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January 30, 2020

Cory Dilmore, PE
Environmental Administrator
Solid Waste Section
Florida Department of Environmental Protection
2600 Blair Stone, MS #4565
Tallahassee, Florida 32399

RE: Sarasota County Solid Waste Division
Central County Solid Waste Disposal Complex Class I Landfill
Alternate Procedures Request
FDEP Solid Waste Permit No.: 0130542-028-SO-IM
Jones Edmunds Project No.: 19006-059-02

Dear Mr. Dilmore:

On behalf of the Sarasota County Solid Waste Division (SWD), Jones Edmunds is submitting the enclosed Request for Alternate Procedures for the Central County Solid Waste Disposal Complex (CCSWDC). This request proposes varying from the final cover requirements of Rule 62-701.600(3)(g)4., FAC, for the CCSWDC Class I Landfill. Enclosed please find the alternate procedures request and a check for $2,000 for the fee.

If you have any questions or need clarification regarding the enclosed information, please contact me at (352) 377-5821 or at TMcKnight@jonesedmunds.com.

Sincerely,

Tobin S. McKnight, P.E.
Department Manager/Vice President
730 NE Waldo Road
Gainesville, Florida 32641

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Xc: Jason Timmons, Sarasota County Solid Waste Division

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SARASOTA CENTRAL COUNTY
SOLID WASTE DISPOSAL COMPLEX
REQUEST FOR ALTERNATE PROCEDURES
FINAL CLOSURE SYSTEM

Sarasota County | January 2020

SARASOTA CENTRAL COUNTY SOLID WASTE DISPOSAL COMPLEX
REQUEST FOR ALTERNATE PROCEDURES
FINAL CLOSURE SYSTEM

Prepared for:

Sarasota County Board of County Commissioners

Public Utilities Solid Waste Division

4000 Knights Trail Road

Nokomis, Florida 34275

Permit No.: 0130542-028-SO-IM

WACS Facility ID No.: 51614

Prepared by:

Jones Edmunds & Associates, Inc.

730 NE Waldo Road

Gainesville, Florida 32641

Professional Engineering Certificate of Authorization #1841

Jones Edmunds Project No.: 19006-059-02

Sarasota County CIP #88041

January 2020

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1 OVERVIEW

1.1 PURPOSE

This Request for Alternate Procedures proposes a variance from the final cover requirements outlined in Rule 62-701.600(3)(g)4., Florida Administrative Code (FAC), for the Sarasota Central County Solid Waste Disposal Complex (CCSWDC) Class I Landfill. This request proposes installing an exposed geomembrane cover (EGC) closure over the Class I waste as final cover for Phase II, forthcoming Phase III, and future Class I cells (Phase I was previously closed). The landfill cells will be closed with an EGC when the landfill reaches design capacity; at this time, the long-term care (LTC) period begins. The closure will be converted to the final prescriptive soil cover system (soil conversion) when the material strength half-life of the EGC is reached. The EGC's material strength will be monitored from when it is placed and will continue until the soil conversion.

The closure funds required for the soil conversion will be in place before the end of the 30-year LTC period. LTC of the cover system will occur for 5 years after the EGC conversion to prescriptive soil cover. If the conversion occurs before Year 25 of the LTC period, all LTC responsibilities will end in Year 30. If the conversion occurs after Year 30 of the LTC period, all LTC responsibilities, except the 5-year final soil cover maintenance period, will end with Florida Department of Environmental Protection (FDEP) approval.

1.2 FACILITY INFORMATION

The CCSWDC is owned by the Sarasota County Board of County Commissioners and operated by the Sarasota County Public Utilities Solid Waste Division (SWD). CCSWDC is a 4,000-acre property with a 550-acre facility for solid waste disposal and processing. The CCSWDC receives residential, commercial, and industrial wastes.

On-site operations include municipal solid waste (MSW [Class I]) disposal, yard waste collection and processing, construction and demolition debris (C&DD) collection and processing, waste tire collection, scrap metal collection, and household hazardous waste collection. The support facilities include administration offices, maintenance buildings for County and contractor personnel, scale house operations, leachate collection and storage systems, landfill gas (LFG) collection and flare systems, and a landfill-gas-to-energy (LFGTE) facility operated by a third-party developer, Aria Energy. Figure 1, Site Plan, shows these features.

The original layout for the CCSWDC included five Class I waste disposal units. These areas were designated as Phases I through V, which are shown on the Site Plan in Figure 1, and comprise 294 acres of the 550-acre CCSWDC area. Each phase of the landfill was planned to be approximately 60 acres in area except for Phase V, which is approximately 20 acres. As part of initial development of the CCSWDC, the entire stormwater and road access systems were constructed for future build-out of all five Class I landfill phases.

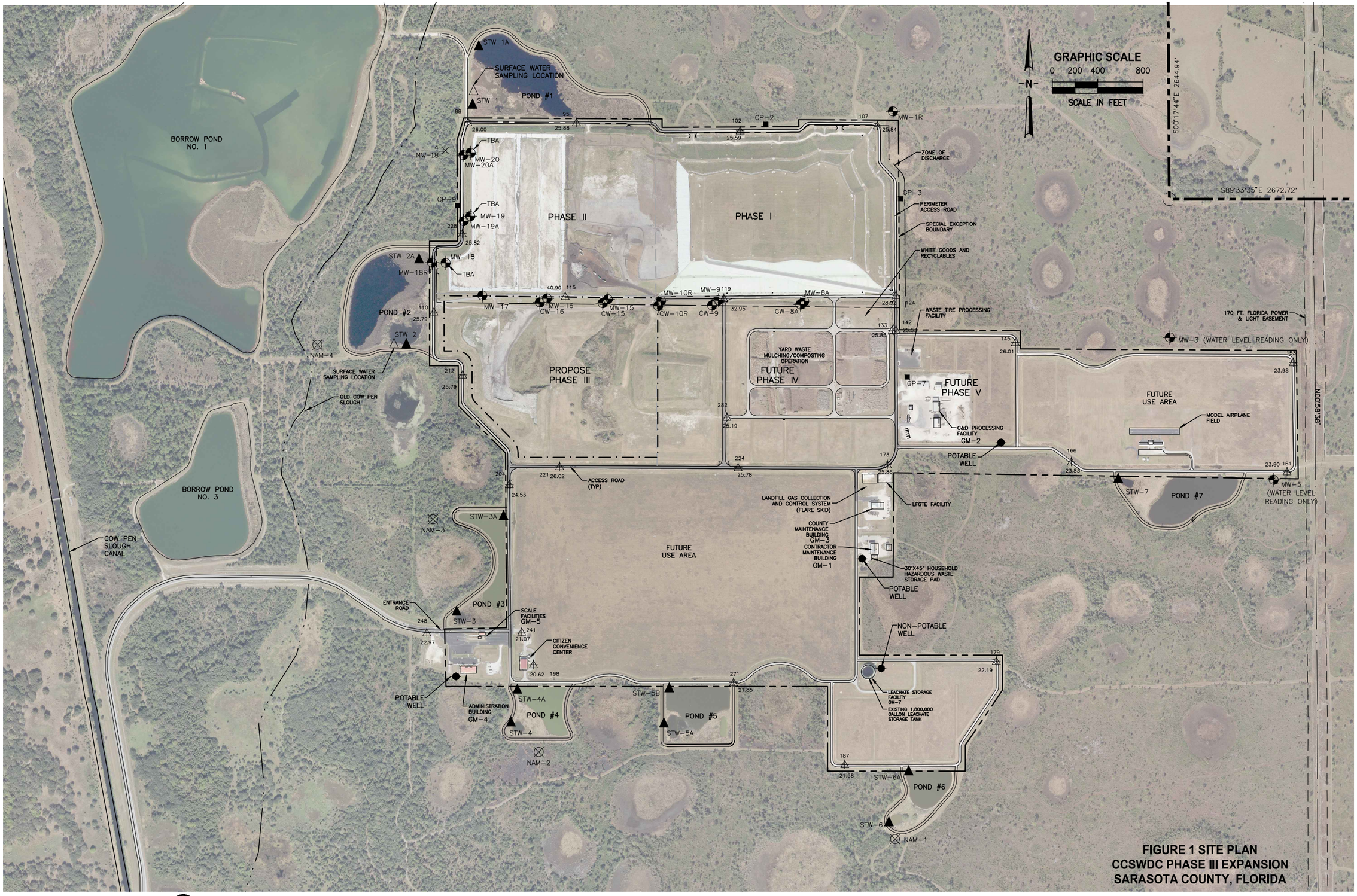

FIGURE 1 SITE PLAN
CCSWDC PHASE III EXPANSION
SARASOTA COUNTY, FLORIDA

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2 INTRODUCTION

The proposed EGC will be a 60-mil textured high-density polyethylene (HDPE) geomembrane that will serve as the barrier layer. The soil conversion cover will meet Rule 62-701.600(3)(g)4, FAC, requirements and will include a protective soil layer at least 24 inches thick that will be installed on top of the EGC. The protective soil layer will include topsoil or soils that will sustain vegetative growth.

The EGC will be designed so that the final soil cover layer installation will meet the Rule requirements. SWD proposes the EGC for Phase II, Phase III, and future phases of landfill construction. Figure 2 shows the expected final buildout of Phase II and Phase III.

This Request for Alternate Procedures for construction of an exposed barrier layer installed until the material reaches its half-life will provide SWD with the following benefits:

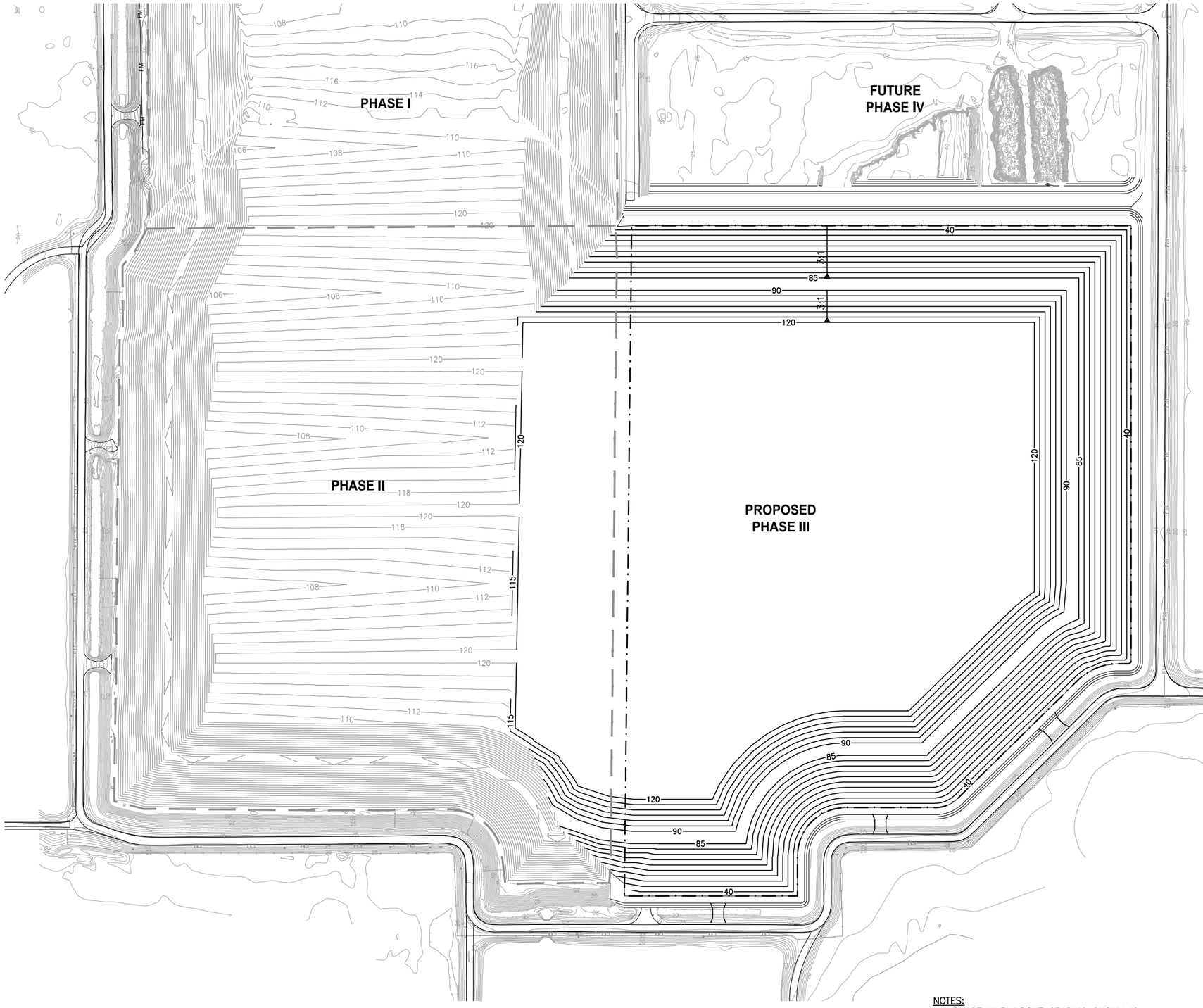
- Reduced side-slope soil erosion and maintenance effort with the delayed installation of the soil cover.
- More effective fugitive gas emission control with the EGC installed.
- Reduced leachate generation with the early EGC installation.
- Reduced fertilizing of the vegetative cover with the delayed installation of the soil cover.

Section 4.1 describes these benefits in more detail.

Existing installations and laboratory analysis demonstrate that the proposed EGC can maintain its material strength properties for well over 30 years. Advances in geomembrane formulations including antioxidants help the geomembrane retain strength and barrier layer function under exposed conditions. For this project, the intent is to perform regular testing of the EGC once it is installed until conversion and to evaluate its material strength properties to determine its half-life (i.e., the time required for the geomembrane's strength properties to decrease by half). Installing an EGC and deferring installation of final soil cover benefits SWD and the environment. SWD will meet all financial assurance obligations for closure and LTC required by the Rule.

If this Request for Alternate Procedures for installation of an EGC with conversion to prescriptive soil cover is granted, SWD will include this modification in the upcoming Class I Phase III Landfill expansion operations and construction permit application, or a future Operating Permit Modification if needed, that will include the following:

- A closure design plan including drawings, specifications, and a construction quality assurance plan (CQAP) for installation of the EGC and the soil conversion cover.
- A closure operation plan with details specific to the EGC and soil conversion cover.
- An LTC plan including detailed inspection, maintenance, and testing procedures for the EGC.



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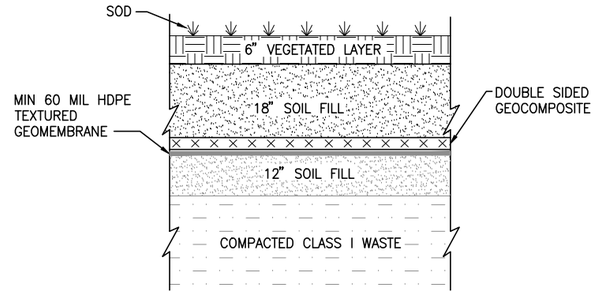
GRAPHIC SCALE

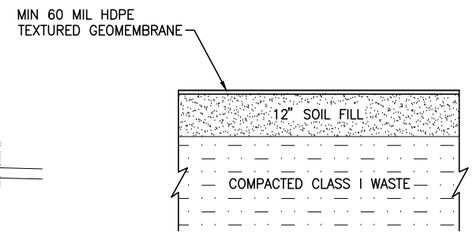
0 75 150 300

SCALE IN FEET



PROPOSED CLASS I CONVERSION SOIL COVER DETAIL

NTS



PROPOSED CLASS I EGC COVER DETAIL

NTS

LEGEND

PHASE III EDGE OF LINER BOUNDARY

130 EXISTING CONTOUR (2018) TOPOGRAPHIC SURVEY BY KUCERA INTERNATIONAL INC.

NOTES:

1. PHASE III BUILDOUT GRADING SHOWN IS PRELIMINARY ONLY AND MAY CHANGE BASED ON THE RESULTS OF THE GEOTECHNICAL ANALYSIS AND FINAL DESIGN PARAMETERS.

FIGURE 2
PROPOSED BUILDOUT
CCSWDC PHASE III EXPANSION
SARASOTA COUNTY, FLORIDA

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SAVED:1/15/2020 2:43 PM BY:PLIPSTILL PATH=Y:\19006-SARASOTACOUNTY\PROJECTS\059-02-CCSWDC PHASE III DESIGN & PERMITTING\CAD\FIGURES EGC ALT\1900605902-FIG-2.DWG PLOTTED:1/15/2020 02:46 PM BY:PAUL LIPSTILL

- The financial assurance cost estimate will include closure and long-term-care costs for the EGC with the additional closure cost associated with soil conversion included as a Site-Specific Cost in item number IV.13 of FDEP Form 62-701.900(28). A detailed breakdown of the soil conversion closure cost will be provided separately.

3 RULE REQUIREMENTS

3.1 APPLICABILITY

Landfill final cover includes a barrier layer and protective cover. Historically, the barrier layer was a compacted low-permeability soil, and the protective cover was compacted soil with a grassed surface for erosion protection. As geosynthetic technology became part of landfill design, final cover designs incorporated an impermeable geomembrane barrier layer with a protective soil cover, which is the currently prescribed final cover design (Rule 62-701.600(3)(g), FAC). In 2010, the geosynthetic clay liner (GCL) was approved for use as a final cover barrier layer. Before 2010, the use of GCLs as a final cover barrier layer was only allowed through the Alternate Procedure Approvals.

This Request for Alternate Procedures will demonstrate that the proposed EGC meets the intended performance of a barrier layer overlain by 2 feet of soil cover based on technical evaluations. The geomembrane material and installation will meet the barrier layer cover requirements of Rule 62-701, FAC[1] .

3.2 CRITERIA

This section addresses the Alternate Procedures requirements outlined in Rule 62-701.310(2), FAC.

3.2.1 SPECIFIC FACILITY

This Request for Alternate Procedures is for the following facility (as described in Section 1.2):

Sarasota Central County Solid Waste Disposal Complex
Class I Landfill
4000 Knights Trail Road
Nokomis, Florida 34275
WACS ID Number 51614

3.2.2 SPECIFIC PROVISIONS

The specific provision for which this Alternate Procedure is being requested is with respect to the installation of the landfill final cover. This Request for Alternate Procedures proposes installing an EGC over the Class I waste. After the Class I landfill reaches design capacity, it will be completely covered with an EGC and the LTC period will begin; the soil conversion cover will be installed when the half-life of the EGC is reached. The EGC will be regularly monitored and tested from the time it is installed.

The Class I landfill is a lined facility. In accordance with Rule 62-701.600(3)(g)1., FAC:

> *Landfills shall have a final cover designed to minimize infiltration and erosion, which shall include a barrier layer consisting of a soil layer, a geomembrane,*

[1]FDEP Rules 62-701.400(3)(d)1. and 2., (3)(d)5.-11., paragraphs (e) and (f), FAC.

or a combination of a geomembrane with a low permeability material. All geosynthetic and soil components used in the final cover shall meet the standards and specifications contained in subparagraphs 62-701.400(3)(d)1. and 2., (3)(d)5.-11., paragraphs (e), and (f), F.A.C. For lined Class I and Class III landfills, the barrier layer shall have a permeability that is substantially equivalent to, or less than, the permeability of the bottom liner system. If the landfill uses a geomembrane in the bottom liner system, the barrier layer shall also incorporate a geomembrane.

The proposed EGC barrier layer will be a 60-mil textured HDPE geomembrane. This material is chemically and physically resistant to leachate, ultraviolet (UV)-resistant, and substantially equivalent to the permeability of the existing bottom liner system. Installation of the EGC will comply with FDEP rules and requirements[2].

SWD complies with its financial assurance requirements by using the Financial Test Method[3]. Refer to Sections 1.1 and 2.0 for details on the proposed closure and LTC approach for the EGC and soil conversion cover.

3.2.3 Basis for the Exception

The proposed alternate final closure system will allow SWD to protect public health and safety and minimize detrimental impacts to the environment while reducing costs to the citizens of Sarasota County. Installing an EGC will significantly reduce side-slope erosion and maintenance efforts, provide more effective fugitive gas emission control, and reduce leachate generation. An alternate final cover design is permissible according to Rule 62-701.600(3)(g)6, FAC, provided that the alternate design demonstrates that it will result in a substantially equivalent rate of stormwater infiltration through the final cover. This alternate design will result in an equivalent rate of stormwater infiltration through the final cover because ultimately the same prescriptive final cover system is proposed but installed at an alternate time.

3.2.4 Specific Requirements and Demonstration That the Alternate Provides an Equal Degree of Protection

Section 4.1 provides this information and details that the alternate provides an equal degree of protection.

3.2.5 Demonstration of Effectiveness

Section 4.2 provides this information and detailed technical evaluations demonstrating an equal degree of environmental protection and effectiveness.

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[2] FDEP Rule 62-701.400(3)(d)1. and 2., (3)(d)5.-11., paragraph (e), and (f), FAC.

[3] FDEP letter dated March 28, 2018, documenting compliance with financial assurance requirements of Rule 62-701.630, FAC. SWD submitted a closure cost estimate update on January 30, 2019.

3.2.6 Department Order

If approval of this Alternate Procedure is granted, SWD will prepare a permit modification application to include installing the EGC and delaying installation of the soil conversion cover until the EGC reaches its half-life.

3.2.7 Alternate Sampling Procedures

Alternate sampling procedures are not proposed under this Request for Alternate Procedures.

3.2.8 Other Relief Mechanisms

Other relief mechanisms are not proposed under this Request for Alternate Procedures. The EGC and soil conversion cover are not proposed for research, development, or demonstration.

3.2.9 Application Fee

SWD or its contracted consultant will pay all applicable fees associated with this request for alternate procedures. In accordance with Rule 62-4.050(4)(j)25.a, a check for $2,000 is submitted under separate cover.

3.2.10 Engineer's Certification

On behalf of SWD, Jones Edmunds has prepared this request and is an authorized engineering firm in Florida (Certificate of Authorization #1841). This application has been certified, signed, and sealed for completeness. Section 6 is the engineering certification signature page.

4 ALTERNATE PROCEDURES AND DEMONSTRATION OF EFFECTIVENESS

This section addresses the requirements of FDEP Rule 62-701.310(2)(d) and (e), FAC.

4.1 ALTERNATE PROCEDURES

Rule 62-701.600(3)(g)4, FAC, provides the FDEP requirements for seeking Alternate Procedures and states that the final cover design is required to include a geomembrane barrier layer and 24 inches of protective soil cover. This alternate final cover design proposes delaying installation of the final cover soil until the EGC reaches its half-life. The EGC will be installed by a to-be-determined schedule, the LTC period will begin when the Class I Landfill reaches full design capacity and the EGC is completely in place, and the soil conversion cover will be installed when the EGC reaches its half-life.

The EGC provides the following equivalencies and potential advantages over placement of the prescriptive final cover as the waste reaches final elevations:

- LFG Control – The impermeable geomembrane controls potential surface/fugitive gas emissions of LFG, which is important for meeting Title V requirements. Early installation of the EGC will provide beneficial gas emission control.
- Slope Stability – With no soil cover, veneer slope stability and soil erosion are not considerations in cover maintenance. The proposed EGC will consist of a textured 60-mil HDPE geomembrane with an anchoring system for maintaining stability under potential LFG and wind uplift conditions.
- Reduced Stormwater Infiltration – Because stormwater is rapidly drained off the landfill and not retained in the thick soil layer, little can infiltrate the geomembrane. As a result, the probability of stormwater mixing with waste and entering the groundwater is greatly reduced.
- Reduced Leachate Generation – Leachate generation is reduced because of a lower potential for head-water buildup on the barrier layer since no soil is present to retain stormwater. With no head on the barrier layer, less potential exists for stormwater intrusion into the landfill. With a traditional 2-foot-thick cover soil, up to 2 feet of head is on the barrier layer when the soil cover is saturated.
- Reduced Maintenance – Because soil and vegetation are not present, maintenance of the EGC will be minimal. By delaying the installation of the soil and vegetative cover, mowing, fertilizing, and soil and vegetation replacement are eliminated. Without the soil and vegetative cover, the EGC is easy to inspect and repair, and the potential for damage from vectors (e.g., burrowing animals) and root intrusions is minimized because no soil cover is present.
- Reduced Total Costs – Previous experience with EGCs suggests that the proposed installation of the EGC and delayed installation of the final cover soil will provide SWD with a net cost savings compared to installation of a traditional cover soil closure.

SWD will inspect the EGC system annually to monitor the integrity of the barrier layer. This annual inspection will begin as the first section of the EGC system is installed. The annual inspection report will be prepared by a Florida-licensed professional engineer and submitted to FDEP for review; the report will document the annual inspection and identify any areas of

concern. The EGC system will also be tested at least once every 5 years (from when it is first installed). The EGC test results, half-life calculations, data analysis, and documented repairs and maintenance will be reported to FDEP.

A detailed EGC monitoring plan and testing protocol will be developed during the permit application process. The testing will include destructive material property testing (tensile properties[4] and wide width strip tensile[5]) and antioxidant testing (High-Pressure Oxidative Induction Time [HPOIT[6]] tests). Based on the results of the testing, predictions of the EGC lifetime will be performed.

SWD will submit a Financial Assurance Closure Estimate (FACE) at the time of permitting for the EGC barrier layer, which will include Site-Specific Costs for the soil conversion closure and LTC. The closure cost estimate for the EGC will be based on installing the EGC and considering that the system will be covered with soil in the future. The LTC costs of the EGC will include annual inspections, an estimate for liner repair, liner testing, and all other LTC items that pertain to the landfill (as defined in FDEP Form 62-701.900(28), FAC). The Site-Specific Costs for the soil conversion cover will be based on the costs to convert the EGC to a prescriptive soil cover (without repeating costs already included in the EGC closure cost estimate); and LTC costs for the soil conversion cover will be based on the maintenance of the soil cover. LTC of the soil cover will be for a minimum of 5 years. The FACE will be updated annually using the FDEP-prescribed inflation factor and re-calculated every 5 years. Appendix A summarizes the closure and LTC items for the EGC and items included in the Site-Specific Costs for soil cover.

The details of the inspection frequency and procedures will be included in the permit modification application submitted after SWD receives the Department Order approving the proposed EGC and soil cover installation as final cover.

[4]ASTM D638, Standard Test Method for Tensile Properties for Plastics.

[5]ASTM D4885, Standard Test Method for Determining Performance Strength of Geomembranes by Wide Strip Tensile Method.

[6] HPOIT: This test uses a higher pressure and lower temperature than the Oxidative Induction Time (OIT) test and is considered more accurate for measuring the long-term stabilizing antioxidants applicable for selecting and specifying geomembrane for use as EGCs. (ASTM D5885 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry.)

4.2 Demonstration of Alternate Requirement Effectiveness

The EGC will meet the requirements of Rule 62-701.600(3)(g), FAC – final cover design.

4.2.1 Infiltration and Erosion Requirements

FDEP Rule 62-701.600(3)(g)1, FAC, states:

> *Landfills shall have a final cover designed to minimize infiltration and erosion, which shall include a barrier layer consisting of a soil layer, a geomembrane, or a combination of a geomembrane with a low permeability material.*

The EGC will be an equivalent barrier layer to minimize infiltration and may reduce infiltration because stormwater will flow off the surface very quickly and will not remain in the cover soil. Because of the lack of soil cover, no erosion will occur while the EGC system is in place.

4.2.2 Standards and Specifications Requirements

FDEP Rule 62-701.600(3)(g)1., FAC, states:

> *All geosynthetic and soil components used in the final cover shall meet the standards and specifications contained in subparagraphs 62-701.400(3)(d)1. and 2., (3)(d)5.-11., paragraphs (e), and (f), F.A.C.*

The EGC will be an HDPE geomembrane, and the CQAP will meet the requirements of Rule 62-701.400(3)(d), FAC, for geosynthetic components:

> *1. HDPE geomembranes and LLDPE geomembranes shall have factory and field seams whose shear and peel strengths during testing are in conformance with the seam strengths specified in method GRI GM19… For all geomembranes, the failure shall occur in the lining material outside the seam area. All field seams must also be visually inspected and pressure or vacuum tested for seam continuity using suitable non-destructive techniques.*
>
> *2. Geomembranes shall not be used at landfills unless they are subjected to continuous spark testing by the manufacturer at the factory and no defects have been found.*
>
> *5. HDPE geomembranes shall meet the specification contained in method GRI GM13...*
>
> *7. Interface shear strength of the actual components which will be used in the liner system shall be tested with method ASTM D5321 or an equivalent test method… Unless it can be justified otherwise, the interface shall be tested in a water-saturated state. For the purposes of this test, clays compacted in the test apparatus during setup which have a water content wet of optimum shall be considered water saturated.*
>
> *10. If not submitted as part of the permit application to the Department, then the testing required in subparagraphs (3)(d)7., 8. and 9. of this section for the materials used in the liner construction shall be conducted as part of the*

construction quality assurance activities, and the results of these tests shall be included in the completion of construction documents required in subsection (7) of this section.

11. The testing required in subparagraphs (3)(d)7., 8. and 9. of this paragraph are single-point tests required either as part of the permit application phase of a landfill project or prior to liner construction. The purpose of these tests is to confirm that the components selected for the liner construction meet the design criteria used in the permit application.

The EGC will be an HDPE geomembrane, and the CQAP will meet the requirements of Rule 62-701.400(3)(e), FAC, including the following specifications:

1. Definition and qualifications of the designer, manufacturer, installer, geosynthetic quality assurance consultant, geosynthetic quality assurance laboratory, and quality assurance program;

2. Material specifications for geomembranes, geotextiles, geogrids, geocomposites, and geonets, including general requirements, specified geomembrane properties, and labeling;

3. Manufacturing and fabrication specifications including:

a. Geomembrane manufacturing, including raw material and roll quality control;

b. Geomembrane fabrication, including requirements of personnel, seaming equipment and products, seam preparation, weather conditions for factory seaming, overlapping and temporary bonding, trail seams, and nondestructive seam continuity testing;

c. Destructive seam strength testing including location and frequency, sampling procedure, size of samples, testing at the fabrication factory, laboratory testing, fabricator's laboratory testing, and procedures for destructive test failure; and

d. Repairs.

4. Geomembrane installation specifications including:

a. Earthwork;

b. Conformance testing;

c. Geomembrane placement, which shall address layout drawings, panel identification, and field panel placement;

d. Field seaming, which shall address seam layout, requirements of personnel, overlapping and temporary bonding, seam preparation, seaming equipment and products, weather conditions for seaming, trial seams, general seaming procedures, nondestructive seam continuity testing,

destructive testing, and defects and repairs including identification, evaluation, and repair procedures;

e. Materials in contact with the geomembrane, including granular materials, concrete, and sumps and appurtenances; and

f. Lining system acceptance.

4.2.3 PERMEABILITY REQUIREMENTS

Rule 62-701.600(3)(g)1., FAC, states:

> *…the barrier layer shall have a permeability that is substantially equivalent to, or less than, the permeability of the bottom liner system. If the landfill uses a geomembrane in the bottom liner system, the barrier layer shall also incorporate a geomembrane.*

The EGC will be a 60-mil HDPE geomembrane with a permeability equivalent to the existing geomembrane bottom liner system of Phase II, proposed Phase III, and expected future phases of the Class I Landfill.

4.2.4 MATERIAL REQUIREMENTS

Rule 62-701.600(3)(g)4., FAC, states:

> *If a geomembrane is used in the barrier layer, it shall be either HDPE or LLDPE with a minimum average thickness of 40 mils or PVC with a minimum average thickness of 30 mils, shall have chemical and physical resistance to materials it may come in contact with, and shall withstand exposure to the natural environmental stresses and forces throughout the installation, seaming process, and settlement of the waste during the closure and long-term care period.*

The EGC will be a 60-mil HDPE geomembrane that is resistant to leachate and stormwater.

4.2.4.1 Landfill Gas Uplift

Traditional final cover systems must address the stability of the soil cover due to LFG uplift. LFG uplift is the buildup of LFG below the geomembrane that could reduce the stability of the overlying soil cover system. While the EGC is in place, no issue of "cover soil stability" due to LFG uplift will occur. Once the soil conversion cover is installed, gas production will have reduced and stabilized.

SWD operates an active gas collection and control system (GCCS) under vacuum. The GCCS includes vertical extraction wells under vacuum pressure, reducing the potential for positive gas pressure at the surface. In addition to the active GCCS, the EGC design will include additional gas control measures below the geomembrane. This system will prevent gas from collecting under the geomembrane. The design of the underlying gas collection measures will be provided with the permit modification application upon approval of this Request for Alternate Procedures.

The GCCS will be operated according to the requirements of the facility's Title V Air Operating permit; based on the current air operating permit, the site is not yet subject to the NSPS Subpart WWW performance requirements.

4.2.4.2 Wind Uplift

Wind at high velocities can cause negative pressures (vacuum) over the EGC. The EGC anchoring system will be designed to stabilize the EGC against wind uplift forces. Our experience at the Polk County North Central Landfill (NCLF), New River Regional Landfill, and published design information will be used to design the EGC anchoring systems.

The anchor system design and detailed wind uplift calculations will be provided with the permit modification application upon approval of this Request for Alternate Procedures.

4.2.4.3 Weathering and Retained Strength

The long-term performance of the EGC's weathering resistance is critical to maintaining the integrity of the barrier layer.

Over 17 years of data are available on the mechanical properties of the Polk County NCLF's EGC. Based on the test results previously submitted to FDEP, the Polk County NCLF EGC can be expected to maintain field performance longer than 80 years. Appendix B shows that the predicted lifetime of an EGC in Florida using published Geosynthetic Research Institute (GRI)[7,8] UV device testing and adjusting for Florida radiation conditions is approximately 90 years.

4.2.4.4 Soil Cover Alternative

Rule 62-701.600(3)(g)4. and 5., FAC, states:

> *4. …A protective soil layer at least 24 inches thick shall be put on top of the geomembrane. ... Material specifications, installation methods, and compaction specifications, which may include a drainage layer between the geomembrane and the protective soil layer, shall be adequate to protect the barrier layer from root penetration, resist erosion, and remain stable on the final design slopes of the landfill. This layer shall include topsoil or soils that will sustain vegetative growth.*
>
> *5. The final cover design shall include an evaluation of the stability of the cover system and the disposed waste and shall be designed to meet the factor of safety criteria in subsection 62-701.400(2), F.A.C. This evaluation shall include an analysis of the potential for slides along the weakest interface*

[7] GRI Report #42, *Lifetime Prediction of Laboratory UV Exposed Geomembranes: Part I – Using a Correlation Factor*; by Koerner, Robert M., Koerner, George R., and Hsuan, Y (Grace); January 3, 2012.

[8] GRI Report #44, *Exposed Lifetime Predictions of 19 Different Geosynthetics in the Laboratory and in Phoenix, Arizona*; by Koerner, Robert M., Hsuan, Y (Grace), and Koerner, George R.; December 16, 2014.

of the final cover system and of the potential for deep seated rotational or translational failures through the waste and the final cover.

A prescriptive soil cover will be installed over the EGC when the geomembrane reaches its half-life. The soil conversion cover design will include a complete veneer stability analysis of the cover system. The permit application for operation and construction of the Class I Phase III Landfill will address the analyses of deep-seated rotational or translational failures and will discuss the EGC and soil final cover, as applicable. The EGC anchoring system will be designed to remain stable under the exposed environmental conditions.

5 SUMMARY

Based on the documentation of the EGC performance at the Polk County NCLF and published geomembrane laboratory testing, the proposed EGC with the delayed soil cover system installation at the Sarasota CCSWDC is equivalent to the FDEP-prescribed final cover system. The EGC will be specified to resist degradation from exposure, preserving stability and material strength, and will be monitored and tested until the soil cover is installed. The proposed Alternate Procedures are summarized as follows:

1 Initial closure with EGC:

   a. Install EGC on the landfill according to the to-be-determined schedule.
   b. Design EGC to allow conversion to prescriptive cover when EGC reaches its half-life:
      i. Place 2 feet of soil cover and grassing over EGC.
      ii. Meet global and veneer slope stability requirements.
      iii. Include the stormwater management system.
   c. Convert to prescriptive cover based on the half-life of the EGC mechanical properties.
   d. Maintain the EGC including (from the time of installation):
      i. Perform annual inspections, maintenance, and repairs.
      ii. Prepare 5-year stabilization reports including strength testing, HPOIT testing, and lifetime prediction analysis.
   e. Begin 30-year post-closure LTC clock after the Class I landfill reaches design capacity (i.e., closed) and the EGC installation is complete.
      i. Continue annual inspections, maintenance, and repairs.
      ii. Continue 5-year stabilization reports including strength testing, HPOIT testing, and lifetime prediction analysis.

2 Prescriptive cover installation:

   a. Install soil cover over EGC (including stormwater controls, grassing, and other closure appurtenances as needed) when the EGC reaches its half-life.
   b. Extend the LTC period by 5 years after the prescriptive cover is installed.
   c. Prepare one 5-year stabilization report after prescriptive cover completion.
   d. If the conversion occurs before Year 25 of the LTC period, all LTC responsibilities will end at Year 30. If the conversion occurs after Year 25 of the LTC period, all LTC responsibilities, except maintenance of the final soil cover, will end at Year 30.

3 Financial Assurance:

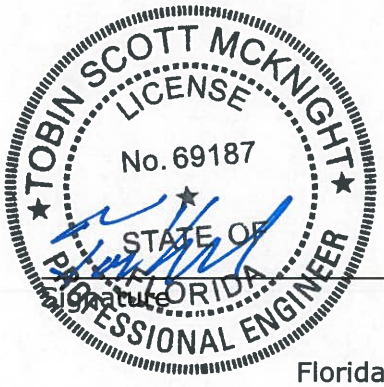
   a. Prepare financial assurance closure and LTC estimate for the EGC, including soil conversion cover costs as a Site-Specific Cost.
   b. Fund full EGC at the time of closure. Fund full soil conversion cover at Year 30 of LTC. Maintain soil cover construction funds until needed.
   c. The Financial Test method is used to ensure adequate funds are available for closure and LTC.

d. Adjust soil conversion cover funding if strength testing and lifetime predictions show that EGC will reach the half-life before the end of the 30-year LTC period.
e. Fund annual LTC costs:
    i. EGC annual inspections, maintenance, and repairs.
    ii. 5-year stabilization reporting and EGC testing and lifetime predictions.
f. Once prescriptive cover is constructed, fund annual maintenance of grass for minimum 5-year extended LTC period.
g. Update closure and LTC costs annually based on inflation factor and re-calculate every 5 years.

6 ENGINEERING CERTIFICATION

This Request for Alternate Procedures was prepared specifically for the Central County Solid Waste Disposal Complex in Sarasota County, Florida. This Report was based on research and literature data available at the time. Any data prepared by others used in the development of this Report was referenced accordingly. This Report has been prepared in accordance with accepted professional engineering practices.

I further certify that this Request for Alternate Procedures was prepared by me or under my direct supervision, and that I am a duly registered Professional Engineer.



Signature

1/30/2020
Date

Tobin S. McKnight, PE
Florida PE Registration No. 69187

Appendix A

Financial Assurance Line Item Summary

JonesEdmunds

PROJECT NUMBER:	19006-059-02	
PROJECT NAME:	EGC Alternate Procedure Request Central County Solid Waste Disposal Complex Sarasota County, Florida	
BY:	M.Morse	Date: 1/27/2020
CHECKED BY:	C.Sawyer	Date: 1/29/2020

Closure and Long Term Care Cost Estimating for Solid Waste Facilities
Form 62-701.900(28)

The following identifies line items that will be included in the financial assurance cost estimate (FACE) for the EGC and the items included in the site specific cost for the soil cover conversion.

Legend: -- Cost Not Applicable x Cost Applicable

IV. ESTIMATED CLOSING COST	EGC Closure	Final Soil Cover Conversion: Items to be Included in Site Specific Costs
Description		
1. Proposed Monitoring Wells	--	--
2. Slope and Fill (bedding layer between waste and barrier layer):		
Excavation	x	--
Placement and Spreading	x	x
3. Cover Material (Barrier Layer):		
60-mil HDPE geomembrane	x	--
Geocomposite	--	x
4. Top Soil Cover		
Off-Site Material	--	x
Spread	--	x
5. Vegetative Layer		
Sodding	--	x
6. Stormwater Control System		
Earthwork	x	--
Grading	--	x
Toe Drains	x	--
Piping	--	x
Control Structures	--	x
Other - Geotextile for Toe Drains	x	--
Other - Filter Point Mat	--	x
7. Passive Gas Control:	--	--
8. Active Gas Extraction Control:		
Other - GCCS Construction and Replacement	x	x
9. Security System	--	--
(Installed during active operations.)		
10. Engineering		
Closure Plan Report	x	x
Certified Engineering Drawings	x	x
NSPS/Title V Air Permit	x	--
Final Survey	x	x
Certification of Closure	x	x

JonesEdmunds	PROJECT NUMBER:	19006-059-02	
	PROJECT NAME:	EGC Alternate Procedure Request Central County Solid Waste Disposal Complex Sarasota County, Florida	
	BY:	M.Morse	Date: 1/27/2020
	CHECKED BY:	C.Sawyer	Date: 1/29/2020

11. Professional Services		
P.E. Supervisor	x	x
On-Site Engineer	x	x
Office Engineer	x	x
On-Site Technician	x	x
Other - Administrative Assistant	x	x
Quality Assurance Testing	x	x
12. Contingency		
5% of subtotal of 1-11	x	x
13. Site Specific Costs		
Mobilization and Bonds	x	x
Waste Tire Facility	x	–
Materials Recovery Facility	x	–
Special Wastes	x	–
Soil Conversion Closure Costs	--	x

V. ANNUAL COST FOR LONG-TERM CARE	**EGC**	**Final Soil Cover (Conversion)**
Description		
1. Groundwater Monitoring [62-701.510(6), and (8)(a)]		
Semi-Annual	x	–
2. Surface Water Monitoring [62-701.510(4), and (8)(b)]		
Semi-Annual	x	–
3. Gas Monitoring [62-701.400(10)]		
Quarterly	x	–
4. Leachate Monitoring [62-701.510(5), (6)(b) and 62-701.510(8)c]		
5. Leachate Collection/Treatment Systems Maintenance		
Maintenance		
Collection Pipes	x	–
Sumps, Traps	x	–
Lift Stations	x	–
Tanks	x	–
Disposal	x	–
6. Groundwater Monitoring Wells Maintenance		
Replacement	x	–
7. Gas System Maintenance		
Replacement	x	–
Operation	x	–
8. Landscape Maintenance		
Mowing	--	x
Fertilizer	--	x
9. Erosion Control and Cover Maintenance		
Sodding	--	x
Regrading	--	x
Liner Repair - Phase I	x	–
Liner Repair - Phases II & III	x	–
10. Storm Water Management System Maintenance		
Conveyance Maintenance	x	x

JonesEdmunds

PROJECT NUMBER:	19006-059-02	
PROJECT NAME:	EGC Alternate Procedure Request Central County Solid Waste Disposal Complex Sarasota County, Florida	
BY:	M.Morse	Date: 1/27/2020
CHECKED BY:	C.Sawyer	Date: 1/29/2020

11. Security System Maintenance		
Fences	x	--
Gate(s)	x	--
Sign(s)	x	--
12. Utilities	x	--
13. Leachate Collection/Treatment Systems Operation		
Operation		
P.E. Supervisor	x	--
On-Site Engineer	x	--
Office Engineer	x	--
Onsite Technician	x	--
14. Administrative		
P.E. Supervisor	x	x
On-Site Engineer	--	--
Office Engineer	x	x
Onsite Technician	x	x
15. Contingency		
5% of subtotal of 1-14	x	x
16. Site Specific Costs		
Groundwater Monitoring Report	x	--
Soil Conversion LTC costs	--	x

Appendix B

EGC Lifetime Prediction

JonesEdmunds

PROJECT NUMBER: 19006-059-02 SHEET: 1 OF 1
PROJECT NAME: CCSWDC EGC ALT PROCEDURE
SUBJECT: Half-life Estimate for EGC in Florida
BY: M.Morse Date: 1/15/2020
CHECKED BY: C.Sawyer Date: 1/29/2020

Objective:

Estimate the lifetime for an exposed HDPE geomembrane based on laboratory testing per ASTM D7238 corrected for average annual Florida UV radiation.

Data:

UV_{rad} = UV Radiation in Florida (hot and wet) =	23	MJ/m^2-month		*Reference 1*
i_{QUV} = QUV-D7238 Irradiance =	42.42	W/m^2		*Reference 1*
$t_{50\%\_80C}$ = Time to 50% Elongation at 80 C =	38,000	light hours	106 months	*Reference 1*
$t_{50\%\_70C}$ = Time to 50% Elongation at 70 C =	65,000	light hours	181 months	*Reference 1*
$t_{50\%\_60C}$ = Time to 50% Elongation at 60 C =	80,000	light hours	222 months	*Reference 1*
Average annual temperature, Venice, FL =	22.8	C		*Reference 2*

Conversion: 1 W*hour = 0.0036 MJ

Calculation:

1. Calculate the Total UV Radiation (UV_{total}) at 50% Elongation Time Period

UV_{total} = ($t_{50\%\_80C}$) x (i_{QUV})

where: $t_{50\%\_[\,]}$ = Time to 50% elongation time at [temperature]
UV_{total} = Total UV Radiation at 50% Elongation Time Period
i_{QUV} = QUV-D7238 Irradiance = 42.42 W/m^2

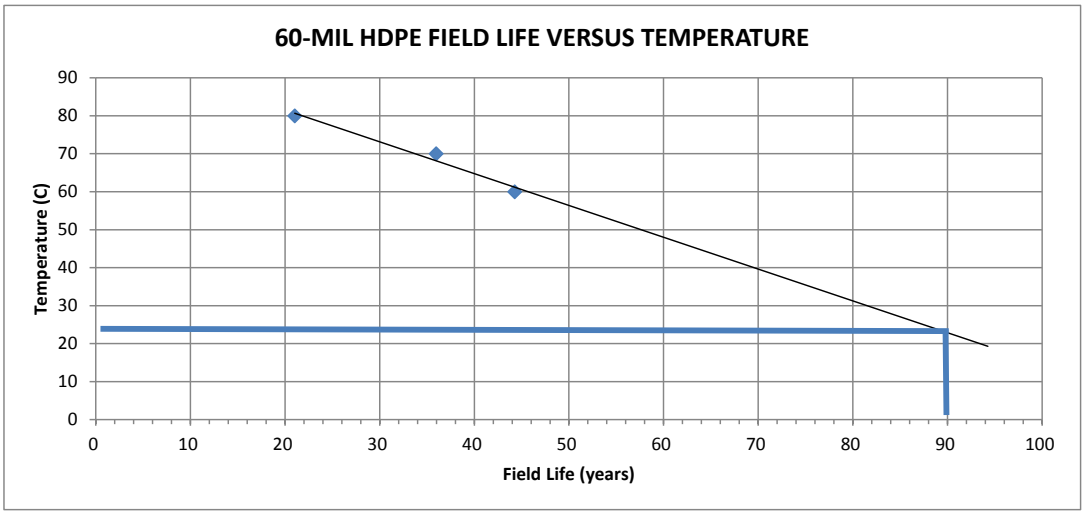
Temp. (C)	UV_{total} (MJ/m^2)
80	5,803
70	9,926
60	12,217

2. Calculate the Field Service Life (t_{FL}) for Florida.

t_{FL} = (UV_{total}) / (UV_{rad})

where: t_{FL} = Field Service Life
UV_{total} = Total UV Radiation at 50% Elongation Time Period
UV_{rad} = UV Radiation in Florida = 23 MJ/m^2-month

Temp. (C)	t_{fl} (years)
80	21
70	36
60	44



Conclusion:

Under the anticipated field conditions for Florida, a 60-mil HDPE geomembrane manufactured in accordance with GRI GM-13 is anticipated to have a field life of approximately 90 years.

References:

1 *Lifetime Predictions of Unexposed Versus Exposed High Density Polyethylene (HDPE) Geomembranes*, Presentation by Bob Koerner, George Koerner and Grace Hsuan, Geosynthetic Institute/Drexel University, dated October 24, 2014.

2 *Venice Weather Averages.* U.S. Climate Data. www.usclimatedata.com/climate/venice/florida/united-states/usfl0497.

Reference 1
Presentation - Koerner, Koerner, and Hsuan (excerpt)

Conversion of Lab Life-to-Field Life

Example: Convert 50% elongation properties at 80°C (20,000 lt. hrs.), 70°C (30,000 lt. hrs.) and 60°C (45,000 lt. hrs.) from QUV incubation to worst case USA field conditions using…

- QUV-D7238 irradiance = 42.42 W/m^2 between 250-400 nm wavelength… a property of the device
- UV radiation in AZ (hot & dry) = 28 MJ/m^2-month, or
- UV radiation in FL (hot & wet) = 23 MJ/m^2-month, or
- we will use the Arizona value….

Calculations:

Laboratory

@ 80°C: 20,000 hr. = 72 x 10^6 sec × 42.42 W/m^2 ÷ 10^6
= 3054 MJ/m^2 total energy

@ 70°C: 30,000 hr. = 108 × 10^6 sec 42.42 W/m^2 ÷ 10^6
= 4581 MJ/m^2 total energy

@ 60°C: 45,000 hr. = 162 x 10^6 sec × 42.42 W/m^2 ÷ 10^6
= 6872 MJ/m^2 total energy

Arizona

@ 80°C = 3054/28 = 109 mo.
@ 70°C = 4581/28 = 164 mo.
@ 60°C = 6872/28 = 245 mo.

Now plot data, extrapolate using a linear plot to average monthly temperature for the site-specific predicted elongation lifetime.

Ans. @ 20°C ~ 500 mo. = 42 yrs.

Let's do above calculations for all the GM's

Reference 1
Presentation - Koerner, Koerner, and Hsuan (excerpt)

Various Geomembrane Halflives in Months in Arizona (based on QUV Incubation)

Temp. (°C)	Strength*	sec × 42.42 ÷ 10^6/28	mos.	Elongation*	sec × 42.42 ÷ 10^6/28	mos.
Black 1.5 mm HDPE per GM13						
80	40,000	6108/28	218	38,000	5803/28	207
70	70,000	10790/28	382	65,000	9926/28	355
60	85,000	12981/28	464	80,000	12217/28	436
Black 1.0 mm LLDPE per GM17						
80	28,000	4275/28	153	27,000	4123/28	147
70	40,000	6108/28	218	36,000	5039/28	180
60	55,000	8400/28	300	55,000	8400/28	300
Black 1.0 mm fPP per GM18						
80	23,000	3512/28	125	23,000	3512/28	125
70	40,000	6108/28	218	40,000	6108/28	218
60	45,000	6822/28	245	43,000	6566/28	234
Black 1.0 mm EPDM per GM21						
80	40,000	6108/28	218	14,000	2138/28	76
70	50,000	7635/28	273	36,500	5574/28	199
60	65,000	9926/28	355	40,000	6108/28	218
Grey 0.75 mm PVC (N.A.) per D7176						
80	8,500	1298/28	46	4,500	687/28	25
70	12,200	1863/28	66	8,000	1221/28	44
60	20,000	3054/28	109	12,500	1909/28	68

*Values of strength and elongation are in light hours at 50% retained values from original.

Note: These high temperatures values are now extrapolated down to average site-specific temperature as follows.

Various Geomembrane Halflives (in Years) in Arizona at 20°C

Geomembrane Description	Strength (field)	Elongation (field)	Comment
Black 1.5 mm HDPE per GM13	81 yrs.	75 yrs.	60° & 70° estimate
Black 1.0 mm LLDPE per GM17	49 yrs.	50 yrs.	60° estimate
Black 1.0 mm fPP per GM18	41 yrs.	39 yrs.	60° estimate
Black 1.0 mm EPDM per GM21	52 yrs.	43 yrs.	60° estimate
Grey 0.75 mm PVC (N.A.) per D7176	19 yrs.	13 yrs.	complete

Reference 2
US Climate Data

Climate Venice - Florida

°C | °F

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	71	73	77	81	86	89
Average low in °F:	51	54	58	62	67	73
Av. precipitation in inch:	2.44	2.24	3.82	2.48	2.28	7.52
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-

	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	91	91	89	85	79	74
Average low in °F:	74	75	73	67	60	54
Av. precipitation in inch:	7.32	7.8	6.93	3.58	1.81	2.32
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-

Climate data for venice, Longitude: -82.4364, Latitude: 27.1006
Average weather Venice, FL - 34285 - 1981-2010 normals

Jan: January, Feb: February, Mar: March, Apr: April, May: May, Jun: June, Jul: July, Aug: August, Sep: September, Oct: October, Nov: November, Dec: December

Venice weather averages

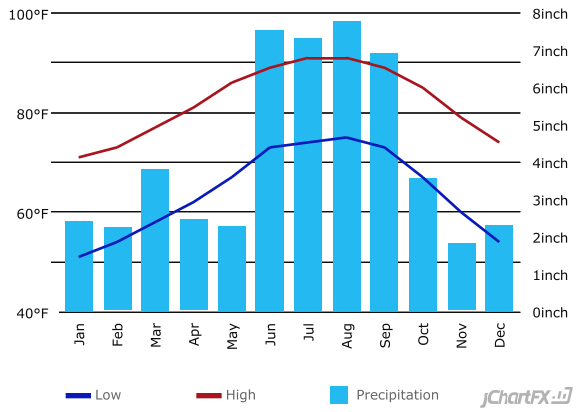
Annual high temperature:	82.2°F
Annual low temperature:	64°F
Average temperature:	73.1°F
Average annual precipitation - rainfall:	50.54 inch
Days per year with precipitation - rainfall:	-
Annual hours of sunshine:	-
Av. annual snowfall:	-

Average Temperature = 73.1 F
C = (F - 32) * 5/9
C = (73.1 - 32) * 5/9
C = 22.8 deg C

13

Thermal Ox

Venice Climate Graph - Florida Climate Chart



Climograph of Venice on your website