SCS ENGINEERS







Hardee County Landfill
Phase II Section II Expansion
Application for Construction Permit
Responses to
Request for Additional Information No. 2

Prepared for:

Hardee County
Solid Waste Department
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Wauchula, Florida 33873
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Presented by:

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Florida Board of Professional Engineers
Certification No. 00004892

June 28, 2013
File No. 09199033.23

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June 28, 2013
File No. 09199033.23

Mr. Steven G. Morgan
Florida Department of Environmental Protection
Southwest District Office
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Subject: Hardee County Class I Landfill
Phase II Section II Expansion Construction
Response to Request for Additional Information No. 2
Pending Permit No. 38414-015-SC/01, Hardee County
WACS No. SWD/25/40612

Dear Mr. Morgan:

On behalf of the Hardee County Board of County Commissioners (BOCC), SCS Engineers (SCS) submits the following responses to the Florida Department of Environmental Protection (FDEP) Request for Additional Information (RAI) No. 2 letter dated May 3, 2013. The letter, sent via email, was directed to Ms. Teresa Carver, Director Hardee County Solid Waste Department regarding the Hardee County Class I Landfill Phase II Section II Expansion Application for Construction documents dated April 1, 2013 and April 3, 2013. For ease of review, each FDEP comment is reiterated in bold type followed by SCS's response in normal print.

GENERAL

1. **The requested information and comments below do not necessarily repeat the information submitted by the applicant. However, every effort has been made to concisely refer to the section, page, drawing detail number, etc. where the information has been presented in the original submittal.**

   Response: Comment noted.

2. **Please submit 1 paper copy and 1 electronic copy of all requested information. Please specify if revised information is intended to supplement, or replace, previously submitted information. Please submit all revised plans and reports as a complete package. For revisions to the narrative reports, deletions may be struckthrough (~~struckthrough~~) and additions may be underlined (underlined) or similar notation method. This format will expedite the review process. Please include revision date on all revised pages. Please also provide 1 electronic copy of the entire application package that incorporates the supplemental and replacement information submitted. This will**

ensure that an accurate record copy of the final approved permit application package is on file with the Department in one electronic file location.

Response: Comment noted. SCS has provided one paper copy and one electronic copy of revised submittals, or replacement pages to the submittals, hole-punched for a three-ring binder using a strikethrough (~~strikethrough~~), underline (underline) or shaded (shaded) format to facilitate the FDEP review process. SCS included the revision date as part of the footer for all revised submittals, replacement pages to the submittals, and additional materials. A list of submitted documents in response to RAI No. 2 is provided at the end of this letter.

In addition, SCS has provided one electronic copy of the entire application package that incorporates the supplemental and replacement information submitted.

Note, the revised drawings in response to RAI No. 1 for the Operations Permit Renewal Application for pending permit #38414-016-SO/01 are identified below and are discussed in the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. A hard copy of these revised drawings **is supplied** with this submittal and **is not supplied** with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. The electronic copy of the drawings provided to the Department includes the complete set of drawings which indicates the responses to RAI No. 2, the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS and the remainder of the drawings revised only in the title block to indicate combining the drawings as discussed below. These drawings are the exact same as those supplied on the CD with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

3. **Please provide a summary of all revisions to drawings, and indicate the revision on each of the applicable plan sheets. Please use a consistent numbering system for drawings. If new sheets must be added to the original plan set, please use the same numbering system with a prefix or suffix to indicate the sheet was an addition, e.g. Sheet 1A, 1B, P1-A, etc.**

Response: Revisions to the Hardee County Landfill Phase II Section II Expansion Construction Drawings dated April 2013, previously submitted to FDEP consisting of drawing numbers 1 through 37, have been indicated by SCS on each of the applicable drawings using revision clouds with labels as necessary and the reason for the revisions have been indicated in the title block. Also, the revisions or clarifications implemented to the drawings identified below have been discussed within the responses to RAI No. 2, where applicable. Refer to Attachment A for the revised drawings created by SCS in response to RAI No. 2 based on the meeting as discussed below.

- Drawing Number 1 - Cover Sheet/Drawing Index
- Drawing Number 11 - Section - Bottom Cell
- Drawing Number 15 - Tie-in Details - Bottom Cell

- Drawing Number 16 - Perimeter Road and Trench Details - Bottom Cell
- Drawing Number 20 - Details - 3

A meeting was conducted on June 7, 2013 between the below-identified attendees in order to provide consistent and complete information for the responses to RAI No. 2 and the responses to the April 11, 2013 RAI No. 1 Department letter for the Operations Permit Renewal Application for pending permit #38414-016-SO/01. During the meeting a decision was made by the attendees to combine the Hardee County Landfill Phase II Section II Expansion Construction Drawings and the Hardee County Landfill Operation Drawings consisting of drawing numbers 1 through 37 dated March 2013 previously submitted with the Operations Permit Renewal Application for the facility, into one set of drawings.

- Shane R. Fischer, P.E. - SCS Engineers
- Ed Hilton, Jr., P.E. - SCS Engineers
- Ken Wheeler - Director/County Engineer Hardee County Public Works
- Teresa Carver - Hardee County Solid Waste Director
- Steve Morgan - FDEP
- John Morris - FDEP

The revised drawings in response to RAI No. 1 for the Operations Permit Renewal Application for pending permit #38414-016-SO/01 are identified below and are discussed in the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. A hard copy of these revised drawings **is supplied** with this submittal and **is not supplied** with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. Refer to Attachment A for the revised drawings created by SCS based on the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

- Drawing Number 1 - Cover Sheet/Drawing Index
- Drawing Number 7 - Project Area Existing Conditions Site Plan
- Drawing Number 8 - Top of Subgrade Bottom Cell Grading Site Plan
- Drawing Number 9 - Leachate Collection System Site Plan
- Drawing Number 10 - Top of Protective Cover Bottom Cell Grading Site Plan
- Drawing Number 31 - Phase II Section I and II Fill Sequence No. 6 Plan

- Drawing Number 37 - Phase II Section I and II Fill Sequence No. 6 Sections
- Drawing Number 37a - Phase II Section I and II Fill Sequence No. 6 Section

Also note, since the Hardee County Landfill Phase II Section II Expansion Construction Drawings and the Hardee County Landfill Operation Drawings have been combined into one set of drawings, the remainder of the drawings not listed above specifically revised for either RAI response have been revised only in the title block to indicate combining the drawings. The electronic copy of the drawings provided to the Department includes the complete set of drawings which indicates the responses to RAI No. 2, the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS and the remainder of the drawings revised only in the title block to indicate combining the drawings. These drawings are the exact same as those supplied on the CD with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

4. **Please be advised that although some comments do not explicitly request additional information, the intent of all comments shall be to request revised calculations, narrative, technical specifications, QA documentation, plan sheets, clarification to the item, and/or other information as appropriate.**

   Response: Comment noted. All revised calculations, narrative, technical specifications, QA documentation, Drawings, clarification to items and/or other information as appropriate that has been submitted by SCS in response to RAI No. 2 has also been signed and sealed by the registered professional engineer who prepared them.

The following information is needed in support of the solid waste application [Chapter 62-701, Florida Administrative Code (F.A.C.)]:

1. **Rule 62-701.320(5)(b), F.A.C. Please address the comments in John Morris' April 26, 2013 memorandum (attached) regarding this application. You may call Mr. Morris at (813) 744-6100, extension 336, to discuss the items in his memorandum.**

   Response: SCS has provided responses to the comments in John Morris' April 26, 2013 memorandum relating to the following Parts towards the end of this letter.

   - Part H - Hydrogeological Investigation Requirements
   - Part L - Water Quality And Leachate Monitoring Requirements
   - Part N - Gas Management System Requirements

ATTACHMENT A - REVISED PHASE II SECTION II EXPANSION CONSTRUCTION DRAWINGS

2. **The revised construction drawings plan set appear to be identical to the operation drawings plan set submitted with Permit Application #38414-016-SO/01. Where**

appropriate, please revise this plan set to be consistent with revisions made to the operation permit plan set in response to the Department's April 11, 2013 RAI letter for Permit Application #38414-016-SO/01.

Response: Revisions to the Hardee County Landfill Phase II Section II Expansion Construction Drawings dated April 2013, previously submitted to FDEP consisting of drawing numbers 1 through 37, have been indicated by SCS on each of the applicable drawings using revision clouds with labels as necessary and the reason for the revisions have been indicated in the title block. Also, the revisions or clarifications implemented to the drawings identified below have been discussed within the responses to RAI No. 2, where applicable. Refer to Attachment A for the revised drawings created by SCS in response to RAI No. 2 based on the meeting as discussed below.

- Drawing Number 1 - Cover Sheet/Drawing Index
- Drawing Number 11 - Section - Bottom Cell
- Drawing Number 15 - Tie-in Details - Bottom Cell
- Drawing Number 16 - Perimeter Road and Trench Details - Bottom Cell
- Drawing Number 20 - Details - 3

A meeting was conducted on June 7, 2013 between the below-identified attendees in order to provide consistent and complete information for the responses to RAI No. 2 and the responses to the April 11, 2013 RAI No. 1 Department letter for the Operations Permit Renewal Application for pending permit #38414-016-SO/01. During the meeting a decision was made by the attendees to combine the Hardee County Landfill Phase II Section II Expansion Construction Drawings and the Hardee County Landfill Operation Drawings consisting of drawing numbers 1 through 37 dated March 2013 previously submitted with the Operations Permit Renewal Application for the facility, into one set of drawings.

- Shane R. Fischer, P.E. - SCS Engineers
- Ed Hilton, Jr., P.E. - SCS Engineers
- Ken Wheeler - Director/County Engineer Hardee County Public Works
- Teresa Carver - Hardee County Solid Waste Director
- Steve Morgan - FDEP
- John Morris - FDEP

The revised drawings in response to RAI No. 1 for the Operations Permit Renewal Application for pending permit #38414-016-SO/01 are identified below and are discussed in the *Operations Permit Renewal Application Response to Request for Additional Information*

No. 1, dated June 28, 2013, prepared by SCS. A hard copy of these revised drawings **is supplied** with this submittal and **is not supplied** with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. Refer to Attachment A for the revised drawings created by SCS based on the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

- Drawing Number 1 - Cover Sheet/Drawing Index
- Drawing Number 7 - Project Area Existing Conditions Site Plan
- Drawing Number 8 - Top of Subgrade Bottom Cell Grading Site Plan
- Drawing Number 9 - Leachate Collection System Site Plan
- Drawing Number 10 - Top of Protective Cover Bottom Cell Grading Site Plan
- Drawing Number 31 - Phase II Section I and II Fill Sequence No. 6 Plan
- Drawing Number 37 - Phase II Section I and II Fill Sequence No. 6 Sections
- Drawing Number 37a - Phase II Section I and II Fill Sequence No. 6 Section

Also note, since the Hardee County Landfill Phase II Section II Expansion Construction Drawings and the Hardee County Landfill Operation Drawings have been combined into one set of drawings, the remainder of the drawings not listed above specifically revised for either RAI response have been revised only in the title block to indicate combining the drawings. The electronic copy of the drawings provided to the Department includes the complete set of drawings which indicates the responses to RAI No. 2, the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS and the remainder of the drawings revised only in the title block to indicate combining the drawings. These drawings are the exact same as those supplied on the CD with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

3. **Sheet 11: It is unclear from the sections on this sheet whether the compacted fill berms will be constructed directly over the anchor trench or over a 2-foot protective sand layer that is installed over the anchor trench. Please provide a detail of the berm that that clarifies this issue.**

   Response: Refer to Attachment A for revised Drawing Number 11 for a detail that clarifies the compacted fill berms will be constructed directly over the anchor trench and not over a 2-foot protective sand layer that is installed over the anchor trench.

ATTACHMENT I - REVISED ENGINEERING REPORT SECTIONS

SECTION G - LANDFILL CONSTRUCTION REQUIREMENTS (RULE

62-701.400(9), F.A.C.)

4. **Section G.1: Much of the revised language in this section appears to be identical to language in the Engineering Report and Operation Plan submitted with Permit Application #38414-016-SO/01. Where appropriate, please revise this section to be consistent with language revisions made to the Engineering Report and Operation Plan in response to the Department's April 11, 2013 RAI letter for Permit Application #38414-016-SO/01.**

   Response: Refer to Attachment B for revised Section G Landfill Construction Requirements. Parts G.1.a and G.1.a.7 through G.1.a.8 have been revised where appropriate to be consistent with the language revisions made to the Engineering Report and Operation Plan in response to the Department's April 11, 2013 RAI letter for Permit Application #38414-016-SO/01 supplied under a separate cover as *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

   In addition, the Engineering Report and Operation Plan in response to the Department's April 11, 2013 RAI letter for Permit Application #38414-016-SO/01 (supplied under a separate cover) has been revised where appropriate to be consistent with the responses to RAI No. 1 supplied by SCS as *Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013 and these responses to RAI No. 2 of the Phase II Section II Expansion Engineering Report.

5. **Section G.2: The installation of the rain tarp on the Phase I side slopes during Phase II Section II construction does not appear to be shown on construction plan set. Please verify and revise the construction plan set, where appropriate.**

   Response: The installation of the rain tarp on the Phase I side slope during the Phase II Section II construction was previously identified on Drawing Number 10 and Drawing Number 11 Section E. For clarity, Detail Numbers 1, 2, and 5 on Drawing Number 15 has also been revised to indicate the rain tarp will be installed on the Phase I west side slope during the construction of the Phase II Section II Expansion. Refer to Attachment A for revised Drawing Number 15.

6. **Section G.2.c.2.2.: Comment #23 in the Department's September 28, 2012 RAI #1 letter requested that this section be revised to identify and explain the peak daily rainfall utilized in design calculations. Please revise this section to identify the peak daily rainfall utilized in design calculations and to describe how that value was determined.**

   Response: Refer to Attachment B for revised Section G.2.c.2.2 which indicates the peak daily rainfall utilized in the design calculations and describes how that value was determined.

ATTACHMENT N - REVISED LEACHATE COLLECTION TRENCH DESIGN CALCULATIONS:

7. **Attachment N provides revised calculation sheets, but does not include the associated attachments previously submitted. In some cases (e.g. geocomposite hydraulic**

conductivity calculations), the previously provided supporting attachments have been revised. Please either provide the revised attachment or provide references to where elsewhere in the application submittal the supporting calculations are provided. This comment may also be applicable to the revised design calculations provided in Attachments R, S, and T and should be addressed for those design calculations, where applicable.

Response: Attachment N submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the 8-inch leachate collection lateral trench capacity calculations for the Phase II Section II Expansion. The calculations provided in Attachment N indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 2 - Table 14.1 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 3 - Bi-planar geocomposite hydraulic conductivity calculations based on max waste loading and bi-planar geocomposite hydraulic thickness calculations based on max waste loading - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within Attachment R.

- Attachment - 4 - Manning's roughness coefficient - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

Attachment N submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the 10-inch leachate collection lateral trench capacity calculations for the Phase II Section II Expansion. The calculations provided in Attachment N indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 2 - Table 14.1 - Previously provided in the *Hardee County Landfill*

Phase II Section II Expansion Application for Construction, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 3 - Bi-planar geocomposite hydraulic conductivity calculations based on max waste loading and bi-planar geocomposite hydraulic thickness calculations based on max waste loading - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within Attachment R.

- Attachment - 4 - Manning's roughness coefficient - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

Attachment N submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the 12-inch leachate collection header trench capacity calculations for the Phase II Section II Expansion. The calculations provided in Attachment N indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-13.

- Attachment - 2 - Table 14.1 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-13.

- Attachment - 3 - Bi-planar geocomposite hydraulic conductivity calculations based on max waste loading and bi-planar geocomposite hydraulic thickness calculations based on max waste loading - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within Attachment R.

- Attachment - 4 - Manning's roughness coefficient - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-13.

Attachment N submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the 8-inch leachate collection lateral trench capacity calculations for the Phase II Section II Expansion south portion. The calculations provided in Attachment N indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 2 - Table 14.1 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 3 - Bi-planar geocomposite hydraulic conductivity calculations based on max waste loading and bi-planar geocomposite hydraulic thickness calculations based on max waste loading - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within Attachment R.

- Attachment - 4 - Manning's roughness coefficient - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

Attachment N submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the 8-inch leachate detection header trench capacity calculations for the Phase II Section II Expansion. The calculations provided in Attachment N indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 2 - Table 14.1 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

- Attachment - 3 - Tri-planar geocomposite hydraulic conductivity calculations based on max waste loading and bi-planar geocomposite hydraulic thickness calculations based on max waste loading - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within Attachment R.

- Attachment - 4 - Manning's roughness coefficient - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-12.

Attachment N submitted with the *Hardee County Class I Landfill Phase II Section II*

Expansion Construction Response to Request for Additional Information No. 1, dated April 1, 2013, prepared by SCS contained the leachate detection system lateral trench capacity calculations for the Phase II Section II Expansion. The calculations provided in Attachment N indicated refer to Attachment 1 for sources referenced in the calculations. The Attachment referenced in the calculations may be found in the following location and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Tri-planar geocomposite hydraulic conductivity calculations and thickness calculations based on max waste loading - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within Attachment R.

Attachment R submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the Revised Bi-Planar Transmissivity Calculations for the Phase II Section II Expansion. The calculations provided in Attachment R indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - GRI Standard - GC8 Technical Release, April 17, 2001 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-9.

- Attachment - 2 - Bi-planar material properties (FabriNet UF Geocomposite) data sheets - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-9.

- Attachment - 3 - Correspondence from manufacturer for bi-planar 100 hour transmissivity values - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-9.

- Attachment - 4 - Soil properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-9.

Attachment R submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the Revised Tri-Planar Transmissivity Calculations for the Phase II Section II Expansion. The calculations provided in Attachment R indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - GRI Standard - GC8 Technical Release, April 17, 2001 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-10.

- Attachment - 2 - Tri-planar material properties (Tendrain 770-2 Double sided Geocomposite) data sheets - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-10.

- Attachment - 3 - Correspondence from manufacturer for bi-planar 100 hour transmissivity values - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-10.

- Attachment - 4 - Soil properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-10.

Attachment R submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the SKAPS Bi-Planar Transmissivity Calculations for the Phase II Section II Expansion. The calculations provided in Attachment R indicated refer to Attachments 1 through 4 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - GRI Standard - GC8 Technical Release, April 17, 2001 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachments G-9 and G-10.

- Attachment - 2 - Bi-planar material properties (SKAPS TN330-2-8) data sheets - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within the calculations in Attachment R.

- Attachment - 3 - CQA Testing Data from construction of the Hardee County Landfill Phase I - Previously provided in the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS within the calculations in Attachment R.

- Attachment - 4 - Soil properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachments G-9 and G-10.

Attachment S submitted with the *Hardee County Class I Landfill Phase II Section II*

Expansion Construction Response to Request for Additional Information No. 1, dated April 1, 2013, prepared by SCS contained the revised leachate collection and leachate detection pump calculations. The calculations provided in Attachment S indicated refer to Attachments 1 through 3 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-14.

- Attachment - 2 - Design of Polyethylene Piping Systems Fittings Factors - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-14.

- Attachment - 3 - Model 4-7.5-4 and 1-0.5-2 PU Pump Curves - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-14.

Attachment T submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the pipe crushing and flow capacity calculations for the 8 inch leachate collection lateral pipe calculations located in the north and center portions of the Phase II Section II Expansion. The calculations provided in Attachment T indicated refer to Attachments 1 through 7 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Chevron Phillips Chemical Company, Bulletin - Book 2 Chapter 5, 2003 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 2 - Buried Pipe Design, A.P. Moser, Chapter 3 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 3 - EPA, Lining of Waste Impoundment and Disposal Facilities, SW-870 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 4 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 5 - CAT 826G Series II Compactor Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 6 - CAT D7R Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 7 - CAT D6R XW Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

Attachment T submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the pipe crushing and flow capacity calculations for the 10 inch leachate collection lateral pipe calculations located along the eastern side of the center and northern portions of the Phase II Section II Expansion. The calculations provided in Attachment T indicated refer to Attachments 1 through 7 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Chevron Phillips Chemical Company, Bulletin - Book 2 Chapter 5, 2003 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 2 - Buried Pipe Design, A.P. Moser, Chapter 3 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 3 - EPA, Lining of Waste Impoundment and Disposal Facilities, SW-870 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 4 - Driscoplex Pipe Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

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- Attachment - 7 - CAT D6R XW Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

Attachment T submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the pipe crushing and flow capacity calculations for the 8 inch leak detection header pipe located between the center and northern portions of the Phase II Section II Expansion. The calculations provided in Attachment T indicated refer to Attachments 1 through 7 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Chevron Phillips Chemical Company, Bulletin - Book 2 Chapter 5, 2003 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 2 - Buried Pipe Design, A.P. Moser, Chapter 3 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

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- Attachment - 5 - CAT 826G Series II Compactor Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

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- Attachment - 7 - CAT D6R XW Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

Attachment T submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the pipe crushing and flow capacity calculations for the

12 inch leachate collection header pipe located between the center and northern portions of the Phase II Section II Expansion. The calculations provided in Attachment T indicated refer to Attachments 1 through 7 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Chevron Phillips Chemical Company, Bulletin - Book 2 Chapter 5, 2003 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 2 - Buried Pipe Design, A.P. Moser, Chapter 3 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 3 - EPA, Lining of Waste Impoundment and Disposal Facilities, SW-870 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

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- Attachment - 6 - CAT D7R Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 7 - CAT D6R XW Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

Attachment T submitted with the *Hardee County Class I Landfill Phase II Section II Expansion Construction Response to Request for Additional Information No. 1*, dated April 1, 2013, prepared by SCS contained the pipe crushing and flow capacity calculations for the 8 inch leachate collection lateral pipe calculations located in Phase II Section I. The calculations provided in Attachment T indicated refer to Attachments 1 through 7 for sources referenced in the calculations. The Attachments referenced in the calculations may be found in the following locations and have not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Chevron Phillips Chemical Company, Bulletin - Book 2 Chapter 5, 2003 - Previously provided in the *Hardee County Landfill Phase II Section II*

Expansion Application for Construction, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 2 - Buried Pipe Design, A.P. Moser, Chapter 3 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

- Attachment - 3 - EPA, Lining of Waste Impoundment and Disposal Facilities, SW-870 - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

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- Attachment - 7 - CAT D6R XW Series II Equipment Data Sheet - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-18.

8. **8-Inch Leachate Lateral Trench - South Portion: Please verify and compare the hydraulic gradient utilized in this calculation with the calculated after settlement slopes reported in Table I-2 of the Engineering Report and revise this calculation, as appropriate.**

   Response: Refer to Attachment C for revised 8-inch leachate collection lateral trench capacity calculations in the Phase II Section II Expansion South Portion to be consistent with the calculated after settlement slopes reported in Table I-2 of the Engineering Report.

ATTACHMENT O - FLORIDA JETCLEAN REPORT:

9. **This entire report and associated video inspection discs were submitted with Operation Permit Application #38414-016-SO/01. Comments regarding this report were provided by the Department in its April 11, 2013 RAI #1 letter regarding that application. Permitting of the vertical and lateral expansions of this facility, as proposed in this application, is pending responses to those comments that demonstrate the adequacy of the Phase I and Phase II Section I leachate collection systems. Please verify that issue has been addressed as part of Permit Application #38414-016-SO/01.**

Response: The adequacy of the Phase I and Phase II Section I leachate collection systems are addressed and discussed in the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS as part of the Operations Permit Renewal Application for pending permit #38414-016-SO/01. A supplemental Florida Jetclean report and video inspection CD's of additional work conducted during May 2013 of the Phase I leachate collection system was provided to the Department with those responses in Attachment I and have not been resupplied with this submittal. Based on the findings of the work conducted and the Florida Jetclean reports and video inspection CD's for the work during December 2012 and May 2013, it is SCS's professional opinion that the existing Phase I leachate collection system, Phase II Section I leachate collection system, and Phase II Section I groundwater interceptor system pipes are operating as intended.

ATTACHMENT P - REVISED CQA PLAN AND TECHNICAL SPECIFICATIONS (RULES 62-701.400(3), (7) AND (8), F.A.C.)

REVISED CQA PLAN:

10. Section 6.2.2: Technical Specification Section 02940-2.01.A. appears to also include "Wide Width Tensile Strength" as a geotextile material property for which conformance testing will be conducted. Please verify and revise this part or Specification Section 02940, as appropriate.

Response: Technical Specification Sections 02940-2.01.A and B have been revised to remove the conformance and manufacturer testing requirement for "Wide Width Tensile Strength." No changes have been made to the CQA Plan as a result of the changes to the Specification, both documents are consistent. Refer to Attachment D for revised Technical Specification Section 02940 Geotextile.

REVISED TECHNICAL SPECIFICATIONS:

11. Section 02940 - Geotextile:

a. <u>Parts 3.03.A., 3.03.D. & 3.04. G:</u> These parts indicate that installation and repair will be in accordance "Manufacturer's Recommendations" while Sections 6.2.3 through 6.2.5 of the CQA Plan appear to have specific procedures for geotextile installation and repair. Please verify and revise the CQA Plan and/or this specification section as appropriate to provide consistent descriptions of geotextile installation and repair procedures.

Response: Technical Specification Sections 02940-3.03.A and D and 3.04.A (as opposed to 3.04.G as indicated by the Department's comment) have been revised as required regarding procedures for geotextile installation and repair. No changes have been made to the CQA Plan as a result of the changes to the Technical Specification, both documents are consistent. Refer to Attachment D for revised Technical Specification Section 02940 Geotextile.

b. Part 3.05.A.: Part 3.02.G. of this specification section indicates that geotextile shall not be exposed to sunlight for greater than 15 days. Please verify and revise these specification sections, as appropriate.

Response: Part 3.05.A of Technical Specification Section 02940 Geotextile has been revised to indicate the geotextile shall not be exposed to sunlight for greater than 15 days as opposed to the previously indicated 30 days. No changes have been made to Part 3.02.G of Technical Specification Section 02940; Parts 3.02.G and 3.05.A are consistent. Refer to Attachment D for revised Technical Specification Section 02940 Geotextile.

ATTACHMENT S - REVISED LEACHATE COLLECTION & PUMP CALCULATIONS

12. The intent of Comment #53 in the Department's September 28, 2012 RAI #1 was to request that the calculations in "Attachment G-15 Leachate Sump Size Calculations" be revised, as appropriate, based on changes to other calculations utilized in support of these calculations that were made in response to comments provided in the September 28, 2012 letter. Please revise the leachate sump size calculations, as appropriate.

Response: Refer to Attachment E for revised leachate sump size calculations. The revised calculations indicate refer to Attachment 1 for a source referenced in the calculations. The Attachment referenced in the calculations may be found in the following location and has not been resubmitted with the responses to RAI No. 2.

- Attachment - 1 - Leachate Sump Granular Fill Properties - Previously provided in the *Hardee County Landfill Phase II Section II Expansion Application for Construction*, dated August 31, 2012, prepared by SCS within Attachment G-15.

ATTACHMENT X - REVISED FINANCIAL ASSURANCE (RULE 62-701.630, F.A.C.)

13. Site Specific Closing Costs: Comment #1 in the Department's September 28, 2012 Financial Assurance Cost Estimate RAI #1 letter requested that the Site Specific Closing Costs be revised to include the annual cost for leachate disposal at the facility. This cost does not appear to have been included in the revised cost estimate provided in Attachment X. Please verify and revise Attachment X accordingly.

Response: Refer to Attachment F for revised FDEP Form Number 62-701.900(28) Closure Cost Estimating Form For Solid Waste Facilities. Item 13 Site Specific Costs within Section IV Estimated Closing Cost has been revised to include an annual cost for leachate disposal for one year at the facility as requested by the Department. A conservative annual estimate of $280,000 (when greatest leachate generation occurs) was added as a Site Specific Cost for leachate disposal.

In addition, a new FDEP Form Number 62-701.900(28) page 9 has been signed by Shane R. Fischer, P.E. (and sealed) and Teresa Carver as provided in Attachment F.

As indicated in the comments provided above, the Department had some comments that

are related to comments regarding information, narrative, and drawings submitted with Operation Permit Application #38414-016-SO/01 that were subsequently included with your response to Permit Application #38414-015-SC/01. In order to assist the applicant in provide consistent and complete information for both application submittals, the Department feels it would very beneficial to meet to discuss both this letter and the Department April 11, 2013 RAI #1 letter for Application #38414-016-SO/01. The Department therefore requests that the applicant contact us to schedule a meeting to discuss both letters prior to submittal of its responses.

Response: Comment noted. Based on the meeting conducted on June 7, 2013 between the following meeting attendees, the responses to RAI No. 2 have been generated and provided to the Department by June 28, 2013 as discussed.

- Shane R. Fischer, P.E. - SCS Engineers
- Ed Hilton, Jr., P.E. - SCS Engineers
- Ken Wheeler - Director/County Engineer Hardee County Public Works
- Teresa Carver - Hardee County Solid Waste Director
- Steve Morgan - FDEP
- John Morris - FDEP

PART H - HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS [Rule 62-701.410(1), F.A.C.]

1. **H.1.: Hydrogeological Investigation and Site Report [Rule 62-701.410(1), F.A.C.].**

   a. **No additional information is requested.**

      Response: Comment noted.

   b. **The response letter indicated that based on review of ground water elevations measured at the facility through December 2012, additional monitoring plan changes were proposed for the Phase II, Section II expansion. The proposed monitoring plan details for the facility are presented in modifications to ¶2 in this section, and new ¶3 through ¶7 of this section. ¶7 of this section referred to the construction details for proposed wells MW-13 and MW-14 as presented on the Site Plans. It is noted that the construction requirements provided on the "Typical Monitor Well Detail" [Drawing #20, Detail 1] for proposed wells MW-13 and MW-14 differ from the construction details summarized in Table L-2 in the "Groundwater Monitoring Plan" document [prepared by SCS, dated March 12, 2013] submitted for the pending operations permit renewal application for the facility [pending permit #38414-016-SO/01]. Please submit revisions to the Site Plans or to the "Groundwater Monitoring Plan" document to clarify the**

construction details for proposed wells MW-13 and MW-14 [total depth, screen length, and ground surface elevation].

Response: The "Typical Monitor Well Detail" provided on Detail 1 of Drawing 20 for proposed wells MW-13 and MW-14 has not been revised. Table L-2 Well Construction Details from the *Groundwater Monitoring Plan*, dated March 12, 2013, prepared by SCS with the pending operations permit renewal application for the facility [pending permit #38414-016-SO/01] has been revised as needed. Refer to Attachment G for revised Table L-2 Well Construction Details. In addition, revised Table L-2 has been supplied with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS within Attachment G.

2. **H.1.b.: Direction and rate of ground water and surface water flow including seasonal variations [Rule 62-701.410(1)(a)1, F.A.C.].**

   a. **No additional information is requested.**

      Response: Comment noted.

3. **H.1.g.: Inventory of all public and private water wells within a one-mile radius of the landfill . . . H.1.i.: Include a map showing locations of all potable wells . . . [Rules 62-701.410(1)(b) and 62-701.410(1)(d), F.A.C., respectively].**

   a. **No additional information is requested.**

      Response: Comment noted.

   b. **No additional information is requested.**

      Response: Comment noted.

PART L - WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS [Rule 62-701.510, F.A.C.]

4. **L.1.: Water quality and leachate monitoring plan shall be submitted describing the proposed . . . [Rule 62-701.510(1), F.A.C.].**

   a. **No additional information is requested.**

      Response: Comment noted.

   b. **No additional information is requested.**

      Response: Comment noted.

5. **L.1.b.: All sampling and analysis performed in accordance . . . [Rule 62-701.510(2)(b), F.A.C.].**

a. **No additional information is requested.**

Response: Comment noted.

6. **L.1.c.: Ground water monitoring requirements [Rule 62-701.510(3), F.A.C.].**

a. **No additional information is requested.**

Response: Comment noted.

7. **L.1.c.(1): Detection wells located downgradient from . . . [Rule 62-701.510(3)(a), F.A.C.].**

a. **No additional information is requested.**

Response: Comment noted.

8. **L.1.c.(2): Downgradient compliance wells as required [Rule 62-701.510(3)(b), F.A.C.].**

a. **No additional information is requested.**

Response: Comment noted.

9. **L.1.c.(6): Well screen locations properly selected [Rule 62-701.510(3)(d)4, F.A.C.].**

a. **The response letter indicated that based on review of ground water elevations measured at the facility through December 2012, additional monitoring plan changes were proposed for the Phase II, Section II expansion. The proposed monitoring plan details for the facility are presented in new ¶2 through ¶5 of this section. ¶5 of this section referred to the construction details for proposed wells MW-13 and MW-14 as presented on the Site Plans. It is noted that the construction requirements provided on the "Typical Monitor Well Detail" [Drawing #20, Detail 1] for proposed wells MW-13 and MW-14 differ from the construction details summarized in Table L-2 in the "Groundwater Monitoring Plan" document [prepared by SCS, dated March 12, 2013] submitted for the pending operations permit renewal application for the facility [pending permit #38414-016-SO/01]. Please submit revisions to the Site Plans or to the "Groundwater Monitoring Plan" document to clarify the construction details for proposed wells MW-13 and MW-14 [total depth, screen length, and ground surface elevation].**

Response: The "Typical Monitor Well Detail" provided on Detail 1 of Drawing 20 for proposed wells MW-13 and MW-14 has not been revised. Table L-2 Well Construction Details from the *Groundwater Monitoring Plan*, dated March 12, 2013, prepared by SCS with the pending operations permit renewal application for the facility [pending permit #38414-016-SO/01] has been revised as needed. Refer to Attachment G for revised Table L-2 Well Construction Details. In addition, revised Table L-2 has been supplied with the *Operations Permit Renewal Application Response to Request for Additional*

Information No. 1, dated June 28, 2013, prepared by SCS within Attachment G.

b. No additional information is requested.

Response: Comment noted.

10. L.1.c.(8): Procedures for properly abandoning monitoring wells [Rule 62-701.510(3)(d)6, F.A.C.].

a. No additional information is requested.

Response: Comment noted.

11. L.1.d.(1): Location of and justification for all proposed surface water monitoring points
L.1.d.(2): Each monitoring location to be marked and its position . . .
[Rules 62-701.510(4)(a) and 62-701.510(4)(c), F.A.C., respectively]

a. No additional information is requested.

Response: Comment noted.

12. L.1.e.: Leachate sampling locations
L.1.f.(2): Routine leachate sampling and analysis requirements
[formerly Rules 62-701.510(5) and 62-701.510(6)(c), F.A.C.].

a. No additional information is requested.

Response: Comment noted.

13. L.1.f.(4): Routine surface water sampling and analysis requirements [Rule 62-701.510(5)(d), F.A.C.].

a. No additional information is requested.

Response: Comment noted.

14. L.1.g.: Describe procedures for implementing evaluation monitoring . . . [Rule 62-701.510(6), F.A.C.].

a. No additional information is requested.

Response: Comment noted.

b. No additional information is requested.

Response: Comment noted.

15. L.1.h.(1): Semi-annual report requirements [Rule 62-701.510(8)(a), F.A.C.].

a. The response letter indicated the four rule citations presented in this section were revised to reflect the amendments to Chapter 62-701, F.A.C., that were effective on August 12, 2012. Please submit additional revisions to this section to indicate the results of the semi-annual sampling events will be reported to meet the requirements of Rule 62-701.510(8)(a), F.A.C.

Response: Section L.1.h.(1) has been revised to indicate the results of the semi-annual sampling events will be reported to meet the requirements of Rule 62-701.510(8)(a), FAC. Refer to Attachment B for revised Section L.1.h.(1) of the Engineering Report.

16. L.1.h.(3): Two and one-half year report requirements . . . [Rule 62-701.510(8)(b), F.A.C.].

a. No additional information is requested.

Response: Comment noted.

PART N - GAS MANAGEMENT SYSTEM REQUIREMENTS [RULE 62-701.530, F.A.C.]

17. N.1.: Provide the design for a gas management system . . .
N.2.: Provide documentation that will describe locations, construction details and procedures . . .
[Rules 62-701.530(1) and 62-701.530(2), F.A.C., respectively].

a. The response letter indicated that a re-evaluation of seasonal low ground water level was conducted to review ground water elevations measured at the facility through December 2012. New ¶4 in Section N.1., and new ¶5 in Section N.2., indicated the proposed gas probes shall extend from the soil surface to the seasonal low ground water level to draw landfill gas from the permeable layers. While the response letter indicated that the construction details of the proposed gas probes had been revised, it appears that the "Landfill Gas Monitoring Probe Schedule" detail on Drawing #20 of the Site Plans was not changed from the August 2012 Site Plans. Please clarify if the construction details of the proposed gas probes have been revised, and submit revisions to Drawing #20 of the Site Plans, as appropriate.

Response: The "Landfill Gas Monitoring Probe Schedule" provided on Detail 2 of Drawing Number 20 for the proposed six LFG probes has been revised as requested by the Department. Refer to Attachment A for revised Drawing Number 20.

b. The response letter referred to the "Landfill Gas Monitoring Probe Detail" provided on Drawing #20 of the Site Plans to refer to the "Landfill Gas Monitoring Probe Schedule" regarding the "slotted pipe length" determined for the individual proposed gas probes. It appears that Drawing #20 of the Site Plans was not changed from the August 2012 Site Plans. Please clarify if the construction details of the

proposed gas probes have been revised, and submit revisions to Drawing #20 of the Site Plans, as appropriate.

Response: The "Landfill Gas Monitoring Probe Schedule" provided on Detail 2 of Drawing Number 20 for the proposed six LFG probes has been revised as requested by the Department. Refer to Attachment A for revised Drawing Number 20.

PART O - LANDFILL FINAL CLOSURE REQUIREMENTS [RULE 62-701.600, F.A.C.]

18. O.4.b.: Final survey report [Rule 62-701.600(6)(b), F.A.C.].

a. **No additional information is requested.**

Response: Comment noted.

19. O.5.: Declaration to the public [Rule 62-701.600(7), F.A.C.]

a. **No additional information is requested.**

Response: Comment noted.

20. O.6.: Official date of closing [Rule 62-701.600(8), F.A.C.].

a. **No additional information is requested.**

Response: Comment noted.

Please respond by the <u>date established in the meeting requested above</u>, responding to all of the information requests and indicating when a response to any unanswered questions will be submitted. If the responses will require longer than the above schedule, you should develop an alternative timetable for the submission of the requested information for Department review and consideration. If the Department does not receive a timely, complete response to this request for information, the Department may issue a final order denying your application. A denial for lack of information or response will be unbiased as to the merits of the application. The applicant may reapply as soon as the requested information is available.

Response: Comment noted. Based on the meeting conducted on June 7, 2013 between the following meeting attendees, the responses to RAI No. 2 have been generated and provided to the Department as required by June 28, 2013 as stated.

- Shane R. Fischer, P.E. - SCS Engineers
- Ed Hilton, Jr., P.E. - SCS Engineers
- Ken Wheeler - Director/County Engineer Hardee County Public Works

- Teresa Carver - Hardee County Solid Waste Director
- Steve Morgan - FDEP
- John Morris - FDEP

Please provide 1 paper and one electronic copy of your response to this letter as one complete package.

Response: Comment noted. SCS has provided one paper copy and one electronic copy of revised submittals, or replacement pages to the submittals, hole-punched for a three-ring binder using a strikethrough (~~strikethrough~~), underline (underline) or shaded (shaded) format to facilitate the FDEP review process. SCS included the revision date as part of the footer for all revised submittals, replacement pages to the submittals, and additional materials. A list of submitted documents in response to RAI No. 2 is provided at the end of this letter.

In addition, SCS has provided one electronic copy of the entire application package that incorporates the supplemental and replacement information submitted.

Note, the revised drawings in response to RAI No. 1 for the Operations Permit Renewal Application for pending permit #38414-016-SO/01 are discussed in the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. A hard copy of the revised drawings **is supplied** with this submittal and **is not supplied** with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS. The electronic copy of the drawings provided to the Department includes the complete set of drawings which indicates the responses to RAI No. 2, the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS and the remainder of the drawings revised only in the title block to indicate combining the drawings. These drawings are the exact same as those supplied on the CD with the *Operations Permit Renewal Application Response to Request for Additional Information No. 1*, dated June 28, 2013, prepared by SCS.

Please do not hesitate to contact us if you need anything further.

Sincerely,

Shane R. Fischer, P.E.
Project Manager
SCS ENGINEERS

C. Ed Hilton, P.E.
Vice President/Solid Waste Division Director
SCS ENGINEERS

SRF/CEH:srf

Attachments
cc: Teresa Carver, Hardee County Solid Waste Director, w/ attachments

5802.6
6/28/13

LIST OF ATTACHMENTS

- A - Revised Hardee County Landfill Phase II Section II Expansion Construction/Operations Drawings

- B - Revised Section G Landfill Construction Requirements
  - Revised Section L Water Quality and Leachate Monitoring Requirements

- C - Revised 8-Inch Leachate Collection Lateral Trench Capacity Calculations Phase II Section II Expansion South Portion

- D - Revised Technical Specification Section 02940 Geotextile

- E - Revised Leachate Sump Size Calculations

- F - Revised FDEP Form Number 62-701.900(28) Closure Cost Estimating Form For Solid Waste Facilities

- G - Revised Table L-2 Well Construction Details from the *Groundwater Monitoring Plan*, dated March 12, 2013, prepared by SCS

Attachment A

Revised Hardee County Landfill Phase II Section II Expansion Construction/Operations Drawings (Bound Separately)

Attachment B

- Revised Section G Landfill Construction Requirements
- Revised Section L Water Quality and Leachate Monitoring Requirements

SCS ENGINEERS

Hardee County Landfill
Phase II Section II Expansion
Application for
Construction Permit

Hardee County, Florida

Prepared for:

Hardee County
Solid Waste Department
685 Airport Road
Wauchula, FL 33873
(863) 773-5089

Prepared by:

SCS ENGINEERS
4041 Park Oaks Blvd, Suite 100
Tampa, FL 33610
(813) 621-0080

File No. 09199033.23
August 31, 2012
Revised April 1, 2013
Revised June 28, 2013

Hardee County Landfill
Phase II Section II Expansion
Application for
Construction Permit

Hardee County, Florida

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Table of Contents

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

Contents (Cont.)

Section **Page**

List of Figures

No.

List of Tables

No. **Page**

List of Attachments

No. **Page**

Contents (Cont.)

Section **Page**

Revised Section G

Landfill Construction Requirements

SECTION G

LANDFILL CONSTRUCTION REQUIREMENTS

G.1 FILL SEQUENCE PLAN

G.1.a General

The Operation Permit for the Hardee County Landfill has an expiration date of May 12, 2013. Immediately following the submission of the Phase II Section II Expansion construction permit application the Operation Permit renewal application process will be initiated (well in advance of operation of the Phase II Section II Expansion area). The Operation Permit renewal application will include a request for a modification to the landfill's Operation Permit to include the Phase II Section II Expansion after approval of the Certification of Construction Completion documents by the Department following construction of the Expansion. The Operation Permit renewal application will include the operational fill sequence plans to show a detailed plan for the filling of the Phase II Section II area and the Phase II Section I height increase.

This construction permit application for the Phase II Section II Expansion also includes a request for a height increase for the Phase II Section I area permitted to operate under Permit No. 38414-011-SO-01. The Phase II Section I area and "piggy-back" portion onto the south sideslope of the existing closed Phase I area is currently permitted for filling to a peak of roughly EL 132.1 feet National Geodetic Vertical Datum (NGVD) top of intermediate cover (approximately EL 134.1 feet NGVD top of final closure). With the Phase II Section II Expansion, the height increase will raise the peak to roughly EL 166 feet NGVD top of final closure within the Phase II Section I area with an overall final buildout of the Phase II Section II Expansion to EL 173.2 feet NGVD top of final closure. The request for the height increase will provide sufficient time for the County to continue filling within the area while the Phase II Section II Expansion area is permitted, advertised for bid, constructed, and approval from the Department is received to begin filling within the Phase II Section II Expansion area.

To ensure compliance with the permitted facility filling sequence, the County will survey waste filling approximately monthly, or as needed during operations, to confirm and monitor waste filling elevations, slopes, and dimensions. In addition, as part of the Operation Permit for the facility, an aerial topographic survey is conducted annually which is reviewed to verify waste filling elevations, slopes, and dimensions as part of the annual site life calculations.

The following subsections describe the sequence and procedures for placement and removal of rain tarps on the Phase I sideslope prior to and during the operation of the vertical expansion over Phase I during Phase II Section I and Phase II Section II operations at the facility.

G.1.a.1 Phase II Section I Vertical Expansion Filling

The Phase II Section I area will continuing filling in the western portion of the "valley" between the Phase I and Phase II Section I areas to approximately EL 125 feet NGVD. Filling will progress from south to north and west to east. This has been identified as Fill Sequence No. 1 on

the construction permit application drawings located in Attachment E-2.

Following, the eastern portion of the "valley" between the Phase I and Phase II Section I areas will be filled while raising the entire Phase II Section I area to a peak of approximately EL 130.6 feet NGVD (132.1 feet NGVD top of intermediate cover). Filling will progress from west to east in the "valley" portion and south to north over the top. This has been identified as Fill Sequence No. 2 on the construction permit application drawings located in Attachment E-2.

Fill Sequences 1 and 2 will bring the Phase II Section I area to the current permitted elevation of EL 130.6 feet NGVD (132.1 feet NGVD top of intermediate cover). By the end of Fill Sequence No. 2, the Operation Permit renewal application (submitted under a separate cover) should be approved by FDEP. Approval of the Operation Permit will allow the Phase II Section I area to be raised vertically higher and operate to the proposed elevations (i.e. fill above the current permit height).

Following approval of the Operation Permit renewal application, the Phase II Section I area will be raised to approximately EL 166 feet NGVD. Filling will progress from north to south and west to east. This has been identified as Fill Sequence No. 3 on the construction permit application drawings located in Attachment E-2. The filling of Phase II Section I in this manner shall provide sufficient time to allow the construction, creation/submittal of the Certification of Construction Completion Report for the Department and approval by the Department for waste filling in the Phase II Section II Expansion.

The Phase II Section II Expansion area consists of the northern portion, approximately 2.33 acres, the center portion approximately 2.22 acres, and the southern portion approximately 1.63 acres. Waste filling of the Phase II Section II Expansion areas will be generally conducted as follows.

G.1.a.2 Phase II Section II Expansion Southern Portion Filling

Generally, the filling of the Phase II Section II Expansion area will begin in the southern portion of the disposal area adjacent to the western side of the existing Phase II Section I disposal area. This has been identified as Fill Sequence No. 4 on the construction permit application drawings located in Attachment E-2. The filling will proceed by placing waste along the southern end of this portion and proceeding north and from west to east in this area.

An initial lift of select loose municipal solid waste, a minimum of four feet in thickness, will be placed over the protective sand layer. The select waste will be spread out and inspected for large rigid objects that may puncture the liner system when compacted. This waste thickness will bring the southern portion disposal area slightly below the proposed western and southern perimeter road and the interior separation berm along the north side of the area (which separates it from the Phase II Section II Expansion center portion). After the layer of select waste has been placed, additional waste will be placed in order to make the first lift approximately 10 feet thick across the Phase II Section II Expansion within this area. The limits of waste (as shown on the construction permit application drawings located in Attachment E-2) and surface of the waste layer will be placed so it is sloped back "into" the landfill cell. Also, the limits of waste along

the northern portion of this area will be placed approximately 10 feet to the south of the interior separation berm along the north side of the area to ensure waste/leachate runoff does not enter the Phase II Section II Expansion center portion.

In addition, a perimeter berm will be placed around the exterior of the placed waste (southern and western sides) to ensure no runoff of stormwater from the waste will occur outside of the lined cell area. Successive waste layers will be added in this southern portion in 10-foot lifts working from south to north and west to east. Each layer will be placed across the cell bottom and against the existing western sideslope of the Phase II Section I disposal area. Once the Phase II Section II Expansion southern portion has reached a vertical elevation of approximately EL 113.5 feet NGVD top of waste (approximately 25 feet of waste in the deepest section), filling within the portion will be temporarily stopped. Please refer to the construction permit application drawings located in Attachment E-2 for a plan view and section views of Fill Sequence No. 4 within the Phase II Section II Expansion southern portion.

G.1.a.3 Phase II Section II Expansion Center Portion Filling

Filling will then begin in the center portion of the Phase II Section II Expansion area working from north to south. This has been identified as Fill Sequence No. 5 on the construction permit application drawings located in Attachment E-2. An initial lift of select loose municipal solid waste, a minimum of four feet in thickness, will be placed over the protective sand layer. The select waste will be spread out and inspected for large rigid objects that may puncture the liner system when compacted. After the layer of select waste has been placed, additional waste will be placed in order to make the first lift approximately 10 feet thick across the Phase II Section II Expansion within this area. This waste thickness will bring the center portion disposal area slightly below the proposed western perimeter road and the interior separation berm along the south side of the area (which separates it from the Phase II Section II Expansion southern portion). The limits of waste (as shown on the construction permit application drawings located in Attachment E-2) and surface of the waste layer will be placed so it is sloped back "into" the landfill cell.

Also, the limits of waste along the northern portion of this area will be placed approximately 50 feet to the south of the east/west main LCS header trench which has been elevated with drainage sand to create an interior separation berm. This interior separation berm will separate the Phase II Section II Expansion center portion from the northern portion to ensure waste/leachate runoff does not enter the Phase II Section II Expansion northern portion (when filling the center portion) which is covered with a rain tarp. In addition, a perimeter berm will be placed along the exterior of the placed waste (western side) to ensure no runoff of stormwater from the waste will occur outside of the lined cell area.

After the initial 10-foot lift according to the above-mentioned methods, successive waste layers will be added in this center portion in 10-foot lifts. Filling will proceed from north to south and east to west. Each layer will be placed across the cell bottom and against the existing western sideslope of the Phase I disposal area. In addition, while filling from north to south, waste will also be placed against the north sideslope of the Phase II Section II Expansion south portion previously filled in Fill Sequence No. 4. Eventually, waste filling will reach an elevation that

waste will also be placed on the western and top portion of the Phase II Section I area previously filled in Fill Sequence No. 3. Filling in this manner will meet the peak elevation obtained in Fill Sequence No. 3 of approximately EL 166 feet NGVD.

Prior to placing waste against the Phase I sideslope, the procedures outlined below in "Waste Placement Against Phase I Sideslope" will be followed by the County. Once Fill Sequence No. 5 has been completed, filling within the portion will be temporarily stopped. Please refer to the construction permit application drawings located in Attachment E-2 for plan views and section views of the proposed fill sequencing within the Phase II Section II Expansion center portion.

G.1.a.4 Phase II Section II Expansion Northern Portion Filling

Filling will then begin in the northern portion of the Phase II Section II Expansion working from south to north after removal of the rain tarp within this area. This has been identified as Fill Sequence No. 6. An initial lift of select loose municipal solid waste, a minimum of four feet in thickness, will be placed over the protective sand layer. This will also include the 50 foot offset created during Fill Sequence No. 5 between the north and center portions of the Phase II Section II Expansion. The select waste will be spread out and inspected for large rigid objects that may puncture the liner system when compacted. After the layer of select waste has been placed, additional waste will be placed in order to make the first lift approximately 10 feet thick across the entire Phase II Section II Expansion within this area. This waste thickness will bring the northern portion (and the 50 foot offset area) disposal area below the proposed western and northern perimeter road. The limits of waste (as shown on the construction permit application drawings located in Attachment E-2) and surface of the waste layer will be placed so it is sloped back "into" the landfill cell. In addition, a perimeter berm will be placed along the exterior of the placed waste (western and northern sides) to ensure no runoff of stormwater from the waste will occur outside of the lined cell area.

After the initial 10-foot lift according to the above-mentioned methods, successive waste layers will be added in this northern portion in 10-foot lifts. Filling will proceed from south to north and east to west. Each layer will be placed across the cell bottom and against the existing western sideslope of the Phase I disposal area. In addition, while filling from south to north, waste will also be placed against the north sideslope of the Phase II Section II Expansion center portion previously filled in Fill Sequence No. 5. Prior to placing waste against the Phase I sideslope, the procedures outlined below in "Waste Placement Against Phase I Sideslope" will be followed by the County.

G.1.a.5 Waste Placement Against Phase I Sideslope

Prior to placement of waste against the western sideslope of the Phase I disposal area (as indicated above during filling of the center and northern portions of the Phase II Section II Expansion), the County will remove only as much of the rain tarp (installed over the existing sod during construction of the Phase II Section II Expansion) and existing sod within an area of the sideslope where waste will be placed as needed. Rain tarp and sod within select areas will only be removed by the County as needed prior to waste filling. The remainder of the rain tarp and sod along the western sideslope of the Phase I disposal area will remain in place until further

removal is required for additional waste placement to prevent washout of the existing drainage sand material along the sideslope during storm events and stormwater infiltration/runoff into the active waste filling area. As soon as the rain tarp and sod is removed within a select area of the Phase I sideslope prior to waste filling, County personnel will conduct depth checks by hand (on an approximately 25-foot grid) of the remaining sideslope protective cover material to ensure there is 24-inches (measured perpendicular to the slope) of protective material remaining. If the County depth checks and measurements indicate there is 24-inches of protective material remaining, no other field work will be conducted by the County prior to waste placement along the Phase I sideslope in that area. The County will then notify FDEP according to Part G.1.a.7. prior to waste placement. If the County depth checks indicate less than 24-inches of protective material is remaining after the rain tarp and sod removal the County will place additional protective material within the area prior to waste placement as needed to obtain the required depth. Following material placement to the required depth by the County, the County will notify FDEP according to Part G.1.a.7. prior to waste placement.

G.1.a.6 Protective Soil/Drainage Sand Material

During construction of the Phase II Section II Expansion, the County will ensure that additional protective soil/drainage sand material, which has met the requirements of the project Technical Specifications (minimum hydraulic conductivity of $1x10^{-3}$ cm/sec, gradation, etc.) and has been approved by the Engineer during construction, is stockpiled onsite for future use. This material would be placed as needed by the County against the Phase I sideslope prior to waste placement in the locations identified from the depth checks that less than 24-inches of the existing protective material was remaining after the rain tarp and sod removal. If the stockpiled protective material has been depleted by the County and additional material is required, the County shall perform material testing as required for protective soil/drainage sand by Specification Section 02220 Excavation, Backfill, Fill, and Grading from a suitable source. After the material has met the requirements of the Specification, the additional material may be utilized by the County.

G.1.a.7 Confirmation of Protective Soil/Drainage Sand Material Depth

After confirmation by the County that 24-inches of protective material is in place along the Phase I sideslope after removal of the rain tarp and existing sod, through the processes as indicated above in Part G.1.a.5., the County shall provide FDEP a certification statement to the effect prior to waste placement. In addition, the County shall provide confirmation that the processes as indicated above in Part G.1.a.6 were followed regarding the protective material placed against the Phase I sideslope after sod removal.

The certification statement shall either be signed and sealed by the Engineer of Record that conducted and/or monitored the protective soil/drainage sand depth checks and soil replacement or reviewed appropriate documentation of the work; or shall include adequate documentation of work that can be reviewed by the Department. In the event that the certification statement is not signed and sealed by the Engineer of Record, the certification statement and supporting documentation shall be submitted at least seven days prior to waste placement over the certified area to allow for Department review of the submittal.

G.1.a.8 Temporary Sideslope Berms

In addition, to reduce the amount of stormwater infiltration and surface water runoff into the Phase II Section II Expansion center and northern portions (and generating additional leachate), the County will ensure the rain tarp (placed during construction of the Phase II Section II Expansion over the existing sod) is maintained as needed along the western sideslope of the Phase I area. In addition, the County will construct temporary sideslope berms along the western Phase I sideslope during operations as needed (discussed further below). The temporary sideslope berms will be active in nature to ensure the rain tarp directs the surface water runoff away from the active filling area. The County will create temporary sideslope berms as needed to accommodate fill sequencing which will be used to control the surface water runoff from the rain tarp and direct it away from the active filling area to reduce surface water runoff into active waste filling to the extent practical.

The temporary sideslope berms will help direct the southern half of the rain-tarped western Phase I sideslope surface water runoff into the Phase II Section II Expansion northern portion (which will be covered with a rain tarp while waste filling is not occurring) while filling in the center portion. This surface water runoff can then be pumped as needed from the northern portion area into the perimeter stormwater management system.

The temporary sideslope berms created along the northern half of the rain-tarped western Phase I sideslope will help direct the surface water runoff into the northern perimeter stormwater management system swale while filling in the northern portion. This will also reduce the amount of surface water runoff entering the northern portion and generating additional leachate.

In addition, prior to filling, the County will remove the concrete rubble rip rap from within the temporary stormwater downchutes located along the sideslope. After removal of the rip rap, the County will place drainage sand within the area downchute areas to a minimum of two feet. After removal of rain tarp, sod, and rip rap, filling will begin by placing waste against the sideslope of the Phase I disposal area and raising the Phase II Section II Expansion disposal area up. Final filling will achieve the grades shown on the construction permit application drawings located in Attachment E-2.

The County will not recirculate leachate but will conduct leachate evaporation during operation of the Phase II Section II area. Ditches, berms, or other devices shall be constructed to control leachate runoff. However, the quantity of leachate applied during leachate evaporation shall not be in such a quantity as to require ditches, berms, or other devices to control leachate runoff or the need to shed runoff to the leachate collection system. Initial and intermediate cover receiving leachate from the leachate evaporation process shall be graded to shed runoff into the leachate collection system and to minimize mixing of leachate runoff and storm water. Initial and intermediate cover shall be permeable to the extent necessary to prevent perched water conditions and gas buildup. Leachate evaporation shall not be conducted during weather conditions or in quantities that may cause runoff outside the solid waste disposal unit, surface seeps, wind-blown spray, or exceedance of the limits of the leachate head on the liner. The application of leachate for evaporation shall be such that leachate runoff is prevented and leachate is only applied to those areas and cover soils that do not runoff to stormwater has been

included in the facility's Operation Plan.

In summary, while no waste filling is occurring in the center and north portions of the Phase II Section II Expansion, the rain tarp placed along the Phase I western sideslope during the Phase II Section Expansion will remain intact and unchanged. Just prior to waste filling within the center portion of the Phase II Section II Expansion, the County will remove only as much of the existing rain tarp and sod along the south portion of the Phase I western sideslope as needed to accommodate filling within the center portion (north portion of the sideslope rain tarp will remain in place). After the rain tarp and sod removal the County will construct a temporary sideslope berm within the area which will direct the southern half of the rain-tarped western sideslope surface water runoff into the Phase II Section II Expansion north portion. The County will also wrap the rain tarp over the top of the temporary sideslope berm to minimize erosion of the berm. After the required field work and Department notification has been conducted and provided by the County as indicated within Parts G.1.f.5, G.1.f.6, and G.1.f.7 the County will then begin waste filling within the center portion. Once waste filling within the center portion and up against the Phase I western sideslope has reached the temporary sideslope berm constructed in the area the County will then repeat this process. Rain tarp and sod will be removed, a temporary sideslope berm will be constructed, the remaining rain tarp will be wrapped over the top of the sideslope berm, required field work and Department notification will be conducted and provided as indicated within Parts G.1.f.5, G.1.f.6, and G.1.f.7 and waste filling will continue as per the fill sequencing plans. Once the grades have reached the elevations as indicated in the fill sequencing plans for the center portion, the County will repeat the process along the northern portion of the Phase I western sideslope for waste filling within the Phase II Section II Expansion north portion. The only difference will be the temporary sideslope berms will be constructed by the County in a manner to direct the sideslope surface water runoff into the northern perimeter stormwater management system swale while waste filling in the northern portion.

As indicated above, the Operation Permit renewal application will include the operational fill sequence plans to show a detailed plan for the filling of the Phase II Section II Expansion area. The fill sequence plans will also indicate the location of temporary sideslope berms to be installed by the County during filling to reduce stormwater runoff from entering into the Phase II Section II Expansion area.

G.1.b Maximum Waste Height

The maximum final closure elevation of the Phase II Section II Expansion area will be approximately EL 173.2 feet NGVD top of final closure. Please refer to the Phase II Section II Expansion construction permit application drawings located in Attachment E-2 for the proposed final buildout configuration.

G.1.c Factor of Safety

Per Rule 62-701.400(2), FAC the Phase II Section II Expansion (and the Phase II Section I height increase) has been designed to prevent failures of sideslopes, and designed to prevent deep-seated failures through the waste, along liner systems, and through foundation soils, and achieves a

minimum factor of safety of 1.5 using peak strength values. Please refer to Section I of this application for further information regarding the slope stability analysis conducted and the resulting factor of safety for the Phase II Section II Expansion and the Phase II Section I height increase.

G.2 LANDFILL LINER REQUIREMENTS

The bottom liner system for the Phase II Section II Expansion meets or exceeds the design requirements specified by Rule 62-701.400(3)(c), FAC for a double liner system. The lining system will incorporate an independent leak detection zone. Please refer to the Phase II Section II Expansion construction permit application drawings located in Attachment E-2 for the cross-section of the bottom liner system. The double liner system for the Phase II Section II Expansion will include the following (from bottom to top):

- 12 inch prepared subbase comprised of compacted soil free of sharp materials
- Geosynthetic Clay Liner (GCL) (encapsulated with an additional layer of 60 mil textured High Density Polyethylene (HDPE) geomembrane liner for specific sections of the bottom liner system)
- 60 mil textured HDPE geomembrane liner (secondary liner)
- 300 mil tri-planar geocomposite (secondary geocomposite)
- 60 mil textured HDPE geomembrane liner (primary liner)
- 300 mil bi-planar geocomposite (primary geocomposite)
- 24 inch protective cover soil layer
- Rain tarp (the northern portion of the Phase II Section II Expansion, approximately 2.33 acres)

The Phase I area of the Hardee County Landfill is unlined. In accordance with the Operations Plans, a portion of the proposed Phase II Section II Expansion will "piggy-back" along the western sideslope of the existing closed Phase I area in the future. The closure of Phase I was previously completed by the County under Construction Permit No. 38414-012-SF/01. The County received FDEP approval of the Phase I closure construction on January 3, 2012. The Phase I liner system along the western sideslope was designed, permitted and constructed according to Rule 62-701.430(1)(c), FAC to be the bottom liner system when the Phase II Section II Expansion does "piggy-back." The Phase II Section II Expansion "piggy-back" area along the western Phase I sideslope will be approximately 4.36 acres in size divided into the northern portion (approximately 2.13 acres) and the southern portion (approximately 2.23 acres). The sideslope (bottom liner system) in the Phase I area along the western sideslope where the Phase II Section II Expansion will "piggy-back" consist of the following (from bottom to top):

- In place waste
- 24 inch thick protective bedding soil layer (as required by Rule 62-701.430(1)(c)3, FAC)
- 60 mil textured HDPE geomembrane liner (as required by Rule 62-701.430(1)(c)2, FAC)
- 3300 mil bi-planar geocomposite (as required by Rule 62-701.430(1)(c)1, FAC)
- 24 inch thick protective cover soil drainage sand layer (as required by Rule 62-701.430(1)(c)3, FAC)
- Vegetative layer (to be covered by a rain tarp during the construction of the Phase II Section II Expansion which the sod and rain tarp will be removed by the County prior to waste filling within the area)

The existing closed Phase I area along the southern sideslope where the Phase II Section I height increase will "piggy-back" consists of the following (from bottom to top):

- In place waste
- 24 inch thick protective bedding soil layer (as required by Rule 62-701.430(1)(c)3, FAC)
- 60 mil textured HDPE geomembrane liner (as required by Rule 62-701.430(1)(c)2, FAC)
- 3300 mil bi-planar geocomposite (as required by Rule 62-701.430(1)(c)1, FAC)
- 24 inch thick protective cover soil drainage sand layer (as required by Rule 62-701.430(1)(c)3, FAC)
- Rain tarp (which will be removed by the County prior to waste filling within the area)

G.2.a.1 Test Information and Documentation

The bottom liner for the Phase II Section II Expansion area will meet the liner design requirements specified by Rule 62-701.400(3)(c)1, FAC for double liner systems. The requirements for geomembrane liner testing and documentation are included in the Technical Specifications contained in the Construction Quality Assurance (CQA) Plan for the Phase II Section II Expansion located in Attachment G-1. The Technical Specifications include manufacturer's quality control testing performance and field construction testing.

- Liner Resin Specifications - The Technical Specifications for the geomembrane liner will include recommendations from the Geosynthetic Research Institute (GRI) and requirements from the American Society for Testing and Materials (ASTM) for meeting resin material formulation and testing criteria to ensure satisfactory performance.
- Liner Construction Quality Assurance (CQA) Controls - Hardee County will retain qualified personnel who will be responsible for conducting Construction Quality

Assurance (CQA) measures and inspections for the materials, installation, seaming and testing of the HDPE geomembrane liner.

- Direct Shear Test - The Technical Specifications for the geomembrane liner will include test requirements for the interface direct shear testing to ensure satisfactory performance.

Testing and documentation of the bottom liner system for the Phase II Section II Expansion area will be performed during construction and will be provided to FDEP upon construction completion. The construction certification report submitted for FDEP approval will include:

- CQA monitoring of subbase preparation, placement, testing, and final survey.
- Geosynthetic Clay Liner (GCL) MQC certificates, CQA direct shear test results (interface and internal), GCL installation plan, repair log, and record drawings.
- Geomembrane Manufacturer's Quality Control (MQC) certificates, CQA monitoring data, seam test results, geomembrane panel layout plan, repair logs, and record drawings.
- Construction of the leachate collection and removal system (LCRS), including MQC certificates from the pipe manufacturer(s), permeability tests of the protective drainage sand, MQC certificates from the geocomposite manufacturer(s), CQA test results for the geocomposites, and depth measurements for the protective drainage sand layer.
- The test information, which will be provided to FDEP, will verify that the materials used are in accordance with the Technical Specifications provided by ASTM and GRI.
- Record documents reflecting as-built conditions.

The test information, which will be provided to FDEP, for the HDPE geomembrane liner will verify the materials were constructed in accordance with the Technical Specifications contained in the CQA Plan located in Attachment G-1. Geomembrane liner MQC tests will include:

- Density.
- Sheet thickness.
- Sheet tensile properties.
- High Density Polyethylene (HDPE) content.
- Carbon black content.
- Carbon black dispersion.
- Seam strength.

G.2.a.2 Foundation

The estimated bearing capacity of the Phase II Section II Expansion area foundation is discussed in Section I of this application. Per Rule 62-701.400(3)(a)2, FAC the Phase II Section II Expansion area will be installed upon a base and in a geologic setting capable of providing structural support to prevent overstressing of the liner due to settlements and applied stresses.

G.2.a.3 Bottom Liner Location Relative to Seasonal High Groundwater

To estimate the seasonal high groundwater table, SCS previously had the County dig test holes in five locations several feet below existing grade, surrounding the facility borrow pit area. Soil staining observations made in accordance with the Southwest Florida Water Management District (SWFWMD) district guidelines were used to estimate the groundwater elevations. Pit numbers 1 and 5 were used to estimate the seasonal high groundwater table as previously submitted to the Department with the *Hardee County Landfill Expansion Construction Permit Application*, dated April 2004, prepared by SCS. In pit number 2, 3, and 4 no distinct soil staining layers were observed possibly due to the close proximity to the adjoining former borrow pit. The County surveyed in the stained soil layer in pit numbers 1 and 5. Based upon the survey the seasonal high groundwater elevation was estimated to be at approximately EL 78.53 feet NGVD.

In addition, SCS reviewed the groundwater elevations recorded at the monitor wells and piezometers at the facility during the routine, semi-annual sampling events recorded from June 1999 through June 2012 and in addition elevations recorded in December 2012 provided by the County. Based on review of the above-mentioned groundwater elevations the current estimated seasonal high groundwater elevation was chosen to be EL 82.09 feet NGVD within the sump area of the Phase II Section II Expansion. The bottom liner system in relation to the groundwater table is further addressed in Section I.1.c of this construction permit application.

The lowest proposed elevation of the bottom lining system for the Phase II Section II Expansion area is the leachate collection sump at EL 78.5 feet NGVD. Due to the fluctuations of the groundwater table within the area of the sump and a portion of the cell bottom, as further discussed in Section I of this construction permit application, an additional layer of 60 mil textured HDPE geomembrane liner will be placed under the GCL and welded to the secondary 60 mil textured HDPE geomembrane liner. This additional layer of 60 mil textured HDPE geomembrane liner will help prevent the "wet-dry" cycles of the GCL due to the fluctuations of the groundwater table. Requirements for the additional layer of liner below the GCL has been included within the Technical Specifications located in Attachment G-1 and the construction permit application drawings located in Attachment E-2. The bottom liner system in relation to the groundwater table is further addressed in Section I of this construction permit application.

G.2.a.4 Hydrostatic Uplift

The double lined bottom of the leachate sump is placed at EL 78.5 feet NGVD in order to facilitate good drainage flow off the leachate collection system and provide adequate temporary storage for the proper operation of the automatic leachate pumps. An additional layer of 60 mil

textured HDPE geomembrane liner will be placed under the GCL and welded to the secondary 60 mil textured HDPE geomembrane liner. This additional layer of 60 mil textured HDPE geomembrane liner will help prevent the "wet-dry" cycles of the GCL due to the fluctuations of the groundwater table. Provisions have been made in the design and construction of the sump and the leachate collection and leachate detection header trench to reduce the potential for hydrostatic uplift that could damage the bottom lining system. The Technical Specifications will require dewatering equipment be provided to draw down the groundwater table so the lining systems are installed "in the dry" without hydrostatic uplift forces. Following the lining installation the rock fill will be placed in the sump and leachate collection and leachate detection header trench to the prescribed height as indicated on the construction permit application drawings located in Attachment E-2 to act as ballast. The bottom liner system in relation to the groundwater table is addressed in Section I of this construction permit application.

Once the dewatering system is shut off, should the water table rise, the weight of the rock within these areas will act as a ballast which is adequate to offset the hydrostatic uplift force and provide a factor of safety of approximately 1.75. Please refer to Attachment G-2 for buoyancy calculations for the leachate collection system sump.

The weight of the rock in the leachate collection and detection header trench acting is adequate to offset the hydrostatic uplift force and will provide a factor of safety of approximately 1.91. Please refer to Attachment G-3 for buoyancy calculations for the leachate collection system header pipe and detection header pipe leading to the leachate collection system sump.

As previously indicated, the Technical Specifications will require dewatering equipment be provided to draw down the groundwater table so the bottom lining system is installed "in the dry" without the influence of hydrostatic forces. The lowest proposed elevation of the bottom lining system for the Phase II Section II Expansion area is the leachate collection sump at EL 78.5 feet NGVD. SCS reviewed the groundwater elevations recorded at the monitor wells and piezometers at the facility during the routine, semi-annual sampling events recorded from June 1999 through June 2012 and in addition elevations recorded in December 2012 provided by the County. Based on review of the groundwater elevations the current estimated seasonal high groundwater elevation was chosen to be EL 82.09 feet NGVD within the sump area of the Phase II Section II Expansion. Therefore, due to the fluctuations of the groundwater table the bottom liner system could be influenced from the area covered from EL 78.5 feet NGVD to EL 82.09 feet NGVD. Based on the volume of protective cover material and rock within this area it will act as a ballast which is adequate to offset the hydrostatic uplift force and provide a factor of safety of approximately 2.0.

The existing nine 8-inch diameter HDPE groundwater control system pipes located under the Phase II Section I area will be extended and continued to the west under the southern portion of the Phase II Section II Expansion area as shown on the construction permit application drawings located in Attachment E-2. Trenches for each of the groundwater control system pipes will be excavated in the existing subgrade to the grades as shown on the construction permit application drawings (similar in nature to the construction of the original groundwater control system pipes during construction of the Phase II Section I area). A separate cleanout will be constructed for each of the groundwater control system pipes along the western side of the Phase II Section II

Expansion for access.

The groundwater control system pipes, sloped from west to east, will all be connected to an existing 12-inch diameter HDPE header pipe located on the eastern end of the Phase II Section I area. The 12-inch diameter HDPE header pipe is connected to an existing groundwater control system pump station located to the southeast of the Phase II Section I cell. The capacity of the 8-inch diameter HDPE groundwater control system pipes, 12-inch diameter HDPE header pipe, groundwater pump station and pumps were originally sized for collection of the groundwater previously submitted to the Department with the *Hardee County Landfill Expansion Construction Permit Application*, dated April 2004, prepared by SCS.

Jet cleaning and tracked video camera equipment will be able to travel from west to east through the groundwater control system pipes to the point they are connected to the existing 12-inch diameter HDPE header within the Phase II Section I area. Access within these pipes will be available from west to east in the Phase II Section II Expansion and also from the east to west in the Phase II Section I area.

The existing groundwater control system piping originally designed with the *Hardee County Landfill Expansion Construction Permit Application*, dated April 2004, prepared by SCS used the entire footprint at that time of 10-acres for pipe sizing calculations. As a conservative estimate, the original design also used a high-water of EL 82.5 feet NGVD within the pipe sizing calculations. The calculated groundwater flow rate at the high-water elevation used for the 10-acres was determined to be 700 gpm. Since the April 2004 submittal the original 10-acre area has been divided and is identified as the Phase II Section II Expansion and the Phase II Section I Expansion. The Phase II Section I Expansion area was constructed with a footprint of approximately 5-acres. The area which the existing groundwater control system piping will be extended under the Phase II Section II Expansion will be approximately 1.63-acres. Therefore the groundwater control system would be required to handle the flow generated from approximately 6.63-acres as opposed to the original design of 10-acres. In addition, the current estimated high groundwater table of EL 82.09 feet NGVD is below the original system design value of EL 82.5 feet NGVD. Therefore, the existing groundwater control system piping which will be extended under the Phase II Section II Expansion will handle the anticipated groundwater flow.

G.2.a.5 Limits of Liner

Solid waste will not be placed beyond the horizontal extent of the liner for the Phase II Section II Expansion area. The limits of the lining system will be easily visible in the field at all leading edges including the anchor trenches along the north, west and south sides. Anchor trench markers will be placed along the north, west and south sides of the Phase II Section II Expansion area. Maintaining the waste within the limits of liner prevents municipal solid waste and leachate from coming into contact with any exposed soil.

The peripheral geomembrane anchor trench was designed to restrain the geomembrane from movement under anticipated loads but to pull out of the anchor trench before the geomembrane tears. The geometry of the anchor trench was designed so that the resistance capacity of the

trench was lower than the ultimate yield strength of the geomembrane but still high enough to restrain the geomembrane against typical loads. Refer to Attachment G-4 for the anchor trench calculations.

G.2.b Composite Liner

This Section of the application is not applicable. The proposed facility will have a full double liner system. Please refer to Section G.2.c below for the double liner system description.

G.2.c Double Liners

G.2.c.1 Geomembrane Thickness and Properties

The bottom liner for the Phase II Section II Expansion area will meet the liner design requirements specified by Rule 62-701.400(3)(c)1, FAC for double liner systems. The requirements and properties for the primary and secondary HDPE liners are described in the Technical Specifications for the liner system, which are presented in the CQA Plan located in Attachment G-1. The HDPE geomembrane liners will be nominal 60 mils thick and textured.

The proposed double liner system of the Phase II Section II Expansion will include the following (from bottom to top). Please refer to the Phase II Section II Expansion construction permit application drawings located in Attachment E-2 for the cross-section of the bottom liner system.

- 12 inch prepared subbase comprised of compacted soil free of sharp materials
- Geosynthetic Clay Liner (GCL) (encapsulated with an additional layer of 60 mil textured High Density Polyethylene (HDPE) geomembrane liner for specific sections of the bottom liner system)
- 60 mil textured HDPE geomembrane liner (secondary liner)
- 300 mil tri-planar geocomposite (secondary geocomposite)
- 60 mil textured HDPE geomembrane liner (primary liner)
- 300 mil bi-planar geocomposite (primary geocomposite)
- 24 inch protective cover soil layer
- Rain tarp (the northern portion of the Phase II Section II Expansion, approximately 2.33 acres)

The GCL below the secondary liner is intended for use as a substitute, but equal material for the 6-inch thick prepared subbase required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)(1), FAC.

The geosynthetic components of the bottom liner for the Phase II Section II Expansion area will

meet the requirements specified by Rule 62-701.400(3)(d), FAC for double liner systems. The properties for the GCL, 60 mil primary and secondary HDPE textured geomembrane liners, primary and secondary geocomposite drainage layer materials, rain tarp, and protective cover soil are described in the Technical Specifications that are presented in the CQA Plan located in Attachment G-1.

A geosynthetic rain tarp will be placed over portions of the Phase II Section II Expansion that will not receive waste initially to reduce the flow of rainwater to the leachate collection system. The northern portion of the Phase II Section II Expansion, approximately 2.13 acres, will receive the rain tarp. The location for the rain tarp is identified on the construction permit application drawings located in Attachment E-2.

G.2.c.2 Leachate Collection and Removal System

The leachate collection and removal system (LCRS) is designed to meet the FDEP requirements to limit the leachate head above the primary geomembrane liner to less than one foot during routine landfill operations after placement of the initial cover as per Rule 62-701.400(3)(c)(1), FAC.

The LCRS, as shown on the Phase II Section II Expansion construction permit application drawings located in Attachment E-2, includes the 24-inch thick sloping sand drainage layer, a sloped bi-planar geocomposite (i.e., the geonet or drainage net) and a piping network. The bi-planar geocomposite and the drainage layer are installed at a slope across the Phase II Section II Expansion as indicated on the construction permit application drawings. A series of sloped 8-inch diameter HDPE perforated pipes are placed in rock-filled trenches wrapped with a geotextile that are spaced at regular, predetermined intervals across the geocomposite lining. Together the piping and geocomposite collect leachate flowing through the drainage layer and transport it to the leachate collection header trench which in turn transports the leachate via gravity to the leachate collection sump. The leachate sump is equipped with submersible pumps that discharge the leachate out of the sump through a pipeline and out of the cell.

From that point the leachate will travel in a pressure pipeline (i.e., a force main) from the cell to the leachate collection sideslope risers located along the western side of the south portion of the Phase II Section II Expansion. The leachate force main is sized to serve the flow from the leachate collection and detection pumps. The sideslope risers are extensions of the leachate collection pipes for the Phase II Section II Expansion which will be connected to the existing leachate collection lines located within the Phase II Section I area during construction. Leachate will then flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

Per Specific Condition No. C.8.g.(3) of Operation Permit #38414-011-SO/01 the Phase II Section I leachate collection and removal system (LCRS) pipes were jet-cleaned and video-inspected to verify adequate performance by Florida Jetclean (Jetclean) on December 18, 2012. The Phase II Section I LCRS consist of three 8-inch diameter leachate collection lateral pipes identified as south, center and north and one 8-inch diameter leachate detection lateral pipe

identified as detection.

The leachate collection lateral pipes were accessed through cleanouts located along the western side of the Phase II Section I Expansion area. The leachate detection lateral pipe was accessed through a cleanout located in the southeast corner of the Phase II Section I Expansion area. The Jetclean video-inspection equipment is capable of recording distances along the LCRS pipes inspected to document the length of LCRS jet-cleaned and video-inspected. The Jetclean video-inspection showed the LCRS pipes viewed with the inspection camera were clean and defect free. In areas where the video quality was obscured by high liquid levels within the LCRS pipes, the fact that both the inspection camera and the high-pressure jetting nozzle were not restricted through those areas would support the contention that those areas of the leachate collection system are also in good working order. A "Jetting Log" summary table was provided in the Jetclean report *Hardee County Landfill 2012 LCS & GCS Pipe Maintenance Phase I LCS & Phase II LCS/GCS* which indicated the LCRS pipes location, achieved inspection distance (pipe length) and results of the inspection.

The Florida Jetclean report *Hardee County Landfill 2012 LCS & GCS Pipe Maintenance Phase I LCS & Phase II LCS/GCS*. Based on the findings of the Florida Jetclean report, it is SCS's professional opinion that the existing Phase II Section I LCRS is operating as intended and will handle the additional leachate generated from the Phase II Section II and Phase II Section I Expansions.

In addition, as required by Specific Condition No. C.8.i.(3) of Operation Permit #38414-011-SO/01 the Phase II Section I groundwater interceptor system pipes were jet-cleaned and video-inspected by Jetclean on December 18, 2012. The Phase II Section I groundwater interceptor system consist of nine 8-inch diameter groundwater collection pipes identified as CO1 through CO9 and one 12-inch diameter wetwell to header pipe.

The groundwater interceptor system pipes were accessed through cleanouts located along the western side of the Phase II Section I Expansion area. The wetwell to header pipe was accessed through the groundwater wetwell located in the southeast corner of the Phase II Section I Expansion area. The Jetclean video-inspection showed the groundwater interceptor system pipes viewed with the inspection camera were clean and defect free. In areas where the video quality was obscured by high liquid levels within the groundwater interceptor system pipes, the fact that both the inspection camera and the high-pressure jetting nozzle were not restricted through those areas would support the contention that those areas of the groundwater interceptor system are also in good working order. A "Jetting Log" summary table was provided in the Jetclean report *Hardee County Landfill 2012 LCS & GCS Pipe Maintenance Phase I LCS & Phase II LCS/GCS* which indicated the groundwater interceptor system pipes location, achieved inspection distance (pipe length) and results of the inspection.

The Florida Jetclean report *Hardee County Landfill 2012 LCS & GCS Pipe Maintenance Phase I LCS & Phase II LCS/GCS*. Based on the findings of the Florida Jetclean report, it is SCS's professional opinion that the existing Phase II Section I groundwater interceptor system pipes are operating as intended and will handle the groundwater flow generated from the Phase II Section II and Phase II Section I Expansions.

G.2.c.2.1 Leachate Generation Modeling

To calculate the anticipated rate of leachate generation and in turn determine the capacity of the leachate pumping equipment, a water balance was performed using the United States Environmental Protection Agency's (U.S. EPA) Hydrological Evaluation of Landfill Performance (HELP) model version 3.07, 1994. Precipitation falling on a landfill surface will run off, evaporate, evapotranspirate, or infiltrate. The percentage of precipitation falling on a landfill surface that will travel each of these paths can be estimated by use of water balance methods.

The HELP model uses various formulas based upon fundamentals of soil mechanics to simulate water percolation in a vertical and horizontal direction under many climatological, soil and topographic conditions. The HELP model estimates how much leachate and surface drainage is likely to occur after a certain period of time within a specific landfill profile. Parameters pertinent to the design of the geonet component of the geocomposite drainage layer include hydraulic transmissivity, hydraulic conductivity and hydraulic gradient. The hydraulic transmissivity and hydraulic conductivity of the geonet drainage layer is primarily a function of overburden compressive stress and boundary conditions. The model provides an estimation of how much leachate will be generated within a landfill profile and how the LCRS will perform on a daily basis using daily climatological data.

The HELP model calculates flow through the geonet with McEnroe's equation. This equation is based on unconfined flow principles. McEnroe's equation assumes that the geonet drainage layer is infinite in thickness. When the head exceeds the geonet thickness, the HELP model assumes that the leachate can continue to stage up past the geonet layer thickness, yet still have the associated hydraulic conductivity of the geonet. In actuality, the leachate is moving at the hydraulic conductivity of the geonet and drainage sand. When the head over the liner exceeds the geonet thickness, the Model does not account for this change in conductivity.

G.2.c.2.2 Rainfall Records and Design Storm

The following rainfall records for the Phase II Section II Expansion were reviewed by SCS.

- National Oceanic and Atmospheric Administration (NOAA) rainfall data obtained from the National Climatic Data Center (NCDC) web site for the NOAA weather station (station index number 08-9401-04) located in Wauchula, Florida at Latitude: 27^{o} 31' North Longitude: 81^{o} 48' West. The NOAA rainfall data is located in Attachment G-5. Rainfall data information was available for the weather station from January 1954 to April 30, 2012. Based on the NOAA rainfall data for the mentioned time period, the annual average rainfall was documented to be 51.16 inches.

- Site specific rainfall data was also obtained from the Hardee County Solid Waste Department. Site specific rainfall data was available from February 1998 through September 1998, calendar years 2003 through 2009, and January 2011 through December 2012. The site specific rainfall data is located in Attachment G-6. Based on the site specific rainfall data for the mentioned time period, the annual average rainfall was

calculated to be 40.26 inches.

- In addition, as a comparison, SCS used the NOAA rainfall data previously mentioned above and included the years where the site specific data was available and calculated the average rainfall from January 1954 to December 31, 2012. The combination of the NOAA rainfall data and the site specific rainfall data is located in Attachment G-7. Based on the combination of the NOAA rainfall data and the site specific rainfall data, the annual average rainfall was calculated to be 48.70 inches.

The HELP Model analyses are based on daily site specific rainfall data provided by the County for the following time period:

- February 1998 through September 1998.
- January 2003 through May 2009.
- January 2012 through December 2012.

Daily rainfall data obtained from NOAA was input into the HELP Model analyses and used for the following time period:

- January 1984 through January 1998.
- October 1998 through December 1998 (used to fill-in unavailable County data).
- January 1999 through December 2002 (used to fill-in unavailable County data).
- June 2009 through December 2011 (used to fill-in unavailable County data).

Based on the three above-mentioned rainfall data reviews SCS created a summary table. Please refer to Attachment G-8 for a summary table of the rainfall data reviewed. As indicated in the summary tables, the NOAA weather station values are the largest (most conservative) for the annual average rainfall and average monthly rainfall compared to only site specific rainfall and a combination of site specific and NOAA values. The peak daily rainfall utilized in the design calculations was 7.60 inches. The peak daily rainfall was determined based on the daily rainfall data obtained from NOAA and daily site specific rainfall data provided by the County from 1984 through 2012.

G.2.c.2.3 Geonet Design Properties

Under dry conditions (i.e., no active rainfall) the maximum depth of leachate on the primary geomembrane liner is normally designed to be maintained within the thickness provided by the geonet. Thus precise physical parameters are required to be designated for the geonet including the minimum transmissivity (i.e., a flow rate per unit area). The transmissivity calculations for the bi-planar and tri-planar geocomposites are located in Attachment G-9 and Attachment G-10, respectively. Appropriate reduction factors have been applied to the transmissivity values calculated for the geocomposites. These reduction factors represent chemical clogging (RF_{CC}), biological clogging (RF_{BC}), geotextile intrusion (RF_{IN}), creep reduction (RF_{CR}) and a factor of safety.

- Chemical and biological reduction factors account for the particles that fill the voids in the geotextile over time. The chemical and biological clogging reduces the transmissivity of the geocomposite. The chemical and biological reduction factors have been obtained from the Geosynthetic Research Institute (GRI) Standard-GC8. The primary and secondary systems have differing chemical and biological clogging factors.

- Geotextile intrusion accounts for the geotextile encroaching on the geonet under a constant load. A 100-hour transmissivity test factors into intrusion. After the 100-hour seat time the geotextile has already begun to intrude into the geonet; therefore, the transmissivity value has already been affected by the intrusion factor. The intrusion factor used in the calculations is 1.0 because the transmissivity values were based on the 100-hour seat time.

- Creep reduction represents the elongation of the geonet under constant load for an extended period of time. Typical creep reduction factors have been supplied by the bi-planar and tri-planar geocomposite manufacturers.

- The transmissivity is also divided by a factor of safety of two.

The HELP model requires a hydraulic conductivity input for each of the geocomposite layers (primary and secondary). Hydraulic conductivity for each geocomposite is determined by dividing the transmissivity by the thickness of the geocomposite. The transmissivity and hydraulic conductivity calculations for the bi-planar and tri-planar geocomposites are located in Attachment G-9 and Attachment G-10, respectively.

The leachate collection system (LCS) drainage layer consists of 24 inches of soil cover placed over a 300 mil (0.300-inch) bi-planar geocomposite (primary geocomposite). In accordance with Rule 62-701.400(3)(c)1, FAC the hydraulic head on the upper liner must not exceed one foot during normal facility operations. According to the HELP model results located in Attachment G-11, the maximum hydraulic head on the primary liner is 0.283 inches (i.e., worst-case operating scenario for production of leachate), which is significantly less than the one foot required by Rule 62-701.400(3)(c)1, FAC. Therefore, a bi-planar geocomposite can be used for the primary leachate collection system. Refer to Section G.2.c.2.4 for the design of the LCRS collection layer.

Per 62-701.400(3)(c)(2), FAC the leak detection and secondary leachate collection system shall have a minimum hydraulic conductivity of ten centimeters per second (cm/sec), shall be designed to limit the maximum hydraulic head on the lower liner to one inch, and shall not allow leachate head to exceed the thickness of the drainage layer. The hydraulic conductivity of the leak detection and secondary collection system material shall be derived from transmissivity and thickness measurements. According to the HELP model results located in Attachment G-11, the maximum hydraulic head on the secondary liner is 0.002 inches (i.e., worst-case operating scenario for production of leachate), which is less than the thickness of the drainage layer tri-planar geocomposite. Therefore, a tri-planar geocomposite can be used for the secondary leachate collection system. A tri-planar geocomposite can achieve this hydraulic conductivity after accounting for all the reduction factors and while keeping the maximum head within the geocomposite thickness in the secondary system. Refer to Section G.2.c.2.4 for the design of the

LCRS collection layer.

G.2.c.2.4 Design of LCRS Collection Layer

The leachate collection and removal system (LCRS) is designed to limit the hydraulic head on the liner to the thickness of the geocomposite layer. The primary leachate collection system is composed of double-sided, bi-planar geocomposite (geonet between two layers of geotextile) placed over the primary 60 mil textured HDPE geomembrane liner along the bottom and sides of the cell. The geocomposite is designed to maintain a high flow rate under the pressure exerted by the solid waste under final buildout height conditions. The maximum final closure elevation of the Phase II Section II Expansion area will be approximately EL 173.2 feet NGVD top of final closure. Refer to the Phase II Section II Expansion construction permit application drawings located in Attachment E-2 for the proposed final buildout configuration.

For the proposed Phase II Section II Expansion the final buildout height pressure is estimated to be approximately 4,000 pounds per square foot (psf) at a waste thickness of approximately 60 feet and an average density of 60 pounds per cubic foot or 1,640 pounds per cubic yard. A cross section detail of the leachate collection system is provided in the Phase II Section II Expansion construction permit application drawings located in Attachment E-2.

The HELP model was used to determine leachate quantities generated for several anticipated operating (waste filling) Scenarios within the Phase II Section II Expansion area and when it "piggy-backs" onto the western sideslope of the Phase I area. The following eleven Scenarios (Scenario 1 through Scenario 11) represent the varying operating conditions analyzed. The maximum hydraulic head and geonet thickness for the respective Scenarios is summarized in Table G-1 below. Refer to the HELP model runs located in Attachment G-11.

In addition, Drawing 1 has been provided in Attachment G-11 which identifies the areas indicated below for the Scenarios analyzed.

- Phase II Section II Expansion divided into north, center and south portions = 6.18 acres.
- Northern portion of Expansion bottom area = 2.33 acres
- Center portion of Expansion bottom area = 2.22 acres
- Southern portion of Expansion bottom area = 1.63 acres
- Expansion center and north bottom area = 4.55 acres
- Total Phase I western sideslope area = 4.36 acres
- Entire southern sideslope of Phase I adjacent to center portion of Expansion bottom area = 2.23 acres
    - Bottom southern sideslope of Phase I adjacent to center portion of Expansion bottom area = 0.80 acres

  - Top southern sideslope of Phase I adjacent to center portion of Expansion bottom area = 1.43 acres

- Entire northern sideslope of Phase I adjacent to northern portion of Expansion bottom area = 2.13 acres

  - Bottom northern sideslope of Phase I adjacent to northern portion of Expansion bottom area = 0.91 acres

  - Top northern sideslope of Phase I adjacent to northern portion of Expansion bottom area = 1.22 acres

SCENARIO 1

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, is completely open with no waste placement. Stormwater which enters the area is pumped to the swale adjacent to the Expansion using the leachate collection pump located within the sump through bypass piping.

- The bottom southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.80 acres, remains intact with a rain tarp over the existing sod.

- The top southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.43 acres, remains intact with a rain tarp over the existing sod.

- The southern portion of the Expansion, approximately 1.63 acres, is completely open and waste placement has just started.

- The leachate generated will flow to the 8-inch diameter leachate collection pipes within the area for which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction of the Phase II Section II Expansion south portion. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

SCENARIO 2

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, is completely open with no waste placement. Stormwater which enters the area is pumped to the swale adjacent to the Expansion using the leachate collection pump located within the sump through bypass piping.

- The bottom southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.80 acres, remains intact with a rain tarp over the existing sod.

- The top southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.43 acres, remains intact with a rain tarp over the existing sod.

- The southern portion of the Expansion, approximately 1.63 acres, has had an initial four foot lift of select loose municipal solid waste placed over the drainage sand layer. The waste will be offset 10 feet to the south of the interior separation berm along the north side of the area (which separates it from the Phase II Section II Expansion center portion). This waste thickness will bring the southern portion disposal area slightly below the western and southern perimeter berm. A temporary working face berm will be placed along the western and southern perimeters of the area to prevent stormwater runoff from the active filling area entering the adjacent stormwater swale. Additional waste will then be placed to make the first lift approximately 10 feet thick across the area and up against the Phase II Section I western sideslope within this area. During waste placement, the surface of the waste layer will be placed so it is sloped back "into" the landfill cell.

- The leachate generated will flow to the 8-inch diameter leachate collection pipes within the area for which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction of the Phase II Section II Expansion south portion. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

SCENARIO 3

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, is completely open with no waste placement. Stormwater which enters the area is pumped to the swale adjacent to the Expansion using the leachate collection pump located within the sump through bypass piping.

- The bottom southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.80 acres, remains intact with a rain tarp over the existing sod.

- The top southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.43 acres, remains intact with a rain tarp over the existing sod.

- The southern portion of the Expansion, approximately 1.63 acres, has waste placed in ten foot lifts (beginning with the offset 10 feet to the south of the interior separation berm along the north side of the area which separates it from the Phase II Section II Expansion center portion) and up against the Phase II Section I western sideslope to a depth of approximately 25 feet thick in the deepest portion identified as Fill Sequence No. 4. A temporary working face berm will be placed along the western and southern perimeters of the area to prevent stormwater runoff from the active filling area entering the adjacent stormwater swale. During waste placement, the surface of the waste layers will be placed so they are sloped back "into" the landfill cell.

- The leachate generated will flow to the 8-inch diameter leachate collection pipes within the area for which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction of the Phase II Section II Expansion south portion. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

SCENARIO 4

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area,

approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, is completely open and waste placement has just started. Prior to filling in the center portion the bypass piping used for Scenarios 1, 2, and 3 for this area to discharge the stormwater to the swale adjacent to the Expansion using the leachate collection pump within the sump will be capped. All liquid generated within this area from this point on will be considered leachate.

- The bottom southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.18 acres, has had the rain tarp and sod removed, the County has constructed a temporary sideslope berm as needed, and the area is ready for waste placement. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the Expansion northern portion (which will be covered with a rain tarp while waste filling is not occurring). This surface water runoff will then be pumped by the County from the northern portion area into the adjacent stormwater swale. Approximately 0.62 acres of the bottom southern sideslope portion remains intact with a rain tarp over the existing sod.

- The top southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.43 acres, remains intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, previously had waste placed to a depth of approximately 25 feet thick in the deepest portion across the Expansion and up against the Phase II Section I western sideslope within the area. No additional waste filling within the area has occurred vertically during this scenario. The temporary berms placed along the western and southern perimeters have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 5

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, has had an initial four foot lift of select loose municipal solid waste placed over the drainage sand layer. The waste will be offset 50 feet to the south of the interior separation berm along the north side of the area (which separates it from the Phase II Section II Expansion north portion). This waste thickness will bring the center portion disposal area slightly below the western perimeter berm. A temporary working face berm will be placed along the western side of the area to prevent stormwater runoff from the active filling area entering the adjacent stormwater swale. Additional waste will then be placed to make the first lift approximately 10 feet thick at the deepest section within the area and up against the bottom southern portion of the Phase I sideslope adjacent to the area. During waste placement, the surface of the waste layer will be placed so it is sloped back "into" the landfill cell. Prior to waste placement against the bottom southern portion of the Phase I sideslope, the County will construct a temporary sideslope berm as needed and will remove the rain tarp and existing sod from approximately 0.34 acres which will be open and ready for waste placement. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the Expansion northern portion (which will be covered with a rain tarp while waste filling is not occurring). This surface water runoff will then be pumped by the County from the northern portion area into the adjacent stormwater swale. The remainder of the bottom southern portion of the Phase I sideslope in this area of roughly 0.46 acres will remain intact with a rain tarp over the existing sod.

- The top southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.43 acres, remains intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, previously had waste

placed to a depth of approximately 25 feet thick in the deepest portion across the Expansion and up against the Phase II Section I western sideslope within the area. No additional waste filling within the area has occurred vertically during this scenario. The temporary berms placed along the western and southern perimeters have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 6

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, has had a ten foot thick lift of waste placed across the bottom and up against the bottom southern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.34 acres. The center portion of the Expansion will continue to have waste placed in ten foot lifts across the bottom to a depth of approximately 25 feet thick at the deepest section. Waste will also be placed up against the north sideslope of the south portion which will fill in the 10 foot offset south of the east west interior separation berm created during Fill Sequence No. 4. During waste placement, the surface of the waste layer will be placed so it is sloped back "into" the landfill cell. Waste will also be placed up against the bottom southern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.56 acres for an average depth of 10 feet over the sideslope. Prior to waste placement against the bottom southern portion of the Phase I sideslope, the County will construct a temporary sideslope berm as needed and will remove the rain tarp and existing sod within the area. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the Expansion northern portion (which will be covered with a rain tarp while waste filling is not occurring). This surface water runoff will then be pumped by the County from the northern portion area into the adjacent stormwater swale. The remainder of the bottom southern portion of the Phase I sideslope in this area of roughly 0.24 acres will remain intact with a rain tarp over the existing sod.

- The top southern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.43 acres, remains intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south

portion which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, previously had waste placed to a depth of approximately 25 feet thick in the deepest portion across the Expansion and up against the Phase II Section I western sideslope within the area. No additional waste filling within the area has occurred vertically during this scenario. The temporary berms placed along the western and southern perimeters have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 7

- The northern portion of the Phase II Section II Expansion, approximately 2.33 acres, is covered with a rain tarp.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.91 acres, remains intact with a rain tarp over the existing sod. Stormwater runoff from the rain-tarped sideslope enters the rain-tarped northern portion of the Expansion which is pumped to the stormwater swale adjacent to the Expansion.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, has had waste placed in ten foot lifts across the bottom and up against the northern sideslope of the south portion adjacent to the area and up against the bottom southern portion of the Phase I sideslope adjacent to the area for an average depth of 10 feet over the sideslope. The center portion of the Expansion, approximately 2.22 acres, will continue to have waste placed in ten foot lifts across the bottom to a depth of approximately 60 feet thick at the deepest section. Waste will also be placed up against the north sideslope of the south portion created during Fill Sequence No. 4. During waste placement, the surface of the waste layer will be placed so it is sloped back "into" the landfill cell. Waste will also be placed up against the bottom southern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.59 acres for an average depth of 25 feet over the sideslope. Prior to waste placement against the bottom southern portion of the Phase I sideslope, the County will construct a temporary sideslope berm as needed and will remove the rain tarp and existing sod. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the Expansion northern portion (which will be covered with a rain tarp while waste filling is not occurring). This surface water runoff will then be pumped by the County from the northern portion area into the adjacent stormwater swale. The remainder of the bottom southern portion of the Phase I sideslope in this area of roughly 0.21 acres will remain intact with a rain tarp over the existing sod.

- The County has constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area from approximately 0.33 acres within the top southern portion of the Phase I sideslope. Waste has been placed within this area for an average depth of approximately 25 feet. The remainder of the top southern portion of the Phase I sideslope in this area of roughly 1.10 acres will remain intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, previously had waste placed to a depth of approximately 25 feet thick in the deepest portion across the Expansion and up against the Phase II Section I western sideslope within the area. Waste has been placed up against the north sideslope of the area in the original 10 foot offset area created during Fill Sequence No. 4. Eventually, waste filling from the center portion will reach an elevation that waste will also be placed on the top of the south portion and the western and top portion of the Phase II Section I area previously filled in Fill Sequence No. 3 to a depth of approximately 60 feet thick at the deepest section. Filling in this manner from the center portion into the southern portion will meet the peak elevation previously obtained in Fill Sequence No. 3 of approximately EL 166 feet NGVD. The temporary berms placed have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 8

- The rain tarp on the northern portion of the Phase II Section II Expansion, approximately 2.33 acres, has been removed and is completely open and waste placement has just started.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.19 acres, has had the rain tarp and sod removed, the County has constructed a temporary sideslope berm as needed, and the area is ready for waste placement. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the adjacent stormwater swale. Approximately 0.72 acres of the bottom northern sideslope portion remains intact with a rain tarp over the existing sod.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, has had waste placed in ten foot lifts across the bottom to a depth of approximately 60 feet thick at the deepest section. Waste has also been placed up against the north sideslope of the south portion created during Fill Sequence No. 4. During waste placement, the surface of the waste layer was placed so it was sloped back "into" the landfill cell. Waste was also placed up against the bottom southern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.59 acres for an average depth of 25 feet over the sideslope. Prior to waste placement against the bottom southern portion of the Phase I sideslope, the County constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area. The remainder of the bottom southern portion of the Phase I sideslope in this area of roughly 0.21 acres will remain intact with a rain tarp over the existing sod.

- The County has constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area from approximately 0.33 acres within the top southern portion of the Phase I sideslope. Waste has been placed within this area for an average depth of approximately 25 feet. The remainder of the top southern portion of the Phase I sideslope in this area of roughly 1.10 acres will remain intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, has had waste placed up against the north sideslope of the area in the original 10 foot offset area created during Fill Sequence No. 4. Waste filling from the center portion reached an elevation that waste was also placed on the top of the south portion and the western and top portion of the Phase II Section I area previously filled in Fill Sequence No. 3 to a depth of approximately 60 feet thick at the deepest section. Filling in this manner from the center portion into the southern portion has met the peak elevation previously obtained in Fill Sequence No. 3 of approximately EL 166 feet NGVD. The temporary berms placed have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 9

- The northern portion of the Expansion, approximately 2.33 acres, has had an initial four foot lift of select loose municipal solid waste placed over the drainage sand layer to include the 50 foot offset to the south of the interior separation berm along the south side

of the area (which originally separated it from the Phase II Section II Expansion center portion). This waste thickness will bring the northern portion disposal area slightly below the northern and western perimeter berm. A temporary working face berm will be placed along the northern and western sides of the area to prevent stormwater runoff from the active filling area entering the adjacent stormwater swale. Additional waste will then be placed to make the first lift approximately 10 feet thick at the deepest section within the area and up against the north side of the center portion of the Expansion created in Fill Sequence No. 5 in the original fifty foot offset space when the center portion had been filled. During waste placement, the surface of the waste layer will be placed so it is sloped back "into" the landfill cell.

- The bottom northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 0.19 acres, has had the rain tarp and sod removed, the County has constructed a temporary sideslope berm as needed, and the area is ready for waste placement. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the adjacent stormwater swale. Approximately 0.72 acres of the bottom northern sideslope portion remains intact with a rain tarp over the existing sod.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, has had waste placed in ten foot lifts across the bottom to a depth of approximately 60 feet thick at the deepest section. Waste has also been placed up against the north sideslope of the south portion created during Fill Sequence No. 4. During waste placement, the surface of the waste layer was placed so it was sloped back "into" the landfill cell. Waste was also placed up against the bottom southern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.65 acres for an average depth of 25 feet over the sideslope. Prior to waste placement against the bottom southern portion of the Phase I sideslope, the County constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area. The remainder of the bottom southern portion of the Phase I sideslope in this area of roughly 0.15 acres will remain intact with a rain tarp over the existing sod.

- The County has constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area from approximately 0.33 acres within the top southern portion of the Phase I sideslope. Waste has been placed within this area for an average depth of approximately 25 feet. The remainder of the top southern portion of the Phase I sideslope in this area of roughly 1.10 acres will remain intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter leachate collection lines

located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, has had waste placed up against the north sideslope of the area in the original 10 foot offset area created during Fill Sequence No. 4. Waste filling from the center portion reached an elevation that waste was also placed on the top of the south portion and the western and top portion of the Phase II Section I area previously filled in Fill Sequence No. 3 to a depth of approximately 60 feet thick at the deepest section. Filling in this manner from the center portion into the southern portion has met the peak elevation previously obtained in Fill Sequence No. 3 of approximately EL 166 feet NGVD. The temporary berms placed have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 10

- The northern portion of the Expansion, approximately 2.23 acres, has had a ten foot thick lift of waste placed across the bottom and up against the bottom northern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.85 acres. The northern portion of the Expansion will continue to have waste placed in ten foot lifts across the bottom to a depth of approximately 25 feet thick at the deepest section. Waste will also be placed up against the north sideslope of the south portion created during Fill Sequence No. 4. During waste placement, the surface of the waste layer will be placed so it is sloped back "into" the landfill cell. Waste will also be placed up against the bottom northern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.85 acres for an average depth of 10 feet over the sideslope. Prior to waste placement against the bottom northern portion of the Phase I sideslope, the County will construct a temporary sideslope berm as needed and will remove the rain tarp and existing sod within the area. The temporary sideslope berm will direct the surface water runoff from the above sideslope area into the adjacent stormwater swale. The remainder of the bottom northern portion of the Phase I sideslope in this area of roughly 0.06 acres will remain intact with a rain tarp over the existing sod. This will roughly complete the filling up against the bottom northern portion of the Phase I sideslope in this area.

- The top northern sideslope portion of the Phase I sideslope adjacent to the area, approximately 1.22 acres, remains intact with a rain tarp over the existing sod.

- The center portion of the Expansion, approximately 2.22 acres, has had waste placed in ten foot lifts across the bottom to a depth of approximately 60 feet thick at the deepest section. Waste has also been placed up against the north sideslope of the south portion created during Fill Sequence No. 4. During waste placement, the surface of the waste layer was placed so it was sloped back "into" the landfill cell. Waste was also placed up against the bottom southern sideslope portion of the Phase I sideslope adjacent to the area for approximately 0.80 acres for an average depth of 25 feet over the sideslope. Prior to

waste placement against the bottom southern portion of the Phase I sideslope, the County constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area from approximately 0.80 acres.

- The County has constructed a temporary sideslope berm as needed and removed the rain tarp and existing sod within the area from approximately 0.33 acres within the top southern portion of the Phase I sideslope. Waste has been placed within this area for an average depth of approximately 25 feet. The remainder of the top southern portion of the Phase I sideslope in this area of roughly 1.10 acres will remain intact with a rain tarp over the existing sod.

- The leachate generated will be pumped from the Phase II Section II Expansion sump, through the forcemain and into the leachate collection sideslope risers located along the western side of the south portion of the Expansion. The sideslope risers are extensions of the 8-inch diameter leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter leachate collection lines located within the Phase II Section I area during construction. The leachate will flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

- The southern portion of the Expansion, approximately 1.63 acres, has had waste placed up against the north sideslope of the area in the original 10 foot offset area created during Fill Sequence No. 4. Waste filling from the center portion reached an elevation that waste was also placed on the top of the south portion and the western and top portion of the Phase II Section I area previously filled in Fill Sequence No. 3 to a depth of approximately 60 feet thick at the deepest section. Filling in this manner from the center portion into the southern portion has met the peak elevation previously obtained in Fill Sequence No. 3 of approximately EL 166 feet NGVD. The temporary berms placed have been maintained to prevent stormwater runoff from the area entering the adjacent stormwater swale.

SCENARIO 11

- The northern portion of the Expansion has had waste placed to final grades.

- The bottom northern portion of the Phase I sideslope has had waste placed to final grades.

- The top northern portion of the Phase I sideslope has had waste placed to final grades.

- The center portion of the Expansion has had waste placed to final grades.

- The bottom southern portion of the Phase I sideslope has had waste placed to final grades.

- The top southern portion of the Phase I sideslope has had waste placed to final grades.

- The southern portion of the Expansion has had waste placed to final grades.

HELP MODEL INPUTS

The HELP model allows the user to input soil, waste, or material types in order to simulate the leachate percolation through the landfill. The HELP model user's guide suggests using 0.5 to 1.0 pinholes per acre should account for manufacturers and construction defects for the HDPE geomembrane liner. To be conservative, one pinhole per acre was used within the HELP model.

The HELP model also ranks geomembrane installation on a scale of 1 to 5, with 1 being perfect installation and 5 being the worst-case scenario for installation. The worst-case scenario assumes that the contact between the geomembrane and adjacent soil does not limit the drainage rate, resulting in a leakage rate controlled only by the pinhole. An installation ranking of 3 was used, which represents good field installation with well-prepared, smooth soil surface and good geomembrane wrinkle control to insure good contact between geomembrane and adjacent soil that limits drainage rate. Input data is summarized below in Table G-1 for each of the above-mentioned Scenarios 1 through 11. Refer to the HELP model runs located in Attachment G-11.

Table G-1 HELP Model Input Data

	Thickness (inches)	Soil Texture Number	USCS Description	Hydraulic Conductivity (cm/sec)	Comments
South, Center and North Portions Bottom Waste Depth = 0 ft					
Protective Sand Layer	24	5	SM	1.0×10^{-3}	
Bi-planar Geocomposite	0.30			11.9	
60 mil Textured Liner	0.06	35	HDPE Membrane	2.0×10^{-13}	1 pinhole/acre (per EPA HELP Model Guide)
Tri-planar Geocomposite	0.30			40.7	
60 mil Textured Liner	0.06	35	HDPE Membrane	2.0×10^{-13}	1 pinhole/acre (per EPA HELP Model Guide)
GCL	0.25	17	GCL	3.0×10^{-9}	
South, Center and North Portions Bottom Waste Depth = 10 ft					
Daily Cover	6	5	SM	1.0×10^{-3}	
Waste Layer	120	19	Municipal Waste w/ Channeling	1.0×10^{-3}	
Protective Sand Layer	24	5	SM	1.0×10^{-3}	
Bi-planar Geocomposite	0.30			11.9	Transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	2.0×10^{-13}	1 pinhole/acre (per EPA HELP Model Guide)
Tri-planar Geocomposite	0.30			40.7	Transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	2.0×10^{-13}	1 pinhole/acre (per EPA HELP Model Guide)

	Thickness (inches)	Soil Texture Number	USCS Description	Hydraulic Conductivity (cm/sec)	Comments
GCL	0.25	17	GCL	$3.0x10^{-9}$	
South, Center and North Portions Bottom Waste Depth = 25 ft					
Daily Cover	6	5	SM	$1.0x10^{-3}$	
Waste Layer	60	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Protective Sand Layer	24	5	SM	$1.0x10^{-3}$	
Bi-planar Geocomposite	0.273			7.2	Reduced transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
Tri-planar Geocomposite	0.273			29.4	Reduced transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
GCL	0.25	17	GCL	$3.0x10^{-9}$	
South, Center and North Portions Bottom Waste Depth = 60 ft					
Intermediate Cover	18	5	SM	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Protective Sand Layer	24	5	SM	$1.0x10^{-3}$	

	Thickness (inches)	Soil Texture Number	USCS Description	Hydraulic Conductivity (cm/sec)	Comments
Bi-planar Geocomposite	0.261			5.3	Reduced transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
Tri-planar Geocomposite	0.261			21.8	Reduced transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
GCL	0.25	17	GCL	$3.0x10^{-9}$	
Bottom Southern Sideslope Phase I, Top Southern Sideslope Phase I, Bottom Northern Sideslope Phase I and Top Northern Sideslope Phase I (With Sod) Waste Depth = 0 ft					
Protective Sand Layer	24	5	SM	$1.0x10^{-3}$	
Bi-planar Geocomposite	0.33			7.8	
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
Subbase	24	5	SM	$1.0x10^{-3}$	
Bottom Southern Sideslope Phase I and Bottom Northern Sideslope Phase I (No Sod) Waste Depth = 0 ft					
Protective Sand Layer	24	5	SM	$1.0x10^{-3}$	
Bi-planar Geocomposite	0.33			7.8	
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
Subbase	24	5	SM	$1.0x10^{-3}$	
Bottom Southern Sideslope Phase I and Bottom Northern Sideslope Phase I Waste Depth = 10 ft					
Daily Cover	6	5	SM	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Protective Sand Layer	24	5	SM	$1.0x10^{-3}$	
Bi-planar Geocomposite	0.33			7.8	Transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
Subbase	24	5	SM	$1.0x10^{-3}$	
Bottom Southern Sideslope Phase I, Top Southern Sideslope Phase I and Bottom Northern Sideslope Phase I Waste Depth = 25 ft					
Daily Cover	6	5	SM	$1.0x10^{-3}$	

	Thickness (inches)	Soil Texture Number	USCS Description	Hydraulic Conductivity (cm/sec)	Comments
Waste Layer	60	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Waste Layer	120	19	Municipal Waste w/ Channeling	$1.0x10^{-3}$	
Protective Sand Layer	24	5	SM	$1.0x10^{-3}$	
Bi-planar Geocomposite	0.30			5.7	Reduced transmissivity/hydraulic conductivity
60 mil Textured Liner	0.06	35	HDPE Membrane	$2.0x10^{-13}$	1 pinhole/acre (per EPA HELP Model Guide)
Subbase	24	5	SM	$1.0x10^{-3}$	

Provided below are summary Tables G-2 through G-25 identifying the results of the HELP model analysis for the above-mentioned Scenarios. Please refer to Attachment G-11 for the HELP model runs and a summary table of the results provided below. In addition, the anticipated leachate volume generated from the leachate collection system and leachate detection system is provided for each Scenario.

Table G-2 Expansion South Portion Bottom Waste Depth = 0 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.280	12,611.95	65.52	0.000	46.67	0.24

Note: *Leachate collected is on a per acre basis.

Table G-3 Expansion South Portion Bottom Waste Depth = 10 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.134	7,045.82	36.60	0.001	34.62	0.18

Note: *Leachate collected is on a per acre basis.

Table G-4 Expansion South Portion Bottom Waste Depth = 25 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.123	3,921.42	20.37	0.000	33.34	0.17

Note: *Leachate collected is on a per acre basis.

Table G-5 Expansion South Portion Bottom Waste Depth = 60 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.083	1,925.07	10.00	0.001	27.08	0.14

Note: *Leachate collected is on a per acre basis.

Table G-6 Expansion Center Portion Bottom Waste Depth = 0 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.280	12,611.95	65.52	0.000	46.67	0.24

Note: *Leachate collected is on a per acre basis.

Table G-7 Expansion Center Portion Bottom Waste Depth = 10 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.134	7,045.82	36.60	0.001	34.64	0.18

Note: *Leachate collected is on a per acre basis.

Table G-8 Expansion Center Portion Bottom Waste Depth = 25 Feet (Peak Values)

	Collection System	Detection System

	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.123	3,921.42	20.37	0.000	33.34	0.17

Note: *Leachate collected is on a per acre basis.

Table G-9 Expansion Center Portion Bottom Waste Depth = 60 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.10 ft Slope = 2.20%	0.261	1,925.07	10.00	0.001	27.08	0.14

Note: *Leachate collected is on a per acre basis.

Table G-10 Expansion North Portion Bottom Waste Depth = 0 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.5 ft Slope = 2.20%	0.283	12,617.35	65.54	0.000	46.82	0.24

Note: *Leachate collected is on a per acre basis.

Table G-11 Expansion North Portion Bottom Waste Depth = 10 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.5 ft Slope = 2.20%	0.135	7,046.71	36.61	0.001	34.75	0.18

Note: *Leachate collected is on a per acre basis.

Table G-12 Expansion North Portion Bottom Waste Depth = 25 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*

Length = 53.5 ft Slope = 2.20%	0.273	3,935.12	20.44	0.002	33.53	0.17

Note: *Leachate collected is on a per acre basis.

Table G-13 Expansion North Portion Bottom Waste Depth = 60 Feet (Peak Values)

	Collection System			Detection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 53.5 ft Slope = 2.20%	0.261	1,925.07	10.00	0.000	27.18	0.14

Note: *Leachate collected is on a per acre basis.

Table G-14 Phase I Sideslope Bottom Southern Sideslope (With Sod) Waste Depth = 0 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.030	9,546.75	49.59

Note: *Leachate collected is on a per acre basis.

Table G-15 Phase I Bottom Southern Sideslope Waste Depth = 10 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.038	7,083.94	36.80

Note: *Leachate collected is on a per acre basis.

Table G-16 Phase I Bottom Southern Sideslope Waste Depth = Open Cell, 0 Feet (Peak Values)

	Collection System

	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.022	9,601.70	49.88

Note: *Leachate collected is on a per acre basis.

Table G-17 Phase I Bottom Southern SideslopeWaste Depth = 25 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.015	3,880.14	20.16

Note: *Leachate collected is on a per acre basis.

Table G-18 Phase I Top Southern Sideslope With SodWaste Depth = 0 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 105 ft Slope = 33.33%	0.045	9,494.95	49.32

Note: *Leachate collected is on a per acre basis.

Table G-19 Phase I Top Southern Sideslope Waste Depth = 25 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 105 ft Slope = 33.33%	0.049	3,872.44	20.12

Note: *Leachate collected is on a per acre basis.

Table G-20 Phase I Sideslope Bottom Northern Sideslope (With Sod) Waste Depth = 0 Feet

(Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.030	9,546.75	49.59

Note: *Leachate collected is on a per acre basis.

Table G-21 Phase I Bottom Northern Sideslope Waste Depth = Open Cell, 0 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.022	9,601.70	49.88

Note: *Leachate collected is on a per acre basis.

Table G-22 Phase I Bottom Northern Sideslope Waste Depth = 10 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.038	7,083.94	36.80

Note: *Leachate collected is on a per acre basis.

Table G-23 Phase I Bottom Northern Sideslope Waste Depth = 25 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 75 ft Slope = 33.33%	0.015	3,880.14	20.16

Note: *Leachate collected is on a per acre basis.

Table G-24 Phase I Sideslope Top Northern Sideslope (With Sod) Waste Depth = 0 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 105 ft Slope = 33.33%	0.045	9,494.95	49.32

Note: *Leachate collected is on a per acre basis.

Table G-25 Phase I Top Northern Sideslope Waste Depth = 15 Feet (Peak Values)

	Collection System		
	Maximum Head on Liner (inch)	Leachate Collected (ft^3/day)*	Leachate Collected (gal/min)*
Length = 105 ft Slope = 33.33%	0.037	5,313.60	27.60

Note: *Leachate collected is on a per acre basis.

As shown in the above Tables G-2 through G-25, the addition of waste decreases the amount of leachate produced. In all HELP model runs, the head in the primary and secondary LCRS is less than the thickness of the bi-planar geocomposite and secondary tri-planar geocomposites as identified in Table G-26 below. In addition, please refer to Attachment G-11 for the HELP model runs and a summary table of the results.

Table G-26 Leachate Depth in LCRS

	Depth of Waste (Feet)	Thickness of Primary Geocomposite (Inches)	Maximum Leachate Head (Inches)	Thickness of Secondary Geocomposite (Inches)	Maximum Leachate Head (Inches)
Expansion Bottom South	0	0.300	0.280	0.300	0.000
Expansion Bottom South	10	0.300	0.134	0.300	0.001
Expansion Bottom South	25	0.273	0.123	0.273	0.000
Expansion Bottom South	60	0.261	0.083	0.261	0.001
Expansion Bottom Center	0	0.300	0.280	0.300	0.000
Expansion	10	0.300	0.134	0.300	0.001

Bottom Center					
Expansion Bottom Center	25	0.273	0.123	0.273	0.000
Expansion Bottom Center	60	0.261	0.083	0.261	0.001
Expansion Bottom North	0	0.300	0.283	0.300	0.000
Expansion Bottom North	10	0.300	0.135	0.300	0.001
Expansion Bottom North	25	0.273	0.125	0.273	0.002
Expansion Bottom North	60	0.261	0.000	0.261	0.000
Phase I Bottom South Sideslope (With Existing Sod)	0	0.330	0.030	N/A*	N/A*
Phase I Bottom South Sideslope (No Sod)	0	0.330	0.022	N/A*	N/A*
Phase I Bottom South Sideslope	10	0.330	0.038	N/A*	N/A*
Phase I Bottom South Sideslope	25	0.300	0.015	N/A*	N/A*
Phase I Top South Sideslope (With Existing Sod)	0	0.330	0.045	N/A*	N/A*
Phase I Top South Sideslope	25	0.300	0.049	N/A*	N/A*
Phase I Bottom North Sideslope (With Existing Sod)	0	0.330	0.030	N/A*	N/A*
Phase I Bottom North Sideslope (No Sod)	0	0.330	0.022	N/A*	N/A*
Phase I Bottom North Sideslope	10	0.330	0.038	N/A*	N/A*
Phase I Bottom North Sideslope	25	0.300	0.015	N/A*	N/A*
Phase I Top North Sideslope (With Existing Sod)	0	0.330	0.045	N/A*	N/A*
Phase I Top North Sideslope	15	0.300	0.037	N/A*	N/A*

Note: *Phase I sideslope only has a primary geocomposite, no secondary geocomposite installed.

G.2.c.2.5 Design of LCRS Pipes

The leachate collection and removal system is designed to limit the hydraulic head on the liner to the thickness of the geocomposite layer. The primary leachate collection system is composed of double-sided bi-planar geocomposite laid over the primary HDPE liner along the bottom and sides of the cell. The geocomposite is designed to maintain a high flow rate under the load exerted by the full height of the landfill waste.

The flow capacity of the LCRS lateral pipes must be greater than the flow entering the pipes from the geocomposite. The LCRS lateral pipes are 8-inch diameter HDPE SDR 11 pipe except for the LCRS lateral pipes at the toe of slope where the Phase II Section II Expansion joins the Phase I area where the LCRS lateral pipes will be 10-inch diameter HDPE SDR 11 pipe. Please refer to Attachment G-12 for the LCRS lateral trench and pipe capacity calculations.

The LCRS lateral pipes transport the leachate to a 12-inch diameter HDPE SDR 11 header pipe, which in turn transports the leachate to the leachate collection sump. The flow capacity of the LCRS header pipe must be greater than the flow entering the header pipe from the LCRS lateral pipes. Please refer to Attachment G-13 for the LCRS header pipe capacity calculations.

During Fill Sequence No. 1 through Fill Sequence No. 3, as indicated on the Drawings, stormwater accumulated within the Phase II Section II Expansion sump will be pumped into the adjacent stormwater swale using the leachate collection pump through the use of piping and a bypass valve.

In addition, during waste filling operations identified as Fill Sequence No. 4 through Fill Sequence No. 6, as indicated on Drawings, leachate will be pumped from the leachate collection sump (via the leachate collection and leachate detection pumps) through a force main to the three 8-inch diameter HDPE SDR 11 leachate collection sideslope risers located in the south portion of the Phase II Section II Expansion. Valves located at each of the sideslope risers can be manually opened or closed by the County as needed to allow the leachate into any of the sideslope risers individually or to all three at the same time. During normal operations, all valves on the sideslope risers will remain open which will distribute leachate flow into each of the three risers.

Based on the HELP Model analyses the worst-case operating Scenario regarding leachate generation from the Phase II Section II Expansion center and northern portions which would be pumped would be Scenario 8. During this scenario approximately 202.93 gpm of leachate is generated from the north and center collection portions and 0.88 gpm of leachate is generated from the north and center detection portions which will be pumped from the Phase II Section II Expansion sump through the force main into the south portion leachate collection sideslope risers for a total of 203.81 gpm.

Based on the HELP Model analyses the worst-case operating Scenario regarding leachate generation from the Phase II Section II Expansion center and northern portions and also the leachate generated in the Phase II Section II Expansion south portion would be Scenario 8 and Scenario 3, respectively. During this operating Scenario approximately 202.93 gpm of leachate is generated from the Phase II Section II Expansion north and center collection portions, 0.88

gpm of leachate is generated from the Phase II Section II Expansion north and center detection portions, and 33.20 gpm is generated from the Phase II Section II Expansion south portion collection system for a total of approximately 237.01 gpm. This amount of leachate will be added to the flow in the existing 8-inch leachate collection pipes within the Phase II Section I area.

Therefore, assuming the worst-case operating Scenario would be if all of the leachate pumped from the Phase II Section II Expansion sump would go into only one of the three leachate collection sideslope risers in the Phase II Section II Expansion south portion and that all of the leachate would be collected in one of the south portion leachate collection laterals. Therefore, the worst case design flow to the leachate collection pipes within the Phase II Section II Expansion south portion would be approximately 237.01 gpm (202.93 gpm + 0.88 gpm + 33.20 gpm).

HELP Model analysis were conducted on the existing conditions of the Phase II Section I area to determine an existing amount of leachate generation from the area. Based on an existing waste depth of 40 feet within the 5-acre area, peak conditions indicate that approximately 74.71 gpm is generated. In addition, additional HELP Models were conducted on the existing conditions of the Phase I south sideslope area to determine an existing amount of leachate generation from the area which also flows into the Phase II Section I area. A rain tarp and stormwater outlet pipes divert stormwater away from the active filling area along the sideslope. Based on a waste depth of 10 feet within half of the sideslope area (0.65-acres due to the rain tarp), peak conditions indicate that approximately 23.84 gpm is generated from the sideslope area. Therefore, approximately 98.55 gpm (74.71 gpm + 23.84 gpm) is currently being transported by the existing Phase II Section I leachate collection pipes.

Based on the above-mentioned HELP Model information, the maximum flow to the existing leachate collection pipes within the Phase II Section I area is approximately 335.56 gpm (202.93 gpm + 0.88 gpm + 33.20 gpm + 74.71 gpm + 23.84 gpm).

Therefore, in order to size the 8-inch leachate collection pipes within the Phase II Section II Expansion south portion and also confirm the adequacy of the existing 8-inch leachate collection pipes within the Phase II Section I area, the worst-case flow of 335.56 gpm was utilized. The flow capacity of the LCRS lateral pipe must be greater than the flow entering the pipe from the geocomposite within the area and the flow pumped into the LCRS pipe from the Phase II Section II Expansion. The LCRS lateral pipes are 8-inch diameter HDPE SDR 11 pipe. At the estimated slope after expected settlement, the 8-inch LCRS has a capacity of approximately 587 gpm. Based on the estimated peak flow generated of 335.56 gpm there is a factor of safety of approximately 1.8 for the 8-inch LCRS lateral pipe. Therefore, if one 8-inch diameter HDPE SDR 11 LCRS lateral pipe is sufficient to carry all of the flow as described above, distributing the leachate flow through three 8-inch diameter HDPE SDR 11 LCRS lateral pipes will adequately carry the flow as needed. Refer to Section G.2.c.2.8 for information regarding the force main piping network.

The existing LCRS collection pump in the Phase II Section I area is a Sligo Series 3-7.5-4 Pump which is sufficient to handle the anticipated flow. The existing LCRS detection pump in the

Phase II Section I area is a Sligo Series 1-0.34-2 PSF Pump which is sufficient to handle the anticipated flow.

G.2.c.2.6 Design of LCRS Pumps

Peak daily leachate flows indicated from the HELP model were used to assess the appropriate size of the leachate pumps. SCS also considered a special design case (Scenario 1) for the pumps recognizing that solid waste operations can be substantially affected by a 24-hour 25-year storm event, especially early in the filling operation. The Southwest Florida Water Management District (SWFWMD) Twenty Four Hour Twenty Five Year Return Period Rainfall Map for the Hardee County Landfill indicates that the total rainfall amount that occurs during a 24-hour 25-year storm event is 8.2 inches. In effect, periodically generated leachate flows are erratic and can be greater over a short period of time than with the assumption of constant hydraulic conductivity. Thus, the leachate pumping system should be designed with a greater capacity to absorb these periodic higher flow discharges. This special case will consider major short-circuiting of rainfall into the collection system caused by virtually no attenuation offered by in-place waste. Essentially this is a flooded condition in the cell. Thus, in order to account for these irregularities in leachate flow, the leachate pump design also included considerations for the 24-hour 25-year design storm event totaling 8.2 inches in the cell which would be pumped down by the leachate pump to normal conditions within approximately 72 hours.

To reduce the head on the liner to 12 inches within three days of the 24-hour 25-year storm event of 8.2 inches as required, the sump will be required to pump at a rate of approximately 171 gallons per minute (gpm). The leachate sump will consist of one leachate pump for handling flow from the primary leachate collection system and one leachate detection pump for handling flow from the secondary leachate detection system. The leachate pumps will be located within a sideslope riser pipe at the low point in the sump to allow easy access. The leachate collection pump is rated at 320 gpm and the leachate detection pump is rated at 60 gpm. Please refer to Attachment G-14 for the leachate collection and leachate detection pump sizing calculations.

G.2.c.2.7 Size of Leachate Sump

The leachate sump is sized to provide an adequate temporary storage volume for leachate to prevent the leachate pumps from cycling on and off excessively. The proposed sump provides a net storage capacity of approximately 1,346 gallons. Leachate pump manufacturers recommend no more than 15 cycles per hour, or approximately once every four minutes. The volume of the sump was sized such that the volume provided will allow the pump cycle times to be less than the cycle time recommended by the manufacturer (thus extending the life of the pumps by not excessively starting and stopping). Please refer to Attachment G-15 for the leachate sump sizing calculations. As cell waste volume increases and leachate flows begin to drop, the County may decide to change to smaller pumps that are better matched to the lower flows so that adequate running time for the pumps is provided.

G.2.c.2.8 Leachate Force Main

The leachate sump is equipped with submersible pumps that discharge the leachate out of the

sump through a pipeline and out of the cell. From that point the leachate will travel in a pressure pipeline (i.e., a force main) to any or all three leachate collection sideslope risers located along the western side of the south portion of the Phase II Section II Expansion through a series of valves. The leachate force main is sized to serve the flow from the leachate collection and detection pumps. The sideslope risers are extensions of the 8-inch diameter HDPE SDR 11 leachate collection pipes for the Phase II Section II Expansion south portion which will be connected to the existing 8-inch diameter HDPE SDR 11 leachate collection lines located within the Phase II Section I area during construction. Leachate flow to the three leachate collection sideslope risers will be directed by the County through valves located at each of the risers as needed. During normal operations all valves will remain open which will distribute leachate flow into each of the risers. Please refer to the Drawings which identify the force main piping network.

Leachate will then flow via gravity to the existing leachate collection sump and pumps located within the Phase II Section I area. From the Phase II Section I sump the leachate will be pumped into the existing above ground leachate storage tanks.

These two leachate storage tanks can hold 79,000 gallons each. The County has secured interlocal agreements with the three surrounding wastewater treatment plants (WWTPs) for leachate disposal. The WWTPs and their respective leachate disposal quantities are as follows:

- City of Wauchula WWTP - 35,000 gal/day
- Wauchula Hills WWTP - 63,000 gal/day
- Vandolah WWTP - 25,000 gal/day

G.2.c.3 Subbase Design

Rule 62-701.400(3)(c)1, FAC requires that the subbase below the lower geomembrane be a minimum of 6-inches thick, free of sharp materials or any materials larger than one-half inch, and have a saturated hydraulic conductivity equal to or less than $1x10^{-5}$ cm/sec. The subbase for the liner system will be constructed of existing native soil and fill placed over native soil and graded as shown on the construction permit applications drawings located in Attachment E-2. The subbase will be prepared as described in the Technical Specifications included in the CQA Plan provided in Attachment G-1.

A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$cm/sec will be used as an equivalent substitute for the 6-inch thick prepared soil subbase required by Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in the CQA Plan provided in Attachment G-1.

The lowest proposed elevation of the bottom lining system for the Phase II Section II Expansion area is the leachate collection sump at EL 78.5 feet NGVD. Due to the fluctuations of the groundwater table within the area of the sump and a portion of the cell bottom, as further discussed in Section I of this construction permit application, an additional layer of 60 mil textured HDPE geomembrane liner will be placed under the GCL and welded to the secondary

60 mil textured HDPE geomembrane liner. This additional layer of 60 mil textured HDPE geomembrane liner will help prevent the "wet-dry" cycles of the GCL due to the fluctuations of the groundwater table. Requirements for the additional layer of liner below the GCL has been included within the Technical Specifications located in Attachment G-1 and the construction permit application drawings located in Attachment E-2. The bottom liner system in relation to the groundwater table is further addressed in Section I of this construction permit application.

G.2.c.4 Leak Detection System Design Criteria

The leak detection system (LDS) is designed to limit the hydraulic head on the lower liner to less than the thickness of the leak detection system geonet. The LDS consists of the LDS drainage layer, trenches, headers, and pumps. The secondary leachate collection system is composed of double-sided, tri-planar geocomposite placed over the secondary HDPE liner along the bottom and sides of the cell. The geocomposite is designed to maintain a high flow rate under the load exerted by the full height of the landfill waste.

Per 62-701.400(3)(c)(2), FAC the leak detection and secondary leachate collection system shall have a minimum hydraulic conductivity of ten centimeters per second (cm/sec), shall be designed to limit the maximum hydraulic head on the lower liner to one inch, and shall not allow the leachate head to exceed the thickness of the drainage layer. The hydraulic conductivity of the leak detection and secondary collection system material shall be derived from transmissivity and thickness measurements.

According to the HELP model results located in Attachment G-11 and summarized above in Tables G-2 through G-25, the maximum hydraulic head on the Expansion secondary liner is 0.002 inches, which is less than the thickness of the drainage layer tri-planar geocomposite. Therefore, a tri-planar geocomposite can be used for the secondary leachate collection system. A tri-planar geocomposite can achieve this hydraulic conductivity after accounting for all the reduction factors and while keeping the maximum head within the geocomposite thickness in the secondary system throughout the range of expected loadings.

The HELP model was also used to estimate flow into the leak detection system. Using Scenario 8, as described above, the estimated peak flow through the primary liner into the secondary collection system is approximately 0.88 gpm. The flow capacity of the LDS swales must be greater than the rate of flow entering them. Each LDS swale includes one additional layer of 300 mil tri-planar geocomposite to transport the anticipated flow. Refer to Attachment G-16 for the flow capacity calculations of the LDS trenches using one additional layer of 300 mil tri-planar geocomposite. For the maximum anticipated loading condition, the calculated flow capacity of the LDS trench with one additional layer of tri-planar geocomposite is greater than the calculated rate of flow entering the LDS trench. Therefore, the flow capacity of the LDS trench is adequate.

The LDS trenches transport the leachate to a center header trench which has an 8-inch diameter HDPE SDR 11 header pipe for a portion of the trench, which in turn transports the leachate to the leachate collection sump. The flow capacity of the LDS header pipe must be greater than the flow entering the header pipe from the LDS trenches. At a slope of 0.93 percent after expected settlement, the LDS header pipe has a capacity of approximately 520 gpm flowing full. The

maximum flow according to the HELP model is 202.93 cubic feet/day or approximately 0.88 gpm. The pipe capacity is more than the flow entering from the LDS trenches.

G.2.d Standards for Geosynthetic Components

The geosynthetic components of the bottom liner for the Phase II Section II Expansion area will meet the requirements specified by Rule 62-701.400(3)(d), FAC for double liner systems. The properties for the GCL, 60 mil primary and secondary HDPE geomembrane liners, primary and secondary geocomposite drainage layer materials, rain tarp, and soil cover are described in the Technical Specifications that are presented in the CQA Plan located in Attachment G-1.

G.2.d.1 Geomembrane Seams

Geomembrane seam strength will be tested as required by Rule 62-701.400(3)(d)(1), FAC. All field seams will be visually inspected and tested for seam continuity using suitable non-destructive techniques as described in the Technical Specifications and the CQA Plan presented in Attachment G-1. The Technical Specifications and CQA Plan for the geomembrane including seams are presented in Attachment G-1.

G.2.d.2 Spark Test

Rule 62-701.400(3)(d)2, FAC requires liners used in landfills to be subjected to continuous spark testing by the manufacturer at the factory, with no defects found. The manufacturer of the HDPE geomembrane will be required to test the geomembrane using a continuous spark test. Only HDPE geomembranes found to have no defects will be used at the proposed Phase II Section II Expansion. The Technical Specifications and CQA Plan requiring continuous spark testing for the geomembrane are presented in Attachment G-1.

G.2.d.3 Protective Layers over Upper Liner

A 24-inch thick protective sand layer will be placed on top of the double-sided primary geocomposite material. The sand layer will be installed across the entire bottom and sideslopes of the cell prior to the placement of the first lift of waste. All materials in direct contact with the liner shall be free of sharp materials or any materials larger than one half inch. The Technical Specifications and CQA Plan for the protective sand layer are presented in Attachment G-1.

G.2.d.4 First Layer of Waste

Hardee County Landfill personnel will take care when placing the first layer of waste over the 24-inch protective sand layer. This first layer of waste will consist of selected wastes containing no large, rigid objects that might damage the liner or leachate collection system and will be a minimum of four feet in compacted thickness. In order to minimize disturbance of the protective layer, traffic will be prohibited from traveling directly on top of the sand drainage layer. The first lift of waste will be deposited from the top of an adjacent working face, if possible, or otherwise from the end of a temporary dirt haul road.

G.2.d.5 HDPE Geomembrane Specification

The Technical Specifications are presented with the CQA Plan in Attachment G-1. The Technical Specifications include definitions and requirements for the manufacture, handling, installation and quality control for geomembranes and other geosynthetics. HDPE geomembranes will be required to meet the specifications of GRI GM13.

G.2.d.6 PVC Geomembranes

PVC geomembranes will not be used for the Hardee County Landfill Phase II Section II Expansion. Therefore, this requirement is not applicable to this project.

G.2.d.7 Interface Shear Strength Testing

Per Rule 62-701.400(3)(d)7, laboratory interface shear strength testing will be conducted on representative samples of the actual lining system components proposed for use in accordance with the following testing parameters. The required interface shear strength properties and testing parameters are included in the Technical Specifications presented with the CQA Plan in Attachment G-1. The results of this testing will be submitted to the FDEP prior to or during construction.

- Interface Friction Angle (ASTM D5321) testing configuration of protective soil material and the bi-planar geocomposite material. The testing criteria will be as follows. The proposed protective soil material shall be prepared and molded to a minimum of 90% of the standard proctor (ASTM D698). The direct shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 1 hour. Fully saturate soil prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak interface friction angle shall be 20.5 degrees. The interface friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in ASTM D5321. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective interface friction angle.

- Interface Friction Angle (ASTM D5321) testing configuration of bi-planar geocomposite and the 60 mil textured HDPE geomembrane material. The testing criteria will be as follows. The direct shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 1 hour. Fully saturate soil prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak interface friction angle shall be 20.5 degrees. The interface friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in ASTM D5321. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective interface friction angle.

- Interface Friction Angle (ASTM D5321) testing configuration of tri-planar geocomposite and the 60 mil textured HDPE geomembrane material. The testing criteria will be as follows. The direct shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 1 hour. Fully saturate soil prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak interface friction angle shall be 20.5 degrees. The interface friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in ASTM D5321. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective interface friction angle.

- Interface Friction Angle (ASTM D6243) testing configuration of GCL and the 60 mil textured HDPE geomembrane material. The testing criteria will be as follows. The shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 24 hours. Fully saturate interface prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak interface friction angle shall be 20.5 degrees. The interface friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in ASTM D6243. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective interface friction angle.

- Interface Friction Angle (ASTM D6243) testing configuration of GCL and the subbase material. The testing criteria will be as follows. The shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 24 hours. Fully saturate interface prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak interface friction angle shall be 20.5 degrees. The interface friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in ASTM D6243. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective interface friction angle.

- Interface Friction Angle (ASTM D6243) testing configuration of the 60 mil textured HDPE geomembrane material and the subbase. The testing criteria will be as follows. The shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 24 hours. Fully saturate interface prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak interface friction angle shall be 20.5 degrees. The interface friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in

ASTM D6243. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective interface friction angle.

- Internal Shear Resistance (ASTM D6243) GCL material. The testing criteria will be as follows. The shear box shall be a minimum of 12 inches by 12 inches. Each normal load shall be preloaded at the specified normal load for a minimum of 24 hours. Fully saturate interface prior to testing for each normal load. The specified testing normal stresses are 1,000, 2,000, and 4,000 psf. The strain rate is 1 mm/min (0.04 in/min). The minimum peak internal shear friction angle shall be 20.5 degrees. The internal shear friction angle shall be the result of a linear regression line drawn continuously through the three shear strength results obtained for the normal loads specified following the procedures outlined in ASTM D6243. The results of peak and residual values shall be provided, the adhesion value may be considered in determining the effective internal shear friction angle.

G.2.d.8 Transmissivity Testing

Per Rule 62-701.400(3)(d)8, the transmissivity of the geonets shall be tested with method ASTM D4716, or an equivalent test method, to demonstrate that the design transmissivity will be maintained for the design period of the facility. The testing for the geonet in the liner system shall be conducted using actual boundary materials intended for the geonet at the maximum design normal load for the landfill. At the maximum design normal load, testing shall be conducted for a minimum period of 100 hours unless data equivalent to the 100-hour period is provided in which case the test shall be conducted for a minimum period of one hour.

Laboratory transmissivity testing will be performed on the bi-planar and tri-planar geocomposites and the results of this testing will be submitted to FDEP with the Construction Certification Report. The required transmissivity properties are included in the Technical Specifications presented in Attachment G-1.

- Per ASTM D4716 with a normal stress of 4,000 psf; water at 20^{o}C (68^{o}F); with a gradient of 0.02; testing configuration of Ottawa sand/bi-planar geocomposite/60 mil textured HDPE geomembrane material; and a test time period of 100 hours. Apply normal stress, under saturated conditions, for 1 hour minimum prior to start of test. Test data shall indicate that transmissivity values when tested in excess of 100 hours do not fall below the minimum value specified. Report shall provide hydraulic conductivity and transmissivity values.

- Per ASTM D4716 with a normal stress of 4,000 psf; water at 20^{o}C (68^{o}F); with a gradient of 0.02; testing configuration of 60 mil textured HDPE geomembrane material /tri-planar geocomposite/60 mil textured HDPE geomembrane material; and a test time period of 100 hours. Apply normal stress, under saturated conditions, for 1 hour minimum prior to start of test. Test data shall indicate that transmissivity values when tested in excess of 100 hours do not fall below the minimum value specified. Report shall provide hydraulic conductivity and transmissivity values.

G.2.d.9 Hydraulic Conductivity Testing of Geosynthetic Clay Liners

Per Rule 62-701.400(3)(d)9, FAC hydraulic conductivity testing will be performed on the GCL and the results of this testing will be submitted to the FDEP with the Construction Certification Report. The required hydraulic conductivity properties are included in the Technical Specification 02077 - Geosynthetic Clay Liner presented in Attachment G-1.

The hydraulic conductivity of the GCL shall be tested with method ASTM D5887, or ASTM D6766-06a, or an equivalent test method and EPA 9100. First, the GCL test specimen shall be hydrated with using leachate and groundwater from the existing Hardee County Landfill for a minimum of 48 hours using sufficient backpressure to achieve a minimum B coefficient of 0.9 and using a confined effective consolidation stress not exceeding five pounds per square inch. Then, the hydraulic conductivity test on the GCL specimen shall be conducted, using the appropriate permeant fluid, at a confined effective consolidation stress not exceeding five pounds per square inch. The hydraulic conductivity test shall continue until steady state conditions are reached or a minimum of two pore volumes of permeant fluid have passed through the test specimen. The permeant fluid shall be a representative leachate sample obtained from the Hardee County Landfill.

G.2.e Geosynthetic Specifications

Per Rule 62-701.400(3)(e), FAC the CQA Plan and/or the Technical Specifications presented in Attachment G-1 include the following requirements.

G.2.e.1 Definitions and Qualifications

The definitions and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program are identified.

G.2.e.2 Material Specifications

The material specifications for geomembranes, geocomposites and geotextiles are identified.

G.2.e.3 Manufacturing and Fabrication Specifications

The manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and nondestructive seam testing, seam testing location, frequency, procedure, sample size and geomembrane repairs are identified.

G.2.e.4 Geomembrane Installation Specifications

The Technical Specification 02776 - High Density Polyethylene (HDPE) Geomembrane Liner installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembrane and procedures for lining system acceptance are identified.

G.2.e.5 Geotextile and Geogrid Specifications

Technical Specification 02940 - Geotextile includes handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials are identified.

G.2.e.6 Geonet and Geocomposite Specifications

Technical Specifications 02930 Tri-Planar Geocomposite and 02931 Bi-Planar Geocomposite include handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials are identified.

G.2.e.7 GCL Specifications

The Technical Specification 02077 - Geosynthetic Clay Liner includes handling and placement, conformance testing, seams and overlaps, repair, and placement of soil material and any overlying materials are identified.

G.2.f Soil Component Standards

Technical Specification Section 02220 - Excavation, Backfill, Fill, and Grading presented in Attachment G-1describes construction procedures including over-excavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil components in layers for the soil components are.

G.2.f.1 Construction Procedures

A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$ cm/sec will be used as an equivalent substitute for the 6-inch thick prepared soil sub-base required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in Attachment G-1. Therefore, this subsection is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.2.f.2 Compatibility of the Soil Component

A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$ cm/sec will be used as an equivalent substitute for the 6-inch thick prepared soil sub-base required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in Attachment G-1. Therefore, this subsection is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the

beginning of this permit application report.

G.2.f.3 Procedures for Testing In-Situ Soils

Rule 62-701.400(3)(c)1, FAC requires that the sub-base below the lower geomembrane be a minimum of 6-inches thick, free of sharp materials or any materials larger than one-half inch, and have a saturated hydraulic conductivity equal to or less than $1x10^{-5}$ cm/sec. The subbase for the liner system will be placed over prepared native soil graded to the grades shown on the construction permit applications drawings located in Attachment E-1. The subbase will be prepared as described in the Technical Specifications included in Attachment G-1. A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$ cm/sec will be used as an equivalent substitute for the 6-inch thick prepared soil sub-base required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in Attachment G-1.

G.2.f.4 Specifications for Soil Component of Liner

A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$ cm/sec will be used as an equivalent substitute for the 6-inch thick prepared soil sub-base required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in Attachment G-1. Therefore, this subsection is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.2.f.5 Field Test Section

A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$ cm/sec will be used as an equivalent substitute for the 6-inch thick prepared soil sub-base required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in Attachment G-1. Therefore, this subsection is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.2.g Class III Landfills

The Hardee County Landfill Phase II Section II Expansion will be a Class I Landfill. Therefore, this subsection is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.3 LEACHATE COLLECTION AND REMOVAL SYSTEM

The leachate collection and removal system (LCRS) for the proposed Phase II Section II Expansion includes the primary leachate collection system (LCS) and a secondary leak detection system (LDS).

G.3.a Primary and Secondary LCRS Requirements

G.3.a.1 Chemical Compatibility

The LCRS components, including non-calcareous quartz or granite gravel, drainage sand, bi-planar and tri-planar geocomposites, geotextile, leachate collection pipe, leachate pump riser pipes, force main, and geomembranes, will be constructed of materials which are known to be chemically resistant to the leachate anticipated to be generated from the municipal solid waste placed in the Phase II Section II Expansion. Aggregates for use in the LCRS will be rounded to well-rounded non-calcareous quartz or granite gravel which is inert to the leachate and does not form calcium carbonate deposits.

- Geotextile: Polypropylene or polyester.
- Geomembrane: High-Density Polyethylene (HDPE).
- Geocomposite (Geonet): Polyethylene core, polypropylene or polyester geotextile facing (both sides).
- Collection Header Pipe: High-Density Polyethylene (HDPE).
- Pump Intake and Riser Access Pipes: High-Density Polyethylene (HDPE).
- Force Main: High-Density Polyethylene (HDPE).

The leachate collection and removal system consists of:

- The LCRS is overlain by a 2 foot thick protective cover layer consisting of granular material.
- LCRS geocomposite drainage layer covering the entire cell area; and
- LCRS collection pipe including an 8-inch nominal diameter perforated HDPE pipe embedded in pipe bedding material (non-calcareous quartz or granite gravel).

G.3.a.2 Mechanical Properties

G.3.a.2.1 LCRS and LDS Pipes

To verify the LCRS and LDS pipes have sufficient mechanical properties to prevent collapse under pressures exerted by overlying wastes, cover materials, and by equipment used at the

landfill pipe crushing calculations were conducted. The pipes proposed for use in the leachate collection system and the leak detection system is smooth wall, HDPE pipes, minimum SDR 11.

The LCRS leachate collection pipe and the LCRS and LDS leachate riser pipes were evaluated to determine if each has sufficient mechanical properties to prevent collapse under pressure exerted by the overlying landfilled material, cover materials, and equipment. The buried leachate pipe must be designed to resist the three pipe structural failure mechanisms referred to as wall crushing, wall buckling and excessive ring deflection. The three pipe structural failure mechanisms have been evaluated for the Phase II Section II Expansion construction permit application using methods recommended by the pipe manufacturer and all exceed the minimum standards recommended by the pipe manufacturer. Please refer to the following locations for pipe structural calculations for wall crushing, wall buckling, and excessive ring deflection based on the loads anticipated on the pipe during construction, operation and post-closure. A summary table of the pipe structural calculations for wall crushing, wall buckling, and excessive ring deflection based on the loads anticipated on the pipe is provided prior to the calculations in Attachment G-17.

- Phase II Section II Expansion
    - Attachment G-18 - 12-inch diameter perforated HDPE leachate collection header pipe during construction. In addition during operations with a CAT 826G Series II Compactor and a CAT D7R Series II track-type bulldozer. The analysis during operations was performed at different waste filling scenarios of no waste, 10 feet, 25 feet and 60 feet (final buildout).
    - Attachment G-19 - 8-inch diameter perforated HDPE leachate collection pipe during construction. In addition during operations with a CAT 826G Series II Compactor and a CAT D7R Series II track-type bulldozer. The analysis during operations was performed at different waste filling scenarios of no waste, 10 feet, 25 feet and 60 feet (final buildout).
- Phase II Section I Vertical Expansion
    - The Phase II Section I vertical expansion area also has existing 8-inch diameter perforated HDPE leachate collection pipe. Pipe crushing calculations were not conducted on these existing pipes. This is due to the fact that the Phase II Section II Expansion pipe crushing analysis which was conducted on 8-inch diameter perforated HDPE leachate collection pipe is representative of the existing pipes within this area. The final loading on the existing 8-inch diameter perforated HDPE leachate collection pipe will be less in this area than in the proposed Phase II Section II Expansion area.
- Phase I Area
    - Attachment G-20 - Existing 4-inch diameter perforated HDPE SDR 17 LFG pipe during operations with a CAT 826G Series II Compactor and a CAT D7R Series II track-type bulldozer. The analysis during operations was performed at different waste

filling scenarios of no waste, 10 feet, 25 feet and 60 feet (final buildout). The existing 10-inch diameter perforated HDPE leachate collection pipe during operations with a CAT 826G Series II Compactor and a CAT D7R Series II track-type bulldozer. The analysis during operations was performed at different waste filling scenarios of no waste, 10 feet, 25 feet and 60 feet (final buildout). The existing HDPE leachate collection pipe connects MH-7 and MH-9.

- Attachment G-21 - Existing 8-inch diameter perforated ADS leachate collection pipe during operations with a CAT 826G Series II Compactor and a CAT D7R Series II track-type bulldozer. The analysis during operations was performed at 60 feet (final buildout). The existing ADS leachate collection pipe connects MH-4, MH-5 and MH-6.

The pipes with the respective SDR rating have been calculated to be of sufficient strength to withstand the pressures exerted during construction, operations and under the maximum permitted depth of municipal solid waste. Perforation diameter, spacing, and location will be as shown on the Phase II Section II Expansion construction permit drawings located in Attachment E-1.

G.3.a.2.2 Bi-planar and Tri-planar Geocomposites

Geocomposite loading is identified for the bi-planar geocomposite in Attachment G-9 and for the tri-planar geocomposite in Attachment G-10. The transmissivity values in the HELP model analysis provided in Attachment G-11 estimate the long-term performance of the geocomposite materials after the reduction factors for geotextile intrusion, creep deformation, chemical degradation, particulate clogging, biological clogging, and chemical clogging. The geocomposite transmissivity values determined in were selected to account for reduction in flow capacity due to high overburden pressures expected to be exerted by the landfilled material. The flow characteristics of the geocomposite materials were also selected based on the long-term slopes after predicted settlement. As the HELP model summary provided at the beginning of Attachment G-11 demonstrates, even with the estimated reductions, it still maintains the head over the liner with the design limits. Therefore, the geocomposite materials are stable under loading.

G.3.a.3 Reduction of Clog Potential

The LCRS has been designed to maintain proper leachate flow and to maximize resistance to clogging. The LCRS consists of 24-inches of protective sand placed on top of a bi-planar geocomposite drainage layer (geonet with a non-woven geotextile on both sides). The bi-planar geocomposite drainage material has a geotextile on both sides to prevent sand particles from passing into the geonet and collection pipes. Clogging is reduced within the geonet by bonding the non-woven geotextile on both sides of the geonet core. To account for possible reductions in flow rates due to biological and chemical clogging, reduction factors were considered in the transmissivity calculations when determining the anticipated leachate flow.

The LCRS pipes (header and lateral pipes) will be encased in a non-calcareous quartz or granite

gravel backfilled trench that will be wrapped with a 6-oz woven geotextile which will also be covered by the 24-inch drainage sand layer. The geotextile and aggregate have been designed to effectively filter out solids in the leachate and also to minimize sites or conditions at the rock and protective sand interface where growth of organisms can accumulate and prevent normal flow of leachate into the collection system. Refer to Attachment G-22 and Attachment G-23 for the leachate collection pipes and geocomposite geotextile calculations, respectively. The leachate collection sump will be encased in non-calcareous quartz or granite gravel that will resist clogging and promote adequate flow to the pumps.

G.3.a.4 System Cleanouts

The design of the LCRS piping (header and lateral pipes) has also taken into consideration the need to periodically test and clean the system and to provide contingent design for unexpected problems that affect normal leachate flow. All of the LCRS piping was sized and configured to allow for jet cleaning and tracked video camera equipment access through the piping. The geocomposite is proposed to cover the entire bottom and sideslopes of the Phase II Section II Expansion and if a section becomes clogged, leachate can flow around the area and eventually will either discharge into the leachate collection header pipe or the leachate sump. Should the main leachate collection header pipe become blocked, leachate can still flow directly to the sump through the non-calcareous quartz or granite gravel placed around the header pipe. Refer to Attachment G-13 for the LCRS header trench conveyance calculations.

For the northern portion of the Phase II Section II Expansion, the center and eastern 8-inch and 10-inch diameter leachate collection lateral pipes will be accessed through cleanouts for each line located at the northern end of the Expansion area. Jet cleaning and tracked video camera equipment will travel south the approximately 920 feet through the pipes to the interior east/west berm located in the southern portion of the Expansion area (where the pipes begin).

For the northern portion of the Phase II Section II Expansion the western 8-inch diameter leachate collection lateral pipe located at the toe of slope will be accessed through a cleanout located at the northern end of the Expansion area. Jet cleaning and tracked video camera equipment will travel south the approximately 460 feet through the pipe to the leachate collection sump (where the pipe discharges).

For the center portion of the Phase II Section II Expansion the western 8-inch diameter leachate collection lateral pipe located at the toe of slope will be accessed through a cleanout located along the western side of the Expansion area. Jet cleaning and tracked video camera equipment will travel north the approximately 460 feet through the pipe to the leachate collection sump (where the pipe discharges).

The 12-inch diameter leachate collection header pipe will be located approximately in the center of the northern and center portions of the Phase II Section II Expansion and will be sloped from east to west into the leachate collection sump located on the western side of the Expansion area. The leachate collection header pipe will be extended with a riser pipe through the leachate collection sump, along the sideslope of the Expansion area to the top of slope and terminated at the surface with a cleanout for access. Jet cleaning and tracked video camera equipment will

travel east the approximately 160 feet through the entire pipe to the end.

The three 8-inch diameter leachate collection lateral pipes located in the southern portion of the Phase II Section II Expansion will be connected to the existing 8-inch diameter leachate collection lateral pipes within the Phase II Section I area. The leachate collection lateral pipes within this area will continue from east to west from the existing leachate collection pipes and will be accessed through cleanouts located along the western side of the Phase II Section II Expansion. Jet cleaning and tracked video camera equipment will travel east the approximately 160 feet through the pipes to the point they are connected to the existing leachate collection lateral pipes within the Phase II Section I area. Access within these leachate collection lateral pipes will then be available from west to east in the Phase II Section II Expansion and also from the east to west in the Phase II Section I area.

The leachate detection system for the northern portion of the Phase II Section II Expansion will convey liquid in the tri-planar geocomposite located within the LCS trench to an 8-inch diameter detection header pipe located within the same trench as the 12-inch diameter leachate collection header pipe. The leachate detection header pipe will be extended with a riser pipe through the leachate collection sump, along the sideslope of the Expansion area to the top of slope and terminated at the surface with a cleanout for access. Jet cleaning and tracked video camera equipment will travel east the approximately 80 feet through the entire pipe to the end.

The leachate detection system for the southern portion of the Phase II Section II Expansion area will convey liquid in the tri-planar geocomposite located within the LCS swale, to an existing tri-planar geocomposite located within the LCS trench of the Phase II Section I area to an existing 8-inch diameter header pipe located along the toe of slope of the Phase II Section I area. The existing 8-inch diameter header pipe drains to the existing leachate collection sump located in the northeast corner of the Phase II Section I area. The existing leachate detection header pipe is extended with a riser pipe through the leachate collection sump, along the sideslope to the top of slope and terminated at the surface with a cleanout for access. The existing leachate pump riser pipe is accessible from the surface and is equipped so that the existing pump and discharge piping can be completely removed for repairs or replacement. In addition, with the pumps removed, the portion of the pipe forming the intake section in the sump can have jet cleaning and tracked video camera equipment inserted to travel through the entire pipe to the end.

G.3.b Primary LCRS Requirements

G.3.b.1 Bottom Twelve Inches

The primary leachate collection layer will consist of a 60 mil textured HDPE geomembrane liner overlain by a double-sided bi-planar geocomposite overlain by a protective cover soil drainage layer a minimum of 12 inches thick. The 12 inch thick protective cover soil drainage layer above the primary geomembrane liner and bi-planar geocomposite will consist of a non-carbonate sand with a minimum hydraulic conductivity of $1x10^{-3}$ cm/sec.

Laboratory tests will be conducted during construction to demonstrate the geocomposite will maintain the required hydraulic conductivity under full design load. The bi-planar geocomposite

includes a geonet core with a 6-oz non-woven geotextile on both sides that will provide equal or better protection to the HDPE geomembrane liner than a granular material.

G.3.b.2 Total Thickness Resistant to Waste and Leachate

The 12 inch thick protective cover soil drainage layer will be overlain by a minimum of 12 inches of additional non-carbonate protective soil, for a total drainage layer thickness of 24 inches above the bi-planar geocomposite. The non-carbonate protective soil will be chemically resistant to the waste and leachate.

G.3.b.3 Bottom Slope Design to Accommodate for Predicted Settlement

The Phase II Section II Expansion cell bottom drains to the LCRS piping (header and lateral pipes) and LDS header pipe at a minimum slope of 2.2 percent after the anticipated settlement. The LCS lateral pipes drain to the header pipe at a minimum slope of 0.47 percent after the predicted maximum settlement. The header pipes drain to the leachate collection sump at a minimum slope of 0.93 percent after the predicted maximum settlement.

The bottom slope of the LCRS has been designed to achieve the required leachate head after the predicted settlement determined by the foundation analysis. Refer to Section J for the settlement calculations.

G.3.b.4 Equivalent to Granular Material

The primary leachate collection layer will consist of a 60 mil textured HDPE geomembrane liner overlain by a double-sided bi-planar geocomposite overlain by a protective sand layer a minimum of 24 inches thick. The protective sand layer above the primary geomembrane liner and bi-planar geocomposite will have a minimum hydraulic conductivity of $1x10^{-3}$ cm/sec. The bi-planar geocomposite will maintain the head over the geomembrane to within the thickness of the geocomposite. The calculations presented in Attachment G-9 for the bi-planar geocomposite and Attachment G-10 for the tri-planar geocomposite show that the hydraulic conductivity of the geocomposites under the anticipated design load is greater than the hydraulic conductivity of the drainage layer.

G.4 LEACHATE RECIRCULATION

Leachate will be stored on-site in the leachate tanks until being hauled to local wastewater treatment facilities that have disposal agreements with the County. The County is not exploring the option of leachate recirculation at this time. Therefore, this subsection for G.5.b.1 through G.5.b.6 is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

The County will not recirculate leachate but will conduct leachate evaporation during operation of the Phase II Section II area. Ditches, berms, or other devices shall be constructed to control

leachate runoff. Initial and intermediate cover receiving leachate from the leachate evaporation process shall be graded to shed runoff into the leachate collection system and to minimize mixing of leachate runoff and storm water. Initial and intermediate cover shall be permeable to the extent necessary to prevent perched water conditions and gas buildup. Leachate evaporation shall not be conducted during weather conditions or in quantities that may cause runoff outside the solid waste disposal unit, surface seeps, wind-blown spray, or exceedance of the limits of the leachate head on the liner.

The Operations Permit for the Hardee County Landfill has an expiration date of May 12, 2013. Immediately following the submission of the Phase II Section II Expansion construction permit application the Operations Permit renewal application process will be initiated (well in advance of operation of the Phase II Section II Expansion area). The Operations Permit renewal application will include a request for a modification to the landfill's Operation Permit to include the Phase II Section II Expansion after approval of the Certification of Construction Completion documents by the Department following construction of the Expansion. The Operation Permit renewal application will include an explanation of the leachate evaporation procedures proposed by the County during operations of the Phase II Section II area.

G.5 LEACHATE STORAGE TANKS AND SURFACE IMPOUNDMENTS

The Hardee County Landfill currently stores leachate in two steel tanks with a capacity of 79,000 gallons each. The Phase II Section II Expansion will produce additional amounts of leachate resulting in more frequent hauling events to the wastewater treatment facility.

G.5.a Surface Impoundment Requirements

A leachate surface impoundment will not be used for the Hardee County Landfill Phase II Section II Expansion. Therefore, this subsection for G.5.a.1 through G.5.a.6 is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.5.b Above-ground Leachate Storage Tanks

The previously permitted aboveground leachate storage tanks will be used for storing leachate for the Phase II Section II Expansion. Therefore, this subsection for G.5.b.1 through G.5.b.7 have been identified as "No Change" and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.5.c Underground Leachate Storage Tanks

An underground leachate storage tank will not be used for the Hardee County Landfill Phase II

Section II Expansion. Therefore, this subsection for G.5.c.1 through G.5.c.4 is "Not Applicable" and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

G.5.d Routine Maintenance Schedule

The LCRS includes leachate collection pipes and cleanout riser pipes. The leachate collection pipes will be cleaned and maintained, as necessary, through the sideslope cleanout riser pipes. The LCRS collection pipes will be cleaned by flushing or be inspected by video recording in accordance with Rule 62-701.500(8)(h), FAC. Flushing will be accomplished by inserting a self-propelled nozzle attached to the end of a hose into the cleanout riser and the LCRS pipe. The nozzle is used to flush the pipes with pressurized water. The leachate pump manufacturer will supply an operation manual presenting the manufacturer's recommended maintenance.

G.6 GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE PLAN

G.6.a CQA Plan

The installation of the geosynthetic components (i.e., geomembrane, geocomposite, and geotextile) of the bottom liner system will be monitored in accordance with the CQA Plan, included as Attachment G-1. The CQA Plan describes procedures to be followed to certify the integrity of the geosynthetics. Technical Specifications for the components of the bottom liner system are also contained in Attachment G-1. The CQA Plan includes a description of quality control testing procedures and frequencies, identification of key personnel (i.e., supervising professional, laboratory), and the forms used in the field for documenting the construction activities.

G.6.a.1 Specifications and Construction Requirements for Liner System

The CQA Plan describes procedures to be followed to certify the integrity of the geosynthetics. The CQA Plan will provide personnel with adequate information to achieve continuous compliance with the liner construction requirements.

G.6.a.2 Quality Control Testing Procedures and Frequencies

The CQA Plan describes procedures to be followed to certify the integrity of the geosynthetics. Refer to Attachment G-1 for the CQA Plan.

G.6.a.3 Supervising Professional Engineer

The CQA Plan describes the supervising professional engineer responsible for the project. Sampling and testing shall be conducted in the field by trained personnel during construction and after construction completion. Such personnel will be under the direction of the construction quality assurance professional engineer, to assure the liner system will comply with the

standards. The construction quality assurance professional engineer or his designee shall be on-site at all times during construction to monitor construction activities and shall be on-site to monitor off-loading of the geosynthetics to be used in the liner system. Refer to Attachment G-1 for the CQA Plan.

G.6.a.4 Responsibility and Authority

The CQA Plan describes the responsibility and authority of the personnel for the project. Refer to Attachment G-1 for the CQA Plan.

G.6.a.5 Qualifications of Personnel

The CQA Plan describes the qualifications of the personnel for the project. Refer to Attachment G-1 for the CQA Plan.

G.6.a.6 CQA Reporting Forms and Documents

The CQA Plan provides the required reporting forms and documents to be followed. Refer to Attachment G-1 for the CQA Plan.

G.6.a.7 Independent Laboratory Testing of Geosynthetics

The CQA Plan describes procedures to be followed for testing of the geosynthetic materials. A laboratory experienced in the testing of geosynthetics, independent of the liner manufacturer and installer, shall perform the required testing which will include conformance testing for all geosynthetics and geocomposites, and testing of seam shear and peel strength for geomembranes. Refer to Attachment G-1 for the CQA Plan.

G.7 SOIL CONSTRUCTION QUALITY ASSURANCE PLAN

A GCL with a hydraulic conductivity (k) equal to or less than $1x10^{-7}$ cm/sec will be used as a substitute for the 6-inch thick prepared sub-base required by Rule 62-701.400(3)(c)1, FAC. The use of GCL is allowed in accordance with Rule 62-701.400(3)(c)1, FAC. The GCL will be installed in accordance with Technical Specification 02077 - Geosynthetic Clay Liner included in Attachment G-1. Therefore, this subsection for G.7.a through G.7.c is "Not Applicable" for the liner system and has been so designated on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report. The CQA Plan included in Attachment G-1 contains the soils testing requirements for general soils backfill.

G.8 SURFACE WATER MANAGEMENT SYSTEM

G.8.a Department Permit for Stormwater Control

The County currently has or has had the following stormwater permits for the site.

- Management and Storage of Surface Water (MSSW) Permit (Number 407767.00) from the SWFWMD for the Solid Waste Recycling Center located on-site.

- Environmental Resource Permit (Number 25-0124892-001) from the Florida Department of Environmental Protection (FDEP) for the Leachate Storage Tank Facility located on-site.

- MSSW Permit (Number 477767.01) from the Southwest Florida Water Management District (SWFWMD) for the Animal Control Facility located on-site.

- Environmental Resource Permit (Number 25-0124892-002) from the Florida Department of Environmental Protection (FDEP) for the Phase II Section I Expansion.

- Environmental Resource Permit (Number 25-0124892-003) from the Florida Department of Environmental Protection (FDEP) for the Phase II Section I Expansion.

ERP Number 25-0124892-002, dated July 10, 2006, with an expiration date of July 10, 2011, was previously issued by FDEP for a proposed 10-acre expansion which included both the Phase II Section I and Phase II Section II Expansions. A FDEP solid waste construction permit was only approved and issued for the Phase II Section I Expansion (approximately 5-acres). Therefore, the ERP was modified during construction of the Phase II Section I Expansion to remove the Phase II Section II Expansion construction requirements. FDEP issued a modified ERP which was only for the construction of the Phase II Section I Expansion under FDEP ERP Number 25-0124892-003. An application for a new ERP is currently being made under a separate cover for the proposed remaining portions of the Phase II Section II Expansion stormwater management system.

G.8.b Surface Water Management System Design

The only remaining stormwater management feature remaining for construction during the Phase II Section II Expansion from the original 10-acre ERP will be a stormwater swale system along the north, west, and south sides of the Expansion area. The northern swale will connect to an existing swale system that will transfer the stormwater to an existing wet detention pond located in the northeast corner of the facility. The western and southern swales will connect to an existing swale located in the southeast corner of the Phase II Section I area which will transport the surface water to the east and then south to the existing wet detention pond located on the southern end of the site.

Stormwater runoff from the upper portion of the landfill travels via sheet flow into collection terraces located along the sideslopes of the landfill. Stormwater runoff flows within the collection terraces and is conveyed, via stormwater structures, down the landfill and into ditches that are located on the perimeter of the landfill.

The perimeter ditches convey stormwater runoff to an existing stormwater detention pond located in the northeast corner of the facility. As the stormwater runoff in the pond rises, an overflow structure located on the southern end of the pond allows water to be discharged into the

heavily vegetative area located on the east side of the facility. Two culverts, located beneath the main access road allow stormwater to flow from the east side of the site under the road and along a channel to the existing stormwater management area on the southern end of the site. This stormwater area is a wet detention pond that treats the first one-inch of stormwater runoff from the entire site. An existing overflow structure discharges the stormwater offsite. Once offsite the runoff flows overland and via naturally occurring channels until the flows eventually discharges into the Peach River.

G.8.c Stormwater Control Details

Details of the stormwater controls design, including collection channels, and downchutes, are provided on the Phase II Section II Expansion construction permit application drawings located in Attachment E-2.

The disposal area was designed and will be graded to keep stormwater runoff separate from runoff (leachate) that has come in contact with waste material. Isolation berms will be used to minimize erosion and separate stormwater from waste disposal areas. The unused portion of the disposal (northern portion of the Phase II Section II Expansion area approximately 2.33 acres) will be covered with a rain tarp to keep stormwater runoff from entering the leachate collection system. Stormwater will be removed from the cell that has accumulated on the rain tarp via pumps that will discharge stormwater to the perimeter ditches that convey water to the stormwater management system. Runoff that has not come in contact with waste material will be allowed to discharge into the stormwater management system.

The Operations Permit for the Hardee County Landfill has an expiration date of May 12, 2013. Immediately following the submission of the Phase II Section II Expansion construction permit application the Operations Permit renewal application process will be initiated (well in advance of operation of the Phase II Section II Expansion area). The Operations Permit renewal application will include a request for a modification to the landfill's Operation Permit to include the Phase II Section II Expansion after approval of the Certification of Construction Completion documents by the Department following construction of the Expansion. The Operation Permit renewal application will include the operational fill sequence plans to show a detailed plan for the filling of the Phase II Section II area and the Phase II Section I height increase.

G.9 GAS CONTROL SYSTEMS

See Section N of this document for the landfill gas control system for the Hardee County landfill.

G.10 GROUND WATER GRADIENT

See Section I of this document for the discussion regarding the bottom liner system in relation to the groundwater table.

Revised Section L

Water Quality and Leachate Monitoring Requirements

SECTION L

WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

L.1 WATER QUALITY AND LEACHATE MONITORING PLAN

The water quality and leachate monitoring requirements and locations of the existing groundwater monitoring wells for the Hardee County Landfill were previously provided to the Department in the following documents.

- *Hydrogeological Investigation*, dated April 2004, prepared by SCS.
- *Revised Hydrogeological Investigation*, dated November 15, 2004, prepared by SCS.
- *Revised Ground Water Monitoring Plan*, dated November 15, 2004, prepared by SCS.
- *Biennial Groundwater Monitoring Plan Evaluation Report*, dated January 30, 2008, prepared by SCS.
- *Operation Permit Modification to Include Phase II Section I Landfill Expansion*, dated March 10, 2008, prepared by SCS.
- *Revised Groundwater Monitoring Plan*, dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011].
- *Figure M-2 Hardee County Solid Waste Groundwater Monitoring Plan Sampling Locations Map*, dated March 10, 2008, prepared by SCS.
- *Groundwater Flow Evaluation*, dated June 1, 2009, prepared by SCS
- The locations of the existing groundwater monitoring wells for the Hardee County Landfill were also provided by SCS on Sheet 3 of 26 Aerial Photograph June 2006 of the *Operation Permit Modification to Include Phase II Section I Landfill Expansion*.

L.1.a Hydrogeological Investigation Information Signed, Dated and Sealed

The *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS discussed the hydrogeological investigation information. In addition, the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011] discussed the hydrogeological investigation information.

L.1.b Sampling and Analysis Methods

All water quality sampling and analysis is performed in accordance with Chapter 62-160, FAC and with the latest revision of FDEP Standard Operating Procedures for Field Activities. The analyses of environmental samples collected at the Hardee County Landfill are conducted by a firm that is certified by the Florida Department of Health, Environmental Laboratory Certification Program. Currently Atkins [formerly known as Post, Buckley, Schuh & Jernigan, Inc. (PBS&J)] provides groundwater and surface water sampling activities as required by the County's Operations Permit.

All sampling activities are conducted in accordance with Chapter 62-160, FAC procedures and requirements. The frequency of sampling and monitoring for analysis is in accordance with applicable FDEP Permits. Proper analytical procedures by specified methods, with trip blanks and controls, are performed. Results and reports are generated in the FDEP required format and are provided to the County for review. The County reviews and compiles the reports for submittal to FDEP. Sampling and analysis of groundwater and surface water will be performed in accordance with the requirements of Rules 62-160 and 62-701.510(2)(b) FAC.

L.1.c Groundwater Monitoring Requirements

Groundwater monitoring requirements were discussed in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The groundwater monitoring requirements were also updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011].

The groundwater monitoring program includes analysis of groundwater samples for field and laboratory parameters described in Chapter 62-701.510, FAC. The monitoring program is divided into two parts: (i) initial monitoring (collection of background data); and (ii) semiannual routine monitoring. The sampling frequency and protocol are discussed below.

- After construction, each monitoring well is sampled and analyzed for field and laboratory parameters as described in Rules 62-701.510(7)(a) and (c), FAC (in accordance with Rule 62-701.510(5)(b)2, FAC). After this initial sampling event, groundwater samples will be collected semiannually from all wells identified as background and detection wells and analyzed for the groundwater indicator parameters listed in Rule 62-701.510(7)(a), FAC (in accordance with Rule 62-701.510(5)(c), FAC).

L.1.c.1 Detection Wells Located Downgradient Within 50 Feet of Disposal Units

Information regarding the detection well locations was submitted in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS.

The detection well locations were also updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. The location of the existing and proposed detection wells is identified on the construction permit application drawings located in Attachment E-2.

The estimated schedule for the Hardee County Landfill Phase II Section II Expansion construction is as follows:

a) FDEP Notice of Completeness - May 1, 2013
b) FDEP draft Permit preparation - 45 days (June 15, 2013)
c) Review and comment on proposed Permit ~ 2 days (June 17, 2013)
d) FDEP Intent to Issue Permit - 1 day (June 18, 2013)
e) Notice of proposed Agency Action (Permit advertising period) - 15 days (July 3, 2013)
f) Notice of Permit Issuance - 1 day (July 8, 2013)
g) Prepare bid documents ~ 15 days (July 29, 2013)
h) Bid phase services and BOCC approval of contract ~ 64 days (October 1, 2013)
i) Notice to Proceed (NTP) ~ Issued October 1, 2013.
j) Construction phase ~ 180 calendar days (October 1, 2013 - April 1, 2014)
    - The routine, semi-annual groundwater monitoring event for June 2013 can occur on all wells as usual.
    - Existing monitor wells MW-3, MW-5, and MW-8 will be abandoned at the initial stages of construction in approximately mid October 2013.
    - During construction access will be made for the routine, semi-annual groundwater monitoring event for December 2013 for all existing monitor wells with the exception of monitor wells MW-3, MW-5, and MW-8 (which will have been abandoned by that time).
    - Monitor wells MW-13 and MW-14 will be installed at the end of construction in approximately late March 2014.
k) The routine, semi-annual groundwater monitoring event for June 2014 will be conducted as usual for all existing monitor wells including new monitor wells MW-13 and MW-14.

L.1.c.2 Downgradient Compliance Wells

Information regarding the downgradient compliance wells locations was submitted in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The compliance wells information was also updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Currently, none of the existing monitor wells at the Hardee County Landfill have been designated as compliance wells. Compliance wells shall be installed if needed in accordance with the requirements of Rule 62-701.510(6), FAC.

L.1.c.3 Background Wells

Information regarding the background wells locations was submitted in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The background wells locations were also updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. The location of the existing background wells is identified on the construction permit application drawings located in Attachment E-2.

L.1.c.4 Location Information for Monitoring Wells

Location information for monitoring wells was submitted in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The monitoring wells locations were also updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. The location of the existing monitoring wells is identified on the construction permit application drawings located in Attachment E-2.

L.1.c.5 Well Spacing

Well spacing information was discussed in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The monitoring wells locations were also updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. The location of the existing monitoring wells is identified on the construction permit application drawings located in Attachment E-2. The location of the existing wells is identified on the construction permit application drawings located in Attachment E-2. Well spacing will be completed and accomplished with appropriate intervals to satisfy the FDEP requirements of 1,500 feet upgradient and 500 feet downgradient.

L.1.c.6 Well Screen Locations

Well screen intervals information was discussed in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The monitoring wells locations were also updated in the *Revised Groundwater Monitoring Plan,* dated March 10,

2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. The proposed monitor wells (MW-13 and MW-14) locations and screen intervals (screen length, screen elevation) have been updated for the Phase II Section II Expansion. The location of the existing monitoring wells is identified on the construction permit application drawings located in Attachment E-2. The location of the existing wells is identified on the construction permit application drawings located in Attachment E-2.

SCS reviewed the groundwater elevations recorded at the monitor wells and piezometers at the facility during the routine, semi-annual sampling events recorded from June 1999 through June 2012 and in addition elevations recorded in December 2012 provided by the County. Based on the review of the above-mentioned groundwater elevations, the construction requirements for proposed groundwater monitoring wells MW-13 and MW-14 have been revised. The construction details as provided for proposed groundwater monitoring wells MW-13 and MW-14 will replace the construction details as previously provided in Table M-2 of the *Revised Groundwater Monitoring Plan*, dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Placement of monitoring points MW-13 and MW-14 were based on Chapter 62-701.510, FAC.

In addition, SCS previously sampled the shallow aquifer formation material at the depth interval where monitoring well screen would be installed to provide grain size data to assist in the design of existing groundwater monitoring wells MW-10R and MW-12R to reduce the level of turbidity in the groundwater samples. Soil samples were submitted to a geotechnical testing laboratory for analysis in accordance with American Society for Testing and Materials (ASTM) D422. The grain size analyses indicated that the aquifer material grain size was similar at the two depths and it also contained a relatively large percentage of silt.

Therefore, to minimize potential turbidity issues in proposed groundwater monitoring wells MW-13 and MW-14, a finer slotted well screen and sand pack will be used as with formerly installed MW-10R and MW-12R. Proposed groundwater monitoring wells MW-13 and MW-14 will be constructed using fifteen feet of 2-inch diameter 0.006-inch factory slotted Schedule 40 polyvinyl chloride (PVC) well screen, five feet of solid PVC riser and an additional three feet of solid PVC for the riser stickup. Following installation of MW-13 and MW-14 well assembly's, the annular space of the screened interval of each well will be packed with 30/65 silica sand from the bottom of the well assembly to approximately three feet above the well screen. The remaining annular space will be sealed to grade with Portland Type I cement and completed with a concrete pad and an aluminum riser-type locking cover. Four bollards, consisting of 4-inch diameter Schedule 40 PVC filled with concrete, will be constructed around MW-13 and MW-14.

Refer to the Phase II Section II Expansion construction permit application drawings located in Attachment E-2 that indentify the construction requirements as identified above for proposed groundwater monitoring wells MW-13 and MW-14.

L.1.c.7 Monitoring Well Representative Groundwater Samples

Monitoring wells representative groundwater samples were discussed in the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS.

L.1.c.8 Procedures for Monitoring Well Abandonment

Post closure procedures for abandonment of monitoring wells are proposed to be the same as the current requirements. Procedures for monitoring wells which are abandoned due to the Phase II Section II Expansion where discussed in the *Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS. The procedures for abandonment of monitoring wells was updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Procedures for properly abandoning monitoring wells will be conducted per Rule 62-701.510(3)(d)6, FAC. Well abandonment requirements will be according to Rule 62-532.500(5), FAC, per the amendments to Chapter 62-532, FAC, that were effective on February 16, 2012 and SWFWMD.

L.1.c.9 Detailed Description of Detection Sensors

The County does not use detection sensors capable of detecting changes in ground water that may indicate leachate releases.

L.1.d Surface Water Monitoring Locations

L.1.d.1 Proposed Surface Water Monitoring Locations

Surface water monitoring locations were discussed in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The surface water monitoring locations were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. A single surface water sampling point [location identified as "SW-2"] has been designated for the Hardee County Landfill in the "Revised Groundwater Monitoring Plan" document. The location of the existing single surface water monitoring location remains unchanged with regard to location and designation and is identified on the construction permit application drawings located in Attachment E-2.

L.1.d.2 Surface Water Monitoring Locations

Surface water monitoring locations were discussed in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The surface water monitoring locations were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011

[revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. A single surface water sampling point [location identified as "SW-2"] has been designated for the Hardee County Landfill in the "Revised Groundwater Monitoring Plan" document. The location of the existing surface water monitoring location is identified on the construction permit application drawings located in Attachment E-2. The existing single surface water monitoring location remains unchanged with regard to location and designation. No additional surface water monitoring locations are proposed.

L.1.e Leachate Sampling Locations

. This Part of the Engineering Report is not applicable (has been removed) to be consistent with the amendments to Chapter 62-701, FAC, that were effective on August 12, 2012 which deleted the requirements to sample, analyze and report leachate quality data.

L.1.f Initial and Routine Sampling Frequency and Requirements

Post closure initial and routine sampling frequency and requirements are proposed to be the same as the current requirements within the Operations Permit. Sampling frequency and requirements were discussed in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The initial and routine sampling frequency and requirements were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011].

L.1.f.1 Initial Background Groundwater and Surface Water Sampling

Initial background groundwater and surface water sampling requirements remains unchanged as described in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The initial background groundwater and surface water sampling requirements were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011].

L.1.f.2 Routine Leachate Sampling and Analysis

This Part of the Engineering Report is not applicable (has been removed) to be consistent with the amendments to Chapter 62-701, FAC, that were effective on August 12, 2012 which deleted the requirements to sample, analyze and report leachate quality data.

L.1.f.3 Routine Monitor Well Sampling and Analysis

Routine monitor well sampling and analysis remains unchanged as described in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in

the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The routine monitor well sampling and analysis requirements were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Groundwater sampling is performed in general accordance with FDEP standard operating procedures (SOPs) FS 2200 for the purpose of field measurement and sampling activities as mandated by FAC 62-160 (Quality Assurance) and DEP-SOP-001-01.

L.1.f.4 Routine Surface Water Sampling and Analysis

Routine surface water sampling and analysis remains unchanged as described in the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The routine surface water sampling and analysis requirements were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Surface water samples shall be analyzed for the parameters listed in Rule 62-701.510(7)(b), FAC.

L.1.g Procedures for Evaluation, Prevention, Corrective Action

Procedures for evaluation, prevention and corrective actions remains unchanged as described in the "*Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS per the requirements of Rule 62-701.510(6), FAC. The procedures for evaluation, prevention and corrective actions were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011].

L.1.h Water Quality Monitoring Report Requirements

Water quality monitoring report requirements were discussed in the "*Revised Hydrogeological Investigation Report,* dated November 15, 2004, included as Attachment I-1 in the Hardee County Landfill Expansion construction permit application prepared by SCS and the *Biennial Groundwater Monitoring Plan Evaluation Report,* dated January 30, 2008, prepared by SCS. The water quality monitoring report requirements were updated in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011].

L.1.h.1 Semi-annual Report Requirements

The County will continue to prepare and submit monitoring reports to FDEP every two and a half years regarding monitoring at the Hardee County Landfill. Procedures for the Technical Report requirements will be as described in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Monitoring

wells will be sampled and analyzed for field and laboratory parameters as described in Rules 62-701.510(7)(a) and (c), FAC (in accordance with Rule 62-701.510(5)(b)2, FAC). After an initial sampling event, groundwater samples will be collected semi-annually from all wells identified as background and detection wells and analyzed for the groundwater indicator parameters listed in Rule 62-701.510(7)(a), FAC (in accordance with Rule 62-701.510(5)(c), FAC). The results of the semi-annual sampling events will be reported to meet the requirements of Rule 62-701.510(8)(a), FAC.

L.1.h.2 Water Quality Data Electronic Format Submittal to the Department

Monitoring wells will be sampled and analyzed for field and laboratory parameters as described in the Rules.

L.1.h.3 Technical Report Requirements

The County will continue to prepare and submit monitoring reports to FDEP every two and a half years regarding monitoring at the Hardee County Landfill. Procedures for the Technical Report requirements will be as described in the *Revised Groundwater Monitoring Plan,* dated March 10, 2008, prepared by SCS and revised by SCS dated January 18, 2011 [revisions were submitted in support of permit modification #38414-014-SO/MM, issued April 15, 2011]. Every two and a half years, a technical report (prepared, signed, and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations) will be submitted to the FDEP. The report will be updated at the time of permit renewal. The report will summarize and interpret the water quality data and water level measurements collected during the past two and a half years. The report will contain the following, as required by Rule 62-701.510(8)(b) to be consistent with the amendments to Chapter 62-701, FAC, that were effective on August 12, 2012:

- Tabular and/or graphical displays of the data, including hydrographs for all monitoring wells.
- Trend analyses of any monitoring parameters consistently detected.
- Comparisons among shallow, middle, and deep wells (if applicable).
- Comparisons between background water quality and the water quality in detection and compliance wells.
- Correlations between related parameters such as total dissolved solids and specific conductance.
- Discussion of erratic and/or poorly correlated data.
- An interpretation of the groundwater contour maps and an evaluation of groundwater flow rates.
- An evaluation of the adequacy of the water quality monitoring frequency and sampling

locations.

All field and laboratory records will be made available to the FDEP and be retained for the design period of the storage facility.

Attachment C

Revised 8-Inch Leachate Collection Lateral Trench Capacity Calculations Phase II Section II Expansion South Portion

SCS ENGINEERS

SHEET 1 OF 3

CLIENT	PROJECT	JOB NO.
Hardee County	Phase II Section II Expansion	09199033.23

SUBJECT	BY	DATE
Phase II Section II South Portion	SRF	4/1/13
Leachate Collection & Removal System	CHECKED	DATE
8-inch Leachate Collection Lateral Trench Capacity Calculations		

OBJECTIVE: Verify that the stone lined leachate collection lateral trench can convey the estimated leachate quantities predicted from the HELP model analysis.

KNOWN: Leachate collection lateral trench cross section.

Trench bottom width =	6.0	feet			
Trench top width =	1.0	feet			
Trench side slope left =	1.0	:1			
Trench side slope right =	1.0	:1			
Trench depth =	2.0	feet			
Trench gravel depth (above pipe) =	1.28	feet			
Trench bottom area per foot, $A_{trench\ bottom}$ =	6.00	ft^2			
Nominal pipe diameter =	8.0	inches	SDR 11		
Pipe area (ID) =	0.26	ft^2	6.963	inches	Refer to Attachment 1
Pipe area (OD) =	0.41	ft^2	8.625	inches	Refer to Attachment 1

CALCULATIONS: Determine the hydraulic capacity of the leachate collection lateral trench by calculating the flow through the trench gravel, geocomposite, and leachate collection lateral pipe. Then, determine the hydraulic capacity of the trench if the leachate collection lateral pipe was crushed or 30% blocked. Compare results to peak leachate generation predicted by the HELP model.

Q_{LCS} = Gravel Flow + Geocomposite Flow + Pipe Flow = $Q_{gravel} + Q_{geocomposite} + Q_{pipe}$
Q_{LCS} = total flow through leachate collection system trench
Q_{gravel} = flow through gravel
$Q_{geocomposite}$ = flow through geocomposite
Q_{pipe} = flow through pipe

1. Determine flow through gravel using Darcy's Law.
$Q_{gravel} = KiA$

K = horizontal hydraulic conductivity =	10.0	cm/sec	Refer to Attachment 2 Table 14.1
i = hydraulic gradient =	0.45%		Slope of trench after waste placement, including settlement
A = cross section area = $(A_{trench} - A_{pipeOD})$ =	5.59	ft^2	
Q_{gravel} = flow through gravel =	8.26E-03	ft^3/sec	
=	0.50	ft^3/min	
Q_{gravel} =	3.71	gal/min	

2. Determine flow through geocomposite using Darcy's Law.
$Q_{geocomposite} = KiA = Ki(tW) = TiW$

K = horizontal hydraulic conductivity =	5.3	cm/sec	Refer to Attachment 3 for bi-planar geocomposite hydraulic conductivity calculations based on max waste loading
i = hydraulic gradient =	0.45%		Slope of trench after waste placement, including settlement
t = geonet thickness =	0.261	inches	Refer to Attachment 3 for bi-planar geocomposite hydraulic thickness calculations based on max waste loading
W = width of trench bottom =	6.0	feet	
T = transmissivity = Kt =	0.00035	m^2/sec	Refer to Attachment 3 for bi-planar geocomposite hydraulic conductivity calculations based on max waste loading
A = cross section area = Wt =	0.1305	ft^2	
$Q_{geocomposite}$ =	2.89E-06	m^3/sec	
=	1.02E-04	ft^3/sec	
$Q_{geocomposite}$ =	0.05	gal/min	

Revised June 28, 2013

CLIENT	PROJECT	JOB NO.
Hardee County	Phase II Section II Expansion	09199033.23

SUBJECT	BY	DATE
Phase II Section II South Portion	SRF	4/1/13
Leachate Collection & Removal System	CHECKED	DATE
8-inch Leachate Collection Lateral Trench Capacity Calculations		

3. Determine flow in/through leachate collection lateral pipe. Verify the perforations in the LCRS are adequate for the peak leachate flow anticipated based on worst-case conditions from the HELP model.
Discharge equation, orifice flow rate = $Q_{orifice} = (C_d)(A_o)(2gh)^{0.5}$

C_d = coefficient of discharge =	0.82			
D_o = diameter of orifice =	0.375	inch	0.031	feet
A_o = area of orifice = $(\pi)(D_o)^2$ =	0.110	in^2	0.00077	ft^2
g = gravitational acceleration =	32.2	ft/sec^2		
h = static head =	1.0	inch	0.083	feet
$Q_{orifice}$ =	0.0015	ft^3/s/orifice	0.65	gpm/orifice

Total length of lateral pipe =	196.0	feet		
Number of perforations per row per foot of pipe=	3			
Number of row perforations =	2			
Number of perforations per foot of pipe =	6			
Max leachate flow per foot of pipe =	0.009	$ft^3/sec/ft$	3.92	gpm/ft
Total flow into pipe through orifices =	1.71	ft^3/sec	768.98	gal/min

4. Determine the flow through the leachate collection lateral pipe using the Manning's equation and assuming a full flowing pipe.
$Q = 1.49/n * R^{2/3}*S^{1/2}*A$

n = Manning's roughness coefficient =	0.009		Refer to Attachment 4
A = cross section area of flow (inside) =	0.26	ft^2	
P_w = wetted perimeter = ID*π =	1.82	feet	
R = Hydraulic radius = A/P_w =	0.15	feet	
S = slope of pipe =	0.45%		Slope of trench after waste placement, including settlement

Q_{pipe} = flow through pipe =	0.81	ft^3/sec	363.91	gal/min

Q_{LCS} = Gravel Flow + Geocomposite Flow + Pipe Flow = $Q_{gravel} + Q_{geocomposite} + Q_{pipe}$

=	3.71	+	0.05	+	363.91

Q_{LCS} = 367.66 gal/min

5. Determine flow through a damaged leachate collection pipe using the Mannings equation and assuming a 30% loss of volume.
$Q_{damaged} = 1.49/n * R_{damaged}^{2/3}*S^{1/2}*A$

n = Manning's roughness coefficient =	0.009		Refer to Attachment 4
$A_{damaged}$ = 30% less cross section area of flow =	0.19	ft^2	
$P_{damaged}$ = damaged wetted perimeter = ID*π =	0.91	feet	
$R_{damaged}$ = damaged hydraulic radius = A/P_w =	0.073	feet	
S = slope of pipe =	0.45%		Slope of trench after waste placement, including settlement

$Q_{damaged}$ = flow through damaged pipe =	0.36	ft^3/sec	160.47	gal/min

$Q_{LCS\ damaged}$ = Gravel Flow + Geocomposite Flow + Pipe Flow = $Q_{gravel} + Q_{geocomposite} + Q_{damaged}$

=	3.71	+	0.05	+	160.47

$Q_{LCS\ damaged}$ = 164.22 gal/min

Revised June 28, 2013

SCS ENGINEERS

SHEET 3 OF 3

CLIENT	PROJECT	JOB NO.
Hardee County	Phase II Section II Expansion	09199033.23

SUBJECT	BY	DATE
Phase II Section II South Portion	SRF	4/1/13
Leachate Collection & Removal System	CHECKED	DATE
8-inch Leachate Collection Lateral Trench Capacity Calculations		

HELP model results from leachate balance summary report (peak-worst case) filling conditions.

Peak flow = Q_{max} = 237.01 gal/min From the HELP Model

Q_{LCS} = 367.66 gal/min > Q_{HELP} = 237.01 gal/min FS = 1.6

$Q_{LCS\ damaged}$ = 238.72 gal/min > Q_{HELP} = 237.01 gal/min FS = 1.0

CONCLUSION:

Compared to the peak drainage collected from the leachate collection system as predicted in the HELP model analyses, the gravel trench, leachate collection lateral pipe and geocomposite provide adequate flow for the leachate collection system. Furthermore, in accordance with Rule 62-701.400(4)(a)4, the LCRS has sufficient capacity to convey the leachate past a collapse or clog.

Revised June 28, 2013

Attachment D

Revised Technical Specification Section 02940 Geotextile

SECTION 02940

GEOTEXTILE

PART 1 - GENERAL

1.01 SUMMARY

A. The WORK specified in this Section includes the manufacture, testing, and installation of woven geotextile for the Leachate Collection and Removal System and the extension to the existing Groundwater Dewatering System as shown on the Contract Drawings and as specified herein.

1.02 SUBMITTALS

A. Submit MANUFACTURER'S prequalification, test reports and data, specifications, installation instructions and roll dimensions.

B. Submit copies of evaluation reports provided by the MANUFACTURER demonstrating that properties for the materials comply with Specification requirements.

C. ENGINEER'S approval shall be obtained prior to the use of any materials in the project.

PART 2 - PRODUCTS

2.01 GEOTEXTILE

A. Material shall be a woven monofilament geotextile equivalent to Filterweave 402 as manufactured by TenCate Mirafi, or ENGINEER approved substitution conforming to the following minimum properties:

CHARACTERISTICS	SPECIFICATION	TEST METHOD
Mass/Unit Area	5.6 oz/yd^2	ASTM D5261
Apparent Opening Size	#40 Sieve (0.425 mm)	ASTM D4751
Flow Rate	140 gal/min/ft^2	ASTM D4491
CBR Puncture Strength	600 lbs/in	ASTM D6241
~~Wide Width Tensile Strength (CD)~~	~~135 lbs/in @ ultimate~~	~~ASTM D4595~~
Grab Tensile Strength	365 x 200 lbs	ASTM D4632
Trapezoidal Tear Strength	115 x 75 lbs/in	ASTM D4533

B. Geotextile shall be tested by the MANUFACTURER for the compliance with the following frequencies. Minimum test frequencies shall be observed:

PROPERTY	TEST METHOD	MINIMUM FREQUENCY
Mass/Unit Area	ASTM D5261	1/100,000 sf
Apparent Opening Size	ASTM D4751	1/100,000 sf
Flow Rate	ASTM D4491	1/100,000 sf
CBR Puncture Strength	ASTM D6241	1/100,000 sf
~~Wide Width Tensile Strength (CD)~~	~~ASTM D4595~~	~~1/100,000 sf~~
Grab Tensile Strength	ASTM D4632	1/100,000 sf
Trapezoidal Tear Strength	ASTM D4533	1/100,000 sf

PART 3 - EXECUTION

3.01 SHIPPING AND HANDLING

A. The MANUFACTURER typically assumes responsibility for initial loading and shipping of geotextiles. Unloading, on-site handling, and storage shall be the responsibility of the CONTRACTOR.

B. A visual inspection of each roll should be made as it is unloaded to identify if any packaging has been damaged. Rolls with damaged packaging should be repaired prior to being placed in storage.

C. The CONTRACTOR shall contact the MANUFACTURER prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment to be utilized.

D. The CONTRACTOR assumes all liability with regards to shipping, transport and unloading of the geotextiles required to complete the WORK. The OWNER shall not be responsible for damaged, lost or mis-stocked shipments, or mishandled or damaged materials.

3.02 PROTECTION AND STORAGE

A. Each roll of material shall have a MANUFACTURER'S identification label. Each roll shall be labeled to provide product identification adequate for inventory and quality control purposes. The label shall provide as a minimum the MANUFACTURER'S name, product identification, lot number, roll number, and roll dimensions. Rolls shall be labeled as per ASTM D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

B. Materials shall be shipped and stored in rolls furnished at the manufacturing facility to prevent exposure of the geotextile to ultraviolet light, precipitation, moisture, mud, dirt, dust, puncture, or other damaging conditions.

C. Rolls of geotextiles should not be stacked upon one another to the extent that deformation of the core occurs. Outdoor storage shall not exceed 6 months.

D. Storage of the geotextile rolls shall be the responsibility of the CONTRACTOR. A dedicated storage area shall be selected at the site that is away from high traffic areas and is level, dry, and well-drained.

E. Rolls should be stored in a manner that prevents sliding or rolling from the stacks. This may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls. Rolls should be stacked at a height no greater than the lifting apparatus can be safely handled (typically no higher than four rolls).

F. All stored geotextiles must be covered with a plastic sheet or tarpaulin until their installation. Covering shall protect the geotextile from ultraviolet light exposure, precipitation, mud, dirt, puncture, cutting or any other damaging or deleterious conditions.

G. Geotextiles shall not be exposed to sunlight for more than 15 days unless otherwise specified and guaranteed by the geotextile manufacturer.

3.03 INSTALLATION

A. Geotextiles shall be installed in accordance with the MANUFACTURER'S recommendations and the CQA Plan. No equipment shall be allowed to operate on the geotextile, and any tears or damage to the geotextile shall be repaired prior to placement in the trench. The surface of the geotextile shall be kept relatively clean and free of debris during installation.

B. Geotextile shall not be placed in a trench that is excessively wet or has standing water.

C. Geotextile shall be overlapped in the trench as shown in the Contract Drawings. Overlapped material can be sewn to maintain overlap during backfilling operations.

D. Geotextile sheets shall be joined in accordance with the MANUFACTURER'S recommendations and the CQA Plan.

E. The CONTRACTOR shall place all cover materials in such a manner to prevent damage to the materials, slippage of the underlying layers, and excessive tensile stresses in the materials.

3.04 REPAIRS

A. Geotextile damaged during placement shall be replaced or repaired at the CONTRACTOR'S expense with a patch of the same geotextile double-sewn or

heat-tacked into place~~in accordance with MANUFACTURER'S recommendation~~. Repairs occurring on slopes steeper than 10H:1V shall be double-sewn in place. The CONTRACTOR shall be responsible for the documentation of repairs describing location and type of repair. Repair documentation shall be submitted to the ENGINEER.

3.05 GEOTEXTILE EXPOSURE FOLLOWING PLACEMENT

A. Exposure of geotextiles to the elements between the time the geotextile is placed in the trench to the time backfilling operations are complete shall be limited to a maximum of 15~~30~~ days to minimize ultraviolet damage. Any geotextile exposed to sunlight for more than 15~~30~~ days shall be removed and replaced with new material at the CONTRACTOR'S expense.

END OF SECTION

Attachment E

Revised Leachate Sump Size Calculations

SCS ENGINEERS

SHEET 1 OF 2

CLIENT	PROJECT	JOB NO.
Hardee County	Phase II Section II Expansion	09199033.23

SUBJECT	BY	DATE
	SRF	8/31/12
Leachate Collection & Removal System Collection Sump Calculations	CHECKED	DATE

OBJECTIVE: Determine the leachate collection and removal system sump dimensions. The sump must be of adequate size to provide enough water to the pump so the pump does not cycle excessively.

KNOWN: Calculated leachate quantities predicted from the worste-case condition evaluated within the HELP model analysis.

Leachate flow =	202.93	gallons/min/acre
Area exposed size =	4.55	acres
Exposure area =	198,198.0	ft^2
Leachate flow =	1,329,579.4	gallons/day
Factor of Safety =	1.2	
Design pumping rate =	243.5	gallons/min

Check the extreme event by multiplying the design pumping rate by the draw-down time.

Sump draw-down time =	72.0	hours	The volume within the sump must be removed within this period of time.
Design pumping rate =	1,051,974.9	gallons	The volume within the sump to be removed during draw-down time.
=	140,638.4	ft^3	Pumping capacity over draw-down time

Relate the design pumping rate to a rainfall event and determine the depth over the exposure area.

Depth for exposure area =	0.71	feet
=	8.5	inches
25-yr 24-hr storm event =	8.2	inches

Since the design depth over the exposure area is at least as great as the 25-year 24-hour storm event this is a conservative approach. The minimum sump size is then calculated as follows:

Pump cycle time =	10	minutes	
Sump volume =	2,435.13	gallons	
=	325.55	ft^3	
Void ratio sump gravel =	0.30		Refer to Attachment 1
Sump volume =	423.2	ft^3	Required volume, taking into account the void ratio of the sump gravel.

Leachate collection and removal system sump dimensions assume vertical side slopes (conservative).

Sump bottom width =	20.0	feet	
Sump bottom length =	20.0	feet	
Sump depth provided =	1.0	feet	
Sump storage provided =	897.6	gallons	Taking into account void ratio of sump gravel.

Sump Depth (ft)	Area (ft^2)	Volume (ft^3)	Volume (gallons)	Storage Volume (gallons)
0.0	400.0	0.0	0.0	0.0
0.1	400.0	40.0	299.2	89.8
0.2	400.0	80.0	598.4	179.5
0.3	400.0	120.0	897.6	269.3
0.4	400.0	160.0	1,196.8	359.0
0.5	400.0	200.0	1,496.0	448.8
0.6	400.0	240.0	1,795.2	538.6
0.7	400.0	280.0	2,094.4	628.3
0.8	400.0	320.0	2,393.6	718.1
0.9	400.0	360.0	2,692.8	807.8
1.0	400.0	400.0	2,992.0	897.6
1.1	400.0	440.0	3,291.2	987.4
1.2	400.0	480.0	3,590.4	1,077.1
1.3	400.0	520.0	3,889.6	1,166.9

Revised June 28, 2013

SCS ENGINEERS

SHEET 2 OF 2

CLIENT	PROJECT	JOB NO.
Hardee County	Phase II Section II Expansion	09199033.23

SUBJECT	BY	DATE
	SRF	8/31/12
Leachate Collection & Removal System Collection Sump Calculations	CHECKED	DATE

Based on the sump volume estimated from page 1 of 2, confirm the leachate collection pump pumping cycles.

Calculated quantities from design pumping rate page 1.

Pump off = 4.0 inches
Suction intake = 7.0 inches
Transducer height = 6.0 inches

Net leachate flow into/out of sump.

$Q_{net} = Q_{in} - Q_{out}$

Design pumping rate = Q_{in} = 202.93 gallons/min

Q_{out} = 243.5 gallons/min

$Q_{net\ out}$ = 5.4 ft^3/min

Sump bottom width = 20.0 feet
Sump bottom length = 20.0 feet
Area = 400.0 ft^2

Determine sump depth to be provided for recommended number of pumping cycles, H_T.

Volume = 20.0 feet * 20.0 feet * H_T feet
= 400 * (H_T) ft^3

Void ratio sump gravel = 0.30

Available volume of voids = 0.30 * 400 * (H_T) ft^3 = 120 * (H_T) ft^3

Design cycle time = 10.0 minutes

T_{Fill} = 120 * (H) ft^3 / 32.6 ft^3 = 3.69 (H) minutes/ft thickness of sump

T_{Empty} = 120 * (H) ft^3 / 5.4 ft^3/min = 22.12 (H) minutes/ft thickness of sump

Sump cycle time = T_{Fill} + T_{Empty} = 3.69 (H) min/ft + 22.12 (H) min/ft
10.0 = 25.80 (H) min/ft
H = 0.39 feet
H = 4.65 inches

CONCLUSION: The following sump depth is required to maintain the recommended number of pumping cycles per hour.

Sump depth required = 4.0 inches + 4.65 inches

= 8.7 inches

Sump depth provided = 12 inches

This depth corresponds to a design cycle time greater than the recommended number of pumping cycles of 10.0 minutes

Revised June 28, 2013

Attachment F

Revised FDEP Form Number 62-701.900(28) Closure Cost Estimating Form For Solid Waste Facilities

	Subtotal of 1-11 Above:	$2,389,668
12. Contingency	10% of Subtotal of 1-11 Above	10%
	Subtotal Contingency:	$238,967
	Estimated Closing Cost Subtotal:	$2,628,630

Description	**Total Cost**
13. Site Specific Costs	
Mobilization (10% of Sub-total 1-11)	$238,970
Waste Tire Facility	$617
Materials Recovery Facility	$46,525
Special Wastes	$0
Leachate Management System Modification	$0
Other (Household Hazardous Waste Building)	$7,603
Annual Cost for Leachate Disposal	$280,000
Subtotal Site Specific Costs:	$573,720
TOTAL ESTIMATED CLOSING COSTS ($):	$3,202,350

VI. CERTIFICATION BY ENGINEER

This is to certify that the Cost Estimates pertaining to the engineering features of the this solid waste management facility have been examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, the Cost Estimates are a true, correct and complete representation of the financial liabilities for closing and/or long-term care of the facility and comply with the requirements of Rule 62-701.630 F.A.C. and all other Department of Environmental Protection rules, and statutes of the State of Florida. It is understood that the Cost Estimates shall be submitted to the Department annually, revised or adjusted as required by Rule 62-701.630(4), F.A.C.

Signature

Shane R. Fischer, P.E., Project Manager
Name & Title (please type)

6/28/13
Date

58026
Florida Registration Number
(please affix seal)

SCS Engineers, 4041 Park Oaks Blvd. Suite 100
Mailing Address

Tampa, Florida 33610
City, State, Zip Code

sfischer@scsengineers.com
E-Mail Address

(813) 621-0080
Telephone Number

VII. SIGNATURE BY OWNER/OPERATOR

Signature of Applicant

Teresa Carver, Solid Waste Director
Name & Title (please type)

teresa.carver@hardeecounty.net
E-Mail Address (if available)

685 Airport Road
Mailing Address

Wauchula, Florida 33873
City, State, Zip Code

(863) 773-5089
Telephone Number

Attachment G

Revised Table L-2 Well Construction Details from the *Groundwater Monitoring Plan*, dated March 12, 2013, Prepared by SCS

TABLE L-2. WELL CONSTRUCTION DETAILS

Well ID	Well Diameter	Current Permit Designation	Permit Designation Phase II Section I	Permit Designation Phase II Section II	Total Depth (bls)	Casing Length (ft bls)	Screen Length	TOC Elevation (NGVD)	Ground Surface Elevation (Ft-NGVD)	Screen top/bottom (ft. bls)	screen top/bottom (NGVD)	Maximum Water Level (NGVD)	Minimum Water Level (NGVD)
MW-1	4"	Background	Background	Background	11.00'	7.80'	5'	88.22	86.46	6.0/11.0	80.46/75.46	85.44 (Feb 95)	78.27 (June 00)
MW-2	4"	Detection	Detection	Detection	10.50'	7.80'	5'	86.46	84.56	5.5/10.5	79.06/74.06	82.46 (Dec 02)	75.56 (June 00)
MW-3	2"	Piezometer	Piezometer	Abandoned	unknown	unknown	unknown	88.06	86.46	unknown	unknown	unknown	unknown
MW-4	2"	Background	Background	Background	18.90'	12.20'	10'	87.15	84.22	8.9/18.9	75.32/65.32	83.06 (Dec 02)	76.56 (June 00)
MW-5	2"	Detection	Detection	Abandoned	18.10'	11.00'	10'	89.12	86.28	8.1/18.1	78.18/68.18	82.91 (Dec 97)	76.46 (June 00)
MW-6	2"	Piezometer	Piezometer	Piezometer	13.50'	3.50'	10'	88.25	85.06	3.5/13.5	81.56/71.56	83.11 (Dec 02)	75.31 (June 01)
MW-7	2"	Piezometer	Piezometer	Piezometer	13.50'	3.50'	10'	87.88	84.98	3.5/13.5	81.48/71.48	83.11 (Dec 02)	75.31 (June 01)
MW-8	2"	Detection	Detection	Abandoned	13.50'	3.50'	10'	89.39	86.63	3.5/13.5	83.13/73.13	83.18 (Dec 02)	75.58 (June 01)
MW-9	2"	Abandoned	Abandoned	Abandoned	13.50'	3.50'	10'	88.71	85.90	3.5/13.5	82.40/72.40	83.11 (Dec 02)	75.31 (June 01)
MW-10*	2"	Abandoned	Abandoned	Abandoned	12.00'	2.00'	10'	88.0**	85.0**	3.8/12.0	81.2/71.2**	82.5***	74.5 (MW-6 Jun 00)***
MW-10R	2"	Detection	Detection	Detection	20.00	5.00	15'	88.57	85.49	5/20	80.49/65.49	78.19 (Jan 08)	78.19 (Jan 08)
MW-11	2"	Detection	Detection	Detection	12.00'	2.00'	10'	88.11	85.17	2.0/12.0	79.17/69.17	77.76 (Jan 08)	77.76 (Jan 08)
MW-12*	2"	Abandoned	Abandoned	Abandoned	17.00'	2.00'	15'	88.3**	85.3**	2.0/12.0	83.3/68.3**	82***	74.4 (MW-7 Jun 00)***
MW-12R	2"	Detection	Detection	Detection	17.00'	2.00'	15'	89.00	85.71	5/20	80.71/65.71	77.81 (Jan 08)	77.81 (Jan 08)
MW-13****	2"	Proposed	Phase II Section II	Detection	17.00'	2.00'	15'	88.9 ~~87.4~~****	85.9 ~~84.4~~****	2.0/17.0	83.9 ~~82.4~~/68.9 ~~67.4~~****	83***	74.4 (MW-7 Jun 00)***
MW-14****	2"	Proposed	Phase II Section II	Detection	17.00'	2.00'	15'	89.0 ~~88.5~~****	86.0 ~~85.5~~****	2.0/17.0 ~~15.0~~	84.0 ~~83.5~~/69.0 ~~68.5~~****	82***	76.6 (MW-5 Jun 00)***
Maintenance Supply Well	4"	Supply Well	To Be Abandoned	To Be Abandoned	197'	63'	NA	unknown	unknown	NA	NA	NM	NM
Material Recover Facilty Supply Well	4"	Supply Well	Supply Well	Supply Well	200'	67'	NA	unknown	unknown	NA	NA	NM	NM
Proposed Supply Well*	4"	Proposed	Supply Well	Supply Well	197'	63'	NA	TBD	TBD	NA	NA	NM	NM

NOTES:

* = Abandoned on January 22, 2008.

** = Approximate Elevation based upon March 2003 Aerial Topography Survey of the Site by I.F. Rooks and Associates

*** =Approximate based on potentiometric flow maps

**** = Approximate elevation based upon April 3, 2012 Aerial Topography Survey of the site by Pickett & Associates, Inc.

TBD =To Be Determined

NA =Not Applicable

NM = Not Measured