



Memorandum

To: Jack Mesojedec, P.E.
Solid Waste Authority

From: Jim Wittig, P.E. *JW 10/20*

Date: August 21, 2008

Subject: North County Resource Recovery Facility
Evaluation of the Sitewide Stormwater System

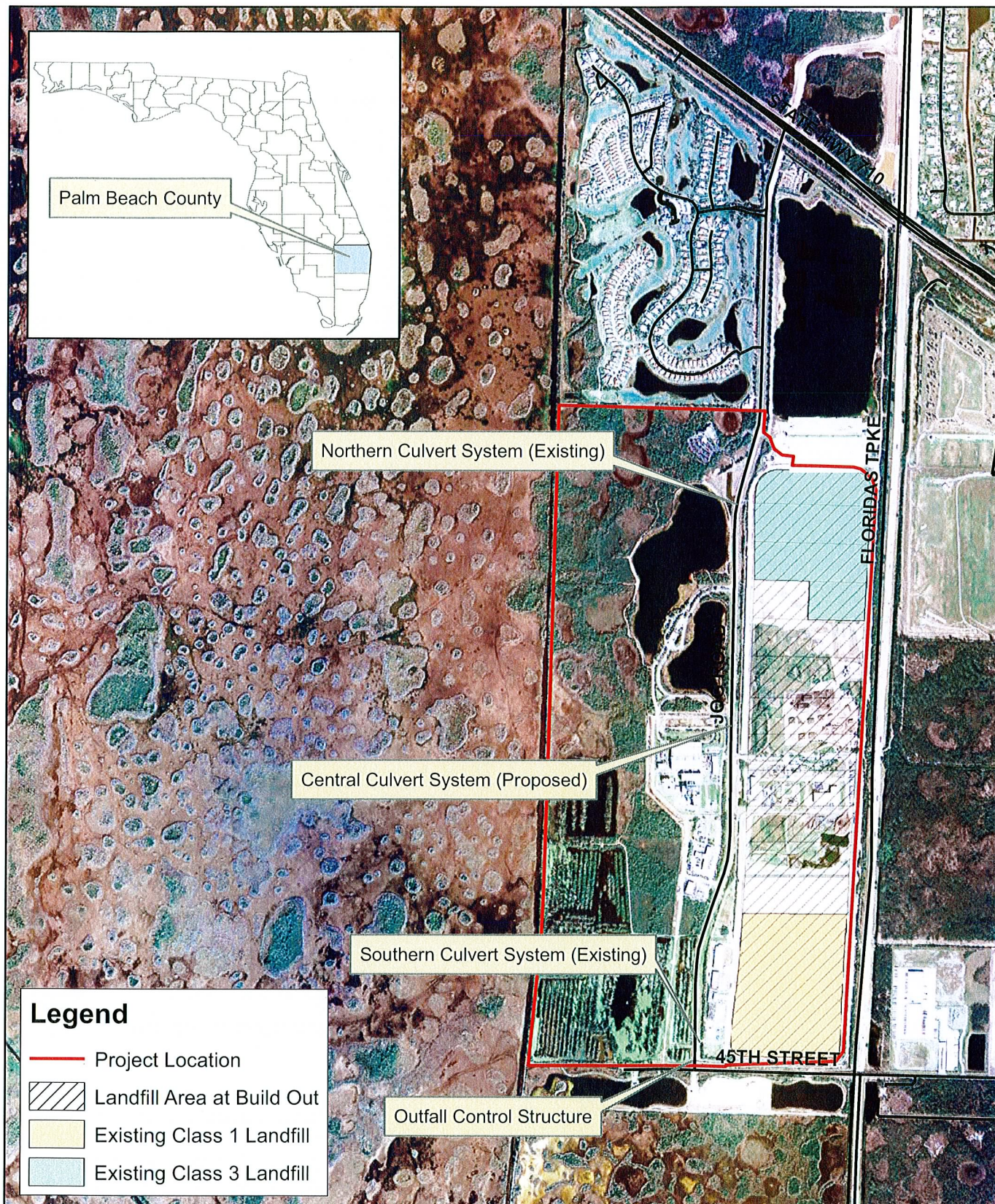
BACKGROUND

The Solid Waste Authority (SWA) of Palm Beach County owns and operates the North County Resource Recovery Facility (NCRRF or landfill) at the intersection of Jog Road and 45th Street. The stormwater management system for the site was originally studied and designed by Post, Buckley, Schuh and Jernigan, Inc. (PBS&J) in 1985 when the site was first permitted. In 1996, Camp Dresser and McKee Inc. (CDM) investigated and modeled the site stormwater system for build-out conditions. In the current build-out design, a perimeter swale around the landfill and three box culvert systems, (north, south, and central) convey stormwater runoff from the NCRRF under Jog Road to the stormwater management area located west of Jog Road (see **Figure 1**). Currently the northern and southern box culvert systems have both been constructed, however the central box culvert system has not been constructed and the landfill perimeter swale is not contiguous around the landfill, having been constructed only along the northern and southern ends. The configuration of the proposed central culvert system under Jog Road currently consists of multiple 30-inch pipes that convey runoff from the Jog Road right of way.

As the NCRRF expands and displaces existing facilities at the center of the landfill footprint, SWA wants to re-evaluate the need for a central box culvert system. Under current conditions, the two existing box culvert systems (north and south) adequately convey runoff from the landfill. The purpose of this analysis is to determine whether a third box culvert system is necessary for future build out of the landfill.

METHODOLOGY

The 1996 stormwater model was used as a basis for the subject stormwater model. Due to a lack of updated topographic survey information, the basin boundaries and stage-area relationships used in the 1996 model were used for the subject analysis. The basin boundaries, hydrologic parameters, and stage-area relationships were reviewed for reasonableness and



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Figure 1

North County Resource Recovery Facility
Project Location Map

updated as needed using available data. Site specific survey was obtained to verify pipe sizes and inverts, specifically for the major pipes under Jog Road and at the outfall control structure in the stormwater management area. Water levels onsite were also surveyed to confirm initial stages used in the model.

The Interconnected Channel and Pond Routing (ICPR) model (version 3.10), was used for model development. Peak design stages at the landfill perimeter swale and the southern and northern box culvert systems, as well as the top of road/berm elevations are used as criteria in determining the need for a central box culvert system.

In order to perform the analysis with limited additional survey information, several assumptions were made as follows:

- Model data were primarily derived from the 1996 site stormwater model.
- The scope of this study is primarily the landfill area. Evaluation of improvements to facilities west of Jog Road, such as the Waste to Energy Expansion will require additional analysis
- Future build-out conditions were used to represent the landfill in the model. Build-out conditions assume a contiguous 10-foot wide bottom perimeter swale around the entire landfill and a perimeter road (adjacent to the perimeter swale) built to elevation 28.0 feet NGVD. Due to lack of current site information in the central landfill area, a model scenario could not be developed to evaluate a current or interim landfill condition (prior to build-out).
- The perimeter swale is assumed to be clean and well maintained.
- It is assumed there will be one roadway crossing of the perimeter swale system, located at the existing scale-house entrance road, to provide access to the landfill.

Two scenarios of the landfill at build-out conditions were modeled as part of this evaluation. The scenarios are described as follows:

- 1) Scenario 1 represents the original build-out design and includes the existing northern and southern box culverts systems, as well as the central box culvert system. The central box culvert system improvements (original design) include replacing the existing 30-inch pipes under Jog Road with three (3) 10-foot x 2.5-foot box culverts, and replacing the six (6) 30-inch pipes west of Jog Road with three (3) 10-foot x 3-foot box culverts. In this scenario, the perimeter swale crossing is modeled as two (2) 48-inch pipes.
- 2) Scenario 2 includes the existing northern and southern box culvert systems and no improvements to the central culvert system under the landfill perimeter road and

under Jog Road. In this scenario, the pipe connections of the landfill perimeter swale to the existing central culvert system ((2) 24-inch pipes and (2) 5-foot x 8-foot box culverts) are removed. In this scenario, the perimeter swale crossing is modeled as two (2) 3-foot by 5-foot box culverts.

An additional scenario that considers the bridged re-alignment of Jog Road over the southern culvert system (proposed by others) may also be modeled when design parameters for this scenario are available. Review of preliminary design plans for this roadway re-alignment indicate that the bridge may need to be elevated further to fully clear the southern culvert stormwater management system.

The 25- and 100-year, 72-hour design storm events were modeled using rainfall amounts of 12.5 inches and 15.0 inches, respectively. This information was obtained from current rainfall charts used by the South Florida Water Management District (SFWMD). These rainfall totals are less than those used in the 1996 stormwater model because SFWMD has since updated their rainfall charts.

RESULTS

Peak stages for the 25- and 100-year storm events, are provided in **Table 1**. The model schematic showing node locations is provided in **Figure 2**. Table 1 also identifies critical elevations at each node. The critical elevations represent the elevation of Jog Road at the northern and southern culvert systems, the elevations of the berms on the north and south sides of both the northern and southern culvert systems, and the elevation of the perimeter road surrounding the landfill.

As shown in Table 1, neither scenario modeled results in stormwater overtopping the perimeter road or Jog Road in either storm event. However, both scenarios indicate that the berms adjacent to the northern and southern box culvert systems are not currently high enough and must be improved. The improved berm elevations (rather than existing berm elevations) are shown as the critical elevations in Table 1. The necessary berm improvements are described in the following section.

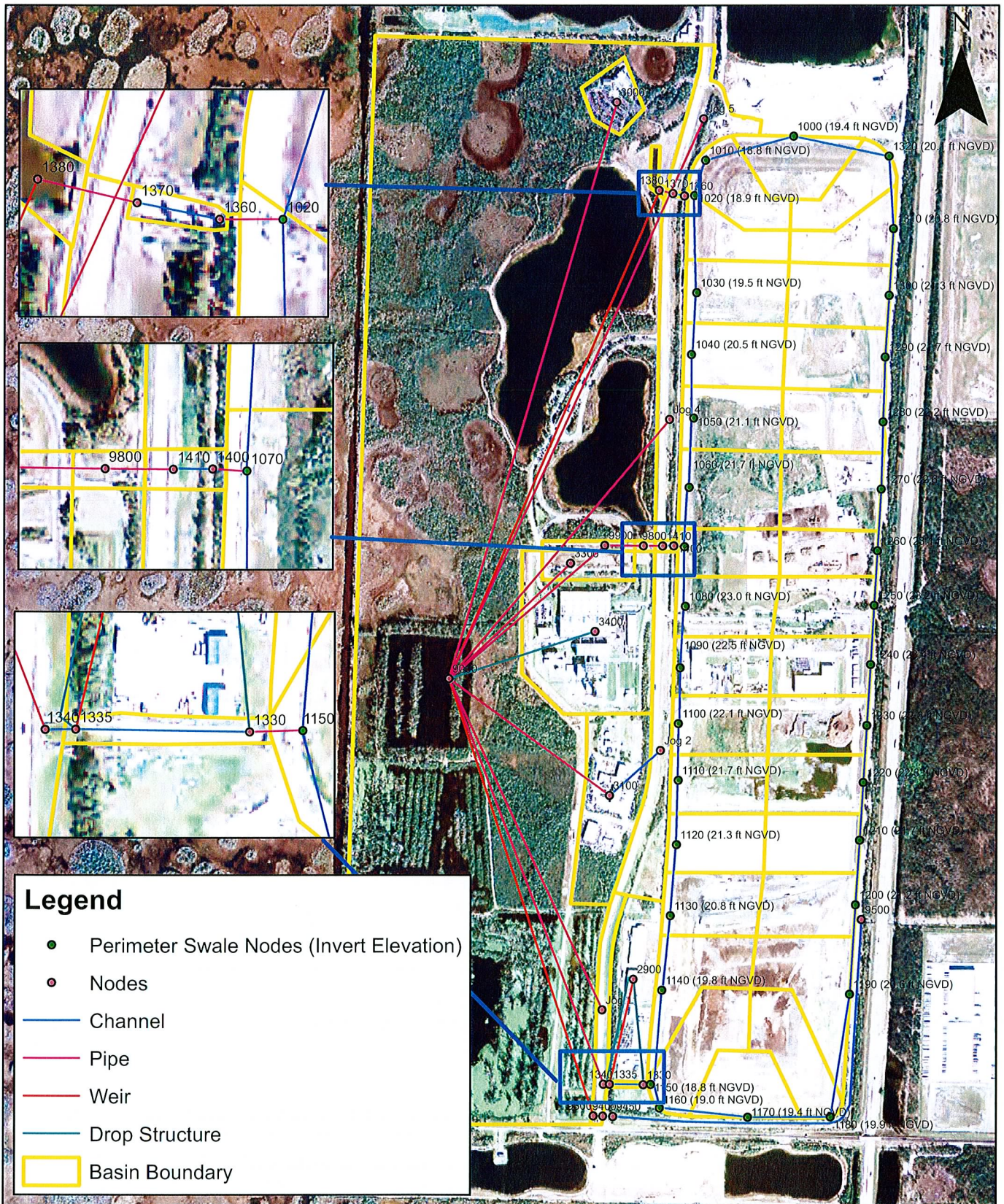
Compared with scenario 1, scenario 2 shows significant increases in stages in the perimeter swale on the western side of the landfill, however there are no significant increases in stages in the perimeter swale on the east side of the landfill. Model results for scenario 2 also indicate increases in stages at Jog Road at both the northern and southern box culvert system. In both scenarios however, peak stages are maintained below the critical elevations at the perimeter road and Jog Road.

Table 1: Summary of Peak Stages

Location / Node	Critical Elevation (feet NGVD)	Peak Stage (Feet NGVD)		Peak Stage (Feet NGVD)	
		25-year 72-hour storm		100-year 72-hour storm	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2
Southern Culvert System					
1330	22.2	21.2	21.9	21.5	22.1
1335	22.0	20.9	21.7	21.3	21.9
1340 (Just East of Jog Road)	21.4	20.3	21.1	20.6	21.3
Central Culvert System					
1400	22.2	21.5	20.2	22.1	20.7
1410 (Just East of Jog Road)	22.1	21.4	-----	22.0	-----
Northern Culvert System					
1360	22.5	21.4	22.0	21.7	22.4
1370 (Just East of Jog Road)	20.8	19.9	20.4	20.1	20.7
Landfill Perimeter Ditch					
1000	28.0	25.3	25.9	25.9	26.6
1010	28.0	24.5	25.6	25.2	26.4
1020	28.0	23.8	25.4	24.6	26.2
1030	28.0	23.8	25.6	24.6	26.4
1040	28.0	23.8	25.8	24.6	26.5
1050	28.0	23.7	26.0	24.5	26.6
1060	28.0	23.5	26.2	24.3	26.8
1070	28.0	23.1	26.3	24.0	26.8
1080	28.0	23.6	26.3	24.2	26.9
1080a	28.0	24.3	26.3	25.1	26.9
1090	28.0	24.4	26.3	25.2	26.9
1100	28.0	24.5	26.3	25.2	26.8
1110	28.0	24.5	26.2	25.3	26.7
1120	28.0	24.6	26.0	25.3	26.6
1130	28.0	24.5	25.8	25.3	26.4
1140	28.0	24.5	25.5	25.2	26.3
1150	28.0	24.4	25.3	25.2	26.1
1160	28.0	24.8	25.4	25.5	26.2
1170	28.0	25.4	25.8	26.0	26.5
1180	28.0	25.8	26.1	26.4	26.8
1190	28.0	26.4	26.5	27.0	27.2
1200	28.0	26.8	26.8	27.3	27.4
1210	28.0	26.9	27.0	27.5	27.6
1220	28.0	27.1	27.1	27.6	27.7
1230	28.0	27.2	27.2	27.7	27.8
1240	28.0	27.3	27.3	27.8	27.8
1250	28.0	27.3	27.3	27.8	27.8
1260	28.0	27.3	27.3	27.8	27.8
1270	28.0	27.3	27.3	27.8	27.8
1280	28.0	27.1	27.2	27.6	27.7
1290	28.0	26.9	27.0	27.5	27.6
1300	28.0	26.7	26.8	27.2	27.4
1310	28.0	26.3	26.5	26.8	27.1
1320	28.0	25.9	26.2	26.4	26.9
Jog1 (ROW)	22.0	21.2	21.2	21.7	21.7
Jog2 (ROW)	22.0	21.1	20.6	21.8	21.2
Jog3 (ROW)	22.0	21.2	20.9	21.5	21.7
Jog4 (ROW)	22.0	19.4	19.4	19.8	19.8

Scenario 1: Design with central culvert system

Scenario 2: Modified Design with no central culvert improvements



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Figure 2
North County Resource Recovery Facility
Model Schematic

CONCLUSIONS AND RECOMMENDATIONS

Based on original build out design parameters and the results of the scenarios modeled, the data indicate that the central box culvert system will not be needed if the assumptions stated above remain valid and the recommendations discussed below, specifically recommendations 3 through 7, are implemented. Provided that the perimeter swale and road are built and maintained according to design conditions and that berm improvements are completed at the northern and southern culvert systems, the model indicates no adverse flooding under scenario 2 (no central box culvert system). A critical location in the system is at the intersection of Jog Road at the southern culvert system, where Jog Road is low. The improvements proposed by Palm Beach County, will raise Jog Road at this location making the stages at this location less critical. CDM understands that the Jog Road re-alignment project has already been permitted and should be constructed well before build out of the landfill.

CDM recommends the following:

1. When final design drawings for the bridged Jog Road re-alignment become available, an additional model scenario should be developed to confirm design and planning parameters for this condition. After the realignment of Jog Road is completed, the existing southern box culverts under Jog Road may be removed and the channel extended between the perimeter road and the stormwater management area.
2. CDM recommends developing an interim conditions model to reflect current and next phase conditions. This model would include the Jog Road re-alignment and would facilitate existing planning and phasing activities while maintaining adequate stormwater management for the site.
3. The berms adjacent to the southern box culvert system should be raised to elevation 22.2 feet NGVD immediately west of the landfill perimeter road, and taper down to elevation 21.4 feet just east of Jog Road. Please refer to **Figure 3** depicting the locations of these improvements. These berm improvements should be made in coordination with the Jog Road re-alignment project since it is proposed to bridge over the southern culvert system.
4. The berms adjacent to the northern box culvert system should be raised to elevation 22.5 feet NGVD immediately west of the landfill perimeter road, and taper down to elevation 20.8 feet just east of Jog Road. Please refer to Figure 3 depicting the locations of these improvements. These berm improvements should be made concurrently with the improvements to the southern culvert system berm improvements.
5. If no central box culvert system is constructed, the existing culverts that connect the landfill perimeter swale to the existing central culvert system should be removed or plugged prior to the construction of the perimeter swale in this location. If these culverts are left connected, without upgrades to the downstream culverts under Jog Road, flooding of Jog Road may result.

6. As the landfill expands, the perimeter road and swale system should be constructed simultaneously. When the northern and southern landfill swale systems are ultimately connected, the culverts should be installed under the access road crossing the perimeter swale.
7. The landfill perimeter swale should be well maintained and have a 10-foot bottom and 3:1 side slopes (as specified in the build-out design) and the perimeter road should be constructed at elevation 28.0 feet NGVD. Figure 2 shows the elevations used for the perimeter swale in Scenario 2 (no central culvert system). Maintenance of the perimeter landfill swale is critical to allow conveyance of peak flows at stages that do not top the perimeter road during design storm events.

A schematic detailing the above recommendations is provided as Figure 3. If SWA chooses to follow these recommendations, an updated build out plan should be developed to incorporate the above recommendations. Abandoning plans for the central box culvert system without construction of the improvements recommended above and detailed in Figure 3 may result in short circuiting of the stormwater management system and possible flooding of Jog Road. Also, the alternative improvements will have a cost associated with them. SWA may wish to perform a cost analysis to confirm the costs of the different alternatives.

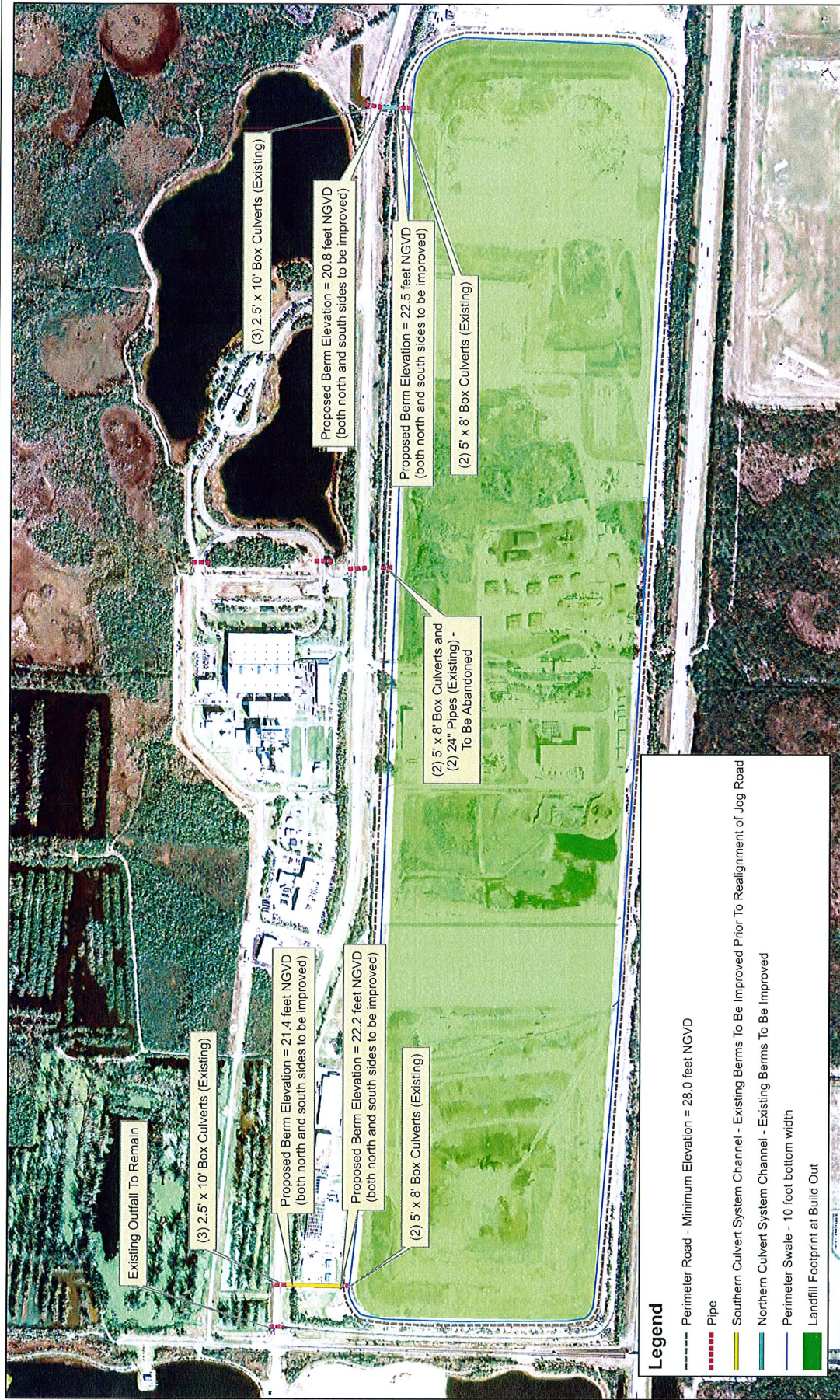


Figure 3
North County Resource Recovery Facility
Proposed Build-Out Conditions Schematic

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