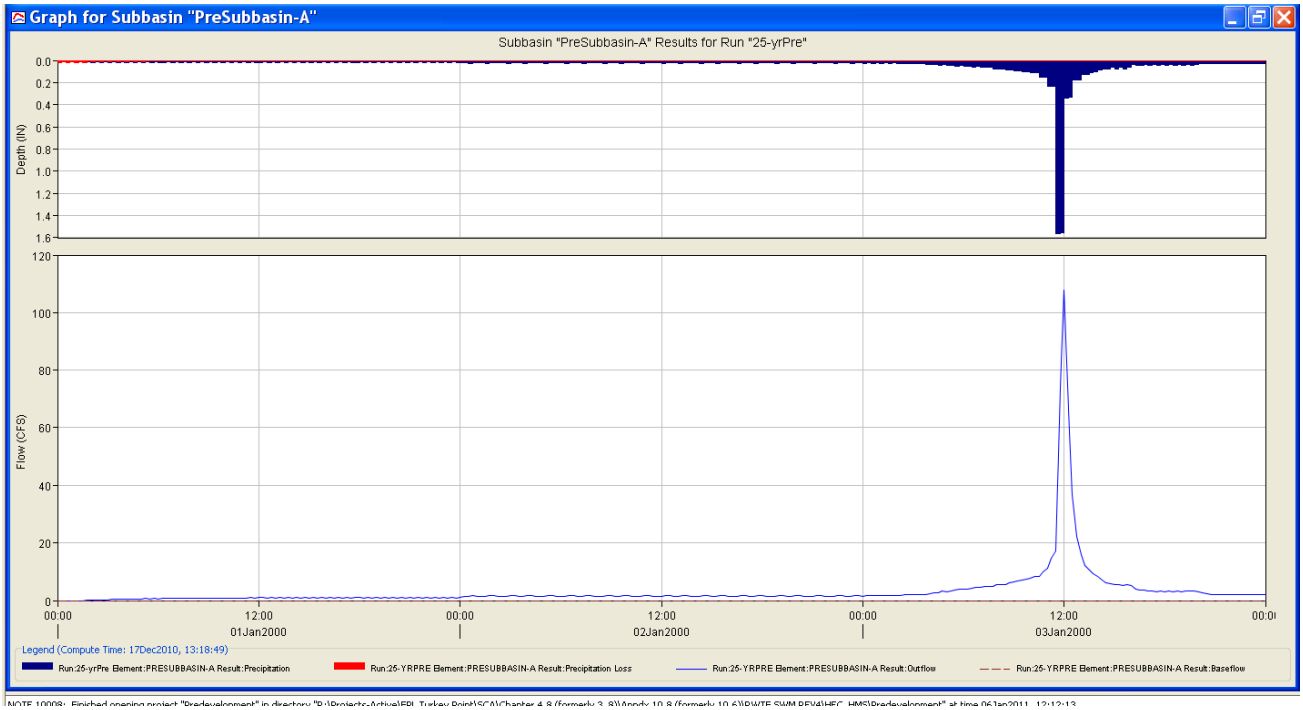
NOTE 10008: Finished opening project "Predevelopment" in directory "R:\Projects-Active\FPL Turkey Point\SCA\Chapter 4.8 (formerly 3_8)\Appdx 10.8 (formerly 10.6)\RWTF SWM REV4\HEC_HMS\Predevelopment" at time 06Jan2011, 12:12:13.

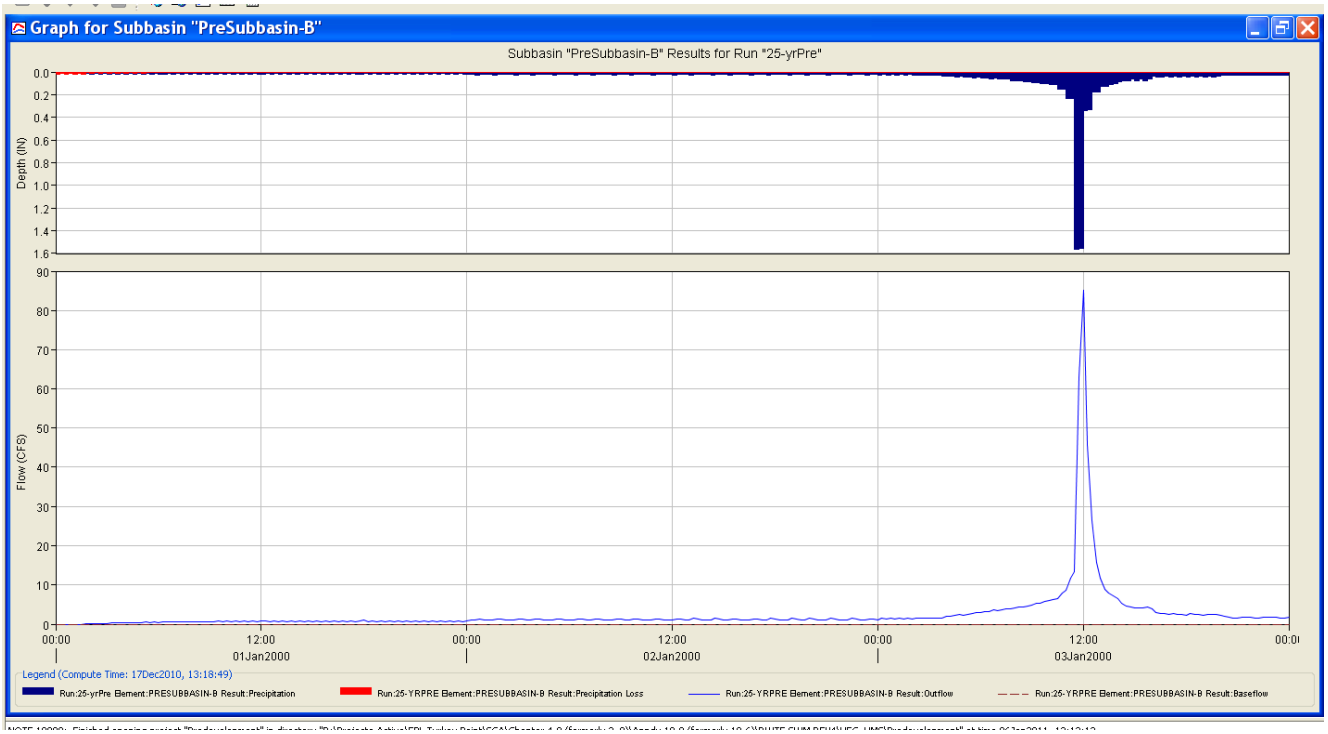
10-YEAR Pre


Graph for Subbasin "PreSubbasin-A"
Subbasin "PreSubbasin-A" Results for Run "10-yrPre"
Depth (IN)
Flow (CFS)
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 20Dec2010, 13:23:04)
Run:10-yrPre Element:PRESUBBASIN-A Result:Precipitation
Run:10-YRPRE Element:PRESUBBASIN-A Result:Precipitation Loss
Run:10-YRPRE Element:PRESUBBASIN-A Result:Outflow
Run:10-YRPRE Element:PRESUBBASIN-A Result:Baseflow


Graph for Subbasin "PreSubbasin-B"
Subbasin "PreSubbasin-B" Results for Run "10-yrPre"
Depth (IN)
Flow (CFS)
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 20Dec2010, 13:23:04)
Run:10-yrPre Element:PRESUBBASIN-B Result:Precipitation
Run:10-YRPRE Element:PRESUBBASIN-B Result:Precipitation Loss
Run:10-YRPRE Element:PRESUBBASIN-B Result:Outflow
Run:10-YRPRE Element:PRESUBBASIN-B Result:Baseflow

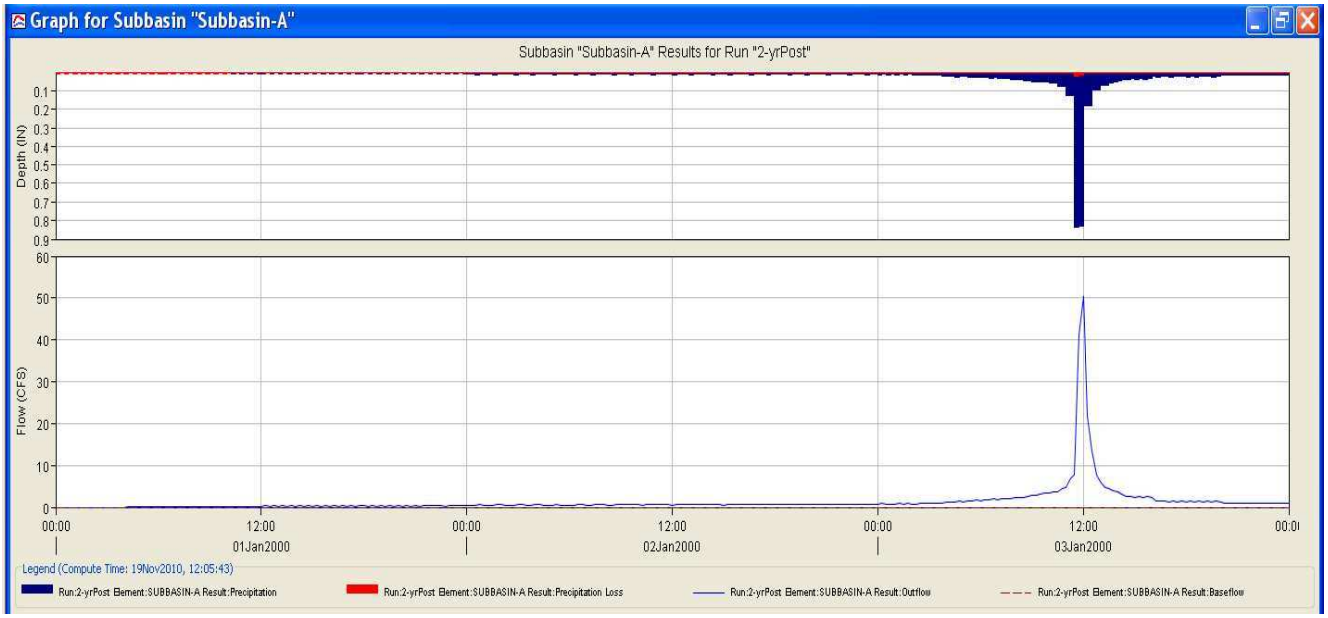
25-YEAR Pre

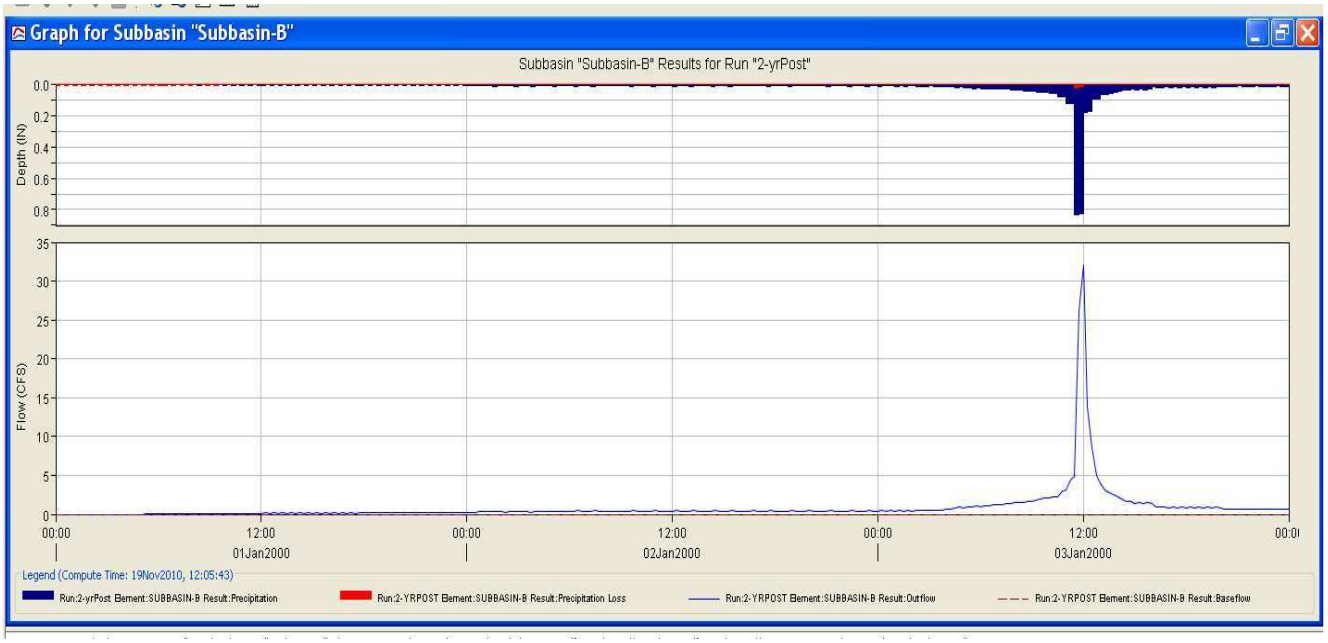

Graph for Subbasin "PreSubbasin-A"
Subbasin "PreSubbasin-A" Results for Run "25-yrPre"
Depth (IN)
Flow (CFS)
00:00
12:00
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 17Dec2010, 13:18:49)
Run:25-yrPre Element:PRESUBBASIN-A Result:Precipitation
Run:25-YRPRE Element:PRESUBBASIN-A Result:Precipitation Loss
Run:25-YRPRE Element:PRESUBBASIN-A Result:Outflow
Run:25-YRPRE Element:PRESUBBASIN-A Result:Baseflow


Graph for Subbasin "PreSubbasin-B"
Subbasin "PreSubbasin-B" Results for Run "25-yrPre"
Depth (IN)
Flow (CFS)
00:00
12:00
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 17Dec2010, 13:18:49)
Run:25-yrPre Element:PRESUBBASIN-B Result:Precipitation
Run:25-YRPRE Element:PRESUBBASIN-B Result:Precipitation Loss
Run:25-YRPRE Element:PRESUBBASIN-B Result:Outflow
Run:25-YRPRE Element:PRESUBBASIN-B Result:Baseflow

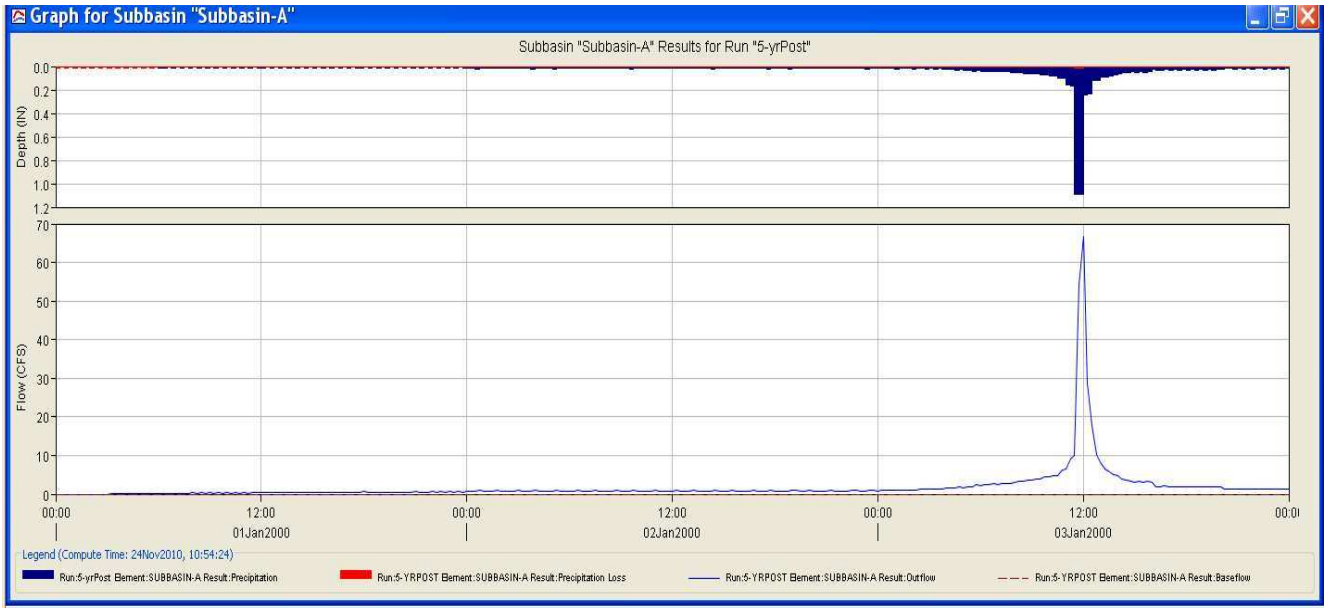
Post Development

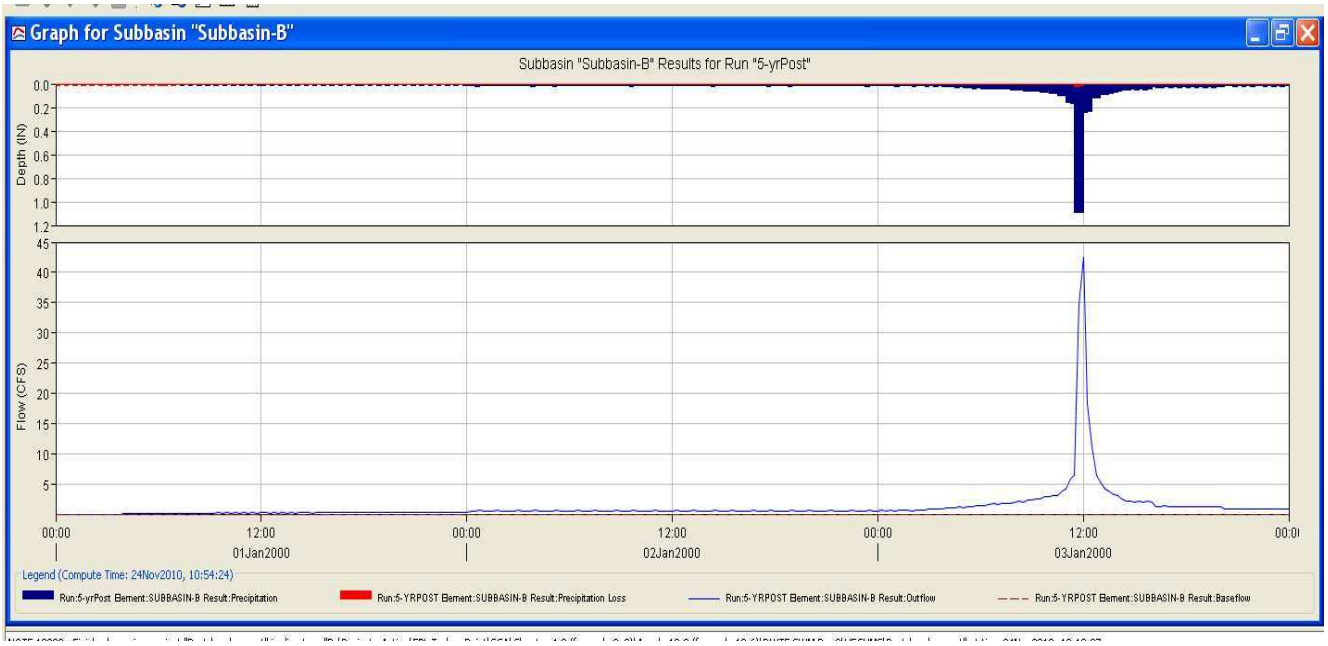
2-YEAR post



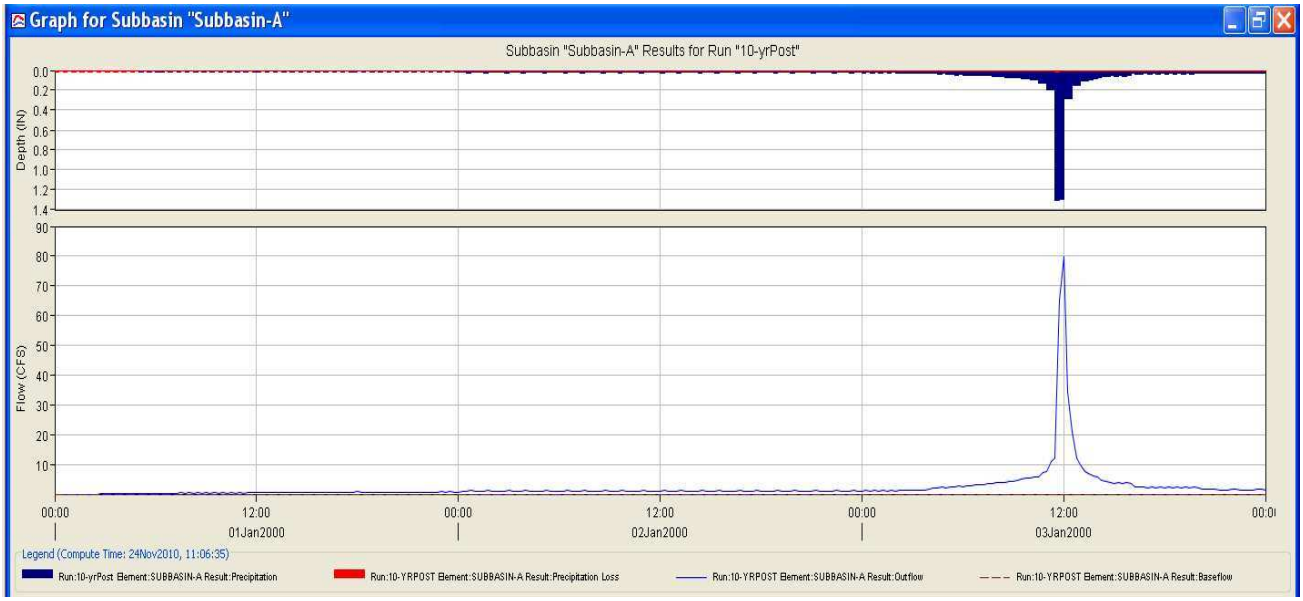


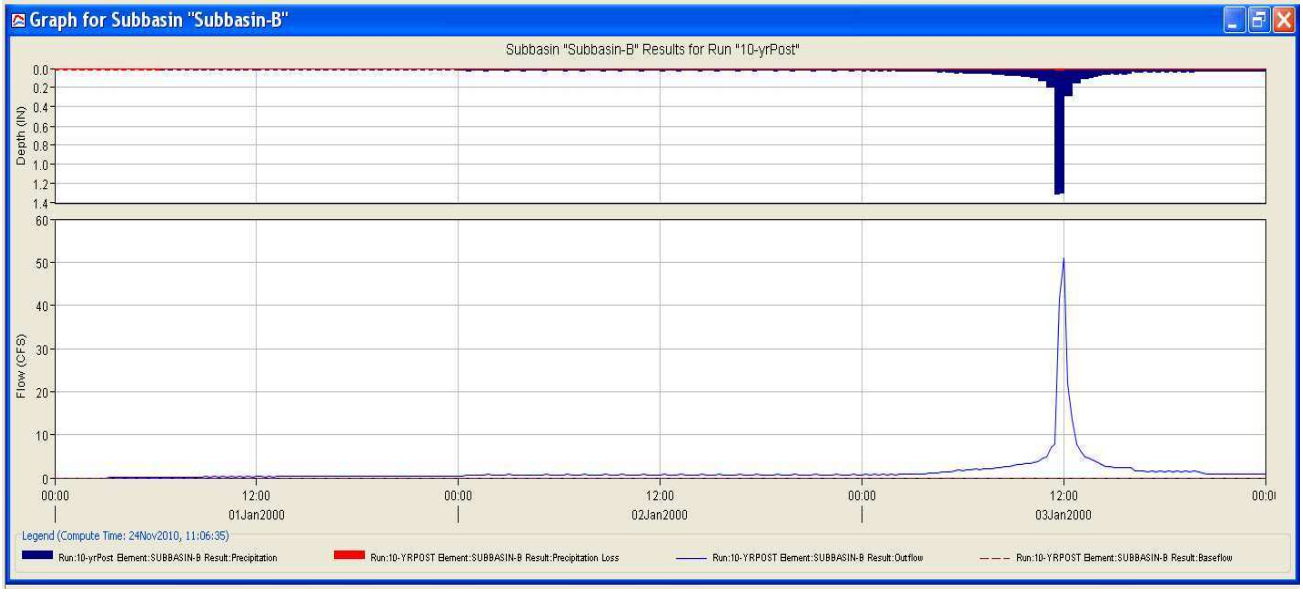
5-YEAR post


Graph for Subbasin "Subbasin-A"
Subbasin "Subbasin-A" Results for Run "5-yrPost"
Depth (IN)
Flow (CFS)
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 24Nov2010, 10:54:24)
Run:5-yrPost Element:SUBBASIN-A Result:Precipitation
Run:5-YRPOST Element:SUBBASIN-A Result:Precipitation Loss
Run:5-YRPOST Element:SUBBASIN-A Result:Outflow
Run:5-YRPOST Element:SUBBASIN-A Result:Baseflow

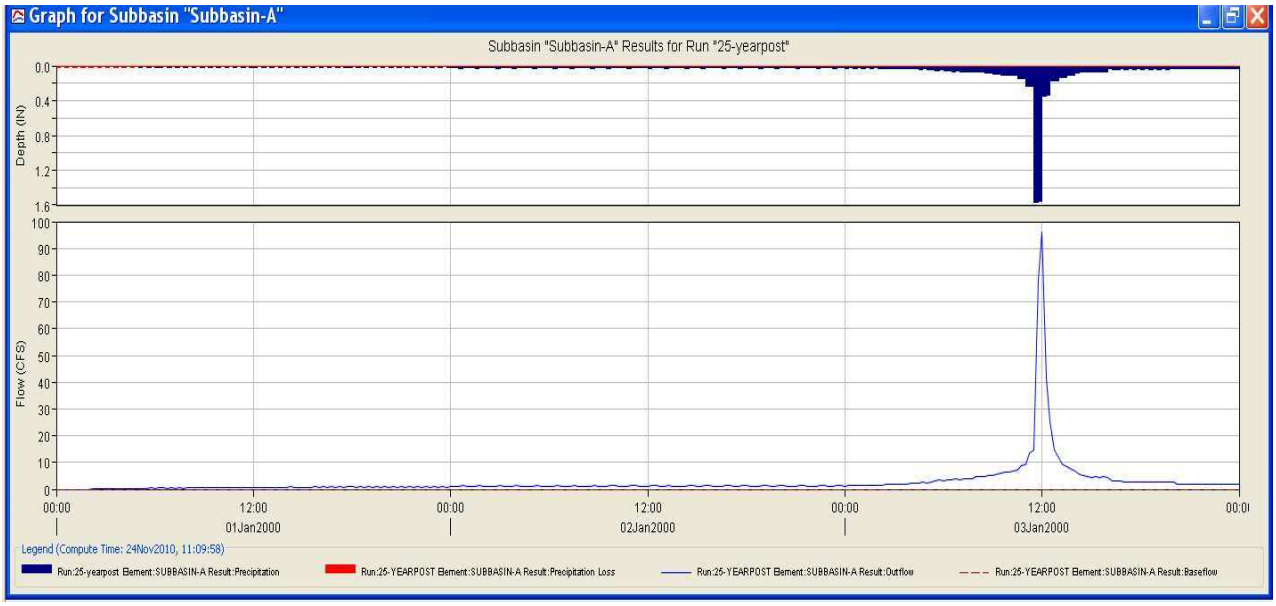

Graph for Subbasin "Subbasin-B"
Subbasin "Subbasin-B" Results for Run "5-yrPost"
Depth (IN)
Flow (CFS)
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 24Nov2010, 10:54:24)
Run:5-yrPost Element:SUBBASIN-B Result:Precipitation
Run:5-YRPOST Element:SUBBASIN-B Result:Precipitation Loss
Run:5-YRPOST Element:SUBBASIN-B Result:Outflow
Run:5-YRPOST Element:SUBBASIN-B Result:Baseflow

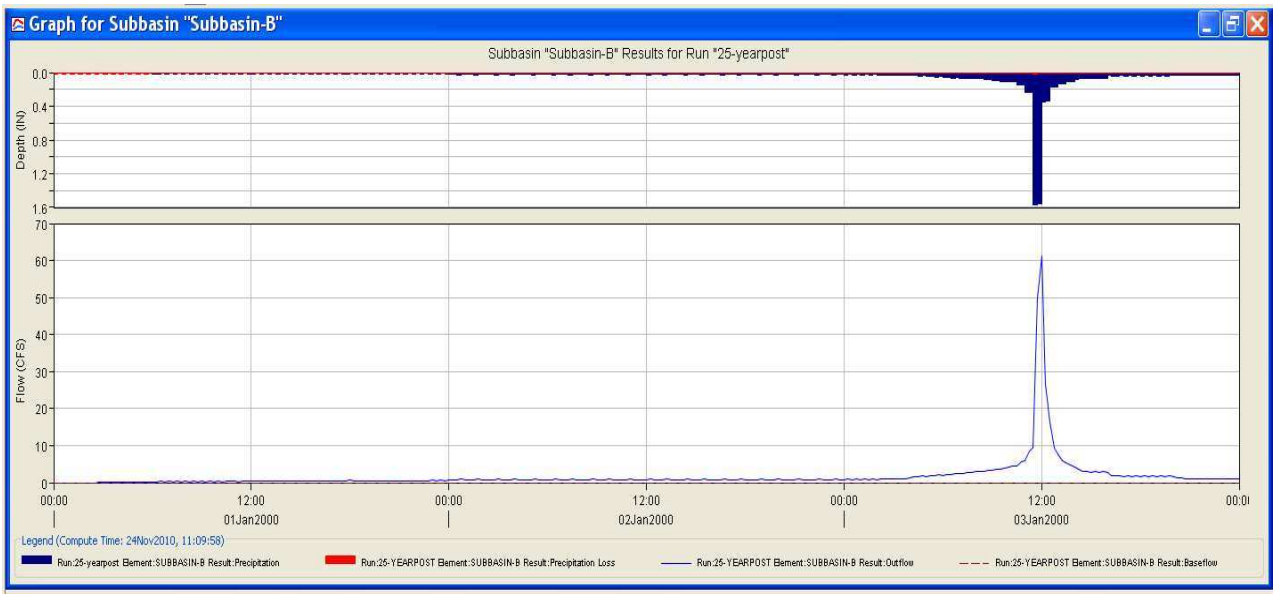
10-YEAR post


Graph for Subbasin "Subbasin-A"
Subbasin "Subbasin-A" Results for Run "10-yrPost"
Depth (IN)
Flow (CFS)
00:00
12:00
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 24Nov2010, 11:06:35)
Run:10-yrPost Element:SUBBASIN-A Result:Precipitation
Run:10-YRPOST Element:SUBBASIN-A Result:Precipitation Loss
Run:10-YRPOST Element:SUBBASIN-A Result:Outflow
Run:10-YRPOST Element:SUBBASIN-A Result:Baseflow

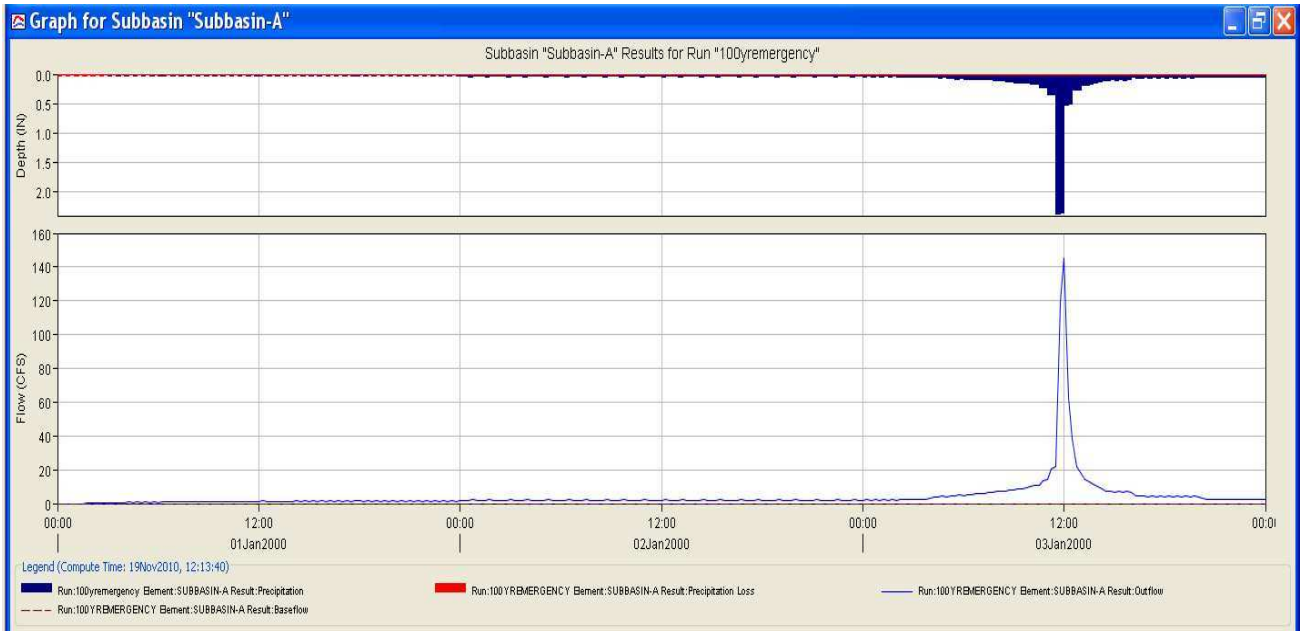

Graph for Subbasin "Subbasin-B"
Subbasin "Subbasin-B" Results for Run "10-yrPost"
Depth (IN)
Flow (CFS)
00:00
12:00
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 24Nov2010, 11:06:35)
Run:10-yrPost Element:SUBBASIN-B Result:Precipitation
Run:10-YRPOST Element:SUBBASIN-B Result:Precipitation Loss
Run:10-YRPOST Element:SUBBASIN-B Result:Outflow
Run:10-YRPOST Element:SUBBASIN-B Result:Baseflow

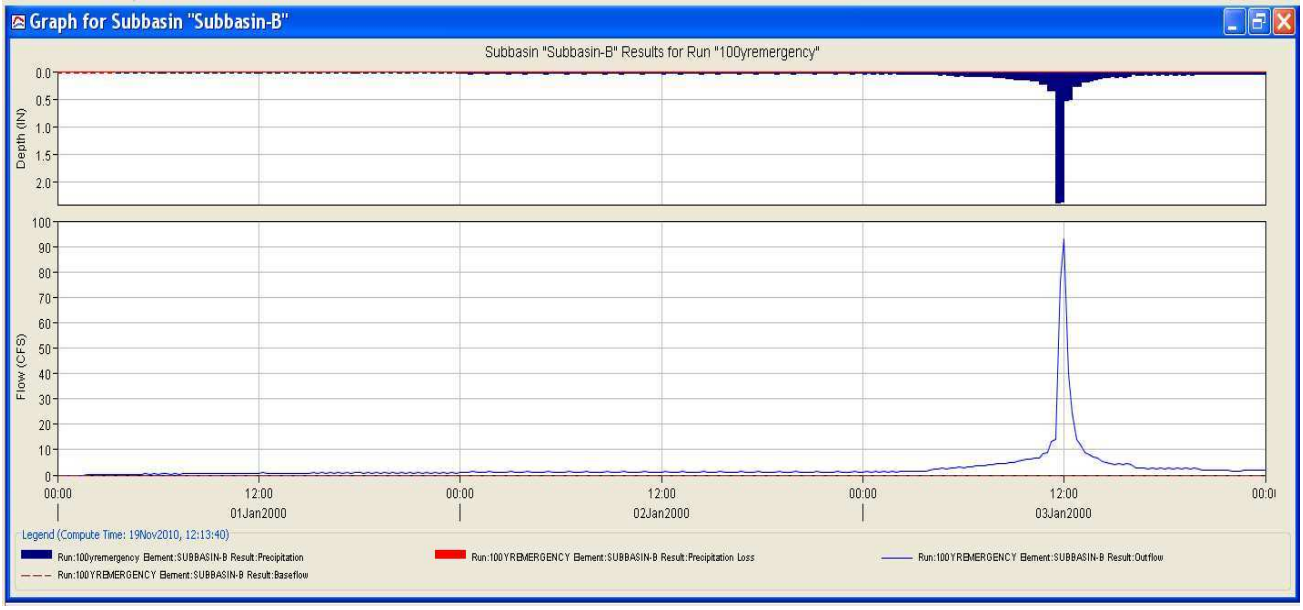
25-YEAR post


Graph for Subbasin "Subbasin-A"
Subbasin "Subbasin-A" Results for Run "25-yearpost"
Depth (IN)
Flow (CFS)
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 24Nov2010, 11:09:58)
Run:25-yearpost Element:SUBBASIN-A Result:Precipitation
Run:25-YEARPOST Element:SUBBASIN-A Result:Precipitation Loss
Run:25-YEARPOST Element:SUBBASIN-A Result:Outflow
Run:25-YEARPOST Element:SUBBASIN-A Result:Baseflow


Graph for Subbasin "Subbasin-B"
Subbasin "Subbasin-B" Results for Run "25-yearpost"
Depth (IN)
Flow (CFS)
01Jan2000
02Jan2000
03Jan2000
Legend (Compute Time: 24Nov2010, 11:09:58)
Run:25-yearpost Element:SUBBASIN-B Result:Precipitation
Run:25-YEARPOST Element:SUBBASIN-B Result:Precipitation Loss
Run:25-YEARPOST Element:SUBBASIN-B Result:Outflow
Run:25-YEARPOST Element:SUBBASIN-B Result:Baseflow

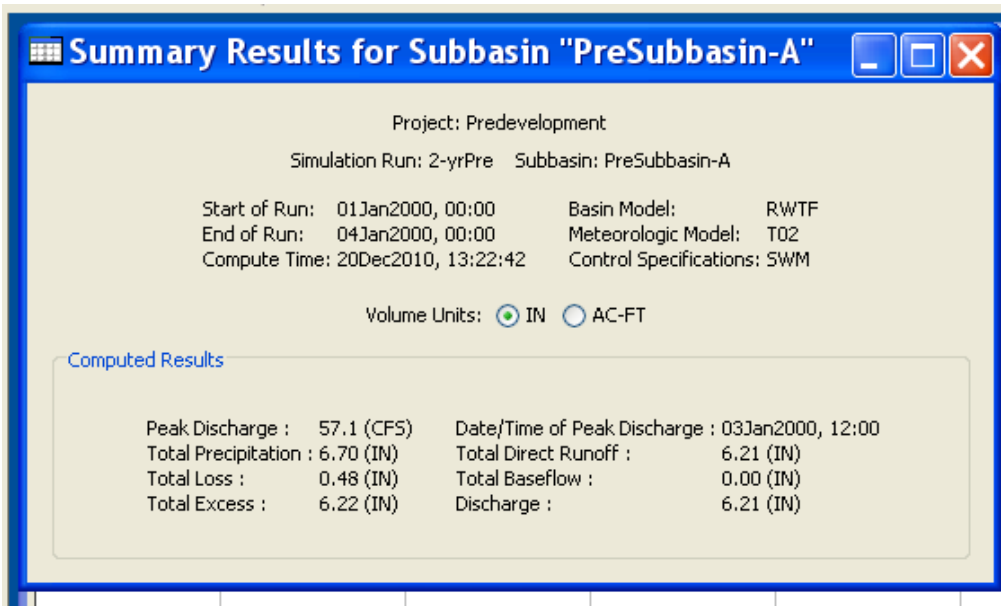
100-YEAR post

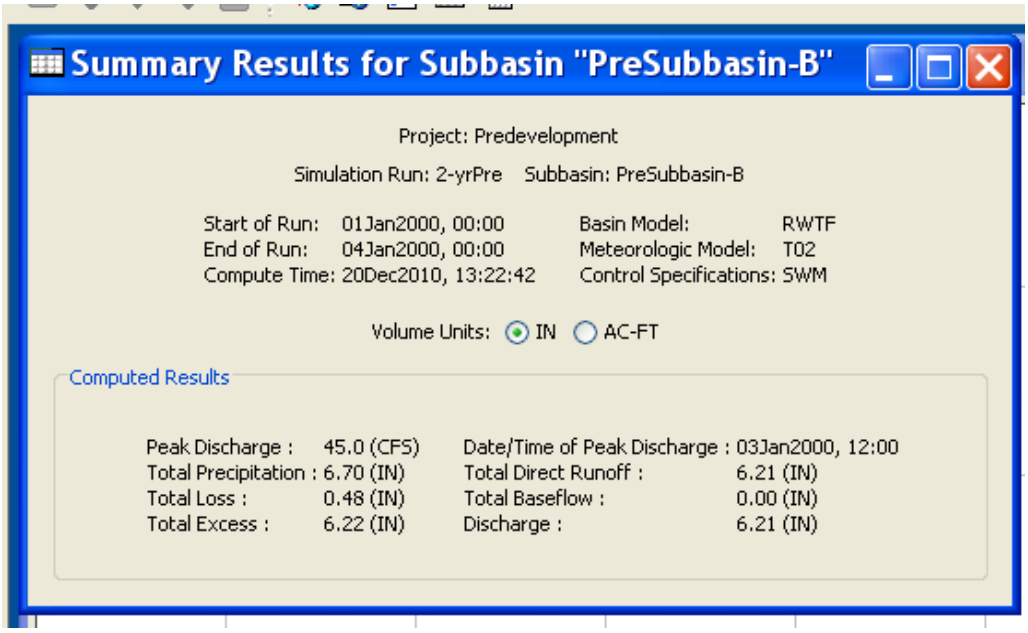




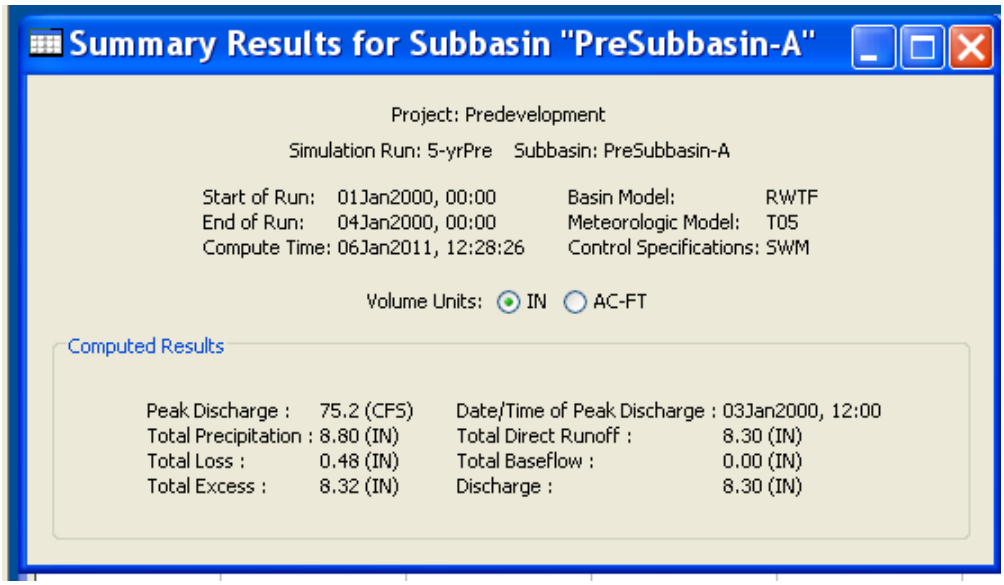
PRE-DEVELOPMENT PEAK DISCHARGE SUMMARY TABLES

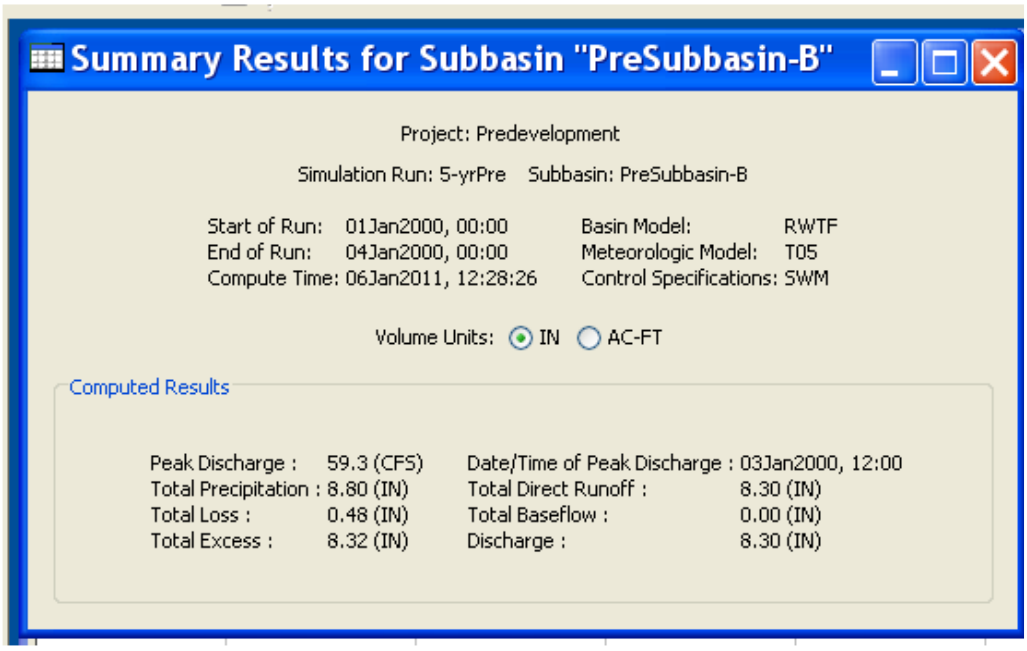
2-YEAR



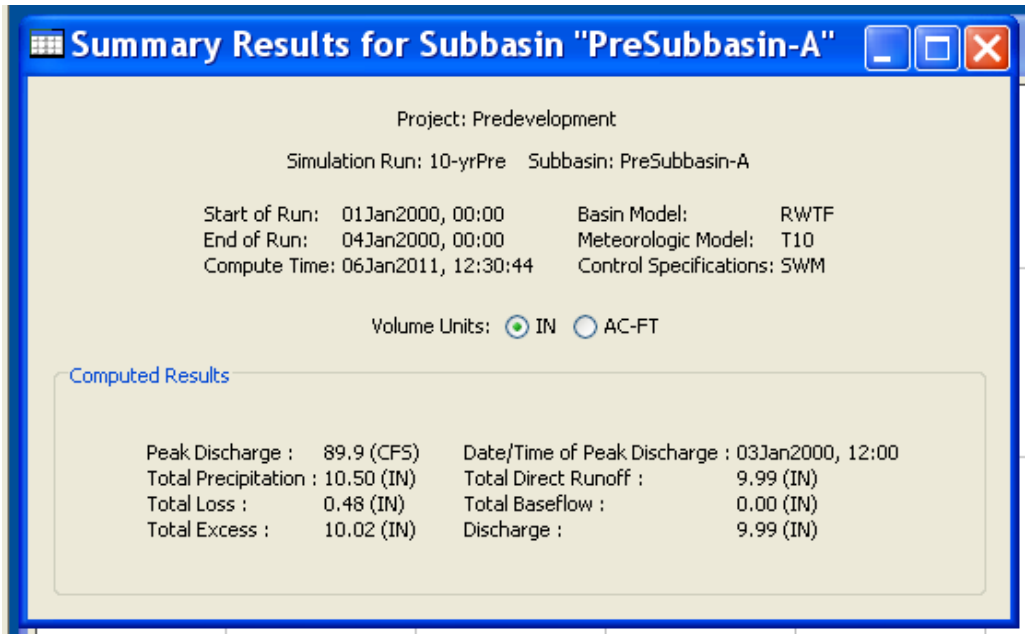


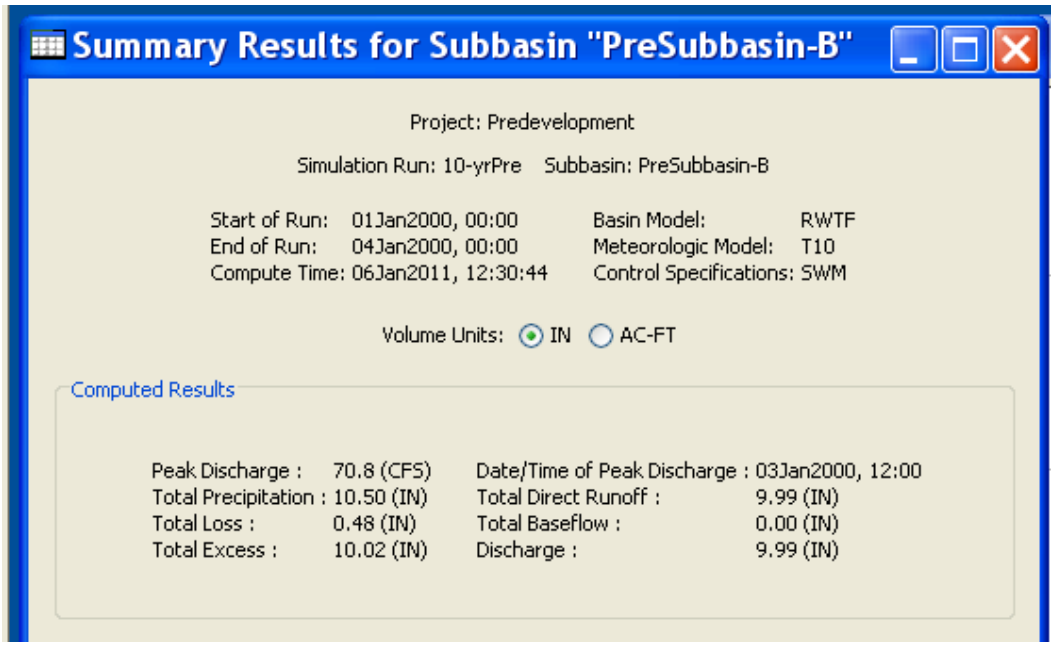
5 - YEAR


Summary Results for Subbasin "PreSubbasin-A"
Project: Predevelopment
Simulation Run: 5-yrPre Subbasin: PreSubbasin-A
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 06Jan2011, 12:28:26
Basin Model: RWTF
Meteorologic Model: T05
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Discharge : 75.2 (CFS)
Total Precipitation : 8.80 (IN)
Total Loss : 0.48 (IN)
Total Excess : 8.32 (IN)
Date/Time of Peak Discharge : 03Jan2000, 12:00
Total Direct Runoff : 8.30 (IN)
Total Baseflow : 0.00 (IN)
Discharge : 8.30 (IN)

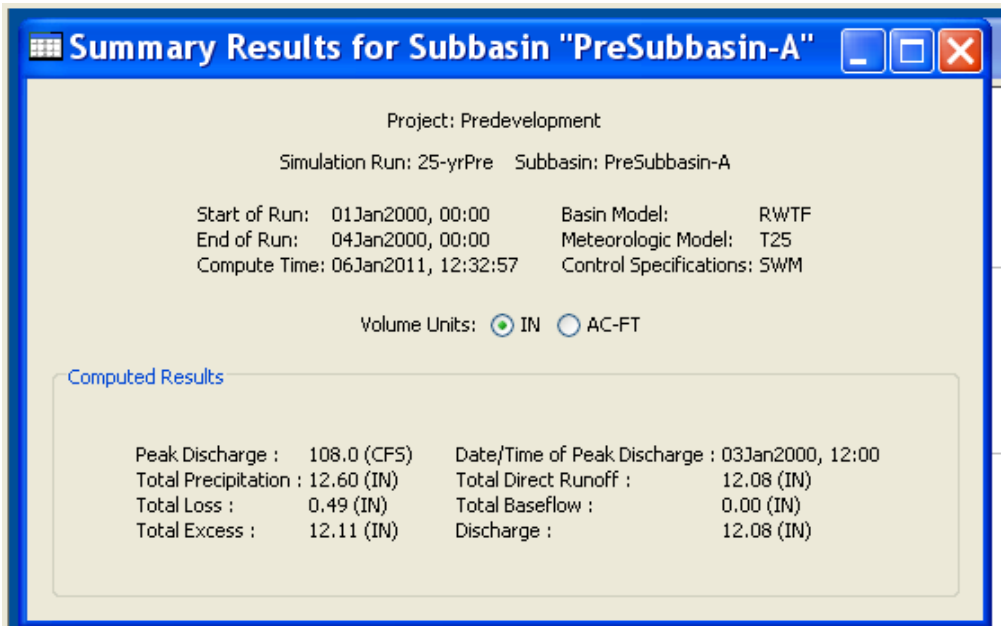

Summary Results for Subbasin "PreSubbasin-B"
Project: Predevelopment
Simulation Run: 5-yrPre Subbasin: PreSubbasin-B
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 06Jan2011, 12:28:26
Basin Model: RWTF
Meteorologic Model: T05
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Discharge : 59.3 (CFS)
Total Precipitation : 8.80 (IN)
Total Loss : 0.48 (IN)
Total Excess : 8.32 (IN)
Date/Time of Peak Discharge : 03Jan2000, 12:00
Total Direct Runoff : 8.30 (IN)
Total Baseflow : 0.00 (IN)
Discharge : 8.30 (IN)

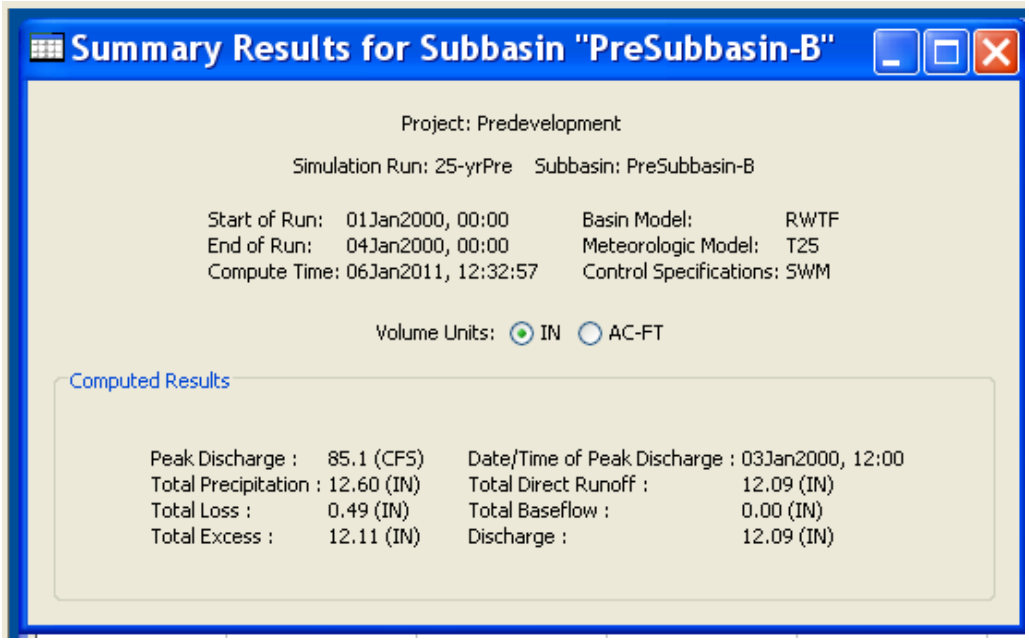
10-YEAR


Summary Results for Subbasin "PreSubbasin-A"
Project: Predevelopment
Simulation Run: 10-yrPre Subbasin: PreSubbasin-A
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 06Jan2011, 12:30:44
Basin Model: RWTF
Meteorologic Model: T10
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Discharge : 89.9 (CFS)
Total Precipitation : 10.50 (IN)
Total Loss : 0.48 (IN)
Total Excess : 10.02 (IN)
Date/Time of Peak Discharge : 03Jan2000, 12:00
Total Direct Runoff : 9.99 (IN)
Total Baseflow : 0.00 (IN)
Discharge : 9.99 (IN)


Summary Results for Subbasin "PreSubbasin-B"
Project: Predevelopment
Simulation Run: 10-yrPre Subbasin: PreSubbasin-B
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 06Jan2011, 12:30:44
Basin Model: RWTF
Meteorologic Model: T10
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Discharge : 70.8 (CFS)
Total Precipitation : 10.50 (IN)
Total Loss : 0.48 (IN)
Total Excess : 10.02 (IN)
Date/Time of Peak Discharge : 03Jan2000, 12:00
Total Direct Runoff : 9.99 (IN)
Total Baseflow : 0.00 (IN)
Discharge : 9.99 (IN)

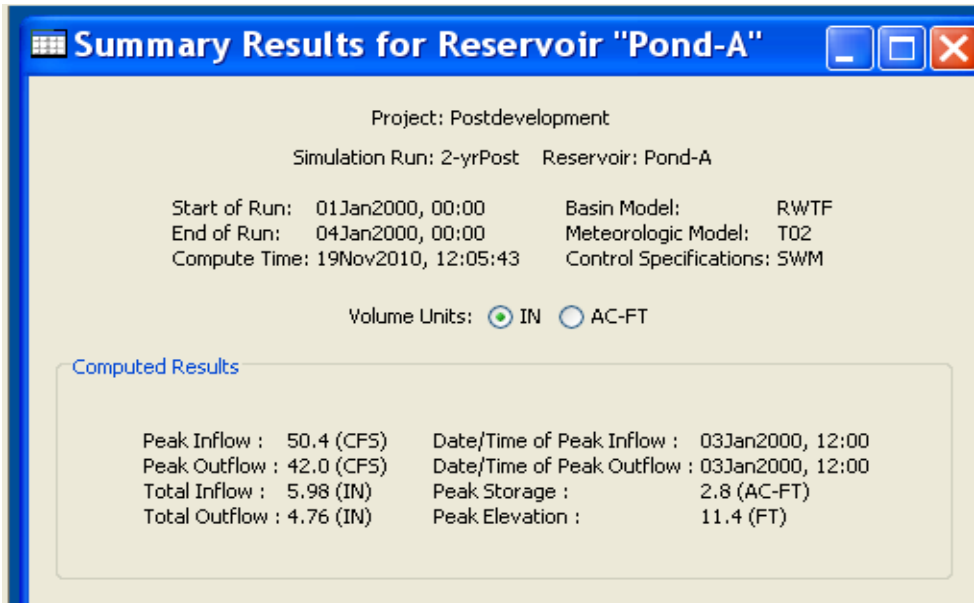
25 - YEAR

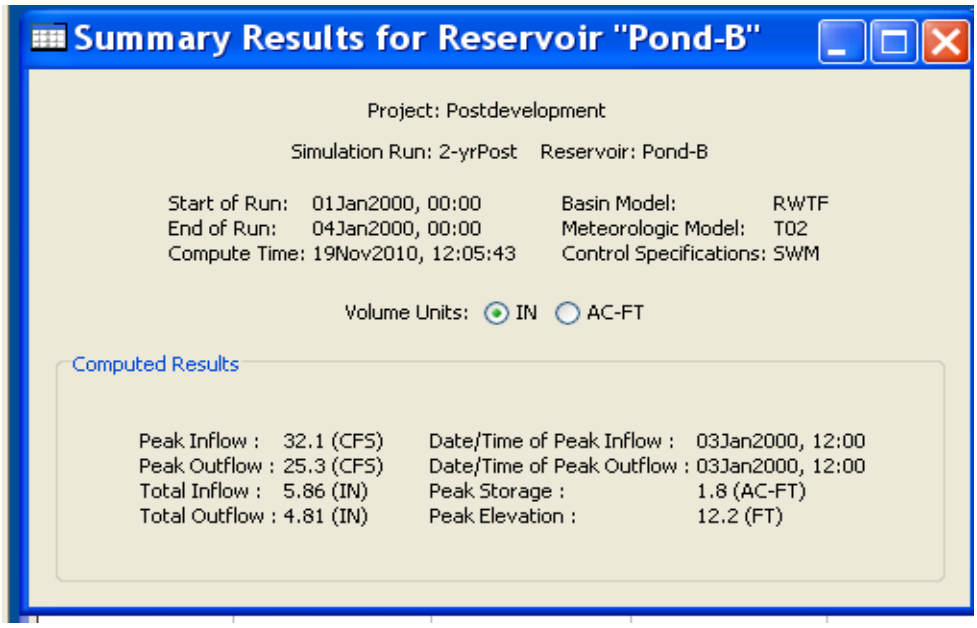

Summary Results for Subbasin "PreSubbasin-A"
Project: Predevelopment
Simulation Run: 25-yrPre Subbasin: PreSubbasin-A
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 06Jan2011, 12:32:57
Basin Model: RWTF
Meteorologic Model: T25
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Discharge : 108.0 (CFS)
Total Precipitation : 12.60 (IN)
Total Loss : 0.49 (IN)
Total Excess : 12.11 (IN)
Date/Time of Peak Discharge : 03Jan2000, 12:00
Total Direct Runoff : 12.08 (IN)
Total Baseflow : 0.00 (IN)
Discharge : 12.08 (IN)


Summary Results for Subbasin "PreSubbasin-B"
Project: Predevelopment
Simulation Run: 25-yrPre Subbasin: PreSubbasin-B
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 06Jan2011, 12:32:57
Basin Model: RWTF
Meteorologic Model: T25
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Discharge : 85.1 (CFS)
Total Precipitation : 12.60 (IN)
Total Loss : 0.49 (IN)
Total Excess : 12.11 (IN)
Date/Time of Peak Discharge : 03Jan2000, 12:00
Total Direct Runoff : 12.09 (IN)
Total Baseflow : 0.00 (IN)
Discharge : 12.09 (IN)

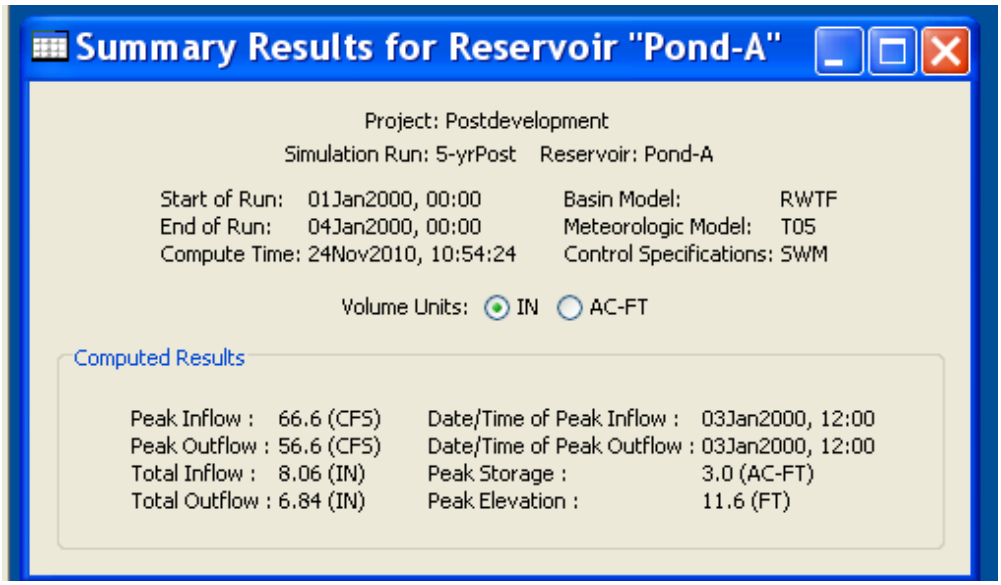
STORM WATER BASIN DISCHARGE SUMMARY TABLES

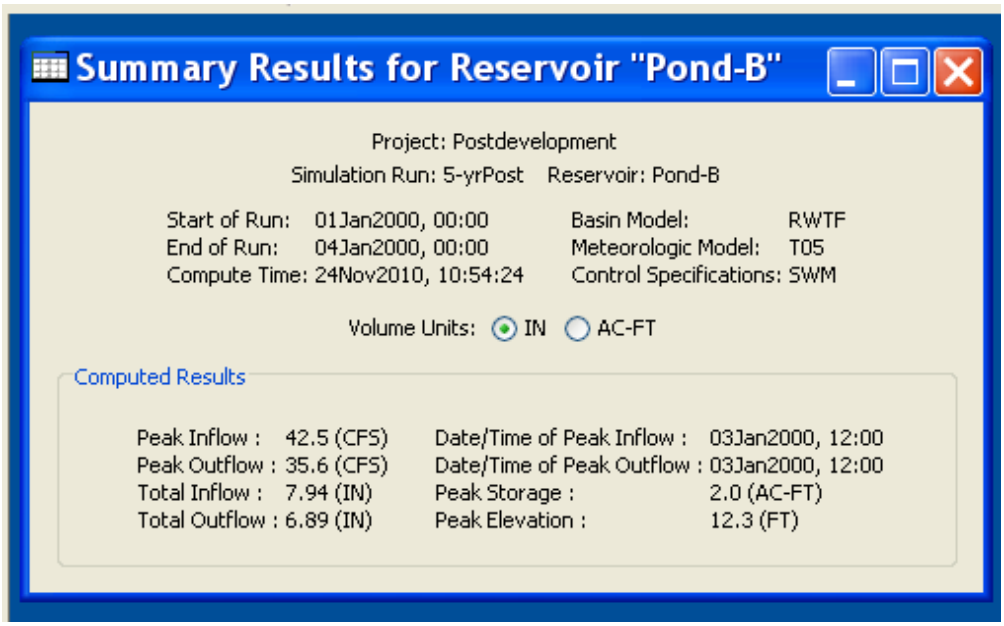
2-YEAR



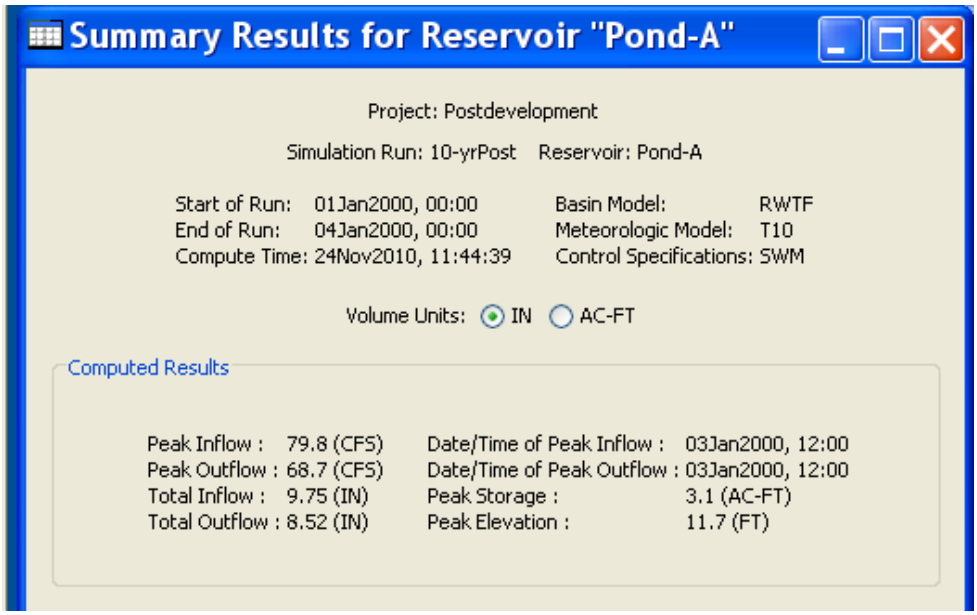


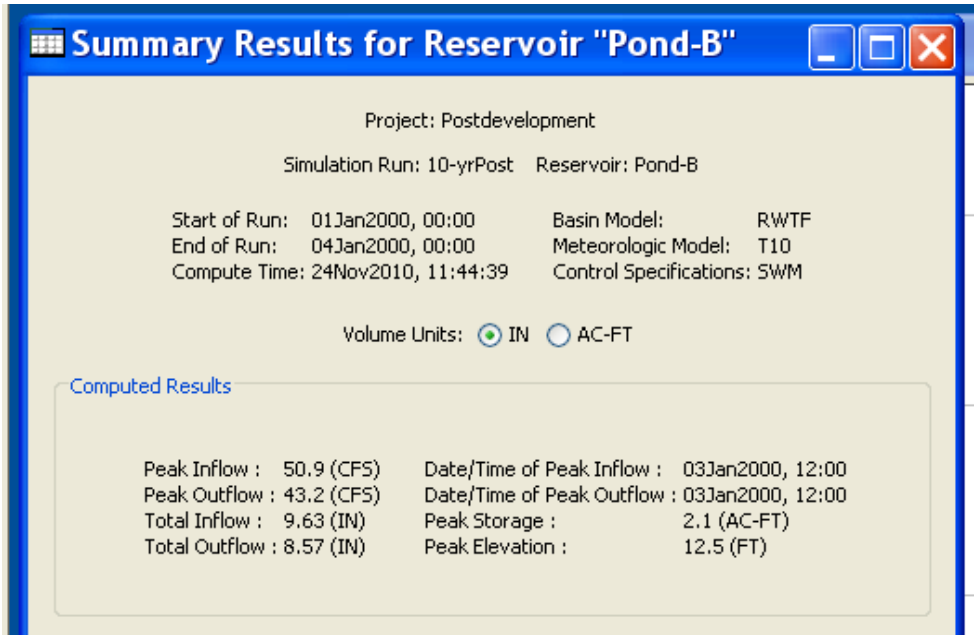
5 - YEAR


Summary Results for Reservoir "Pond-A"
Project: Postdevelopment
Simulation Run: 5-yrPost Reservoir: Pond-A
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 24Nov2010, 10:54:24
Basin Model: RWTF
Meteorologic Model: T05
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 66.6 (CFS)
Peak Outflow : 56.6 (CFS)
Total Inflow : 8.06 (IN)
Total Outflow : 6.84 (IN)
Date/Time of Peak Inflow : 03Jan2000, 12:00
Date/Time of Peak Outflow : 03Jan2000, 12:00
Peak Storage : 3.0 (AC-FT)
Peak Elevation : 11.6 (FT)

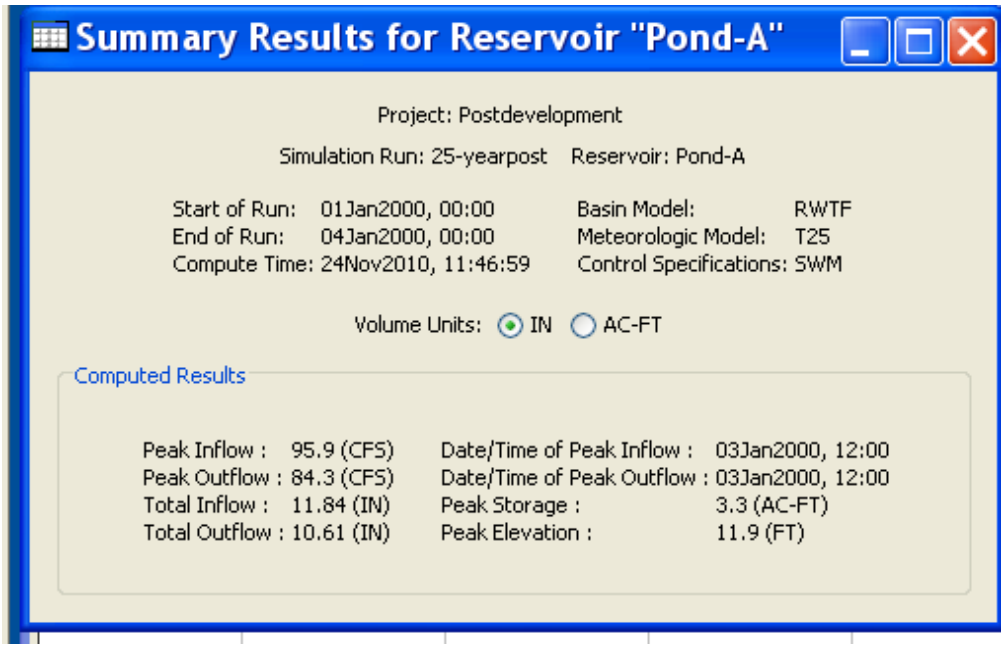

Summary Results for Reservoir "Pond-B"
Project: Postdevelopment
Simulation Run: 5-yrPost Reservoir: Pond-B
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 24Nov2010, 10:54:24
Basin Model: RWTF
Meteorologic Model: T05
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 42.5 (CFS)
Peak Outflow : 35.6 (CFS)
Total Inflow : 7.94 (IN)
Total Outflow : 6.89 (IN)
Date/Time of Peak Inflow : 03Jan2000, 12:00
Date/Time of Peak Outflow : 03Jan2000, 12:00
Peak Storage : 2.0 (AC-FT)
Peak Elevation : 12.3 (FT)

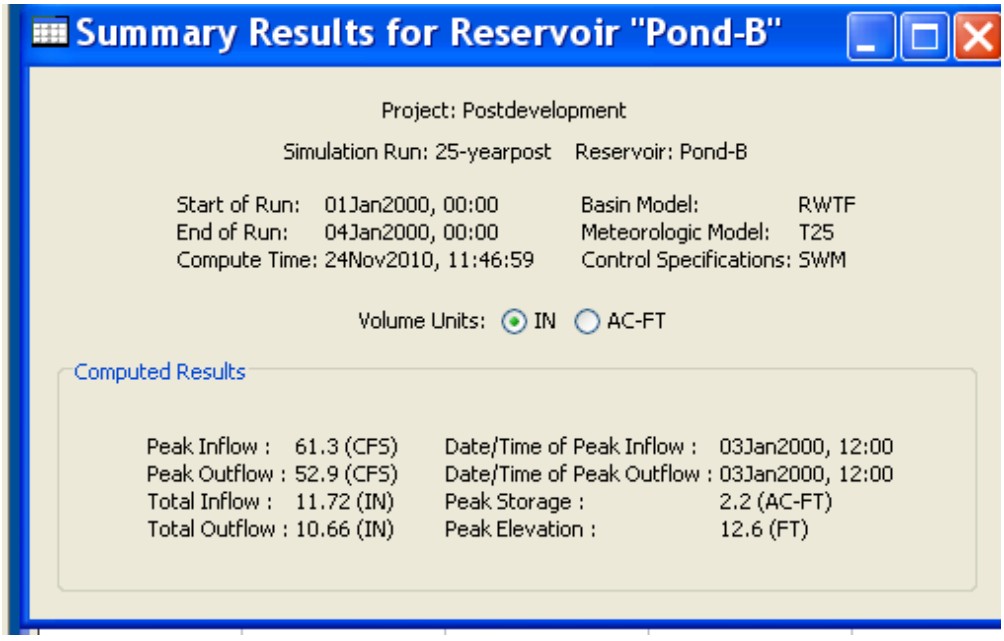
10-*YEAR*


Summary Results for Reservoir "Pond-A"
Project: Postdevelopment
Simulation Run: 10-yrPost Reservoir: Pond-A
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 24Nov2010, 11:44:39
Basin Model: RWTF
Meteorologic Model: T10
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 79.8 (CFS)
Peak Outflow : 68.7 (CFS)
Total Inflow : 9.75 (IN)
Total Outflow : 8.52 (IN)
Date/Time of Peak Inflow : 03Jan2000, 12:00
Date/Time of Peak Outflow : 03Jan2000, 12:00
Peak Storage : 3.1 (AC-FT)
Peak Elevation : 11.7 (FT)


Summary Results for Reservoir "Pond-B"
Project: Postdevelopment
Simulation Run: 10-yrPost Reservoir: Pond-B
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 24Nov2010, 11:44:39
Basin Model: RWTF
Meteorologic Model: T10
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 50.9 (CFS)
Peak Outflow : 43.2 (CFS)
Total Inflow : 9.63 (IN)
Total Outflow : 8.57 (IN)
Date/Time of Peak Inflow : 03Jan2000, 12:00
Date/Time of Peak Outflow : 03Jan2000, 12:00
Peak Storage : 2.1 (AC-FT)
Peak Elevation : 12.5 (FT)

25 - YEAR


Summary Results for Reservoir "Pond-A"
Project: Postdevelopment
Simulation Run: 25-yearpost Reservoir: Pond-A
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 24Nov2010, 11:46:59
Basin Model: RWTF
Meteorologic Model: T25
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 95.9 (CFS)
Peak Outflow : 84.3 (CFS)
Total Inflow : 11.84 (IN)
Total Outflow : 10.61 (IN)
Date/Time of Peak Inflow : 03Jan2000, 12:00
Date/Time of Peak Outflow : 03Jan2000, 12:00
Peak Storage : 3.3 (AC-FT)
Peak Elevation : 11.9 (FT)


Summary Results for Reservoir "Pond-B"
Project: Postdevelopment
Simulation Run: 25-yearpost Reservoir: Pond-B
Start of Run: 01Jan2000, 00:00
End of Run: 04Jan2000, 00:00
Compute Time: 24Nov2010, 11:46:59
Basin Model: RWTF
Meteorologic Model: T25
Control Specifications: SWM
Volume Units: IN AC-FT
Computed Results
Peak Inflow : 61.3 (CFS)
Peak Outflow : 52.9 (CFS)
Total Inflow : 11.72 (IN)
Total Outflow : 10.66 (IN)
Date/Time of Peak Inflow : 03Jan2000, 12:00
Date/Time of Peak Outflow : 03Jan2000, 12:00
Peak Storage : 2.2 (AC-FT)
Peak Elevation : 12.6 (FT)

100-*YEAR Emergency*