DRAFT

WPA Feasibility Study
MAD Team
Alternative 1 Documentation

DRAFT

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7 March 2000 Updates:

- Slopes on canals and levees reversed from 1V on 3H to 1V on 3H

31 January 2000 Updates:

- Changed Hillsboro levee heights on L-M-05 and L-M-06
- Added lengths of E-1 canal reaches to Acme Basin B

Component: Acme Basin B Discharge
Component: OPE List: A

Alternative 1:
a) Increase impoundment depth to 8 feet.
b) Store and/or treat as much as possible Acme B basin runoff in the basin impoundment and STA.
c) Deliver excess runoff to Ag Reserve when the impoundment is full and STA is operating at capacity.
d) Keep the STA hydrated with 0.5’ depth of water.
e) During runoff events operate the STA at 150 cfs capacity and backpump into impoundment at a rate of 350 cfs.
f) Remove the seepage canal on southern side of impoundment.

Design Rational:
a) The initial modeling run for D13R used a 6’ impoundment depth.
b) No routing to the STA was modeled so the STA was dry out.
c) Routing water from Acme Basin B to the Ag Reserve impoundment is only done when the basin capacity is diminished. Delivering water south via E1 canal during runoff events will require E1 canal capacity to be improved.
d) Interested in the effects of under levee seepage to Strazzula hydroperiod with southern impoundment seepage canal removed.

Operational Scenarios & Rules:
a) Pump during runoff events at a rate of 350 cfs to the impoundment and 150 cfs to the STA when canal triggers are reached.
b) If canal elevations are still high enough to continue pumping and impoundment is at capacity, stop pumping into impoundment and start pumping a maximum of 350 cfs at north end of E1 to Ag Reserve on top of the E1 canal capacity (E1 canal will require conveyance improvement).
c) At the point were canal stages begin receding, the impoundment will proceed with a maximum 150 cfs discharge to the STA until the impoundment reaches 1’ in depth.
d) The STA discharge shall terminate when the STA depth reaches a minimum of 0.5 feet.

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  STA Area: 360 acres
  Maximum Depth: 4 feet
  Maximum Storage: 1440 acft
  Time to Fill at 150 cfs: 4.8 days

  Impoundment Area: 550 acres
  Maximum Depth: 8 feet
  Maximum Storage: 4400 acft
  Time to Fill at 350 cfs: 6.3 days

- STA calculations:

Marsh Flow Width: 2800 ft	
Marsh Flow Depth: 2 ft	design choice
Marsh Flow Velocity: 0.0328 ft/s	maximum for STA
Computed Marsh Flow = 184 cfs	> than 150 cfs
Travel Distance: 5000 ft	
Travel Time = 42.3 hours/1.8 days	
Marsh Flow: 150 cfs	design choice
Marsh Flow Width: 2800 ft	
Marsh Flow Depth: 1.5 ft	design choice
Marsh Flow Velocity = 0.0357 ft/s	= maximum for STA
Travel Distance: 5000 ft	
Travel Time = 38.9 hours/1.6 days	

- Length of E1 canal from pump P-OPE-01 to pump P-VV-01 is approximately 28,900 ft or 5.5 miles.
- Length of E1 canal from pump P-VV-01 to pump P-VV-03 is approximately 16,000 ft or 3.0 miles.

Structures:

1) (P-OPE-O1) 350 cfs pump at C-25 extension and LWDD E-1 canal to deliver water to Ag Reserve impoundment via LWDD E-1, ON only when Acme impoundment is full at which time impoundment pump (P-OPE-04) is turned OFF, OFF at 13.5 ft-NGVD
2) (P-OPE-02) 65 cfs impoundment seepage pump, ON 13.6 ft-NGVD, OFF 13.0 ft-NGVD
3) (P-OPE-03) 65 cfs impoundment seepage pump, ON 13.6 ft-NGVD, OFF 13.0 ft-NGVD
4) (P-OPE-04) 350 cfs pump into impoundment, ON 14.0 ft-NGVD, OFF when impoundment is full or when stage in canal Acme C-25 is 13.0 ft-NGVD

5) (P-OPE-05) 25 cfs STA seepage pump, ON 13.6 ft-NGVD, OFF 13.0 ft-NGVD
6) (P-OPE-06) 150 cfs pump into STA impoundment from C-1 canal, ON 14.0 ft-NGVD, OFF when impoundment is no longer discharging to lower pool or when STA is 0.5′ in depth
7) (P-OPE-07) 25 cfs STA seepage pump, ON 13.6 ft-NGVD, OFF 13.0 ft-NGVD
8) (P-OPE-08) 150 cfs pump from STA into WCA1, ON when STA inflow pump P-OPE-06 is ON and STA reaches a minimum 1.5′ depth, off when STA is 0.5′ in depth
9) (S-OPE-01) 150 cfs gated culvert to discharge out of impoundment to C-6 or C-25, OPEN when required to make deliveries to STA to lower impoundment pool, CLOSED when impoundment reached 1.0′ in depth or inflow pump P-OPE-04 is ON
10) (S-OPE-02 through 09) 8-25 cfs culverts to discharge from STA distribution canal into STA

Levees:

1) (L-OPE-01) Impoundment levee on all boundaries, top width 12′, side slopes 1V on 3H, height 14′ = 8′ depth + 6′ superiority, average ground 16.2 ft-NGVD, bottom width 96′, length 19550′, width (east to west) 4875′, length (north to south) 4900′
2) (L-OPE-05) STA levee, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 16.3 ft-NGVD, bottom width 54′, length 16380′, width (east to west) 5190′, length (north to south) 3000′
3) (L-OPE-06) Internal levee to establish marsh flow from the distribution canal through the STA, top width 12′, side slopes 1V on 3H, height 5.0′ = 4′ depth + 1.0′ superiority, average ground 16.3 ft-NGVD, bottom width 42′, length 2960′
4) (L-OPE-07) Internal levee (east to west alignment) to ensure marsh flow and compartmentalize STA, top width 12′, side slopes 1V on 3H, height 5.0′ = 4′ depth + 1.0′ superiority, average ground 16.3 ft-NGVD, bottom width 42′, length 4980′

Canals:

1) (C-OPE-01) new canal C-25 Extension from impoundment to LWDD E-1, bottom width 30′, side slopes 1V on 3H, bottom elevation 8.0 ft-NGVD, average ground 17.0 ft-NGVD, top width 84′, length 10820′
2) (C-OPE-02) impoundment seepage canal on western, northern, and eastern boundary, bottom width 12′, side

slopes 1V on 3H, bottom elevation 9.2 ft-NGVD, average ground 16.2 ft-NGVD, top width 54’, length 15325’

3) (C-OPE-03) STA seepage canal on northern, eastern, and southern boundary, bottom width 6’, side slopes 1V on 3H, bottom elevation 10.3 ft-NGVD, average ground 16.3 ft-NGVD, top width 42’, length 13680’
4) (C-OPE-04) STA distribution canal from C-1 to STA, bottom width 15’, side slopes 1V on 3H, bottom elevation 10.0 ft-NGVD, average ground 16.3 ft-NGVD, top width 53’, length 2965’
5) (C-OPE-05) STA distribution canal from STA to WCA1, bottom width 15’, side slopes 1V on 3H, bottom elevation 8.3 ft-NGVD, average ground 16.3 ft-NGVD, top width 63’, length 2970’

Policy Issues, Seepage Issues and/or Questions:

a) Discharges out of the impoundment to canals impacted by ongoing runoff events should be limited as much as possible. If this could be accomplished than LWDD E-1 canal improvements may not be required.
b) Will the absence of a seepage canal on the southern boundary of the Acme Basin B impoundment be beneficial to the Strazzula tract?
c) What effects on WQ in the Strazzula tract could be expected by allowing seepage from the southern boundary of the Acme Basin B impoundment?
d) Can WQ targets of 10 ppm be meet by chemical treatment? Chemical treatment WQ targets are not known although the assumption is that 10 ppm can be accomplished with a combination of a primary chemical treatment and a secondary STA treatment to make the water marsh ready.
e) If Acme Basin B can meet water quality targets and direct all the water into the Refuge then no water will need to be directed to Ag Reservoir impoundment.
f) STA-Seepage canals on north and south will be backpumped into the STA.
g) Impoundment seepage canals are provided on eastern and western boundaries. Southern boundary is adjacent to the Strazzula tract and northern boundary is adjacent to C-25 canal. Seepage is backpumped into the impoundment.

Component: Strazzula
Component: OPE List: A

Alternative 1:
a) Place a 3’ high berm along the eastern border to prevent drainage to the east.

Design Rational:
a) Berm will reduce losses to the east and allow for potentially higher water depths in area.

Operational Scenarios & Rules: None

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  Wetland Area: 3470 acres

Structures:
1) (S-STZ-01) 300 cfs gated culverts at eastern boundary of wetlands and on the LWDD L23W canal

Levees:
1) (L-SOPE-01) Eastern boundary berm, top width 2’, side slopes 1V on 3H, height 3’, average ground 17.0 ft-NGVD, bottom width 20’, length 54470’

Canals: None

Policy Issues, Seepage Issues and/or Questions:
a) What effects on WQ in the Strazzula tract could be expected by allowing seepage from the southern boundary of the Acme Basin B impoundment?
b) LWDD L-23W canal berms and culverts need to be analyzed and possibly redesigned to prevent inadvertent impact to wetland.
c) Concerns exist that the wetlands are being drained by LWDD L-23W canal. A structure to maintain water levels at 15.5 ft-NGVD within the wetlands is desired by Natural Areas Team. Structure to be located at the eastern boundary of the wetland on the L-23W canal.
d) Is there any means of delivering water from WCA1 into the Strazzula tract besides L-23W canal?

Component: Ag Reserve Impoundment/ASR
Component: VV List: B

Alternative 1:
a) Shift the footprint south.
b) Create flow path in northern section of previous footprint with meandering canal and littoral zones for fish habitat.
c) Maximum depth of 12’ in impoundment.

Design Rational:
a) Footprint has less perimeter and LWDD delivery canal will be on northern boundary as opposed to having to pass through impoundment.

Operational Scenarios & Rules:
a) Pump 250 cfs at northern end of meander until Acme B impoundment is at capacity, once at capacity pump additional 350 cfs (total 600 cfs). All pumping is done into meander canal.

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  Area north of impoundment: 770 acres

  Impoundment Area: 1240 acres
  Maximum Depth: 12 feet
  Maximum Storage: 14880 acft
  Time to Fill at 850 cfs: 8.8 days

Structures:
1) (P-VV-01) 600 cfs (350 from north and 250 from basin) pump north of meander canal, ON 16.0 ft-NGVD, OFF 15.8 ft-NGVD
2) (P-VV-03) 250 cfs pump into impoundment from north end (L-30 canal), ON 16.0 ft-NGVD, OFF 15.0 ft-NGVD
3) (P-VV-04) 200 cfs seepage pumps, ON 12.7 ft-NGVD, OFF 12.5 ft-NGVD (delete P-VV-02)
4) (P-VV-05) 600 cfs pump into north end of impoundment, ON 16.0 ft-NGVD, OFF 15.0 ft-NGVD
5) (S-VV-01) 500 cfs gated culverts discharging from impoundment to LWDD canals
6) (S-VV-02) 300 cfs culverts with riser discharging from impoundment to L-40 Borrow Canal

Levees:

1) (L-VV-01) Impoundment levee on all boundaries that tie into L-40, top width 12’, side slopes 1V on 3H, height 15’ = 12’ depth + 3.0’ superiority, average ground 16.0 ft-NGVD, bottom width 102’, length 26100’
2) (L-VV-02) New levee berm west of SR-7 the length of the northern buffer, top width 2’, side slopes 1V on 3H, height 3’, average ground 16.0 ft-NGVD, bottom width 20’, length 18500’

Canals:

1) (C-VV-01) Impoundment seepage canals on eastern and southern boundary, bottom width 25’, side slopes 1V on 4H, bottom elevation 8.0 ft-NGVD, average ground 16 ft-NGVD, top width 89’, length 16010’
2) (C-VV-02) 600 cfs meandering canal for conveyance to impoundment with littoral zones for F&W habitat, bottom width 46’, side slopes 1V on 3H, bottom elevation 7.0 ft-NGVD, average ground 16’, top width 100’, length 16045’
3) (C-VV-03) Impoundment seepage and conveyance canal on northern boundary, bottom width 47’, side slopes 1V on 2H, bottom elevation 4.1 ft-NGVD, average ground 16 ft-NGVD, top width 95’, length 5580’

Policy Issues, Seepage Issues and/or Questions:

a) Swap land use of top portion of mitigated area with 2000’ x 2500’ square area east of mitigated area. If this is possible a reduction of approximately 1 mile of levee and seepage canal construction could be realized and the impoundment footprint area would increase.
b) Southern portion of the new impoundment footprint (southern 1/3 area) is proposed as a state park.
c) Impoundment seepage canals required on southern and eastern sides. Seepage remains at 200 cfs backpumped into impoundment.

Component: Hillsboro Impoundment/ASR
Component: M List: A (ASR is B list)

Alternative 1:
a) Create compartmentalized impoundments north and south of Hillsboro Canal.
b) Create an internal levee running south to north in the impoundment north of Hillsboro Canal.
c) Move southern boundary on impoundment north of existing borrow pits.
d) Increase inflow pump to 1000 cfs.
e) Enlarge seepage canals and lower bottom elevation for better seepage interception.
f) Provide littoral zones for F&W habitat along seepage canals.
g) Store a maximum depth of 6’ in impoundments.

Design Rational:
a) Reducing footprint on southern impoundment eliminates borrow pits.
b) Compartmentalizing
   1) Maintains existing flood control and water delivery capabilities at S-39 and Hillsboro Canal.
   2) Reduces wind fetch and wave runup potential.
   3) Reduces evapotransporation by reducing surface water area by allowing operational flexibility in determining which impoundment areas are inundated.
   4) Has potential to provide improved seepage management towards ASR production wellfields and seepage canal interception.

Operational Scenarios & Rules:
a) Pump from Hillsboro into northwest impoundment H1.
b) Allow gravity flow to the other two compartments (H2 and H3) when elevation 14 ft-NGVD is reached in H1.

Alternative Summary & Component Description/Modifications:

Impoundments Areas:
H1-northwestern, H2-northeastern, and H3-southern

- Storage calculations:
  H1 Area: 840 acres
  Maximum Depth: 6 feet
  Maximum Storage: 5040 acft

H2 Area: 825 acres
Maximum Depth: 6 feet
Maximum Storage: 4950 acft

H3 Area: 585 acres
Maximum Depth: 6 feet
Maximum Storage: 3510 acft

Total Area: 2250 acres
Maximum Depth: 6 feet
Maximum Storage: 13500 acft
Time to Fill at 1000 cfs: 6.8 days

Structures:

1) (P-M-01) deleted (southern impoundment seepage pump to be replaced by gated culverts discharging in Hillsboro Canal)
2) (P-M-02) 1000 cfs inflow pump into impoundment H1, ON 7.8 ft-NGVD, OFF 7.6 ft-NGVD
3) (P-M-03) 64 cfs seepage pump on northeast side, ON 9.0 ft-NGVD, OFF 8.5 ft-NGVD
4) (S-M-01) 200 cfs gated culverts (4 each 48″, invert 7 ft-NGVD) to discharge from impoundment H1 to Hillsboro Canal
5) (S-M-02) deleted (previously was an emergency overflow structure into WCA-2A)
6) (S-M-03) 100 cfs gated culvert discharge from impoundment H1 to H2 impoundment, diameter 72″, invert 9.0 ft-NGVD, length 60′, weir invert 11.0 ft-NGVD (ground elevation)
7) (S-M-04) 3-100 cfs ungated culverts discharge from impoundment H1 to H2 impoundment, diameter 72″, invert 9.0 ft-NGVD, length 60′, weir invert 15.0 ft-NGVD
8) (S-M-05) 3-100 cfs gated culverts discharge from impoundment H1 to H3 impoundment, diameter 72″, invert 9.0 ft-NGVD, length 200′
9) (S-M-06) 3-200 cfs gated culverts, replaces S-39A with to handle southern impoundment boundary seepage, L-36 seepage from WCA-2A, plus 350 cfs permitted discharge to L-36, diameter 72″, invert 1.0 ft-NGVD, length 55′
10) (S-M-07) 100 cfs gated culvert discharge from impoundment H3 to Hillsboro Canal, diameter 72″, invert 7.0 ft-NGVD, length 150′

Levees:

1) (L-M-01) Impoundment levee on eastern boundary north of Hillsboro Canal, top width 12′, side slopes 1V on 3.5H, height 12′ = 6′ depth + 6′ superiority, average ground 11.5 ft-NGVD, bottom width 96′, length 8000′

2) (L-M-02) Impoundment H3 levee on western boundary along existing levee L-36, top width 12′, side slopes 1V on 3.5H, height 12′ = 6′ depth + 6′ superiority, average ground 10.0 ft-NGVD, bottom width 96′, length 4900′
3) (L-M-03) Impoundment H3 levee on southern and eastern boundary, top width 12′, side slopes 1V on 3.5H, height 12′ = 6′ depth + 6′ superiority, average ground 11.0 ft-NGVD, bottom width 96′, length 9800′
4) (L-M-04) Internal levee separating impoundment H1 and H2, top width 12′, side slopes 1V on 3H, height 6.5′ = 6′ depth + 0.5′ superiority, average ground 11.5 ft-NGVD, bottom width 51′, length 6200′
5) (L-M-05) Impoundment levee on southern boundary of impoundment H1 and H2 north of Hillsboro Canal, top width 12′, side slopes 1V on 3H, height 9′ = 6′ depth + 3′ superiority, average ground 11.0 ft-NGVD, bottom width 66′, length 15750′
6) (L-M-06) Impoundment levee on northern boundary of impoundment H3 south of Hillsboro Canal and Lox Road, top width 12′, side slopes 1V on 3H, height 9′ = 6′ depth + 3′ superiority, average ground 11.0 ft-NGVD, bottom width 66′, length 7620′

Canals:

1) (C-M-02) Impoundment H2 seepage canal with littoral zones for F&W habitat on eastern boundary north of Hillsboro Canal, bottom width 5′, side slopes 1V on 2H, bottom elevation -5.0 ft-NGVD, average ground 11.5 ft-NGVD, top width 71′, length 7670′, 29′ ROW for littoral zone
2) (C-M-03) Pump getaway canal in impoundment H2, bottom width 40′, side slopes 1V on 3H, bottom elevation 1.0 ft-NGVD, average ground 11.0 ft-NGVD, top width 100′, length 2500′
3) (C-M-04) Impoundment H3 seepage canal with littoral zones for F&W habitat on southern and eastern boundary south of Hillsboro Canal, bottom width 26′, side slopes 1V on 2H, bottom elevation -5.0 ft-NGVD, average ground 11.0 ft-NGVD, top width 90′, length 9750′, 30′ ROW for littoral zone

Alternative Features not Required by Modelers:

1) Profile of impoundment levee H2 and seepage canal on eastern boundary north of Hillsboro Canal
   250′ from east ROW to centerline of levee =
   12′ east ROW +
   29′ littoral zone for F&W habitat +
   71′ top width of seepage canal (bottom –5 NGVD) +
   90′ ASR, geotechnical toe bench and other (Red Bay tree transplant) +
   48′ from levee toe to levee centerline
2) Profile of impoundment levee and seepage canal on southern and eastern boundary of H3
   195′ from east ROW to centerline of levee =
   12′ south and east ROW +
   30′ littoral zone for F&W habitat +
   90′ top width of seepage canal (bottom –5 NGVD) +
   15′ geotechnical toe bench and maintenance ROW
   48′ from levee toe to levee centerline

Policy Issues, Seepage Issues and/or Questions:

a) Additional reduction of seepage from WCA-1 can be achieved if LWDD E-1W-S canal elevation could be raised. The area north east of impoundment will require analysis of flood protection solutions in the area around LWDD E-43-W, E-1W-S, and #20 control structure. A solution will reduce seepage from WCA-1 by reducing head across levee.
b) If Lox road is relocated than access will need to be provided to the public for access to boat ramps at vicinity of S-39.
c) Impoundment seepage canals on south to handle 350 cfs permitted pumping to L-36 from a development to the south.
d) Will borrow pit backfilled with muck impact seepage losses?

Component: C-11 STA/Impoundment
Component: Q List: A

Alternative 1:
a) Increase impoundment footprint on northwestern end to include some wetland areas not developed but avoid wetland mitigation areas to the north that have been developed.
b) Add an internal levee to ensure marsh flow through STA.
c) Provide littoral zones for F&W habitat along eastern seepage canal.
d) Store a maximum depth of 4’ in impoundment

Design Rational:
a) Study the effects on hydroperiod in wetlands.
b) Study the effects of increased impoundment storage on frequency of backpumping at S-9 into WCA-3A.

Operational Scenarios & Rules:
a) Pump during runoff events at a maximum rate of 2500 cfs to the STA/impoundment.
b) Discharge from impoundment south if downstream storage is available and STA depth is greater than 2.0’.
c) The STA discharge shall terminate when the STA depth reaches a minimum of 0.5 feet.

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  Area north of impoundment: 335 acres

  Impoundment Area: 1735 acres
  Maximum Depth: 4 feet
  Maximum Storage: 6940 acft
  Time to Fill at 2500 cfs: 1.4 days

- STA calculations:
  Marsh Flow Width: 2300 ft
  Marsh Flow Depth: 2 ft design choice
  Marsh Flow Velocity: 0.0328 ft/s maximum for STA
  Computed Marsh Flow = 151 cfs < than 2500 cfs
  Travel Distance: 23000 ft
  Travel Time = 194.8 hours/8.1 days

Marsh Flow: 2500 cfs design choice
Marsh Flow Width: 2300 ft
Marsh Flow Depth: 4.0 ft design choice
Marsh Flow Velocity = 0.2717 ft/s > maximum for STA
Travel Distance: 23000 ft
Travel Time = 23.5 hours/1.0 days

Structures:

1) (P-Q-01) 60 cfs pump for flood protection of mobile home park to backpump into US-27 conveyance canal, ON 6.0 ft-NGVD, OFF 5.0 ft-NGVD
2) (P-Q-02) 25 cfs seepage collection pump station for the northern boundary of the STA, ON 6.8 ft-NGVD, OFF 6.3 ft-NGVD
3) (P-Q-03) 240 cfs seepage collection pump for the eastern boundary of the STA, ON 5.3 ft-NGVD, OFF 5.0 ft-NGVD
4) (P-Q-04) 2500 cfs inflow pump station for the C-11 STA, ON 4.0 ft-NGVD, OFF 3.0 ft-NGVD
5) (P-Q-05) 60 cfs pump for flood protection of FPL substation to backpump into US-27 conveyance canal, ON 6.0 ft-NGVD, OFF 5.0 ft-NGVD
6) (P-Q-06) 80 cfs seepage collection pump for western boundary of the STA, ON 8.0 ft-NGVD, OFF 7.5 ft-NGVD
7) (S-Q-01) 2500 cfs gated spillway discharges from STA/impoundment into the US-27 conveyance canal
8) (S-Q-04) 500 cfs gated culverts discharge from WCA-3A into L-33 conveyance canal to CLBSA

Levees:

1) (L-Q-01E) Impoundment levee on eastern boundary, top width 12′, side slopes 1V on 3H, height 10′ = 4′ depth + 6′ superiority, average ground 6.0 ft-NGVD, bottom width 72′, length 15000′
2) (L-Q-01N) Impoundment levee on northern boundary, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 6.0 ft-NGVD, bottom width 54′, length 6675′
3) (L-Q-01W) Impoundment levee on western boundary, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 6.0 ft-NGVD, bottom width 54′, length 12800′
4) (L-Q-01S) Impoundment levee on southern boundary, top width 12′, side slopes 1V on 3H, height 7′ = 4′ depth + 3′ superiority, average ground 6.0 ft-NGVD, bottom width 54′, length 4300′
5) (L-Q-04) Internal levee to ensure marsh flow through STA, top width 12′, side slopes 1V on 3H, height 4.5′ = 4′

depth + 0.5’ superiority, average ground 6.0 ft-NGVD, bottom width 39’, length 9750’

Canals:

1) (C-Q-01) Impoundment seepage canal with littoral zones for F&W habitat on eastern boundary, bottom width 20’, side slopes 1V on 2H, bottom elevation –2.5 ft-NGVD, average ground 6.0 ft-NGVD, top width 54’, length 15000’, 30’ ROW for littoral zone
2) (C-Q-04) Impoundment seepage canal on northern and western boundary, bottom width 10’, side slopes 1V on 2H, bottom elevation 0.0 ft-NGVD, average ground 6.0 ft-NGVD, top width 34’, length 19500’

Alternative Features not Required by Modelers:

1) Profile of impoundment levee and seepage canal on eastern boundary
   150’ from east ROW to centerline of levee =
   12’ east ROW +
   30’ littoral zone for F&W habitat +
   54’ top width of seepage canal (bottom –2.5 NGVD) +
   18’ geotechnical toe bench and maintenance ROW +
   36’ from levee toe to levee centerline

Policy Issues, Seepage Issues and/or Questions:

a) Property on southern end of Soka Gakkai International – USA, Florida Nature and Culture Center is mitigated and can be lowered 2-3’ and be developed with F&W habitat features.
b) Prior to NLBSA coming online the pump that discharges into the C-9 STA/impoundment is 1000 cfs. 500 cfs capacity is allocated for the C-9 basin. Operationally that infers that only an additional 500 cfs could be delivered from the C-11 STA/impoundment south to C-9 STA/impoundment when 500 cfs is coming from the C-9 basin. The 500 cfs C-9 basin runoff could be reduced to allow more discharge from C-11 to C-9 up to 1000 cfs if storage is available
c) Prior to NLBSA coming online discharges out of the C-9 STA/impoundment cannot occur at the same time water is being delivered from the C-11 STA/impoundment into the C-9 STA/impoundment because of the common canal used.
d) Will the removal of the L-68A levee cause increased seepage loss from WCA-3A?
e) Will more seepage out of C-11 STA/impoundment occur due to L-68A removal?

Component: C-9 STA/Impoundment
Component: R List: A

Alternative 1:
a) Move the northern boundary south of borrow pits.
b) Area north of the northern boundary is not used for storage.
c) Add and internal levee to ensure marsh flow through STA.
d) Provide littoral zones for F&W habitat along eastern seepage canal.
e) Store a maximum depth of 4’ in impoundment

Design Rational:
a) Eliminate the borrow pit to reduce seepage
b) Remove irregular shaped northern area from STA/impoundment footprint to reduce levee perimeter.
c) Study the effects of removing the northern area on seepage from WCA-3B.

Operational Scenarios & Rules:
a) Discharge from STA/impoundment at a maximum rate of 1000 cfs. (0.07 ft/s velocity as an STA parameter)
b) The STA discharge shall terminate when the STA depth reaches a minimum of 0.5 feet.

Alternative Summary & Component Description/Modifications:

- Storage calculations:
  Area north of impoundment: 735 acres

  Impoundment Area: 1705 acres
  Maximum Depth: 4 feet
  Maximum Storage: 6820 acft
  Time to Fill at 1000 cfs: 3.4 days

- STA calculations:
  Marsh Flow Width: 3650 ft
  Marsh Flow Depth: 2 ft design choice
  Marsh Flow Velocity: 0.0328 ft/s maximum for STA
  Computed Marsh Flow = 239 cfs < than 1000 cfs
  Travel Distance: 19600 ft
  Travel Time = 166.0 hours/6.9 days

Marsh Flow: 1000 cfs design choice
Marsh Flow Width: 3650 ft
Marsh Flow Depth: 4.0 ft design choice
Marsh Flow Velocity = 0.0685 ft/s > maximum for STA
Travel Distance: 19600 ft
Travel Time = 79.5 hours/3.3 days

Structures:

1) (P-XX-01) 1000 cfs pump station from NLBSA into C-9 STA/impoundment, ON above –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
2) (P-R-01) 100 cfs seepage collection pump station for the western boundary, ON 8.0 ft-NGVD, OFF 7.5 ft-NGVD
3) (P-R-02) 100 cfs seepage collection pump station for the eastern boundary, ON 3.0 ft-NGVD, OFF 2.5 ft-NGVD
4) (S-R-01) 1000 cfs gated spillway discharging from the C-9 STA/impoundment into the C-9 Canal

Levees:

1) (L-R-01) Impoundment levee on all boundaries, top width 12’, side slopes 1V on 3H, height 7’ = 4’ depth + 3’ superiority, average ground 5.0 ft-NGVD, bottom width 54’, length 35300’, width (east to west) 7350’, length (north to south) 10300’
2) (L-R-02) deleted
3) (L-R-03) Internal levee to ensure marsh flow through STA, top width 12’, side slopes 1V on 3H, height 4.5’ = 4’ depth + 0.5’ superiority, average ground 5.0 ft-NGVD, bottom width 39’, length 7350’

Canals:

1) (C-R-01) Impoundment seepage canal with littoral zones for F&W habitat on eastern boundary, bottom width 20’, side slopes 1V on 2H, bottom elevation –4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 58’, length 10420’, 30’ ROW for littoral zone
2) (C-R-02) Impoundment seepage canal on western boundary, bottom width 10’, side slopes 1V on 2H, bottom elevation 0.0 ft-NGVD, average ground 5.5 ft-NGVD, top width 32’, length 10420’
3) (C-R-02N) Impoundment seepage canal on northern boundary, bottom width 10’, side slopes 1V on 2H, bottom elevation 0.0 ft-NGVD, average ground 5.5 ft-NGVD, top width 32’, length 7575’

Alternative Features not Required by Modelers:

1) Profile of impoundment levee and seepage canal on eastern boundary
   140’ from east ROW to centerline of levee =
   12’ east ROW +
   30’ littoral zone for F&W habitat +
   58’ top width of seepage canal (bottom –2.5 NGVD) +
   13’ geotechnical toe bench and maintenance ROW +
   27’ from levee toe to levee centerline

Policy Issues, Seepage Issues and/or Questions:

a) Modeling results show a long thin impoundment reduces seepage and maybe mitigation land could be moved east to keep impoundment long and thin.
b) Seepage from WCA-3B may increase if no water is impounded on the area north of the impoundment that was removed.

Component: North Lake Belt Storage Area (NLSBA)
Component: XX List: B

Alternative 1:
a) Reduce the perimeter by eliminating outlying areas.
b) Keep the total storage volume the same at 90,000 acft.
c) Increase the footprint of the northeastern STA.
d) Take offline the southeastern STA.

Design Rational:
a) A reduced perimeter will reduce cost associated with construction of the seepage curtain wall.
b) Land that the airport is located can be avoided.
c) Pump to a lower elevation in the storage impoundment.

Operational Scenarios & Rules:
a) Pump to –30.0 ft-NGVD as opposed to –15.0 ft-NGVD in D13R.
b) Storage is in-ground with the maximum water surface elevation of 5.0 ft-NGVD which is the average ground elevation.

Storage Comparison:

	Area	Storage Elev. (ft-NGVD)		Range	Storage
	(acres)	Minimum	Maximum	(ft)	(acft)
D13R	4500	-15.0	5.0	20.0	90,000
Alt1	2910	-26.0	5.0	31.0	90,210

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Impoundment Area: 2910 acres
  Northeast STA Area: 780 acres
  Southwest STA Area: 215 acres
  Southeast STA Area (offline): 200 acres

- Seepage curtain calculations:
  D13R Perimeter: 77270 feet
  Alternative 1 Perimeter: 46550 feet
  Perimeter Reduction: 30720 feet/5.82 miles/39.76%

- STA calculations:

  NE NLBSA STA

Marsh Flow Width: 4850 ft	
Marsh Flow Depth: 2 ft	design choice
Marsh Flow Velocity: 0.0328 ft/s	maximum for STA
Computed Marsh Flow = 318 cfs	> than 100 cfs
Travel Distance: 6600 ft	
Travel Time = 55.9 hours/2.3 days	
Marsh Flow: 100 cfs	design choice
Marsh Flow Width: 4850 ft	
Marsh Flow Depth: 1.5 ft	design choice
Marsh Flow Velocity = 0.0137 ft/s	< maximum allowable
Travel Distance: 6600 ft	
Travel Time = 133.4 hours/5.6 days	

  SW NLBSA STA

Marsh Flow Width: 1120 ft	
Marsh Flow Depth: 2 ft	design choice
Marsh Flow Velocity: 0.0328 ft/s	maximum for STA
Computed Marsh Flow = 73 cfs	< than 100 cfs
Travel Distance: 3700 ft	
Travel Time = 31.3 hours/1.3 days	
Marsh Flow: 100 cfs	design choice
Marsh Flow Width: 1120 ft	
Marsh Flow Depth: 1.5 ft	design choice
Marsh Flow Velocity = 0.0595 ft/s	> maximum for STA
Travel Distance: 3700 ft	
Travel Time = 17.3 hours/0.7 days	

Structures:

1) (P-XX-01) 1000 cfs pump station from NLBSA into C-9 STA/impoundment, ON above –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
2) (P-XX-02) 600 cfs inflow pump station from C-9 into NLBSA, ON 3.0 ft-NGVD, OFF 2.5 ft-NGVD
3) (P-XX-03) 100 cfs pump station from NLBSA into northeastern STA, ON above –10.0 ft-NGVD with delivery demand, OFF –15.0 ft-NGVD
4) (P-XX-04) 300 cfs inflow pump station from C-6 into NLBSA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD
5) (P-XX-08) 180 cfs seepage collection pump station for the southwestern STA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD

6) (P-XX-09) 100 cfs pump station from NLBSA into southwestern STA, ON above –10.0 ft-NGVD with delivery demand, OFF –10.0 ft-NGVD
7) (P-XX-10) 180 cfs seepage collection pump station for the southwestern STA, ON 3.5 ft-NGVD, OFF 3.0 ft-NGVD
8) (S-XX-01) 2000 cfs gated spillway and bridge to pass flows under Krome Avenue
9) (S-XX-02) 1500 cfs gated spillway for deliveries from US-27 conveyance to C-6
10) (S-XX-03) 2500 cfs gated spillway for deliveries of US-27 conveyance to NLBSA
11) (S-XX-04) 500 cfs gated culverts on C-9 east of C-9 STA/impoundment
12) (S-XX-05) 100 cfs gated culverts for NE NLBSA STA discharge to C-9
13) (S-XX-06) 300 cfs culverts for C-6 delivery to NLBSA
14) (S-XX-07) 100 cfs gated culverts for SW NLBSA STA discharge to C-6
15) (S-XX-09) 300 cfs gated culverts for Snapper Creek East delivery to C-2/C-4
16) (S-XX-10) 600 cfs gated culverts on C-6 east of Turnpike
17) (S-XX-11) 300 cfs gated culverts for C-6 delivery to Turnpike canal

Levees:

1) (L-XX-02) NLBSA perimeter levee on all boundaries (minus shared boundaries with SW and NE STA’s), top width 8’, side slopes 1V on 3H, height 3’ = ground elevation + 3’ superiority, average ground 5.0 ft-NGVD, bottom width 26’, perimeter length 37900’
2) (L-XX-03) SW NLBSA STA perimeter levee on all boundaries, top width 12’, side slopes 1V on 3H, height 7’ = 4’ depth + 3’ superiority, average ground 5.0 ft-NGVD, bottom width 54’, perimeter length 19510’
3) (L-XX-05) NE NLBSA STA perimeter levee on all boundaries, top width 12’, side slopes 1V on 3H, height 7’ = 4’ depth + 3’ superiority, average ground 5.0 ft-NGVD, bottom width 54’, perimeter length 23180’

Canals:

1) (C-XX-01) SW NLBSA STA impoundment seepage canal around perimeter boundaries, bottom width 30’, side slopes 1V on 2H, bottom elevation -4.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 66’, length 16245’
2) (C-XX-04) Conveyance canal from C-6 to Snapper Creek, bottom width 40’, side slopes 1V on 2H, bottom elevation

-4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 78’, length 7605’

3) (C-XX-05) Conveyance canal from Snapper Creek/C-6 to Snapper Creek South, bottom width 20’, side slopes 1V on 2H, bottom elevation -4.5 ft-NGVD, average ground 5.0 ft-NGVD, top width 58’, length 19055’
4) (C-XX-07) New canal from northeastern STA/C-9 to C-6 canal, bottom width 80’, side slopes 1V on 2H, bottom elevation -4.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 116’, length 23885’

Policy Issues, Seepage Issues and/or Questions:

a) The southeastern STA is taken off line and could be converted to a natural area.
b) If the water quality coming out of the STA’s is acceptable can it be routed through the existing Snapper Creek protection canal to provide deliveries to C-2 and C-4. Pilot project should address this issue.
c) An increased drawdown in the NLBSA may cause a surcharge from the connate water below the footprint.
d) An increased drawdown will cause increased shear stresses across the curtain wall and may require a wider cross section of rock to stabilize the curtain wall.

Component: Central Lake Belt Storage Area (CLBSA)
Component: S List: B

Alternative 1:
a) Reduce the perimeter by eliminating outlying areas.
b) Keep the total volume the same at 187,200 acft.
c) Increase polishing cell footprint eastward towards FPL power lines.
d) Reroute Snapper Creek Canal to southern boundary of CLBSA.

Design Rational:
a) A reduced perimeter will reduce cost associated with construction of the seepage curtain wall.
b) FPL power lines and right of way are avoided.
c) Pump to a lower elevation in the storage impoundment.

Operational Scenarios & Rules:
a) Pump to –33.0 ft-NGVD as opposed to –15.0 ft-NGVD in D13R.
b) Storage is both in and above ground with the maximum water surface elevation of 21.0 ft-NGVD which is 15.0 feet above the average ground elevation of 5.0 ft-NGVD.

Storage Comparison:

	Area	Storage Elev. (ft-NGVD)		Range	Storage
	(acres)	Minimum	Maximum	(ft)	(acft)
D13R	5200	-15.0	21.0	36.0	187,200
Alt1	3960	-27.0	21.0	48.0	187,380

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Impoundment Area: 3960 acres
  STA Area: 1520 acres

- Seepage curtain calculations:
  D13R Perimeter: 70470 feet
  Alternative 1 Perimeter: 57645 feet
  Perimeter Reduction: 12825 feet/2.43 miles/18.20%

- STA calculations:
  Marsh Flow Width: 9750 ft
  Marsh Flow Depth: 2 ft — design choice
  Marsh Flow Velocity: 0.0328 ft/s — maximum for STA
  Computed Marsh Flow = 640 cfs — < than 800 cfs
  Travel Distance: 4620 ft
  Travel Time = 39.1 hours/1.6 days

  Marsh Flow: 800 cfs — design choice
  Marsh Flow Width: 9750 ft
  Marsh Flow Depth: 1.5 ft — design choice
  Marsh Flow Velocity = 0.0410 ft/s — > maximum for STA
  Travel Distance: 4620 ft
  Travel Time = 31.3 hours/1.3 days

Structures:

1) (P-S-01) 1500 cfs inflow pump station to CLBSA impoundment, ON 4.0 ft-NGVD or above in supply canal, OFF 3.5 ft-NGVD or when impoundment reaches 21.0 ft-NGVD
2) (P-S-02) 800 cfs pump station from CLBSA into CLBSA STA, ON above –33.0 ft-NGVD with delivery demand, OFF below –33.0 ft-NGVD or no delivery demand
3) (S-S-01) 1500 cfs gated spillway discharging from L-33 to C-6
4) (S-S-02) 300 cfs gated culverts discharging from Pennsuco Canal to Snapper Creek Protection Canal
5) (S-S-03) 800 cfs gated culverts discharging from CLBSA STA to L-30
6) (S-S-06) 300 cfs gated culverts discharging down Turnpike Canal C-XX-05
7) (S-BB-01) 3-200 cfs gated culverts for C-6 canal divide structure, diameter 72”, invert –3.5 ft-NGVD, length 20’
8) (S-BB-02) 1400 cfs gated spillway discharging from C-6 to Dade-Broward Canal
9) (S-BB-03) 800 cfs culverts for deliveries from Dade-Broward levee canal to L-30 canal or reverse
10) (S-BB-04) 1400 cfs gated spillway on Dade-Broward levee canal
11) (S-BB-05) 300 cfs gated culverts discharging from canal C-EEE-02 to Dade-Broward Wellfield protection canal

Levees:

1) (L-S-01) CLBSA perimeter levee on all boundaries, top width 12’, side slopes 1V on 3H, height 19’ = 16’ depth +

3′ superiority, average ground 5.0 ft-NGVD, bottom width 126′, perimeter length 58185′

2) (L-S-02) CLBSA STA perimeter levee on all boundaries (includes L-BB-02 levee which is northern boundary), top width 12′, side slopes 1V on 3H, height 5′ = 4′ depth + 1′ superiority, average ground 5.0 ft-NGVD, bottom width 42′, perimeter length 39590′
3) (L-BB-01) Dade-Broward Levee west of canal, top width 10′, side slopes 1V on 3H, height 5′, average ground 5.0 ft-NGVD, bottom width 40′, length 47325′

Canals:

1) (C-S-01) Rerouted Snapper Creek Canal to southern boundary of CLBSA, bottom width 12′, side slopes 1V on 1H, bottom elevation -0.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 22′, length 15580′
2) (C-BB-01) Conveyance canal from C-6 to Dade-Broward Levee canal, bottom width 10′, side slopes 1V on 3H, bottom elevation 1.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 34′, length 9800′
3) (C-BB-02) Dade-Broward Levee conveyance canal from NLBSA STA to C-4, bottom width 110′, side slopes 1V on 1H, bottom elevation -9.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 138′, length 56040′
4) (C-EEE-01) Conveyance canal from CLBSA STA to L-30 canal, bottom width 50′, side slopes 1V on 3H, bottom elevation -2.0 ft-NGVD, average ground 5.0 ft-NGVD, top width 92′, length 4105′

Policy Issues, Seepage Issues and/or Questions:

a) Should the expanded Dade-Broward Canal incorporate a F&W littoral zone to the east side of the canal? The littoral zone will expand the canal width into impacted melalueca wetlands although the F&W feature will be adjacent to and similar to the Pennsuco wetlands that are existing F&W habitat.
b) An increased drawdown in the CLBSA may cause a surcharge from the connate water below the footprint.
c) An increased drawdown will cause increased shear stresses across the curtain wall and may require a wider cross section of rock to stabilize the curtain wall.

Component: WCA 3A/3B Levee Seepage Management
Component: O List: A

Alternative 1:
a) Allow for a maximum water surface elevation of 8.0 ft-NGVD to be maintained in area north of C-11 (WCA-3A Seepage Management Area).
b) Allow for a maximum water surface elevation of 6.0 ft-NGVD to be maintained in area south of C-11 (WCA-3B Seepage Management Area).

Design Rational:
a) Maintaining higher water surface elevations should be beneficial to reducing seepage from WCA-3A and WCA-3B to the east.
b) Managed water surface hydroperiod will be beneficial to marsh environments.

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Total WCA-3A/3B Area: 4565 acres
  WCA-3A Seepage Management Area: 1780 acres
  WCA-3B Seepage Management Area: 2785 acres

Levees:
1) (L-O-01) US-27 conveyance canal levee from C-11 north to US-27/I-75 Interchange, top width 12’, side slopes 1V on 3H, height 8’, average ground 8.0 ft-NGVD, bottom width 60’, perimeter length 31485’
2) (L-O-02) US-27 conveyance canal levee from C-11 south to US-27/Krome Avenue intersection, top width 12’, side slopes 1V on 3H, height 8’, average ground 6.0 ft-NGVD, bottom width 60’, perimeter length 44720’
3) (L-Q-02) Mobile home perimeter protection levee, top width 12’, side slopes 1V on 3H, height 5’, average ground 6.0 ft-NGVD, bottom width 42’, length 7620’

Policy Issues, Seepage Issues and/or Questions:
a) The maximum allowable water surface in area north and south of C-11 should take into account the base elevations of the FPL towers within the area.
b) The need for flood protection levees and pumps around the FPL sub-station and Holy Lakes Mobile Home Community will be dependant on the maximum water surface elevation south of C-11 and the water surface elevation required to deliver water south down the US-27 conveyance canal.

c) There is a potential to develop appropriate recreation and F&W features in the 235 acre area south of C-11 north of FPL substation. The area could:
    - Have access at FPL sub-station crossing (new crossing)
    - Excavated material may be suitable for levee construction
    - Benefit from melalueca exotic removal
d) New bridge crossing construction would be needed at Griffin Road, FPL sub-station, and Holy Lake Mobile Home Community.

Component: NNR Diversion
Component: List: A

Alternative 1:
c) No Change

Policy Issues, Seepage Issues and/or Questions:
a) Are there potential ways to improve the WCA-2B northern area drying when southern area of WCA-2B is wet.

Component: Eastern C-4 Divide Structure
Component: T List: A

Alternative 1:

a) Increase size of eastern C-4 structure that would divert dry season stormwater flows from the western C-4 basin to the C-2 Canal to recharge the wellfields in the eastern C-2 Canal basin.

Design Rational:

a) D13R design capacity was 600 cfs which may be inadequate to pass flood releases when necessary.

Operational Scenarios & Rules:

Alternative Summary & Component Description/Modifications:

Structures:

1) (S-T-02) 1000 cfs gated spillway on C-4 located downstream of the confluence of the C-2 and C-4 canals.

Policy Issues, Seepage Issues and/or Questions:

a) Sizing of structure is under debate. A 2200 cfs structure has been stated as needed for flood protection because of the size of the outflow structure S-25B. 2200 cfs seems to be oversized. Western C-4 structure has a design discharge of 400 cfs. Backpumping of C-4 to Bird Drive Recharge Area at 200 cfs will also account for flood protection of the contributing basin between the Western C-4 and Eastern C-4 structures.
b) Does a portion of the C-4 canal need to be deepened to improve conveyance and meet design flood protection levels?

Component: Bird Drive Recharge Area
Component: U List: A

Alternative 1:
a) Reduce the amount of reuse water delivery in half.
b) Use monthly average distribution of reuse flows.
c) Increase canal size (C-U-01 and C-U-02).

Design Rational:
a) Cut reuse in half to lower the difference between 95/2050 and D13R hydroperiod depths.
b) Monthly average distribution of reuse flows is more realistic than annual average.
c) Canal size increased to help with conveyance and head loss requirements.

Operational Scenarios & Rules:

Alternative Summary & Component Description/Modifications:

- Area calculations:
  Impoundment Area: 2885 acres

Structures:
1) (P-U-01) 800 cfs pump station for SDCS deliveries when required from C-4 to relocated L-31N
2) (P-U-02) 200 cfs pump station for inflow from C-4 to impoundment, ON 4.5 ft-NGVD, OFF 4.0 ft-NGVD
3) (P-U-03) 150 cfs seepage collection pump station for the eastern boundary, ON 5.8 ft-NGVD, OFF 5.3 ft-NGVD
4) (P-U-04) 150 cfs seepage collection pump station for the southern boundary, ON 5.8 ft-NGVD, OFF 5.3 ft-NGVD
5) (S-U-01) 100 cfs gated culvert discharging from the impoundment into the SDCS
6) (S-U-02) 2-150 cfs gated culverts on C-1W to replace S-338 that is removed.

Levees:
1) (L-U-01) Impoundment levee on all boundaries, top width 12’, side slopes 1V on 3H, height 7’ = 4’ depth + 3’ superiority, average ground 5.2’, bottom width 54’, length 44950’

Canals:
1) (C-U-01) Conveyance and seepage collection canal from C-4 to L-31N-E, bottom width 90’, side slopes 1V on 1H,

bottom elevation -4.0 ft-NGVD, average ground 5.2 ft-NGVD, top width 108’, length 22595’

2) (C-U-02) Conveyance canal from impoundment to C-1W, bottom width 90’, side slopes 1V on 1H, bottom elevation -4.0 ft-NGVD, average ground 5.2 ft-NGVD, top width 108’, length 24785’

Policy Issues, Seepage Issues and/or Questions:

a) An STA, or retention/attenuation area may be required to allow solids to drop out prior to entering the BDRA. An area in the northeast corner could be used and is 3000’ by 1500’ (103 acres). Water Quality Team should address the possible requirement and make recommendation.
b) There is a potential area of acreage to the south and east of the impoundment that could serve as a buffer from urban development in the area.
c) There is also a potential area of acreage to the northeast of the impoundment and north of C-4 Canal that could serve as buffer from urban development in the area.