Ardaman & Associates, Inc.

AAI File No. 08-2163
February 16, 2009

Lauren Engineers & Constructors, Inc.
901 South First Street
Abilene, Texas 79602

Attention: Mr. Alan Hewett, P.E.

DEWATERING PLAN
FPL MARTIN COUNTY SOLAR PLANT PROJECT
MARTIN COUNTY, FLORIDA

The proposed FPL Solar Power Plant site in Martin County will require filling of low areas with sandy soils to be obtained from two borrow pits that will be excavated along the eastern portion of the property. In particular, the solar panel field will require filling. It is desired to excavate the borrow soils under dry conditions to facilitate their subsequent placement and compaction at the site. Consequently, the borrow pits will be dewatered while the excavation is ongoing, which is estimated to span over six months. In addition, the section of the site reserved for the installation of the Solar Power Block may have to be dewatered to facilitate the installation of the foundations; this dewatering effort could extend over a period of four months. The purpose of this submittal is to address Martin Project Condition of Certification VI.B.3 and VII.C to evaluate the impacts of dewatering to any existing on-site and/or off-site legal users or wetlands, and to confirm that the stability of the cooling pond embankment will not be affected by excessive seepage and piping under its embankment. Sheet C - 5 illustrates the location of the various dewatering sites within the FPL Martin County Plant site. Also refer to the attached Dewatering Sheet C-17 of the construction plans, which illustrates the layout of the proposed borrow pits and related water disposal facilities.

Subsurface Profile

The sites for the borrow pits and for the Power Block are underlain with fine sands with lenses of slightly silty sands to depths of at least 23 feet, where slightly cemented sands and then cemented sands are found. The more cemented sands are found at a depth of about 30 feet. Limestone is present below a depth of fifty feet. Permeability tests performed in dense and slightly silty soils in the upper section of the profile suggest that they have a coefficient of permeability on the order of 0.4 to 4.0 feet per day. However, the more pervious, clean sands in the profile are likely to have a coefficient of permeability closer to 40 feet per day. The layers with a coefficient of permeability of 0.4 feet per day would be considered aquitards, retarding seepage flow.

Solar Power Block Site

The groundwater table at the Power Block site was found to be more than four feet deep in December of 2008. It is tentatively desired to temporarily lower the groundwater table at this site to a depth of eight feet below the existing ground surface to facilitate the installation of foundations. Present plans call for the installation of a wellpoint system that could dewater the entire site at a

time so that work can proceed throughout it. This system consists of wellpoints arranged along the borders of the rectangular site, and spaced about three feet apart. The wellpoints are to be connected by a six inch diameter header pipe, with two six inch pumps to handle the flow and have a back-up in case of malfunction of one of them. The anticipated flow is expected to be on the order of 250 to 750 gallons per minute if all wellpoints have to be functioning at one time. Figure 1 presents a diagram with the recommended installation pattern. The groundwater withdrawn by the wellpoints is to be discharged into a trench or pipe leading south to a swale of the stormwater system of the FPL Martin Power Plant. The sides of the swale will be raised as needed to help carry the flow. Any excess flow will be discharged as sheet flow unto the future Solar Panel field east of the Solar Power Block. The discharge volume could be reduced by quartering the site and dewatering one quarter at a time. This dewatering effort will likely extend over a period of less than four months as the foundations are installed and the areas around them are backfilled.

The anticipated radius of significant influence of the dewatering system is less than about 500 feet. There are no wetlands of concern within more than two thousand feet of the Power Block and consequently no wetland will be affected by this dewatering effort.

The main concern with regards to the stability of the embankment surrounding the Cooling Pond of the Martin County plant is the potential for piping effects as seepage passes under it. The proposed six to seven feet excavation is too far to directly affect the stability of the embankment slope. The subsurface profile at the Power Block is not conducive to the development of piping since they are underlain by sands to significant depths and there is no shallow rock layer that could form a roof over a seepage conduit or pipe. The Cooling Pond embankment has an internal drain system which helps control seepage which passes under it. Simple seepage studies of conditions created by the limited groundwater lowering that would be created by the proposed dewatering system indicate that the median velocity of seepage passing under the downstream toe of the embankment will be on the order of 0.1 feet per day once steady state seepage conditions develop; consequently, there will be no net effects, because it will take more than a few years for steady state conditions to develop and for seepage from the pond to enter the Power Block area. Again, the dewatering effort will only span over four months and therefore, the power block dewatering will have no effect on the Cooling Pond embankment safety.

Borrow Pits

The two borrow pits will be excavated to a maximum depth of 20 feet below the existing ground water level, or about 23 feet deep. The sides of the excavations will have slopes of 2.0 Horizontal to 1.0 Vertical; the upper section of the slopes will have to be adjusted so as to form a 4.0 Horizontal to 1.0 Vertical slope from a point one foot below the water level up to the existing ground level. The preferred dewatering method would be to excavate interconnected trenches inside the given borrow pit as it is lowered, and to use sump pumps to collect the seepage entering into the trenches. Because of the sandy nature of the subsoils, the drainage trenches inside the borrow pits may have to be close together and relatively deep so as to provide stable working conditions for the excavating and loading equipment. The trenches would be deepened as the excavation progressed, with seepage into the pit increasing accordingly. It is possible that the last few feet of borrow can be excavated without the use of deep trenches if they consist of clean sands that dry quickly upon stockpiling, so that the net lowering of groundwater will actually be less than 20 feet, and the amount of withdrawn groundwater will be reduced. In any case, it is planned to divide each borrow pit into four or more compartments to reduce total flow at a given time.

The groundwater collected from the pit compartments is to be discharged into settling basins before it is allowed to flow into groundwater recharge trenches. As shown in Sheet C-17, the settling basins are located adjacent to the borrow pits and should provide the required treatment to the removed groundwater. The operational order within the compartmentalized basins will insure that the settling basin area is not overfilled and that adequate settling may occur. The groundwater recharge trenches will be located along the perimeters of the borrow areas and will receive treated water from the settling basins. The recharge trenches will run by the borrow pits to counter the groundwater drawdown being produced.

The South borrow pit will be approximately 21.1 acres in size and will be located east of the Solar Panel field. It will be no closer than 200 feet from a wetland which is adjacent to the east boundary of the project site. The North borrow pit will have a square shape covering approximately 22.4 acres. The flow from the one to two 10 inch pumps anticipated for use in the borrow pit compartments is to be discharged into a settling basin during the initial phase, from which it will be allowed to settle and then decant into the recharge trenches surrounding the excavations. Subsequent excavation/dewatering phases of each borrow area will incorporate a staged system where the dewatering will be pumped into an existing internal excavated area first, then pumped into the settling basin, allowed to settle, and then decanted into the recharge trenches. Limited turbidity is anticipated because of the clean nature of the sands in the pits.

The settling basin for the South borrow pit will be located north of the borrow pit; it will cover an area of approximately 435,600 square feet (10 acres). It will be formed by excavating the perimeter of the borrow area by one to two feet, and using that soil to form a four feet high berm around the basin perimeter. From this sedimentation basin the water will overflow into a wide ditch that will lead to a groundwater recharge trench running in north-south direction just east of the borrow pit. The recharge trench will be given one to two feet high berms to allow filling it to the existing ground level. Any overflow will run over the ground surface to the east.

The settling basin for the North borrow pit will be located just west of the excavated area and will cover an area of 435,600 square feet (10 acres). It will be constructed in a manner similar to the South basin, with the basin perimeter excavated by one to two feet to generate the fill for the perimeter berm and increase the holding capacity. Decanted water is to be discharged into a groundwater recharge trench located between the basin and the borrow pit and also running along the southern edge of the pit and along the western half of the north border of the pit, as illustrated in Sheet C-17. Overflow is to be discharged as sheet flow over adjacent ground.

It may be possible to excavate one borrow pit at a time. This would allow using both sedimentation basins to hold the flow from one of the pits should it exceed expectations.

The maximum drawdown at the borrow pits will not last more than about a month since the excavation will progress gradually and there will not be need to have the maximum drawdown all the time. The North borrow pit is located in the previously permitted Expansion Area. All wetlands in the Expansion Area have previously been mitigated. The closest wetland that has not been previously mitigated is located in the power transmission corridor and is 500 feet from the borrow pit and should not be significantly affected by the staged dewatering in the pit. For the South borrow pond, the closest wetland is 200 feet away and it will likely be affected by the excavation of nearby compartments. As illustrated in Sheet C-17, the location of groundwater recharge trenches has been set to counter the anticipated groundwater drawdown effects. The groundwater

recharge trenches are to be maintained full up to a level of one foot above the ambient groundwater level in the wetland or higher if needed. Further, decanted water can overflow directly into nearby low areas as needed. As a result of the above measures, no impacts on the wetlands east closest to the borrow pits are anticipated.

The Martin County FPL plant Cooling Pond is located approximately 5700 feet from the nearest (southern) proposed borrow pit so that there is no fear of directly affecting the Cooling Pond embankments. The subsurface profile at the proposed borrow pit sites is not conducive to the development of piping since only sands will be exposed along the sides of the pits. In any case, simple seepage analyses indicate that the median velocity of the seepage traveling under the Cooling Pond embankment to the southern pit due to a 20 feet drop in the groundwater will be on the order of 0.03 feet per day; consequently, it would take more than 100 years for the seepage to reach the pit (steady state conditions), eliminating any concern.

In case the sump pumps and basins cannot handle the seepage flow in a given section or all of a borrow pit, it will be necessary to excavate the pits in the wet and to use large trackhoes, draglines, or a sand dredge to remove the borrow sands. In that case there will be no formal dewatering system, but a temporary groundwater recharge trench may be installed east of the southern borrow pit pending the speed of the excavation and the effect on the nearby groundwater as the excavation is replenished with groundwater.

After the pits are abandoned and they become lakes, the water level in the lakes will rise to the level of the regional groundwater. Pending rainfall and evaporation rates, the level of the water in the southern lake may be slightly lower than the groundwater in the nearby, relatively low wetland, but this wetland will be 200 feet away so that the resulting gradient will be less than 0.005 and of no consequence.

It has been a pleasure to assist you on this phase of your project. Please contact us whenever we may be of service to you, and please call if you have any questions concerning this report.

ARDAMAN & ASSOCIATES, INC.
FL. Certificate of Authorization No. 5950

Roberto E. Balbis, P.E.
Principal Engineer
FL. Reg. No. 15832

REB:rf

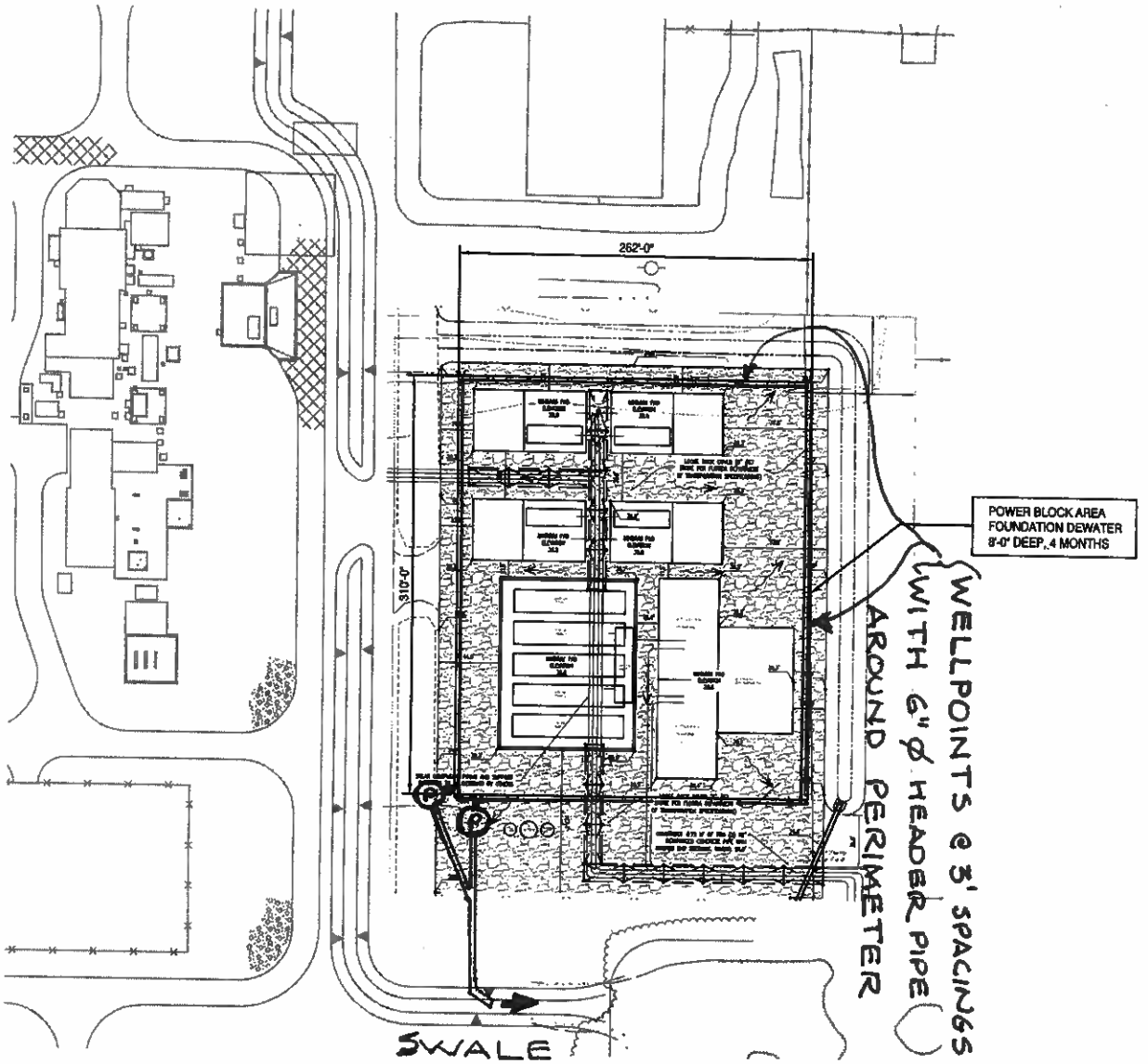

FIGURE 1

REV	DATE	BY	DESCRIPTION	APPD.
A	12-11-08	CRC	ISSUED FOR REVIEW	ATH

LAUREN Engineers & Constructors, Inc.
A Member of the Lauren Corporation
FLORIDA COA NO. 9457

PROJECT
FLORIDA POWER & LIGHT
Martin Solar Energy Center
FPL.

DRAWING TITLE
POWER BLOCK AREA
DEWATERING PLAN

DRAWN: CRC
CHECKED: ATH
SCALE: 1" = 40'
DATE: 12-10-08
REV. A
DRAWING NO.
C50-01

GRAPHIC SCALE 1" = 40'
40' 0 40' 80'

LEGEND

ESTIMATED WETLAND AREAS

PROPOSED BORROW AREA: 22.4 ACRES

N

0 400' 800'

Scale: 1" = 400'

EXISTING TRANSMISSION AREA

CONSTRUCTION SERVICE AREA

CONSTRUCTION SERVICE AREA

CONSTRUCTION SERVICE AREA 20.8± ACRES

SOLAR PANEL FIELD (TYPICAL)

SOLAR PANEL FIELD (TYPICAL)

PROPOSED BORROW AREA: 16.7 ACRES

UPLAND PRESERVE AREA

UPLAND PRESERVE AREA 50± ACRES

UPLAND PRESERVE AREA 50± ACRES

BOYLE

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421 N.W. 3rd Street
Okeechobee, Florida 34972
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FL Engineering Business No. EB-2005
www.boyle.aecom.com

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ER	NO	DATE	REVISION	BY	CH	COR	APP
2		2/23/09	MOVED HAUL ROAD, ADDED LAYDOWN AREA				
1			ISSUED FOR PERMITTING				

DATE

FPL

DR	RR	ER	MM
CH	MM	COR	
APPROVED			

FLORIDA POWER & LIGHT
THE MARTIN SOLAR ENERGY CENTER
CONSTRUCTION DRAINAGE PLAN

SHEET
17038-C5
OF
17038-C18

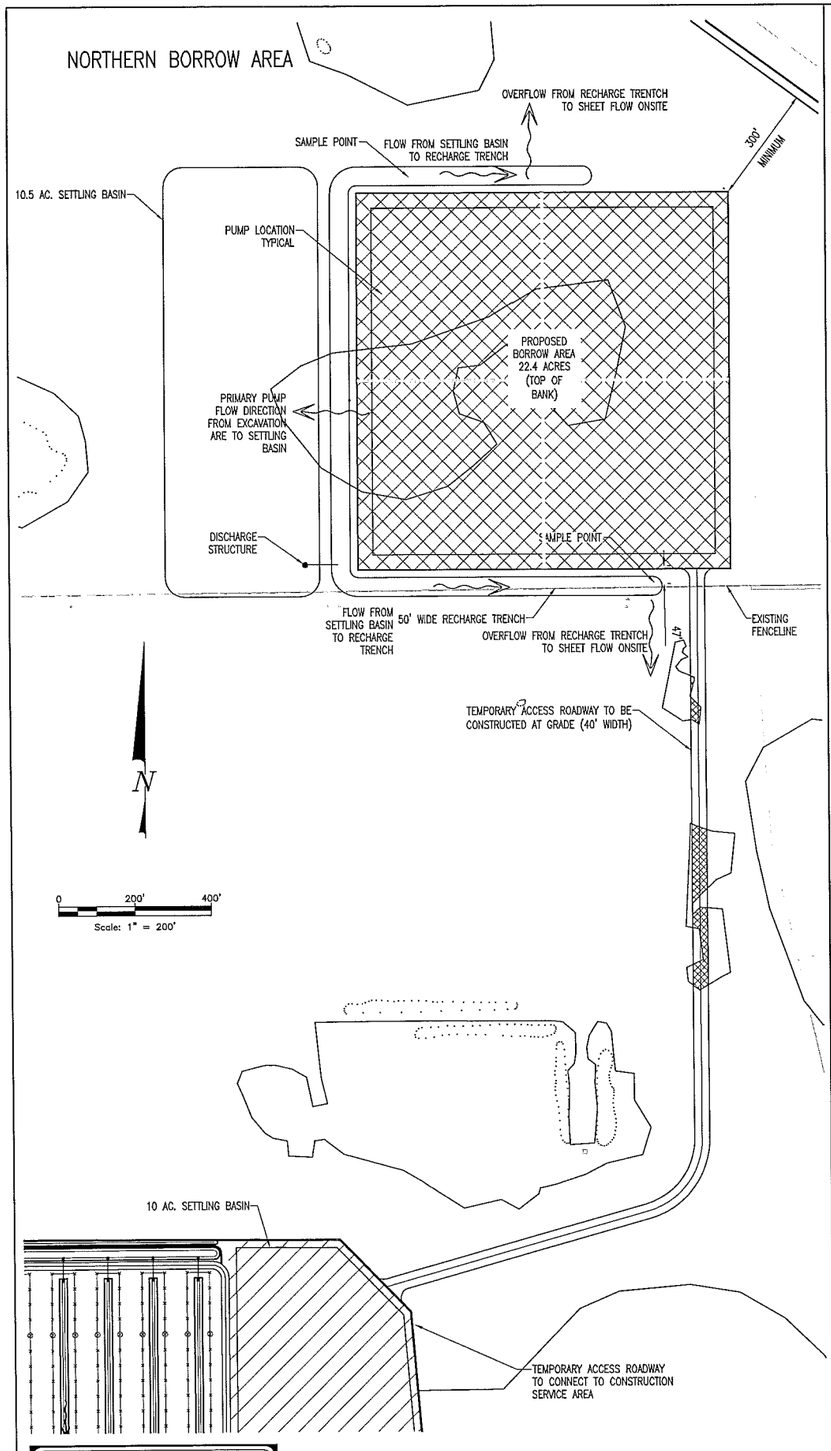
REV NO

2/24/2009

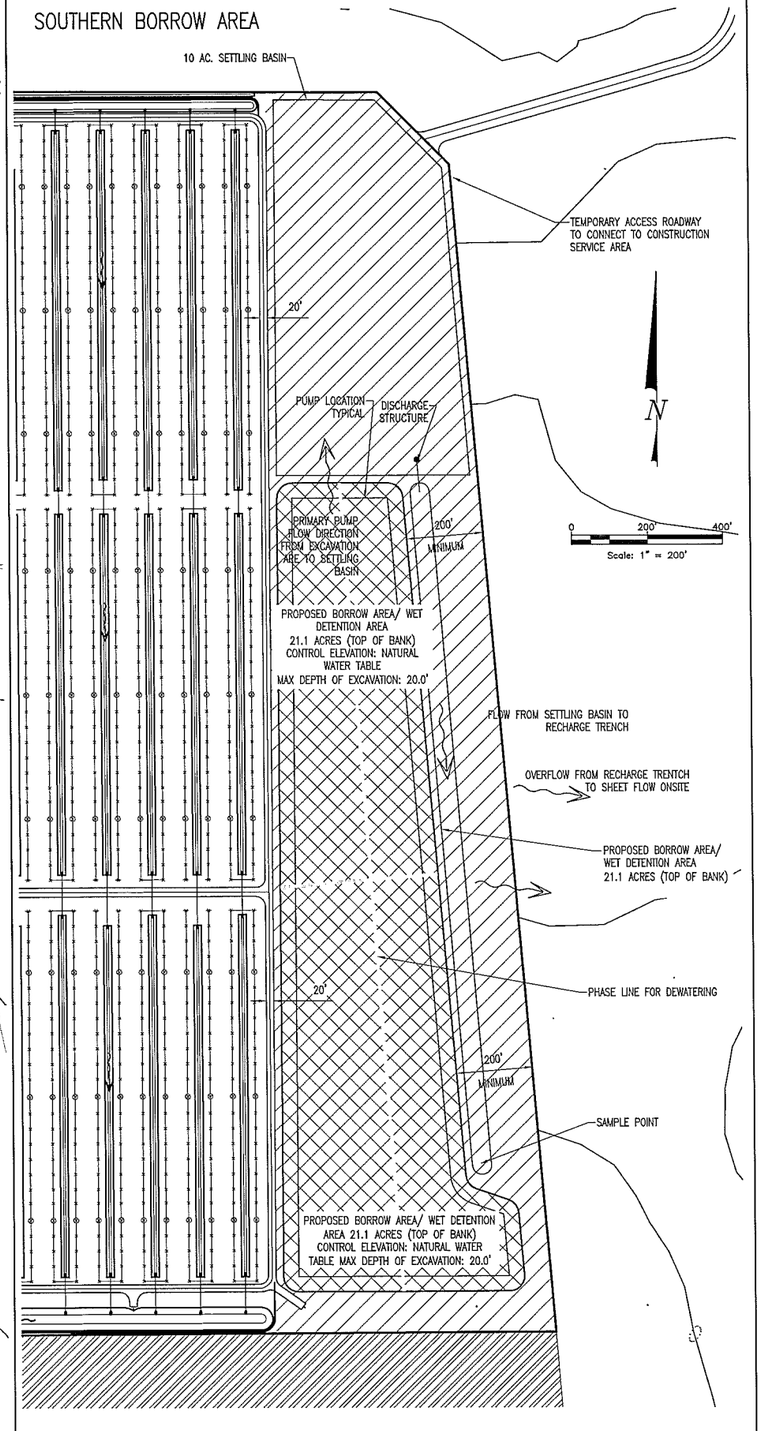
MARCOS MONTES DE OCA
No. 63897
BOYLE ENGINEERING CORP. No. 2005
421 NW 3RD STREET
OKEECHOBEE, FL 34972

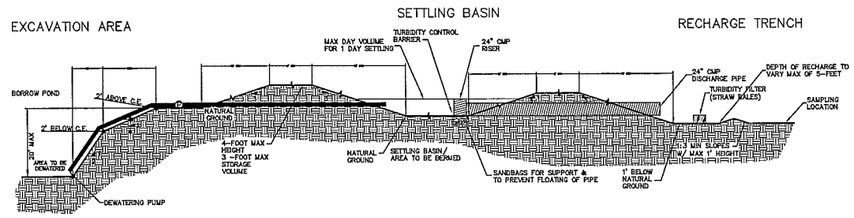
ENGINEER'S SEAL

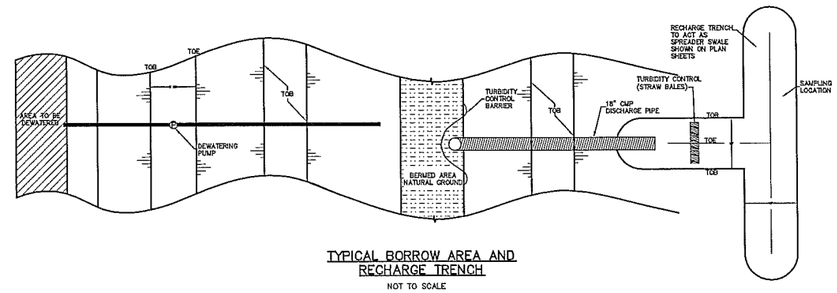
NORTHERN BORROW AREA



SOUTHERN BORROW AREA







TYPICAL BORROW AREA AND RECHARGE TRENCH

NOT TO SCALE

DEWATERING NOTES:

-CONTRACTOR TO MONITOR DISCHARGE DAILY WITH SAMPLES TO BE PROVIDED TO OWNER AND ENGINEER FOR REVIEW.

-SAMPLE TO BE LESS THAN 29 NTU ABOVE BACKGROUND LEVELS.

-DAILY INSPECTION OF TURBIDITY CONTROL REQUIRED

-CONTRATOR TO HALT DEWATERING ACTIVITY IN CASES OF FAILING WATER QUALITY TESTS AND CONTACT SFWMD AND ENGINEER

-CONTINGINCY SHALL BE, BUT NOT LIMITED TO, THE FOLLOWING ITEMS LISTED BELOW.

1. HALT DEWATERING ACTIVITY IMMEDIATELY
2. INSURE PROPER PLACEMENT AND QUALITY OF TURBIDITY CONTROLS
3. REPAIR OR REPLACE FAULTY EQUIPMENT AND/OR BARRIERS
4. RETEST WATER TO INSURE PROPER QUALITY AND OPERATION OF SYSTEM.

DEWATERING FLOW AND ORDER OF OPERATION

EXCAVATION IN BORROW AREAS TO BE COMPLETED IN FOUR PHASES EACH. EACH AREA OF EXCAVATION WILL BE PUMPED TO SETTLING BASIN. SUBSEQUENT PHASES FLOW WILL BE PUMPED TO PREVIOUSLY EXCAVATED AREAS THEN PUMPED TO SETTLING BASIN TO ALLOW FOR ADDTIONAL TREATMENT.

SETTLING BASIN TO CONTAIN SINGLE DAY OF PUMPING
DISCHARGE VIA MORNING GLORY STRUCTURE TO RECHARGE TRENCH

RECHARGE TRENCH TO OVERFLOW (ACT AS SPREADER SWALE) TO BE SHEET FLOW TO ADJACENT WETLANDS AND/OR PROJECT AREA

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www.boyle.aecom.com

ER	NO	DATE	REVISION	BY	CH	COR	APP
	1	2/12/09	ISSUED FOR CONTRACT	MM			

DATE

DR	RR	ER	MM
CH	MM	COR	
APPROVED			

FPL

FLORIDA POWER & LIGHT
THE MARTIN SOLAR ENERGY CENTER
DEWATERING PLAN

SHEET 17038-C17 OF 17038-C18

REV NO

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ENGINEER'S SEAL