REVISED CLOSURE PLAN

J.C. WEADOCK GENERATING FACILITY

REVISED CLOSURE PLAN
REVISION 01

Submitted To: Consumers Energy Company
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EXECUTIVE SUMMARY

The following report referred to as J.C. Weadock Revised Closure Plan – Revision 01 (Closure Plan – Rev 01) presents a description of revisions to the previous 2011 Revised Closure Plan for J.C. Weadock Solid Waste Disposal Area (Weadock Disposal Area). Consumers Energy Company (CEC) retained AECOM in 2011 to develop a revised grading plan (2011 Revised Closure Plan) for final Coal Combustion Residuals (CCR) grades (and subsequent final cover grades) and to accommodate provisions of special license condition 20.d (from Operating License No. 9233). The 2011 Revised Closure Plan was submitted to the Michigan Department of Environmental Quality (MDEQ) in December 2011 for review. As of November 2018, the 2011 Revised Closure Plan by AECOM has not been formally approved by MDEQ but was referenced in the most recent operating permit renewal in 2015, Solid Waste Disposal Operating License No. 9440.

Final Closure Grades

Per the 2011 Revised Closure Plan, *"In 1991 CEC submitted an application to the MDNR for a vertical expansion permit for the Weadock disposal area in order to gain additional air space without further raising the perimeter embankment dikes. The vertical expansion permit was approved for an estimated volumetric capacity of 11,200,000 cubic yards limited to a maximum coal ash fill elevation of 650 feet (USGS datum).*

A comparison of the existing grades from an aerial survey completed in December 2010 to the permitted grades from the approved construction permit was performed using Computer-Aided Design and Drafting (CADD) generated surfaces. This evaluation was used as the basis for determining the remaining airspace for the landfill. Once this volume was established, a revised grading plan was developed to accommodate provisions of Special License Condition 20.d without adding additional airspace."

To demonstrate that no additional airspace is proposed for the Closure Plan – Rev 01, a comparison between the 2011 Revised Closure Plan Top of Ash grades and the 2018 Closure Plan – Rev 01 proposed Top of Ash grades was completed using computer-aided design and drafting (CADD) generated surfaces. This evaluation concluded an approximate reduction in airspace of 8,394,730 cubic yards (cy). An airspace calculation is provided in Appendix F.

The proposed grading plan at final closure generally includes a 2.5, 3.0, and 10.0 percent slope across the majority of the fill areas, resulting in a grading plan that reduces remaining fill volume from 11,200,000 cy (AECOM 2011) to approximately 2,394,109 cy. The remaining fill volume was determined by comparing the most recently available survey data obtained in 2013 and 2016, as further summarized in Appendix A. The existing approved maximum final closure elevation from the 2011 Revised Closure Plan of 650.0 feet US Geological Survey (USGS) (648.8 NAVD88) is reduced to 648.0 feet NAVD88.

Final Cover Construction

The specifications for the final cover material have been revised from the currently permitted 40-mil geomembrane or geosynthetic clay liner (GCL), geocomposite drainage layer on slopes greater than nine percent and 18 inches of cover soil over the coal ash disposal area. Cover soils previously could consist of 12 inches of bottom ash overlain by six inches of topsoil or could consist of 12 inches of natural soils overlain by six inches of topsoil. Perimeter ditches and ponds were also lined with 60-mil geomembrane and overlain by Fabriform® for protection of the geomembrane during maintenance activities.

The revised final cover system is simplified with a textured 40-mil high-density polyethylene (HDPE) or linear low-density polyethylene (LLDPE) geomembrane, geocomposite or non-woven geotextile, 12 inches of rooting zone layer consisting of natural soils, and six inches of topsoil.

The revised final cover system provides for equivalent hydraulic conductivity through the final cover. The coal ash disposal area is also contained by a soil-bentonite slurry wall that extends around the perimeter of the Weadock Disposal Area.

Ditches

Fabriform® was removed from the final cover design for ditch lining and replaced with vegetated topsoil or riprap.

B.C. Cobb Ponds 0-8 CCR Disposal

The proposed Closure Plan – Rev 01 includes airspace to provide minimum grades for closure by accepting CCR from the B.C. Cobb Ponds 0-8 and the Bottom Ash Pond closure. Approximately 650,000 cy of CCR will be hauled to and placed at the Weadock Disposal Area achieving engineering specifications for the subgrade layer described in Section 3.2.1 of the Final Cover Design narrative. The approximate area to be utilized for CCR placement to create grades for the final cover construction from the B.C. Cobb Ponds 0-8 and the Bottom Ash Pond closure project is provided in Appendix A. Alternative locations for the placement of CCR from B.C. Cobb may be elected by CEC. CEC may also elect to use another inert material to balance the fill if other beneficial use projects can utilize the CCR from B.C. Cobb.

Regulations

The proposed improvements do not increase landfill volume (air space), exceed existing maximum permitted elevations, or change the limits of the solid waste boundary. The construction sequence of the improved final cover design will not constitute any of the items listed in paragraphs (i) through (iv) of Rule 106(a)(l); therefore, Golder Associates Inc. (Golder) concludes that Closure Plan - Rev 01 is considered an “Other improvement to a disposal area that is approved by the Director.”

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List of Appendices

1.0 INTRODUCTION

The J.C. Weadock Revised Closure Plan – Revision 01 (Closure Plan – Rev 01) is proposed as an improvement ("upgrade") to the existing permitted disposal facility for the purpose of improving the final cover design. This improvement does not require a revision to the existing construction permit as defined by Rule 106(l) of the Solid Waste Management Act Administrative Rules Promulgated Pursuant to Part 115 of the Natural Resources and Environmental Protection Act (Part 115), 1994 PA 451, as amended. Additionally, Section 11510 of Part 115 states that an "upgrade" does not require a new construction permit. Because the construction sequence of the improved final cover design will not constitute any of the items listed in paragraphs (i) through (iv) of Rule 106(a)(l), Golder Associates Inc. (Golder) concludes that Closure Plan - Rev 01 is considered an "Other improvement to a disposal area that is approved by the Director."

1.1 Site Description

The J.C. Weadock Generating Facility (JC Weadock) is located six miles north of Bay City, Michigan along the Saginaw River mouth to Saginaw Bay (site). The site consists of two retired coal burning units (Units 7&8), which were operational from 1955 through April 15, 2016. JC Weadock holds a National Pollutant Discharge Elimination System (NPDES) permit, permit No. MI0001678, that allows wastewater to be discharged to Waters of the State in accordance with effluent limitations, monitoring requirements, and other conditions set forth in the permit per the Federal Water Pollution Control Act, Michigan Act 451, Public Acts of 1994, Parts 31 and 41.

The J.C. Weadock Solid Waste Disposal Area (Weadock Disposal Area) is located to the east of decommissioned JC Weadock and covers approximately 292 acres. It is bounded on three sides by historical ash containment dikes separating the landfill from the Saginaw Bay, Taycee Drain, and Combined Discharge Channel as shown in Appendix A. It should be noted that the 292-acre Weadock Disposal Area includes the inactive Bottom Ash Pond and Chemical Treatment Ponds scheduled for closure in 2020. The landfill area bounded by the slurry wall is approximately 272 acres and referred hereto as the Weadock Landfill. Historical operations sluiced fly ash hydraulically to the Weadock Disposal Area, where it was allowed to settle into a system of ponds and channels. Periodically, the ponds and channels were dredged, and material was stockpiled to allow for gravity dewatering. Once drained, the dredged fly ash was stacked as an engineered fill within the Weadock Landfill.

In 1991, Consumers Energy Company (CEC) submitted an application to the Michigan Department of Natural Resources (MDNR) for a vertical expansion permit for the Weadock Landfill in order to gain additional air space without further raising the perimeter embankment dikes. The vertical expansion permit was approved for an estimated volumetric capacity of 11,200,000 cubic yards (cy) limited to a maximum coal ash fill elevation of 650 feet [US Geological Survey (USGS) datum].

In 2008, a soil-bentonite slurry wall was constructed in the containment dike surrounding the Weadock Landfill to minimize groundwater flow through the containment dikes to Waters of the State. The soil-bentonite wall also separates the bottom ash sluicing ponds, which are used for collection and storage of bottom ash, from the Weadock Landfill. The bottom ash sluicing pond and the Weadock Landfill are collocated within the solid waste boundary, which represents the Weadock Disposal Area limits. The evaluation and discussion provided in this plan refers to only the Weadock Landfill bounded by the soil-bentonite slurry wall as shown in Appendix A.

The Weadock Landfill was originally operated as a surface impoundment and received coal combustion residuals (CCR) via sluicing. In April 1992, the MDNR issued Construction Permit 0260 to construct an expansion of the Weadock Disposal Area and change operations to a Type III low hazardous industrial waste landfill. In February 2009, CEC discontinued the sluiced fly ash operation and switched exclusively to a dry fly ash handling system. In this new dry system, fly ash from JC Weadock Units 7&8 and D.E. Karn Generating Facility (DE Karn) Units 1&2 was blown to a single storage silo located at the Weadock Disposal Area, where it was either directly marketed to a third party or moisture-conditioned and hauled by truck to the final disposal site within the Weadock Landfill. In 2014, DE Karn Units 1&2 were upgraded to a Spray Dry Absorber (SDA) system, and CCR was no longer pneumatically piped to the Weadock Disposal Area. Bottom ash continued to be sluiced to the Bottom Ash Pond until CEC ceased electrical generation activities at JC Weadock in April 2016. The Bottom Ash Pond is located west of the Weadock Landfill, outside the limits of the slurry wall boundary (Appendix A, Sheet 2).

Starting in July 2015, CEC regraded the northeast corner of the Weadock Landfill, historically referred to as Pond F, to convey stormwater run-off to the improved stormwater drainage structures and route it to the NPDES Outfall. This work was completed in September 2016 and documented in the Pond F CQA Report (Geosyntec 2017). Additional improvements to the Weadock Landfill structure included the completion of the soil-bentonite slurry wall “vent” in July 2018.

The scope of the existing Construction Permit authorizes the Weadock Landfill to receive CCR generated from DE Karn Units 1&2 and CCR collected from the DE Karn and JC Weadock Bottom Ash Ponds. The Weadock Landfill will become the primary disposal unit once the DE Karn Landfill completes closure. The proposed Closure Plan – Rev 01 is also being used as the engineering plan needed for approval to dispose CCR from B.C. Cobb Ponds 0-8 and the Bottom Ash Pond pursuant to conditions of Beneficial Use Category 4 – construction material at a landfill licensed under Part 115 permit authorities. The materials from B.C. Cobb Ponds 0-8 and the Bottom Ash Pond would be used beneficially to reach minimum permitted grades for the Weadock Landfill final cover as quickly as possible. This would preserve resources (i.e., borrow soil) to reach those grades while obtaining an acceptable engineering specification and performance; thus, facilitating an earlier endpoint for the final closure timeline for the Weadock Landfill.

2.0 IMPROVEMENTS

The proposed Closure Plan – Rev 01 incorporates closure grades ranging from 2.5 percent to 10.0 percent, as shown in Appendix A, to promote positive drainage across the Weadock Landfill; a 40-mil textured linear low density polyethylene (LLDPE) or textured high density polyethylene (HDPE) geomembrane; and a revised final closure stormwater drainage design. This results in a grading plan that reduces remaining fill volume from 11,200,000 cy (AECOM 2011) to approximately 2,394,109 cy. The remaining fill volume was determined by comparing the most recently available survey data obtained in 2013 and 2016, as further summarized in Appendix A. The existing approved maximum final closure elevation from the 2011 Revised Closure Plan of 650.0 feet US Geological Survey (USGS) (648.8 NAVD88) is reduced to 648.0 feet NAVD88.

Textured LLDPE and HDPE geomembranes are being included in Closure Plan – Rev 01 based on several design factors. The inclusion of an LLDPE geomembrane will allow CEC and/or the contractor to select HDPE or LLDPE at the time of construction based on material availability. The composition of LLDPE resin is very similar to that of HDPE, and LLDPE uses the same construction practices and quality control testing for construction. In terms of the interface shear strength between geomembrane and adjacent soils, the LLDPE geomembrane performs equal to or better than the HDPE geomembrane. LLDPE also provides for puncture resistance to an acceptable factor of safety. A technical memorandum is provided in Appendix E for the puncture resistance of the LLDPE geomembrane. The key factors making the LLDPE geomembrane an industry practice for final cover systems is that it is more ductile and better able to accommodate settlement. Landfill capping systems are susceptible to settlement of the underlying waste mass in municipal solid waste landfill facilities. Even though the magnitude of differential settlement for CCR monofill facilities is reduced based on more uniform materials, lack of degradable waste materials, etc.; the LLDPE material specification provides for equivalent performance during the closure and post-closure care period. The LLDPE geomembrane will allow for significantly greater elongation than HDPE while maintaining its barrier function across areas of settlement throughout the design life of the Weadock Landfill. For these reasons, an LLDPE geomembrane will provide equal to or better service than an HDPE geomembrane for the proposed final cover system. The Construction Quality Assurance Plan (CQA Plan) has been updated to include LLDPE and is included in Appendix B.

Closure Plan – Rev 01 provides an improved perimeter drainage system design utilizing a series of riprap stilling basins with independent outlet structures to facilitate an overland flow, non-point source stormwater discharge following stabilized final cover conditions. This design also allows for the elimination of Fabriform®, which was previously proposed for ditch lining. The 2011 Revised Closure Plan included ditches at 0.1 percent design slopes lined with Fabriform®, which are difficult to construct and can be easily blocked with debris, impeding drainage. The improved stormwater drainage system with the stilling basins and improved channel slopes will ultimately lead to a reduction of standing water

within the Weadock Landfill footprint and will reduce the long-term maintenance requirements. Increased channel slopes will also improve the reliability of facilitating efficient stormwater drainage off the Weadock Disposal Area.

3.0 FINAL COVER DESIGN

3.1 Final Cover Grades

The Weadock Landfill final cover grading plan has been developed to satisfy the requirements of the Resource Conservation and Recovery Act (RCRA) and Part 115. The proposed grading plan for the Weadock Landfill can be characterized by two distinct regions, as shown in Appendix A.

The first region is Area A, with a maximum permitted CCR disposal elevation of approximately 604 feet (NAVD88). Area A generally contains transmission line corridors on the south half and eastern end. Grading for the area under the transmission lines has been proposed to generally maintain an overland 2.5 percent finished grade to promote positive drainage. The second region is Area B (including the sub-regions of B-1, B-2, B-3, and B-4) with a maximum permitted CCR disposal elevation of approximately 648 feet (NAVD88) achieved in Area B-1.

The grades for the top of the Weadock Landfill will be established by the placement of CCR, placement of inert soil, or regrading historically placed fly ash. Fly ash relocation may be used to establish grades that will enable the partial closure of some sections of the Weadock Landfill in a staged timeline that will ultimately provide for a reduced timeline for closure once the final closure grade has been achieved or the final receipt of waste has been documented. Dust control measures will be implemented as needed during ash placement and regrading. In addition, the proposed ditch grades have been designed to adequately convey the surface drainage through the post-closure care period.

Power transmission line towers (wood monopoles, steel monopoles, and steel lattice structures) exist within the limits of the Weadock Landfill. Typical utility practice is to prevent disturbance (e.g. adding compacted clay or geosynthetics) near the base of power transmission towers. To maintain the integrity of the steel lattice tower foundations, a 10-foot lateral buffer from the final cover limits is provided between the tower foundations and final cover. Minor fill along the monopole structures is proposed to provide positive drainage away from the structures. CEC will coordinate with the transmission line owners to determine if modifications to the final grades shown in Appendix A are beneficial to both entities. Any modifications to the proposed final grades as shown in Appendix A will be documented in a closure certification report and will be in conformance with Part 115 requirements with a minimum and maximum final grade of 2.0 percent and 25.0 percent, respectively.

3.2 Design

The final cover system consists of the following components (from bottom to top):

- Compacted CCR to support final cover
- 40-mil LLDPE textured or HDPE textured geomembrane liner
- Geocomposite drainage layer
- 18-inch final cover material
  - 12-inch-thick rooting zone soil layer
  - Six-inch-thick topsoil layer
  - Seed, fertilizer, and mulch

The final cover system will be constructed, inspected, and tested in accordance with the CQA Plan provided in Appendix B and is summarized in the following sections. The final cover system has been developed to meet the equivalency criteria for alternative final cover system design for the infiltration layer and the erosion layer. The cover equivalency calculations are documented in a technical memorandum in Appendix E.

3.2.1 Subgrade Layer

Newly placed CCR, inert soil fill or existing ash subgrade will be graded to elevations as shown on Sheet 3 of Appendix A. The CCR, inert fill or existing ash will be compacted to minimize settlement. Dense vegetation will be removed prior to placement of geosynthetics. The subgrade will be examined for soft spots and stabilized as necessary per the Construction Permit.

3.2.2 LLDPE or HDPE Geomembrane Layer

40-mil LLDPE textured or HDPE textured geomembrane liner is proposed for the final cover system. As previously stated in Section 2.0, 40-mil LLDPE textured geomembrane will provide an equivalent barrier layer to the currently approved 40-mil HDPE.

3.2.3 Geocomposite Layer

Double-sided 200-mil geocomposite will be utilized above the geomembrane with a non-woven geotextile heat bonded to each side of the geonet. The geocomposite will discharge into diversion berms, perimeter channels, and stilling basins as detailed in Appendix A. The use of geocomposite will provide increased stability and retain rooting zone material while allowing infiltrated water transmission to the stormwater conveyance system. Ten oz/sy non-woven geotextile is also included for filtration or for additional protection as shown in Appendix A. Drain tiles are provided above the geocomposite layer consisting of four-inch perforated tiles as laterals and six-inch solid Advanced Drainage Systems (ADS) drain tile outlets (or equivalent) as provided on Sheet 5 of Appendix A.

3.2.4 18-inch Final Cover Material

The geosynthetic liner system will be covered with 18 inches of soil to protect the liner system and allow for establishment of vegetative cover. The top six inches of final cover material will consist of topsoil with a minimum organic content of 2.5 percent. The remaining 12 inches of soil will consist of rooting zone soils. Ground pressure at the geomembrane during construction will not exceed five pounds per square inch (psi) as further demonstrated in Appendix D.

Given the potential variability of rooting zone material hydraulic conductivity based on material availability, CEC may propose an alternative final cover drainage system to the Michigan Department of Environmental Quality (MDEQ) District Supervisor prior to initiating each phase of closure activities. An engineering evaluation will be provided to the MDEQ District Supervisor to validate the proposed final cover system's hydraulic adequacy and stability prior to use. Upon satisfactory review, the District Supervisor will issue a letter accepting the alternate drainage system to be included with the certification report.

3.2.5 Seed, Fertilizer, and Mulch

The seed, fertilizer, and mulching system has been selected for this part of Michigan for open, low maintenance cover system. Seeding may be performed by hydroseeding or seed drill. Fertilizing and mulching will be performed in accordance with Michigan Department of Transportation (MDOT) Standard Specifications 816 and 917. The proposed seed mix is as follows:

Seed Variety	Pound/Acre
Perennial Rye Grass	62.5
Creeping Red Fescue	112.5
Hard Fescue	62.5
Kentucky Blue Grass	12.5

It should be noted that alternative seed mixes may be selected by CEC for a specific final cover project based on the time of year the seed is placed.

3.3 Infiltration

Seepage through the topsoil layer in the final cover system will be drained through the rooting zone layer, drain tiles, and geocomposite layer above the geomembrane and collected in perimeter drains and stilling basins. Hydrologic Evaluation of Landfill Performance (HELP) modelling indicates the final cover system meets the minimum permeability requirement of 1.0×10^{-5} cm/sec. Drain tiles were not included in the HELP modelling but were included in the design to provide additional drainage above the geomembrane and structural stability within the capping system. HELP model results are provided in Appendix C.

3.4 Stability

The stability analysis performed in 2011 Revised Closure Plan for the Weadock Disposal Area has been updated for the proposed Weadock Landfill final grades and final cover system. The steepest grades occur along the perimeter berm surrounding the Weadock Landfill at a slope of 3H:1V (33.3 percent) isolated to within the interior slope of perimeter channels. Within the Weadock Landfill, the steepest grades are limited to a slope of 10 H:1V (ten percent). Three sections were analyzed for global stability using information obtained from subsurface investigations performed by Soil and Materials Engineers, Inc. (SME) in 2010 and by Golder in 2017. Material properties for the underlying native soils were updated based on the information obtained by Golder in 2017. Drained and undrained material strength properties were used to evaluate long- and short-term stability for the proposed grades, respectively. Results of the global stability analysis are provided in Appendix D. A veneer analysis was conducted to assess final cover system stability for various scenarios including equipment forces during construction, seepage forces, and seismic conditions. Details of the stability analysis are provided in Appendix D and indicate that the proposed final cover system provides an acceptable factor of safety.

3.5 Stormwater Erosion

The stormwater management system components are designed to manage precipitation falling within the Weadock Landfill. The stormwater management system is designed to manage stormwater that has not come into contact with CCR or existing fly ash. Any stormwater that comes into contact with CCR and/or existing fly ash will be conveyed separately through the existing stormwater infrastructure and to the existing NPDES Outfall 001H. Upon completion of closure, the Outfall 001H will be modified with a riser pipe to drain non-contact stormwater from a portion of the final cover at the existing location as show in Appendix A.

The stormwater management system will consist of the following components:

- Diversion berms – collect and route stormwater from closed Weadock Landfill sideslopes to perimeter channels and stilling basins and prevent erosion of Weadock Landfill sideslopes.
- Perimeter and interior ditches - collect and route stormwater from closed areas to the stilling basins and modified outfall.
- Culverts – route stormwater from ditches under various access roads.
- Stilling basins - reduce stormwater velocity from diversion berms and ditches and discharge stormwater by sheet flow off the Weadock Landfill. By reducing stormwater velocity, the potential for erosion is reduced.

The stormwater management system has been designed to meet the requirements of Part 115. The 25-year, 24-hour Soil Conservation Service (SCS) Type II storm of 4.29 inches is the design storm event. The diversion berms, ditches, culverts, and stilling basins have been designed to manage the calculated run-off for the final closure grades as proposed in this Closure Plan - Rev 01. If closure of the Weadock

Landfill is necessary at lower grades with equivalent or reduced watershed areas due to a reduction in CCR volume or to minimize fill around transmission towers, this design remains valid and will manage water from the design storm event. A minimum 1.0 foot of freeboard is provided for all stormwater conveyances during the 25-year, 24-hour design storm.

3.5.1 Diversion Berms

Diversion berms are used to collect and route stormwater run-off from closed Weadock Landfill sideslopes. Diversion berms were designed to a depth and slope to provide sufficient capacity and to minimize flow velocity to the stilling basins. The diversion berm detail is shown on Sheet 10 in Appendix A, and design information is provided in Appendix C. HydroCAD® was used to calculate the flow rate, flow velocity, and dimensions of each diversion berm. Diversion berms will be constructed with rooting zone material as tack on berms over the geosynthetic liner. The berms will be lined with six inches of topsoil and seeded. Erosion matting and riprap may be used as directed by CEC and as noted in Appendix A.

3.5.2 Ditches and Channels

Both V ditches and trapezoidal channels will convey stormwater collected from the closed portions of the Weadock Landfill. V ditches are generally employed parallel to site access roads, and trapezoidal channels are employed through the interior of the landfill. Appropriate erosion control (vegetation, riprap, erosion matting, etc.) will be provided on the ditch and channel bottoms and sideslopes and at culvert inlets and outlets as shown in Appendix A. Ditch and channel locations and details are shown on Sheets 5 and 10 in Appendix A; and design calculations and minimum ditch and channel slopes are provided in Appendix C.

3.5.3 Culverts

Culverts will be required to convey stormwater run-off from closed areas under access roads within the Weadock Landfill and to convey run-off into the stilling basins. Culverts will be reinforced concrete pipe (RCP). Riprap or equivalent erosion protection will be placed at the inlet and outlet of each culvert to prevent erosion. Culvert locations and details are shown on Sheets 5 and 10 in Appendix A, and design calculations are provided in Appendix C. Alternative culvert materials and/or configurations may be utilized as long as equivalent or improved hydraulic performance is provided.

3.5.4 Stilling Basins

An improved perimeter drainage system design has been developed that utilizes a series of riprap stilling basins to facilitate an overland flow discharge design following stabilized final cover conditions. Stilling basin discharge inverts were designed above the Saginaw Bay ordinary high water mark (OHWM) of 581.61 feet (NAVD88). It should be noted that all stilling basins were designed above the 100-year flood elevation of 585.0 (NAVD88) for an added factor of safety. Stilling basins were sized with the hydraulic

program HY-8 developed by the Federal Highway Administration. Design calculations and model results are provide in Appendix C.

3.6 Erosion Potential

Calculations using the modified universal soil loss equation were used to estimate the erosion potential for the finished grades of the Weadock Landfill in the 2018 Revised Final Closure Plan. Per the 2018 analysis, after vegetation is established, the erosion potential will be less than two tons per acre per year.

3.7 Interior Access Roads

Interior access roads are provided as shown in Appendix A to prevent damage to the cover and meet pressure minimums required at the geomembrane. Access roads will be constructed with a minimum thickness of two feet so that separation with the geotextile is a minimum of three feet (two feet of road material plus one foot of rooting zone). Alternative road sections and thickness may be proposed and documented in the construction certification report demonstrating the pressure limitations at the geomembrane are met.

4.0 POST-CLOSURE

4.1 Final Cover Repair

The final cover system will be inspected annually for evidence of excessive settlement, ponding, erosion, and adequacy of vegetation. Settlement, ponding, and erosion areas will be repaired by placement of additional soils in order to correct grades and to promote surface run-off. If erosion results in the required placement of significant cover soils, the method of placement in the original construction plans and specifications will be reviewed. Vegetated areas disturbed due to repair activities will be revegetated. Additionally, areas determined to have inadequate vegetation will be repaired with the use of additional fertilizer, mulch, and seed, where necessary. Revegetation will generally be conducted during the fall or spring growing season (generally May or September) following the repair or upon determination that revegetation is necessary.

All vegetated areas and associated stormwater conveyance structures will be inspected semi-annually for the remainder of the post-closure maintenance period.

4.2 Vegetation Management

Areas that have experienced erosion will be addressed by re-establishing vegetative cover, adding erosion matting, or replacing the vegetation and topsoil with riprap. Areas identified during inspection as barren must be reseeded until vegetation is established. Mowing will be conducted at a frequency determined by CEC to maintain sufficient vegetation and minimize erosion. Any woody vegetation will be removed.

4.3 Stormwater Management System Maintenance

Site inspections will include visual inspection of diversion berms, channels, culverts, and stilling basins. If debris is noted during the inspection, it will be removed from the culverts or channels. Any equipment planned to clean culverts or management structures will meet required equipment specifications for maximum allowable ground pressure at the geomembrane.

4.4 Equipment on Final Cover

Any equipment required to access final cover will maintain pressure below five psi projected through the cover soil to the geomembrane. If larger equipment is required, access/haul roads as provided for in Appendix A may be used to prevent damage to the liner system.

4.5 Interior Access Roads

Additional interior access roads not shown in Appendix A may be required to prevent damage to the cover and meet pressure minimums required at the geomembrane. Access roads will be constructed with a minimum thickness of two feet so that separation with the geotextile is a minimum of three feet (two feet

of road material plus one foot of rooting zone). Mats are an alternative to the construction of access roads, as long as the maximum allowable pressure is not exceeded.

5.0 GENERAL QUALIFICATIONS

This Closure Plan – Rev 01 has been prepared in general accordance with normally accepted civil engineering practices to revise the previous 2011 Revised Closure Plan for the Weadock Disposal Area. Golder has prepared this report for the purpose intended by CEC, and reliance on its contents by anyone other than CEC is done at the sole risk of the user. No other warranty, either expressed or implied, is made. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects relevant to the site. In the event that any changes in the design or location of the facilities as outlined in this report are planned, Golder should be informed so that the changes can be reviewed, and the conclusions of this report modified, as necessary, in writing by the engineer.

6.0 CLOSING

This report is respectfully submitted to CEC. If you have questions or require additional information, please contact John Puls at (920) 946-9084.

Sincerely,

GOLDER ASSOCIATES INC.

John Puls, P.E.
Senior Engineer

David List, P.E.
Principal

7.0 REFERENCES

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Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

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