Facility Plan Report

FACILITY PLAN REPORT

Proposed Municipal Solid Waste Landfill

Randolph County, North Carolina

Volume III

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1.0 PROPOSED FACILITY PLAN

1.1 Purpose and Scope

15A NCAC 13B .1619(a, b) (1) The facility plan defines the comprehensive development of the property for permit or described in the permit of an existing facility. The plan includes a set of drawings and a report which present the long-term, general design concepts related to construction, operation, and closure of the MSWLF unit(s), including leachate management. The scope of the plan spans the active life of the MSWLF unit(s). Additional solid waste management facilities located at the MSWLF facility shall be identified in the plan and shall meet the requirements of this Subchapter. The facility plan defines the waste stream proposed for management at the MSWLF facility. If different types of landfill units or non-disposal facilities are included in the facility design, the plan must describe general waste acceptance procedures.

1.2 Definitions

15A NCAC 13B .1619(c) The terminology used in describing areas of the landfill unit shall be defined in the facility plan and shall be used consistently throughout a permit application.

As recommended by the NCDENR, the following terms are defined as follows:

Phase: Is an area constructed with a base liner system that provides no more than approximately 5 years of operating capacity. Randolph County has chosen to construct and operate the facility in maximum 10-year phases as allowed under the latest amendment to 15A NC Administrative Code 13B .0206. This amended NC Administrative Code provision became effective July 1, 2013;

Cell: Is a subdivision of a phase, which describes modular or partial construction. It is anticipated that each proposed phase will be further subdivided into cells at the time of developing the Engineering Plan for each phase;

Sub-cell: Is a subdivision of a cell, which describes leachate and stormwater management for active or inactive areas of the constructed MSWLF. It is not anticipated that the proposed phases will be further subdivided into sub-cells.

1.3 Facility Drawings

15A NCAC 13B .1619(d) The proposed Facility Plan (Plan) includes the following facility drawings, which depict the proposed development of the facility. The Existing Conditions, including physical site features, were prepared on a topographic map representing existing conditions, landfill units, leachate facilities, and those applicable physical features referenced in Rule .1622. The compiled boundary survey was

prepared by Fleming Engineering, Inc., November 30, 2012. The topographic mapping was provided by Spatial Data Consultants Inc. using photogrammetric methods from aerial photography taken April 11, 2012.

The Proposed Conditions and general facility plans were prepared on a topographic map representing existing conditions and proposed solid waste management facilities and facility infrastructure, including the landfill units and leachate facilities.

The proposed Phasing Plans depict the landfill construction through the on-site grading activities related to the construction and operation of the landfill units and leachate facilities, and information related to the long-term operation of the MSWLF units. Randolph County has chosen to construct and operate the facility in 10-year phases.

In addition, the phasing plan drawings incorporate the following proposed site features:

1. Limits of grading for landfill units, facility infrastructure, borrow areas, and stockpile areas;
2. Defined 10-year phases of construction and operational development;
3. Proposed landfill base grades prior to the construction of the waste containment liner system;
4. Delineation of facility access roads, sedimentation basins, leachate pipelines and storage facilities, and other structures related to the facility operations;
5. General grades and flow directions for the drainage layer component of the leachate collection system;
6. Size, location, and general grade for the leachate collection piping system, including on-site pipelines to the leachate management facilities;
7. Proposed transitional contours for each phase of development, including operational grades for existing phases and construction grading for the new phases and stormwater segregation features, and;
8. Proposed final contours of the landfill after construction of the final cover liner system.

Other Facility Plan drawings include cross sections through the proposed landfill, preliminary bottom liner and final cover details, and profiles of the entrance and perimeter access roads.

1.4 Facility Report

15A NCAC 13B .1619(e) This Facility Report includes a discussion of facility information related to the proposed waste stream, landfill capacity, containment and environmental control systems, leachate management, and other special engineering features.

1.4.1 Waste Stream

Randolph County is responsible for providing solid waste disposal to the citizens of the County. The County closed the former unlined landfill with the promulgation of the Subtitle D regulations, and began transferring waste out of the County for disposal through a private contracted transfer station. As the County looks ahead to continuing to provide a long-term, cost-effective means of waste disposal for the citizens, County leaders evaluated opening a regional MSWLF facility to serve the citizenry and surrounding counties and municipalities.

The proposed facility will accept municipal solid waste (MSW) as defined by NCDENR. This includes household and commercial solid wastes collected from residents and businesses. In addition, the facility would also accept Construction and Demolition (C&D) wastes in support of local and regional construction projects and emergency debris management as needed. Hazardous, infectious, regulated medical waste, and industrial wastes will be prohibited from disposal, including coal combustion by-products.

It is anticipated that the Randolph County Regional MSWLF facility could receive MSW from all jurisdictions within the State of North Carolina (all North Carolina Counties and municipalities), and possibly out-of-state counties and municipalities (from Virginia and South Carolina) up to approximately 100 miles away from the facility. It is anticipated that the majority of MSW brought to the facility will be generated within the central region of North Carolina. The list of out-of-state Counties (including municipalities located within these Counties) in the proposed service area is as follows:

Virginia Counties:

- Bedford
- Campbell
- Carroll
- Charlotte
- Floyd
- Franklin
- Grayson
- Halifax
- Henry
- Mecklenburg
- Montgomery
- Patrick
- Pittsylvania
- Pulaski

- Roanoke
- Wythe

South Carolina Counties:

- Chester
- Chesterfield
- Darlington
- Dillon
- Florence
- Kershaw
- Lancaster
- Lee
- Marlboro
- York

The anticipated average daily intake and disposal rate is proposed at 2,000 tons per day. This rate equates to an average monthly disposal rate of 46,000 tons per month assuming 23 operational days per month.

The maximum daily intake and disposal rate is proposed at 3,500 tons per day to account for those times when intake rates may peak on a given day, such as around the holidays, in the spring, and in the fall. The maximum daily intake and disposal rate may also be needed during periods when emergency debris management is required after floods, hurricanes, and tornado events.

The proposed operational equipment selection is based on the Caterpillar Waste Performance Handbook (2001) and operations experience. Equipment will be maintained and serviced according to the manufacturer's recommendation. Equipment operating and service manuals will be kept at the facility and followed.

As the volume of the waste stream and material handling change (e.g., at start-up, during peak daily handling times, or during peak days), the number and type of machinery needed to perform daily operations will change. The equipment used on site may be modified as necessary to facilitate efficient and compliant operations. The following is a sample list of equipment that may be used at the facility to perform the necessary operational functions.

Table 1: Equipment Selection Guide

Equipment	Typical Number	Primary Use
Compactors, 70,000 lbs or larger	1 to 2	Pushing and spreading waste or soil, compacting waste and cover material
Tracked dozers, CAT D6 or equivalent	1 to 2	Pushing and spreading waste or soil, shaping roads, and for general construction
Loaders or backhoes	1 to 2	Excavation of waste and soils, loading of materials, and facility maintenance,
Dump truck	1 to 2	Moving soil and materials from borrow and stockpile areas
Water truck/ equipment	1	Dust and fire control
Utility tractor with attachments	1	Site maintenance including cleaning drainage features, snow removal, mowing, and road sweeping
Pickup truck	2 to 4	Site maintenance and personnel vehicles
Pumps (portable)	1 to 2	Moving stormwater or leachate, filling water truck, and maintenance and construction

*Note actual equipment and/or quantities may change depending on site needs.

The effective upper waste handling limit for one dozer (CAT D6 or equivalent) is approximately 2,500 tons per day. In order to safely ensure effective daily operations, it is reasonable to assume that, for 2,000 tons per day (proposed average daily disposal rate), one dozer (CAT D6 or equivalent) will work with one landfill compactor (CAT 836 or equivalent) to spread and compact the waste. Above 2,500 tons per day (during peak periods or for emergency debris management), a second dozer and compactor will be used. Dump trucks will be used to haul cover soils to the working face and for facility maintenance activities. If necessary, backup equipment can be obtained from local equipment suppliers within 24 hours.

1.4.2 Landfill Capacity

An analysis of landfill capacity and soil resources was performed for the proposed MSWLF facility. Eleven phases of development are proposed, of which 10 are phases of bottom liner construction, based on a maximum 10-year capacity phasing plan for construction and operations. The phase that does not require bottom liner construction (Phase 3) is a vertical development phase on top of the first two developed phases. The 11 development phases were configured in a logical sequential order to take advantage of the earthen borrow materials generated from each phase of construction, while optimizing the cut and fill soil requirements. In addition, each construction phase was configured to make efficient use of the natural surrounding topography to facilitate, and cost effectively control, stormwater run-on and runoff as each landfill phase is developed. These development phases are depicted on the Facility Drawings.

For each development phase, total disposal capacity (gross and net) and the anticipated life were calculated. Earthen construction material requirements were also generated for the bottom liner, intermediate and operational cover, and the final cover system. Cumulative soil balances were calculated with the progression of each development phase to demonstrate sufficient earthen materials are available on-site to meet the facility life cycle needs. It was assumed that both the excess soil and rock materials available at the site would be used in the construction of the facility. Stripped top soil would be stockpiled for future closure activities. Excavated soils from roads, stormwater pond embankments, and developing landfill base grades would be used for earthen structural fill, and intermediate and operational cover requirements. Excavated rock could be crushed on site into aggregate for use in the drainage layer and for site haul road surfacing. At the time of this Facility Plan Report, it has not been determined if sufficient on-site rock quantities and quality exist to suit the construction needs for the drainage layer and site haul road surfacing.

In addition, four areas have been identified as potential soil and rock borrow areas. These borrow areas are identified on the Facility Drawings, and the estimated material quantities (from three of the four identified borrow areas) are included in the cumulative soil balance calculations. The fourth potential borrow area is not counted at this time because it may not be needed; however the County desires to make available all four borrow areas identified in the Facility Plan.

The following table presents the data and assumptions used in calculating the landfill capacities, life estimates, earthen construction quantities, and overall soil material balances.

Table 2: Landfill Capacity Calculation Assumptions

Description	Standard Used
Average Daily Disposal Rate	2,000 tons per day (tpd)
Phase Design Life	10 years (maximum) 6.1 years (average)
Operational Landfill Density	2,000 pounds per cubic yard (lbs/cy)
Annual Operating Days	279 days (assumed 5.5 days per week for 52 weeks, less 7 federal holidays)
Low Permeable Soil Layer	12 inches (assumed on-site material for soil balance purposes only)
Drainage Layer Thickness	24 inches (assumed on-site material for soil balance purposes only)
Operational Cover Soil Thickness	6 inches of compacted weekly cover soil (assumed on-site borrow soil conservatively used at a 16:1 waste to soil cover ratio in conjunction with an alternate daily cover

Description	Standard Used
	material)
Intermediate Cover Soil Thickness	12 inches (assumed on-site borrow soil, for completed phases prior to receiving final cover)
Final Cover Thickness	24 inches (assumed use of an alternate final cover system using geosynthetics, 18 inches of protective cover, and 6 inches of top soil)
Waste to Operational Cover Soil Ratio	16:1 (assumed on-site borrow soil conservatively used at a 16:1 waste to soil cover ratio in conjunction with an alternate daily cover material)

Based on the assumptions presented in Table 2 above, the total operating capacity (i.e., net waste disposal capacity) of the landfill is 37,395,313 cubic yards (or short tons) with an approximate 67 years of life. The capacity of each development phase is presented below in Table 3, along with life estimates and earthen construction quantities.

Table 3: Landfill Capacities, Quantities, and Life

Phase Area	Plan Area (ac.)	Gross Capacity (cy)	Base Liner System (cy)	Final Cover (cy)	Operational Cover (cy)	Net Capacity (cy)	Life
Phase 1	34.6	3,628,914	170,368	46,948	247,890	3,163,708	5.7
Phase 2	29.8	3,937,328	147,330	17,585	281,728	3,490,685	6.3
Phase 3	0.0	3,824,518	0	51,691	252,521	3,520,306	6.3
Phase 4	13.5	3,132,190	66,986	50,981	201,554	2,812,669	5.0
Phase 5	27.1	3,735,467	133,729	39,333	257,517	3,304,888	5.9
Phase 6	10.4	2,515,387	51,256	67,115	167,194	2,229,822	4.0
Phase 7	23.5	4,002,979	115,192	33,880	281,529	3,572,378	6.4
Phase 8	11.6	3,634,330	57,112	103,899	228,378	3,244,941	5.8
Phase 9	15.8	4,025,307	78,408	57,435	262,827	3,626,637	6.5
Phase 10	10.9	4,135,061	54,208	57,435	271,980	3,751,439	6.7
Phase 11	13.3	5,167,923	65,340	122,936	301,807	4,677,840	8.4
Totals	**190.5**	**41,739,403**	**939,928**	**649,238**	**2,754,924**	**37,395,313**	**67.0**

Available on-site soil resources were evaluated for quantity and sequencing in relation to the progressive phased development of the landfill. Total cut and fill of earthen material quantities were tabulated for the facility's progressive infrastructure construction, the required soil needs for each development phase including operational requirements, and the identified borrow areas.

Required quantities for earthen materials needed for construction, operations, and closure are presented in Table 4 below. This evaluation includes a cumulative soil balance as the site is developed. Earthen materials needed for structural fill, base liner system, final cover, and operational cover were tabulated for each phase of development. It may be necessary to borrow earthen materials from future phases to ensure that sufficient materials will be available for operations.

Reserved materials, such as those needed for subsequent bottom liner construction, final cover, and operational cover, would be stockpiled on-site for future use. At the time of this Facility Plan Report, it has not been determined if sufficient on-site soil quantities and quality exist to suit the construction needs for the bottom liner and final cover construction needs.

Excavated rock could be crushed on site into aggregate for use in the drainage layer and for site haul road surfacing. At the time of this Facility Plan Report, it has not been determined if sufficient on-site rock quantities and quality exist to suit the construction needs for the drainage layer and site haul road surfacing.

Materials for operational cover would be those materials in excess of the other material requirements needed for structural fill, base liner system, and final cover. Should there be a deficit of earthen materials that are of sufficient quality for construction, the facility will import earthen materials from off-site sources. At this time, however, it is not anticipated the facility will need to import significant quantities of off-site earthen materials through the initial 6 phases of development. The anticipated sequencing of landfill development should yield an adequate supply of earthen materials for construction of the proposed landfill facility, as demonstrated below in Table 4.

Table 4: Construction Soil Quantities and Usage

Phase Area	Construction Soil Quantities (cy)			Site Soil Usage (cy)		
	Cut (available)	Fill (required)	Net Cut (available)	Soil Needs (required)	Soil Balance	Cumulative Balance
Phase 1	945,521	118,417	827,104	465,206	361,898	361,898
Phase 2	596,086	29,541	566,545	446,643	119,902	481,801
Phase 3	n/a	n/a	n/a	304,212	(304,212)	177,588
Phase 4	175,362	100,984	74,378	319,521	(245,143)	(67,555)
Phase 5	334,550	78,435	256,114	430,579	(174,464)	(242,019)
Phase 6	396,288	12,210	384,077	285,565	98,513	(143,507)
Phase 7	1,055,056	20,473	1,034,583	430,601	603,982	460,476
Phase 8	158,416	41,186	117,230	389,389	(272,159)	188,317
Phase 9	105,608	85,552	20,056	398,670	(378,614)	(190,297)
Phase 10	142,610	14,721	127,889	383,622	(255,733)	(446,030)

Phase 11	254,583	64,867	189,716	490,083	(300,367)	(746,397)
Borrow Area 1	575,000	n/a	575,000	n/a	575,000	(171,397)
Borrow Area 2	125,000	n/a	125,000	n/a	125,000	(46,397)
Borrow Area 3	75,000	n/a	75,000	n/a	75,000	28,603
Totals	**4,939,079**	**566,386**	**4,372,693**	**4,344,090**	**28,603**	**28,603**

1.4.3 Containment and Environmental Controls

1.4.3.1 Protective Bottom Liner System

Soil and groundwater will be protected through the use of a double-liner system beneath the proposed MSWLF, as well as daily, intermediate, and final cover systems designed to protect human health and the environment. As required by regulation, and as a standard of industry practice, the protective bottom liner system of the landfill will be designed to efficiently remove collected liquids from the waste mass as they are generated. The daily and intermediate cover systems will help minimize odor, disease vectors, and windblown trash. The final cover system will ensure the deposited wastes are secure from release to the environment, prevent infiltration from precipitation events, and provide a means to collect, contain, and properly treat landfill gas generation.

Several optional bottom liner systems are proposed. They include the following possible bottom liner systems:

Option 1 - The bottom liner system will consist of 12-inches of compacted clay (hydraulic conductivity less than or equal to $1x10^{-5}$ cm/sec) placed on a prepared, compacted, soil subgrade. This layer will be directly overlain by a 60-mil-thick HDPE geomembrane, overlain by a geocomposite drainage layer for leak detection. The geocomposite drainage layer for leak detection will be directly overlain by a second 60-mil-thick HDPE geomembrane, overlain by a second geocomposite drainage layer for leak detection. The second geocomposite drainage layer for leak detection will be directly overlain by a third 60-mil-thick HDPE geomembrane, overlain by a third geocomposite drainage layer for leachate collection. This entire system of geosynthetic materials will then be overlain by 24 inches of protective drainage layer material (i.e., stone or sand) for additional leachate collection capabilities and protection of the underlying geosynthetics. This proposed liner system is the prescriptive NCDENR approved double liner system with the addition of a second leak detection zone and is what the material and life estimates are based on. This proposed bottom liner system is represented on the Facility Drawings included with this submittal.

Option 2 - The bottom liner system will consist of a Geosynthetic Clay Liner (GCL) adhered to a 60-mil-thick High-Density Polyethylene (HDPE) geomembrane placed on a prepared, compacted, soil subgrade.

This layer will be directly overlain by a second 60-mil-thick HDPE geomembrane, overlain by a geocomposite drainage layer for leak detection. The geocomposite drainage layer for leak detection will be directly overlain by a third 60-mil-thick HDPE geomembrane, overlain by a second geocomposite drainage layer for leachate collection. This entire system of geosynthetic materials will then be overlain by 24 inches of protective drainage layer material (i.e., stone or sand) for additional leachate collection capabilities and protection of the underlying geosynthetics. This proposed liner system is an alternate liner system that has been approved by NCDENR at other facilities; however a long term stability demonstration will have to be made for use of this bottom liner system on slopes greater than 5 percent. This proposed alternate bottom liner system is represented on the Facility Drawings included with this submittal.

Option 3 – The bottom liner system will consist of a 60 mil-thick HDPE geomembrane placed on a prepared, compacted, soil subgrade, overlain by a geocomposite drainage layer for leak detection. The geocomposite drainage layer for leak detection will be directly overlain by a second 60 mil-thick HDPE geomembrane, overlain by a second geocomposite drainage layer for leak detection. The second geocomposite drainage layer for leak detection will be directly overlain by a third 60 mil-thick HDPE geomembrane, overlain by a third geocomposite drainage layer for leachate collection. This entire system of geosynthetic materials will then be overlain by 24 inches of protective drainage layer material (i.e., stone or sand) for additional leachate collection capabilities and protection of the underlying geosynthetics. This is an alternate liner system as defined by NCDENR and approval will be subject the appropriate required demonstrations at the time of development of the final Engineering Plan. This proposed alternate bottom liner system is represented on the Facility Drawings included with this submittal.

Peak daily leakage rates and maximum hydraulic head levels on the bottom liner system components were derived from the EPA's Hydrologic Evaluation of Landfill Performance (HELP) computer program. The HELP model is a quasi-two-dimensional hydrologic mathematical model of water movement across, into, through, and out of landfills. The model is used to assist with the design and selection of construction materials, layer thicknesses, required hydraulic conductivities, slopes, etc.

Based on the maximum leachate producing scenario of having 10 acres of newly constructed landfill cell with at least 10 feet of MSW placed in it, peak daily leakage rates and maximum hydraulic head levels were calculated for the 25-year, 24-hour storm event on a per acre basis. This modeled scenario is considered the worst case condition for purposes of this section. Based on this modeling scenario, peak daily leakage rates and maximum hydraulic head levels on the bottom liner system components are as follows:

Table 5: Per Acre Peak Daily Leakage Rates and Hydraulic Head Levels

Bottom Liner System Component	Leakage Rate (gallons)	Hydraulic Head Level (inches)
Primary 60-mil HDPE geomembrane	2.24×10^{-4}	0.148
Secondary 60-mil HDPE geomembrane/GCL	7.48×10^{-5}	0.003

1.4.3.2 Protective Final Cover System

The objective of the final cover system is to limit infiltration of precipitation into the waste mass to minimize creation of leachate and provide a means to collect, contain, and properly treat landfill gas generation. A properly engineered final cover system, which is properly maintained, will significantly limit precipitation from entering the waste mass, and thus minimize the formation of leachate and prevent the emission of landfill gas, which is a known greenhouse gas. The goal of a final cover system is to minimize long-term maintenance and to protect human health and the environment from both leachate and greenhouse gases.

The final cover system will consist of a geocomposite landfill gas collection layer placed on 12 inches of compacted soil (i.e., intermediate cover soil) that covers the waste. This landfill gas collection layer will be directly overlain by a 40-mil-thick Low-Density Polyethylene (LDPE) geomembrane, overlain by a geocomposite drainage layer. The geocomposite drainage layer will be directly overlain by an 18-inch-thick protective soil cover layer and 6 inches of topsoil that will be vegetated with native grasses. The proposed final cover system will apply to the side slopes (3:1 slopes) of the landfill, and is represented on the Facility Drawings included with this submittal.

On the crown of the landfill where slopes range from less than 3:1 to the minimum 5 percent, a GCL will be placed directly beneath the 40-mil-thick LDPE geomembrane to maintain a percolation rate of the final cover that is less than that of the bottom primary liner system.

This combined alternate final cover system is widely used in the waste industry for Subtitle D landfills to maintain percolation rates through the final cover at rates less than that of the bottom primary liner system.

1.4.3.3 Groundwater Monitoring

The engineered containment system for the proposed MSWLF will be designed to meet strict performance standards for liquids collection and removal, to prevent a release to groundwater in order to protect these resources, particularly since water supply wells are utilized in this part of the County. These engineered systems are designed, constructed, tested, inspected, protected, and maintained over the course of construction, facility operation, closure, and post-closure. The proposed facility will have a two-component monitoring system consisting of a “leak detection” zone within the double liner system, and a

network of groundwater monitoring wells. A groundwater monitoring program will be designed in such a way as to provide early detection of an unlikely release, and will be designed based on site-specific data to monitor likely flow paths, as required by NCDENR regulations, so as to allow adequate response time to address any concerns.

The NCDENR regulations require the groundwater monitoring network to be able to detect a release as early as possible. The use of a “leak detection” zone will provide a means to monitor and collect liquids from beneath the primary liner system if necessary. Seasonal high groundwater elevations have been calculated as part of the Facility Plan to ensure that that the minimum 4-foot separation between groundwater and the bottom of the liner is maintained in accordance with the Solid Waste Management Rules. Because of the relatively slow rate of lateral groundwater flow in this hydrogeologic setting and the distance of the monitoring wells to the facility boundary, early detection of any potential release would allow adequate time to investigate and address the issue before the impacts reach the facility property boundary.

Groundwater samples will be collected at least semi-annually from an approved network of monitoring wells designed to intercept primary flow pathways. Samples will be analyzed for an EPA-approved list of inorganic (i.e., metal) and organic compounds, and the data will be statistically analyzed to determine if there have been adverse impacts to groundwater quality. Calculations of groundwater flow pathways and rates will also be completed semi-annually.

1.4.3.4 Surface Water Protection

As part of compliance monitoring activities for surface water, samples are typically collected at least semi-annually from intermittent and perennial streams that could potentially be impacted from the MSWLF operations. Samples will be analyzed for the same list of parameters as groundwater samples. Samples will be routinely collected both upstream and downstream of the facility to help quantify any potential or existing impacts from upstream sources.

Other compliance monitoring for landfills is required under the National Pollutant Discharge Elimination System (NPDES) regulations, and is regulated by NCDENR. During construction activities, a permit will be obtained to monitor stormwater runoff from construction activities, including weekly and post-storm event visual monitoring and inspection of erosion and sediment control features. Once the MSWLF is constructed, NPDES monitoring requires weekly visual inspections of stormwater runoff and treatment systems (i.e., sediment basins) as well as annual monitoring for a list of constituents relevant to landfill activities.

To protect surface waters from unwanted discharges of soil, sediment, trash, and debris, sediment basins will be designed and constructed to safely convey up to the 100-year storm event while providing sediment removal capabilities. Sediment basins will be used on site in addition to other erosion and sediment controls such as silt fences, culvert inlet and outlet protection, rip-rap-lined drainage conveyances (where necessary to control stormwater runoff velocities), and other commonly used structural and best management practices to minimize the transport of sediment from the site.

Each sediment basin will be designed to function as a water quality stormwater pond at the time of final site closure. Due to increased slopes and runoff from grassed closure areas, each stormwater pond will be designed to detain the runoff volume to pre-existing conditions to the extent required by NCDENR regulations. This design allows for long-term protection of natural waterways and channels against erosive discharge quantities and velocities.

1.4.3.5 Air Protection

Dust will be controlled at and around the facility through the maintenance of on-site paved primary roads and regular sweeping/washing of the off-site roads in the immediate area of the facility. Water trucks are commonly used on unpaved all-weather access roads to minimize dust generation. The landfill operator will also monitor and adjust site operations during periods of high winds to minimize dust generation and windblown trash. Installation of litter fences near the active 'working face' will help protect against windblown debris leaving the facility boundary.

As part of the compliance monitoring programs for air quality, operators of MSWLF units must monitor the facility boundary and on-site structures for the presence and concentration of explosive gases at least quarterly. Once on-site MSWLF units reach approximately 2.7 million tons (U.S. short tons) of in-place waste, the County must comply with Title V of the Clean Air Act, wherein the facility is subject to the collection and destruction of landfill gas to control emissions to the environment. In addition, the New Source Performance Standards (NSPS) of the Clean Air Act restrict air emissions from stationary sources such as landfills, and require pollution control technologies for the abatement of greenhouse gases. Pollution control technologies include destroying air pollutants found in landfill gas through open and enclosed flare systems, or through other means such as internal combustion engines and/or boilers when the landfill gas is used as an energy source.

Under the regulatory requirements of NSPS and Title V operating permits, once a landfill gas collection and control system is constructed, the collection and control system must be monitored on a routine basis to ensure the system is functioning properly. This requirement includes monitoring for landfill gas in the soil using monitoring probes placed between the landfill unit and the property boundary, monitoring landfill gas emissions along the surface of the landfill, monitoring on-site structures for the presence of landfill

gas, and emissions monitoring of control and destruction devices such as flares. In addition, annual reporting of these emissions monitoring activities is required under the various regulatory requirements.

Approximately half of the facility acreage will remain undeveloped and used as buffers. These areas are wooded and provide natural screening of the MSWLF activities. The wooded buffers are equal to or greater than the minimum state regulatory requirements, and will assist in the protection of human health by mitigating airborne dust from leaving the property.

1.4.3.6 Odor, Birds, and Wildlife Control

Birds and other wildlife ('disease vectors') will be controlled, and their presence discouraged, by promptly covering the waste at the working face through the use of daily cover. Also, the active working face area of the landfill will be kept to a relatively small area (on the order of 2 acres or less, typically). As required by Solid Waste Management Rule .1626(2)(b), the owners or operators of MSWLF units must cover landfilled solid waste with either 6 inches of earthen material or an approved alternate daily cover at the end of each operating day, or at more frequent intervals if necessary to control disease vectors, fires, odors, blowing litter, and scavenging. Routine inspections will be made to ensure that these daily cover requirements are followed.

Alternate daily cover materials (such as spray-applied materials, wood chips, mulch, or other inert materials) of an alternate thickness (other than at least 6 inches of earthen material) may be approved by the Division of Waste Management (DWM) if the owner or operator demonstrates that the alternate daily cover material and thickness will control disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment. When alternate daily cover is used, soil cover shall be used at a minimum frequency of at least once per week. Alternate daily cover will not be allowed in place of intermediate or final cover requirements. It is anticipated that alternate daily cover will be used at this facility.

Nuisance birds may also be deterred by the use of noise-making devices, sonic wave emitters, or by encouraging the presence of non-nuisance predator birds such as eagles and falcons.

The use of daily cover, whether earthen or otherwise inert materials, is also an effective odor control method. The landfill manager will identify potential sources of odors that may pose an off-site nuisance, and identify and implement odor control practices, such as applying additional cover materials or relocating operations to another part of the facility during certain wind conditions. Such cover applications may be required more frequently than daily for particularly putrescent wastes or such wastes may require special handling to prevent odor emissions, such as immediate burial within the active working face. The landfill manager will monitor weather conditions and incoming waste loads to identify and proactively

manage potential odor issues, such as relocating landfill operations away from a nearby downwind property line. In addition, environmentally friendly, odor neutralizing agents may be employed when necessary to prevent off-site odor migration.

1.4.3.7 Litter and Mud Tracking Control

Windblown litter will be kept to a minimum by keeping the working face of the landfill relatively small, through the use of litter fences and operational cover, and through the requirement of trucks remaining tarped and/or covered until they deposit waste at the working face. The vegetated buffers at this facility meet or exceed the minimal regulatory requirements and will also limit the amount of windblown litter. Windblown litter will be picked up within the facility property boundary and at the facility entrance by the operator to keep off-site windblown litter to a minimum.

The County will require, as part of their operational contract, the pick-up of windblown litter along the traffic route near the facility entrance. The landfill operator will inspect the public road near the facility entrance in both directions at the close of each day, pick up any litter, and sweep/remove any mud or dirt from the pavement. The landfill will be equipped with a road sweeper/washer to effectively maintain paved roads in a mud-free condition. A truck wheel washing station will be used as part of the facility operations. Because of the travel distance from the facility operations to the public roadway, mud/dirt tracking onto the public roadway is not anticipated to be a problem.

1.4.3.8 Noise Control

Noises generated by landfill operations will be attenuated by the use of buffers that provide distance between the source and the property line. Vegetated buffers are especially effective at attenuating noise, as well as providing a visual barrier and improved aesthetics for off-site individuals. Also, topography can be used effectively as a barrier to noise migration, and the topography surrounding many portions of the site is expected to decrease noise impacts.

1.4.3.9 Fire Control

Incoming waste loads will be observed by site operators for evidence of fire, such as flames, smoke, or the odor of burning material. Burning loads will be extinguished before dumping, if possible. If there is evidence of fire in the landfill itself, the landfill general manager will be notified immediately. If possible, the waste will be removed or segregated from other waste in the disposal area. The landfill operator will evaluate the situation to determine whether the fire can be extinguished using fire extinguishers or equipment present at the site, or if off-site equipment will be needed. If necessary, the local fire department (Franklinville Fire Department) will be called to render assistance in extinguishing the fire.

If there is a fire at the landfill, the operator must notify the DWM to report whether the fire has been controlled and notify as to what (if any) environmental damage may have occurred. Solid Waste Management Rule .1626(5)(d) requires that any fires that occur at the landfill be reported verbally to the DWM within 24 hours and in writing within 15 days.

Fire extinguishers will be located on each piece of equipment on site as required by Rule. 1626(5)(c). Equipment operators will be trained in the use of these extinguishers. Fire extinguishers will be used for small, localized fires. A stockpile of soil will be maintained near the working face to be used for extinguishing small surface fires that may be too large to control with the fire extinguishers carried on the landfill equipment. Since the working face is typically kept to a relatively small area (on the order of 2 acres or less), the likelihood of a large fire in the waste disposal area is also kept to a minimum.

Emergency equipment will be called in the case of fires too large to be extinguished with fire extinguishers or soil as described above. Water contained in the sedimentation ponds can be used in an emergency to aid local firefighters in extinguishing large fires.

1.4.4 Leachate Management

1.4.4.1 Performance and Design Concepts

As previously described in Section 1.4.3.1 - Protective Bottom Liner System, the bottom liner system consists of the following components with the assigned hydraulic conductivities for performance modeling using the EPA's HELP model.

Table 8: Bottom Liner System Components

Bottom Liner System Component	Thickness (inches)	Hydraulic Conductivity (cm/sec.)
Leachate Collection Drainage Layer Stone	24	1.0×10^{-3}
Leachate Collection Drainage Geocomposite	0.250	7.87
Primary 60-mil HDPE Geomembrane	0.060	2.0×10^{-13}
Leak Detection Drainage Geocomposite	0.250	7.87
Secondary 60-mil HDPE Geomembrane	0.060	2.0×10^{-13}
Leak Detection Drainage Geocomposite	0.250	7.87
Third 60-mil HDPE Geomembrane	0.060	2.0×10^{-13}
Low Permeable Soil Layer	12	1.0×10^{-5}

HELP models were run for various per acre scenarios to reflect different fill conditions (i.e., thickness of MSW) for any given phase at a particular point in time. Fill heights for modeling purposes included 10,

75, and 120 feet of waste to represent the initial lift of waste, the average half-full condition, and the average full condition of a given phase.

Peak leachate generation rates generally occur when there is the minimum fill height of 10 feet (initial lift of waste) placed in a newly constructed cell. The modeled scenarios included the following typical fill conditions:

Table 9: Per Acre HELP Model Scenarios

Scenario Condition	Condition Description
Open Leachate Collection Stone	This condition was assumed to produce no leachate since any precipitation would not have contacted waste and these areas would have rain covers to control and manage stormwater runoff.
10 feet of MSW (initial lift of waste)	This condition resulted in the maximum per acre leachate generation rate. Results from this condition were used in determining peak daily leachate volumes and on-site leachate storage requirements.
75 feet of MSW with daily cover	This condition represents the average half-full condition of a landfill phase with daily cover. The ending moisture content of the previous condition (i.e., 10 feet of MSW) was used as the initial moisture content of the 75-foot layer of waste. Results from this condition were sequenced in conjunction with the other model results to determine peak yearly and monthly leachate volumes.
120 feet of MSW with intermediate cover	This condition represents the average full condition of a landfill phase with intermediate cover. The ending moisture content of the previous condition (i.e., 75 feet of MSW) was used as the initial moisture content of the 120-foot layer of waste. Results from this condition were sequenced in conjunction with the other model results to determine peak yearly and monthly leachate volumes.
Closed with final cover	This condition represents the average full condition of a landfill phase with final cover. The moisture content used in the previous condition (i.e., 120 feet of MSW) was used for this scenario. Results from this condition were sequenced in conjunction with the other model results to determine peak yearly and monthly leachate volumes.

Other relevant model inputs and assumptions used to develop the leachate generation rates included:

1. Evapotranspiration data were synthetically generated for 25 years based on data obtained from Greensboro, North Carolina. Default values for station latitude, start and end of the growing season (Julian Date), relative humidity, and average annual wind speed were used.
2. The evaporative zone depth, the maximum depth from which water may be removed by evapotranspiration, was assumed to be 12 inches for intermediate and final cover soils.
3. The open condition lift thickness was set at 10 feet, corresponding to the outer edge waste height when placed in the operating cell.
4. The maximum leaf area (LAI), a dimensionless ratio of the leaf area of actively transpiring vegetation to the nominal surface area of the land on which the vegetation is growing, was assumed to be 0 for open waste and 3 for intermediate and final cover soils.
5. Precipitation data were synthetically generated for 25 years using coefficients for Greensboro, North Carolina. Default normal mean monthly precipitation data were used with the exception of manually inputting a 25-year storm event to occur on July 1st of year 3 in the rainfall data file. This manual insertion of the 25-year storm event is to account for storm surges in the model.
6. Temperature data were synthetically generated for 25 years using coefficients for Greensboro, North Carolina. Default normal mean monthly temperature data were used.
7. Solar radiation data were synthetically generated for 25 years using coefficients for Greensboro, North Carolina and station latitude of 35.13 degrees.
8. The analysis was performed using an assumed landfill area (area projected on a horizontal plane) of 1 acre for all scenarios. Consequently, all model outputs are 'per acre,' which allows them to be scaled appropriately for different sizes of landfill phases.
9. Initial moisture content of the layers were computed as nearly steady-state values by the computer program for the open waste condition. Subsequent half-full, intermediate, and final cover moisture conditions were manually input from the final output of the previous model.
10. Where runoff was allowed, the Natural Resources Conservation Service (NRCS) runoff curve number was set at 75 for grassed conditions. The HELP model calculated the curve number based on the soil database for the selected cover soil material. Runoff was allowed at 50% for the half-full condition and 100% for the intermediate and final cover conditions to account for more liquid infiltration to be generated as leachate.
11. The pinhole density for both geomembranes is 0 per acre, assuming all precipitation creates head on the liner or evaporates.
12. The installation quality is "good" and the geomembrane defect density is 0 per acre, leading to conservative modeling of head on the liner.
13. The maximum drainage length and slope of the base lateral drainage layer were set to 300 feet and 4 percent, corresponding to the leachate pipe spacing and minimum base liner slope as designed.

Each scenario was run in the model for a specified number of years to simulate a typical lifecycle of the landfill facility. The models for the open waste, intermediate, and final conditions were run at 5 and 25 years. At the end of the open waste condition scenario, the final water storage values were transferred to the intermediate cover model to serve as the starting moisture content for the layers in the new model. Similarly, the final moisture values were transferred from the intermediate cover model to final closure model. This process more accurately portrays a continuous landfill lifecycle for leachate production modeling.

As previously described in Section 1.4.3.1 - Protective Bottom Liner System, the predicted maximum hydraulic head on the primary 60-mil HDPE geomembrane liner was 0.148 inch, and 0.003 inch on the secondary 60-mil HDPE geomembrane. Under both scenarios, the maximum hydraulic head is less than the thickness of the 250-mil geocomposite drainage layer, demonstrating that the leachate generated within the landfill is contained within the geocomposite material. Therefore, based on the results of the HELP model analysis, the leachate collection system is designed to maintain less than 12 inches of head on the liners under the anticipated operating conditions. The use of a geocomposite as the primary and secondary drainage layer is acceptable as the calculated leachate depth does not exceed the thickness of the selected geocomposite (0.250 inch).

1.4.4.2 Normal and Peak Operating Conditions

Based on the results of sequenced HELP modeling, the combined peak annual leachate generation rate for the facility was determined to be 29,106,079 gallons occurring in year 37. This peak annual rate equates to an average monthly rate of 2,425,507 gallons, or an average of 79,743 gallons per day. These figures represent the maximum annual, average monthly, and average daily leachate generation rates for the peak year over the life of the facility. These average monthly and daily rates will be used to size the upper range of the normal operating conditions of leachate sumps, pumps, transmission lines, and storage facilities.

The one-time peak daily leachate generation rate for the facility was determined to be 128,035 gallons per day. This condition occurs when there is an assumed maximum 10-acre area of landfill phase open with the initial lift of 10 feet of waste placed in it. This one-time peak daily value occurs during the manually input 25-year storm event. This peak daily rate will be used to size the storm surge capacity of the leachate sumps, pumps, transmission line, and storage facilities.

The average monthly leachate generation rate was determined by averaging the sum of the annual leachate generation rates over the life of the facility. The average annual leachate generation rate over the life of the facility was determined to be 16,500,000 gallons. This average annual rate equates to an average monthly rate of 1,375,000 gallons, or an average of 45,205 gallons per day. These average monthly and daily rates will be used to size the lower range of the normal operating conditions of leachate sumps, pumps, transmission lines, and storage facilities.

The peak daily leachate generation rate for the secondary liner system was determined to be 1.5×10^{-4} gallon per acre per day. Because this anticipated flow rate is seven orders of magnitude lower than that of the primary liner system, it is considered to be negligible in the capacity design of the leachate collection and transport. Leachate generated in the secondary line system will be pumped back into the primary liner system for disposal.

The normal and peak leachate generation rates for the facility are summarized in Table 10 below:

Table 10: Normal and Peak Leachate Generation Rates

Leachate Generation Rates	Gallons per Year	Gallons per Month	Gallons per Day	Gallons per Minute
Peak Daily Rates	n/a	n/a	128,035	89
Peak Annual Rates	29,106,079	2,425,507	79,743	55
Average Annual Rates	16,500,000	1,375,000	45,205	31
Secondary Peak Daily Rates	n/a	n/a	$1.5x10^{-4}$	n/a

1.4.4.3 Leachate Management System

The leachate management system consists of sumps, pumps, transmission lines, and storage tanks. Each of the landfill phases will have a single sump for both the primary and secondary liner systems. Dual HDPE risers with submersible leachate pumps will be used for each sump location. Primary liner pumps for each phase will be sized to handle the peak annual leachate generation rate with a factor of safety of 2. This design equates to a peak pumping rate of 110 gallons per minute. This peak design flow rate will be sufficient to handle the peak daily storm surge rate of 89 gallons per minute. Primary liner pumps will deliver leachate through a common 3-inch HDPE force main to on-site leachate storage tanks. Leachate generated in the secondary liner system will be pumped directly back into the primary liner system for disposal because the anticipated flow quantities do not warrant connection to the primary leachate transport force main.

The primary leachate transport force main will deliver leachate to the on-site leachate storage tanks. It is planned to have an on-site storage capacity of 500,000 gallons, expandable up to 750,000 gallons if necessary. This on-site storage capacity is being provided to handle surges due to storm events. The leachate storage tanks provide flow equalization as described prior to pumping the leachate off-site to the City of Asheboro's Waste Water Treatment Plant (WWTP).

Leachate will be pumped from a single pump station located near the leachate storage facility to a City of Asheboro sanitary sewer pump station located adjacent to the existing Randolph County solid waste transfer station. It is anticipated that a single 3-inch HDPE force main will be sufficient to deliver the average and peak daily leachate generation rates to the City's pump station. Upgrades will be made to the City's pump station to handle the additional capacity generated by the landfill facility. It is anticipated that pre-treatment of the facility leachate will not be necessary; however, should pre-treatment be required by the City of Asheboro, there is sufficient room on-site to provide leachate pre-treatment.

1.4.4.4 Leachate Surge Contingencies

Leachate and stormwater surges resulting from severe weather events will be handled by the facility systems. As previously presented, the leachate collection system will be capable of handling twice the anticipated leachate generation rates resulting from the worst case fill condition (10 acres with 10 feet of waste placed in it) during the 25-year storm event. Leachate pumps within each phase will be capable of evacuating twice this peak design volume out of the landfill and into the leachate storage tanks. In order to control and equalize the leachate flow rate to the City's sanitary sewer system, up to 500,000 gallons of on-site leachate storage capacity will be provided. This total storage volume is capable of containing four days of the one-time peak daily leachate generation rate, or six days of the daily average from the peak annual leachate producing year. If necessary, leachate can be temporarily stored within the landfill sumps for up to three days for storm events larger than the 25-year event; however, it is not anticipated this additional storage capacity will be needed due to the design capacities of the leachate management system.

Each phase, or cell, will be limited to 10 acres in operating size until two complete 10-foot lifts of waste cover the entire area. Then adjacent built areas can be opened to receive waste. If additional areas are constructed larger than the initial 10 acres of operating area, the remaining acreage will have rain covers to prevent stormwater from entering and overwhelming the leachate collection system. Stormwater will be managed on top of the rain cover through containment berms where stormwater can be pumped out of the phase or cell and into the facility's perimeter stormwater management system.

1.4.5 Special Engineering Features

The most significant special engineering features of the Randolph County Regional Landfill include the alternate bottom liner system with leak detection and the alternate final cover system, both previously discussed in detail in preceding sections. Other notable engineering features of the facility are discussed briefly below.

1.4.5.1 Entrance Road, Scale House, and Wheel Wash

The facility will have a gated entrance that fronts Old Cedar Falls Road. The facility's entrance road traverses through the front portion of the County property east of Gabriel's Creek. It is on this eastern section of the property that the scales and attendant building will be located. The scales and attendant building are approximately 1,200 feet from the entrance. At the anticipated waste intake rates, this distance will provide sufficient queuing capacity for incoming trucks to stop for inspection.

Beyond the scale and attendant building, the entrance road continues to traverse through the property westward across Gabriel's Creek. It is anticipated that either a bridge or culvert crossing will be constructed across Gabriel's Creek depending on permitted impacts to the floodplain. The final crossing

design will be developed as part of the Application for Permit to Construct and the proper permits will be obtained as necessary prior to construction including any required hydraulic modeling. The Gabriel's Creek crossing is approximately 2,200 feet from the scales and attendant building. At the anticipated waste intake rate, this distance will provide sufficient queuing capacity for incoming trucks on their way to the working face.

Beyond the Gabriel's Creek crossing, the entrance road continues westward another 600 feet to the perimeter access road of the landfill. It is along this section of the entrance roadway that the wheel wash station will be located for exiting vehicles prior to traveling across the Gabriel's Creek crossing.

1.4.5.2 Maintenance and Office Building

Located on the southwest corner of the intersection of the facility entrance and the perimeter access roads is the maintenance and office building location. Approximately 2 acres of area (100 feet by 900 feet) are reserved for the facility's maintenance and office building, equipment and material storage, and employee parking. It is anticipated this area will be developed with the initial landfill phase.

1.4.5.3 Leachate Management Area

The leachate management area lies west of the maintenance and office building area along the perimeter access road adjacent to Stormwater Quality Pond No. 2. This area is where the leachate storage facility will be located. As previously discussed, 500,000 gallons of leachate storage will be provided with above-ground steel tanks. It is envisioned that two, 250,000-gallon storage tanks will be constructed with the initial phase of landfill development. The area has been sized to accommodate a third 250,000-gallon tank if needed for flow equalization or pre-treatment prior to discharge to the City of Asheboro's WWTP. In addition, a single leachate pump station will be located in this area, which will serve as the transport pump station from the landfill to the City's sanitary sewer pump station located adjacent to the existing County solid waste transfer station. The leachate management area will also include a leachate loading station where tanker trucks can be loaded with leachate for direct haul off-site in case of emergency. It is anticipated that identified features of this area, with the exception of the third 250,000-gallon storage tank, will be developed with the initial landfill phase.

1.4.5.4 Stormwater Management Areas

The facility has been developed with four stormwater quality ponds located around the perimeter of the landfill. Perimeter site drainage within the interior of the perimeter access road drains to these ponds. The ponds will be developed with the progression of the landfill as they are needed. Interim erosion and sediment control basins will be constructed with the development of each phase to handle stormwater runoff in the interim until the primary stormwater quality pond is needed for the area of development. These interim basins will be designed as part of the Permit to Construct for each major landfill

development phase. The four stormwater quality ponds have been sized to contain the 25-year, 24-hour storm event, and will be designed to safely pass the 100-year event through the emergency spillway. Final design development of these ponds will accompany the future Permit to Construct submittals.

1.4.5.5 Landfill Gas Management Area

The facility has been developed with a reserve area for future landfill gas management. It is envisioned that, as the facility reaches capacity levels that require active landfill gas management, this area will house the end-point gas collection system where landfill gas will either be destructed through flaring or a landfill gas to energy facility will be constructed. Approximately 1 acre of area (150 feet by 300 feet) has been reserved for the facility's landfill gas management facilities. It is anticipated this area will be developed towards the midlife of the initial landfill phase.

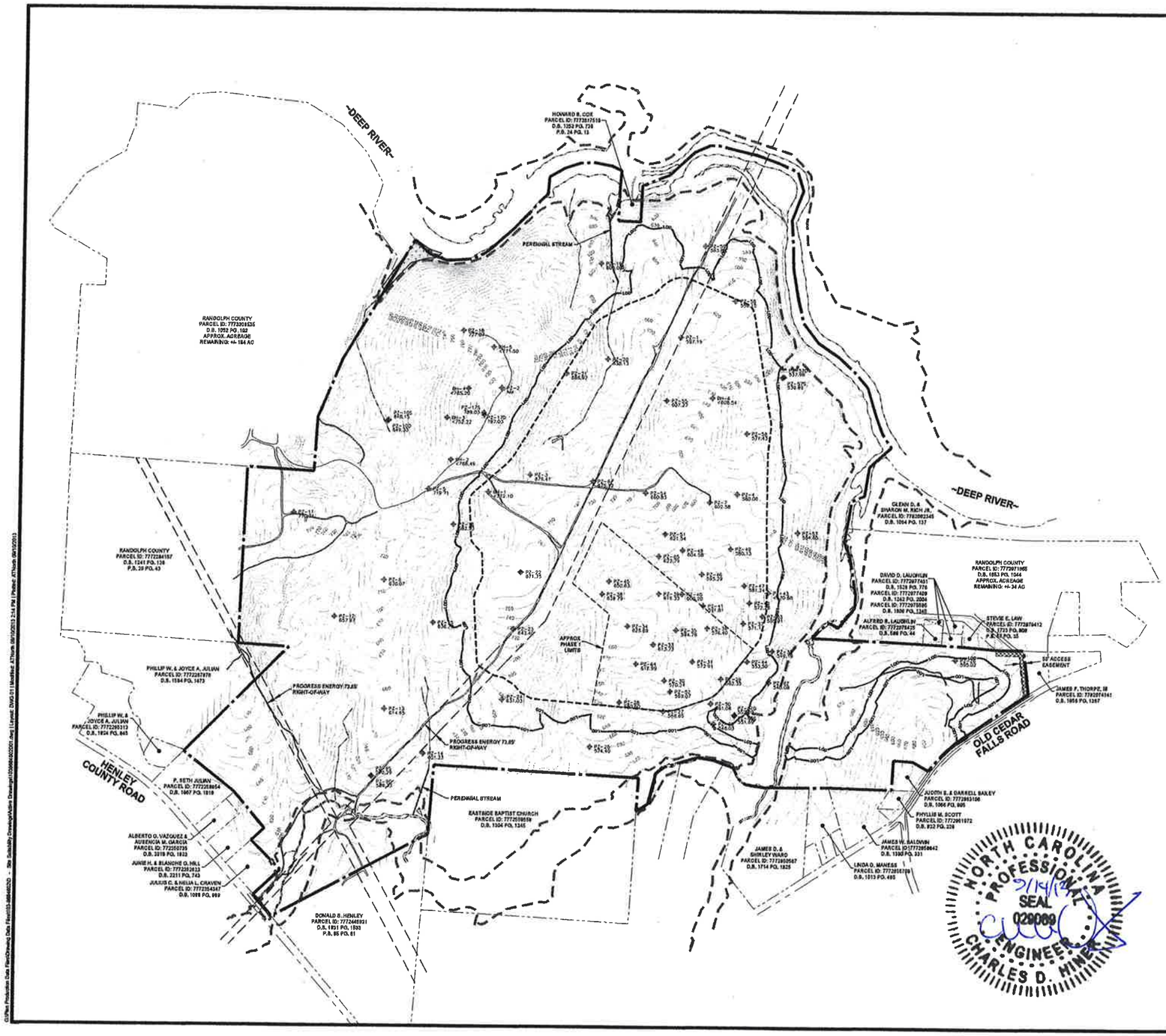
1.4.5.6 Borrow Areas

Several potential borrow areas have been identified as part of this Facility Plan. The Facility Drawings depict four possible locations for borrow soils. As previously presented in Section 1.4.2 Landfill Capacity, three of the borrow areas have an estimated combined availability of earthen materials of approximately 775,000 cubic yards. It is anticipated that the four identified borrow areas, in conjunction with those materials obtained from within the proposed limits of disturbance for landfill construction, can provide sufficient earthen materials for the facility construction, its roadways, and ancillary facilities. However, if necessary, off-site borrow areas can be identified at a later time.

1.4.5.7 Other Solid Waste Management Areas

Although not identified at this time as to a specific location, other solid waste management activities that may occur on-site include yard waste management (including yard waste and leaf composting), wood waste grinding for mulch, and recycling areas for tires, white goods, metals, and household recyclables. The existing County transfer station will be used as a public convenience center and drop off location to avoid mixing residential and commercial truck traffic due to safety concerns.

Drawings



LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- EXISTING PIEZOMETER
- WETLAND AREA
- CONCEPTUAL LIMITS OF WASTE
- CONCEPTUAL LIMITS OF DISTURBANCE

REFERENCE:

1. PROPERTY BOUNDARY FROM COMPILED BOUNDARY SURVEY BY FLEMING ENGINEERING INC. DATED NOVEMBER 30, 2012.
2. EXISTING TOPOGRAPHY FROM AERIAL SURVEY BY SPATIAL DATA CONSULTANTS INC. DATED APRIL 11, 2012.
3. PROPERTY IS LOCATED IN A FEMA FLOOD ZONE PER FIRM MAP #: 3710777300J DATED JANUARY 2, 2008 AND FIRM MAP #: 3710777200J DATED JANUARY 2, 2008.

SCALE 400 0 400 800 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT

RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE

EXISTING CONDITIONS

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-3882

PROJECT No.		1039654602	FILE No.	1039654602D01
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CADD	ATN	2013-09-11	DRAWING	FP-1
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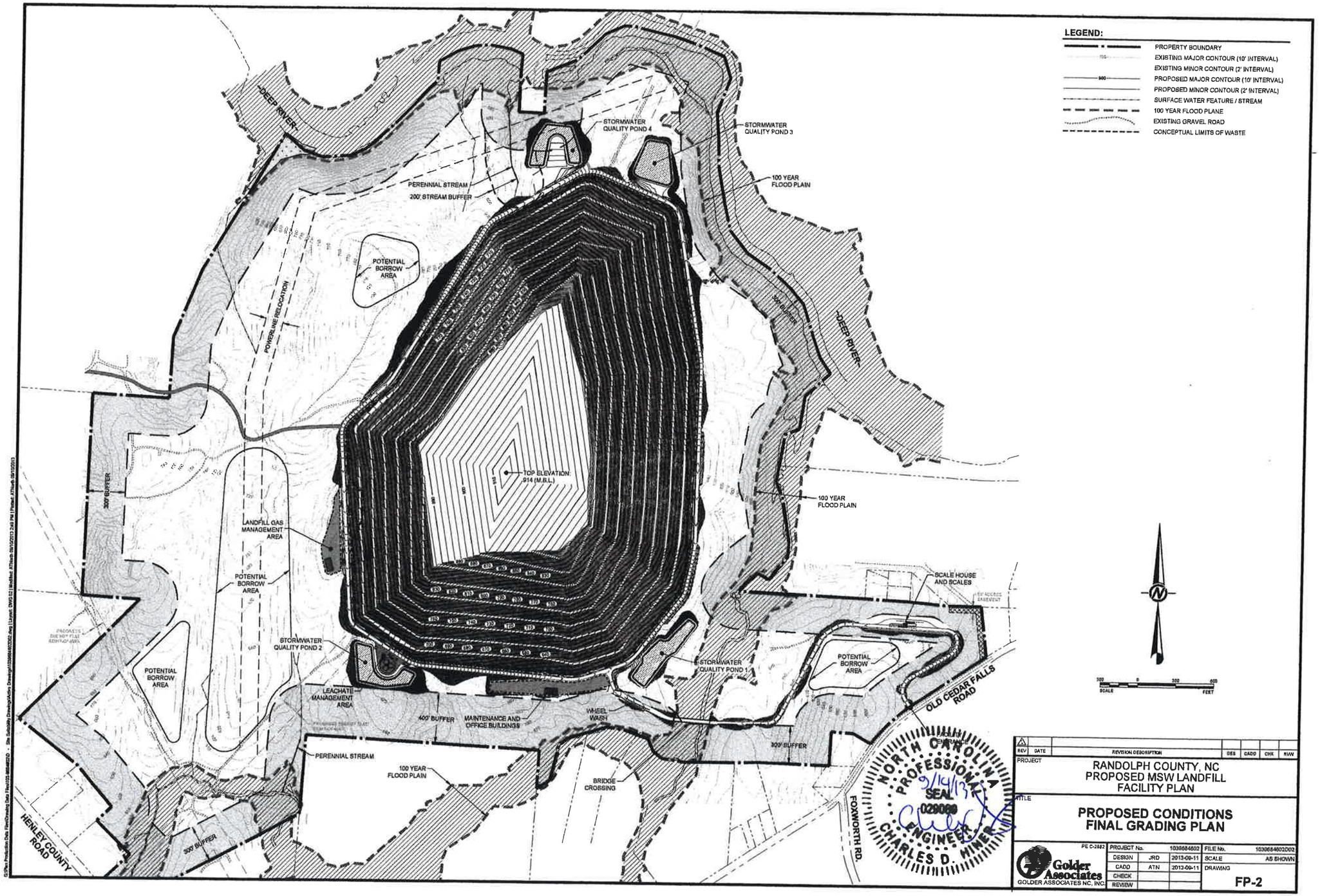
REVIEW				



REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT

RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE

PROPOSED CONDITIONS FINAL GRADING PLAN

PE C-2482

Golder Associates
GOLDER ASSOCIATES NC, INC.

PROJECT No.		1039684602	FILE No.	1039684602D02
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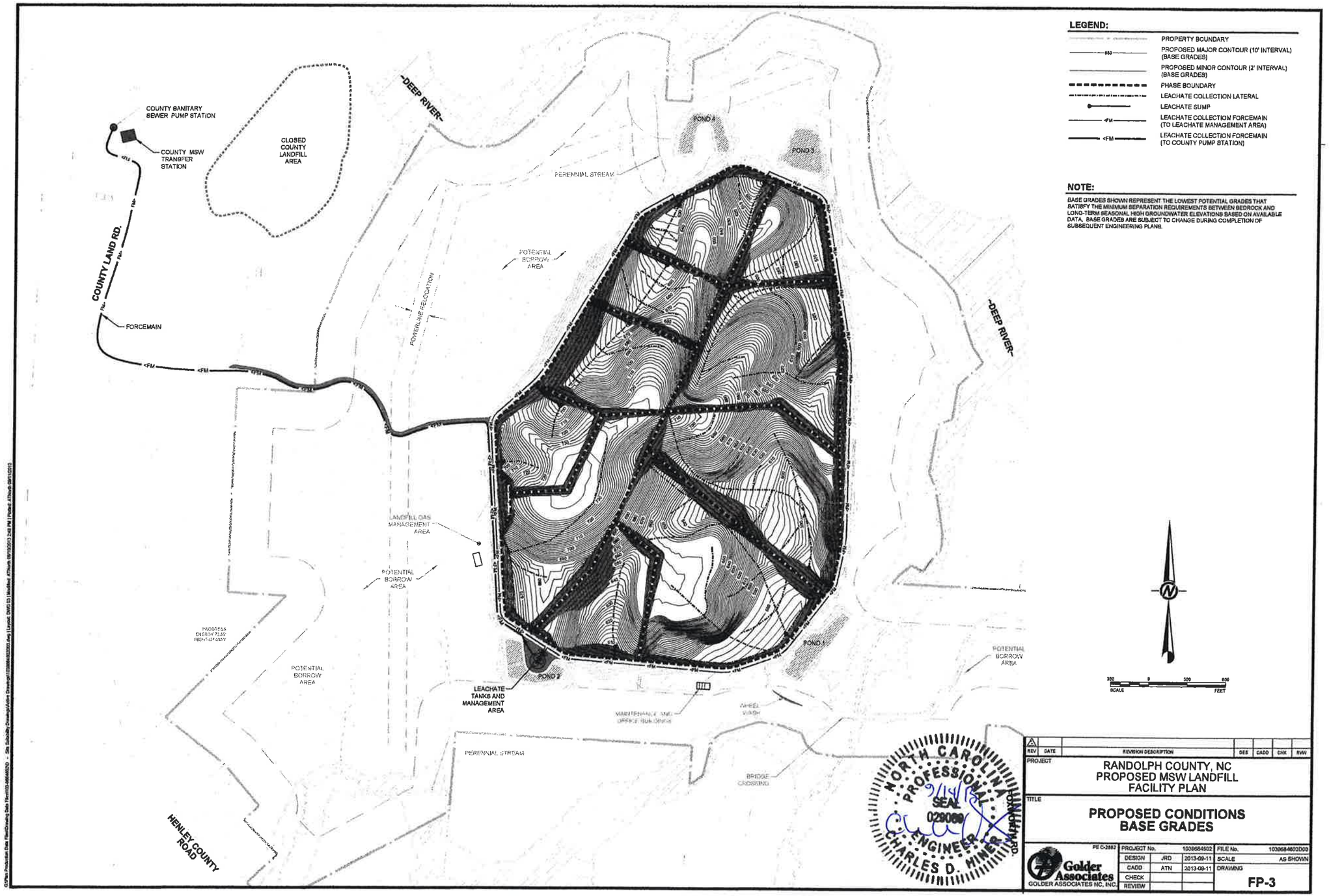
CADD	ATN	2013-09-11	DRAWING	FP-2
CHECK				
REVIEW				



LEGEND:

- PROPERTY BOUNDARY
- PROPOSED MAJOR CONTOUR (10' INTERVAL) (BASE GRADES)
- PROPOSED MINOR CONTOUR (2' INTERVAL) (BASE GRADES)
- PHASE BOUNDARY
- LEACHATE COLLECTION LATERAL
- LEACHATE SUMP
- LEACHATE COLLECTION FORCEMAIN (TO LEACHATE MANAGEMENT AREA)
- LEACHATE COLLECTION FORCEMAIN (TO COUNTY PUMP STATION)

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE: PROPOSED CONDITIONS
BASE GRADES

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2882

PROJECT No.		1038684602	FILE No.	1038684602D03
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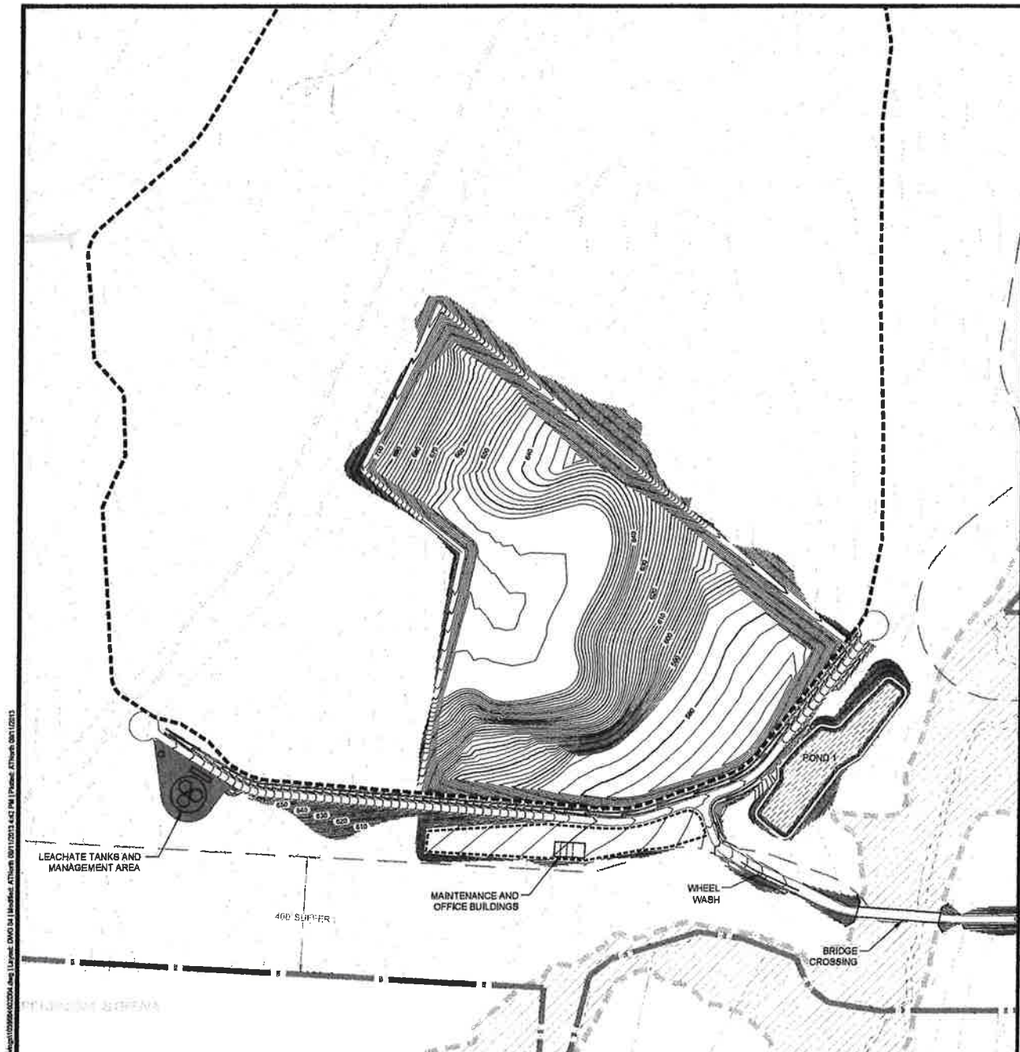
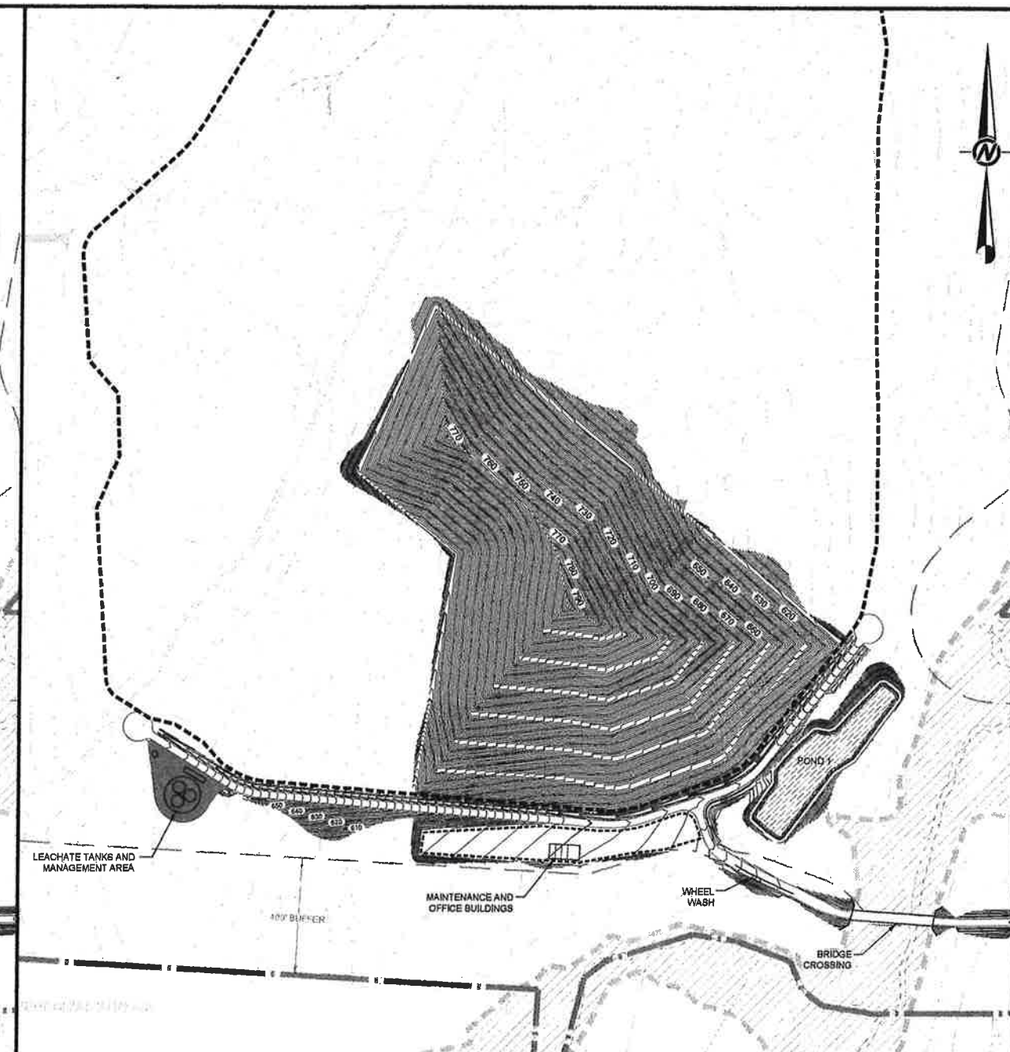
REVIEW				



PHASE 1 BASE GRADES



PHASE 1 FINAL GRADES

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN FOR EACH INDIVIDUAL PHASE ARE CONCEPTUAL AND MAY CHANGE AS THE FINAL BASE GRADES AND ENGINEERING PLAN IS DEVELOPED FOR THE PHASE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029069 CHARLES D. HINER

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT

RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE

PHASING PLAN
(1 OF 11)

PE C-2882

Golder Associates
GOLDER ASSOCIATES NC, INC.

PROJECT No.		1039684602	FILE No.	1039684602D04
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-4
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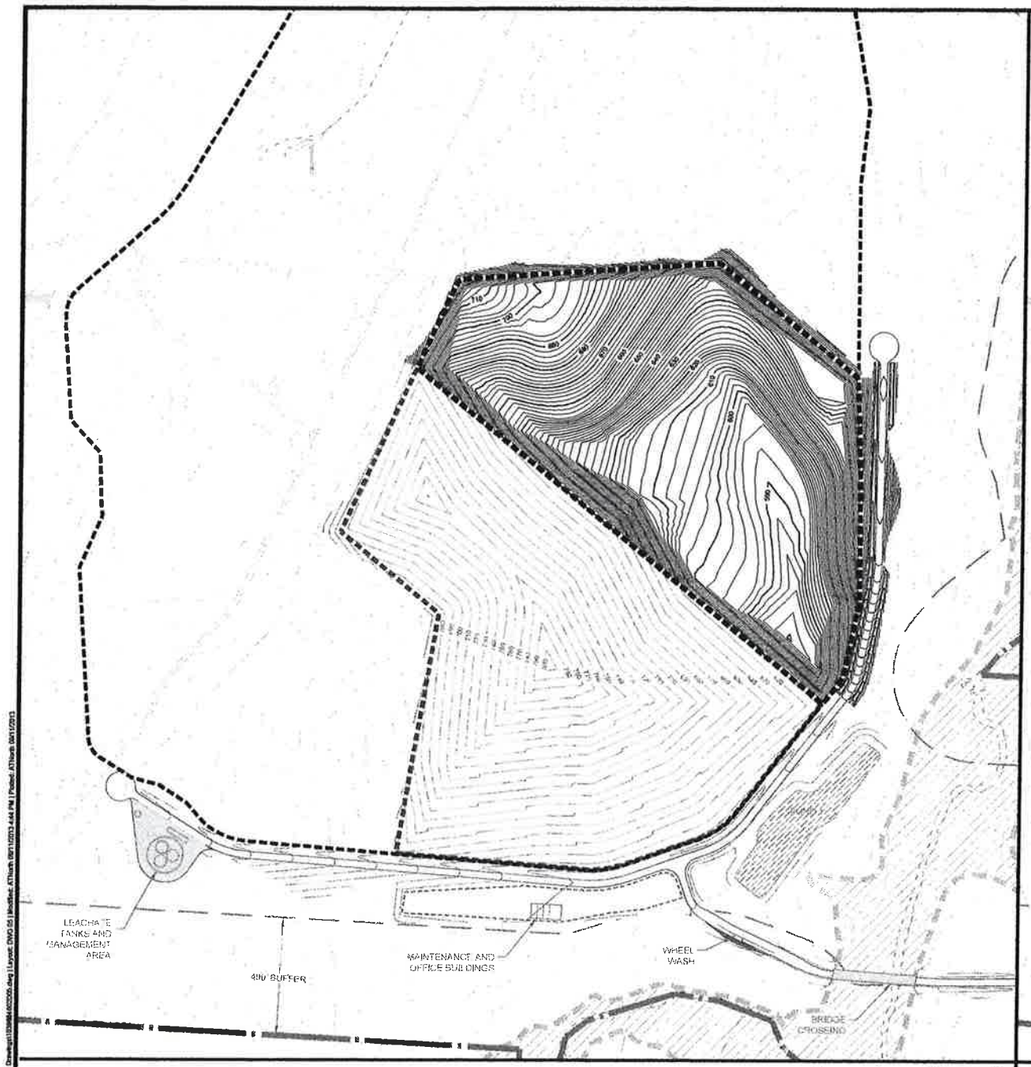
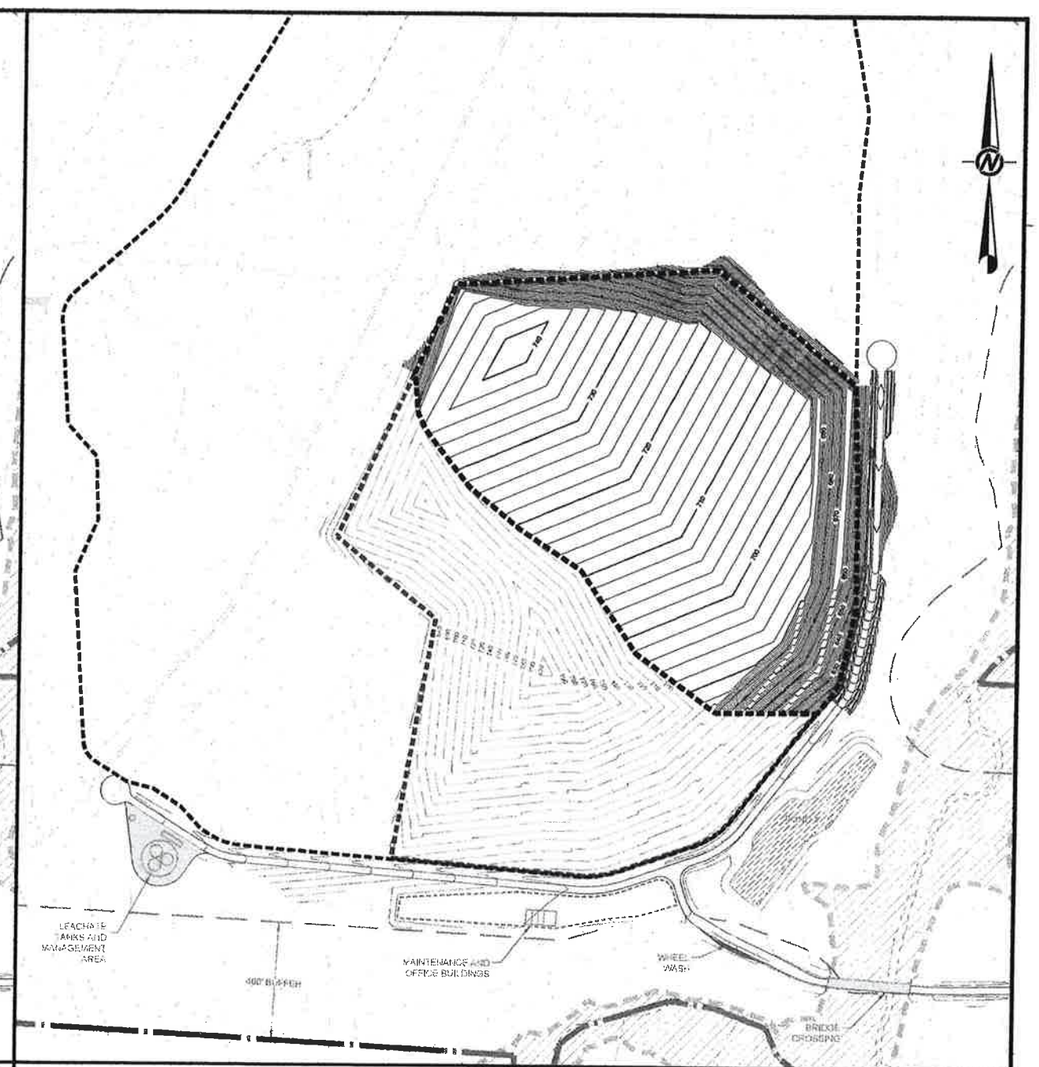
REVIEW				



PHASE 2 BASE GRADES

SCALE 200 0 200 400 FEET



PHASE 2 FINAL GRADES

SCALE 200 0 200 400 FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN FOR EACH INDIVIDUAL PHASE ARE CONCEPTUAL AND MAY CHANGE AS THE FINAL BASE GRADES AND ENGINEERING PLAN IS DEVELOPED FOR THE PHASE.

NORTH CAROLINA PROFESSIONAL SEAL 029069 ENGINEER CHARLES D. HIMER 9/14/13

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE: PHASING PLAN
(2 OF 11)

Golder Associates
GOLDER ASSOCIATES NC, INC.
FB C-3882

PROJECT No.		1039684602	FILE No.	1039684602D05
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-5
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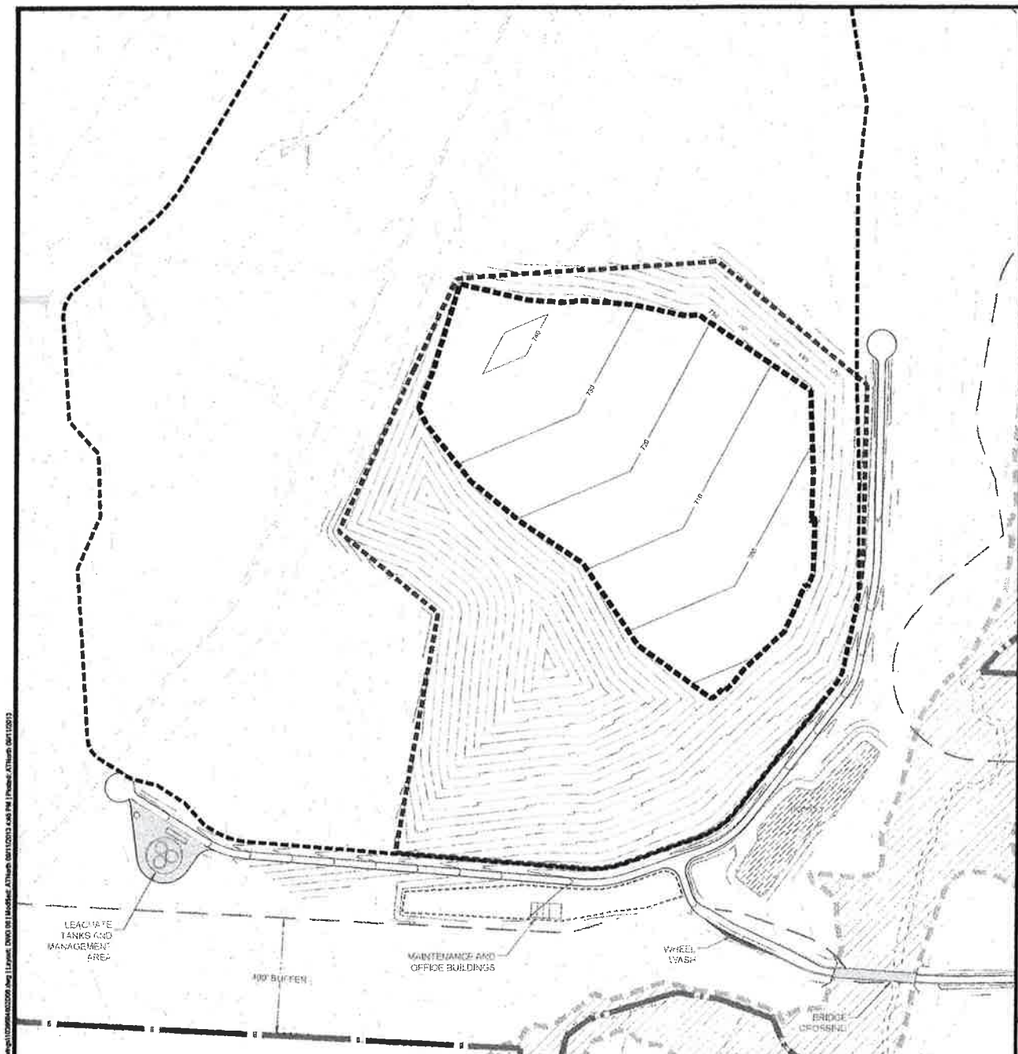
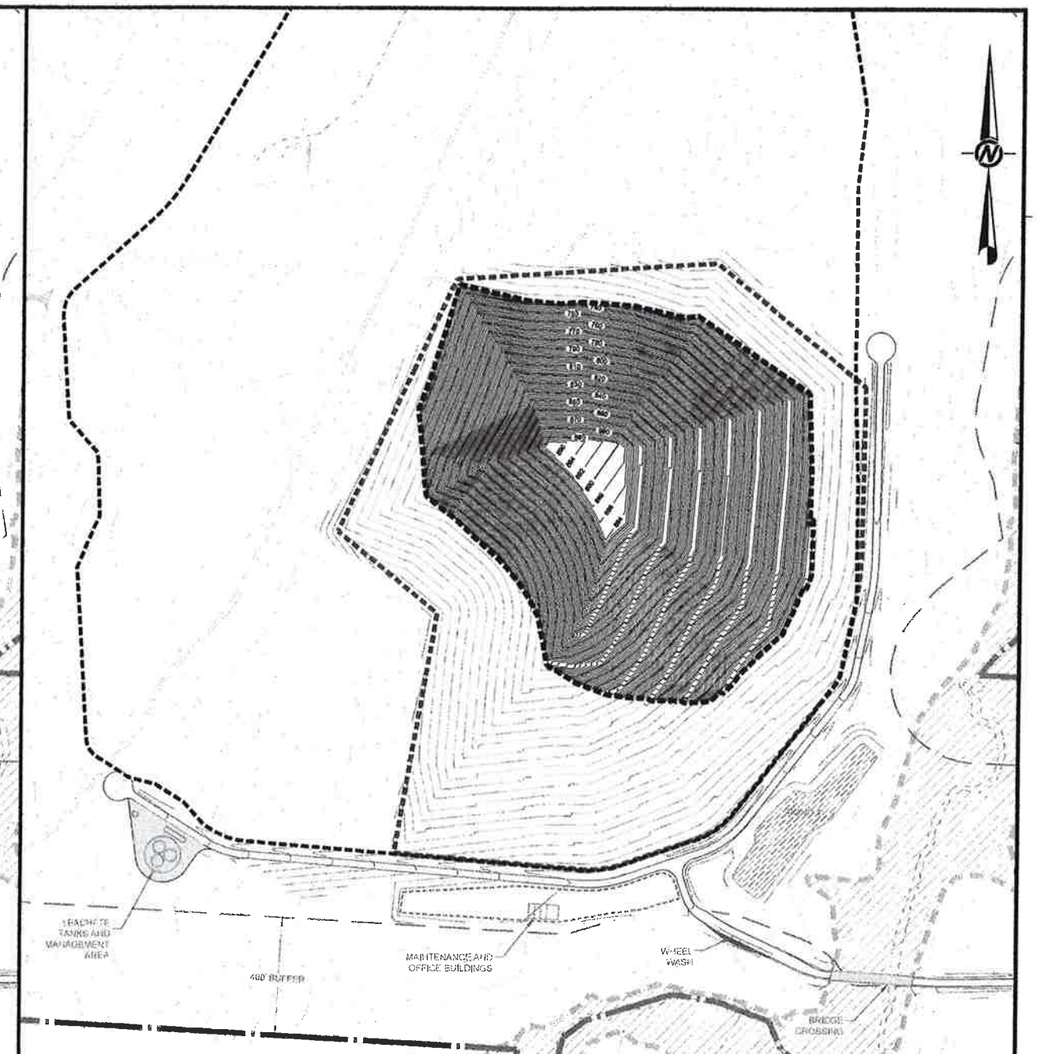
REVIEW				



PHASE 3 BASE GRADES

**NOTE: PHASE 3 DOES NOT HAVE LINED BASE GRADES OR PERIMETER ROAD CONSTRUCTION.

200 0 200 400
SCALE FEET



PHASE 3 FINAL GRADES

200 0 200 400
SCALE FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 902 PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN FOR EACH INDIVIDUAL PHASE ARE CONCEPTUAL AND MAY CHANGE AS THE FINAL BASE GRADES AND ENGINEERING PLAN IS DEVELOPED FOR THE PHASE.

NORTH CAROLINA PROFESSIONAL SEAL 028069 ENGINEER CHARLES D. HIMES

9/14/13

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

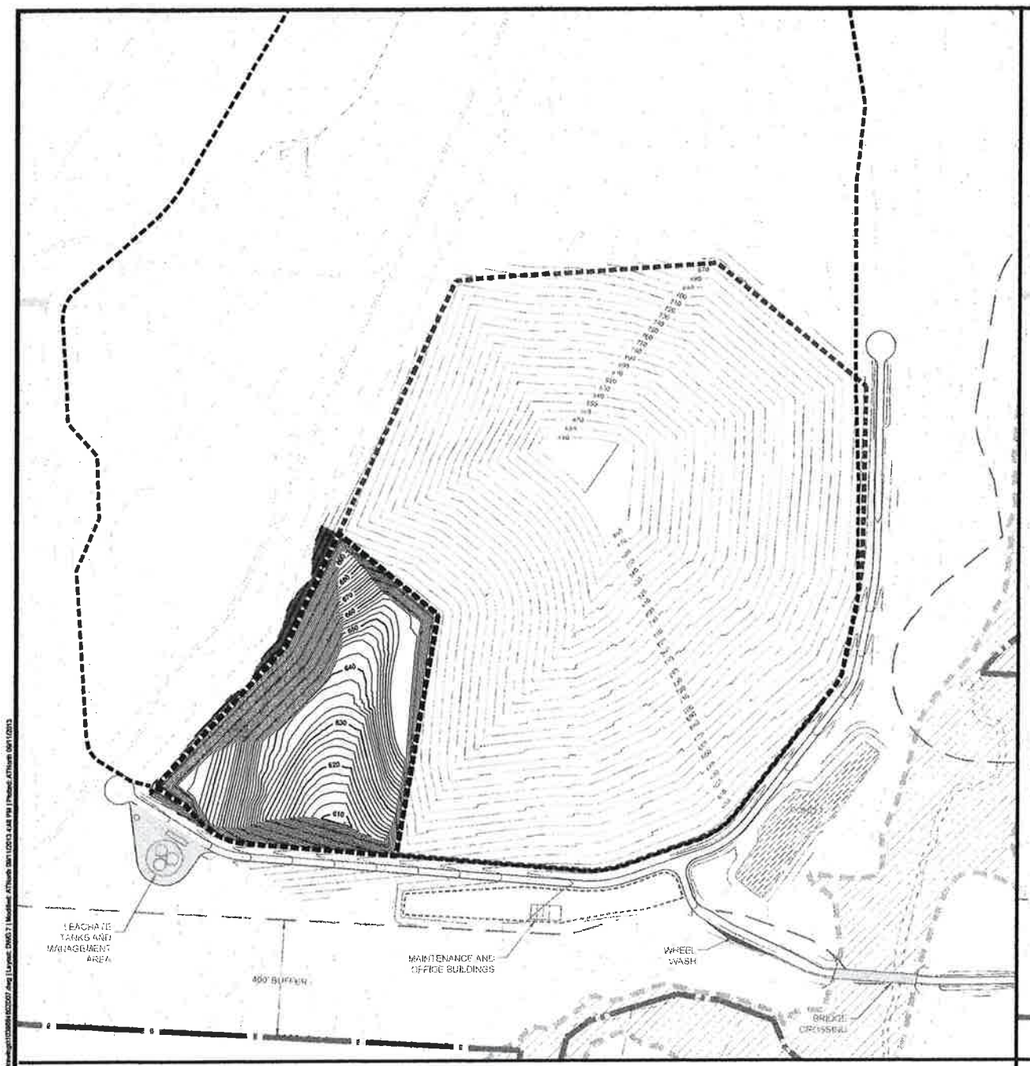
PROJECT
RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE
PHASING PLAN
(3 OF 11)

Golder Associates
GOLDER ASSOCIATES NC, INC.

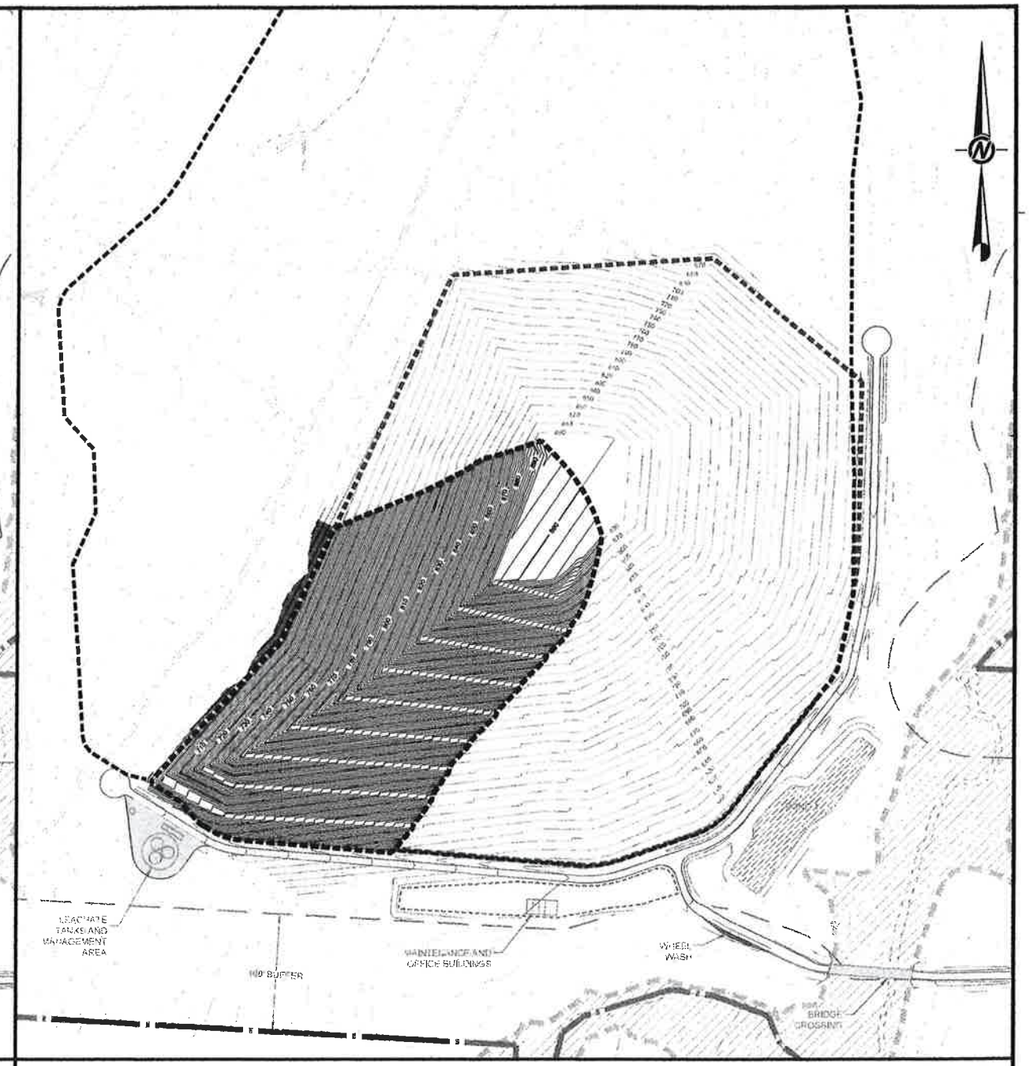
FE C-2862

PROJECT No.		1039684602	FILE No.	1039684602D06
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-6
CHECK				
REVIEW				



PHASE 4 BASE GRADES

SCALE 200 0 200 400 FEET



PHASE 4 FINAL GRADES

SCALE 200 0 200 400 FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 900 PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN FOR EACH INDIVIDUAL PHASE ARE CONCEPTUAL AND MAY CHANGE AS THE FINAL BASE GRADES AND ENGINEERING PLAN IS DEVELOPED FOR THE PHASE.

NORTH CAROLINA PROFESSIONAL SEAL 029009 ENGINEER CHARLES D. HIMES

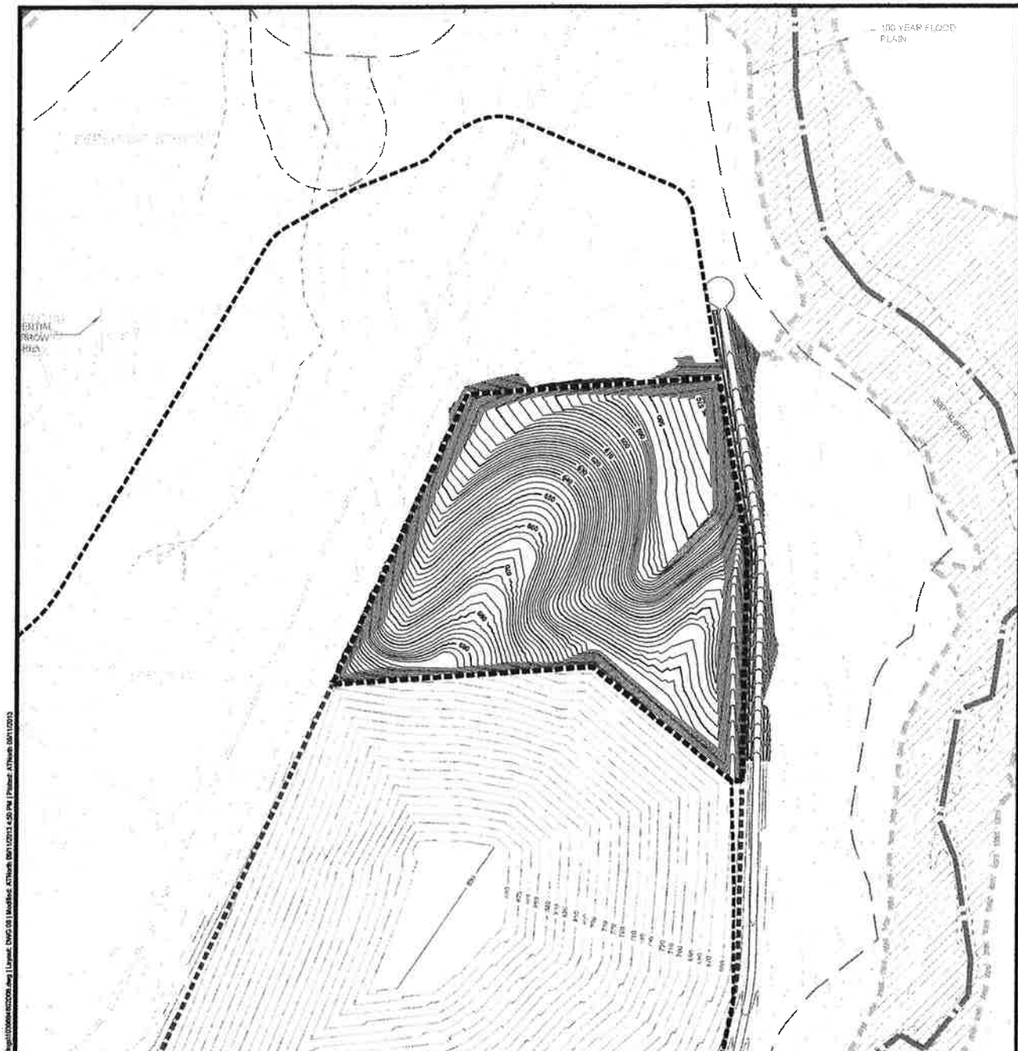
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

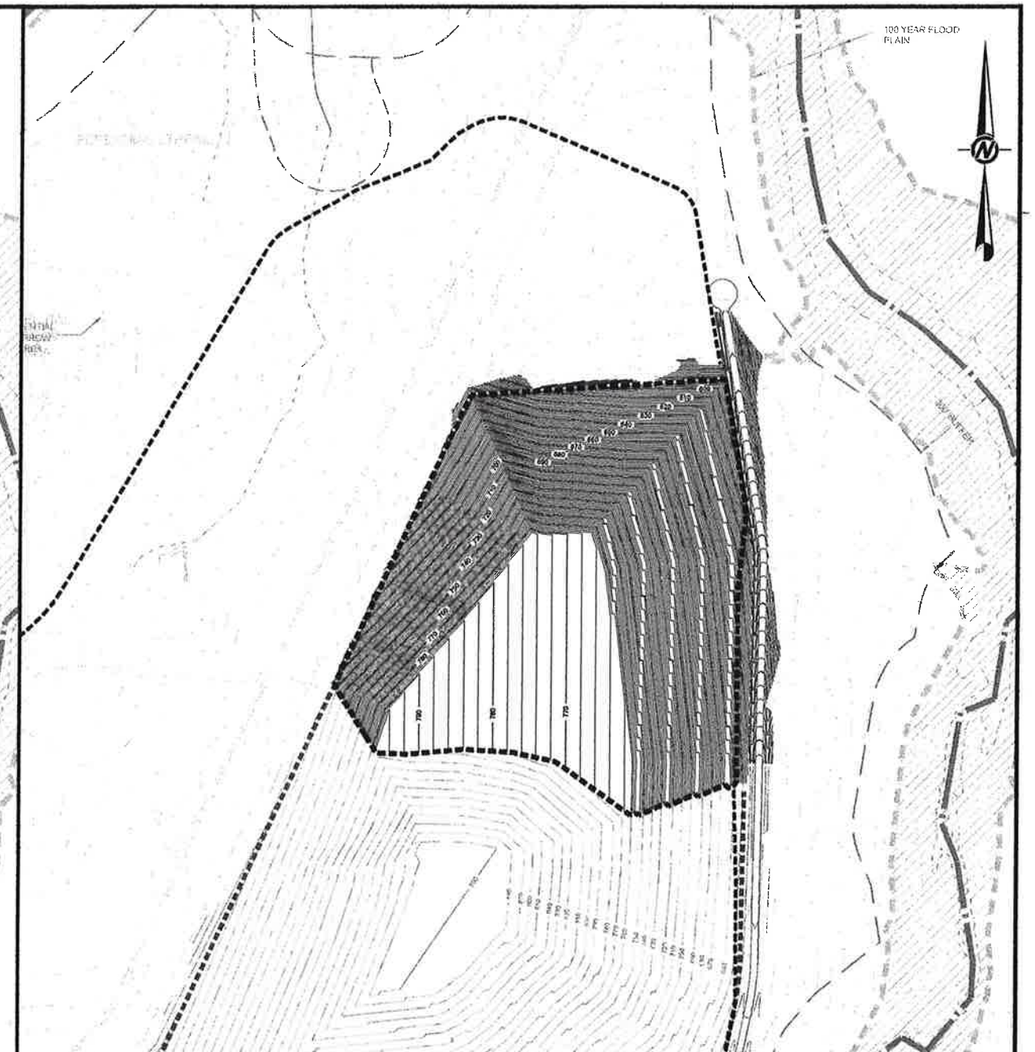
TITLE: PHASING PLAN (4 OF 11)

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2443

PROJECT No.		1039684602	FILE No.	1039684602D07	
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN	
CADD	ATN	2013-09-11	DRAWING	FP-7	
CHECK					
REVIEW					



PHASE 5 BASE GRADES



PHASE 5 FINAL GRADES

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN FOR EACH INDIVIDUAL PHASE ARE CONCEPTUAL AND MAY CHANGE AS THE FINAL BASE GRADES AND ENGINEERING PLAN IS DEVELOPED FOR THE PHASE.

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. MINER 9/14/17

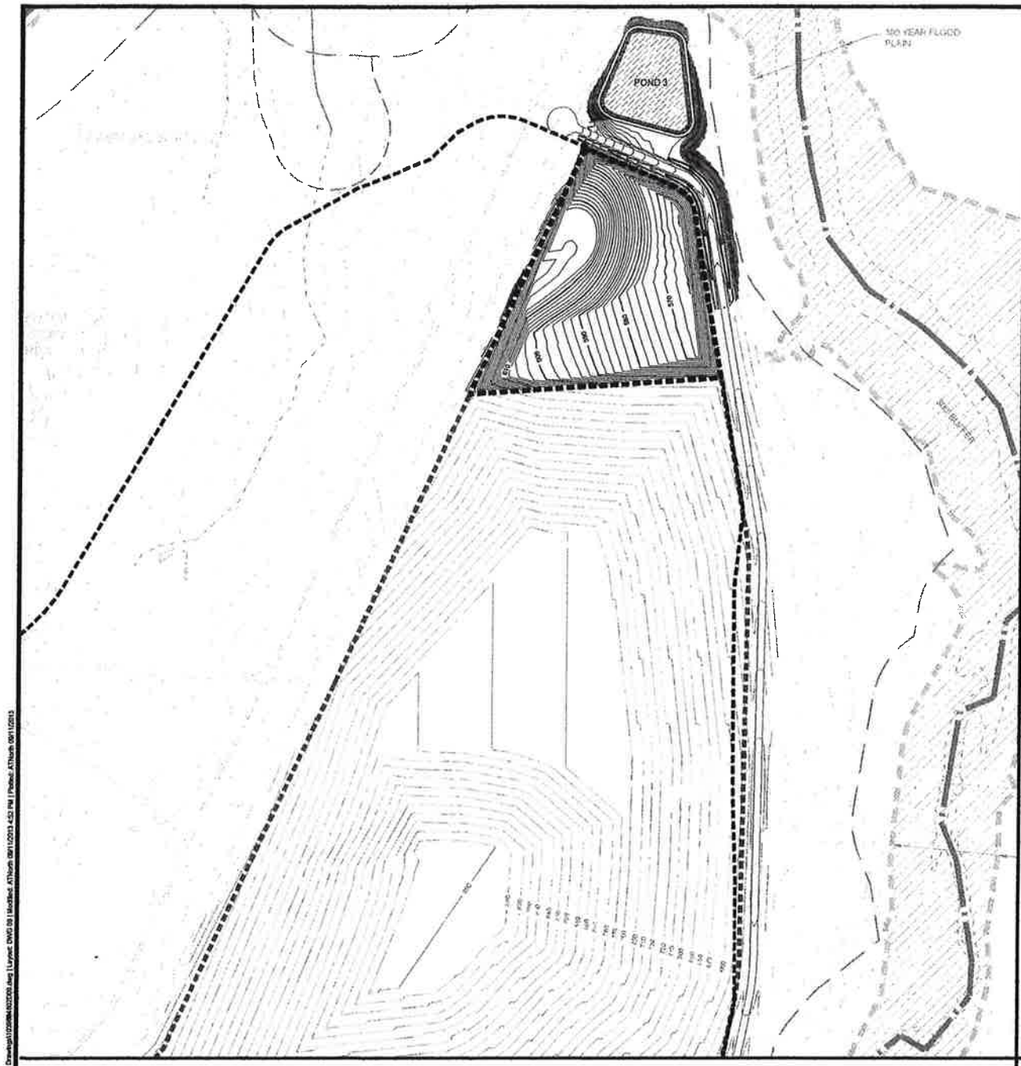
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE: **PHASING PLAN (5 OF 11)**

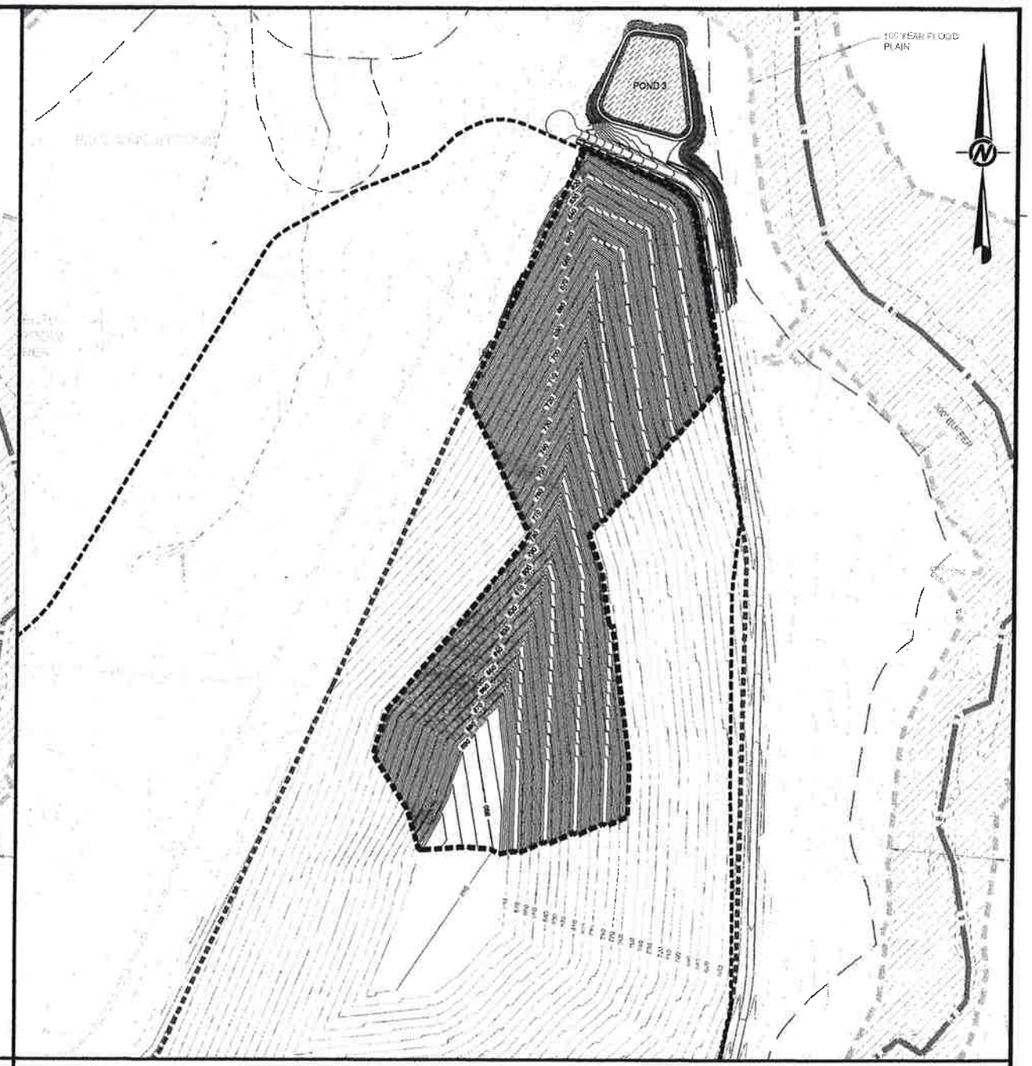
Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-3962

PROJECT No.		1039664602	FILE No.	1039664602D08
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-8
CHECK				
REVIEW				



PHASE 6 BASE GRADES

200 0 200 400
SCALE FEET



PHASE 6 FINAL GRADES

200 0 200 400
SCALE FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 800 PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN FOR EACH INDIVIDUAL PHASE ARE CONCEPTUAL AND MAY CHANGE AS THE FINAL BASE GRADES AND ENGINEERING PLAN IS DEVELOPED FOR THE PHASE.

NORTH CAROLINA PROFESSIONAL SEAL 029060 ENGINEER CHARLES D. HIMES
9/14/13

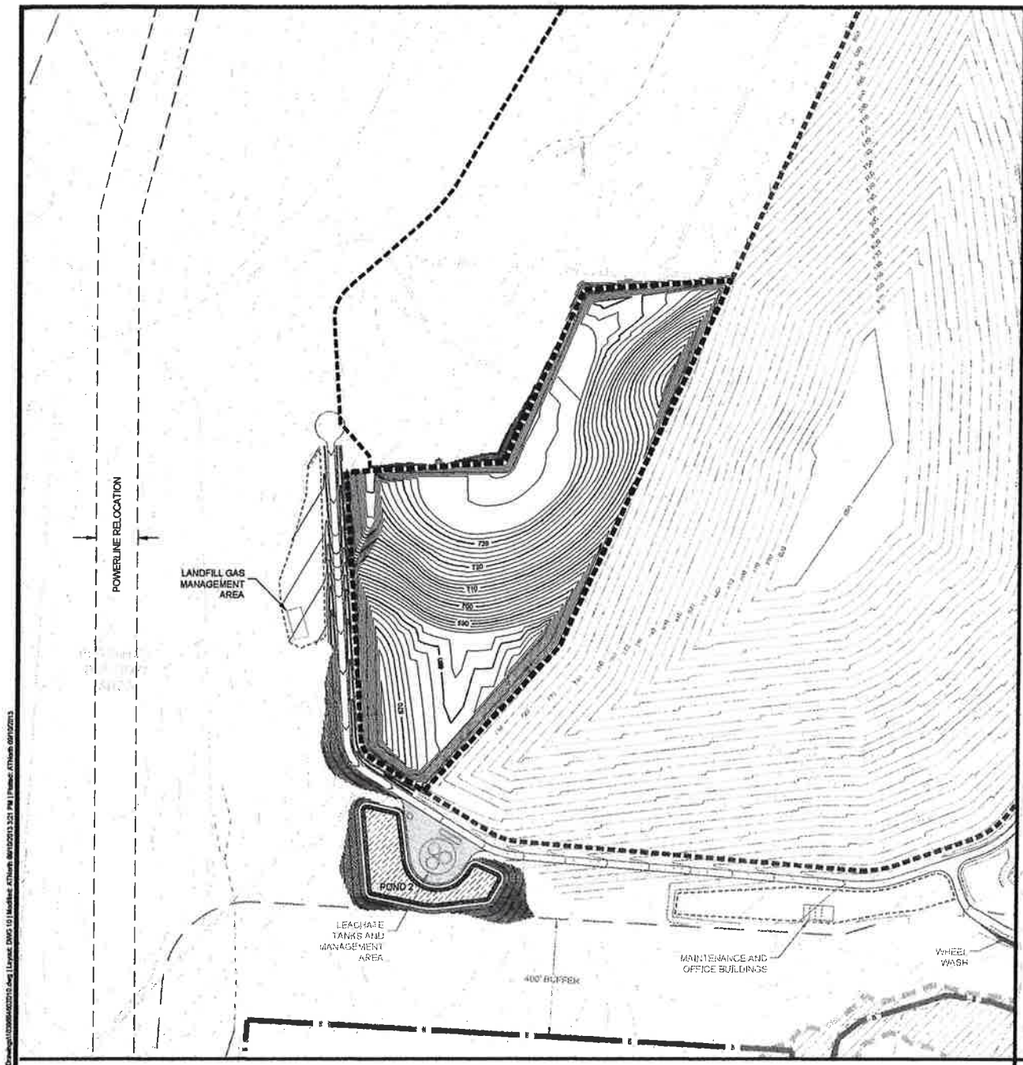
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE: PHASING PLAN
(6 OF 11)

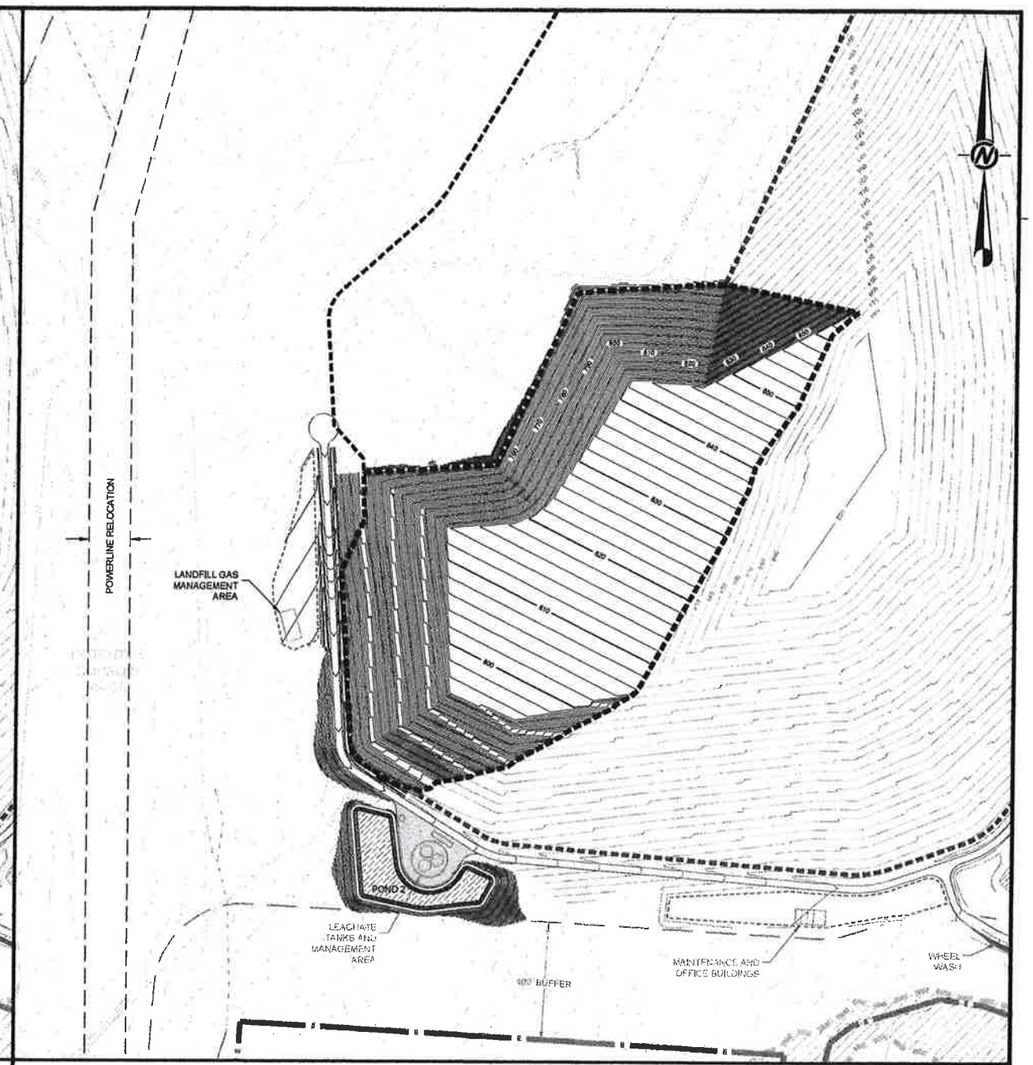
Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-3982

PROJECT No.		1039654602	FILE No.	1039654602D00
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-9
CHECK				
REVIEW				



PHASE 7 BASE GRADES

200 0 200 400
SCALE FEET



PHASE 7 FINAL GRADES

200 0 200 400
SCALE FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 800 PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. HINER 9/14/13

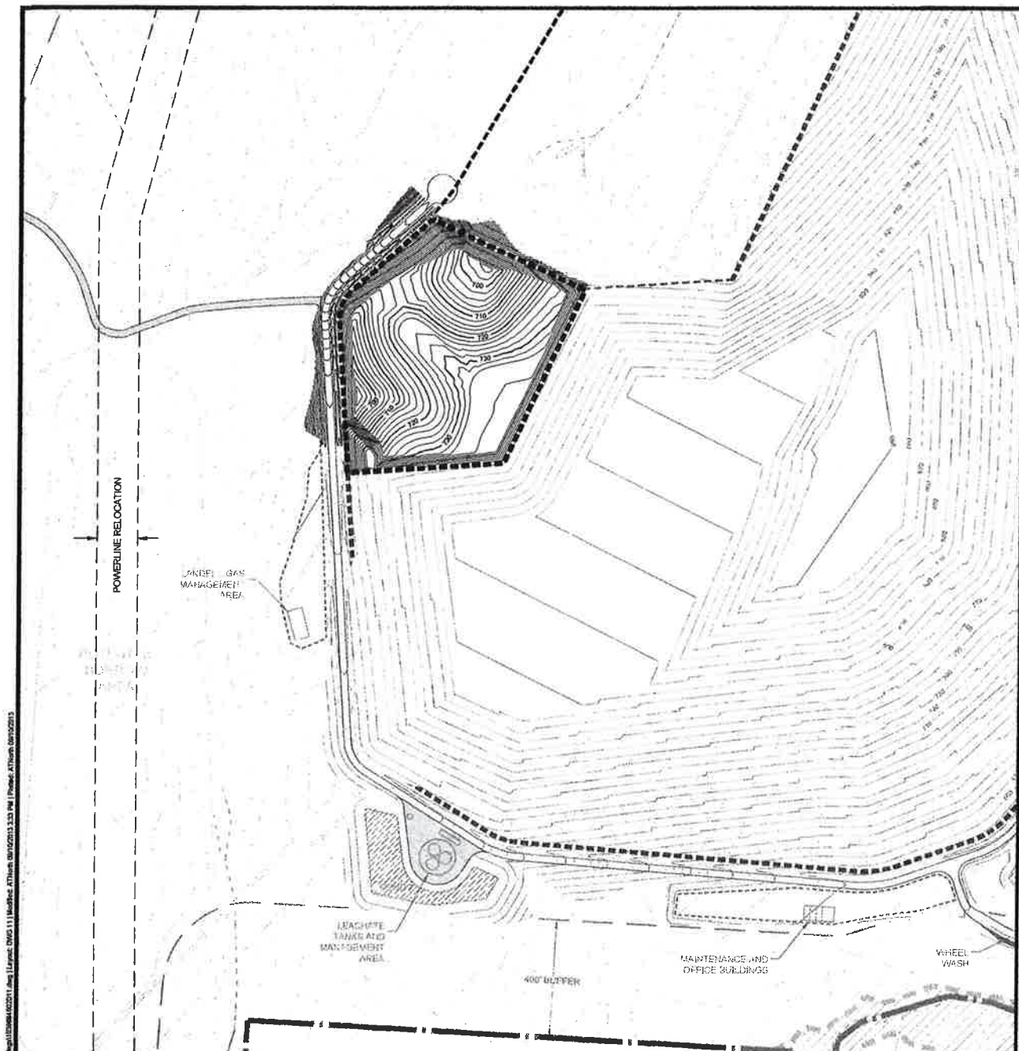
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

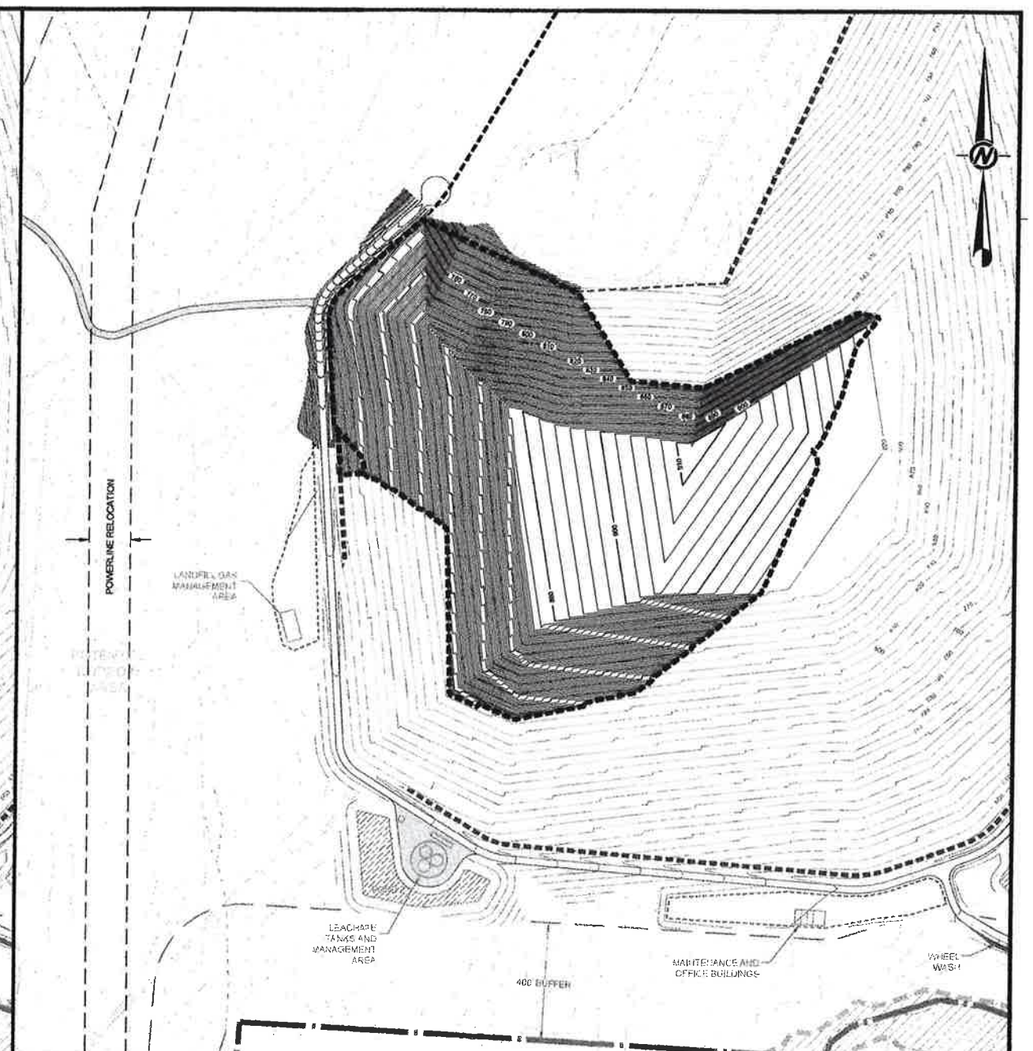
TITLE: PHASING PLAN
(7 OF 11)

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-3962

PROJECT No.		1039684602	FILE No.	1039684602D10
DESIGN	JRO	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-10
CHECK				
REVIEW				



PHASE 8 BASE GRADES



PHASE 8 FINAL GRADES

200 0 200 400
SCALE FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 900 PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. MINER 9/14/13

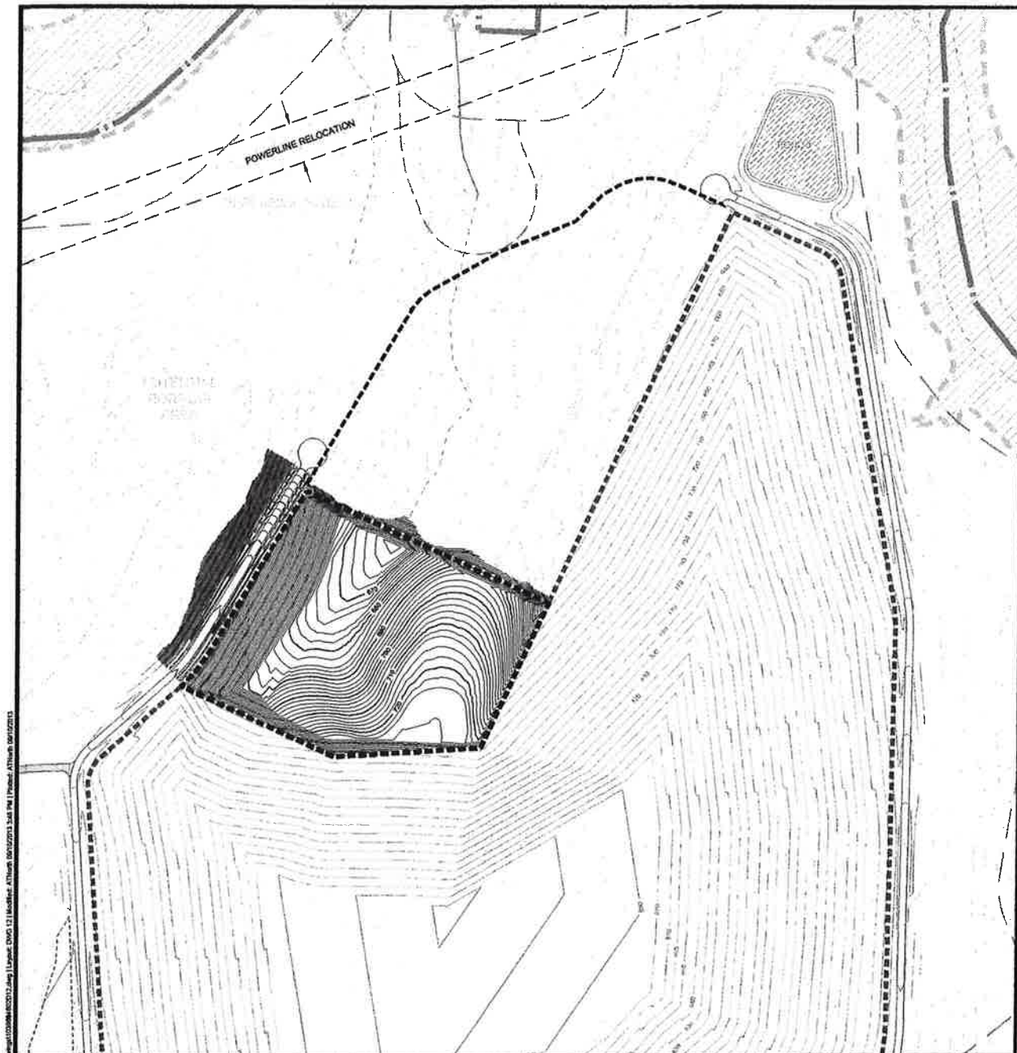
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

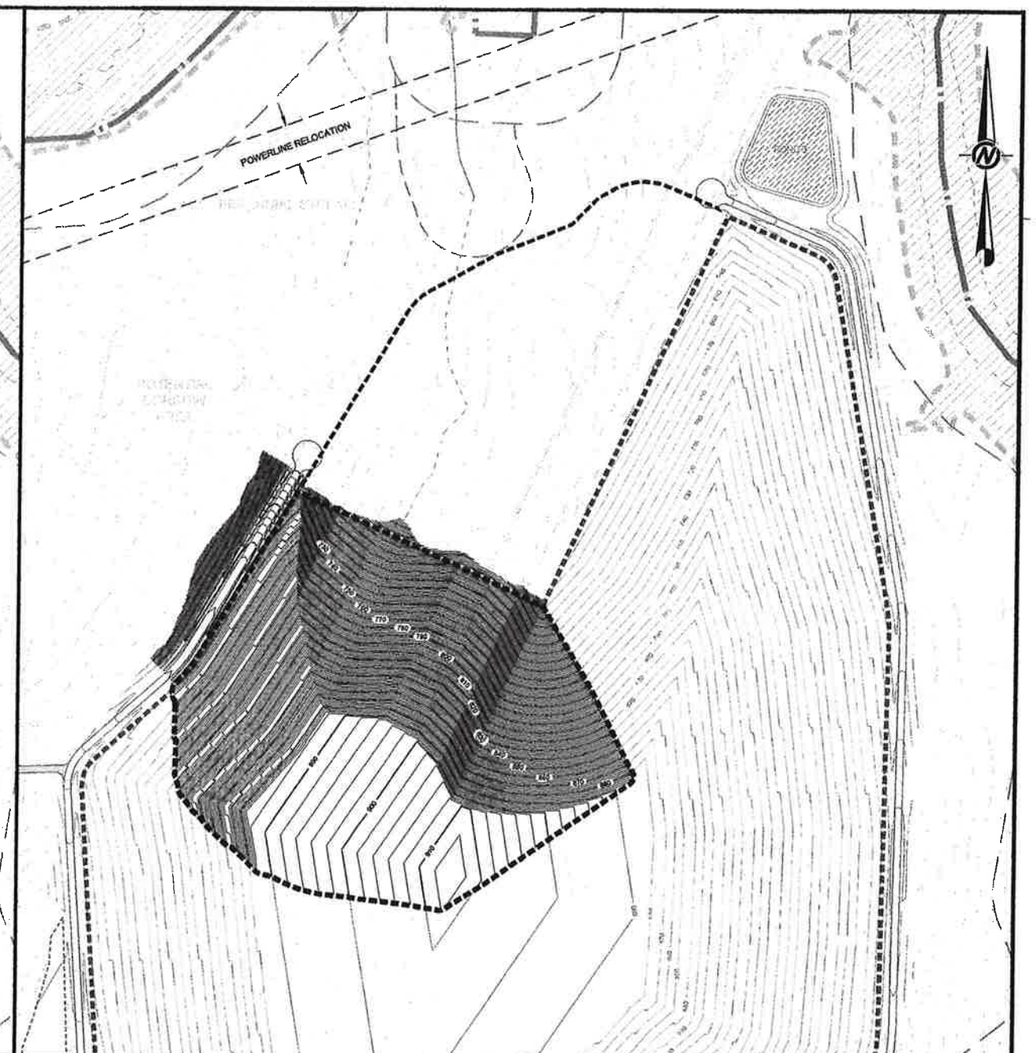
TITLE: **PHASING PLAN (8 OF 11)**

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2662

PROJECT No.		1039684602	FILE No.	1039684602D11
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-11
CHECK				
REVIEW				



PHASE 9 BASE GRADES



PHASE 9 FINAL GRADES

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 900 — PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. HINES

9/11/13

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT

RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

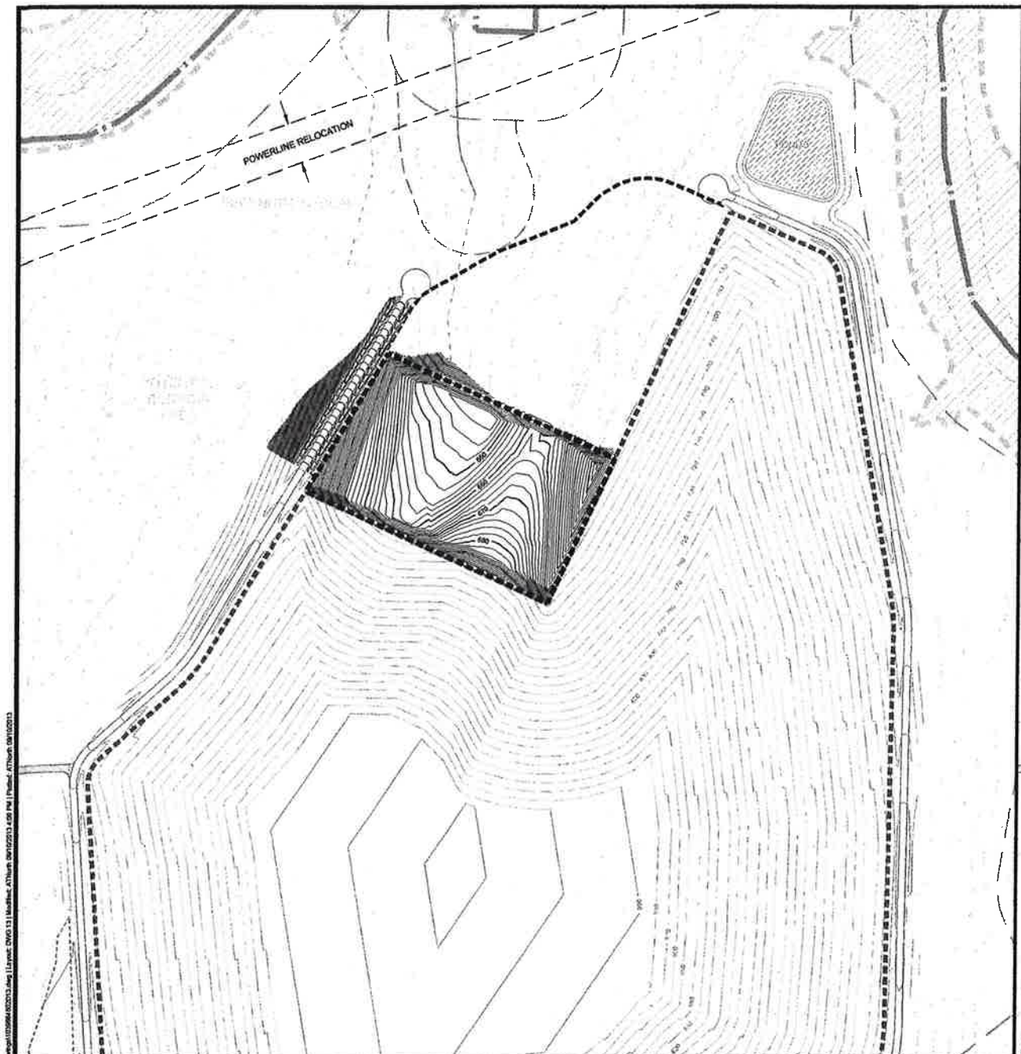
TITLE

PHASING PLAN
(9 OF 11)

Golder Associates
GOLDER ASSOCIATES NC, INC.

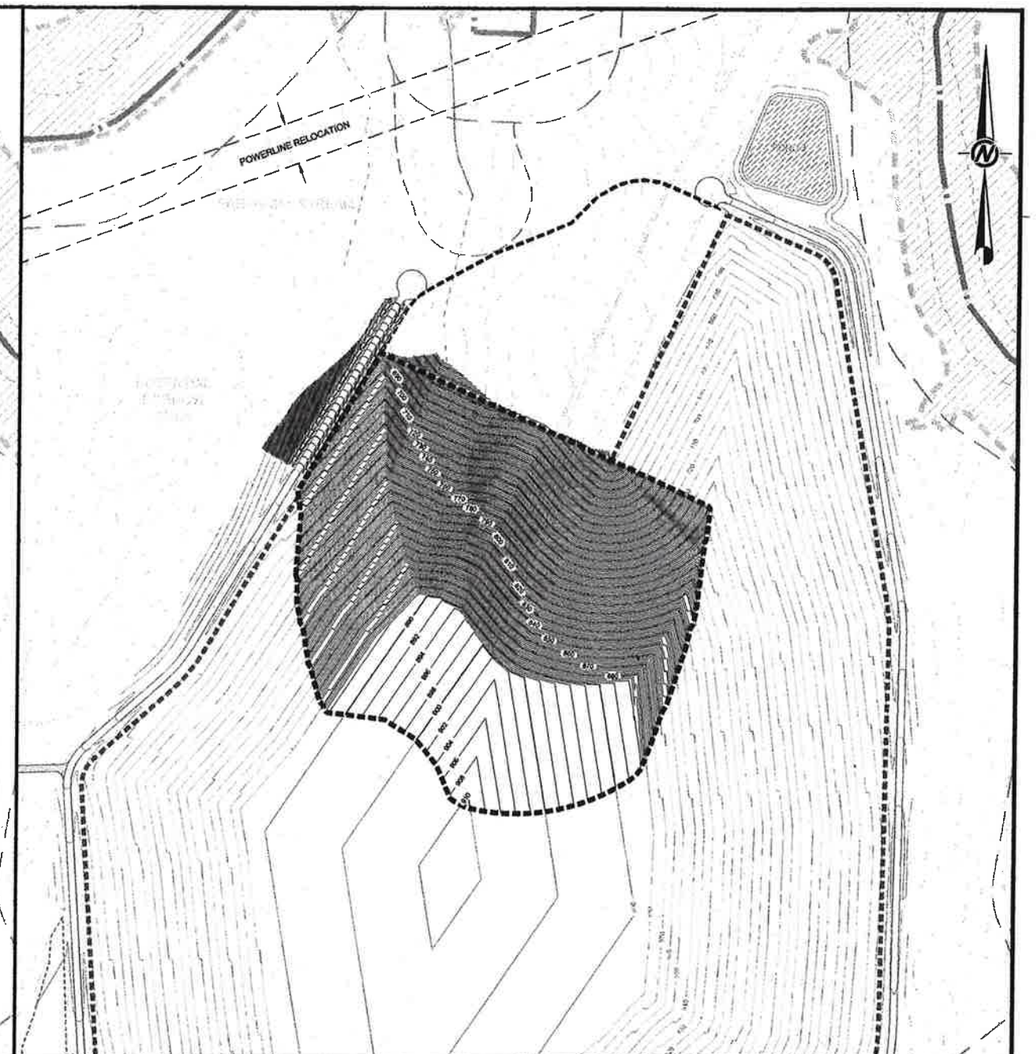
PE C-3882

PROJECT No.		1039684602	FILE No.	1039684602D12
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-12
CHECK				
REVIEW				



PHASE 10 BASE GRADES

200 0 200 400
SCALE FEET



PHASE 10 FINAL GRADES

200 0 200 400
SCALE FEET

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 200 — PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 029069 ENGINEER CHARLES D. HINES

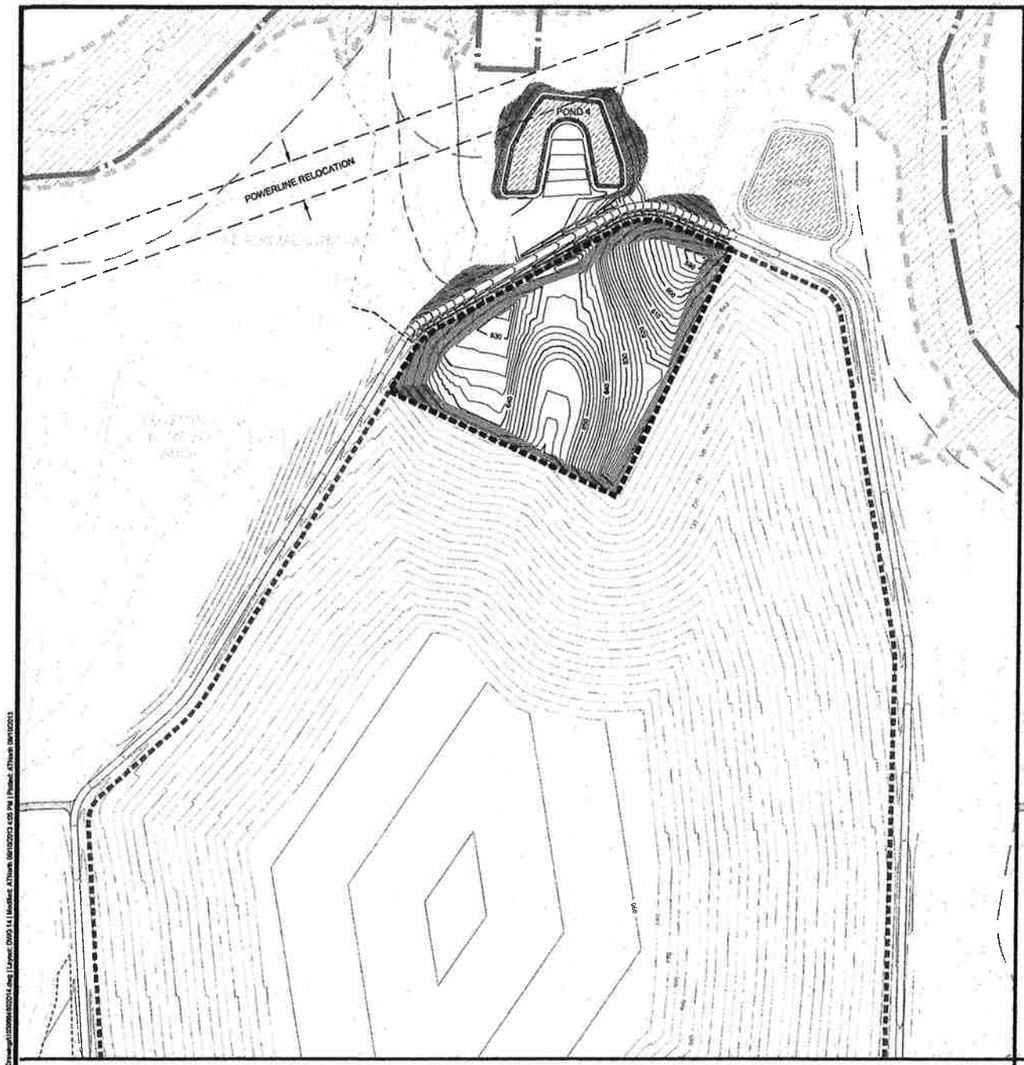
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

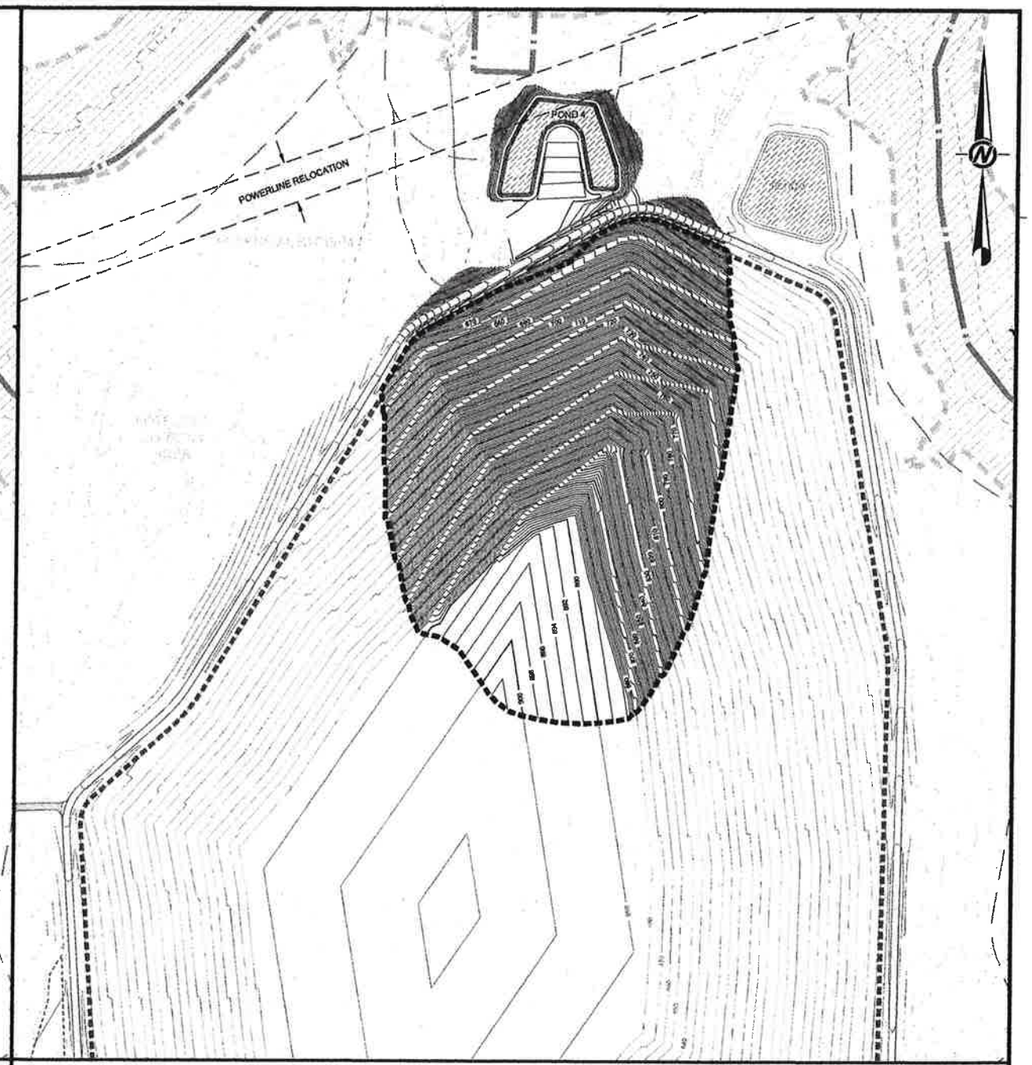
TITLE: **PHASING PLAN (10 OF 11)**

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-3882

PROJECT No.		1039684602	FILE No.	1039684602D13
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-13
CHECK				
REVIEW				



PHASE 11 BASE GRADES



PHASE 11 FINAL GRADES

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- 900 — PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SURFACE WATER FEATURE / STREAM
- 100 YEAR FLOOD PLANE
- EXISTING GRAVEL ROAD
- CONCEPTUAL LIMITS OF WASTE
- PHASE BOUNDARY

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

NORTH CAROLINA PROFESSIONAL SEAL 029069 ENGINEER CHARLES D. HINES

9/11/13

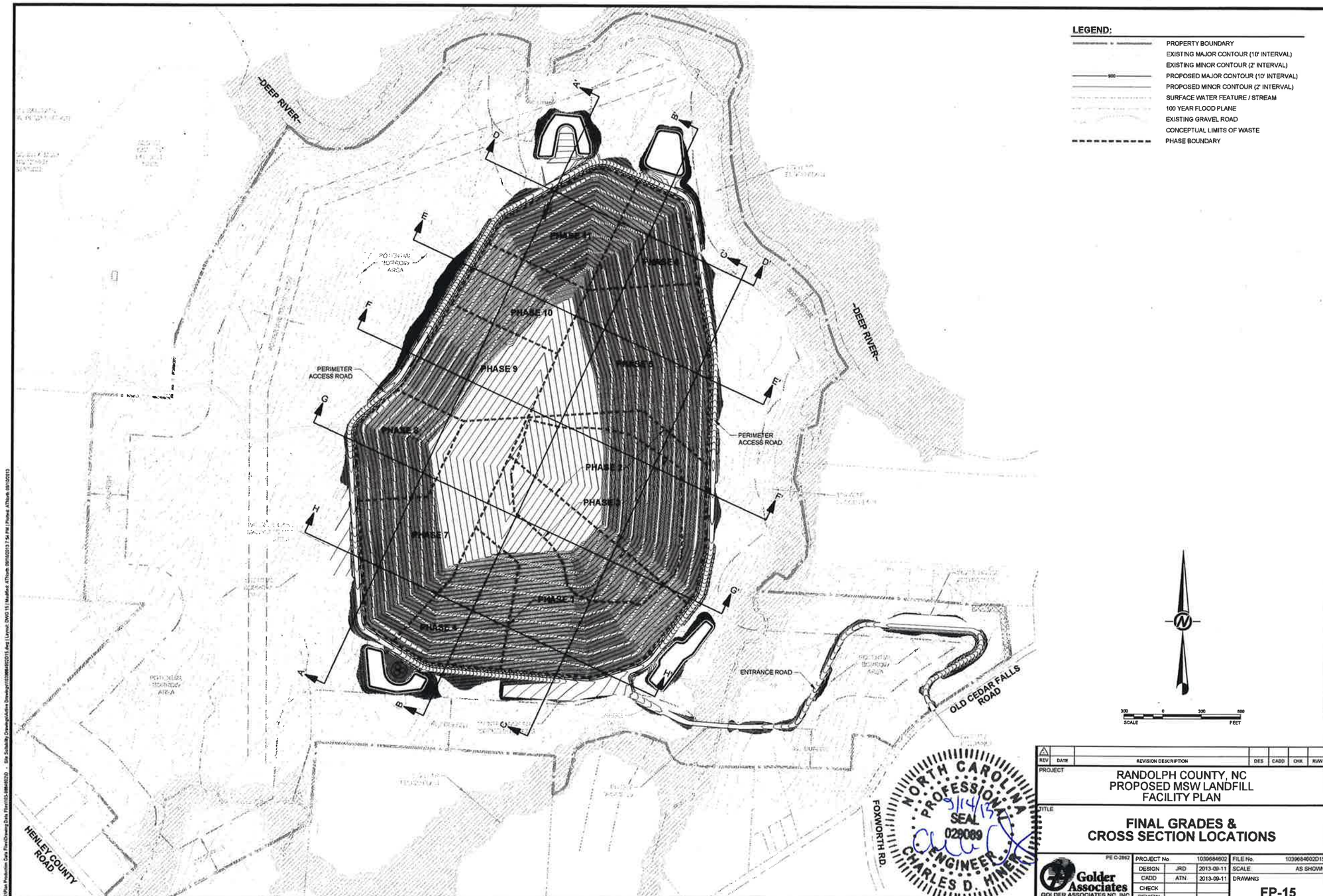
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT
RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE
PHASING PLAN
(11 OF 11)

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2962

PROJECT No.		1039684602	FILE No.	1039684602D14
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-14
CHECK				
REVIEW				



REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	R/W

PROJECT

RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

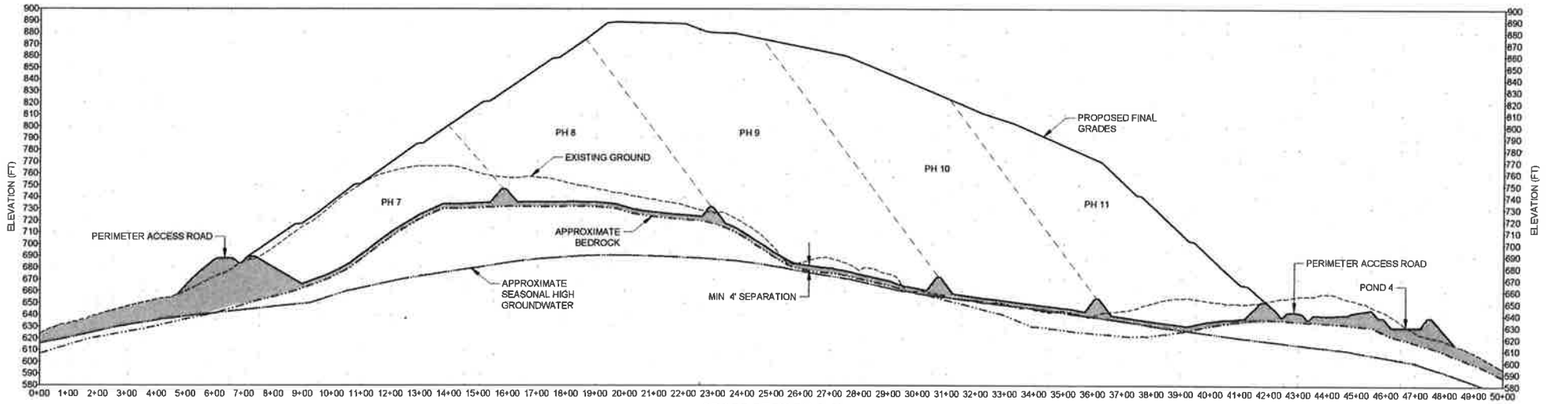
TITLE

FINAL GRADES & CROSS SECTION LOCATIONS

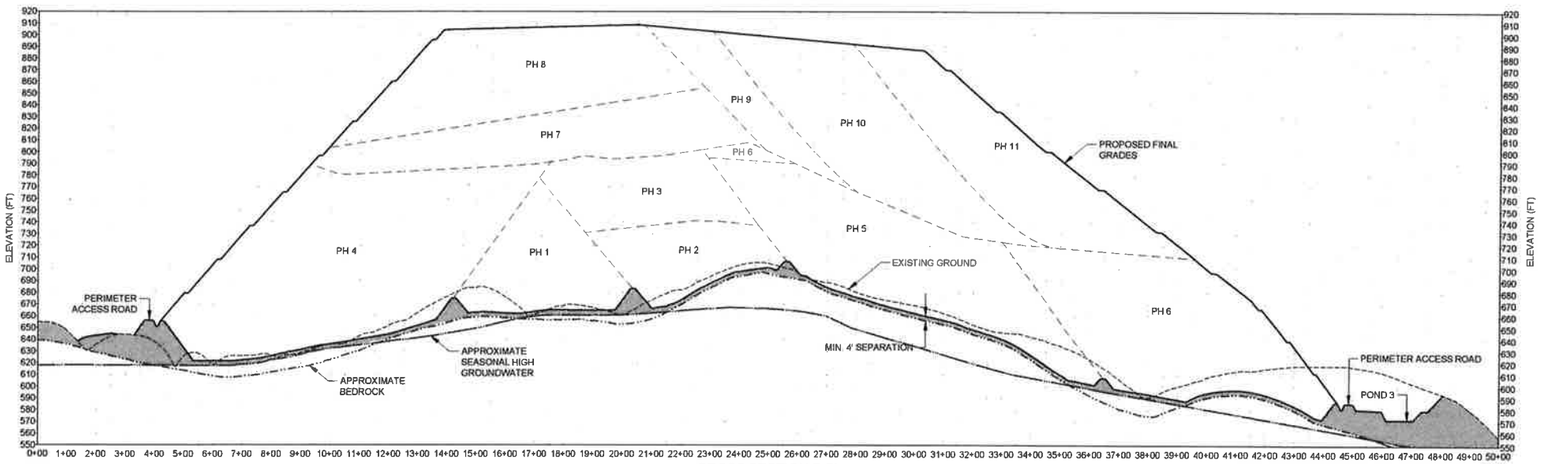
PE C-2862

Golder Associates
GOLDER ASSOCIATES NC, INC.

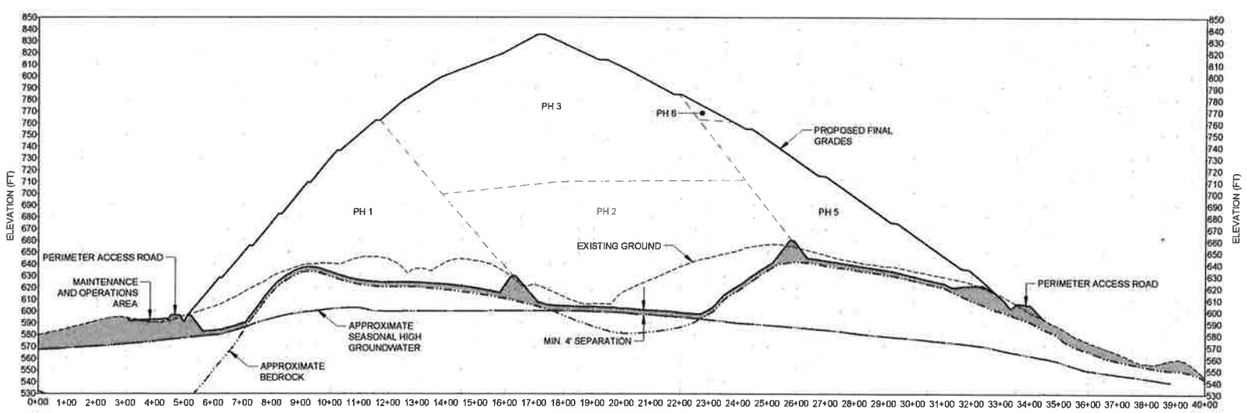
PROJECT No.		1039684602	FILE No.	1039684602D15
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	
CHECK				FP-15
REVIEW				



CROSS SECTION A-A'



CROSS SECTION B-B'



CROSS SECTION C-C'

LEGEND:

- EXISTING GROUND
- PROPOSED GRADES (BASE GRADES AND FINAL GRADES)
- PROPOSED INTERMEDIATE GRADES
- APPROXIMATE BEDROCK
- APPROXIMATE SEASONAL HIGH GROUNDWATER
- MINIMUM SEPARATION BETWEEN BEDROCK AND SEASONAL HIGH GROUNDWATER (SEE NOTE)

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

HORIZONTAL SCALE:

VERTICAL SCALE:

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT

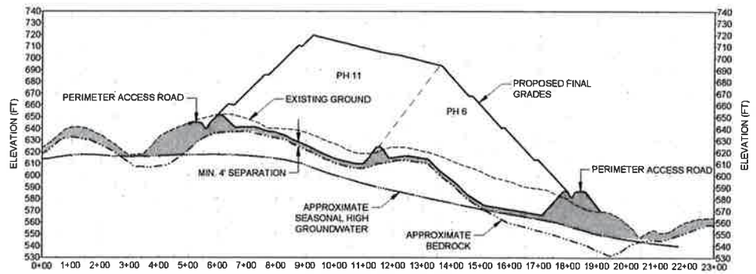
RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE

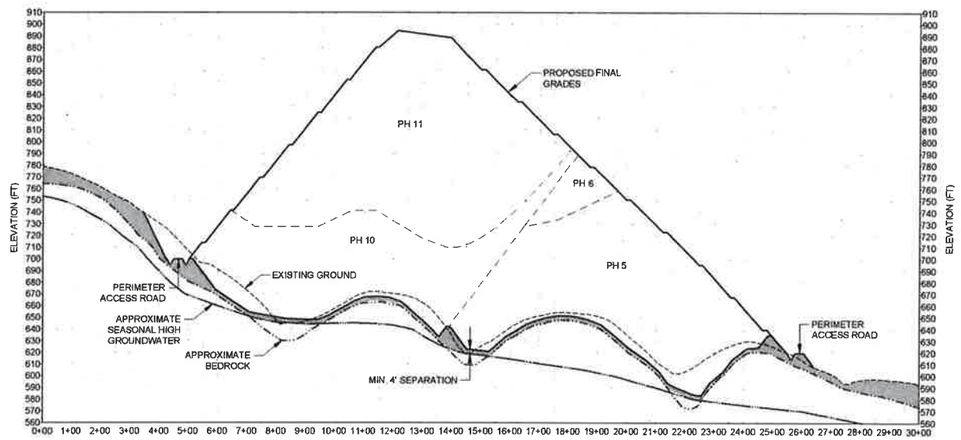
CROSS SECTIONS (1 OF 3)

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2962

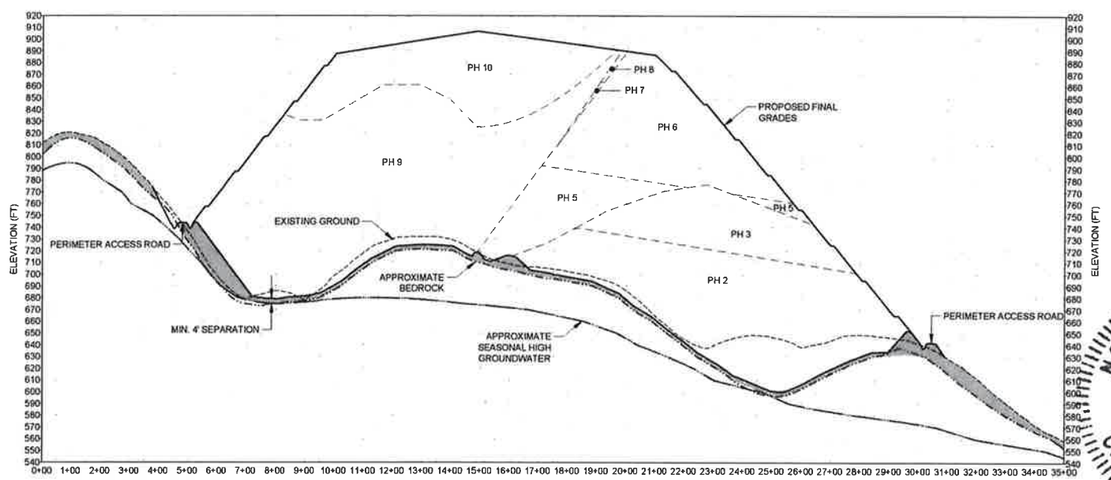
PROJECT No.		1039684602	FILE No.	1039684602D15
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-16
CHECK				
REVIEW		-		



CROSS SECTION D-D'



CROSS SECTION E-E'



CROSS SECTION F-F'

LEGEND:

- EXISTING GROUND
- PROPOSED GRADES (BASE GRADES AND FINAL GRADES)
- PROPOSED INTERMEDIATE GRADES
- APPROXIMATE BEDROCK
- APPROXIMATE SEASONAL HIGH GROUNDWATER
- MINIMUM SEPARATION BETWEEN BEDROCK AND SEASONAL HIGH GROUNDWATER. (SEE NOTE)

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

HORIZONTAL SCALE: 200 0 200 400 SCALE FEET

VERTICAL SCALE: 50 0 50 100 SCALE FEET

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. HINER 9/14/13

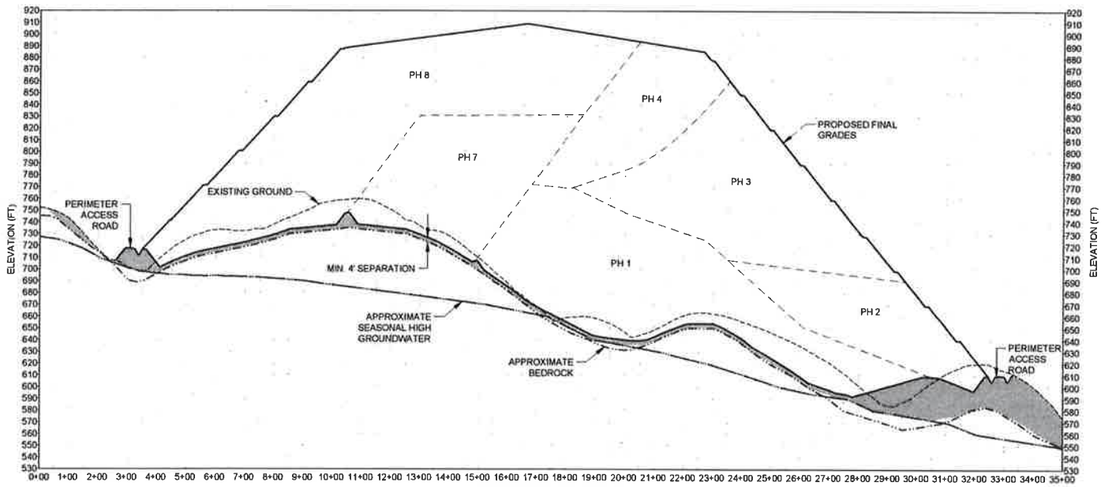
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

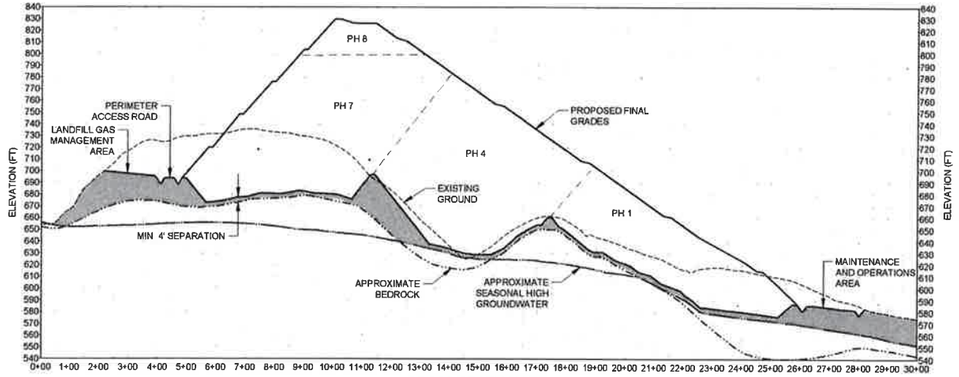
TITLE: **CROSS SECTIONS (2 OF 3)**

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2862

PROJECT No.		1039684602	FILE No.	1039684602D15
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-17
CHECK				
REVIEW				



CROSS SECTION G-G'



CROSS SECTION H-H'

LEGEND:

- EXISTING GROUND
- PROPOSED GRADES (BASE GRADES AND FINAL GRADES)
- PROPOSED INTERMEDIATE GRADES
- APPROXIMATE BEDROCK
- APPROXIMATE SEASONAL HIGH GROUNDWATER
- MINIMUM SEPARATION BETWEEN BEDROCK AND SEASONAL HIGH GROUNDWATER (SEE NOTE)

NOTE:

BASE GRADES SHOWN REPRESENT THE LOWEST POTENTIAL GRADES THAT SATISFY THE MINIMUM SEPARATION REQUIREMENTS BETWEEN BEDROCK AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATIONS BASED ON AVAILABLE DATA. BASE GRADES ARE SUBJECT TO CHANGE DURING COMPLETION OF SUBSEQUENT ENGINEERING PLANS.

HORIZONTAL SCALE: 200 0 200 400 SCALE FEET

VERTICAL SCALE: 50 0 50 100 SCALE FEET

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. HINER

9/4/13

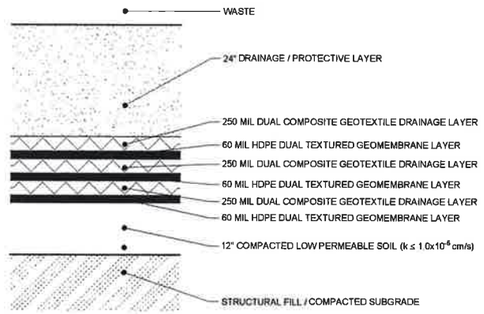
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT: RANDOLPH COUNTY, NC
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE: **CROSS SECTIONS (3 OF 3)**

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2662

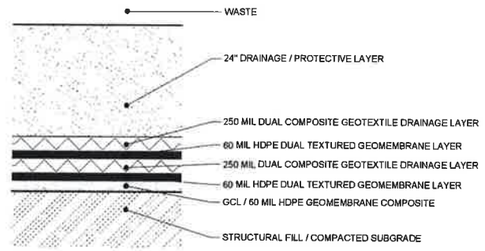
PROJECT No.		1039684602	FILE No.	1039684602D15
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-18
CHECK				
REVIEW				



BOTTOM LINER SYSTEM (OPTION 1)

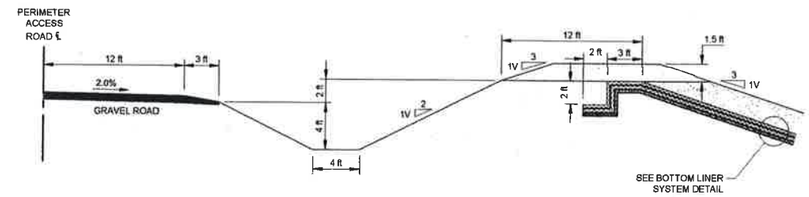
NOT TO SCALE

NOTE:
AN ADDITIONAL OPTION MAY EXIST THROUGH MODELING THAT MAY OMIT THE COMPACTED LOW PERMEABLE SOIL



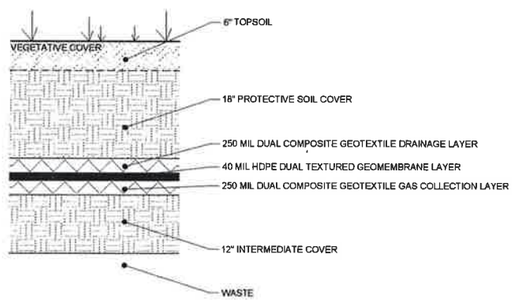
BOTTOM LINER SYSTEM (OPTION 2)

NOT TO SCALE



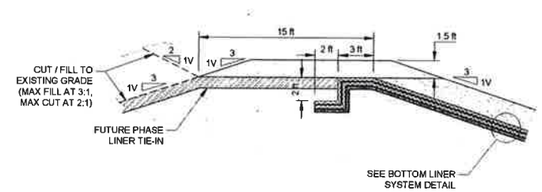
EXTERIOR PERIMETER ANCHOR TRENCH

NOT TO SCALE



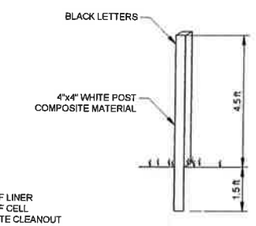
FINAL COVER SYSTEM (SIDE SLOPES = 3:1)

NOT TO SCALE



INTERIOR PERIMETER ANCHOR TRENCH

NOT TO SCALE

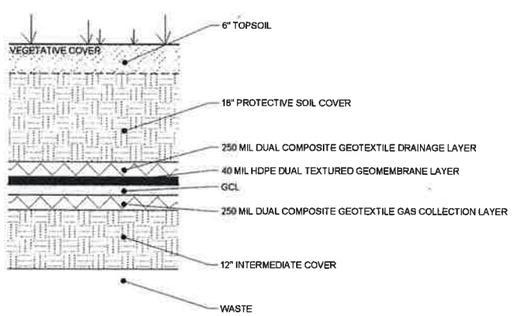


LABELS:
- EDGE OF LINER
- EDGE OF CELL
- LEACHATE CLEANOUT

NOTE:
1. OTHER STYLE MARKERS MAY BE USED AT THE DISCRETION OF THE OWNER
2. CCA TREATED WOOD POSTS MAY NOT BE USED
3. POST SPACING TO BE EVERY 100 LINEAR FEET

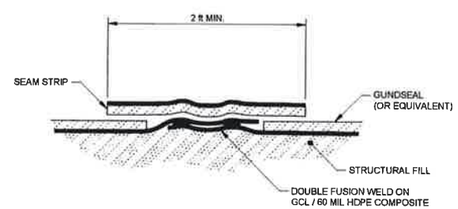
MARKER POSTS (TYPICAL)

NOT TO SCALE



FINAL COVER SYSTEM (SIDE SLOPES < 3:1)

NOT TO SCALE



GCL / HDPE COMPOSITE SEAM DETAIL

NOT TO SCALE

NORTH CAROLINA PROFESSIONAL SEAL 029089 ENGINEER CHARLES D. HINER
9/11/13

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT
RANDOLPH COUNTY
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE
LINER DETAILS
(1 OF 2)

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2947

PROJECT No.		1039684602	FILE No.	1039684602D19
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	FP-19
CHECK				
REVIEW				

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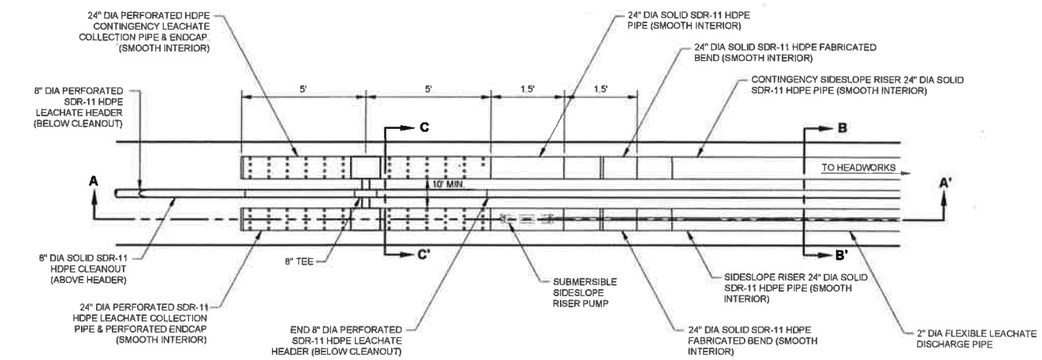
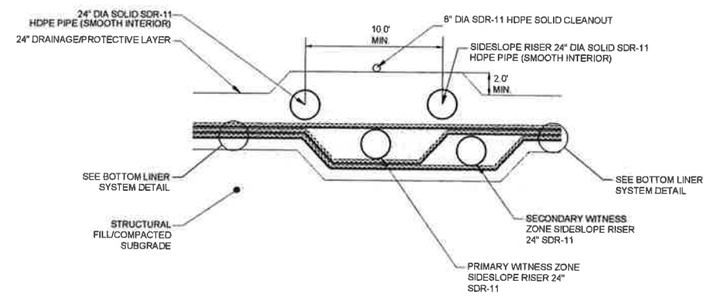


NOTE:
PRIMARY AND SECONDARY WITNESS ZONE SIDE SLOPE RISERS ARE NOT SHOWN FOR CLARITY.

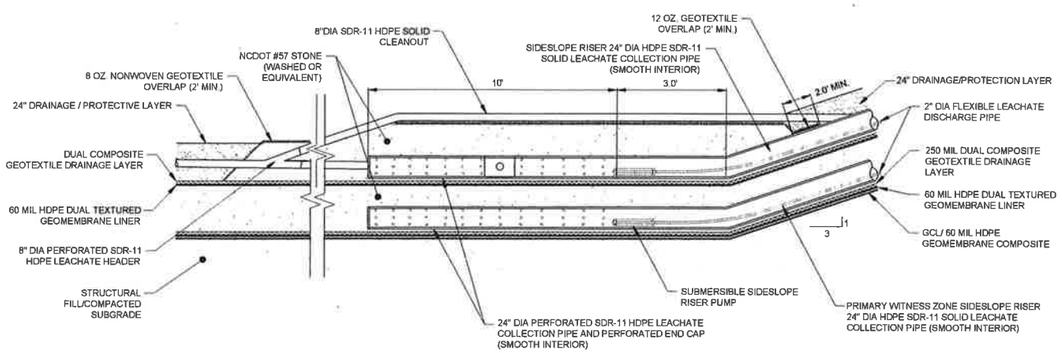
LEACHATE COLLECTION SUMP PLAN

NOT TO SCALE



LEACHATE SIDESLOPE RISER CROSS SECTION (B-B')

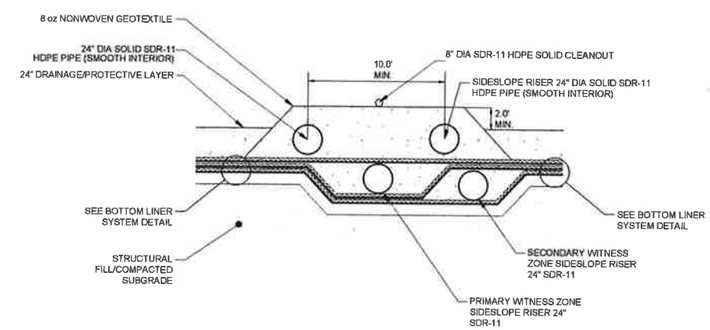
NOT TO SCALE



NOTE:
SECTION DEPICTS SIDESLOPE RISER WITH SUBMERSIBLE PUMP AND VERTICAL EXAGGERATION BETWEEN SUMPS.

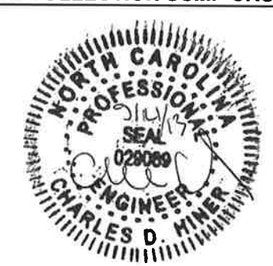
LEACHATE COLLECTION SUMP CROSS SECTION (A-A')

NOT TO SCALE



LEACHATE COLLECTION SUMP CROSS SECTION (C-C')

NOT TO SCALE



REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW

PROJECT
RANDOLPH COUNTY
PROPOSED MSW LANDFILL
FACILITY PLAN

TITLE
LINER DETAILS
(2 OF 2)

Golder Associates
GOLDER ASSOCIATES NC, INC.
PE C-2862

PROJECT No.		1039684602	FILE No.	1039684602D19
DESIGN	JRD	2013-09-11	SCALE	AS SHOWN
CADD	ATN	2013-09-11	DRAWING	
CHECK				
REVIEW				

FP-20

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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North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

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Golder Associates

Engineering Earth's Development, Preserving Earth's Integrity

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