

PERMIT MODULE XII CLOSURE

XII.A. CLOSURE PLAN MODIFICATION

- XII.A.1. The closure plan shall be modified any time changes in operating plans or landfill design affect the closure plan.
- XII.A.2. Modified closure plans shall be submitted to the department at least 180 days before the date the facility expects to begin construction activities related to closure.

XII.B. TIME ALLOWED FOR CLOSURE

The facility shall close each unit and install a final cover system in accordance with the timeframes specified in 9VAC20-81-140.B.1.e., and 9VAC20-81-160.

XII.C. FINAL COVER SYSTEM

The landfill final cover design profiles, including the components in descending order, are as follows:

XII.C.1. **Option I:**

- 6 inches of vegetative support soil layer;
- 18 inches of soil protective layer;
- Geocomposite Drainage Net (GDN) with double sided, nonwoven 8 oz/yd² geotextile. GDN transmissivity shall be at least 4.0×10^{-4} m²/s, tested at site specific layer boundary conditions, 100 hour seating time and pressure of at least 12 kPa (250 lb/ft²);
- 40-mil Linear Low Density Polyethylene (LLDPE) or High Density Polyethylene (HDPE) textured geomembrane;
- 18 inches of compacted soil infiltration layer with hydraulic conductivity of 1.0×10^{-5} cm/s, or less; and
- 12 inches of soil intermediate cover layer.

XII.C.2. **Option II:**

- 6 inches of vegetative support soil layer;
- 18 inches of soil protective layer;
- GDN with double sided, nonwoven 8 oz/yd² geotextile. GDN transmissivity shall be at least 4.0×10^{-4} m²/s, tested at site specific layer boundary conditions, 100 hour seating time and pressure of at least 12 kPa (250 lb/ft²);
- 40-mil LLDPE or HDPE textured geomembrane;
- Geosynthetic Clay Liner (GCL);
- 12 inches of compacted soil subgrade layer. The subgrade layer shall consist of soils free of rock, fractured stone, cobbles, waste, roots, protrusions, irregularities, loose soil, and any abrupt changes in grade. The subgrade layer shall provide grade control and smooth surface for the overlaying geosynthetic material;

XII.C.3. Option III:

- 6 inches of vegetative support soil layer;
- 18 inches of soil protective layer;
- Nonwoven, 8 oz/yd² geotextile;
- 50-mil LLDPE or HDPE, Super Gripnet® or MicroDrain® geomembrane to be overlain by the above specified geotextile to form an alternate drainage layer. Transmissivity of the alternate drainage layer, i.e. Super Gripnet® or MicroDrain® geomembrane combined with geotextile, shall be at least 4.0×10^{-4} m²/s, tested at site specific layer boundary conditions, 100 hour seating time and pressure of at least 12 kPa (250 lb/ft²);
- 18 inches of compacted soil infiltration layer with hydraulic conductivity of 1.0×10^{-5} cm/s, or less; and
- 12 inches of intermediate cover soil layer.

XII.C.4. Option IV:

- 6 inches of vegetative support soil layer;
- 18 inches of soil protective layer;
- Nonwoven, 8 oz/yd² geotextile;

- 50-mil LLDPE, or HDPE MicroDrain® geomembrane to be overlain by the above specified geotextile to form an alternate drainage layer. Transmissivity of the alternate drainage layer, i.e. MicroDrain® geomembrane combined with geotextile, shall be at least $4.0 \times 10^{-4} \text{ m}^2/\text{s}$, tested at site specific layer boundary conditions, 100 hour seating time and pressure of at least 12 kPa (250 lb/ft²);
- GCL;
- 12 inches of compacted soil subgrade layer. The subgrade layer shall consist of soils free of rock, fractured stone, cobbles, waste, roots, protrusions, irregularities, loose soil, and any abrupt changes in grade. The subgrade layer shall provide grade control and smooth surface for the overlaying geosynthetic material;

XII.C.5. Option V - Side slopes only:

- 6 inches of vegetative support soil layer;
- 18 inches of soil protective layer;
- Nonwoven, 8 oz/yd² geotextile;
- 50-mil LLDPE or HDPE, Super Gripnet® or MicroDrain® geomembrane to be overlain by the above specified geotextile to form an alternate drainage layer. Transmissivity of the alternate drainage layer, i.e. Super Gripnet® geomembrane combined with geotextile, shall be at least $4.0 \times 10^{-4} \text{ m}^2/\text{s}$, tested at site specific layer boundary conditions, 100 hour seating time and pressure of at least 12 kPa (250 lb/ft²);
- 12 inches of compacted soil subgrade layer. The subgrade layer shall be composed of reworked top 6 inches of existing intermediate cover and additional 6 inches of new soil layer free of rock, fractured stone, cobbles, waste, roots, protrusions, irregularities, loose soil, and any abrupt changes in grade. The subgrade layer shall provide grade control and smooth surface for the overlaying geosynthetic material;
- 6 inches of intermediate cover soil layer.

XII.C.6. Option VI - Side slopes only:

- 6 inches of vegetative support soil;
- 18 inches of soil protective layer;
- GDN with double sided, nonwoven 8 oz/yd² geotextile. GDN transmissivity shall be at least $4.0 \times 10^{-4} \text{ m}^2/\text{s}$, tested at site specific layer boundary conditions, 100 hour seating time and pressure of at least 12 kPa (250 lb/ft²);

- 40-mil LLDPE or HDPE textured geomembrane;
- 12 inches of compacted soil subgrade layer. The subgrade layer shall be composed of reworked top 6 inches of existing intermediate cover and additional 6 inches of new soil layer free of rock, fractured stone, cobbles, waste, roots, protrusions, irregularities, loose soil, and any abrupt changes in grade. The subgrade layer shall provide grade control and smooth surface for the overlaying geosynthetic material;
- 6 inches of intermediate cover soil layer.

XII.D. CLOSURE CERTIFICATION

- XII.D.1. Following construction of the final cover system for each unit, certification, signed by a registered professional engineer, shall be submitted verifying that closure has been completed in accordance with the permit, approved plans, and specifications. A certification will be required for each capped landfill phase and shall include the results of the CQA/QC requirements under 9VAC20-81-130.Q.1.b.(6).
- XII.D.2. Following the closure of all units, certification, signed by a registered professional engineer, shall be submitted verifying that closure has been completed in accordance with the requirements of 9VAC20-81-160.D.5.a., through 5.c., which entail posting a sign at the facility entrance and erecting suitable barriers to prevent access; submitting a survey plat to the local land reporting authority; and recording a notation on the deed to the facility property.

END OF MODULE XII