Closure Plan

CLOSURE PLAN

Yorktown Power Station Ash Landfill

Permit #457

Dominion

Submitted To: Dominion – Yorktown Power Station
1600 Waterview Road
Yorktown, Virginia 23692

Submitted By: Golder Associates Inc.
2108 W. Laburnum Avenue
Suite 200
Richmond, VA 23227

November 2015
Revised February 2019
Revised June 2020

1239-6405

A world of capabilities delivered locally

Golder Associates

Table of Contents

Tables

Attachments

1.0 CLOSURE PURPOSE

This Closure Plan is written for the Yorktown Power Station Coal Combustion Residuals (CCRs) Landfill (landfill) at Dominion's Yorktown Power Station (Station) in York County, Virginia. The location of the site is shown on Figure 1. Dominion plans to cease coal fired electric power generation at the Yorktown Power Station in the next several years. Consequently, the solid waste landfill supporting the station will no longer receive coal ash after this time and will be subject to closure under the Virginia Solid Waste Management Regulations at 9 VAC 20-81-160 and the Federal Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule (the CCR Final Rule); 40 CFR 257. At the time of its closure, the landfill will not be at its design capacity grades. Dominion has prepared this revised Closure Plan to amend the final grading plan and closure schedule accordingly. The landfill is operated under the Virginia Department of Environmental Quality (DEQ) Solid Waste Permit No. 457 and the York County Conditional Use Permit [Resolution No. R82-221 (R2)].

1.1 General Landfill Information

Dominion has operated the landfill for disposal of CCRs produced at the Station since the early 1980's. The CCRs include fly ash, bottom ash, pyrites, and limestone injection multi-stage burner (LIMB) ash. The landfill is approximately two miles south of the Station on Wolftrap Road. The permitted area of the landfill comprises approximately 48 acres designated for placement of CCRs. The area is divided into 12 cells of the lower landfill and includes 4 phases in the vertical expansion. Cells 1 through 11 have received CCRs and are covered with intermediate cover soil. Cell 12 is currently open and active, and Phase 1 of the vertical expansion has been constructed for future expansion, but CCRs have not been placed in this area. Phases 2 – 4 of the vertical expansion have not been constructed.

Storm water runoff from the disposal units is conveyed to sedimentation ponds located along the eastern border of the landfill. Discharges from these ponds are regulated under a Virginia Pollutant Discharge Elimination System (VPDES) permit (Permit No. VA0004103) issued by DEQ.

Leachate is collected in perforated pipe and conveys leachate to a collection sump that is pumped directly to the Hampton Roads Sanitation District (HRSD) system.

1.2 Closure Plan Implementation

The goals of the closure plan design at the landfill are to provide a low maintenance cover system with appropriate stormwater runoff controls to prevent erosion and exposure of the CCRs. The maximum permitted side slope is 3H:1V, and storm water benches are located to intercept sheet flow before it can concentrate into an erosive flow. The final cover soil will have a vigorous stand of vegetation established to minimize soil erosion. A Linear Low Density Polyethylene (LLDPE) geomembrane liner serves as the infiltration barrier to prevent water percolation into the CCR.

The closure construction will take place in two phases. The first phase of closure (Phase A) will include approximately 29.6 acres and will consist of closing cells 1-3 and 7-11. The final phase (Phase B) will include the remaining active cells, cells 12 and the vertical expansion. Closure of Phase B will close the remaining 19.2 acres. Construction for Phase A is anticipated to begin during the 2nd quarter of 2016, and Phase B closure will begin shortly after the facility ceases coal use for production of electricity and the last placement of ash has occurred. The existing storm water ponds will remain active following completion of the Phase B closure to receive and attenuate storm water flows from the landfill. Discharges for these ponds will continue to be permitted under the Station's VPDES Permit.

CCRs by their nature are non-putrescible, and do not decompose or produce landfill gas. Gas migration and odor is not anticipated to be a concern post-closure. The landfill's leachate system will continue to collect leachate and discharge it directly to the HRSD sanitary system via a leachate pump station. The leachate system that was constructed with Phase 1 of the vertical expansion will be disconnected and removed.

2.0 CLOSURE TIMEFRAMES

Phase A closure, as described above, is anticipated to commence in April 2016 and conclude by November 2016. The active area of the landfill [Cell 12] will continue to receive CCRs until the Station ceases coal fired power generation. The landfill will receive its last waste in conjunction with the shutdown and decommissioning of the Station's coal fired generating units. After the station's coal units are shutdown, the remaining CCR material will be removed from the Station and placed in the landfill.

Based upon historical CCR generation at the Station, the landfill has an estimated remaining disposal life of 23 years. It is anticipated that when the final CCR is placed in the landfill, Cell 12 will not be at its design capacity, nor will CCRs be placed in the vertical expansion.

3.0 CLOSURE OF SURFACE IMPOUNDMENTS

The storm water ponds at the landfill will remain in place to continue providing storm water attenuation for the site post-closure. Discharges for these ponds will continue to be permitted under the Station's VPDES Permit.

4.0 CLOSURE OF LANDFILL UNITS

4.1 Final Cover Design

The Final Cover system to be installed is as described in the landfill's solid waste permit #457. This cover system, in accordance with 9VAC20-81-160-D.2.e, consists of, from the bottom to the top:

- 40 mil LLDPE geomembrane;
- 250 mil Double-sided geocomposite drainage layer;
- A minimum 18-inch protective cover layer of compacted soil; and,
- A minimum 6-inch layer of vegetative support soil that is subsequently seeded.

The final cover system will be placed directly on the CCR surface after it is shaped as needed to achieve design grades. The Design Plans included in Attachment 2 show the final cover system. Technical Specifications and the Construction Quality Assurance (CQA) plan for the closure system components are in the landfill permit.

The final cover system design as proposed will also conform with requirements in the CCR rule at 40 CFR 257.102(d)(3).

4.1.1 Barrier Layer

The barrier layer is a 40-mil, Linear Low Density textured polyethylene geomembrane (LLDPE). Section 02597 of the Technical Specifications describes the material requirements, installation and seaming procedures, and CQA documentation to be recorded during construction of the barrier layer.

4.1.2 Geocomposite Drainage Layer

To provide drainage for the cover soils, a 250-mil geocomposite drainage layer will be placed on top of the geomembrane. The geonet core will be faced on both sides with a nonwoven geotextile to provide filtration and prevent the intrusion of soil into the core. At the toe of slope, the geocomposite will discharge directly into the perimeter drainage channel. Intermediate drains for the geocomposite are proposed to limit the drainage length to 350 feet to prevent saturation of the cover soils. Calculations for the adequacy of the geocomposite for the reduced slope are presented in Attachment 6.

4.1.3 Protective Cover Layer and Vegetative Support Layer

Immediately above the geocomposite drainage layer, a 24-inch thick layer of soil will be placed to serve as the Protective Cover and Vegetative Support layer (18-inches of protective cover and 6-inches of vegetative support soil). The soil will be imported into the site from an offsite borrow source. Acceptable soil types for this layer are: GM, GC, SM, SC, ML, or MH (ASTM D2487) as per the Technical Specifications Sections 02200 and 02235. The maximum expected frost depth for the York County, Virginia area is 18 inches; therefore, the thickness of the soil layer is adequate to protect against freeze/thaw effects.

The Revised Universal Soil Loss Equation (RUSLE) calculations performed for the revised grading demonstrate that the anticipated soil loss is less than 0.2 tons/acre/year. This calculation is presented in Attachment 4.

The final seeding mixture will be applied in accordance with Section 02936 of the Technical Specifications immediately following the placement of the vegetative support layer soil to the design grades. The soil will be seeded with the mix as presented in the Technical Specifications, or with a site-specific mix based on soil testing. While vegetation is being established, soil stabilization matting or other approved erosion control materials will be used to protect the bare soil surface and foster vegetative growth.

4.2 Final Slopes

The maximum final slope for the landfill is 3H:1V (18.4%). The minimum final slope per the landfill's permit is 2%. Storm water diversion berms are located at approximately the midpoint of the crown and at the grade break above the steeper side slopes to intercept and collect sheet flow runoff before it concentrates into erosive concentrated flow.

Calculations from the permit design (Golder, 2008) show that the 3:1 final slope is stable under static conditions. A seismic analysis was not performed as the landfill is not located in a seismic impact zone.

4.3 Run-Off Controls

Sheet flow from the final cover surface will be collected in a perimeter berm and diverted into downchutes that lead into the perimeter channels. These channels are formed of soil and are sized to convey the runoff from at least the 25-year, 24-hour storm event. The storm water channels are lined with a non-biodegradable erosion control matting to resist erosion and enhance vegetative growth. The average longitudinal slope of the storm water diversion channels is 1.0%.

The perimeter channels drain to the existing stormwater ponds for attenuation and eventual discharge through the VPDES-permitted outfalls 003 and 004. Due to the revised grading plan, a new set of calculations for the stormwater control system and the stormwater ponds are included as Attachment 6 to this Plan. The net effect of the revised landfill grading an overall reduction in the rate of peak discharge resulting from the flatter top slopes having lower surface water flow velocities and a longer time of concentration.

4.4 Settlement, Subsidence and Displacement

It is anticipated that the great majority of foundation settlement to be experienced by the landfill has already occurred, as the landfill has been in operation for approximately 30 years. When CCRs are placed and compacted in a bulk fill, such as a landfill, the material consolidates very rapidly and does not experience further secondary consolidation. Once CCRs are placed, secondary consolidation is negligible. In addition, the landfill is being closed at less than the original design height, resulting in lower than anticipated foundation loading.

Calculations from the permit design (Golder, 2008) show the post-closure settlement of the landfill is anticipated to have a minimal impact on the ability of the cover to prevent infiltration. Localized settlement of the final cover is not anticipated to occur as the CCRs do not decompose and leave voids. Global settlement of the landfill, however small, will cause the liner material to shorten, rather than stretch. Small compressive forces would not affect the integrity or performance of the liner.

5.0 CLOSURE OF STORAGE AND/OR TREATMENT UNITS

The Yorktown Power Station does not operate a waste treatment unit at the landfill.

6.0 SCHEDULE FOR CLOSURE

The landfill will receive its last waste immediately following the shutdown of the Station's coal fired generating units. After shutdown, remaining CCRs will be removed from the Station and placed in the landfill. Table 1 outlines the anticipated sequence of closure schedule activities.

TABLE 1
CLOSURE SCHEDULE

Activity	Tentative Date
Phase A closure construction complete	November 2017
Yorktown Station cease coal operations	June 2019
Final CCR placed in landfill	July 2019
Commence Phase B closure construction	July 2019
Phase B closure construction complete	May 2020
Certification of closure	July 2020

7.0 CLOSURE IMPLEMENTATION

7.1 Closure Posting

One sign will be posted at the site entrance to the landfill notifying all persons of the final closure of the landfill and prohibition against further receipt of CCRs. Unauthorized access to the site will be controlled by fencing (as needed) and lockable gates across the access roads.

7.2 Notification

York County, Virginia will be notified upon the completion of closure of the landfill. The closure notification will also be sent to the DEQ, posted on a publicly accessible internet site, and placed in the facility's operating record as outlined in the Final CCR Rule.

The survey plat will be prepared showing the final closure grades and the locations of the groundwater monitoring wells. The survey plat and deed will have the following notification language:

> **This property has been used for the management and disposal of CCRs. Any future use of the site shall not disturb the integrity of the final cover, liners, or any other components of the containment systems, or the function of the monitoring system unless necessary to comply with the Virginia Solid Waste Management Regulations and the Final CCR Rule or approved by the Department of Environmental Quality.**

Within 30 days of recording a notation on the deed to the property, a notification indicating the notation has been recorded will sent to DEQ, posted on a publicly accessible internet site, and placed in the facility's operating record.

7.3 Certification

Upon completion of closure construction, a certification statement, signed by a licensed professional engineer, will be submitted to the DEQ along with the results of the CQA plan. The certification statement shall read as follows:

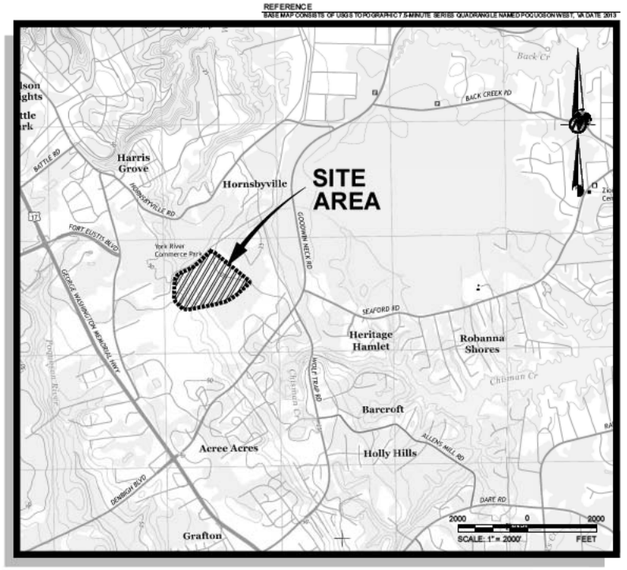
> **I certify that closure has been completed in accordance with the Closure Plan dated [DATE] for solid waste permit number 457 issued to Dominion, with the exception of the following discrepancies: [To Be Determined]**
>
> **In addition, a sign(s) was (were) posted on [DATE] at the landfill entrance notifying all persons of the closing [and state other notification procedures if applicable] and barriers [indicate type] were installed at [location] to prevent new waste from being deposited.**
>
> **A survey plat prepared by [NAME] was submitted to York County, Virginia on [DATE]. A copy of the survey plat is included with this certification.**
>
> **A notation was recorded on the deed to the landfill property on [DATE]. A copy of the revised deed is attached to this certification.**
>
> **[Signature, date and stamp of Professional Engineer]**

8.0 CLOSURE COST ESTIMATE

The estimated cost for closure of the 48-acre landfill is $8,600,000. Dominion will hire a construction contractor to provide closure construction services. Calculations for the closure cost estimate are included in Attachment 8.

ATTACHMENT 2
CLOSURE DESIGN PLANS AND CALCULATIONS

DOMINION
YORKTOWN POWER STATION
LANDFILL CLOSURE PLAN
SITE PLAN AMENDMENT
SITE PLAN #201500238
YORK COUNTY, VIRGINIA
NELSON DISTRICT
OCTOBER, 2018



SITE LOCATION MAP

DRAWING INDEX

DRAWING NUMBER	DRAWING TITLE	REVISION NUMBER
* 1	COVER SHEET	2
* 2	USE PERMIT UP 739-08 CONDITIONS	1
* 3	PROPERTY INFORMATION	1
* 4	NATURAL RESOURCES INVENTORY	1
* 5	EXISTING CONDITIONS	2
* 5A	PHASE B VERTICAL EXPANSION DEMOLITION	2
6	PHASE A LINER GRADES	1
7	PHASE A FINISH GRADES	1
8	PHASE A CROSS SECTIONS	1
9	PHASE A STORMWATER MANAGEMENT PLAN	1
10	PHASE A STAGE 1 EROSION AND SEDIMENT CONTROL PLAN	1
11	PHASE A STAGE 2 EROSION AND SEDIMENT CONTROL PLAN	1
* 12	PHASE B LINER GRADES	2
* 13	PHASE B FINISH GRADES	2
* 14	PHASE B CROSS SECTIONS	2
* 15	PHASE B FINAL STORMWATER MANAGEMENT PLAN	2
* 16	PHASE B STAGE 1 EROSION AND SEDIMENT CONTROL PLAN	2
* 17	PHASE B STAGE 2 EROSION AND SEDIMENT CONTROL PLAN	2
* 18	STORMWATER DETAILS	2
* 19	LINER DETAILS	1
* 20	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS	1
* 21	STORMWATER CALCULATIONS	1

* INCLUDED IN THIS PLAN SET

PROPERTY INFORMATION

OWNER AND DEVELOPER:	VIRGINIA ELECTRIC & POWER CO. 1600 WATERVIEW ROAD YORKTOWN, VIRGINIA 23960 (757) 898-2771 WARREN DEAL warren.deal@dominionenergy.com
ENGINEER:	GOLDER ASSOCIATES 2108 WEST LABURNUM AVENUE, SUITE 200 RICHMOND, VIRGINIA 23227 (804) 358-7900 DANIEL McGRATH, P.E. Daniel_McGrath@golder.com
SITE ADDRESS:	2347 WOLF TRAP ROAD YORKTOWN, VIRGINIA 23960
TAX MAP & PARCEL NUMBER:	24 - 00 - 00 - 204C
GPIN NUMBER:	R08b - 3188 - 2814
ZONING:	IG
USE PERMIT:	UP 739 - 08 04/15/08 (SEE DRAWING 2)
PROPERTY USE:	SOLID WASTE DISPOSAL FACILITY
DEVELOPMENT DISTRICT:	YORK COUNTY NELSON MAGISTERIAL DISTRICT
DISTURBED AREA:	31.81 AC. (PHASE A) + 20.88 AC. (PHASE B) = 52.69 ACRES TOTAL
PROJECT LOCATION:	LATITUDE: 37° 11' 15" N LONGITUDE: 76° 28' 18" W
RECEIVING WATERS:	CB21 POQUOSON RIVER - LOWER CHESAPEAKE BAY
TOPOGRAPHIC INFORMATION:	PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VA. DATED 2013, AND COMPILED OF SURVEYS AND FIELD WORK DATED JULY,2018.

PREPARED BY:

GOLDER

PREPARED FOR:

Dominion

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com
GOLDER

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
COVER SHEET

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
2

1 of 22

DRAWING
1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Proj\ Production Data Files\Drawing Data Files\123-96405\H - Phase B Permit Amendment\Active Drawings\123940501.dwg

BE IT STILL FURTHER RESOLVED THAT SUCH USE PERMIT BE GRANTED FOR THE STORAGE, HANDLING, AND TRANSPORT OF COAL AND THE STORAGE, HANDLING, TRANSPORT AND/OR DISPOSAL OF FLY ASH, BOTTOM ASH AND OTHER PARTICULATE BYPRODUCTS ASSOCIATED WITH THE BURNING OF SUCH COAL, AT VEPCO'S YORKTOWN UNITS 1 AND 2, SUBJECT TO THE FOLLOWING CONDITIONS, TO WIT:

A. ASH HANDLING AND PLACEMENT

A1. SINCE THE CONTROL OF FUGITIVE DUST AND EMISSIONS FROM OTHER THAN HERMETICALLY SEALED TRANSPORT VEHICLES IS DEPENDENT ON THE MOISTURE CONTENT OF THE ASH AS IT IS LOADED AND TRANSPORTED, NO ASH SHALL BE LOADED OR TRANSPORTED IF ITS MOISTURE CONTENT IS BELOW TEN PERCENT (10%) OR ABOVE THIRTY-FIVE PERCENT (35%). IF HERMETICALLY SEALED VEHICLES ARE USED TO TRANSPORT ASH OFF SITE FOR MARKETING PURPOSES, THE MOISTURE CONTENTS MENTIONED HEREIN SHALL NOT APPLY.

A2. MOISTURE CONTENT OF THE ASH AS LOADED IN THE VEHICLE SHALL BE SUPPLIED AND CONTROLLED BY AUTOMATIC EQUIPMENT APPROVED BY THE COUNTY OF YORK. THE LOADING OPERATOR SHALL BE RESPONSIBLE FOR VISUAL INSPECTION OF THE MATERIAL DURING LOADING OPERATIONS TO ENSURE THAT THE ASH IS AT OR NEAR OPTIMUM MOISTURE CONTENT AS IT IS BEING LOADED INTO THE VEHICLE. THE LOADING OPERATOR SHALL ALSO BE RESPONSIBLE FOR ENSURING THAT THE SPRAY CURTAIN, AUTOMATIC DUST CONTROL AIR SYSTEM AND GARAGE DOORS ARE FUNCTIONING AS DESIGNED AND INTENDED.

A3. VEPCO SHALL ENSURE THAT THE DRUM UTILIZED TO MIX THE FLY ASH WITH WATER TO PROVIDE A CONTROLLED MOISTURE CONTENT WILL BE ADEQUATE TO MEET THE NEEDS OF THE POWER PLANT AT ITS MAXIMUM GENERATING CAPACITY.

A4. PERIODIC TESTS SHALL BE CONDUCTED ON THE FLY ASH AS IT IS MIXED WITH WATER IN THE LOADING SILO TO ENSURE OPTIMUM MOISTURE CONTENT PRIOR TO THE LOADING OF ASH TRANSPORT VEHICLES. THIS SHALL BE CONDUCTED APPROXIMATELY ONCE PER HOUR OR AS FREQUENTLY AS REQUIRED TO ENSURE THAT ASH REACHES THE STRUCTURAL FILL IN OPTIMUM MOISTURE CONDITION. SUCH TESTS MAY INCLUDE VISUAL INSPECTION BY THE ON-SITE OPERATOR OF THE ASH LOADING EQUIPMENT. LABORATORY TESTING OF THE ASH SHALL BE ACCOMPLISHED AT LEAST WEEKLY UTILIZING ASTM PROCEDURE D2216-71.

A5. THE APPLICANT SHALL ENSURE AT LEAST A MINIMUM OF THREE DAYS STORAGE CAPABILITY IN THE SILOS AT FULL PLANT OPERATING CAPACITY. DUST CONTROL MEASURES SHALL BE IMPLEMENTED IN SUCH STORAGE AREAS TO PREVENT FUGITIVE DUST DISCHARGES.

A6. SINCE THE APPLICANT HAS CHOSEN TO PROPOSE A SERIES OF PERFORMANCE SPECIFICATIONS, VEPCO SHALL PROVIDE A FULL TIME QUALITY CONTROL ENGINEERING TECHNICIAN, OR EQUIVALENT TRAINED PERSONNEL, WHO SHALL BE ASSIGNED TO THE TESTING AND MONITORING OF ALL ASH PARAMETERS WHICH WILL CONTRIBUTE TO THE PROPER PLACEMENT AND SUCCESSFUL FUNCTIONING OF THE ASH STRUCTURAL FILL AS APPROVED BY THE BOARD OF SUPERVISORS.

THE TECHNICIAN SHALL HAVE AVAILABLE TO HIM AT ALL TIMES A SAND CONE TEST APPARATUS AND A NUCLEAR DENSOMETER TO TEST FOR COMPACTION OF THE ASH. SUCH SAND CONE TEST SHALL BE PERFORMED IN ACCORD WITH ASTM D1556-64 AND SHALL PERIODICALLY VERIFY THE NUCLEAR DENSOMETER APPARATUS ON A TEST STRIP UTILIZING THIS METHOD. THE NUCLEAR DENSOMETER SHALL BE USED ON EACH LIFT PLACED AT THE FILL SITE AND SHALL BE SO USED AT LEAST TWICE PER ACRE, OR PART THEREOF, OF FILL AREA.

THE TECHNICIAN SHALL BE RESPONSIBLE AND SHALL HAVE THE AUTHORITY TO STOP OR MODIFY THE PLACEMENT OF ASH AS REQUIRED TO ENSURE THE OPTIMUM COMPACTION AND DENSITY OF THE ASH.

A7. AN ASH TESTING PROGRAM FOR BOTH FLY AND BOTTOM ASH SHALL BE INSTITUTED AS PROPOSED IN THE MARCH 17, 1982 LETTER FROM GAI CONSULTANTS TO VEPCO, AND SHALL INCLUDE MORE FREQUENT TESTS AS REQUIRED AT SUCH TIMES AS ANY PARAMETER MIGHT BE EXPECTED TO CHANGE.

SUCH A TESTING PROGRAM SHALL INCLUDE BUT NOT BE LIMITED TO:

TEST METHOD	FLY ASH	BOTTOM ASH
VISUAL CLASSIFICATION	X	
MOISTURE CONTENT ASTM D2216-71	X	
GRAIN SIZE DISTRIBUTION ASTM D422-63	X	
SPECIFIC GRAVITY ASTM D854-58	X	
PROCTOR DENSITY ASTM D698-78	X	
PERMEABILITY ASTM D2434-68	X	X
SHEAR STRENGTH ASTM D3080-72	X	
RESISTIVITY	X	
LEACHATE ANALYSIS EPA EXTRACTION	X	X

OTHER FIELD TESTS SHALL BE CONDUCTED AS SPECIFIED HEREIN.

A8. NO FLY ASH OR BOTTOM ASH RESULTING FROM THE COMBUSTION OF COAL SHALL BE STOCKPILED AT THE PLANT EXCEPT IN THE SILO(S). TEMPORARY STOCKPILING OF THE FLY ASH SHALL BE ALLOWED AT THE DISPOSAL SITE WHEN NECESSARY TO ACHIEVE REQUIRED COMPACTION LEVELS, OR AT THE PLANT SITE DURING PERIODS OF EMERGENCY REPAIR. ANY SUCH EMERGENCY REPAIR SHALL BE REPORTED TO THE COUNTY ADMINISTRATOR OR HIS DESIGNEE AND SHALL BE REPORTED PURSUANT TO CONDITION D2 IF THAT CONDITION IS OTHERWISE APPLICABLE.

A9. TRANSPORT, HANDLING AND DISPOSAL OF FLY ASH, BOTTOM ASH, AND OTHER PARTICULATE BY- PRODUCTS RESULTING FROM THE COMBUSTION OF COAL SHALL BE CONDUCTED ONLY DURING THE DAYLIGHT HOURS, MONDAY THROUGH FRIDAY, EXCEPT WHEN SUCH TRANSPORT, HANDLING AND DISPOSAL IS REQUIRED AT OTHER TIMES DUE TO ANY EMERGENCY OR UNUSUAL CIRCUMSTANCE. ANY SUCH EMERGENCY OR UNUSUAL CIRCUMSTANCE SHALL BE REPORTED PURSUANT TO CONDITION D2 IF THAT CONDITION IS OTHERWISE APPLICABLE.

A10. ALL AREAS ADJACENT TO THE ASH HANDLING SILOS SHALL BE PAVED WITH A PERMANENT DUSTLESS SURFACE SUCH AS BITUMINOUS OR PORTLAND CEMENT CONCRETE.

A11. AT LEAST TWO OPERABLE WATER TRUCKS SHALL BE AVAILABLE TO THE YORKTOWN POWER STATION FACILITY, INCLUDING THE ASH STRUCTURAL FILL, AT ALL TIMES. THIS WILL ENSURE THAT ONE WATER TRUCK IS WAITING AT THE PLANT SITE IN RESERVE SHOULD A MALFUNCTION OCCUR WITH RESPECT TO THE PRIMARY WATERING VEHICLE.

A12. ALL PAVED AREAS USED IN THE ASH AND/OR COAL HANDLING AND TRANSPORT OPERATION SHALL BE WASHED DOWN AT LEAST TWICE PER DAY, AND AT SUCH OTHER TIMES AS CONDITIONS WARRANT, DURING THOSE DAYS WHEN ASH AND/OR COAL ARE BEING HANDLED TO MINIMIZE FUGITIVE DUST EMISSIONS ON THOSE DAYS WHEN SUFFICIENT PRECIPITATION DOES NOT OCCUR.

A13. THE APPLICANT SHALL BE PRECLUDED FROM USING PUBLIC ROADS FOR THE TRANSPORT OF FLY ASH, BOTTOM ASH OR OTHER RESIDUES FROM THE PLANT SITE TO THE STRUCTURAL FILL EXCEPT FOR NECESSARY CROSSINGS OF SECONDARY ROADS AT AN ANGLE AT OR NEAR NINETY DEGREES. HAUL ROUTES FOR VEHICLES TRANSPORTING ASH OR OTHER MATERIAL OR EQUIPMENT FROM THE PLANT SITE TO THE DISPOSAL SITE, OR HAULING SOIL OR OTHER MATERIAL OR EQUIPMENT FROM THE DISPOSAL SITE TO THE PLANT, SHALL BE LIMITED TO THAT ROUTE PROPOSED BY VEPCO TO YORK COUNTY IN DRAWINGS 81- 295-E28, E8, E9 AND E10 AS REFERENCED HEREINBEFORE. THIS PROHIBITION MAY BE WAIVED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, IN ORDER TO RESOLVE EMERGENCIES OR OTHER UNUSUAL CIRCUMSTANCES. ANY SUCH EMERGENCY OR UNUSUAL CIRCUMSTANCE SHALL BE REPORTED TO THE COUNTY ADMINISTRATOR OR HIS DESIGNEE AND SHALL BE REPORTED PURSUANT TO CONDITION D2 IF THAT CONDITION IS OTHERWISE APPLICABLE.

A14. ALL HAUL ROUTES USED IN THE TRANSPORT OF FLY ASH, BOTTOM ASH, OTHER PARTICULATE BY-PRODUCTS OF THE PLANT OR IN THE TRANSPORT OF COAL ON THE PLANT SITE SHALL BE PAVED WITH A PERMANENT DUSTLESS SURFACE. SUCH PAVING AND ROAD CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE DESIGN OF THE STATION ACCESS ROAD WHICH WAS APPROVED BY THE BOARD OF SUPERVISORS THROUGH RESOLUTION NOS. R81-154R AND R82-59(R) AND INCLUDED IN THE DRAWINGS SE79- 641-T8, SHEETS 1-9, PREPARED FOR VEPCO BY D'APPOLONIA, INC., PITTSBURGH, PENNSYLVANIA.

A15. ALL ROAD CROSSING SHALL, AT A MINIMUM, BE DESIGNED, CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE CONDITIONS SPECIFIED BY RULES AND REGULATIONS OF THE VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION.

A16. FLY AND BOTTOM ASH SHALL BE TRANSPORTED IN ACCORDANCE WITH SECTION 10-1-4 B(2) OF THE YORK COUNTY ZONING ORDINANCE:

A17. ALL VEHICLES USED TO HANDLE, MOVE OR OTHERWISE TRANSPORT ASH OR OTHER MATERIALS ASSOCIATED WITH THE COMBUSTION OF COAL AT THE STATION SHALL BE EQUIPPED WITH THE BEST AVAILABLE CONTROL TECHNOLOGY (BACT) NOISE SUPPRESSION MUFFLER SYSTEMS AVAILABLE FOR THE SPECIFIC PIECE OF EQUIPMENT IN QUESTION AT THE TIME THE EQUIPMENT IS INITIALLY PUT INTO SERVICE.

THE APPLICANT SHALL FURNISH TO THE COUNTY A CERTIFICATION FROM THE MANUFACTURER, OR HIS DULY AUTHORIZED REPRESENTATIVE, THAT THE EQUIPMENT IN SERVICE AT THE PLANT, DISPOSAL SITE AND BETWEEN THOSE TWO POINTS INCLUDES AN OPERABLE NOISE MUFFLER SYSTEM WHICH HAS BEEN DESIGNED AND INSTALLED ACCORDING TO BEST AVAILABLE CONTROL TECHNOLOGY AT THE TIME THE EQUIPMENT IS INITIALLY PLACED INTO SERVICE. SUCH EQUIPMENT SHALL, AT A MINIMUM, BE MAINTAINED TO MEET SUCH STANDARDS CONTAINED HEREIN.

A18. A SPRAY CURTAIN AND GARAGE DOORS SHALL BE INCLUDED AND USED AT THE ENTRANCE TO AND EXIT FROM THE ASH LOADING SILO. AT LEAST ONE OF THESE FEATURES MUST BE USED WHENEVER ASH IS BEING LOADED INTO HAUL TRUCKS.

A19. WASH DOWN FACILITIES SHALL BE PROVIDED AND USED, UNLESS PROHIBITED BY FREEZING WEATHER CONDITIONS, AT BOTH THE ASH LOADING SILOS AND AT THE STRUCTURAL FILL TO WASH ANY ASH FROM THE VEHICLES PRIOR TO ANY TRAVEL BETWEEN THOSE TWO POINTS OR FROM THOSE POINTS TO ANY OTHER PLACE.

A20. VEPCO SHALL PROVIDE SUFFICIENT EQUIPMENT TO ASSURE THE EFFECTIVE HANDLING SCARIFYING AND/OR BLENDING OF FLY ASH WHICH HAS BEEN PLACED AT THE STRUCTURAL FILL IN OTHER THAN AN OPTIMUM MOISTURE CONDITIONS. AT A MINIMUM, THE FOLLOWING EQUIPMENT SHALL BE PERMANENTLY LOCATED AT THE ASH STRUCTURAL FILL SITE:

OVIBRATORY COMPACTOR SUFFICIENT TO PROVIDE ADEQUATE COMPACTION OF THE FLY ASH.

OBULLDOZER/SCRAPER TO SPREAD FLY ASH.

OA SCARIFYING DEVICE TO BE USED TO BLEND FLY ASH WHICH HAS BEEN DELIVERED, OR IS IN PLACE, AT OTHER THAN OPTIMUM MOISTURE CONTENT.

A21. A WATER TRUCK TO CONTROL FUGITIVE DUST AND/OR TO ENSURE PROPER MOISTURE CONTENT OF THE ASH SHALL BE PERMANENTLY AVAILABLE TO THE STRUCTURAL FILL.

A22. FLY ASH SHALL BE PLACED IN LAYERS NO MORE THAN TWELVE (12) INCHES, AND IMMEDIATELY COMPACTED TO 95 PERCENT OF STANDARD PROCTOR MAXIMUM DENSITY.

A23. THE APPLICANT SHALL PROVIDE QUARTER ANNUAL TESTS FROM AN INDEPENDENT LABORATORY WHICH SHALL BE CONDUCTED TO VERIFY THE COMPACTION RESULTS OBTAINED BY THE FULL TIME ENGINEERING TECHNICIAN OR EQUIVALENT TRAINED PERSONNEL ASSIGNED TO THE PROJECT.

A24. THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, SHALL HAVE THE AUTHORITY TO REQUIRE PERFORMANCE OF REQUIRED TESTS ON RANDOM STRIPS AT REASONABLE TIMES.

A25. TEMPORARY STORAGE OF BOTTOM ASH, AS PROPOSED IN DRAWING 11 "VERTICAL EXPANSION PHASING PLAN" DATED DECEMBER 14, 2007 AND REFERENCED HEREINBEFORE, SHALL BE STRICTLY ADHERED TO. THE BOARD RESERVES THE RIGHT TO REQUIRE, AT ITS DISCRETION, THE CONSTRUCTION OF A PERMANENT BOTTOM ASH STORAGE AREA. FUGITIVE DUST INCIDENTS RESULTING FROM SUCH TEMPORARY STORAGE AREAS SHALL RESULT IN CONSIDERATION OF A REQUIREMENT THAT VEPCO DESIGN, CONSTRUCT AND MAINTAIN, A SINGLE, PERMANENT, AND SHELTERED BOTTOM ASH STORAGE CELL. THE BOTTOM ASH STOCKPILE SHALL BE LOCATED OVER THE LINED AREA OF THE BASE LANDFILL AT ALL TIMES.

A26. WHEN THE FACILITY OR PORTIONS THEREOF REACH DESIGN CAPACITY, OR IF THE APPLICANT SHOULD CHOOSE TO CLOSE THE FACILITY PRIOR TO REACHING DESIGN CAPACITY, THE APPLICANT SHALL CLOSE THE SITE PURSUANT TO THE CLOSURE PLAN CONTAINED IN THE SITE'S VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VDEQ) SOLID WASTE PERMIT.

A27. THE APPLICANT SHALL PROVIDE A FINAL SERIES OF TESTS BY AN INDEPENDENT TESTING LABORATORY FOR THE FILL AS A SINGLE STRUCTURAL ENTITY INCLUDING ANALYSES OF ALL ENGINEERING PARAMETERS DEALING WITH THE STRUCTURAL INTEGRITY OF THE ASH FILL, WITH PARTICULAR ATTENTION TO THE INTERFACING OF INDIVIDUAL CELLS. SUCH TESTS SHALL BE PERFORMED AND RESULTS SUBMITTED TO THE COUNTY ADMINISTRATOR PRIOR TO THE CLOSURE OF THE ENTIRE SITE. SUCH TEST RESULTS SHALL BE CERTIFIED BY AN INDEPENDENT PROFESSIONAL ENGINEERING FIRM.

A28. FLUE GAS DESULFURIZATION OR OTHER PLANT SLUDGES SHALL NOT BE DEPOSITED IN THE ASH STRUCTURAL FILL.

A29. ALL RECORDS OF TESTS AND INSPECTIONS SHALL BE RECORDED AND MAINTAINED THROUGHOUT THE LIFE OF THE FILL, AND TRANSFERRED TO THE COUNTY UPON TRANSFER OF THE PROPERTY.

A30. THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, HAS AUTHORITY TO ENTER THE PLANT AND STRUCTURAL FILL PREMISES AND MAKE SPOT INSPECTIONS ON AN UNANNOUNCED BASIS.

A31. PRIOR TO PLACEMENT OF THE FINAL SOIL COVER FOR ANY CELL, VEPCO SHALL NOTIFY THE COUNTY ADMINISTRATOR OF ITS INTENT TO CLOSE THE SPECIFIC CELL. SUCH NOTIFICATION SHALL INCLUDE AN ANALYSIS OF THE AMOUNTS AND TYPES OF MATERIALS PROPOSED TO BE PLACED ON THE CELL, INCLUDING VEGETATION, TO ENSURE COMPLIANCE WITH APPROVED PLANS AND SPECIFICATIONS. THE LANDFILL CLOSURE WILL BE PERFORMED IN ACCORDANCE WITH THE CLOSURE/POST CLOSURE PLAN CONTAINED IN THE VDEQ SOLID WASTE PERMIT FOR THE FACILITY.

A32. ANY ASH REQUIRED TO HAVE CEMENT ADDITION TO MEET BENEFICIAL REUSE REQUIREMENTS SHALL BE HANDLED IN THE FOLLOWING MANNER:

1. PUGMILLING OF ASH SHALL BE PERFORMED WITHIN THE BOUNDARIES OF A FULLY DEVELOPED CELL. DUST CONTROL MEASURES SHALL BE PRACTICED TO KEEP DUST TO A MINIMUM IN THE AREAS OF EXCAVATION, PUGMILL OPERATION, AND TRUCK LOADING.
2. ALL TRUCKS LEAVING THE ASH SITE SHALL BE WASHED IN THE TRUCK WASH, AND WHEELS MANUALLY WASHED TO PREVENT MIGRATION OF ASH OFF SITE.
3. A WATER TRUCK AND WATER SPRAY SYSTEM SHALL BE UTILIZED THAT ENSURES THAT FUGITIVE DUST FROM THE PUGMILL OPERATION WILL BE ABATED.
4. THE PUGMILL OPERATION WILL BE IN OPEN CELLS ONLY AND, WITH THE EXCEPTION OF INITIAL ASH REMOVAL, OPERATE AT THE ELEVATION EQUAL TO AT LEAST THREE FEET ABOVE THE TOP OF THE DRAINAGE LAYER OF THE CELL BEING EXCAVATED, OR OF THE ADJACENT EMPTY CELL.

A33. ANY ENTRANCE TO OR FROM THE ASH SITE TO A SECONDARY ROAD IN THE STATE SYSTEM, OR, AS IN THE CASE OF NEWSOME DRIVE, A ROAD PROPOSED FOR ACCEPTANCE INTO THE STATE SECONDARY SYSTEM, SHALL BE UPGRADES TO THE SATISFACTION OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) AND YORK COUNTY PRIOR TO THE COMMENCEMENT OF ANY REMOVAL ACTIVITIES UTILIZING SAID ENTRANCE. IN ADDITION, A BOND OR OTHER ACCEPTABLE SURETY SHALL BE POSTED WITH THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) IN THE AMOUNT OF $25,000 TO COVER ANY ROAD DAMAGES AS A RESULT OF THE REMOVAL OPERATION. IN ADDITION, AT NO TIME SHALL THIS ACTIVITY GENERATE MORE THAN FOUR HUNDRED (400) VEHICLE TRIP ENDS PER DAY.

OFF-SITE TRANSPORT OF FLY ASH IN NON-HERMETICALLY SEALED VEHICLES SHALL BE PERMITTED PROVIDED THAT THE MOISTURE CONTENT AND ALL OTHER APPLICABLE REQUIREMENTS SPECIFIED HEREIN ARE OBSERVED, AND PROVIDED THAT NON-RAIL TRANSPORT ROUTES SHALL BE LIMITED TO PRIMARY AND INTERSTATE HIGHWAYS AND THE FOLLOWING ROADS:

A) THAT PORTION OF HORNSBYVILLE ROAD BETWEEN THE HAUL ROAD AND GOODWIN NECK ROAD (ROUTE 173).
B) THAT PORTION OF WOLFTRAP ROAD BETWEEN THE HAUL ROAD AND GOODWIN NECK ROAD; AND
C) THAT PORTION OF NEWSOME DRIVE FROM ITS EASTERN TERMINUS TO OLD YORK-HAMPTON HIGHWAY (ROUTE 634); AND
D) THAT PORTION OF OLD YORK-HAMPTON HIGHWAY BETWEEN NEWSOME DRIVE AND ROUTE 17.

A34. OPERATION, QA/QC, AND DESIGN OF THE ASH REMOVAL ACTIVITIES SHALL BE IN ACCORDANCE WITH THE VDEQ PERMIT FOR THE VIRGINIA POWER - YORKTOWN POWER STATION SOLID WASTE DISPOSAL FACILITY. CLOSURE OF THE FACILITY SHALL BE IN ACCORDANCE WITH THE CLOSURE/POST CLOSURE PLAN CONTAINED IN THE VDEQ SOLID WASTE PERMIT FOR THE FACILITY.

***

B. COAL HANDLING AND STORAGE

B1. ALL COAL HANDLING EQUIPMENT SHALL BE DESIGNED, CONSTRUCTED AND OPERATED TO PREVENT NOISE AND DUST EMISSIONS IN ACCORDANCE WITH BEST AVAILABLE CONTROL TECHNOLOGY.

THE APPLICANT SHALL FURNISH TO THE COUNTY A CERTIFICATION FROM THE MANUFACTURER, OR HIS DULY AUTHORIZED REPRESENTATIVE, THAT THE EQUIPMENT IN SERVICE AT THE PLANT INCLUDES AN OPERABLE NOISE MUFFLER SYSTEM WHICH HAS BEEN DESIGNED AND INSTALLED ACCORDING TO THE BEST AVAILABLE CONTROL TECHNOLOGY AT THE TIME THE EQUIPMENT IS INITIALLY PLACED INTO SERVICE. SUCH EQUIPMENT SHALL, AT A MINIMUM, BE MAINTAINED TO MEET SUCH STANDARDS CONTAINED HEREIN.

B2. EACH LOAD OF COAL, AS IT ARRIVES AT THE PLANT, SHALL BE TESTED FOR MOISTURE, ASH, AND SULFUR TO ENSURE ITS COMPLIANCE WITH PERFORMANCE SPECIFICATIONS REQUIRED BY THE STATE AIR POLLUTION CONTROL BOARD IN ITS CONSENT AGREEMENT WITH VEPCO DATED APRIL 28, 1982. ALL COAL USED AT THE PLANT SHALL HAVE A MAXIMUM MONTHLY PRORATED AVERAGE ASH CONTENT OF 11 PERCENT AND MAXIMUM MONTHLY PRORATED AVERAGE SULFUR CONTENT OF 1.7 PERCENT. ADDITIONAL TESTS SHALL BE CONDUCTED AT ANY SUCH TIME AS CONDITIONS WOULD SUGGEST AN ALTERNATIVE SOURCE OF COAL HAS BEEN RECEIVED.

B3. THE MAXIMUM HEIGHT FOR BOTH THE ACTIVE AND INACTIVE PORTIONS OF THE COAL PILE AT THE PLANT SITE SHALL BE 25 FEET. NO COAL SHALL BE STORED OTHER THAN AT THE COAL PILE AND BUNKERS AND IN A MANNER APPROVED UNDER THE TERMS OF THE USE PERMIT.

B4. A PERMANENTLY INSTALLED AUTOMATIC WATERING SYSTEM SUCH AS THE RAINBIRD RAIN GUN SPRINKLER OR EQUIVALENT, SHALL BE PLACED AT THE COAL PILES. SUCH SYSTEM SHALL BE DESIGNED TO PROVIDE FOR THE AUTOMATIC WATERING DOWN OF THE ACTIVE AND INACTIVE PORTIONS OF THE COAL PILE AT SUCH TIME AS ATMOSPHERIC AND/OR CLIMATIC CONDITIONS INDICATE THAT THE APPLICATION OF WATER WITH OR WITHOUT A SURFACTANT IS NECESSARY TO PREVENT ANY EMISSIONS OF COAL DUST.

B5. THE ACTIVE PORTION OF THE COAL HANDLING SYSTEM AND PILE, INCLUDING ALL TRANSFER POINTS, SHALL BE SERVICED BY A PERMANENTLY INSTALLED WATER SPRAY SYSTEM, SUCH AS THE RAINBIRD RAIN GUN SPRINKLER, OR EQUIVALENT, CAPABLE OF COVERING THE ENTIRE AREA WITH A SUFFICIENT QUANTITY OF WATER TO ELIMINATE THE TRANSMISSION OF FUGITIVE DUST. SUCH WATER SYSTEMS SHALL HAVE THE CAPABILITY OF MANUAL OPERATION AND SHALL BE USED AS NECESSARY DURING COAL HANDLING OPERATIONS TO PREVENT FUGITIVE DUST DISCHARGES.

B6. AND THE INACTIVE PORTION OF THE COAL PILE SHALL BE SEALED WITH A MATERIAL AND IN AN APPLICATION RATE APPROVED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, TO PREVENT EMISSIONS OF ANY FUGITIVE DUST.

B7. AN EARTHEN BERM, SUPPLEMENTED WITH EVERGREEN TREES AND SHRUBBERY IN AN AMOUNT AND PATTERN APPROVED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, SHALL BE CONSTRUCTED AS A WINDBREAK ALONG THE SOUTH AND EAST SIDES OF THE SOLID FUEL STORAGE AREAS WHETHER ACTIVE OR INACTIVE. SUCH EARTHEN BERMS, COMBINED WITH THE VEGETATION, SHALL BE CONSTRUCTED TO A HEIGHT AND DENSITY, AS INITIALLY CONSTRUCTED AND PLANTED, SUCH THAT IT PROVIDES AN EFFECTIVE WINDBREAK AT ALL TIMES.

B8. A DOUBLE ROW OF EVERGREEN TREES SHALL BE INSTALLED ALONG WATERVIEW ROAD IN ADDITION TO THE CEDAR TREES NOW EXISTING AND SHALL BE MAINTAINED AS A WINDBREAK AND VISUAL AND SOUND BARRIER FROM THE PLANT FOR THE BENEFIT OF THE WATERVIEW COMMUNITY.

B9. FOUR AUTOMATIC DUST COLLECTOR SYSTEMS, DESIGNED AND CERTIFIED BY THE MANUFACTURER AS BEST AVAILABLE CONTROL TECHNOLOGY ALLOWS, SHALL BE CONTINUOUSLY AVAILABLE AND IN USE AT THE: (1) TRACK HOPPER/COAL SHAKER BUILDING COMPLEX; (2) COAL STORAGE RECLAIM FEEDER; (3) COAL CRUSHER HOUSE/SAMPLER COMPLEX; AND (4) COAL BINS COMPLEX LOCATED IN THE PLANT AT THE TOP OF THE FULLY ENCLOSED CONVEYOR SYSTEM. IF FAILURE OF ANY COMPONENT OF THESE SYSTEMS WOULD RESULT IN THE RELEASE OF FUGITIVE DUST TO THE ATMOSPHERE, TEMPORARY DUST CONTROL MEASURE, APPROVED IN WRITING BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY WILL BE IMPLEMENTED UNTIL THE FAILED COMPONENT CAN BE REPAIRED.

B10. AT A MINIMUM, THE APPLICANT SHALL INSTALL, MAINTAIN AND CONTINUOUSLY OPERATE THE COAL HANDLING SYSTEM OUTLINED IN ITS SUBMISSION TO YORK COUNTY RECEIVED ON AUGUST 27, 1981, AND ENTITLED "YORKTOWN POWER STATION, COAL HANDLING SYSTEM".

B11. COAL CLEANING ON SITE SHALL NOT BE ALLOWED WITHOUT SPECIFIC APPROVAL OF THE BOARD OF SUPERVISORS.

C. DISPOSAL SITE CONSTRUCTION AND MONITORING

C1. ALL HEAVY CONSTRUCTION VEHICLE TRAFFIC USED IN PREPARING THE SITE FOR ASH DISPOSAL SHALL BE PRECLUDED FROM USING HORNSBYVILLE ROAD AND THAT PORTION OF OLD YORK-HAMPTON HIGHWAY NORTH OF THE C & O RAILROAD TRACKS.

C2. THE APPLICANT SHALL ADHERE TO THE PROCEDURES CONTAINED IN ASTM 01587, "STANDARD PRACTICE FOR THIN-WALLED TUBE SAMPLING OF SOILS FOR GEOTECHNICAL PURPOSES" WHEN SAMPLES OF THE LOW PERMEABILITY SOI1LINER ARE EXTRACTED FOR LABORATORY TESTING. THE SAMPLES SHALL BE TESTED BY AN INDEPENDENT GEOTECHNICAL TESTING LABORATORY TO VERIFY THAT THE PERMEABILITY CRITERIA ESTABLISHED IN C5 ARE MET. IN THE CASE WHERE A LOW PERMEABILITY SOI1LINER IS NOT USED IN THE DESIGN OF A DISPOSAL CELL, THIS REQUIREMENT SHALL NOT APPLY.

C3. CHEMICAL ANALYSES OF LEACHATE FROM THE SITE SHALL BE PROVIDED TO AMERICAN COLLOID, OR OTHER EQUIVALENT DISTRIBUTOR, WITH RESPECT TO LEACHATE GENERATION FROM THE PROPOSED ASH DISPOSAL SITE FOR THEIR REVIEW IN DETERMINING THE TYPE OF LINER PROVIDED FOR EACH CELL. SUCH INFORMATION ON SOIL AND LEACHATE SAMPLES WILL ALSO PROVIDED TO YORK COUNTY AS WELL AS THE RESPONSES FROM THE SOIL SEALANT LINER SUPPLIER. IN THE CASE WHERE LOW PERMEABILITY SOIL LINER IS NOT USED IN THE DESIGN OF A DISPOSAL CELL, THIS REQUIREMENT SHALL NOT APPLY.

C4. AND THE APPLICANT SHALL DESIGN AND ASSUME CONTINUING RESPONSIBILITY FOR A GROUNDWATER DEWATERING SYSTEM, BOTH SHORT TERM AND LONG TERM, FOR THE CONTROL OF GROUNDWATER. APPLICANT SHALL REMAIN SOLELY RESPONSIBLE FOR THE DESIGN, INSTALLATION, MANAGEMENT AND MAINTENANCE OF THE SYSTEM. SHOULD THE APPLICANT ELECT TO RETAIN A SUBCONTRACTOR NONE OF THE APPLICANT'S RESPONSIBILITY UNDER THIS SECTION SHALL BE TRANSFERRED OR TRANSFERABLE TO SAID CONTRACTOR.

C5. THE LINER FOR THE BASE LANDFILL FACILITY AS DESCRIBED IN THE DECEMBER, 1981 DESIGN DRAWINGS BY GAI, SHALL BE CONSTRUCTED WITH A BENTONITE CLAY SOIL SEALANT IN STRICT COMPLIANCE WITH THE MANUFACTURER'S SPECIFICATIONS TO A PERMEABILITY OF 1 X 10-8 CM/ SEC. THE LINER FOR THE VERTICAL EXPANSION PROJECT PORTION OF THE FACILITY SHALL BE CONSTRUCTED IN COMPLIANCE WITH THE FACILITY'S VDEQ SOLID WASTE PERMIT. VEPCO WILL MONITOR, IN ACCORDANCE WITH THE APPROVED GROUNDWATER MONITORING PROGRAM AND CELL NO. 1 LEACHATE MONITORING PROGRAM, THE IMPACT, IF ANY, OF THE ASH FILL OPERATION ON GROUND WATER QUALITY. BASED UPON DATA COLLECTED IN THESE MONITORING PROGRAMS VEPCO MAY FILE FOR AN AMENDMENT TO THE CONDITIONAL USE PERMIT TO PROVIDE FOR USE OF A MORE PERMEABLE LINER IN SUBSEQUENT CELLS.

C6. AND THE CENTER LEACHATE DRAIN OF THE SITE SHALL BE DESIGNED AND CONSTRUCTED TO ADEQUATELY PROTECT GROUNDWATER FROM THE INTRODUCTION OF ANY LEACHATE. TO THAT EXTENT, IT SHALL BE CONSTRUCTED OF A LINER MATERIAL WHICH WOULD HAVE AT LEAST EQUIVALENT PERFORMANCE CHARACTERISTICS OF AMERICAN COLLOID COMPANY GRADE SS100 BENTONITE PRODUCT AT A PERMEABILITY OF 1 X 10-8 CM/SEC.

C7. THE SITE LINER SHALL BE CONSTRUCTED WITH A MINIMUM SLOPE OF FOUR TENTHS (0.4) PERCENT.

C8. VEPCO SHALL ASSUME ALL RESPONSIBILITY FOR THE CONSTRUCTION AND PROPER FUNCTIONING OF THE DISPOSAL SITE. SHOULD THE APPLICANT ELECT TO RETAIN A CONTRACTOR OR SUBCONTRACTOR FOR EITHER CONSTRUCTION OR OPERATION OF THE SITE, NONE OF THE APPLICANT'S RESPONSIBILITY UNDER THIS SECTION SHALL BE TRANSFERRED OR TRANSFERABLE TO SAID CONTRACTOR.

C9. ANY TEMPORARY STOCKPILING OF MATERIAL AT THE SITE SHALL MEET THE TERMS OF THE EROSION AND SEDIMENTATION CONTROL ORDINANCE OF THE COUNTY OF YORK.

C10. TESTING OF THE SOIL LINER SHALL BE CONDUCTED IN THE LABORATORY ON UNDISTURBED SAMPLES TAKEN FROM THE SITE PRIOR TO PLACING THE PARTICULAR SECTION OF THE FILL AREA IN SERVICE FOR THE DISPOSAL OF FLY ASH. TESTING OF GEOMEMBRANE LINER MATERIALS SHALL BE AT THE FREQUENCIES SPECIFIED AND IN ACCORDANCE WITH THE REQUIREMENTS IN THE FACILITY'S VDEQ SOLID WASTE PERMIT.

C11. THE LOCATION OF THE SAMPLING, METHOD OF SAMPLING, AND METHOD OF TESTING SHALL BE AT THE FREQUENCIES SPECIFIED AND IN ACCORDANCE WITH THE FACILITY'S VDEQ SOLID WASTE PERMIT.

C12. A MINIMUM OF TWO SAMPLES PER DISPOSAL AREA AND ONE SAMPLE PER 500 LINEAR FEET OF DRAINAGE CHANNEL SHALL BE CONDUCTED. A MINIMUM OF ONE SAMPLE PER AREA OF IMPERVIOUS LINER CONSTRUCTED PER DAY SHALL BE REQUIRED.

C13. THESE TESTING CONDITIONS WILL SUPPLEMENT ANY INCLUDED IN ATTACHMENT NO. 1 OF THE MARCH 23, 1982 SUBMISSION TO YORK COUNTY ENTITLED "RESPONSES TO QUESTIONS CONCERNING ASH UTILIZATION CONTAINED IN COUNTY'S LETTER TO VEPCO DATED MARCH 4, 1982".

C14. ALL RECORDS OF TESTS AND INSPECTIONS CONCERNING ALL ASPECTS OF THE DISPOSAL SITE CONSTRUCTION SHALL BE RECORDED AND MAINTAINED THROUGHOUT THE LIFE OF THE FILL, AND TRANSFERRED TO THE COUNTY UPON TRANSFER OF THE PROPERTY.

C15. THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, HAS AUTHORITY TO ENTER THE DISPOSAL SITE PREMISES AND MAKE SPOT INSPECTIONS ON AN UNANNOUNCED BASIS.

C16. TEMPORARY BOTTOM ASH STORAGE SHALL BE LIMITED TO A MAXIMUM AREA OF TWO (2) ACRES AND A MAXIMUM HEIGHT OF TWELVE FEET. SUCH AREA SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ALL THE SPECIFICATIONS AND OPERATING PROCEDURES OF THE FLY ASH DISPOSAL CELLS INCLUDING LINER, DRAINAGE AND LEACHATE COLLECTOR AS WELL AS DUST CONTROL MEASURES. THE BOTTOM ASH STOCKPILE SHALL BE LOCATED OVER THE LINED AREA OF THE BASE LANDFILL AT ALL TIMES.

C17. SINCE THE NEED TO STORE BOTTOM ASH IS TEMPORARY, THIS AREA SHALL BE LOCATED AS SHOWN ON THE DRAWINGS SUBMITTED IN SUPPORT OF THIS REQUEST, AND SHALL BE SURROUNDED BY EARTHEN BERMS FOR BOTTOM ASH CONTAINMENT, EXCEPT FOR NECESSARY POINTS OF ACCESS. SUCH BERMS SHALL HAVE AN EFFECTIVE HEIGHT OF AT LEAST FOUR (4) FEET.

C18. THE BOTTOM ASH STOCKPILE SHALL BE LOCATED OVER THE LINED AREA OF THE BASE LANDFILL AT ALL TIMES. SURFACE WATER RUNOFF (STORMWATER) COLLECTED FROM THE BOTTOM ASH STOCKPILE SHALL BE DIRECTED TO THE PROPER STORMWATER CONTROL SYSTEM. THE BOTTOM OF THE STOCKPILE SHALL BE PREPARED AS SUCH TO ALLOW LEACHATE FROM THE BOTTOM ASH STOCKPILE TO BE CONTROLLED BY THE BASE LANDFILL LEACHATE COLLECTION SYSTEM.

C19. A FIFTY (50) FOOT VEGETATED EVERGREEN BUFFER AREA SHALL BE MAINTAINED ALONG ALL PERIMETER PROPERTY LINES OF THE SITE. SUCH BUFFER AREAS SHALL BE LANDSCAPED WITH AT LEAST A DOUBLE ROW OF EVERGREEN TREES, SUPPLEMENTED WITH SHRUBS AS DEEMED NECESSARY TO COMPLEMENT THE TREES, AND SHALL BE UNBROKEN EXCEPT FOR NECESSARY ACCESS ROADS RUNNING PERPENDICULAR, OR NEARLY SO, ACROSS IT. SAID EVERGREEN PLANTINGS SHALL BE OF ADEQUATE SIZE TO PROVIDE AN IMMEDIATE VISUAL SCREEN OF ACTIVITIES CONDUCTED WITH THE SITE, OR SHALL BE SUPPLEMENTED WITH A QUICK GROWING VARIETY OF SHRUB TO ACCOMPLISH THIS OBJECTIVE. AND THE 200 FOOT VEGETATIVE BUFFER ALONG OLD YORK-HAMPTON HIGHWAY SHALL REMAIN FOR THE LIFE OF THE ACTIVE FILL OPERATION.

SUCH BUFFER AREAS MAY BE COMPOSED OF EXISTING VEGETATION AT THE SITE, SUPPLEMENTED AS REQUIRED HEREINABOVE, WHICH EFFECTS AN IMMEDIATE VISUAL SCREEN OF ACTIVITIES WITHIN THE SITE. AND THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, SHALL DETERMINE BASED ON FIELD INSPECTIONS THE ADEQUACY OF SUCH EXISTING VEGETATION TO ACCOMPLISH THESE OBJECTIVES.

SUCH BUFFER AREAS SHALL, AT A MINIMUM, BE MAINTAINED TO MEET SUCH STANDARDS CONTAINED HEREIN.

D. ENVIRONMENTAL MONITORING AND TREATMENT

D1. THE CONTROL OF FUGITIVE DUST GENERATION CONCERNING EACH AND EVERY ASPECT OF THE CONVERSION OF THE YORKTOWN POWER PLANT SHALL BE THE RESPONSIBILITY OF THE VIRGINIA ELECTRIC AND POWER COMPANY. THIS RESPONSIBILITY SHALL IN NO WAY BE TRANSFERABLE TO ANOTHER PARTY.

D2. COMMUNITY NOTIFICATION BY VEPCO TO THE LOCAL MEDIA IN THE FORM OF PUBLIC SERVICE ANNOUNCEMENTS IS REQUIRED IN THE EVENT OF ANY PROPOSED OUTAGE ANTICIPATED TO LAST MORE THAN 12 HOURS, OR ANY UNEXPECTED OUTAGE WHICH HAS LASTED OVER 24 HOURS, OR PARTICULATE EMISSION CONTROL EQUIPMENT OR OTHER POLLUTION CONTROL DEVICES, WHICH MIGHT CAUSE, DIRECTLY OR INDIRECTLY, AN IMPACT ON RESIDENTS. SUCH PUBLIC SERVICE ANNOUNCEMENTS SHALL BE DISTRIBUTED BY VEPCO TO THE LOCAL MEDIA INCLUDING, BUT NOT LIMITED TO THE YORK TOWN CRIER, TIMES HERALD AND DAILY PRESS NEWSPAPERS AND LOCAL RADIO STATIONS WKEZ, WFOG, WGH, WCMS, WTAR, WWE, WQRK AND WBCI. THESE PUBLIC SERVICE ANNOUNCEMENTS SHALL PROVIDE INFORMATION ON THE NATURE, DURATION AND AREA OF THE COMMUNITY MOST LIKELY TO BE AFFECTED BY THE RESULTING FALLOUT OF PARTICULATE MATTER OR INCREASE IN OTHER POLLUTION DISCHARGES.

THE COMPANY SHALL PROVIDE TO THE COUNTY ADMINISTRATOR OR HIS DESIGNATED DEPUTY A COPY OF OR WRITTEN INDICATION OF ANY AND ALL REQUESTS FOR ANY VARIANCE OR MODIFICATION TO THE REGULATIONS OR CONDITIONS OF THE STATE AIR POLLUTION CONTROL BOARD OR THE STATE WATER CONTROL BOARD WHICH: (A) WOULD RESULT, IF GRANTED, IN AN INCREASE IN EMISSIONS INTO THE AIR OR IN DISCHARGES INTO THE WATERS OF THE COMMONWEALTH; OR (B) IS ASSOCIATED WITH THE STORAGE, HANDLING, TRANSPORT OR DISPOSAL OF FLY ASH, BOTTOM ASH, OR OTHER PARTICULATE BY-PRODUCTS ASSOCIATED WITH THE BURNING OF COAL; OR (C) MIGHT CAUSE, DIRECTLY OR INDIRECTLY, AN IMPACT ON RESIDENTS.

FURTHER, THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, SHALL BE COPIED ON ALL RELEVANT CORRESPONDENCE BETWEEN VEPCO AND THE STATE AIR POLLUTION CONTROL BOARD OR STATE WATER CONTROL BOARD DEALING WITH ANY SUCH REQUESTS AS CONTAINED HEREIN. EACH SUBMITTAL TO THE COUNTY SHALL BE ACCOMPANIED BY A SUMMARY SHEET INDICATING THE AMOUNT OF EMISSIONS INCREASE OR DECREASE, AS THE CASE MAY BE, AS WELL AS A COPY OF, AND A GENERAL SUMMARY OF, THE APPLICATION FOR ANY SUCH AMENDMENTS OR VARIANCES.

D3. ANY LEACHATE MONITORING SYSTEM REQUIRED SHALL BE INSTALLED AND SHALL CONTINUE IN OPERATION THROUGHOUT THE LIFE OF THE FILL, OR UNTIL DEMONSTRATED TO BE UNNECESSARY.

D4. THE APPLICANT SHALL CONTINUE AND/OR ESTABLISH A GROUNDWATER AND LEACHATE TESTING AND MONITORING SYSTEM, IN ACCORDANCE WITH THE REQUIREMENTS AND CRITERIA ESTABLISHED HEREIN, IN AND AROUND THE ASH STRUCTURAL FILL AREA SO LONG AS IT SHALL EXIST, AND COAL STORAGE AREA SO LONG AS IT IS IN USE.

MONITORING OF THE GROUNDWATER AT THE COAL STORAGE AREA AND SITE OF THE ASH STRUCTURAL FILL SHALL INCLUDE A SYSTEM OF SHALLOW AND DEEP WELLS. SUCH PROGRAM SHALL FURTHER INCLUDE MONITORING AS REQUIRED BY THE VDEQ WASTE FACILITY PERMIT 457.

INCLUDED AMONG SUCH A MONITORING SYSTEM SHALL BE BOTH A REGULAR PERIODIC WATER QUALITY ANALYSIS TESTING PROGRAM AS THE RESPECTIVE AREAS ARE IN USE, AND ONE WHICH CONTINUES TO ANALYZE THE GROUNDWATER AROUND THE STRUCTURAL FILL SO LONG AS IT EXISTS. THE SPECIFIC LOCATIONS OF SUCH MONITORING WELLS SHALL BE THOSE IDENTIFIED IN THE VDEQ WASTE FACILITY PERMIT 457.

D5. ALL LEACHATE COLLECTED AT THE ASH STRUCTURAL FILL SHALL BE TRANSPORTED TO THE PLANT TREATMENT FACILITY AND SHALL BE SUBJECT TO THE NPDES PERMIT ISSUED BY THE STATE WATER CONTROL BOARD. SUCH TRANSPORTATION OF LEACHATE MAY BE EFFECTED BY TANK TRUCKS UNTIL SUCH TIME AS THE BOARD, AT ITS SOLE DISCRETION, DETERMINES THAT INSTALLATION AND USE OF ANY AUTOMATIC PUMPING SYSTEM TO TRANSPORT SUCH LEACHATE TO THE PLANT IS WARRANTED IN FURTHERANCE OF THE PUBLIC HEALTH, SAFETY AND WELFARE OR IN PROTECTION OF ENVIRONMENTAL RESOURCES. TO ENSURE COMPLIANCE WITH THIS CONDITION, A BOND, LETTER OF CREDIT, OR OTHER FORM OF SURETY APPROVED BY THE COUNTY ATTORNEY AS TO FORM AND AMOUNT SHALL BE PROVIDED TO GUARANTEE THE INSTALLATION OF SUCH SYSTEM.

D6. SUCH LEACHATE COLLECTION TANK SHALL INCLUDE AN AUTOMATIC RECORDING LEVEL INDICATOR AT THE PLANT SITE TO ENSURE THE TANK IS SERVICED PRIOR TO REACHING ITS CAPACITY, AND TO MONITOR LEACHATE GENERATION FROM THE FILL.

D7. THE SOIL COVER ON THE SOUTH SIDE/FACE OF CELLS ONE THROUGH SIX SHALL BE EXTENDED BEYOND THE DRAIN BEING CONSTRUCTED TO ENSURE THE INTEGRITY AND PROPER FUNCTIONING OF THE DRAIN SYSTEM.

D8. THE APPLICANT SHALL INSTALL, MONITOR, AND MAINTAIN A SERIES OF HIGHVOL PARTICULATE EMISSION TESTING DEVICES. SUCH DEVICES SHALL BE INSTALLED IN SUCH NUMBERS, LOCATIONS, AND MANNER AS REQUIRED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, TO MONITOR EMISSIONS FROM THE PLANT AREA AND THE ASH DISPOSAL SITE. FREQUENCY OF TESTS SHALL BE DETERMINED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, IN CONSULTATION WITH STAFF OF THE STATE AIR POLLUTION CONTROL BOARD.

D9. IN AN EFFORT TO ENSURE COMPLIANCE WITH APPROVED AIR POLLUTION EMISSION LEVELS, THE EXISTING MONITORING EQUIPMENT, SUPPLEMENTED AS REQUIRED, SHALL BE PLACED INTO SERVICE TO MEASURE AND MONITOR PARTICULATE EMISSION AND SULFUR DIOXIDE AND SHALL BE OPERATED AND MAINTAINED IN ACCORDANCE WITH RECOMMENDED MANUFACTURERS SPECIFICATIONS. ALL DATA SHALL BE COLLECTED CONTINUOUSLY ON RECORDING CHARTS AND SHALL BE MAINTAINED FOR ONE YEAR.

D10. ALL AIR POLLUTION ABATEMENT MEASURES AND EQUIPMENT SHALL BE CHECKED ONCE EACH SHIFT TO ENSURE THEIR PROPER OPERATIONS. SUCH PROCEDURES SHALL BE RECORDED IN STATION OPERATIONS LOG, OR EQUIVALENT, AND SHALL BE AVAILABLE FOR REVIEW.

E. GENERAL CONDITIONS

E1. USE OF ANY AMOUNT OF DELAYED PETROLEUM COKE AS A FUEL, EITHER ALONE OR IN COMBINATION WITH ANY OTHER FUEL, IS PROHIBITED UNDER THIS PERMIT.

E2. IN THE EVENT THAT ANY CLAUSE, CONDITION OR OTHER PART OF THIS PERMIT IS RULED ILLEGAL BY A COURT OF COMPETENT JURISDICTION, IT SHALL BE DEEMED SEVERABLE FROM THE PERMIT, IN ORDER THAT THE PERMIT AND ALL REMAINING CONDITIONS AND CLAUSES SHALL NOT BE DEEMED INVALID. AND THE PROHIBITION ON USE OF DELAYED PETROLEUM COKE AS A FUEL IS HEREBY MADE SEVERABLE FROM ALL OTHER CONDITIONS OF THIS PERMIT.

E3. THIS PERMIT IN NO WAY TERMINATES THE TERMS OF A CONSENT DECREE ENTERED ON JUNE 27, 1972, AS MODIFIED ON JANUARY 11, 1983, CONCERNING THE USE OF COAL AND COAL-LIKE FUELS IN VEPCO'S PLANT. THIS PERMIT WILL ONLY BECOME EFFECTIVE AFTER SAID CONSENT DECREE IS MODIFIED IN A MANNER ACCEPTABLE TO THE COURT TO REFLECT THE ISSUANCE OF THIS PERMIT. AND THE TERMS OF SUCH MODIFIED DECREE ARE INCORPORATED HEREIN BY REFERENCE; IN THE EVENT THIS PERMIT IS DECLARED INVALID, NULL OR VOID BY A COURT OF COMPETENT JURISDICTION, THE TERMS OF SAID DECREE SHALL REMAIN IN FULL FORCE AND EFFECT.

E4. NO MATERIAL SUBJECT TO THE TERMS OF THIS USE PERMIT INCLUDING BUT NOT LIMITED TO COAL, FLY ASH, AND BOTTOM ASH SHALL BE DEPOSITED OR STORED IN SUCH MANNER AS WOULD OR COULD REASONABLY BE EXPECTED TO ALLOW MOVEMENT OF SAID MATERIALS FROM THE DEPOSIT OR STORAGE AREA TO OTHER TERRAIN, OR INTO ANY SURFACE WATER OR GROUNDWATER.

E5. SUCH FLY ASH, BOTTOM ASH AND/OR COAL STORAGE AND/OR COAL STORAGE AND/OR DISPOSAL SITES SHALL BE DESIGNED, CONSTRUCTED AND OPERATED SO AS TO PREVENT ANY CONTAMINATION OF GROUNDWATER OR SURFACE WATER.

E6. DUST CONTROL METHODS, AS APPROVED, SHALL BE IMPLEMENTED AT ALL STORAGE/DISPOSAL SITES. NO OWNER OR OTHER PERSON SHALL CAUSE, ALLOW OR PERMIT ANY MATERIALS TO BE STORED OR DISPOSED OF WITHOUT TAKING PRECAUTIONARY MEASURES, APPROVED BY THE COUNTY ADMINISTRATOR AS APPROPRIATE, TO PREVENT PARTICULATE MATTER FROM BECOMING AIRBORNE OR WATERBORNE. USE OF SUCH PRECAUTIONARY MEASURES MAY BE ORDERED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, AS REQUIRED.

E7. THE STORAGE/DISPOSAL SITES MAY BE INSPECTED BY THE BOARD OF SUPERVISORS, THE COUNTY ADMINISTRATOR OR EITHER OF THEIR DESIGNATED DEPUTIES AT ANY TIME. THE APPLICANT SHALL PROVIDE WRITTEN AUTHORIZATION FOR SUCH INSPECTION VISITS PRIOR TO THE ISSUANCE OF THE USE PERMIT.

E8. DUST CONTROL METHODS OUTLINED BY THE APPLICANT IN SUPPORT OF THIS APPLICATION, AND SUCH OTHERS AS REQUIRED HEREIN, INSPECTED AND APPROVED BY THE COUNTY ADMINISTRATOR AS APPROPRIATE, SHALL BE IMPLEMENTED AT ALL LOADING AND/OR UNLOADING SITES, ALONG ALL HAUL ROADS, AND IN CONJUNCTION WITH ANY OTHER MEANS OF MATERIAL TRANSPORT OR HANDLING. NO OWNER OR OTHER PERSON SHALL CAUSE, ALLOW OR PERMIT ANY MATERIALS TO BE HANDLED OR TRANSPORTED, OR ANY ROAD TO BE USED, CONSTRUCTED, ALTERED, REPAIRED OR DEMOLISHED WITHOUT TAKING PRECAUTIONARY MEASURES, APPROVED BY THE COUNTY ADMINISTRATOR AS APPROPRIATE, TO PREVENT PARTICULATE MATTER FROM BECOMING WATERBORNE OR AIRBORNE.

E9. EACH TRUCK, VEHICLE OR OTHER MECHANISM USED FOR HAULING OR TRANSPORTING COAL OR OTHER SOLID FOSSIL FUELS, FLY ASH, BOTTOM ASH OR OTHER PARTICULATE BYPRODUCTS SHALL BE DESIGNED, COVERED, SEALED AND OPERATED SO AS TO PREVENT SUCH MATERIALS FROM BEING DEPOSITED OR SPILLED DURING TRANSPORT, UPON ANY PUBLIC OR PRIVATE LANDS OR PROPERTY, INCLUDING THOSE OF THE APPLICANT, PROVIDED, HOWEVER, THAT THIS REQUIREMENT SHALL NOT APPLY TO RAIL CARS USED TO TRANSPORT COAL OR OTHER SUCH FOSSIL FUELS TO THE SITE OF USE.

NO COAL, FLY ASH, BOTTOM ASH OR OTHER PARTICULATE BY-PRODUCTS OF THE BURNING OF SUCH COAL SHALL BE DEPOSITED OR SPILLED DURING TRANSPORT UPON ANY PUBLIC OR PRIVATE LANDS OR PROPERTY EXCEPT AS ALLOWED BY THIS PERMIT.

E10. EACH AND EVERY TRUCK, VEHICLE OR OTHER MECHANISM USED IN THE HAULING AND TRANSPORTATION OF COAL OR OTHER SOLID FOSSIL FUELS, FLY ASH, BOTTOM ASH OR OTHER PARTICULATE BYPRODUCT SHALL BE INSPECTED AND APPROVED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, PRIOR TO ITS INITIAL USE FOR SUCH PURPOSE. ALL SUCH TRUCKS, VEHICLES AND MECHANISMS SHALL DISPLAY AN APPROPRIATE SEAL, ISSUED BY THE COUNTY ADMINISTRATOR, TO INDICATE ITS COMPLIANCE WITH THE COUNTY'S INSPECTION REQUIREMENTS. EACH SUCH TRUCK, VEHICLE OR MECHANISM MAY BE INSPECTED BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, AT ANY TIME.

SUCH INSPECTION SHALL BE TO DETERMINE WHETHER OR NOT SUCH TRUCK, VEHICLE OR MECHANISM IS BEING MAINTAINED AND OPERATED SO AS TO PREVENT THE DEPOSIT OR SPILLING OF ANY MATERIALS DURING TRANSPORT AND TO ENSURE COMPLIANCE WITH BEST AVAILABLE CONTROL TECHNOLOGY NOISE SUPPRESSION SYSTEMS. THE APPLICANT SHALL PROVIDE WRITTEN AUTHORIZATION FOR SUCH INSPECTIONS PRIOR TO THE ISSUANCE OF THE USE PERMIT. THIS REQUIREMENT SHALL NOT BE DEEMED TO APPLY TO RAIL CARS USED TO TRANSPORT COAL TO THE SITE OF USE.

ANY VEHICLE OR OTHER MECHANISM USED IN THE HAULING OF COAL OR OTHER SOLID FOSSIL FUELS, FLY ASH, BOTTOM ASH OR OTHER PARTICULATE BYPRODUCTS NOT IN COMPLIANCE WITH THE TERMS OF THIS PERMIT SHALL BE IMMEDIATELY TAKEN OUT OF SERVICE UNTIL SUCH REMEDIAL ACTION AND REPAIR HAS BEEN EFFECTED TO RENDER THE EQUIPMENT IN COMPLIANCE. REMOVAL OF SUCH VEHICLE OR OTHER MECHANISM FROM SERVICE FOR THIS PURPOSE SHALL NOT SUSPEND OR DIMINISH ANY REQUIREMENT OR OTHER CONDITION OF THIS PERMIT.

E11. ALL MOTORIZED EQUIPMENT SHALL INCLUDE FULL BEST AVAILABLE CONTROL TECHNOLOGY MUFFLER SYSTEMS TO MINIMIZE ANY NOISE POLLUTION EMITTED FROM EITHER THE PLANT SITE, THE HAUL ROUTE, OR THE ASH STRUCTURAL FILL.

THE APPLICANT SHALL FURNISH TO THE COUNTY A CERTIFICATION FROM THE MANUFACTURER, OR HIS DULY AUTHORIZED REPRESENTATIVE, THAT THE EQUIPMENT IN SERVICE AT THE PLANT, DISPOSAL SITE AND BETWEEN THOSE TWO POINTS INCLUDES AN OPERABLE NOISE MUFFLER SYSTEM WHICH HAS BEEN DESIGNED AND INSTALLED ACCORDING TO BEST AVAILABLE CONTROL TECHNOLOGY AT THE TIME THE EQUIPMENT IS INITIALLY PLACED INTO SERVICE. SUCH EQUIPMENT SHALL, AT A MINIMUM, BE MAINTAINED TO MEET SUCH STANDARDS CONTAINED HEREIN.

E12. A PERSON ON EACH SHIFT SHALL BE DESIGNATED AS RESPONSIBLE FOR RECEIVING AND TAKING APPROPRIATE ACTION ON ALL COMPLAINTS RELATED TO THE STATION AND FOR RECORDING ALL PERTINENT INFORMATION INCLUDING THE NATURE OF THE COMPLAINT AND ACTION TAKEN TO MITIGATE THE COMPLAINT. VEPCO SHALL PUBLISH A TELEPHONE NUMBER WHERE COMPLAINTS WILL BE SCREENED AND SHIFTED TO THE POWER STATION IF THEY PERTAIN TO ITS OPERATION.

E13. APPLICANT SHALL ENSURE THAT OPERATING PERSONNEL SHALL CONTINUE THE PREVIOUSLY ESTABLISHED SPECIAL PROGRAM OF OPERATIONS, INSTRUMENTATION MAINTENANCE AND CALIBRATION AS ESTABLISHED IN THE CONSENT AGREEMENT AND ORDER OF THE STATE AIR POLLUTION CONTROL BOARD DATED APRIL 28, 1982. A QUALIFIED INDIVIDUAL APPOINTED BY THE STATION MANAGER SHALL BE RESPONSIBLE FOR THE FOLLOW-UP OF THIS WORK.

E14. UPON REQUEST BY THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, PLANT TOURS AND CLASSES OF INSTRUCTION SHALL BE CONDUCTED FOR COUNTY PERSONNEL TO FAMILIARIZE THEM WITH THE OPERATION OF THE STATION, LOCATION AND INTERPRETATION OF APPROPRIATE RECORDS, LOGS, INSTRUMENTS AND METERS, THE RESPONSIBILITIES AND AUTHORITY OF STATION OPERATING PERSONNEL, AND ANY OTHER SUBJECTS PERTINENT TO THE ENFORCEMENT OF THIS PERMIT. ANY ORAL PRESENTATION SHALL BE SUPPLEMENTED BY A WRITTEN OUTLINE FOR COUNTY FILES.

E15. PRIOR TO ANY TEST BURNS USING A SOLID FUEL OTHER THAN COAL, VEPCO SHALL INFORM, AND SECURE APPROVAL IN WRITING FROM, THE STATE AIR POLLUTION CONTROL BOARD AND THE BOARD OF SUPERVISORS OF THEIR INTENTION TO CONDUCT A TEST AND THE SPECIFICS OF THE TEST. THIS SHALL INCLUDE TIME OF TEST, DURATION, NATURE OF FUEL TO BE TESTED, AND SAFEGUARDS EMPLOYED TO MINIMIZE EMISSIONS. DURING SUCH TESTS OPACITY AND SULFUR DIOXIDE EMISSIONS SHALL NOT EXCEED APPLICABLE EMISSION LIMITATIONS ESTABLISHED BY ALL PARTIES. TEST BURN RESULTS SHALL BE FORWARDED TO ALL PARTIES. ALL ZONING REGULATIONS SHALL BE ADHERED TO.

E16. TRANSPORT, HANDLING AND DISPOSAL OF FLY ASH, BOTTOM ASH, COVER MATERIAL, AND OTHER PARTICULATE BYPRODUCTS AND WORKING OF THE ACTIVE OR INACTIVE PORTIONS OF THE COAL PILE, OTHER THAN AT THE POINT OF UNLOADING RAIL CARS SHALL BE NORMALLY AND PRIMARILY CONDUCTED ONLY DURING DAYLIGHT HOURS. THIS CONDITION RECOGNIZES THE NEED TO PERIODICALLY HANDLE COAL AT THE PLANT AT OTHER TIMES, WHILE SIMULTANEOUSLY NOTING THE PERFORMANCE STANDARD OF NOT DISRUPTING THE NORMAL LIVES OF SURROUNDING RESIDENTS. SHOULD SUCH DISRUPTIONS OCCUR, THE BOARD MAY CONSIDER FURTHER RESTRICTIONS OF HOURS OF COAL HANDLING.

E17. BOND, LETTER OF CREDIT, OR OTHER FORM OF SURETY APPROVED BY THE COUNTY ATTORNEY AS TO FORM AND AMOUNT SHALL BE REQUIRED TO ENSURE COMPLIANCE WITH ALL CONDITIONS IMPOSED BY THE BOARD OF SUPERVISORS.

E18. INSOFAR AS THEY PERTAIN DIRECTLY OR INDIRECTLY TO THE STORAGE, HANDLING, TRANSPORT AND/OR DISPOSAL OF COAL, FLY ASH, BOTTOM ASH AND OTHER PARTICULATE BYPRODUCTS OF SUCH COAL, SUBJECT TO THE TERMS AND CONDITIONS OF SECTION 10-1-4 OF THE COUNTY ZONING ORDINANCE, A VIOLATION OF ANY STATE OR FEDERAL LAW OR REGULATION IN THE DESIGN, CONSTRUCTION OR OPERATION OF THE YORKTOWN POWER STATION EITHER BY THE APPLICANT OR ITS AGENT, SHALL CONSTITUTE A VIOLATION OF THE TERMS OF THIS USE PERMIT.

E19. THE APPLICANT SHALL BE RESPONSIBLE FOR SECURING APPROVAL OF THIS PROJECT UNDER THE TERMS OF THE SITE PLANT ELEMENT OF THE COUNTY ZONING ORDINANCE. NOTHING HEREIN SHALL EXCUSE THE APPLICANT FROM THE TERMS OF ANY COUNTY ORDINANCE.

E20. ALL RECORDS OF TEST RESULTS AND OBSERVATIONS MADE IN CONJUNCTION WITH THE OPERATION OF THE PLANT AND ITS SEVERAL COMPONENTS, INCLUDING THE ASH DISPOSAL SITE, UNDER THE TERMS OF THIS USE PERMIT SHALL BE MADE AVAILABLE TO THE COUNTY ADMINISTRATOR, OR HIS DESIGNATE DEPUTY, UPON REQUEST. ALL RECORDS OF TESTS AND INSPECTIONS SHALL BE RECORDED AND MAINTAINED THROUGHOUT THE LIFE OF THE FILL, AND TRANSFERRED TO THE COUNTY UPON TRANSFER OF THE PROPERTY.

E21. (1) FAILURE BY VEPCO TO COMPLY WITH ANY TERM OR CONDITION OF THIS PERMIT SHALL BE CAUSE FOR REVOCATION OF THE PERMIT BY THE BOARD OF SUPERVISORS, AFTER NOTICE AND HEARING AS REQUIRED BY CHAPTER 11, TITLE 15.1, CODE OF VIRGINIA (1950), AS AMENDED.

(2) THE COUNTY ADMINISTRATOR SHALL REPORT TO THE BOARD OF SUPERVISORS ANY FAILURE BY VEPCO TO COMPLY WITH THE TERMS AND CONDITIONS OF THIS PERMIT. SUCH REPORT SHALL BE MADE NO LATER THAN THE REGULAR BOARD MEETING NEXT IMMEDIATELY FOLLOWING THE ADMINISTRATOR'S DETERMINATION THAT SUCH A FAILURE TO COMPLY HAS OCCURRED.

(3)A. IF THE COUNTY ADMINISTRATOR DETERMINES THAT ANY FAILURE TO COMPLY WITH THE TERMS AND CONDITIONS OF THIS PERMIT IS CAUSING OR WILL CAUSE, IF ALLOWED TO CONTINUE, SERIOUS HARM TO THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS, OR THAT SUCH FAILURE TO COMPLY CONSTITUTES OR WILL CONSTITUTE, IF ALLOWED TO CONTINUE, A PUBLIC NUISANCE, THEN THE COUNTY ADMINISTRATOR SHALL NOTIFY THE VEPCO PLANT MANAGER OR ANY PERSON ACTING IN HIS STEAD OF SUCH DETERMINATION. UPON RECEIPT OF SUCH NOTICE, THE PLANT MANAGER OR THE PERSON ACTING IN HIS STEAD SHALL IMMEDIATELY NOTIFY THE COUNTY ADMINISTRATOR OF ALL MEASURES TAKEN BY VEPCO TO PUT THE PLANT BACK IN COMPLIANCE.

IF THE COUNTY ADMINISTRATOR DETERMINES THAT SUCH MEASURES ARE ADEQUATE TO PREVENT SERIOUS HARM TO THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS, OR TO PREVENT A PUBLIC NUISANCE, HE SHALL REQUIRE VEPCO TO GIVE THE NOTIFICATION REQUIRED IN CONDITION D2 OF THIS PERMIT IF THAT CONDITION IS OTHERWISE APPLICABLE. IF THE COUNTY ADMINISTRATOR DETERMINES THAT THERE HAS BEEN NO TIMELY RESPONSE OR THAT THE MEASURES TAKEN BY VEPCO ARE NOT ADEQUATE TO PREVENT SERIOUS HARM TO THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS OR TO PREVENT A PUBLIC NUISANCE, HE SHALL ISSUE AN ORDER TO VEPCO TEMPORARILY SUSPENDING OPERATION OF AS MUCH OF THE PLANT OR ANY OTHER ACTIVITY AS IS NECESSARY TO PREVENT SERIOUS HARM TO THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS, OR TO PREVENT A PUBLIC NUISANCE.

UPON ISSUANCE OF SUCH AN ORDER, THE COUNTY ADMINISTRATOR SHALL ALSO CAUSE TO BE PUBLISHED NOTICE OF A HEARING TO CONSIDER WHETHER THE BOARD OF SUPERVISORS SHALL REVOKE THIS PERMIT. SAID HEARING SHALL BE SCHEDULED NO LATER THAN 14 DAYS AFTER ISSUANCE OF THE TEMPORARY SUSPENSION ORDER AND SHALL BE A JOINT MEETING OF THE PLANNING COMMISSION AND THE BOARD.

THE COUNTY ADMINISTRATOR MAY ENFORCE HIS SUSPENSION ORDER BY INJUNCTION OR OTHER APPROPRIATE ACTION.

(3)B. IMMEDIATELY UPON ISSUANCE OF A SUSPENSION ORDER UNDER SECTION E21(3A) OF THIS PERMIT, THE COUNTY ADMINISTRATOR SHALL NOTIFY ALL MEMBERS OF THE BOARD OF SUPERVISORS OF HIS ACTION AND HE SHALL SCHEDULE A SPECIAL MEETING OF THE BOARD OF SUPERVISORS. SAID MEETING SHALL OCCUR NO LATER THAN 6 DAYS AFTER ISSUANCE OF THE SUSPENSION ORDER. AT SAID MEETING THE BOARD SHALL HEAR EVIDENCE FROM THE COUNTY ADMINISTRATOR AND VEPCO TO DETERMINE WHETHER THE GROUNDS SUPPORTING THE SUSPENSION ORDER, OR OTHER GROUNDS OF SIMILAR GRAVITY, CONTINUE TO EXIST. IF SUCH GROUNDS ARE DETERMINED TO EXIST, THE BOARD SHALL CONTINUE THE SUSPENSION UNTIL ITS REVOCATION HEARING. IF SUCH GROUNDS ARE DETERMINED NO LONGER TO EXIST, OR TO BE NOT SUFFICIENT TO POSE SERIOUS HARM TO THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS, OR TO BE A PUBLIC NUISANCE, THE SUSPENSION ORDER SHALL BE RESCINDED.

ANY TIME AFTER THE BOARD OF SUPERVISORS HAS DETERMINED PURSUANT TO THIS PARAGRAPH TO CONTINUE THE SUSPENSION ORDER OF THE COUNTY ADMINISTRATOR, THE BOARD MAY RECONSIDER ITS DECISION UPON EITHER ITS OWN MOTION OR THAT OF VEPCO.

THE BOARD OF SUPERVISORS, UPON RECEIPT OF THE RECOMMENDATIONS OF THE PLANNING COMMISSION, AND AFTER HEARING EVIDENCE AT THE PUBLIC HEARING SCHEDULED PURSUANT TO E21 (3A), SHALL DETERMINE WHETHER TO REVOKE THIS PERMIT, OR TO ADD CONDITIONS DEEMED NECESSARY IN LIGHT OF THE SUSPENSION ORDER TO PROTECT THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS OR TO PREVENT A PUBLIC NUISANCE.

E22. THE COUNTY ADMINISTRATOR, OR HIS DESIGNATED DEPUTY, HAS AUTHORITY TO ENTER THE PLANT PREMISES AND MAKE SPOT INSPECTIONS ON AN UNANNOUNCED BASIS.

E23. ANY SPECIFICATIONS, TESTS, OR PROCEDURES REQUIRED UNDER THIS PERMIT SHALL BE INCORPORATED INTO THE DESIGN, CONSTRUCTION AND OPERATION OF THE PLANT AND ITS SEVERAL COMPONENTS. IN THE EVENT OF A CONFLICT BETWEEN A REQUIREMENT OR CONDITION SPECIFIED HEREIN AND A REFERENCED DOCUMENT OR DRAWING, THE MORE RESTRICTIVE AND PROTECTIVE MEASURE WILL GOVERN.

E24. THE BOARD OF SUPERVISORS SHALL CONDUCT AN ANNUAL REVIEW OF THIS PERMIT. PURSUANT TO SUCH REVIEW, IT MAY AMEND THIS PERMIT AS ITS DEEMS NECESSARY TO PROTECT THE HEALTH, SAFETY AND WELFARE OF COUNTY RESIDENTS OR TO PREVENT A PUBLIC NUISANCE. SUCH AMENDMENT TO THE PERMIT SHALL BE MADE AFTER NOTICE AND PUBLIC HEARING AS REQUIRED IN ARTICLE 16 OF THE ZONING ORDINANCE OF YORK COUNTY, AS AMENDED.

E25. THE COUNTY ADMINISTRATOR MAY ENFORCE THE TERMS OF THIS PERMIT BY INJUNCTION OF ANY OTHER APPROPRIATE ACTION.

BE IT FURTHER RESOLVED THAT PRIOR TO THE ISSUANCE OF A LAND DISTURBING ACTIVITY PERMIT FOR THE VERTICAL EXPANSION PROJECT PORTION OF THE FACILITY, THE APPLICANT SHALL SUBMIT EVIDENCE TO THE COUNTY THAT 1) THE FEDERAL AVIATION ADMINISTRATION (FAA) HAS MADE A DETERMINATION IN ACCORDANCE WITH THE PROVISIONS SET FORTH IN SUBPART B OF FEDERAL AVIATION REGULATIONS PART 77 - OBJECTS AFFECTING NAVIGABLE AIRSPACE, THAT THE PROPOSED CONSTRUCTION WILL NOT BE A HAZARD TO AIR NAVIGATION, OR 2) ALL MODIFICATIONS RECOMMENDED BY THE FAA TO MITIGATE ANY POTENTIAL HAZARD TO AIR NAVIGATION HAVE BEEN MADE.

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
1	12/09/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL

Daniel McGrath
DANIEL P. McGRATH
Lic. No. 040703
12/14/18

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
USE PERMIT UP 739-08 CONDITIONS

PROJECT NO.
123-96405

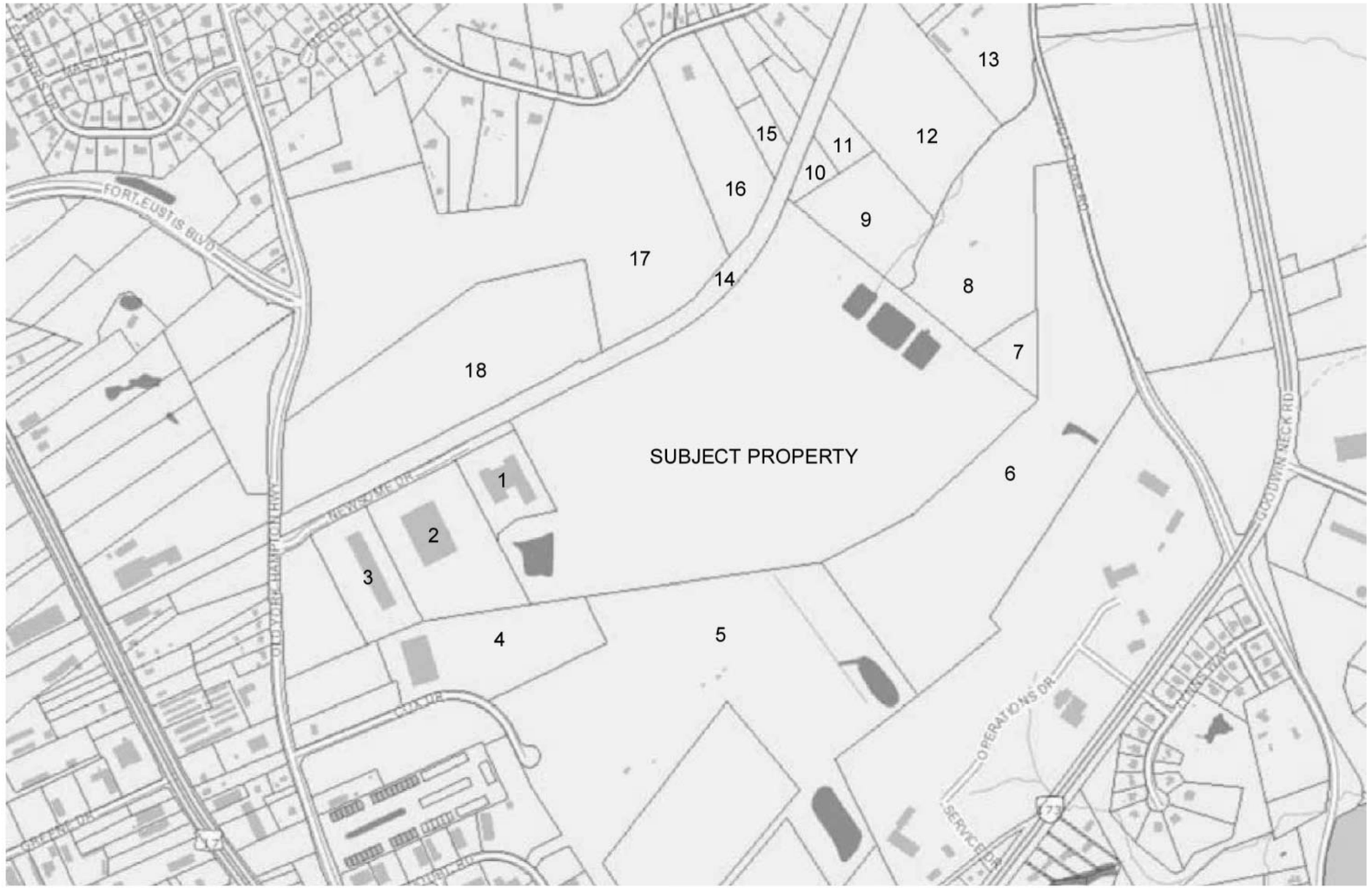
DATE:
12/09/2015

REV.
1

2 of 22

DRAWING
2

0 1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D



PROPERTY MAP

ADJACENT PROPERTY INFORMATION

NUMBER	OWNER NAME	ZONING	GPIN	MAP NUMBER
1	RYSON DEV LTD PART	IG : General Industrial	R08a-2304-2699	24-79-00-003
2	TRAVAINI PUMPS USA INC	IG : General Industrial	R08c-1984-2350	24-79-00-002
3	S & T COMMERCIAL CABINETS LLC	IG : General Industrial	R08c-1551-2191	24-79-00-001B
4	COX S B INC	IG : General Industrial	R08c-2217-1801	24-87-00-000C
5	COUNTY OF YORK	IGWL : General Industrial\Limited Industrial	R08d-3268-1358	24-00-00-181
6	YORK PROPERTIES LLC PLV PLAT PARCEL A	IG : General Industrial	S08a-0172-3054	24-62-00-000A
7	WOLF TRAP ROAD PROPERTIES LLC	IG : General Industrial	S08a-0061-3407	24-00-00-258
8	WOLF TRAP ROAD PROPERTIES LLC	IG : General Industrial	R08b-4924-4060	24-00-00-259
9	VIRGINIA ELECTRIC & POWER CO	IG : General Industrial	R08b-4314-4085	24-00-00-273
10	YORK INDUSTRIAL PARK LLC	IG : General Industrial	R08b-3983-4431	24-00-00-274E
11	YORK INDUSTRIAL PARK LLC	IG : General Industrial	R08b-4118-4558	24-00-00-274F
12	YORK INDUSTRIAL PARK LLC	IG : General Industrial	R08b-4407-4898	24-00-00-272B
13	YORK INDUSTRIAL PARK LLC	IG : General Industrial	R09d-4926-0166	24-00-00-260
14	CSX RAILROAD		RR6	
15	JOSHUA & AMANDA SERENCSES	RR : Rural Residential	R08b-3770-4431	24-00-00-274G
16	CLAYTON, ERIC J ETUX	IG\RR : General Industrial\Rural Residential	R08b-3479-4486	24-00-00-275A
17	VIRGINIA ELECTRIC & POWER CO	IG\RR : General Industrial\Rural Residential	R08a-2224-3788	24-00-00-204
18	VIRGINIA ELECTRIC & POWER CO	IG : General Industrial	R08a-1960-3271	24-00-00-204B
PROJECT	VIRGINIA ELECTRIC & POWER CO	IG : General Industrial	R08b-3188-2814	24-00-00-204C

SOURCE: YORK COUNTY PROPERTY INFORMATION SYSTEM. DATA COLLECTED ON JUNE 19, 2015.

EXISTING VEGETATION DESCRIPTION AND LOCATION:

NO HERITAGE, MEMORIAL, OR SPECIMEN TREES HAVE BEEN IDENTIFIED AT THE FACILITY. ADDITIONALLY, NO TREES IN THE EXISTING 50' WIDE VEGETATIVE BUFFER ARE PROPOSED FOR REMOVAL. ALL CONSTRUCTION AT THE FACILITY WILL TAKE PLACE IN PREVIOUSLY DISTURBED AREAS.

THE EXISTING WOOD LINE IS SHOWN ON DRAWING 4 OF THE PLAN SET.
THE EXISTING VEGETATIVE BUFFER AT THE FACILITY CONSISTS OF A MIX OF DECIDUOUS AND HARDWOOD TREES CONSISTING PRIMARILY OF:
PINUS TAEDA (LOBLOLLY PINE)
SWEET GUM (LIQUIDAMBAR STYRACIFLUA)
BLACK WILLOW (SALIX NIGRA)
SOUTHERN RED OAK (QUERCUS FALCATA)
WHITE OAK (QUERCUS ALBA)
VIRGINIA PINE (PINUS VIRGINIANA)
BLACK GUM (NYSSA SYLVATICA)
CUCUMBER-TREE (ACUMINATA)
FLOWERING DOGWOOD (CORNUS FLORIDA)
SWAMP CHESTNUT OAK (QUERCUS MICHAUXII)

ADDITIONALLY, TWO SPECIES OF SHRUBS ARE FOUND IN THE BUFFER:
SUMAC (RHUS SPECIES)
WAXMYRTLE (MYRICA CERIFERA)

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER

GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PROPERTY INFORMATION

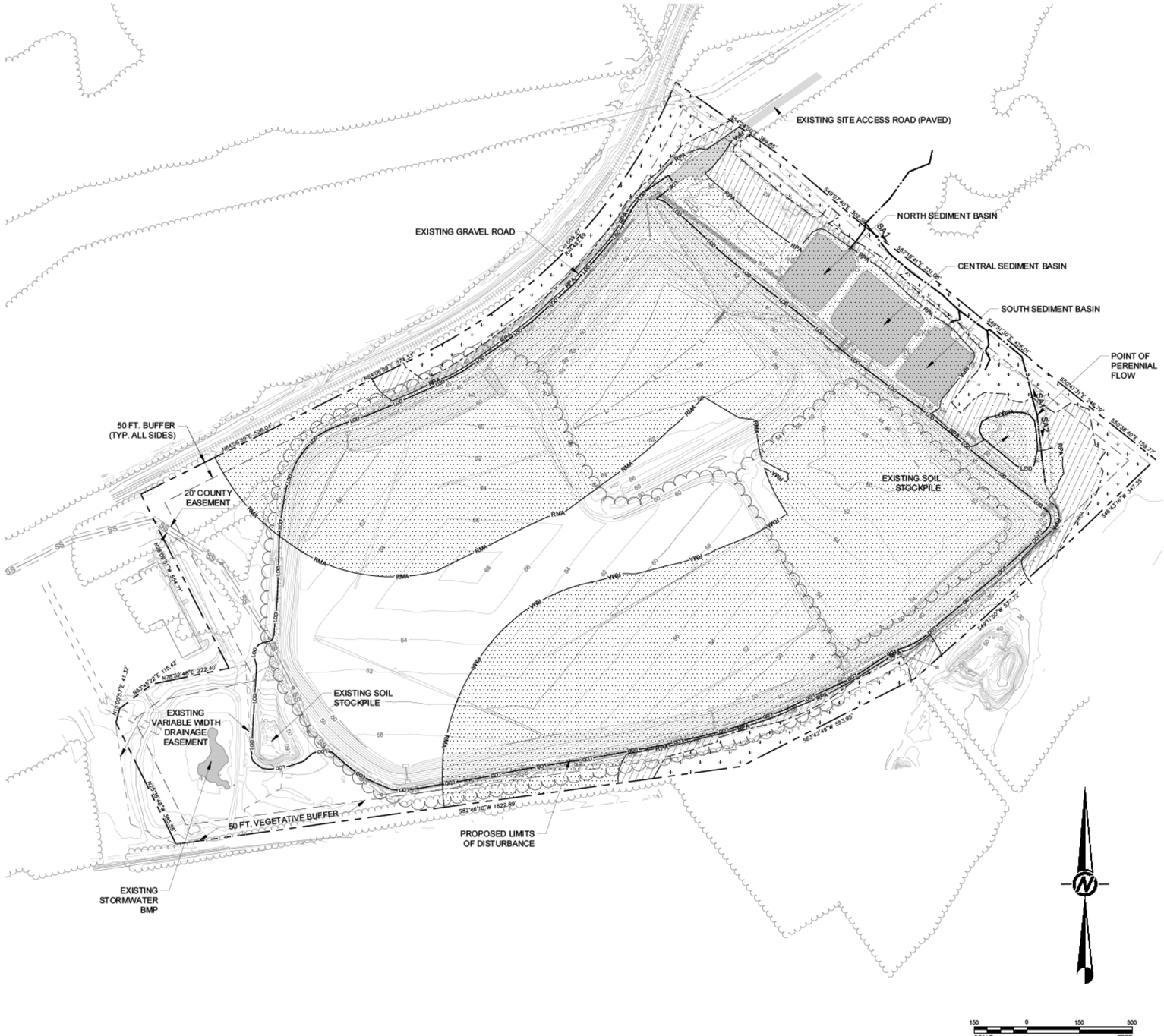
PROJECT NO.
123-96405

DATE:
12/09/2015

REV.
1

3 of 22

DRAWING
3



LEGEND

- EXISTING CONTOURS (2 FOOT INTERVAL)
- PROPERTY LINE
- EXISTING SANITARY SEWER
- LIMITS OF WOODED AREA
- STREAM
- PROPOSED LIMITS OF DISTURBANCE
- WETLAND AREA (SEE NOTE 6 BELOW)
- RESOURCE MANAGEMENT AREA (RMA)
- RESOURCE PROTECTION AREA (RPA)
- EXISTING MANMADE POND
- EXISTING PAVED ROAD
- EXISTING GRAVEL ROAD

NOTES

1. THERE ARE NO KNOWN OR SUSPECTED CULTURAL RESOURCES ON THE SITE.
2. REVISED TOPOGRAPHY (PHASE A CLOSURE) PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2018.
3. TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED JULY13, 2015.
4. TOPOGRAPHY DATA (EXCLUDING PHASE A CLOSURE & CELL 12) PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
5. WOODLAND COVER INFORMATION COMPILED FROM YORK COUNTY GIS.
6. WETLANDS AND WATERS OF THE US DELINEATED BY GOLDER ASSOCIATES INC. DECEMBER 8 AND 9, 2015.
7. WETLAND FLAGS AND SAMPLE POINT LOCATIONS WERE RECORDED USING GLOBAL POSITIONING SYSTEMS CAPABLE OF SUB-METER ACCURACY.
8. THE WETLAND BOUNDARY HAS NOT BEEN CONFIRMED BY THE US ARMY CORPS OF ENGINEERS.
9. THIS PROPERTY APPEARS TO BE LOCATED IN FLOOD ZONE X ON FEMA MAP NO.'S 51199C0128D, 51199C0129D, 51199C0136D, AND 51199C0137D.REVISED FLOOD MAPS ARE DATED 1/16/15.
10. NO LAND DISTURBANCE IS PROPOSED IN WETLAND AREAS.

NATURAL RESOURCE AREAS ON SITE

LAND UNIT NAME	ACRES	% OF TOTAL
PARCEL	79.48	100
SLOPES > 20% AND < 30%	6.01	7.56
SLOPES > 30%	7.23	9.10
100-YEAR FLOODPLAIN	0	0
LAND BELOW 4' CONTOUR	0	0
JURISDICTIONAL WETLANDS	5.77	7.26
WATER FEATURES	2.11	2.65
UTILITY EASEMENTS	1.22	1.53
RPA & RMA	55.48	69.80
NATURAL HERITAGE RESOURCE AREAS *	0	0
WATERSHED MANAGEMENT PROTECTION DISTRICT	0	0

* AREAS IDENTIFIED IN NATURAL AREAS INVENTORY OF THE LOWER PENINSULA OF VIRGINIA, SECOND ANNUAL REPORT, OCTOBER 1990.

REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com
GOLDER

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
NATURAL RESOURCES INVENTORY

PROJECT NO.
123-96405

DATE:
12/09/2015

REV. 1

4 of 22

DRAWING 4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\PH - Phase B Permit Amendment\Active Drawings\123964050405.dwg

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- x — x — EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT

REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

35' COLONIAL PIPELINE CO RIGHT OF WAY
OFFICE TRAILER
SITE ACCESS ROAD (PAVED)
S54°24'50"E 369.85'
TRUCK WASH
36" RCP STORM DRAIN INV IN = 27.55 INV OUT = 25.43
24" CHDPE INV IN = 47.36 INV OUT = 32.85
ELEC. PANEL
AIR MONITORING STATION
LEACHATE FORCEMAIN TO HAMPTON ROADS SANITARY DISTRICT
(2) 24" RCP INV IN = 33.40 INV OUT = 30.40
S49°07'40"E 302.59'
TOP EL 27.30 SPILLWAY EL 26.60
VALVE
24" PIPE INV IN = 24.59 INV OUT = 23.83
L=1059.27'
R=482.69
6" DRAIN LINE
NORTH SEDIMENT BASIN W E = 26.55'
15" RCP STORM DRAIN INV IN = 29.82 INV OUT = 29.36
S52°18'41"E 231.08'
24" RCP INV IN = 27.24 INV OUT = 26.28
24" PIPE INV IN = 24.28 INV OUT = 23.94
VALVE
TOP EL 28.54 SPILLWAY EL 27.05
CENTRAL SEDIMENT BASIN W E = 26.63'
72" WELL GABION BASKET
PUMP STATION
SOUTH SEDIMENT BASIN W E = 25.68'
S49°51'30"E 426.01'
HAMPTON ROADS SANITATION DISTRICT 20' WIDE EASEMENT
SOIL STOCKPILE AREA
24" RCP INV IN = 28.07 INV OUT = 26.74
S50°41'31"E 246.79'
S50°38'40"E 159.77'
3" LEACHATE FORCEMAIN
(3) 36" RCP INV IN = 28.97 INV OUT = 28.74
S46°43'16"W 347.35'
EXISTING DRAINAGE DITCH
N64°06'59"E 374.33'
PHASE B CLOSURE 19.22 ACRES
50 FT. BUFFER (TYP. ALL SIDES)
N64°06'59"E 528.04'
20' COUNTY OF YORK SANITARY SEWER EASEMENT D.B. 967, PG. 844
N26°09'51"W 594.71'
EXISTING PHASE A (PREVIOUSLY CLOSED)
S49°11'50"W 577.72'
N15°00'57"E 41.32'
N53°45'22"E 115.42'
N78°52'48"E 222.40'
SOIL STOCKPILE AREA
EXISTING VARIABLE WIDTH DRAINAGE EASEMENT
WE = 41.70'
S63°42'49"W 553.95'
N25°35'48"W 355.55'
S82°46'10"W 1622.89'
50 FT. VEGETATIVE BUFFER
EXISTING DRAINAGE DITCH

SCALE 100 0 100 200 FEET

REV.	DATE	REVISION TO PHASE B GRADES	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018		KAL	KLL	DPM	
1	12/06/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	
REV.	MM/DD/YY	DESCRIPTION				

SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com
GOLDER

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
EXISTING CONDITIONS

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
2

5 of 22

DRAWING
5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Pw\ Production Data Files\Drawing Data Files\123-96405\04 - Phase B Permit Application\Active Drawings\123964050405.dwg

LEGEND

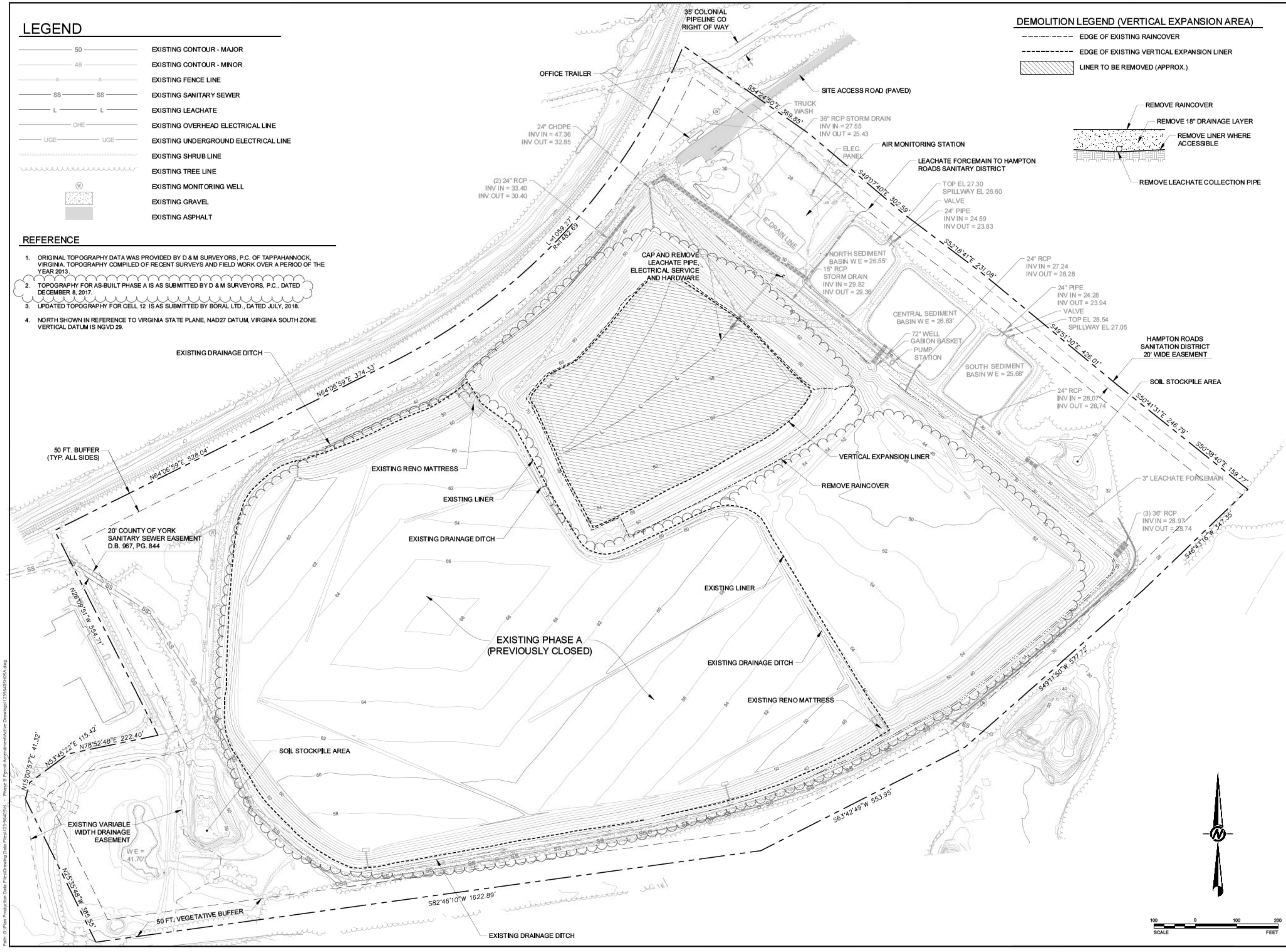
50	EXISTING CONTOUR - MAJOR
48	EXISTING CONTOUR - MINOR
x	EXISTING FENCE LINE
SS	EXISTING SANITARY SEWER
L	EXISTING LEACHATE
OHE	EXISTING OVERHEAD ELECTRICAL LINE
UGE	EXISTING UNDERGROUND ELECTRICAL LINE
	EXISTING SHRUB LINE
	EXISTING TREE LINE
	EXISTING MONITORING WELL
	EXISTING GRAVEL
	EXISTING ASPHALT

REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

DEMOLITION LEGEND (VERTICAL EXPANSION AREA)

	EDGE OF EXISTING RAINCOVER
	EDGE OF EXISTING VERTICAL EXPANSION LINER
	LINER TO BE REMOVED (APPROX.)



REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/09/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL: COMMONWEALTH OF VIRGINIA — DANIEL P. McGRATH Lic. No. 040703 — 12/14/18 — PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PHASE B VERTICAL EXPANSION DEMOLITION

PROJECT NO. 123-96405 DATE: 10/09/2018

REV. 2 6 of 22 DRAWING 5A

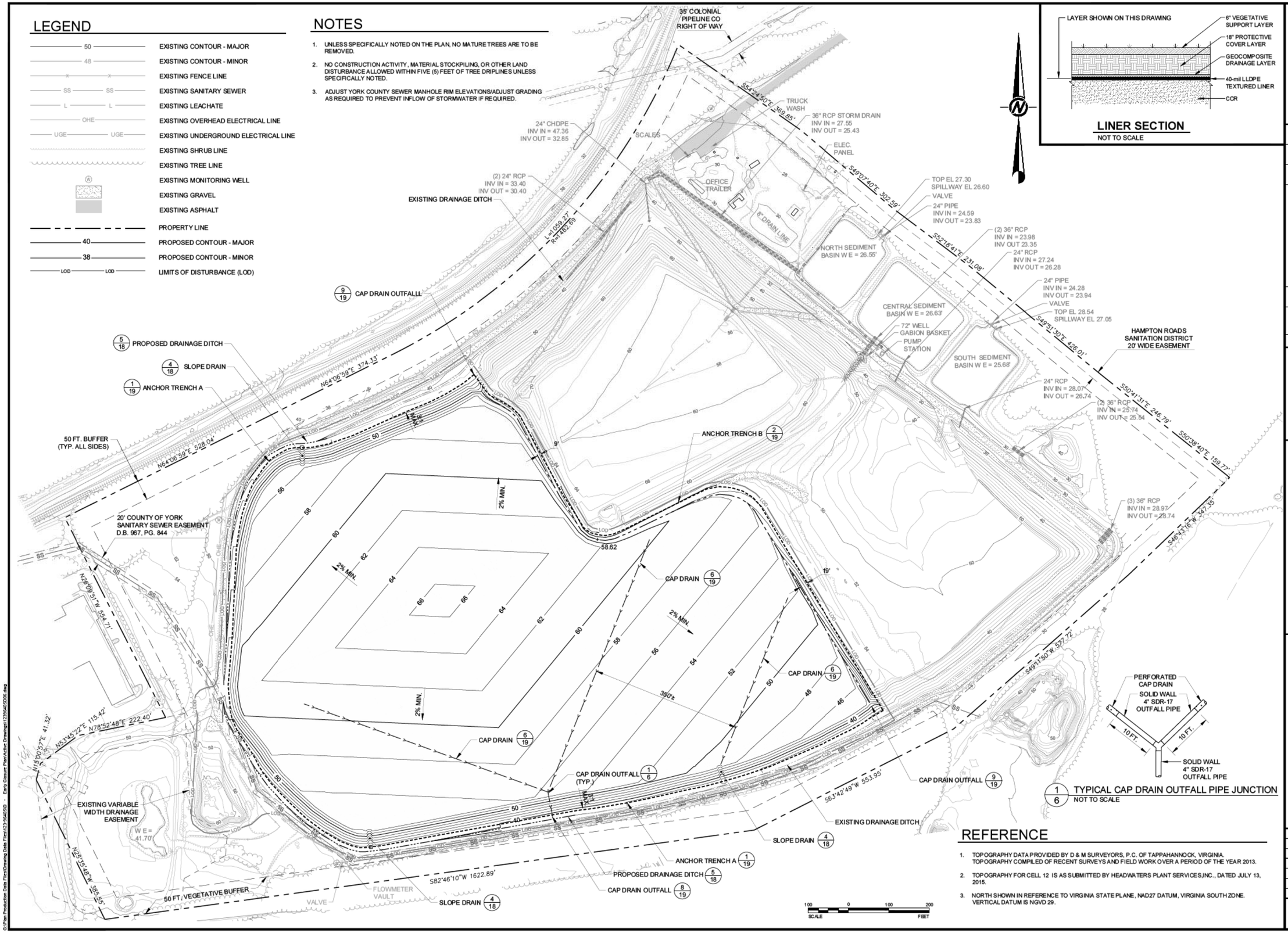
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- W — EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR
- LOD — LOD — LIMITS OF DISTURBANCE (LOD)

NOTES

1. UNLESS SPECIFICALLY NOTED ON THE PLAN, NO MATURE TREES ARE TO BE REMOVED.
2. NO CONSTRUCTION ACTIVITY, MATERIAL STOCKPILING, OR OTHER LAND DISTURBANCE ALLOWED WITHIN FIVE (5) FEET OF TREE DRIPLINES UNLESS SPECIFICALLY NOTED.
3. ADJUST YORK COUNTY SEWER MANHOLE RIM ELEVATIONS/ADJUST GRADING AS REQUIRED TO PREVENT INFLOW OF STORMWATER IF REQUIRED.



LINER SECTION
NOT TO SCALE

1/6 TYPICAL CAP DRAIN OUTFALL PIPE JUNCTION
NOT TO SCALE

REFERENCE

1. TOPOGRAPHY DATA PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED JULY 13, 2015.
3. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

Golder Associates

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	8/04/2016	KLL	ISSUED FOR CONSTRUCTION	KLL	DPM	JRD

COMMONWEALTH OF VIRGINIA — DONALD P. MCCARTHY — Lic. No. 040703 — 8/4/16 — PROFESSIONAL ENGINEER

PROJECT
DOMINION
YORKTOWN POWER STATION
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA
NELSON DISTRICT

TITLE
PHASE A
LINER GRADES

PROJECT No.		123-95405
FILE No.		1236405D06
REV. 1	SCALE	AS SHOWN
DESIGN	KLL	07-15-2015
CADD	ABM	07-22-2015
CHECK	JRD	07-31-15
REVIEW	DPM	07-31-15

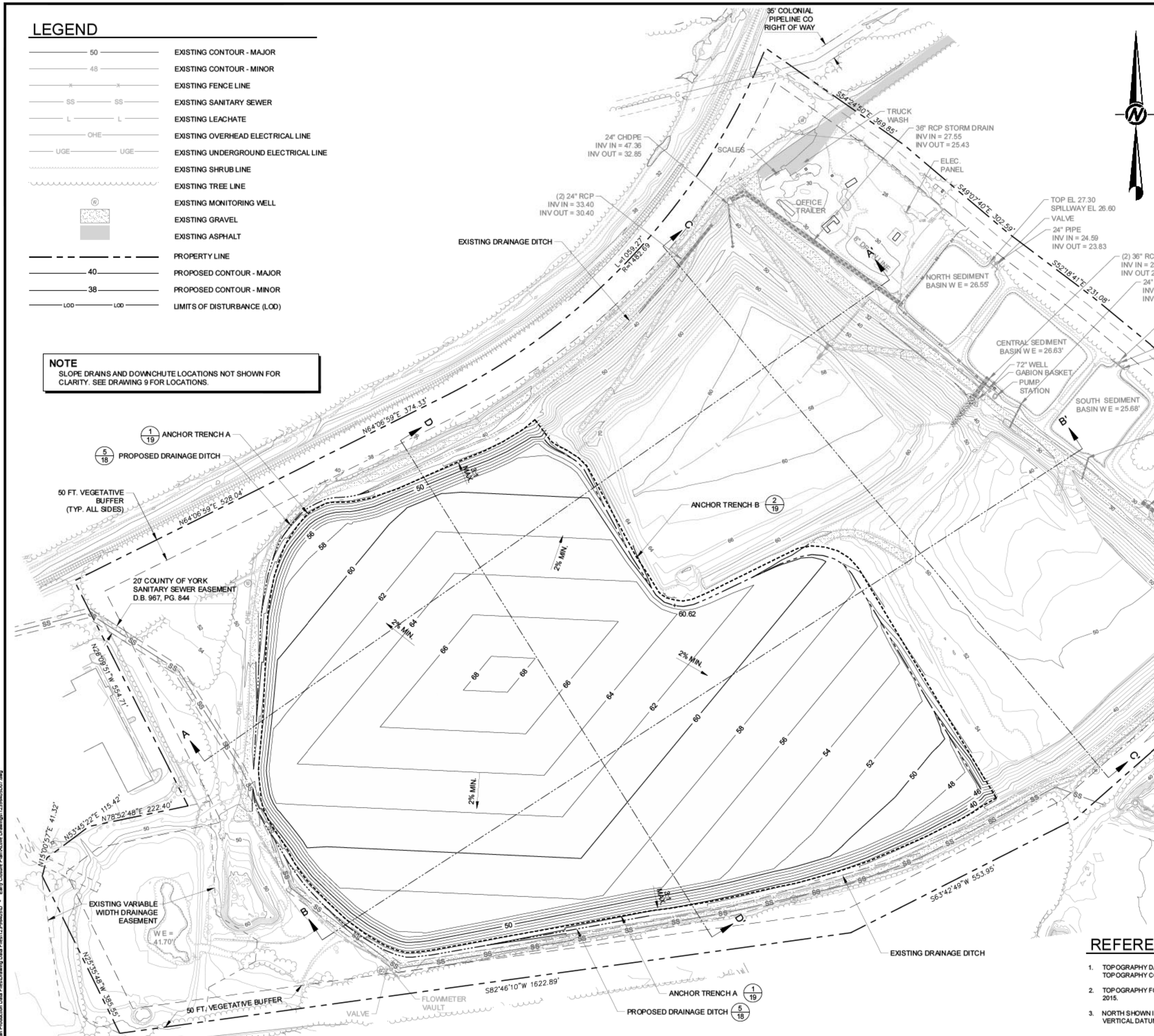
DRAWING 6

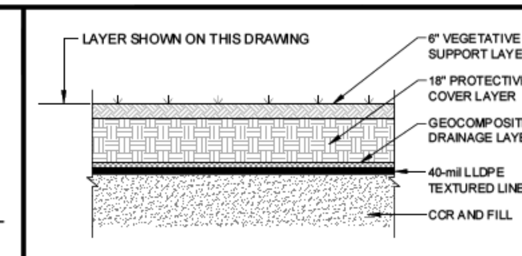
S:\Plan Production Data Files\Drawing Data Files\123-95405\D - Early Closure Plan\Active Drawings\1236405D06.dwg

LEGEND

50	EXISTING CONTOUR - MAJOR
48	EXISTING CONTOUR - MINOR
x	EXISTING FENCE LINE
SS	EXISTING SANITARY SEWER
L	EXISTING LEACHATE
OHE	EXISTING OVERHEAD ELECTRICAL LINE
UGE	EXISTING UNDERGROUND ELECTRICAL LINE
	EXISTING SHRUB LINE
	EXISTING TREE LINE
	EXISTING MONITORING WELL
	EXISTING GRAVEL
	EXISTING ASPHALT
	PROPERTY LINE
40	PROPOSED CONTOUR - MAJOR
38	PROPOSED CONTOUR - MINOR
LOD	LIMITS OF DISTURBANCE (LOD)

NOTE
SLOPE DRAINS AND DOWNCHUTE LOCATIONS NOT SHOWN FOR CLARITY. SEE DRAWING 9 FOR LOCATIONS.





LINER SECTION
NOT TO SCALE

REFERENCE

1. TOPOGRAPHY DATA PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED JULY 13, 2015.
3. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

Golder Associates

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	8/04/2016	KLL	ISSUED FOR CONSTRUCTION	KLL	DPM	JRD

COMMONWEALTH OF VIRGINIA DANIEL P. McGRATH Lic. No. 040703 8/4/16 PROFESSIONAL ENGINEER

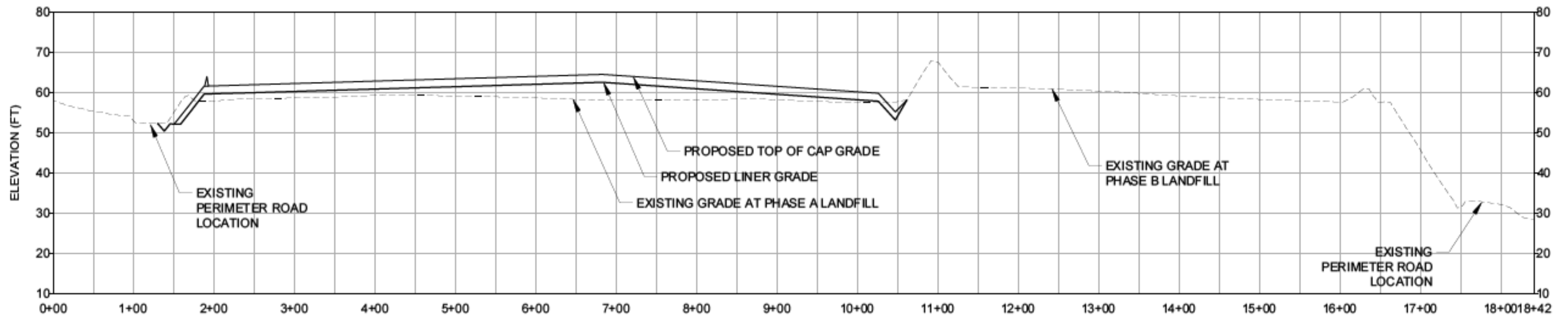
PROJECT
DOMINION
YORKTOWN POWER STATION
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA
NELSON DISTRICT

TITLE
PHASE A
FINISH GRADES

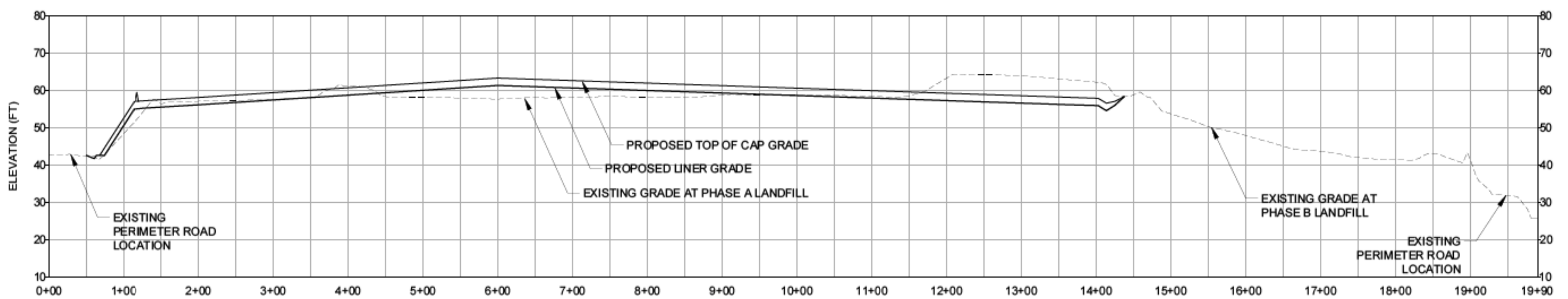
PROJECT No.			123-96405
FILE No.			12396405D07
REV.	1	SCALE	AS SHOWN
DESIGN	KLL		07-15-2015
CADD	ABM		07-22-2015
CHECK	JRD		07-31-15
REVIEW	DPM		07-31-15

DRAWING 7

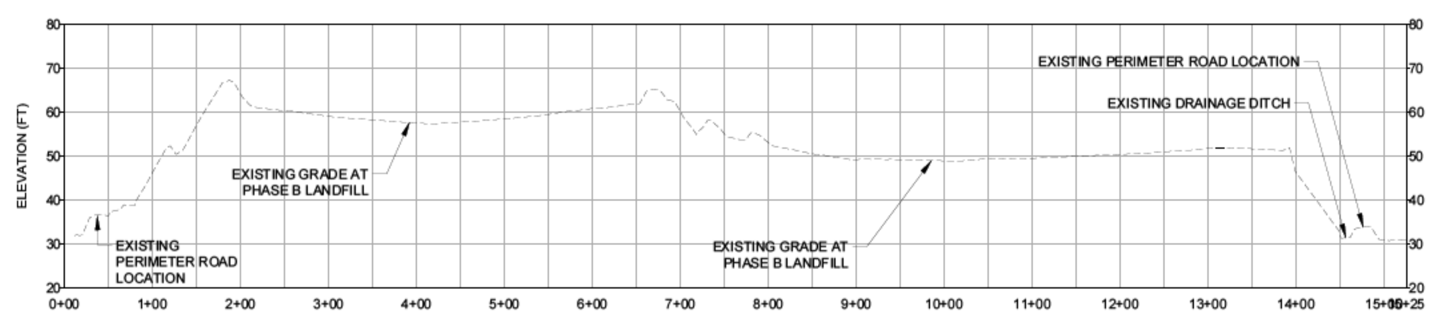
G:\Plan Production Data Files\Drawing Data Files\123-96405\D - Early Closure Plan\Active Drawings\12396405D07.dwg



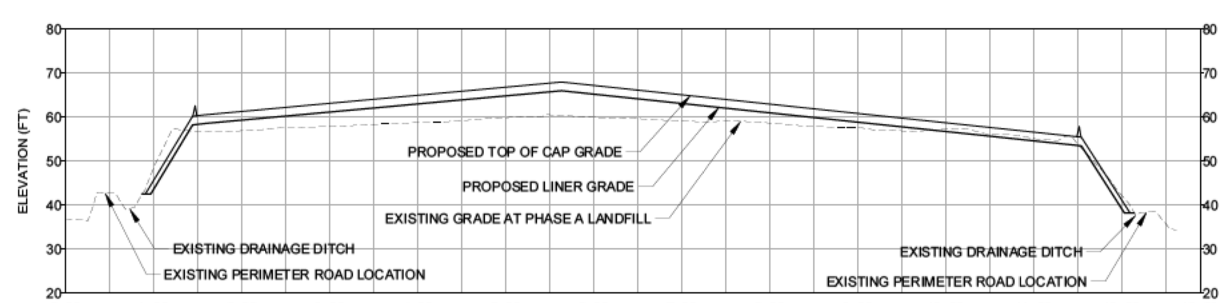
CROSS SECTION A - A'



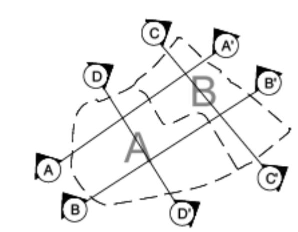
CROSS SECTION B - B'



CROSS SECTION C - C'



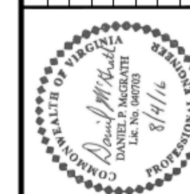
CROSS SECTION D - D'



CROSS SECTION KEY

Golder Associates

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	8/04/2016	KLL	ISSUED FOR CONSTRUCTION	KLL	DPM	JRD



PROJECT
DOMINION
YORKTOWN POWER STATION
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA
NELSON DISTRICT

TITLE
PHASE A
CROSS SECTIONS

PROJECT No.		123-96405
FILE No.		12396405D08
REV. 1	SCALE	AS SHOWN
DESIGN	KLL	07-15-2015
CADD	ABM	07-22-2015
CHECK	JRD	07-31-15
REVIEW	DPM	07-31-15

DRAWING 8

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR
- LOD — LOD — LIMITS OF DISTURBANCE (LOD)

35' COLONIAL PIPELINE CO RIGHT OF WAY

S54°24'50"E 369.85'

TRUCK WASH

36" RCP STORM DRAIN
INV IN = 27.55
INV OUT = 25.43

ELEC. PANEL

24" CHDPE
INV IN = 47.36
INV OUT = 32.85

SCALES

OFFICE TRAILER

8" DRAIN LINE

(2) 24" RCP
INV IN = 33.40
INV OUT = 30.40

L=1,059.27'
R=1,482.69'

S49°07'40"E 302.59'

TOP EL 27.30
SPILLWAY EL 26.60
VALVE
24" PIPE
INV IN = 24.59
INV OUT = 23.83

S52°18'41"E 231.08'

(2) 36" RCP
INV IN = 23.98
INV OUT 23.35

24" RCP
INV IN = 27.24
INV OUT = 26.28

NORTH SEDIMENT BASIN W E = 26.55'

24" PIPE
INV IN = 24.28
INV OUT = 23.94

VALVE

TOP EL 28.54
SPILLWAY EL 27.05

S49°51'10"E 426.01'

HAMPTON ROADS SANITATION DISTRICT 20' WIDE EASEMENT

CENTRAL SEDIMENT BASIN W E = 26.63'

72" WELL GABION BASKET

PUMP STATION

SOUTH SEDIMENT BASIN W E = 25.68'

24" RCP
INV IN = 28.07
INV OUT = 26.74

(2) 36" RCP
INV IN = 25.74
INV OUT = 25.54

S50°41'31"E 246.79'

S50°28'40"E 159.77'

(3) 36" RCP
INV IN = 28.97
INV OUT = 28.74

S46°43'16"W 347.35'

S49°17'50"W 577.72'

EXISTING DRAINAGE DITCH (6/18)

6/18 EXISTING DRAINAGE DITCH

RENO MATTRESS SLOPE PROTECTION

8/18 STILLING BASIN SB-3

3/18 SLOPE DRAIN

7/18 SLOPE DRAIN DROP INLET

N64°06'59"E 374.33'

N64°06'59"E 528.04'

5/18 PROPOSED "V" DRAINAGE DITCH

20' COUNTY OF YORK SANITARY SEWER EASEMENT D.B. 967, PG. 844

1/18 TOP DECK DIVERSION BERM

2/18 TOP DECK DIVERSION BERM

60.62

2/18 TOP DECK DIVERSION BERM

2/18 TOP DECK DIVERSION BERM

1/18 TOP DECK DIVERSION BERM

1/18 TOP DECK DIVERSION BERM

N28°09'51"W 554.71'

N14°00'57"E 41.12'

N53°45'27"E 115.42'

N78°52'48"E 222.40'

EXISTING VARIABLE WIDTH DRAINAGE EASEMENT

W E = 41.70

7/18 SLOPE DRAIN DROP INLET

3/18 SLOPE DRAIN

N25°55'48"W 185.55'

50 FT. VEGETATIVE BUFFER

S82°46'10"W 1622.89'

FLOWMETER VAULT

VALVE

8/18 STILLING BASIN SB-2

5/18 PROPOSED "V" DRAINAGE DITCH

S63°42'49"W 553.95'

9/19 RENO MATTRESS SLOPE PROTECTION

7/18 SLOPE DRAIN DROP INLET

3/18 SLOPE DRAIN

8/18 STILLING BASIN SB-1

100 0 100 200
SCALE FEET

REFERENCE

1. TOPOGRAPHY DATA PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED JULY 13, 2015.
3. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

Golder Associates

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	JRD
0	8/04/2016	KLL	ISSUED FOR CONSTRUCTION	KLL	DPM	RYW

COMMONWEALTH OF VIRGINIA — DONALD P. MCCARTH — Lic. No. 040703 — PROFESSIONAL ENGINEER — 8/4/16

PROJECT

DOMINION
YORKTOWN POWER STATION
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA
NELSON DISTRICT

TITLE

PHASE A
STORMWATER
MANAGEMENT PLAN

PROJECT No.		123-95405
FILE No.		1239405D09
REV. 1	SCALE	AS SHOWN
DESIGN	KLL	07-15-2015
CADD	ABM	07-22-2015
CHECK	JRD	07-31-15
REVIEW	DPM	07-31-15

DRAWING 9

S:\Plan Production Data Files\Drawing Data Files\123-95405D - Early Closure Plan\Active Drawings\1239405D09.dwg

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR
- LOD — LOD — LIMITS OF DISTURBANCE (LOD)

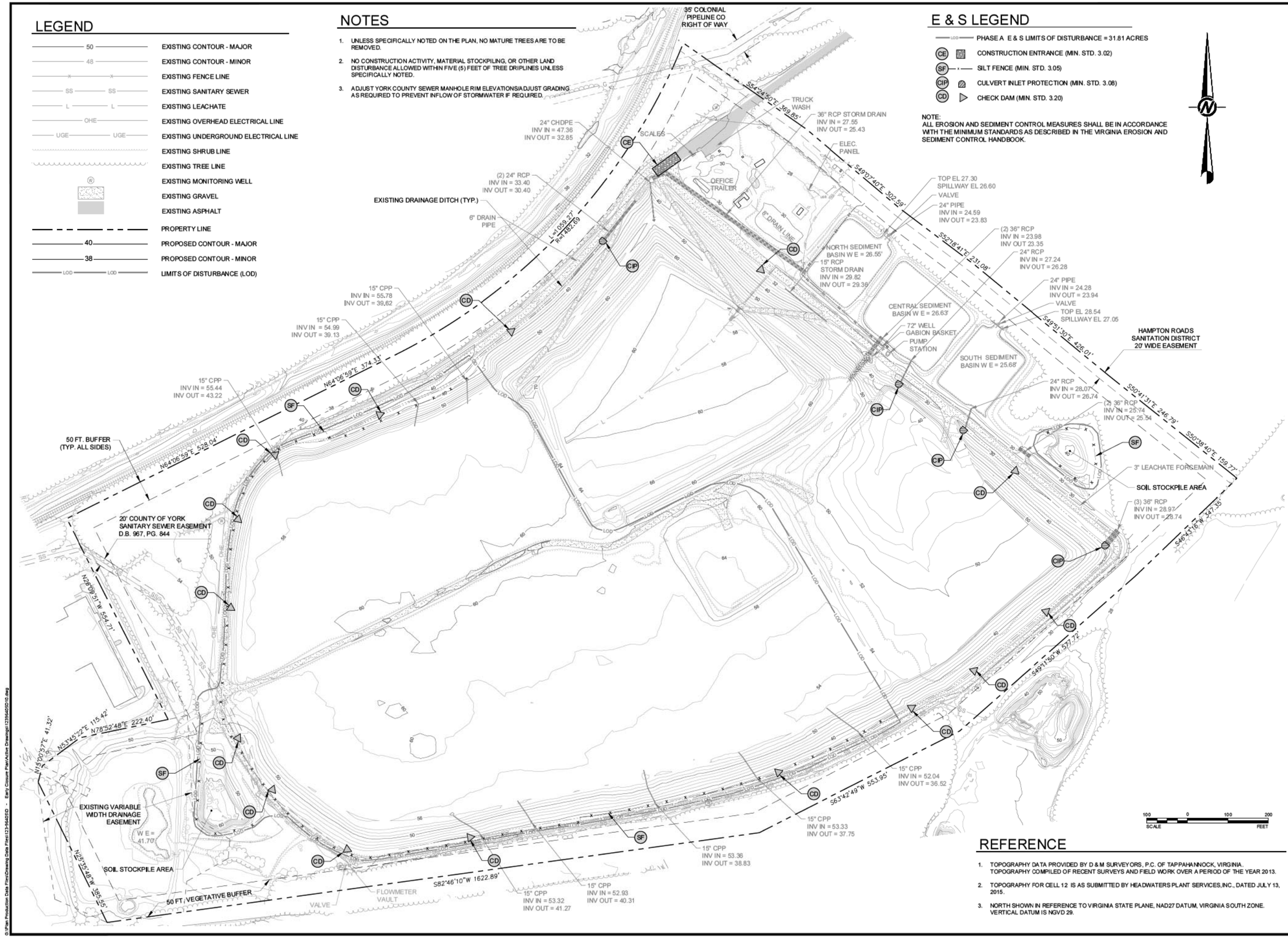
NOTES

1. UNLESS SPECIFICALLY NOTED ON THE PLAN, NO MATURE TREES ARE TO BE REMOVED.
2. NO CONSTRUCTION ACTIVITY, MATERIAL STOCKPILING, OR OTHER LAND DISTURBANCE ALLOWED WITHIN FIVE (5) FEET OF TREE DRIPLINES UNLESS SPECIFICALLY NOTED.
3. ADJUST YORK COUNTY SEWER MANHOLE RIM ELEVATIONS/ADJUST GRADING AS REQUIRED TO PREVENT INFLOW OF STORMWATER IF REQUIRED.

E & S LEGEND

- LOD — PHASE A E & S LIMITS OF DISTURBANCE = 31.81 ACRES
- CE — CONSTRUCTION ENTRANCE (MIN. STD. 3.02)
- SF — SILT FENCE (MIN. STD. 3.05)
- CIP — CULVERT INLET PROTECTION (MIN. STD. 3.08)
- CD — CHECK DAM (MIN. STD. 3.20)

NOTE:
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MINIMUM STANDARDS AS DESCRIBED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.



REFERENCE

1. TOPOGRAPHY DATA PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED JULY 13, 2015.
3. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

Golder Associates

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	JRD
0	8/04/2016	KLL	ISSUED FOR CONSTRUCTION	KLL	DPM	RYW

COMMONWEALTH OF VIRGINIA — DONALD P. MCCARTHY — Lic. No. 040703 — PROFESSIONAL ENGINEER — 8/4/16

PROJECT
DOMINION
YORKTOWN POWER STATION
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA
NELSON DISTRICT

TITLE
PHASE A
STAGE 1 EROSION AND SEDIMENT CONTROL PLAN

PROJECT No.		123-96405
FILE No.		1239640SD10
REV. 1	SCALE	AS SHOWN
DESIGN	KLL	07-15-2015
CADD	ABM	07-22-2015
CHECK	JRD	07-31-15
REVIEW	DPM	07-31-15

DRAWING 10

S:\Plan Production Data Files\Drawing Data Files\123-96405D10 - Early Closure Plan\Active Drawings\1239640SD10.dwg

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- W — EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR
- LOD — LOD — LIMITS OF DISTURBANCE (LOD)
- EC-3 MATTING
- EC-2 MATTING

E & S LEGEND

- LOD — PHASE A E & S LIMITS OF DISTURBANCE = 31.81 ACRES
- CE — CONSTRUCTION ENTRANCE (MIN. STD. 3.02)
- SF — SILT FENCE (MIN. STD. 3.05)
- CIP — CULVERT INLET PROTECTION (MIN. STD. 3.08)
- CD — CHECK DAM (MIN. STD. 3.20)
- B/M — EROSION CONTROL MATTING (MIN. STD. 3.36)
- PS MU — PERMANENT SEEDING/MULCH (MIN. STD. 3.34/3.35)

NOTE:
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MINIMUM STANDARDS AS DESCRIBED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

35' COLONIAL PIPELINE CO RIGHT OF WAY
S54°24'50"E 369.85'
TRUCK WASH
36" RCP STORM DRAIN
INV IN = 27.55
INV OUT = 25.43
24" CHDPE
INV IN = 47.36
INV OUT = 32.85
SCALES
ELEC. PANEL
S49°07'40"E 302.59'
OFFICE TRAILER
(2) 24" RCP
INV IN = 33.40
INV OUT = 30.40
EXISTING DRAINAGE DITCH (TYP.)
L=1,059.27'
R=1,482.69'
6" DRAIN LINE
NORTH SEDIMENT BASIN W E = 26.55'
TOP EL 27.30
SPILLWAY EL 26.60
VALVE
24" PIPE
INV IN = 24.59
INV OUT = 23.83
S52°18'41"E 231.08'
(2) 36" RCP
INV IN = 23.98
INV OUT 23.35
24" RCP
INV IN = 27.24
INV OUT = 26.28
RENO MATTRESS SLOPE PROTECTION
CENTRAL SEDIMENT BASIN W E = 26.63'
72" WELL
GABION BASKET
PUMP STATION
24" PIPE
INV IN = 24.28
INV OUT = 23.94
VALVE
TOP EL 28.54
SPILLWAY EL 27.05
S49°51'10"E 426.01'
HAMPTON ROADS SANITATION DISTRICT 20' WIDE EASEMENT
SOUTH SEDIMENT BASIN W E = 25.68'
24" RCP
INV IN = 28.07
INV OUT = 26.74
S50°41'31"E 246.79'
(2) 36" RCP
INV IN = 25.74
INV OUT = 25.54
S50°28'40"E 159.77'
50 FT. BUFFER (TYP. ALL SIDES)
N64°06'59"E 528.04'
N64°06'59"E 374.33'
EC-3 MATTING (2/19)
(TYPICAL ON ALL 3:1 SLOPES)
SOIL STOCKPILE AREA
(3) 36" RCP
INV IN = 28.97
INV OUT = 28.74
S46°43'16"W 347.35'
20' COUNTY OF YORK SANITARY SEWER EASEMENT D.B. 967, PG. 844
N28°09'51"W 554.71'
EXISTING DRAINAGE DITCH (TYP.)
S49°17'50"W 577.72'
PROPOSED DRAINAGE DITCH (TYP.)
TOP DECK DIVERSION BERM (TYP.)
N14°00'57"E 41.12'
N53°45'27"E 115.42'
N78°52'48"E 222.40'
(TYPICAL ON ALL 3:1 SLOPES)
RENO MATTRESS SLOPE PROTECTION (9/19)
S63°42'49"W 553.95'
EXISTING VARIABLE WIDTH DRAINAGE EASEMENT
W E = 41.70'
SLOPE DRAIN DROP INLET (TYP.)
SLOPE DRAIN (TYP.)
STILLING BASIN (TYP.)
N25°55'48"W 185.55'
S82°46'10"W 1622.89'
50 FT. VEGETATIVE BUFFER
FLOWMETER VAULT
VALVE

100 0 100 200
SCALE FEET

REFERENCE

1. TOPOGRAPHY DATA PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED JULY 13, 2015.
3. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

Golder Associates

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	JRD
0	8/04/2016	KLL	ISSUED FOR CONSTRUCTION	KLL	DPM	RYW

COMMONWEALTH OF VIRGINIA — DONALD P. MCCARTHY — Lic. No. 040703 — 8/4/16 — PROFESSIONAL ENGINEER

PROJECT
DOMINION
YORKTOWN POWER STATION
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA
NELSON DISTRICT

TITLE
PHASE A
STAGE 2 EROSION AND SEDIMENT CONTROL PLAN

PROJECT No.		123-95405
FILE No.		1239540SD11
REV. 1	SCALE	AS SHOWN
DESIGN	KLL	07-15-2015
CADD	ABM	07-22-2015
CHECK	JRD	07-31-15
REVIEW	DPM	07-31-15

DRAWING 11

S:\Plan Production Data Files\Drawing Data Files\123-95405D - Early Closure Plan\Active Drawings\1239540SD11.dwg

LEGEND

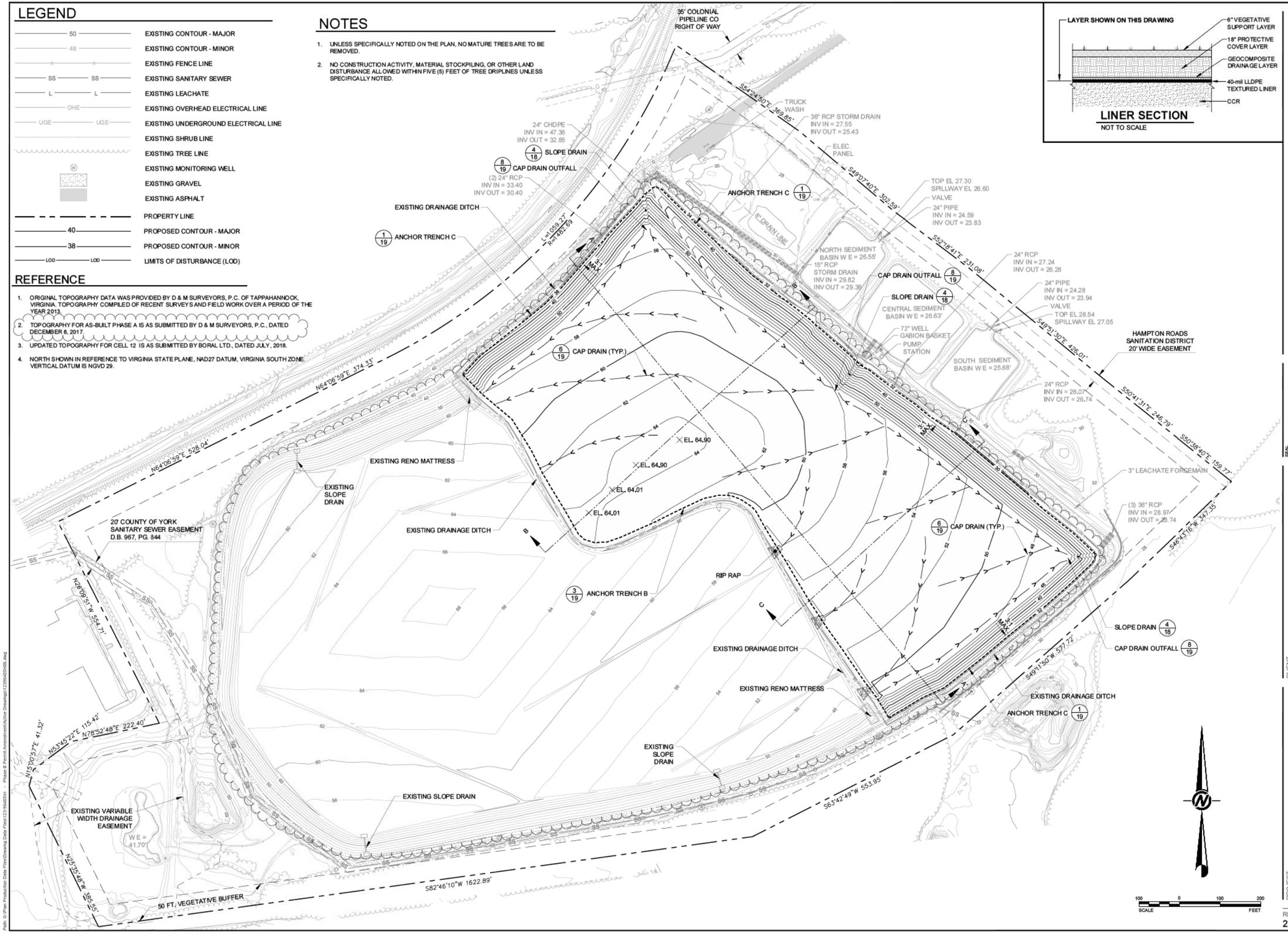
- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- (M) — EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR
- LOD — LOD — LIMITS OF DISTURBANCE (LOD)

REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

NOTES

1. UNLESS SPECIFICALLY NOTED ON THE PLAN, NO MATURE TREES ARE TO BE REMOVED.
2. NO CONSTRUCTION ACTIVITY, MATERIAL STOCKPILING, OR OTHER LAND DISTURBANCE ALLOWED WITHIN FIVE (5) FEET OF TREE DRIPLINES UNLESS SPECIFICALLY NOTED.



LINER SECTION
NOT TO SCALE

REV.	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018 REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/08/2015 RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER
SEAL

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com
GOLDER

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PHASE B LINER GRADES

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
2

13 of 22

DRAWING
12

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

0 1 in

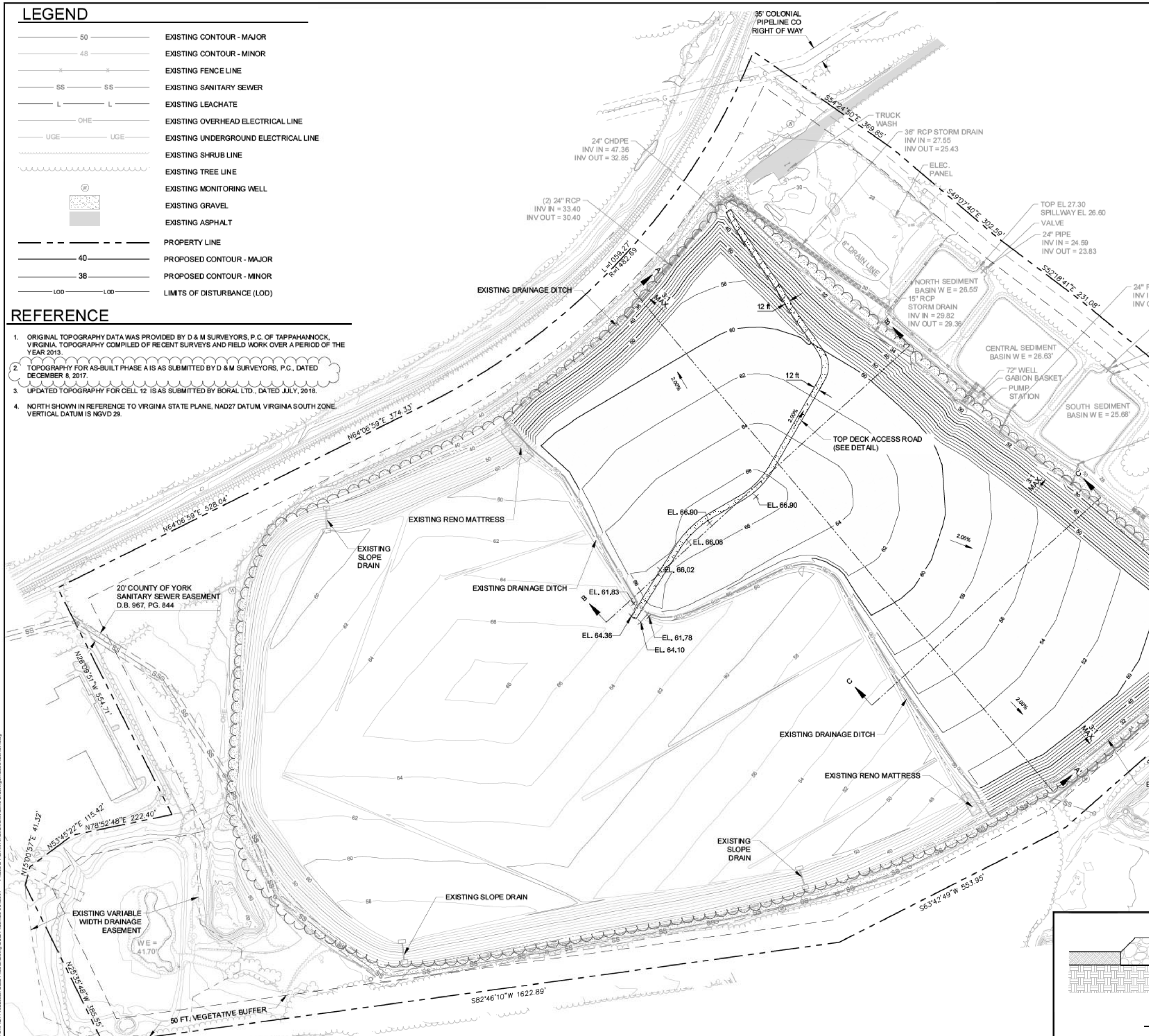
Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\4 - Phase B Permit Amendment\Active Drawings\123964050405.dwg

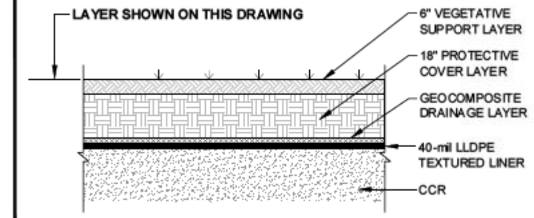
LEGEND

50	EXISTING CONTOUR - MAJOR
48	EXISTING CONTOUR - MINOR
x x	EXISTING FENCE LINE
SS SS	EXISTING SANITARY SEWER
L L	EXISTING LEACHATE
OHE	EXISTING OVERHEAD ELECTRICAL LINE
UGE UGE	EXISTING UNDERGROUND ELECTRICAL LINE
	EXISTING SHRUB LINE
	EXISTING TREE LINE
	EXISTING MONITORING WELL
	EXISTING GRAVEL
	EXISTING ASPHALT
	PROPERTY LINE
40	PROPOSED CONTOUR - MAJOR
38	PROPOSED CONTOUR - MINOR
LOD LOD	LIMITS OF DISTURBANCE (LOD)

REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.





LINER SECTION

NOT TO SCALE

NOTE

PROPOSED SLOPE DRAINS AND DOWNCHUTE LOCATIONS NOT SHOWN FOR CLARITY. SEE DRAWING 15 FOR LOCATIONS.

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/09/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL: COMMONWEALTH OF VIRGINIA — DANIEL P. McGRATH Lic. No. 040703 — 12/14/18 — PROFESSIONAL ENGINEER

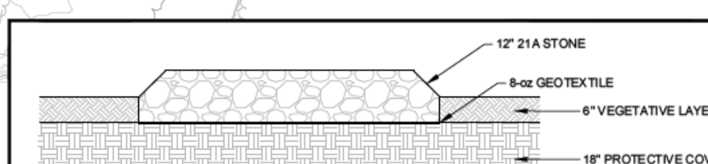
CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PHASE B FINISH GRADES

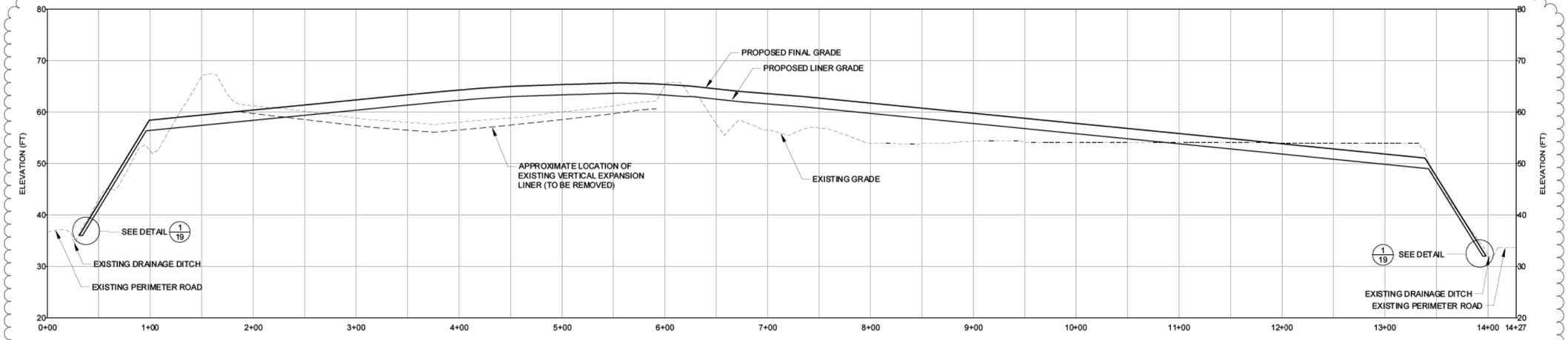
PROJECT NO. 123-96405
DATE 10/09/2018
REV. 2
14 of 22
DRAWING 13



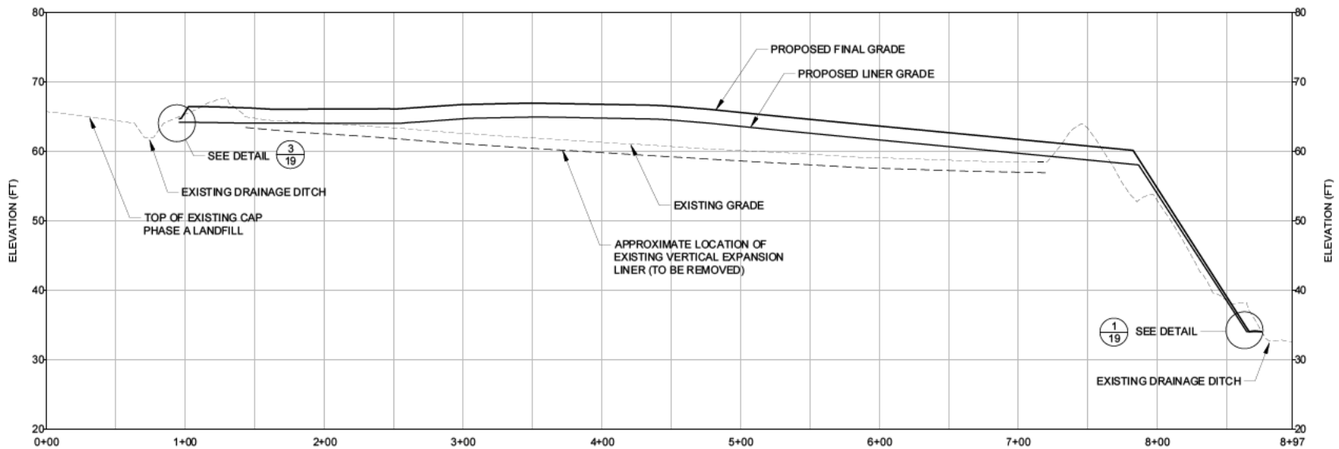
ROAD DETAIL

NOT TO SCALE

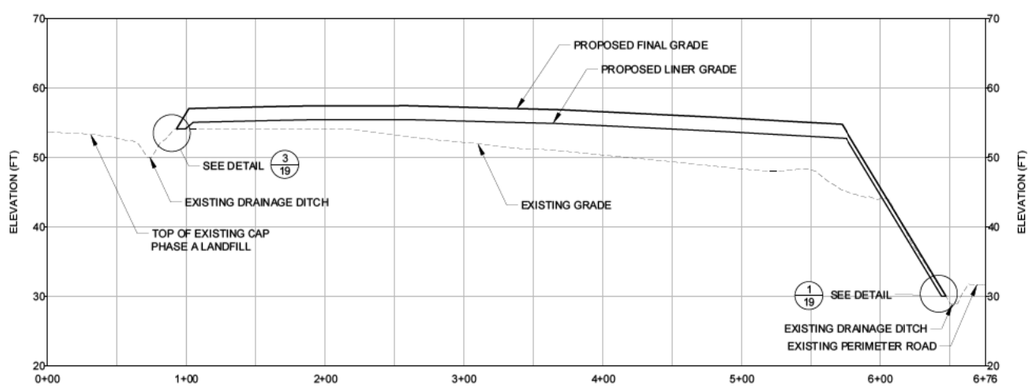
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D



CROSS SECTION A - A'



CROSS SECTION B - B'



CROSS SECTION C - C'

REV.	DESCRIPTION	CADD	CHECK	REVIEW
2	10/09/2018 REVISION TO PHASE B GRADES	KAL	KLL	DPM
1	12/08/2015 RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD

SEAL

COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PHASE B CROSS SECTIONS

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
2

15 of 22

DRAWING
14

SCALE 50 0 50 100 FEET

SCALE 25 0 25 FEET

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

1 in

Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\04 - Phase B Permit Amendment\Active Drawings\123964050405.dwg

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- (W) EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR
- LOD — LOD — LIMITS OF DISTURBANCE (LOD)

REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

35' COLONIAL PIPELINE CO RIGHT OF WAY

S54°24'50"E 369.85'

S49°07'40"E 302.59'

S52°18'41"E 231.06'

S49°51'30"E 426.01'

S50°41'31"E 246.79'

S50°39'40"E 199.77'

8/18 STILLING BASIN SB-4

3/18 SLOPE DRAIN

7/18 SLOPE DRAIN DROP INLET

L=1059.27'
R=1482.69

EXISTING DRAINAGE DITCH

TOP DECK DIVERSION BERM 1/18

15" RCP STORM DRAIN
INV IN = 29.82
INV OUT = 29.35

SLOPE DRAIN DROP INLET 7/18

SLOPE DRAIN 3/18

STILLING BASIN SB-5 8/18

HAMPTON ROADS SANITATION DISTRICT 20' WIDE EASEMENT

3" LEACHATE FORCEMAIN 1/18

TOP DECK ACCESS ROAD

N64°06'59"E 374.33'

N64°06'59"E 528.04'

EXISTING SB-3

EXISTING SLOPE DRAIN

2/18 TOP DECK DIVERSION BERM

2/18 TOP DECK DIVERSION BERM

TOP DECK DIVERSION BERM

S46°43'16"W 547.55'

STILLING BASIN SB-6 8/18

SLOPE DRAIN 3/18

SLOPE DRAIN DROP INLET 7/18

20' COUNTY OF YORK SANITARY SEWER EASEMENT D.B. 967, PG. 844

N28°09'51"W 554.71'

RIP RAP

S49°11'50"W 577.72'

EXISTING DRAINAGE DITCH

N15°00'57"E 41.32'

N53°45'27"E 115.42'

N78°52'48"E 222.40'

EXISTING SLOPE DRAIN

EXISTING SB-1

EXISTING SLOPE DRAIN

EXISTING SB-2

EXISTING VARIABLE WIDTH DRAINAGE EASEMENT

S63°42'49"W 553.95'

N25°35'48"W 355.25'

S82°46'10"W 1622.89'

50 FT. VEGETATIVE BUFFER

100 0 100 200
SCALE FEET

REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL

COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER

GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE:
PHASE B FINAL STORMWATER MANAGEMENT PLAN

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
2

16 of 22

DRAWING
15

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\H - Phase B Permit Amendment\Active Drawings\123964505H05.dwg

LEGEND

50	EXISTING CONTOUR - MAJOR
48	EXISTING CONTOUR - MINOR
x x	EXISTING FENCE LINE
SS SS	EXISTING SANITARY SEWER
L L	EXISTING LEACHATE
OHE	EXISTING OVERHEAD ELECTRICAL LINE
UGE UGE	EXISTING UNDERGROUND ELECTRICAL LINE
	EXISTING SHRUB LINE
	EXISTING TREE LINE
W	EXISTING MONITORING WELL
	EXISTING GRAVEL
	EXISTING ASPHALT
	PROPERTY LINE
40	PROPOSED CONTOUR - MAJOR
38	PROPOSED CONTOUR - MINOR

REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

NOTES

1. UNLESS SPECIFICALLY NOTED ON THE PLAN, NO MATURE TREES ARE TO BE REMOVED.
2. NO CONSTRUCTION ACTIVITY, MATERIAL STOCKPILING, OR OTHER LAND DISTURBANCE ALLOWED WITHIN FIVE (5) FEET OF TREE DRIPLINES UNLESS SPECIFICALLY NOTED.

E & S LEGEND

- PHASE B E & S LIMITS OF DISTURBANCE = 22.24 ACRES
- CE — CONSTRUCTION ENTRANCE (MIN. STD. 3.02)
- SF — SILT FENCE (MIN. STD. 3.05)
- CIP — CULVERT INLET PROTECTION (MIN. STD. 3.08)
- CD — CHECK DAM (MIN. STD. 3.20)

NOTE:
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MINIMUM STANDARDS AS DESCRIBED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

35' COLONIAL PIPELINE CO RIGHT OF WAY
S54°24'50"E 369.85'
TRUCK WASH
36" RCP STORM DRAIN
INV IN = 27.55
INV OUT = 25.43
ELEC. PANEL
24" CHDPE
INV IN = 47.36
INV OUT = 32.85
(2) 24" RCP
INV IN = 33.40
INV OUT = 30.40
L=1,059.27'
R=1,482.69'
S49°07'40"E 302.59'
TOP EL 27.30
SPILLWAY EL 26.60
VALVE
24" PIPE
INV IN = 24.59
INV OUT = 23.83
S52°18'41"E 231.08'
NORTH SEDIMENT BASIN W E = 26.55'
15" RCP STORM DRAIN
INV IN = 29.82
INV OUT = 29.36
24" RCP
INV IN = 27.24
INV OUT = 26.28
24" PIPE
INV IN = 24.28
INV OUT = 23.94
VALVE
TOP EL 28.54
SPILLWAY EL 27.05
S49°51'10"E 426.01'
CENTRAL SEDIMENT BASIN W E = 26.63'
72" WELL
GABION BASKET
PUMP STATION
SOUTH SEDIMENT BASIN W E = 25.68'
HAMPTON ROADS SANITATION DISTRICT 20' WIDE EASEMENT
S50°41'31"E 246.79'
S50°38'40"E 159.77'
24" RCP
INV IN = 28.07
INV OUT = 26.74
3" LEACHATE FORCEMAIN
SOIL STOCKPILE AREA
(3) 36" RCP
INV IN = 28.97
INV OUT = 28.74
S46°43'16"W 347.35'
EXISTING DRAINAGE DITCH
S49°17'50"W 577.72'
S63°42'49"W 553.95'
S82°46'10"W 1622.89'
50 FT. BUFFER (TYP. ALL SIDES)
N64°06'59"E 374.33'
N64°06'59"E 528.04'
20' COUNTY OF YORK SANITARY SEWER EASEMENT D.B. 967, PG. 844
N26°09'51"W 554.71'
N15°00'57"E 41.32'
N53°45'22"E 115.42'
N78°52'48"E 222.40'
EXISTING VARIABLE WIDTH DRAINAGE EASEMENT
W E = 41.70'
SOIL STOCKPILE AREA
N25°35'48"W 355.55'
50 FT. VEGETATIVE BUFFER

100 0 100 200
SCALE FEET

REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/06/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER
SEAL

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PHASE B STAGE 1 EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO. 123-96405
DATE: 10/09/2018

REV. 2
17 of 22
DRAWING 16

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\04 - Phase B Permit Amendment\Active Drawings\123964050416.dwg

LEGEND

- 50 — EXISTING CONTOUR - MAJOR
- 48 — EXISTING CONTOUR - MINOR
- EXISTING FENCE LINE
- SS — SS — EXISTING SANITARY SEWER
- L — L — EXISTING LEACHATE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- UGE — UGE — EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING SHRUB LINE
- EXISTING TREE LINE
- (W) EXISTING MONITORING WELL
- EXISTING GRAVEL
- EXISTING ASPHALT
- PROPERTY LINE
- 40 — PROPOSED CONTOUR - MAJOR
- 38 — PROPOSED CONTOUR - MINOR

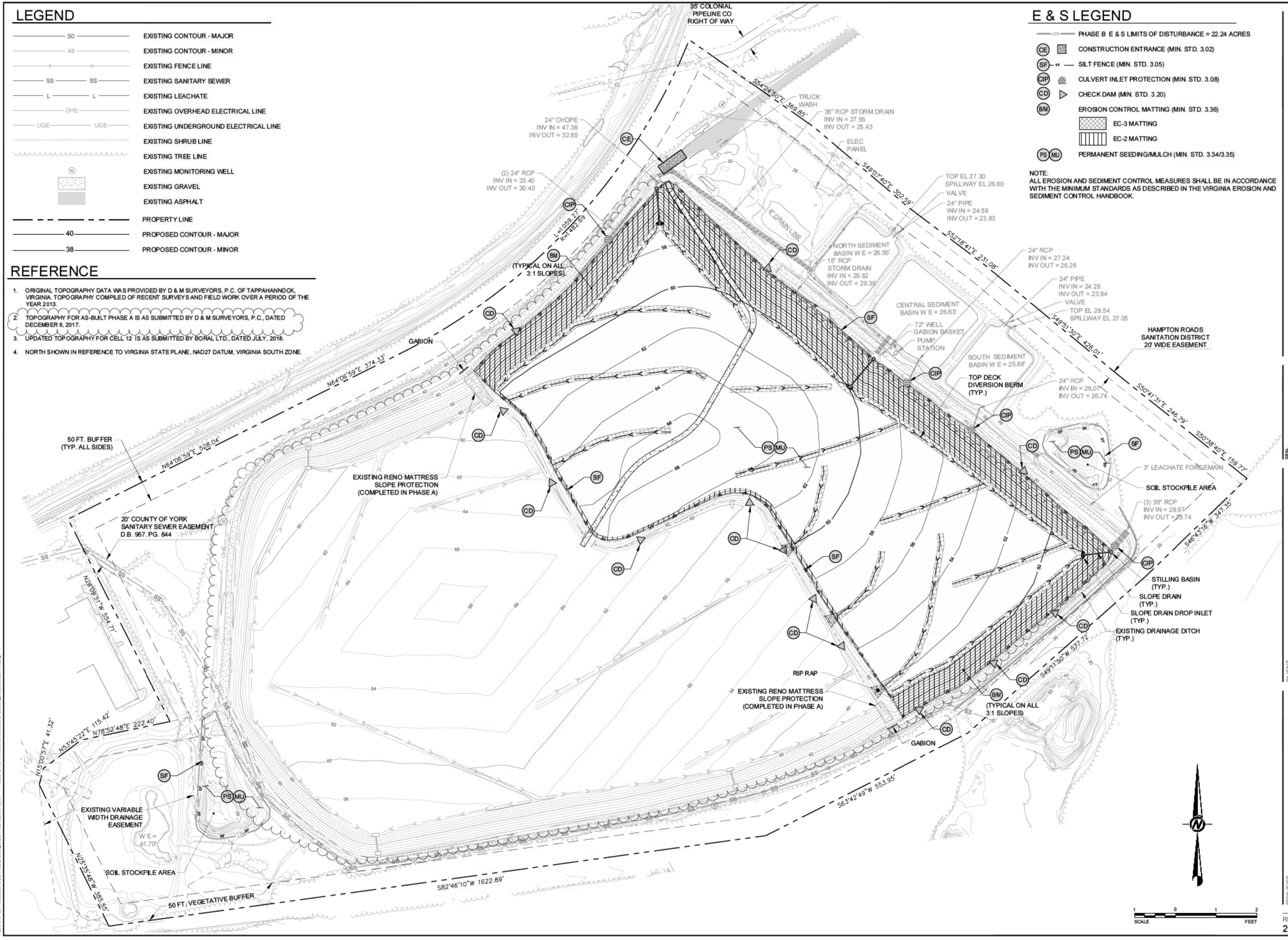
REFERENCE

1. ORIGINAL TOPOGRAPHY DATA WAS PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR AS-BUILT PHASE A IS AS SUBMITTED BY D & M SURVEYORS, P.C., DATED DECEMBER 8, 2017.
3. UPDATED TOPOGRAPHY FOR CELL 12 IS AS SUBMITTED BY BORAL LTD., DATED JULY, 2018.
4. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE.

E & S LEGEND

- LOD — PHASE B E & S LIMITS OF DISTURBANCE = 22.24 ACRES
- CE — CONSTRUCTION ENTRANCE (MIN. STD. 3.02)
- SF — SF — SILT FENCE (MIN. STD. 3.05)
- CIP — CULVERT INLET PROTECTION (MIN. STD. 3.08)
- CD — CHECK DAM (MIN. STD. 3.20)
- B/M — EROSION CONTROL MATTING (MIN. STD. 3.36)
  - EC-3 MATTING
  - EC-2 MATTING
- PS MU — PERMANENT SEEDING/MULCH (MIN. STD. 3.34/3.35)

NOTE:
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MINIMUM STANDARDS AS DESCRIBED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.



REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/06/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER
SEAL

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
PHASE B STAGE 2 EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO.
123-96405

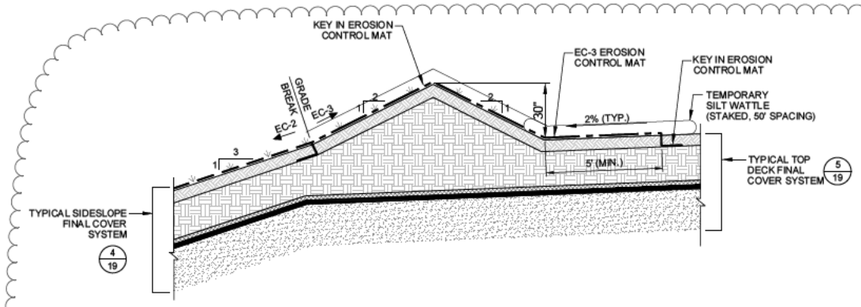
DATE:
10/09/2018

REV.
2

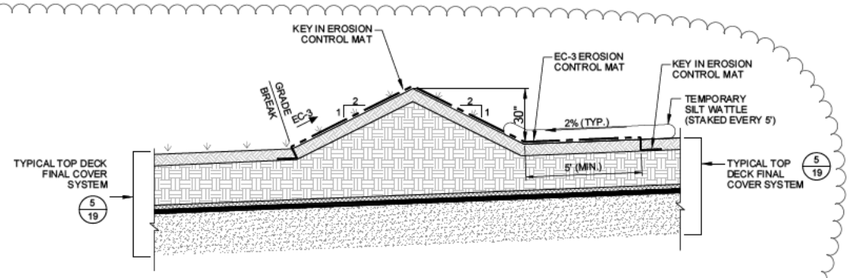
DRAWING
17

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

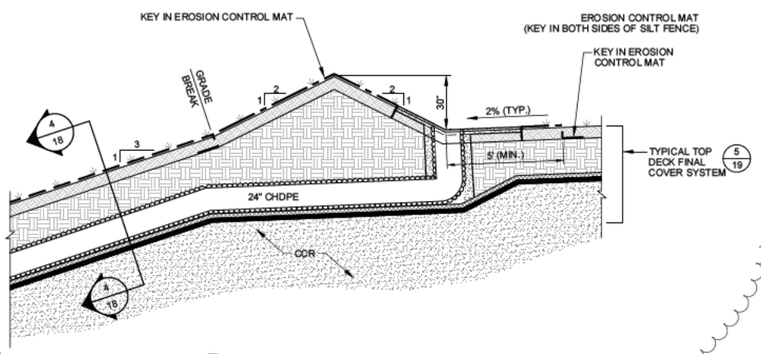
Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\04 - Phase B Permit Amendment\Active Drawings\123964050411.dwg



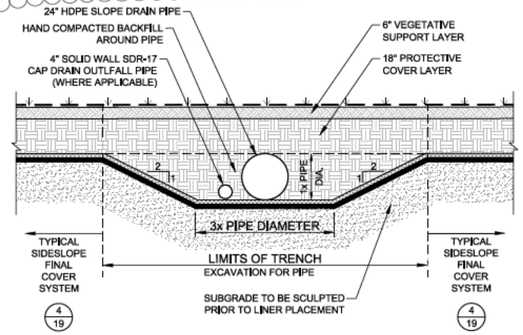
1/18 TOP DECK DIVERSION BERM DETAIL
N.T.S.



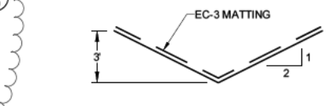
2/18 TOP DECK DIVERSION BERM DETAIL
N.T.S.



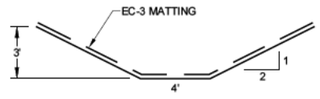
3/18 SLOPE DRAIN DETAIL
N.T.S.



4/18 SLOPE DRAIN CROSS SECTION
N.T.S.



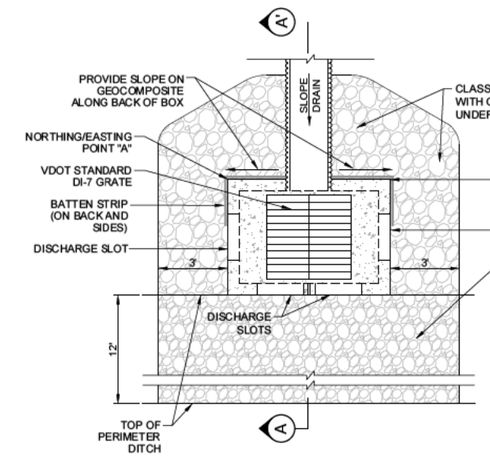
5/18 TYPICAL DITCH SECTION
N.T.S.



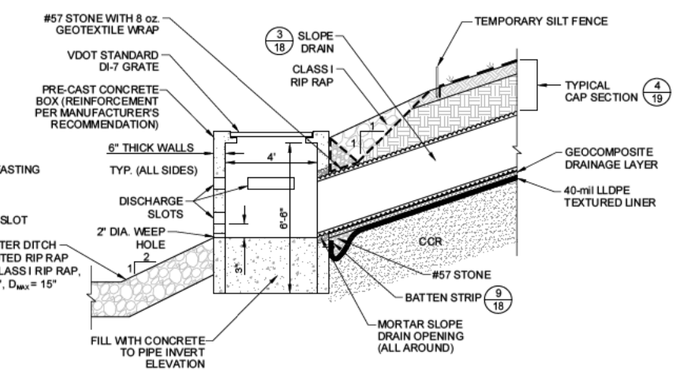
6/18 EXISTING TRAPEZOIDAL DITCH SECTION
N.T.S.

REV.	MM/DD/YY	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/06/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

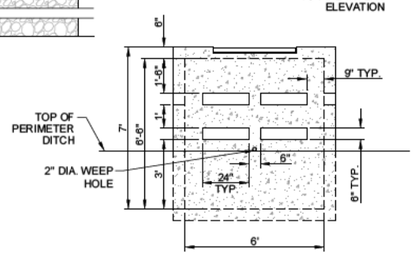
SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER



PLAN VIEW



SECTION A-A'

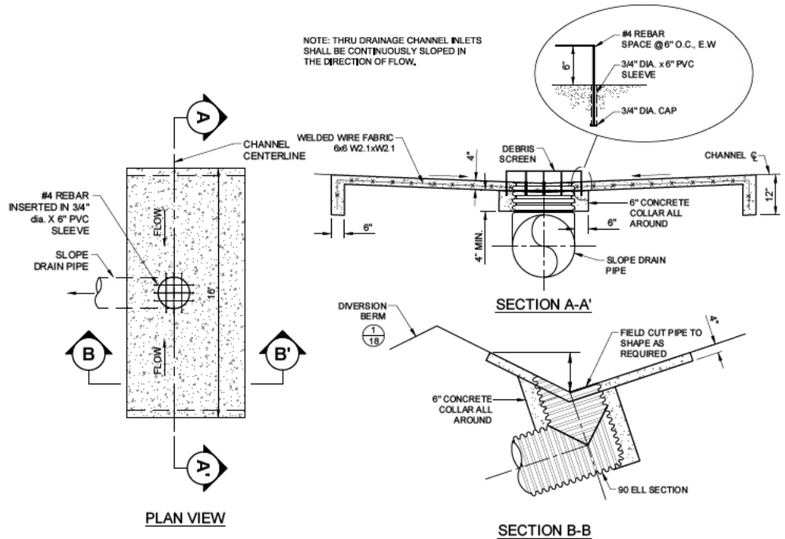


FRONT ELEVATION

8/18 STILLING BASIN DETAIL
NOT TO SCALE

STILLING BASIN SCHEDULE				
ID	NORTHING (A)	EASTING (A)	NORTHING (B)	EASTING (B)
SB-1	316503.657	2590932.931	316505.789	2590939.599
SB-2	316341.542	2590058.702	316342.505	2590065.636
SB-3	317323.581	2589895.952	317323.363	2589888.954
SB-4	317953.425	2590749.216	317952.676	2590742.256
SB-5	317535.736	2591264.068	317540.372	2591258.816
SB-6	317071.768	2591849.84	317078.718	2591849.004

NOTE: THRU DRAINAGE CHANNEL INLETS SHALL BE CONTINUOUSLY SLOPED IN THE DIRECTION OF FLOW.

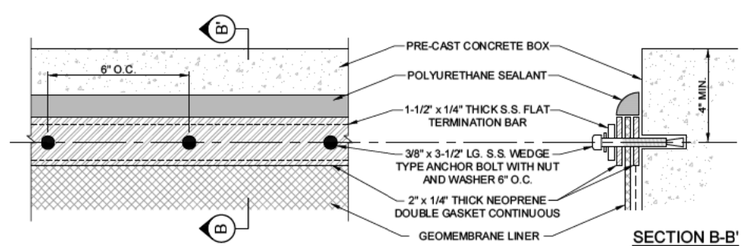


PLAN VIEW

SECTION A-A'

SECTION B-B

7/18 SLOPE DRAIN DROP INLET DETAIL
N.T.S.



SECTION B-B'

9/18 BATTEN STRIP
NOT TO SCALE

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
STORMWATER DETAILS

PROJECT NO.
123-96405

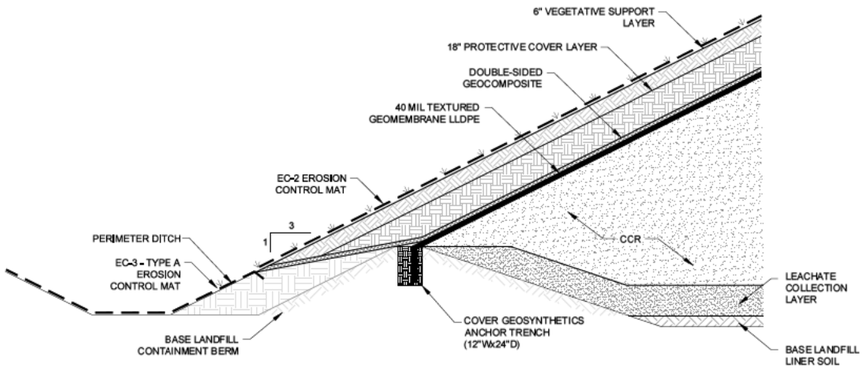
DATE:
10/09/2018

REV.
2

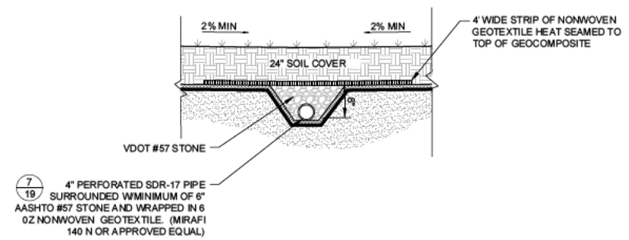
DRAWING
18

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\H - Phase B Permit Amendment\Active Drawings\123964050H14.dwg

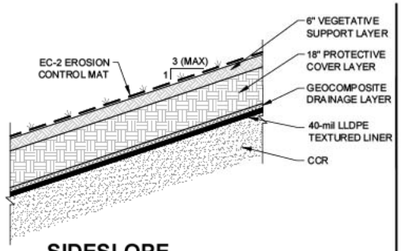


1/19 ANCHOR TRENCH A & C
N.T.S.

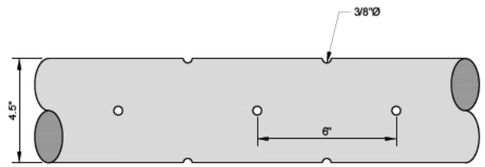


6/19 CAP DRAIN TRENCH
NOT TO SCALE

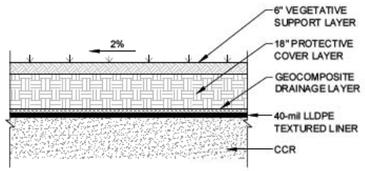
NOTE: TERMINATE PERFORATED PIPE AND STONE WRAP MINIMUM 10' FROM 3:1 SLOPE. INSTALL CLAY PLUG AND SOLID-WALL PIPE FOR REMAINDER OF PIPE RUN.



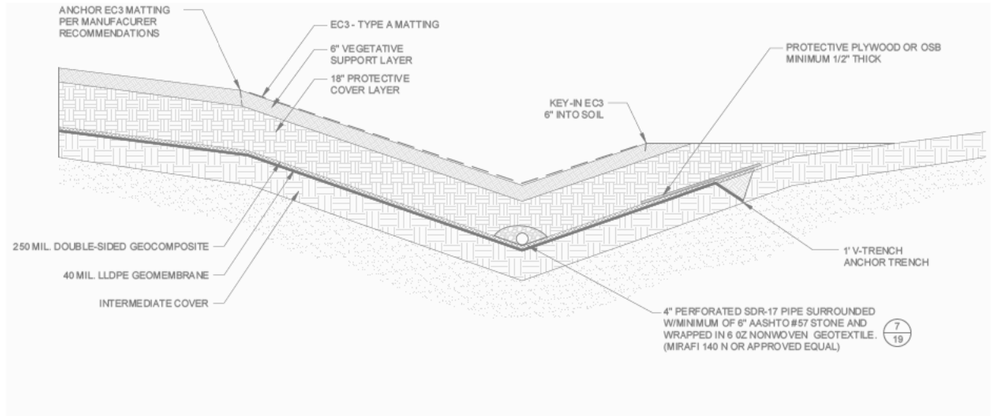
4/19 SIDESLOPE FINAL COVER SYSTEM DETAIL
N.T.S.



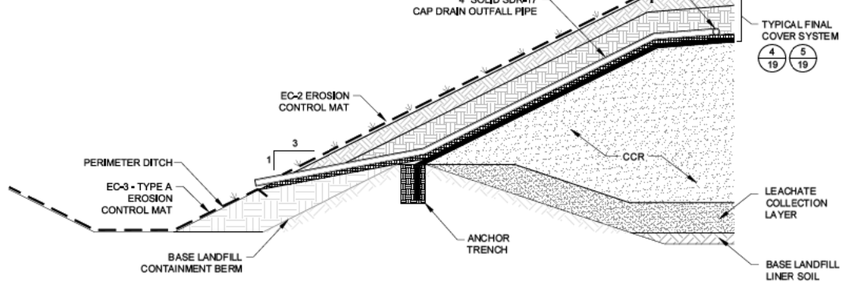
7/19 4" HDPE SDR-17 PIPE
N.T.S.



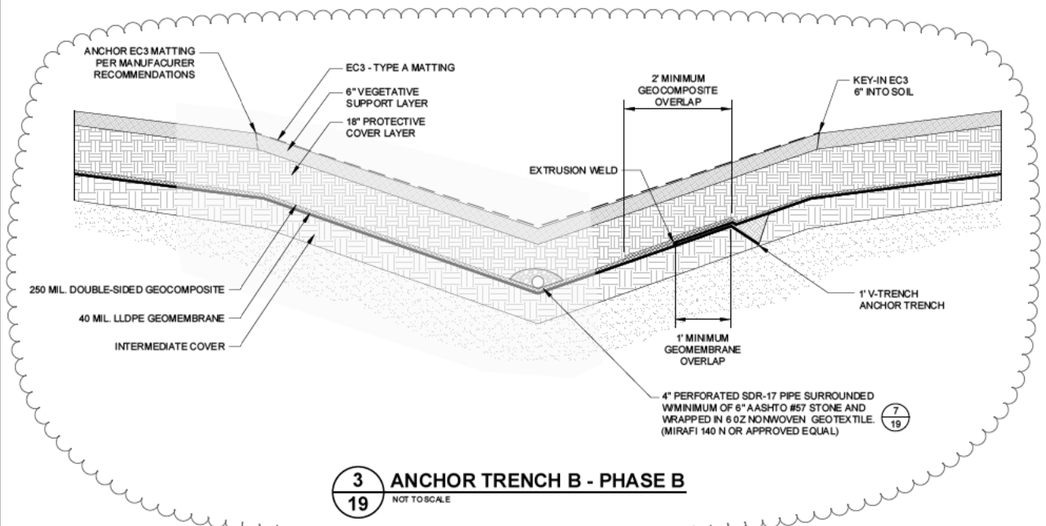
5/19 TOP DECK FINAL COVER SYSTEM DETAIL
N.T.S.



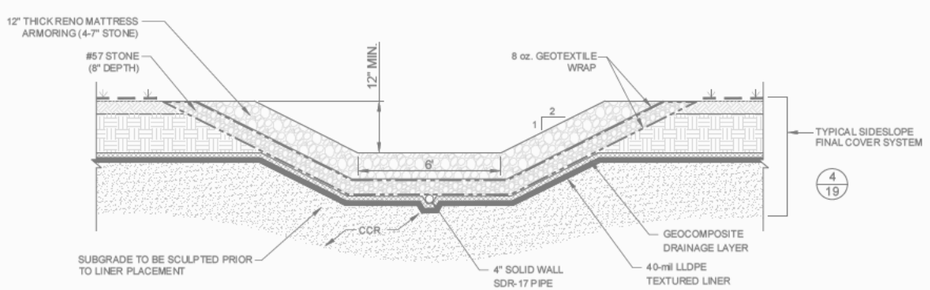
2/19 ANCHOR TRENCH B - PHASE A
NOT TO SCALE



8/19 CAP DRAIN OUTFALL
N.T.S.



3/19 ANCHOR TRENCH B - PHASE B
NOT TO SCALE



9/19 RENO MATTRESS SLOPE PROTECTION DETAIL
SCALE: 3/8" = 1'-0"

REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
LINER DETAILS

PROJECT NO.
123-96405

DATE:
12/09/2015

REV.
1

DRAWING
19

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

TEMPORARY SEEDING NOTES

1. ALL TEMPORARY SEEDING, FERTILIZING AND LIMING SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION 3.31 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), THIRD EDITION, 1992. MULCHING SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION 3.35 OF THE VESCH.

2. TEMPORARY SEEDING WILL BE APPLIED WITHIN 7 DAYS TO DENUDED AREAS WHICH MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. FOR TEMPORARY SEEDING USE 50% OF THE RECOMMENDED RATES OF FERTILIZER AND LIME, AND FULL RATES OF SEED AND MULCH, AS SPECIFIED IN THE VESCH STANDARD FOR PERMANENT SEEDING.

3. ALL SOIL STOCKPILES ARE TO BE MULCHED AND SEEDED FOR VEGETATIVE COVER IMMEDIATELY AFTER GRADING. STRAW OR HAY MULCH IS REQUIRED.

TEMPORARY SEEDING MIXTURES FOR ALL AREAS:

PLANTING DATES	SPECIES	RATE (LBS/AC.)
SEPT 1 - FEB 15	50/50 MIX OF ANNUAL RYE & CEREAL WINTER RYE	50-100
FEB 16 - APR 30	ANNUAL RYE	60-100
MAY 1 - AUG 31	GERMAN MILLET	50-100

PERMANENT SEEDING NOTES

1. ALL SEEDING, FERTILIZING AND LIMING SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION 3.32 OF THE VESCH. MULCHING SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION 3.35 OF THE VESCH.

2. CONDUCT SOIL TESTING PRIOR TO SEEDING. THE AREA TO BE SEEDED SHALL FIRST BE FERTILIZED AND TREATED WITH AGRICULTURAL LIME IN ACCORDANCE WITH THE SOIL TESTING RESULTS. SOIL ADDITIVES SHALL BE WORKED INTO THE SURFACE A MINIMUM DEPTH OF ONE INCH.

3. PERMANENT SEEDING SHALL BE DONE ONLY BETWEEN THE DATES OF FEBRUARY 15 AND JUNE 15 OR BETWEEN SEPTEMBER 15 AND DECEMBER 15, EXCEPT AS OTHERWISE DIRECTED BY THE ENGINEER. ABSENT OF SITE-SPECIFIC SOIL TESTING AND SEED MIXTURE RECOMMENDATIONS, FOLLOW THE SEEDING SCHEDULE BELOW:

SEEDING MIXTURES FOR THE COASTAL PLAIN REGION:

SPECIES	RATE (LBS/AC.)
KENTUCKY 31 FESCUE	128
RED TOP GRASS	2
SEASONAL NURSE CROP*	20
TOTAL: 150 LBS./AC.	

*USE SEASONAL NURSE CROP IN ACCORDANCE WITH SEEDING DATES AS STATED BELOW:

PLANTING DATES	SPECIES
FEBRUARY - APRIL	ANNUAL RYE
MAY - AUGUST	FOXTAIL MILLET
SEPTEMBER - NOVEMBER 15	ANNUAL RYE
NOVEMBER 15 - JANUARY	WINTER RYE

4. AFTER SEEDING, THE SURFACE SHALL BE COVERED WITH STRAW OR HAY AT THE RATE OF 70-90 LBS PER 1,000 SQ. FT.

PHASE 1 EROSION AND SEDIMENT CONTROL SEQUENCE

1. ALL PHASE 1 EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE DRAWINGS. CONTROLS SHALL MEET MINIMUM STANDARDS AND SPECIFICATIONS FROM THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).
2. PHASE 1 EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED AS THE FIRST STEP IN CONSTRUCTION. NO LAND DISTURBING ACTIVITIES ARE TO TAKE PLACE PRIOR TO INSTALLATION OF ALL CONTROLS SHOWN ON THE DRAWINGS.
3. CONTACT YORK COUNTY NO LATER THAN FORTY-EIGHT (48) HOURS PRIOR TO LAND DISTURBING ACTIVITIES SO A PRE- CONSTRUCTION MEETING AND INSPECTION CAN BE SCHEDULED.
4. INSTALL CONSTRUCTION ENTRANCE.
5. INSTALL CULVERT INLET PROTECTION ON EXISTING CULVERTS.
6. INSTALL SILT FENCE
7. INSTALL CHECK DAMS.
8. ONCE ALL CONTROLS LISTED ABOVE HAVE BEEN INSTALLED, COMMENCE WITH RESHAPING AND GRADING OF LANDFILL.
9. TEMPORARY SEEDING SHALL BE APPLIED WITHIN 7 DAYS TO DENUDED AREAS WHICH MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 14 DAYS. SEE TEMPORARY SEEDING NOTES ABOVE FOR SPECIFICATIONS.
10. WHENEVER SEDIMENT-LADEN WATER IS REMOVED FROM A CONSTRUCTION SITE BY MEANS OF PUMPING, A TEMPORARY SETTLING & FILTERING DEVICE SHALL BE USED TO FILTER THE SEDIMENT-LADEN WATER PRIOR OT THE WATER BEING DISCHARGED FROM THE SITE.

PHASE 2 EROSION AND SEDIMENT CONTROL SEQUENCE

1. ALL PHASE 2 EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON DRAWINGS. CONTROLS SHALL MEET MINIMUM STANDARDS AND SPECIFICATIONS FROM THE VESCH.
2. GRADE LANDFILL TO LINER GRADES.
3. INSTALL LINER.
4. GRADE LANDFILL TO FINISH CAP GRADES. TOPSOIL SEED AND MULCH..
5. INSTALL EROSION CONTROL MATTING AS SHOWN ON PLANS.
6. INSTALL PERMANENT SEEDING AS AREAS ARE BROUGHT TO FINAL GRADE.
7. THE CONSTRUCTION ENTRANCE MAY BE REMOVED ONCE CONSTRUCTION ACTIVITIES ARE COMPLETE.
8. WHEN ADEQUATE VEGETATION HAS BEEN ESTABLISHED, CLEAN SEDIMENT BASINS AND RESTORE BOTTOM ELEVATION TO DESIGN GRADES (ELEV. 22.0).
9. EROSION AND SEDIMENT CONTROL MEASURES MAY ONLY BE REMOVED ONCE ADEQUATE VEGETATION IS ESTABLISHED AND APPROVAL FOR REMOVAL IS GRANTED BY THE EROSION AND SEDIMENT CONTROL INSPECTOR.
10. RIP RAP OUTLET PROTECTION IS TO REMAIN.

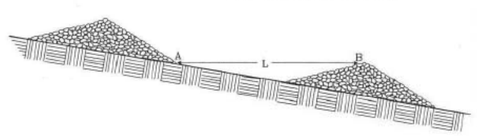
GENERAL EROSION AND SEDIMENT CONTROL NOTES

COUNTY OF YORK, VIRGINIA

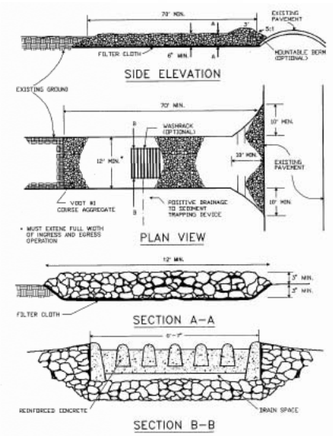
1. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE. THE BASIN(S) ARE TO BE KEPT CLEAR OF DEBRIS AND SEDIMENTS SHALL BE CLEANED OUT PERIODICALLY DURING AND AFTER CONSTRUCTION ACTIVITIES.
2. ALL TEMPORARY OR PERMANENT EROSION AND SEDIMENT CONTROL PRACTICES NECESSARY FOR RETAINING SEDIMENTS ON THE CONSTRUCTION SITE SHALL BE INSTALLED AND TREE PROTECTION FENCING SHALL BE ERECTED AT THE LOCATIONS AS SPECIFIED ON THE APPROVED PLANS PRIOR TO ANY LAND CLEARING, GRUBBING, GRADING OR EARTH MOVING ACTIVITIES.
3. CONSTRUCTION ENTRANCE (CE) SHALL BE INSTALLED CONCURRENTLY WITH THE INITIATION OF CLEARING AND GRUBBING OPERATIONS.
4. CLEARING AND GRUBBING DEBRIS SHALL BE PROPERLY DISPOSED OF.
5. THE INSTALLATION OF EROSION CONTROL AND DRAINAGE FACILITIES SHALL TAKE PRECEDENCE OVER ALL OTHER CONSTRUCTION ACTIVITIES. SITE DRAINAGE FACILITIES SHALL BE SCHEDULED TO BE COMPLETED WITHIN 30 DAYS FOLLOWING COMPLETION OF THE ROUGH GRADING OPERATIONS AT ANY POINT ON THE PROJECT.
6. OUTFALL DITCHES SHALL BE CONSTRUCTED AND STABILIZED PRIOR TO THE INITIATION OF ANY UTILITY CONSTRUCTION OR BUILDING CONSTRUCTION ACTIVITY. OUTLET PROTECTION (OP) SHALL ALSO BE INSTALLED WHERE CALLED FOR IMMEDIATELY AFTER CONSTRUCTION OF THE OUTFALL DITCH(ES).
7. ALL TEMPORARY OR PERMANENT EARTHEN STRUCTURES SUCH AS DAMS, AND DIVERSION DIKES SHALL BE STABILIZED (SEEDED) IMMEDIATELY AFTER THEIR CONSTRUCTION. STONE OUTLET(S) SHALL BE PROVIDED WHERE SHOWN ON THE PLANS.
8. TOPSOIL STOCKPILES SHALL BE PLACED IN THE LOCATION(S) SHOWN ON THESE PLANS. SILT FENCE OR STRAW BALE BARRIERS SHALL BE ERECTED AT THE TOE OF THE STOCKPILE(S). SILT FENCE OR STRAW BALE BARRIERS SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. STOCKPILES SHALL BE SEEDED AND STABILIZED WITH A FIRM STAND OF GRASS.
9. CONSTRUCTION ROAD STABILIZATION SHALL BE APPLIED TO ACCESS ROADS, SUBDIVISION ROADS, PARKING AREAS AND/OR OTHER VEHICLE TRANSPORTATION ROUTES IMMEDIATELY AFTER GRADING.
10. ALL AREAS DESIGNATED FOR UNDERGROUND UTILITIES SHALL BE STABILIZED AS SOON AS PRACTICAL BUT NOT EXCEEDING 15 DAYS FOLLOWING THEIR INSTALLATION AND BACKFILLING. TRENCH LENGTH TO BE OPENED AT ANY ONE TIME IS NOT TO EXCEED 500 FEET. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
11. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS THAT MAY NOT BE A FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR. TEMPORARY VEGETATIVE COVER MAY BE ELIMINATED IN FAVOR OF THE PERMANENT VEGETATIVE COVER IF SITE CONDITIONS PERMIT AND THE OWNER AND/OR ENGINEER SO DIRECTS. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT, IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION. PERMANENT VEGETATIVE COVER STABILIZATION SHALL CONSIST OF TOPSOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS.
12. MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE SCHEDULED ON A WEEKLY BASIS AND AFTER EACH RUNOFF PRODUCING RAINFALL EVENT PER THE VESCH. ANY SEDIMENT THAT HAS BEEN TRANSPORTED BEYOND THE PROJECT LIMITS SHALL BE REMOVED.
13. SEDIMENT TRAPS, BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION HAS BEEN ESTABLISHED. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE DIRECTED BY THE COUNTY.
14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS PERTAINING TO THIS PROJECT SHALL BE MET.
15. THE PERMITTEE SHALL BE HELD RESPONSIBLE FOR THE ACTIONS AND PERFORMANCE OF ANY OTHER PARTIES PERFORMING WORK ON THIS PROJECT.

SPACING BETWEEN CHECK DAMS

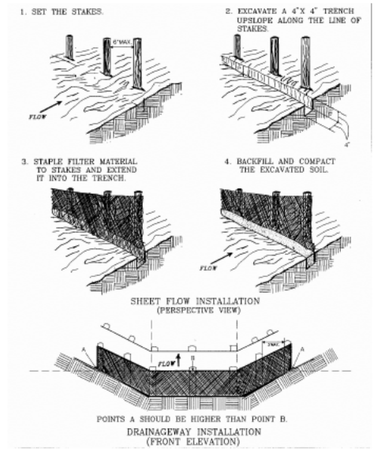
L = THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION



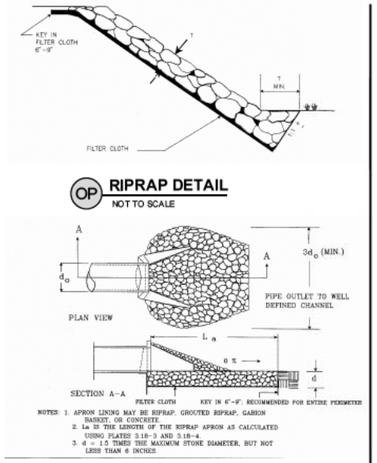
CD **CHECK DAM SPACING DETAIL**
NOT TO SCALE



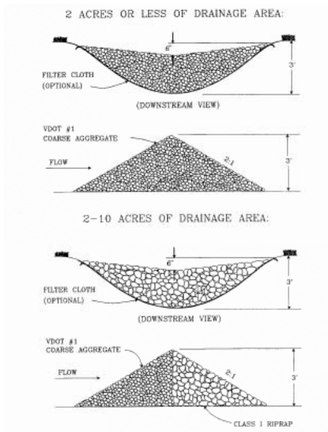
CE **CONSTRUCTION ENTRANCE DETAIL**
NOT TO SCALE



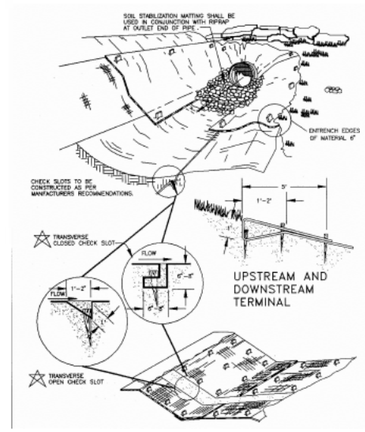
SF **SILT FENCE DETAIL**
NOT TO SCALE



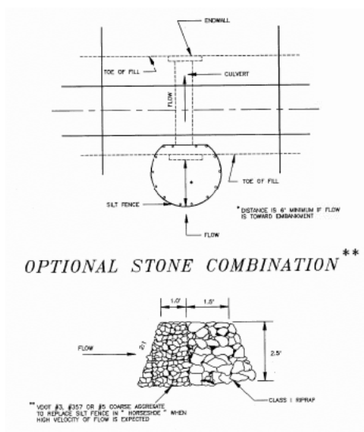
OP **OUTLET PROTECTION DETAIL**
NOT TO SCALE



CD **CHECK DAM DETAIL**
NOT TO SCALE

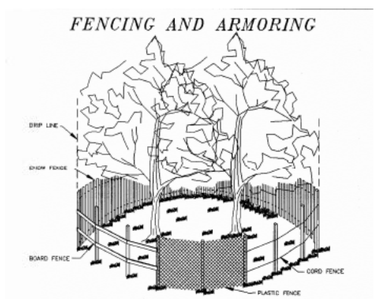


BM **SOIL STABILIZATION DETAIL**
NOT TO SCALE



CIP **CULVERT INLET PROTECTION DETAIL**
NOT TO SCALE

FENCING AND ARMORING



TP **TREE PROTECTION DETAIL**
NOT TO SCALE

ENGINEER'S COST ESTIMATE

FOR LAND DISTURBING ACTIVITIES ONLY; NO PUBLIC IMPROVEMENTS PROPOSED

ITEM DESCRIPTION	UNITS	QUANTITY STATION CLOSURE PLAN	UNIT PRICE*	TOTAL ITEM PRICE
DISTURBED AREA (1st ACRE)	ACRES	1.00	$1,100.00	$1,100.00
ADDT'L. DISTURBED AREA	ACRES	20.88	$550.00	$11,484.00
CULVERT INLET PROTECTION	EACH	4	$110.00	$440.00
CONSTRUCTION ENTRANCE	EACH	1	$4,400.00	$4,400.00
SILT FENCE	LIN. FT.	5,240	$2.75	$14,410.00
CHECK DAM	EA.	11	$300.00	$3,300.00
RESTORATION (GRADE & VEGETATION)	ACRES	19.80	$3,850.00	$76,230.00
			SUBTOTAL	$111,364.00
			CONTINGENCY (15%)	$16,704.60
			TOTAL	$126,068.60

REV.	DATE	DESCRIPTION	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD

SEAL

COMMONWEALTH OF VIRGINIA
Daniel P. McGrath
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com
GOLDER

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
1

21 of 22

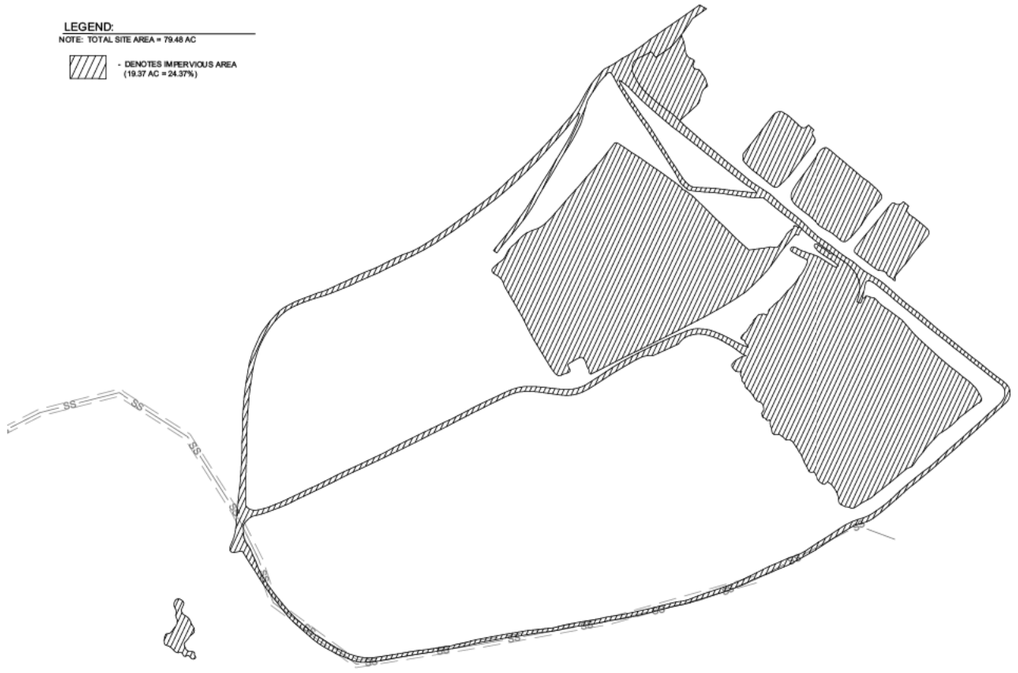
DRAWING
20

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Proj\Production Data Files\Drawing Data Files\123-96405\4 - Phase B Permit Amendment\Active Drawings\123964050413.dwg

LEGEND:
NOTE: TOTAL SITE AREA = 79.48 AC

- DENOTES IMPERVIOUS AREA (19.37 AC = 24.37%)

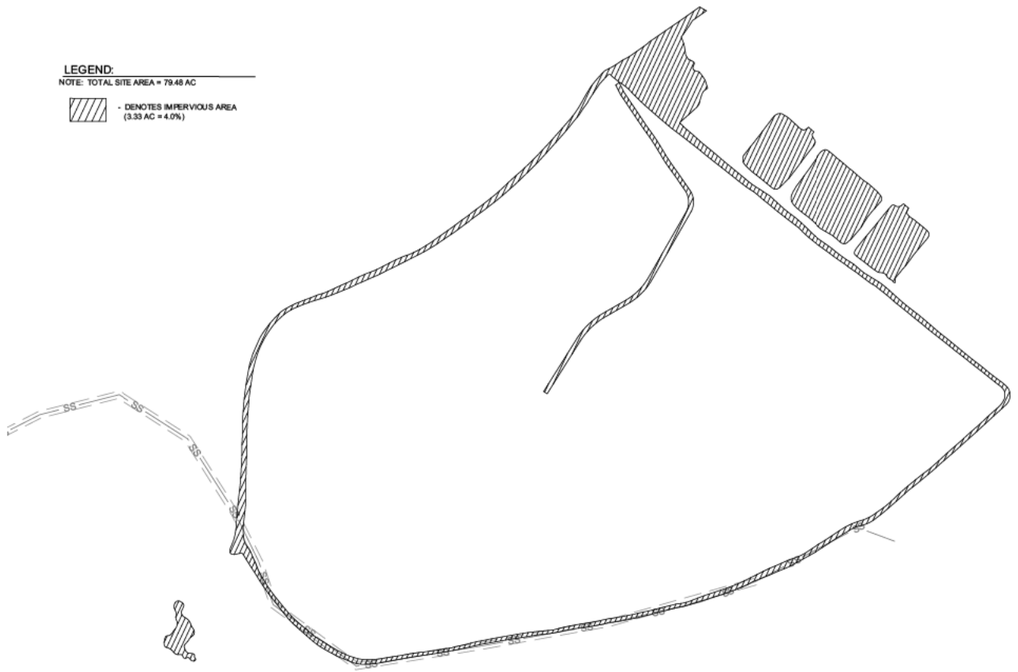


PRE CONSTRUCTION
LAND COVERAGE FOR VRRM

200 0 200 400
SCALE FEET

LEGEND:
NOTE: TOTAL SITE AREA = 79.48 AC

- DENOTES IMPERVIOUS AREA (3.33 AC = 4.0%)



POST CONSTRUCTION
LAND COVERAGE FOR VRRM

200 0 200 400
SCALE FEET

Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014
To be used wi 2011 BMP Standards and Specifications
Site Data

Project Name: Yorktown Power Station - Early Closure Plan	
Date: January 2C, 2015	

data input cells
calculation cells
constant values

Post-ReDevelopment Project & Land Cover Information — **Total Disturbed Acreage** 52.77

Constants

Annual Rainfall (inches)	43		
Target Rainfall Event (inches)	1.00		
Phosphorus EMC (mg/L)	0.26	Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.4'		
Pj	0.90		

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	C.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	33.40	C.00	0.00	33.40
Impervious Cover (acres)	0.00	19.37	C.00	0.00	19.37
				Total	52.77

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	C.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	49.44	C.00	0.00	49.44
Impervious Cover (acres)	0.00	3.33	C.00	0.00	3.33
				Total	52.77
Area Check	Okay	Okay	Okay	Okay	

Rv Coefficients

	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	C.04	0.05
Managed Turf	0.15	0.20	C.22	0.25
Impervious Cover	0.95	0.95	C.95	0.95

Land Cover Summary Pre-ReDevelopment	**Listed**	**Adjusted[1]**
Forest/Open Space Cover (acres)	0.00	0.00
Composite Rv(forest)	0.00	0.00
% Forest	0%	0%
Managed Turf Cover (acres)	33.40	33.40
Composite Rv(turf)	0.20	0.20
% Managed Turf	63%	63%
Impervious Cover (acres)	19.37	19.37
Rv(impervious)	0.95	0.95
% Impervious	37%	37%
Total Site Area (acres)	52.77	52.77
Site Rv	0.48	0.48
Pre-Development Treatment Volume (acre-ft)	2.0901	2.0901
Pre-Development Treatment Volume (cubic feet)	91,046	91,046
Pre-Development Load (TP) (lb/yr)	57.20	57.20

Land Cover Summary Post-ReDevelopment	
Forest/Open Space Cover	0.00
Composite Rv(forest)	0.00
% Forest	0%
Managed Turf Cover (acres)	49.44
Composite Rv(turf)	0.20
% Managed Turf	94%
ReDev. Impervious Cover (acres)	3.33
Rv(impervious)	0.95
% Impervious	6%
Total ReDev. Site Area (acres)	52.77
ReDev. Site Rv	0.25
Post-ReDevelopment Treatment Volume (acre-ft)	1.0876
Post-ReDevelopment Treatment Volume (cubic feet)	47,377
Post-ReDevelopment Load (TP) (lb/yr)	29.77

Land Cover Summary Post-ReDevelopment New Impervious	
New Impervious Cover (acres)	0.00
Rv(impervious)	0.95
% Impervious	Check Area
Total New Dev. Site Area (acres)	0.00
New Dev. Site Rv	0.95
Post-Development Treatment Volume (acre-ft)	0.0000
Post-Development Treatment Volume (cubic feet)	0
Post-Development Load (TP) (lb/yr)	0.00

[1]*Adjusted* **Land Cover Summary** reflects the pre redevelopment land cover minus the pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in **Column I**.

Maximun % Reduction Required Below Pre-ReDevelopment Load	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	0.00
Total Load Reduction Required (lb/yr)	0.00
TP Load Reduction Required for New Impervious Area (lb/yr)	0.00

Pre-Development Load (TN) (lb/yr)	409.23
Post-Development Load (TN) (lb/yr)	212.95

Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

Update Summary Sheet

Print

Site Data Summary

Total Rainfall = 43 inches

Site Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	49.74	0.00	0.00	49.74	94.26
Impervious (acres)	0.00	3.03	0.00	0.00	3.03	5.74
					52.77	100.00

Site Rv	0.24
Post Development Treatment Volume (ft³)	46560
Post Development TP Load (lb/yr)	25.25
Post Development TN Load (lb/yr)	209.28
Total TP Load Reduction Required (lb/yr)	0.00

Total Runoff Volume Reduction (ft³)	0
Total TP Load Reduction Achieved (lb/yr)	0
Total TN Load Reduction Achieved (lb/yr)	0.00
Adjusted Post Development TP Load (lb/yr)	29.25
Remaining Phosphorous Load Reduction (Lb/yr) Required	0.00

Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Impervious (acres)	0.00	0.00	0.00	0.00	0.00	0.00
						0.00

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	0.00	0.00	0.00	0.00	0.00	0.00
TN Load Red. (lb/yr)	0.00	0.00	0.00	0.00	0.00	0.00

REV.	DATE	DESCRIPTION	DESIGN	CADD	CHECK	REVIEW
2	10/09/2018	REVISION TO PHASE B GRADES	KAL	KLL	DPM	
1	12/08/2015	RESPONSE TO COUNTY COMMENTS	DPM	KLL	JRD	

SEAL
COMMONWEALTH OF VIRGINIA
DANIEL P. McGRATH
Lic. No. 040703
12/14/18
PROFESSIONAL ENGINEER

CLIENT
DOMINION ENERGY
YORKTOWN POWER STATION

CONSULTANT
GOLDER
GOLDER ASSOCIATES
2108 WEST LABURNUM AVENUE
SUITE 200
RICHMOND, VA 23227
(804) 358-7900
www.golder.com

PROJECT
EARLY CLOSURE PLAN
YORK COUNTY, VIRGINIA

TITLE
STORMWATER CALCULATIONS

PROJECT NO.
123-96405

DATE:
10/09/2018

REV.
2

22 of 22

DRAWING
21

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ARCH D

Path: G:\Plan Production Data Files\Drawing Data Files\123-96405\H - Phase B Permit Amendment\Active Drawings\123964050H15A.dwg

Golder Associates Richmond, Virginia	Subject: Hydrologic & Hydraulic Analysis of the stormwater conveyance system for the Dominion Yorktown Landfill Closure		
	Job No. 123-96405	Made By: MAK	Date: 9/1/2015
	Rev 1	Checked: DPM	
		Reviewed: JRD	Sheet 1 of 6

OBJECTIVE

The objective of this analysis is to evaluate the stormwater components of the closure cap system for capacity to adequately convey the 10-year and 25-year storm events. The components designed under this set of engineering calculations include sideslope berms, downslope pipes, perimeter channels and an evaluation of the modified stormwater basin's performance. The design is to:

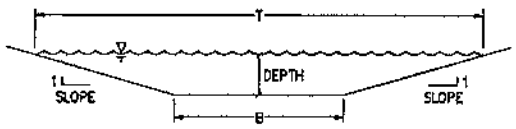
- Adequately convey the 10 and 25-year, 24-hour storm to the stormwater basin without overbank conditions in the sidelslope berms and perimeter channels; and,
- Be non-erosive for the 2-year stormwater flow.

METHOD

Evaluation of stormwater runoff will be made using hydraulic modeling software HEC-HMS (ref #1). Determining hydraulic grade line in channels is determined by the Manning equation (by spreadsheet analysis) at various cross sections. Each section evaluates the freeboard to determine adequate conveyance.

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

Where: Q= flow in cubic feet per second (cfs)
R = hydraulic radius, feet
A = cross sectional area of flow, ft^2
S = channel slope, ft/ft
n = Manning's coefficient of roughness



- Sideslope berms - the berms were designed to ensure at least one-half foot of freeboard during a 25-year storm event and to ensure sufficient capacity during a 100-year storm event.
- Perimeter channels- the perimeter channels were checked to provide freeboard for both the 10-year and 25-year storm event.
- The stormwater basins were checked to verify riser performance and that adequate freeboard remains in the basin under the evaluated design storms.

ASSUMPTIONS

1. The surface Runoff Curve Numbers (CN) used in this evaluation were 74 for the finished landfill cover area (HSG-C, grass, good condition) and 77 for areas containing sections of the perimeter access road. A CN of 98 was used for the pond surface. Most, if not all, of the cover soil will be imported to the site from a yet-to-be-determined borrow area.
2. The perimeter channels and the sideslope berms have one surface type with a Manning's "n" value of 0.035 (grass-lined).
3. The annual 2, 10, 25, and 100-year storm rainfall depths were identified in the Precipitation Frequency Data Server (PFDS - Reference 2) for Yorktown, Virginia:

Year Storm	(in) / 24hrs
2	3.56
10	5.51
25	6.85
100	9.30

CALCULATIONS

HMS Model Input

Sub-area delineations/flow path to point of interest are illustrated on Drawing 1 (attachment 2). Figure 1 illustrates the connectivity of the stormwater elements as modeled in HEC-HMS:

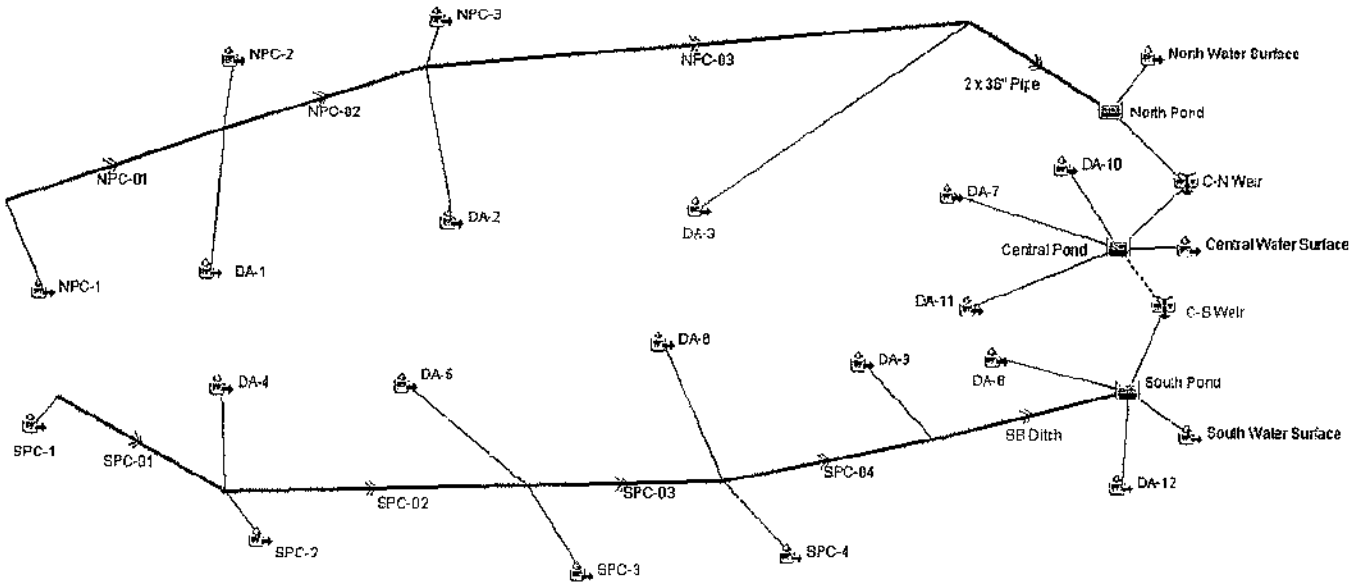


Figure 1 - HEC-HMS Model

Table 1: HEC-HMS Input Data

Element	DA (Ac)	CN	Lag Time (min)
DA-1	2.51	74	6.9
DA-2	7.18	74	12.7
DA-3	3.31	74	8.8
DA-4	2.72	74	6.0
DA-5	4.23	74	10.4
DA-6	11.13	74	13.0
DA-7	2.85	74	8.6
DA-8	2.61	74	6.5
DA-9	3.52	74	6.4
DA-10	1.88	77	6.0
DA-11	0.65	77	6.0
DA-12	1.07	77	6.0
NPC-1	1.01	77	6.0
NPC-2	1.14	77	6.0

NPC-3	1.58	77	6.0
SPC-1	0.97	77	6.0
SPC-2	1.64	77	6.0
SPC-3	0.74	77	6.0
SPC-4	1.54	77	6.0
North Water Surface	0.60	98	1.0
Central Water Surface	0.92	98	1.0
South Water Surface	0.59	98	1.0
Stormwater Basin in (3 Total)	52.28		

Individual Areas for Component Evaluation:

Largest Inlet	4.23	74	10.4
Next Largest Inlet	4.23	74	6.4
Largest Bench	4.58	74	13.0

In addition to evaluating the stormwater system as a whole, individual, unconnected components were established in the model to evaluate specific inlets or sideslope berms. The modeled flows for the individual components were used in further spreadsheet analysis to determine capacities and freeboard.

HMS Model Output

The following table summarizes the results of the HEC-HMS analysis for given storms.

Table 2: HEC-HMS Output

Drainage Areas	DA (Ac)	Q_2 (CFS)	Q_{10} (CFS)	Q_{25} (CFS)	Q_{100} (CFS)
DA-1	2.51	4.5	9.8	13.8	21.3
DA-2	7.18	9.9	22.1	31.2	48.3
DA-3	3.31	5.5	12.1	17.0	26.3
DA-4	2.72	5.1	11.3	15.8	24.3
DA-5	4.23	6.5	14.4	20.2	31.2
DA-6	11.13	14.4	32.2	45.5	70.7
DA-7	2.85	4.7	10.3	14.5	22.4
DA-8	2.61	4.8	10.5	14.7	22.6
DA-9	3.52	6.4	14.2	19.9	30.6
DA-10	1.88	4.8	9.2	12.3	18.2
DA-11	0.65	1.4	2.9	3.9	6.0
DA-12	1.07	2.6	5.1	6.9	10.3
NPC-1	1.01	2.3	4.6	6.2	9.4
NPC-2	1.14	2.8	5.4	7.3	10.9
NPC-3	1.58	3.9	7.6	10.3	15.2

SPC-1	0.97	2.5	4.7	6.4	9.4
SPC-2	1.64	4	7.8	10.6	15.7
SPC-3	0.74	1.9	3.6	4.9	7.2
SPC-4	1.54	3.8	7.3	9.9	14.7
North Water Surface	0.60	3.0	4.7	5.9	8.0
Central Water Surface	0.92	4.5	7.1	8.8	12.0
South Water Surface	0.59	3.0	4.7	5.9	8.0
Perimeter Channels and Culverts	DA (Ac)	Q_2 (CFS)	Q_{10} (CFS)	Q_{25} (CFS)	Q_{100} (CFS)
NPC-01	1.01	2.3	4.6	6.2	9.3
NPC-02	4.66	9.3	19.5	27	40.9
NPC-03	13.42	21.9	46.7	65.1	99.5
2 x 36" Pipe	16.73	26.7	57.9	81.1	124.3
SPC-01	0.97	2.4	4.7	6.3	9.3
SPC-02	5.33	11.3	23.3	32.2	48.7
SPC-03	10.30	18.9	40.3	56.2	85.7
SPC-04	22.97	35.1	76.4	107.1	164.3
SB Ditch	29.10	37.7	84.1	118.7	184.0
Sediment Basins and Components					
C-N Weir		2.6	7.1	11.1	18.7
C-S Weir		2.6	7.1	11.1	18.7
North Basin in	17.33	29.3	65.2	92.5	143.9
North Basin out		9.0	50.0	79.5	130.6
North Basin HW Elevation		26.4	27.0	27.3	27.8
Central Basin in	6.30	13.0	25.8	35.1	52.4
Central Basin out*		2.6	7.1	11.1	18.7
Central Basin HW Elevation		27.3	27.5	27.6	27.8
South Basin in	30.76	43.4	99.8	143.0	224.8
South Basin out		24.7	87.1	130.6	209.5
South Basin HW Elevation		26.7	27.4	27.8	28.4

*Central Basin discharges to North and South basins

Largest Bench	4.58	5.9	13.2	18.7	29.1
Largest Inlet	4.23	6.5	14.4	20.2	31.2

Calculations for the HEC-HMS input and output are attached.

Sideslope Bench Capacity Hydraulics

For the largest sideslope bench drainage area of 4.58 acres, the capacity of the berm to convey water to the downslope pipe inlet was evaluated. Stormwater runoff calculations for the bench capacity were made using the Manning's equation.

The top deck diversion berms have a V-ditch cross sectional shape which is formed when the 45:1 (approximate 2%) landfill side slope meets the constructed berm. The resulting cross section has side slopes of 45:1 and 3:1, and a depth of 2.5 feet. At the 25-year storm event, the bench with the largest individual drainage area is capable of conveying the flow with a freeboard of 1.8-feet. For the 10-year storm, 1.9-feet of freeboard is provided. Flow velocity at the 2-year event is calculated at 1.33 ft/sec, and a non-biodegradable erosion control matting (EC-3 equivalent) is specified.

Calculations for the side slope bench (and other perimeter channels) are attached. The constructed depth of the berms is driven by the downslope pipe inlets rather than the capacity of the berm, as explained in the next section.

Downslope Pipe and Inlet Capacity

At the low point of each of the diversion berms, a 24-inch diameter drop inlet will receive the flow into a 24-inch diameter HDPE downslope pipe. The inlets were evaluated to verify sufficient capacity exists at each inlet to accept flow and provide at least one-half foot of freeboard for the 25-year storm event. A single 24" inlet and side slope berms constructed to an effective depth of 2.5 feet is sufficient to convey the 25-year storm event with a freeboard of 0.6-feet.

The downslope pipe conveying flow from the largest contributing drainage area is DA-5 on the southwestern portion of the landfill. The computed 25-year storm flow for the 4.23-acre drainage area is 20.2 CFS. The capacity of the downslope pipes is approximately 140.8 CFS. Calculation spreadsheets are attached.

At the terminal end of each downslope pipe, a stilling basin box will be constructed to attenuate the concentrated flow from the pipe and let it into the perimeter channel in a non-erosive manner. Capacity calculations are attached.

Perimeter Channel Capacity

The capacity for the proposed perimeter channels were evaluated for the 10 and 25-year storm event. The previously constructed channels do not have adequate capacity based on their associated constructed depth. The below table provides the minimum channel depth required based on a trapezoidal channel section with 3H:1V side slopes. Channel lining of non-biodegradable erosion control matting (EC-3 equivalent) is specified based on the 2-year velocity. Calculation spreadsheets are attached.

Table 3: Perimeter Channel Schedule

Perimeter Channel	Q_2 (CFS)	V_2 (fps)	Q_{25} (CFS)	Flow Depth – 10yr (in)	Freeboard 10yr (in)	Flow Depth – 25yr (in)	Freeboard 25yr (in)	Minimum Channel Depth (ft)
NPC-01	2.3	2.03	6.2	4.3	7.7	5.0	7.0	1.0
NPC-02	9.3	2.82	27	10.2	7.8	12.1	5.9	1.5
NPC-03	21.9	3.17	65.1	17.3	6.7	20.3	3.7	2.0
SPC-01	2.4	2.06	6.3	4.3	7.7	5.1	6.9	1.0
SPC-02	11.3	2.02	32.2	14.8	9.2	17.3	6.7	2.0
SPC-03	18.9	2.76	56.2	17.2	6.8	20.2	3.8	2.0
SPC-04	35.1	3.00	107.1	24.6	5.4	28.7	1.3	2.5
SB Ditch	37.7	3.66	118.7	22.9	7.1	26.9	3.1	2.5

Culvert Capacity

Existing culverts in the surface water management system have been evaluated to confirm adequate capacity has been provided for the 25-year storm. Two (2) existing 36-inch diameter culverts convey flow from the northern perimeter channels to the northern sediment basin. The transition occurs in the northeast corner of the landfill. On the southeastern corner of the landfill three (3), 36-inch diameter culverts convey flow from the southern perimeter channels to the southern basin ditch. Within the ditch are two (2) additional 36-inch diameter culverts. Along the northeastern edge of the landfill a singular 24-inch diameter culvert conveys flow to the southern sediment basin from DA-12 and a separate 24-inch diameter culvert conveys flow to the northern sediment basin from DA-11. Finally, two (2) 36-inch diameter culverts convey flow from DA-7 and DA-10 to the central sediment basin. Calculation spreadsheets are attached. CulvertMaster was utilized to calculate flow when headwater condition is present. Spreadsheet analysis was used for open channel flow conditions.

Stormwater Basin Evaluation

The network of three (3) stormwater basins at the landfill were evaluated to provide function for erosion and sediment control capacity as well as attenuation for the 25-year storm event.

In order to provide a freeboard of at least 1.0-foot for the 25-year storm event, the top of basin berm will be required to be raised to a minimum elevation 28.8. The increase in elevation will provide adequate sizing for the 25-year event. Please see the attached calculation spreadsheets.

ATTACHMENTS

Attachment 1: Drainage Area Map (Drawing 1)

Attachment 2: Individual component calculation spreadsheets or packages:

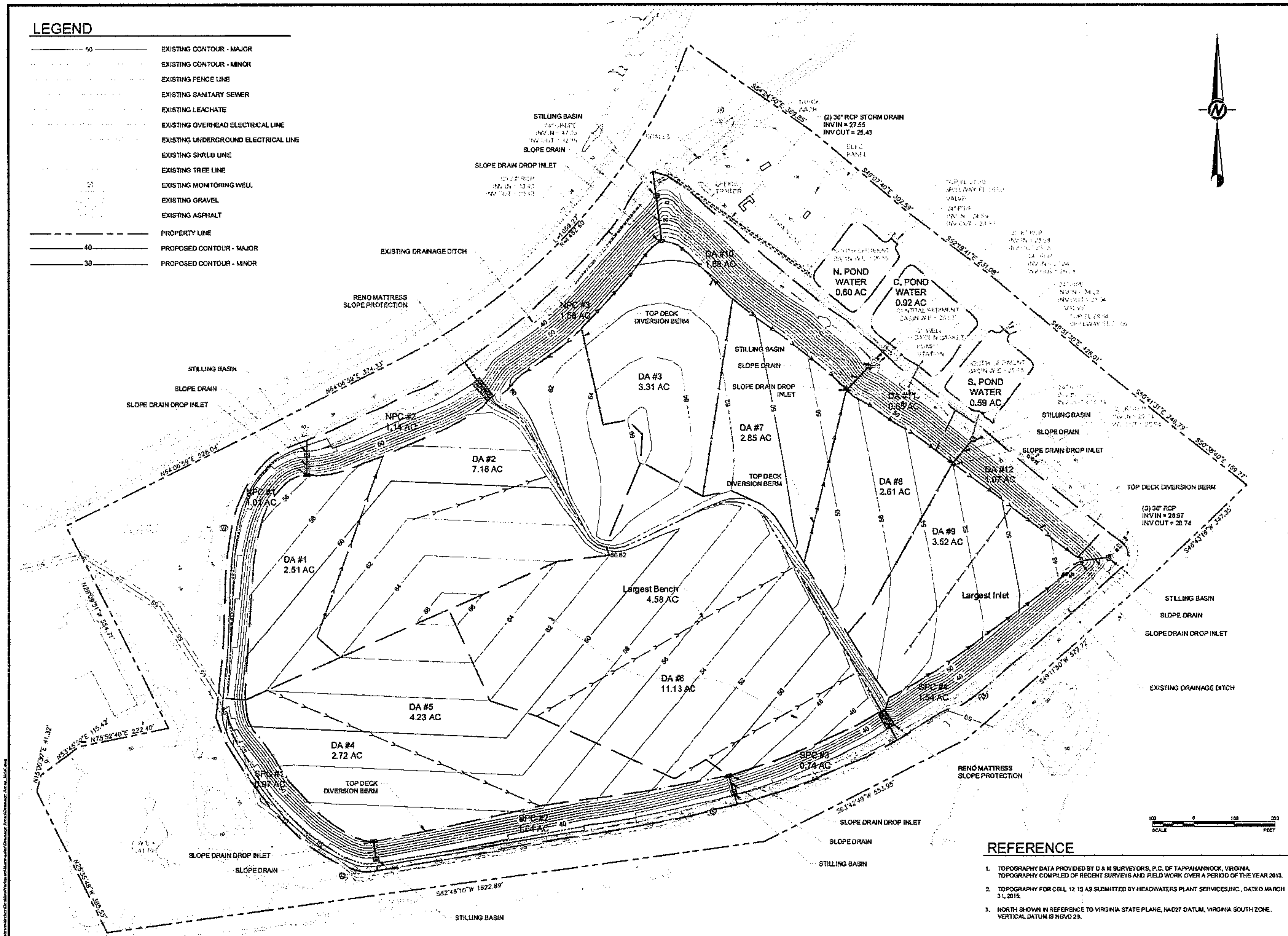
- Slope Drain Drop Inlet Rating;
- Slope drain pipe capacity and stilling basin
- Diversion Berm, Perimeter channel capacity, and Culvert capacity worksheets

References

1) U.S. Army Corps of Engineers Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) release 4.0
2) National Oceanic and Atmospheric Administration (NOAA), Point Precipitation Frequency Estimates for NOAA Atlas 14, http://hdsc.nws.noaa.gov/hdsc/pfds/index.html
3) Brater, Ernest; King, Horace; Handbook of Hydraulics 7th Ed, 1996
4) Natural Resources Conservation Service (NRCS), "Web Soil Survey", http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
5) Bentley Systems, Inc – CulvertMaster v3.3.

DRAINAGE AREA MAP

DRAINAGE AREA MAP


LEGEND
EXISTING CONTOUR - MAJOR
EXISTING CONTOUR - MINOR
EXISTING FENCE LINE
EXISTING SANITARY SEWER
EXISTING LEACHATE
EXISTING OVERHEAD ELECTRICAL LINE
EXISTING UNDERGROUND ELECTRICAL LINE
EXISTING SHRUB LINE
EXISTING TREE LINE
EXISTING MONITORING WELL
EXISTING GRAVEL
EXISTING ASPHALT
PROPERTY LINE
PROPOSED CONTOUR - MAJOR
PROPOSED CONTOUR - MINOR
N
STILLING BASIN
SLOPE DRAIN
SLOPE DRAIN DROP INLET
EXISTING DRAINAGE DITCH
RENO MATTRESS SLOPE PROTECTION
(2) 36" RCP STORM DRAIN
INV IN = 27.55
INV OUT = 25.43
N. POND WATER 0.60 AC
C. POND WATER 0.92 AC
S. POND WATER 0.59 AC
DA #10 1.88 AC
NPC #3 1.58 AC
NPC #2 1.14 AC
NPC #1 1.01 AC
TOP DECK DIVERSION BERM
DA #1 2.51 AC
DA #2 7.18 AC
DA #3 3.31 AC
DA #4 2.72 AC
DA #5 4.23 AC
DA #6 11.13 AC
DA #7 2.85 AC
DA #8 2.61 AC
DA #9 3.52 AC
DA #12 1.07 AC
Largest Bench 4.58 AC
Largest Inlet
(3) 36" RCP
INV IN = 28.97
INV OUT = 20.74
SPC #1 0.97 AC
SPC #2 1.64 AC
SPC #3 0.74 AC
SPC #4 1.54 AC
N54°06'59"E 374.33'
N54°06'59"E 528.04'
S63°42'49"W 553.95'
S82°48'10"W 1522.89'
S49°17'50"W 577.72'
N53°45'02"E 115.42'
N78°52'48"E 222.40'
SCALE
FEET

REFERENCE

1. TOPOGRAPHY DATA PROVIDED BY D & M SURVEYORS, P.C. OF TAPPAHANNOCK, VIRGINIA. TOPOGRAPHY COMPILED OF RECENT SURVEYS AND FIELD WORK OVER A PERIOD OF THE YEAR 2013.
2. TOPOGRAPHY FOR CELL 12 15 AS SUBMITTED BY HEADWATERS PLANT SERVICES,INC., DATED MARCH 31, 2015.
3. NORTH SHOWN IN REFERENCE TO VIRGINIA STATE PLANE, NAD27 DATUM, VIRGINIA SOUTH ZONE. VERTICAL DATUM IS NGVD 29.

Golder Associates

PROJECT: DOMINION YORKTOWN POWER STATION EARLY CLOSURE PLAN YORK COUNTY, VIRGINIA

TITLE: DRAINAGE AREA MAP

PROJECT No.		123-85406
FILE No.		Drainage Areas_MAK
REV 1	SCALE	AS SHOWN
DESIGN	MAK	08-28-2015
CADD	MAK	08-28-2015
CHECK	DPM	09-01-2015
REVIEW	JRD	09-01-2015

DRAWING 1

SLOPE DRAIN DROP INLET RATING

Given Data

Pipe Inside Dia	2	ft
Cd (Orifice)	0.6	
Cw (Weir)	3.33	
Pipe Area, A	2.67	
Pipe Opening, L	5.34	

Nominal Pipe Area	3.14159	
% open area	85%	(assumed obstructed)
Inlet Crest Elevation	0	

Orifice Equation Q = A*Cd*sqrt (2 *g * H)

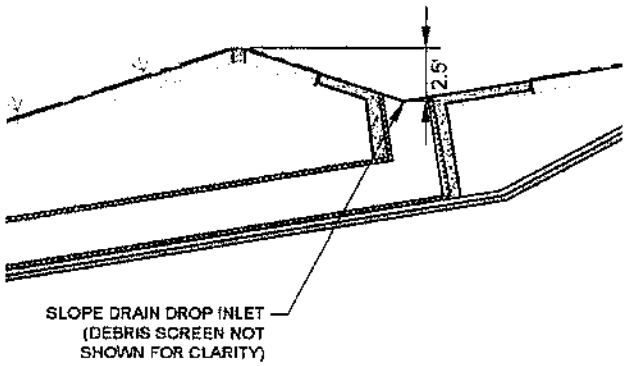
Weir Equation Q = Cw * L * H^1.5

Use:

A vertical pipe used as an inlet will act first as a weir, then at a certain depth, will transition to an orifice flow. This depth depends on the diameter of the pipe. Use the lower of the two values for the actual expected flow from the riser.

Rated Capacity of one Slope Drain Drop Inlet

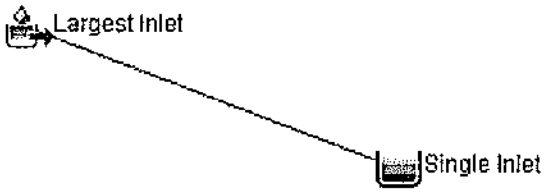
Head, ft	CFS Orifice	CFS Weir	Minimum Value, CFS	Controlling Flow
0	0	0	0.00	N/A
0.25	6.43	2.22	2.22	WEIR
0.5	9.09	6.29	6.29	WEIR
0.75	11.14	11.55	11.14	ORIFICE
1	12.86	17.78	12.86	ORIFICE
1.25	14.38	24.85	14.38	ORIFICE
1.5	15.75	32.67	15.75	ORIFICE
1.75	17.01	41.17	17.01	ORIFICE
2.0	18.18	50.30	18.18	ORIFICE
2.25	19.29	60.02	19.29	ORIFICE
2.5	20.33	70.30	20.33	ORIFICE

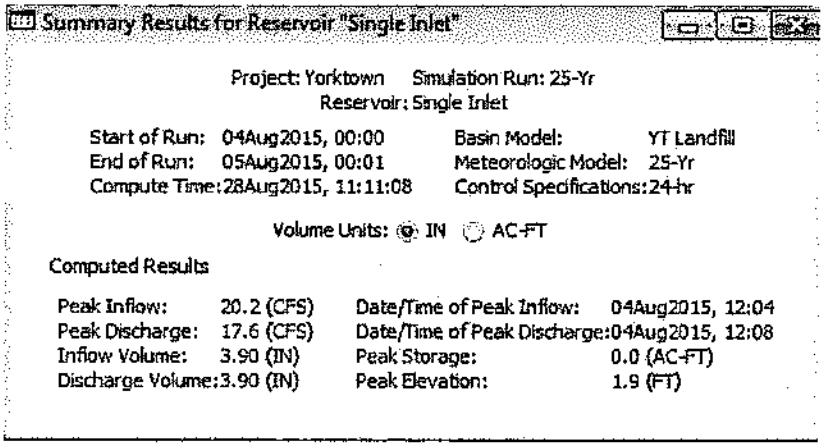


HEC-HMS Modeled Results for inlet analysis

	25-Yr Event			
	Area, Ac.	Flow, CFS	Head, ft	Freeboard
Largest Drop Inlet	4.23	17.6	1.9	0.6

The inlet was modeled in HEC-HMS as a small reservoir to account for the stage storage volume that temporarily develops at the inlet during large storm events. The inlets as designed with 85% open function for the 25-year event.




Summary Results for Reservoir "Single Inlet"

Project: Yorktown Simulation Run: 25-Yr
Reservoir: Single Inlet

Start of Run: 04Aug2015, 00:00 Basin Model: YT Landfill
End of Run: 05Aug2015, 00:01 Meteorologic Model: 25-Yr
Compute Time: 28Aug2015, 11:11:08 Control Specifications: 24-hr

Volume Units: (•) IN ( ) AC-FT

Computed Results

Peak Inflow:	20.2 (CFS)	Date/Time of Peak Inflow:	04Aug2015, 12:04
Peak Discharge:	17.6 (CFS)	Date/Time of Peak Discharge:	04Aug2015, 12:08
Inflow Volume:	3.90 (IN)	Peak Storage:	0.0 (AC-FT)
Discharge Volume:	3.90 (IN)	Peak Elevation:	1.9 (FT)

Made By: MAK
Checked:
Reviewed:

SLOPE DRAIN PIPE CAPACITY AND STILLING BASIN

Golder Associates Richmond, Virginia	Subject: Slope drain and stilling basins at the Dominion - Yorktown Landfill in Yorktown, Virginia		
	Job No: 12396405	Made by: MAK	Date: 8/28/15
	Rev 0	Checked:	
	Ref:	Reviewed:	Sheet 1 of 2

Objective Determine the capacity of the slope drain and the stilling basins that will be located at the base of the slope drain

Calculation

Slope Drain

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$

Where: Q = flowrate, cfs

A= cross-sectional area, sq ft = $\pi/4$ * dia^2

R= hyrdaulic radis, ft = dia/4 (assuming full)

S= downchute slope, ft/ft = 0.33 (3:1 on slopes)

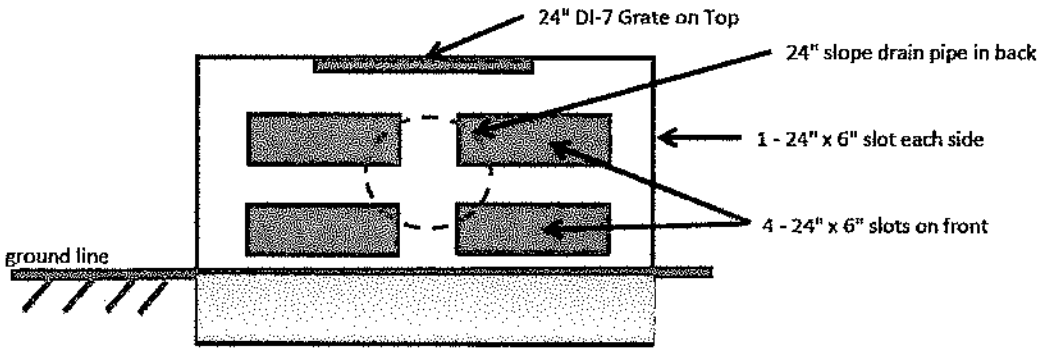
n = Manning number = 0.012 smooth

With diameter = 24"

Qfull = 140.8 cfs

Slope drain Pipe ID	Drainage area (Ac.)	Q_{25} (cfs)	Flow depth (ft)	Flow velocity (ft/s)	% Full
DA-1	2.51	13.8	0.47	30.26	10%
DA-3	3.31	17.0	0.51	31.89	12%
DA-4	2.72	15.8	0.50	31.31	11%
DA-5	4.23	25.3	0.61	35.23	18%
DA-7	2.85	14.5	0.48	30.64	10%
DA-8	2.61	14.7	0.48	30.75	10%
DA-9	3.52	19.9	0.55	33.18	14%

Stilling Basin



Golder Associates Richmond, Virginia	Subject:	Slope drain and stilling basins at the Dominion - Yorktown Landfill in Yorktown, Virginia		
	Job No:	12396405	Made by: MAK	Date: 8/28/15
		Rev 1	Checked:	
	Ref:		Reviewed:	Sheet 2 of 2

Slot height	6	inches
slot width	24	
Hole area	1	ft^2
holes/row 1	2	
holes/row 2	4	
row 1 crest	3	inches from bottom
row 2 crest	18	inches from bottom

Depth in Box	H1	H2	Q/hole1	Q/row1	Q/hole2	Q/row2	Total	
0	0	0	0				0	
3	0	0	0	0			0	
6	0.25	0	1.04	2.08	0.00	0.00	2.08	cfs
9	0.5	0	2.94	5.89	0.00	0.00	5.89	cfs
12	0.75	0	4.17	8.34	0.00	0.00	8.34	cfs
15	1	0	4.81	9.63	0.00	0.00	9.63	cfs
18	1.25	0	5.38	10.77	0.00	0.00	10.77	cfs
21	1.5	0.25	5.90	11.79	1.04	4.16	15.96	cfs
24	1.75	0.5	6.37	12.74	2.94	11.77	24.51	cfs
27	2	0.75	6.81	13.62	4.17	16.68	30.30	cfs
30	2.25	1	7.22	14.44	4.81	19.26	33.70	cfs
33	2.5	1.25	7.61	15.23	5.38	21.53	36.76	cfs
36	2.75	1.5	7.98	15.97	5.90	23.59	39.56	cfs
39	3	1.75	8.34	16.68	6.37	25.48	42.16	cfs
42	3.25	2	8.68	17.36	6.81	27.24	44.60	cfs

** Flows in excess of 44.6 CFS will convey out the top DI-7 grate

Conclusion Based on the results of this model, the downslope pipes and the stilling basins with 6-24"x6" holes adequately convey the 25-year, 24 hour storm event.

References

1) Brater, Ernest; King, Horace; Handbook of Hydraulics 7th Ed, 1996

DIVERSION BERM, PERIMETER CHANNEL CAPACITY, AND CULVERT CAPACITY WORKSHEETS

NPC-01

Channel Dimensions					
Bw:	4	ft	Top width:	10	ft
Length:	690	ft	Offset (LB):	5	
$Elev_0$:		ft	Offset (RB):	5	
$Elev_1$:		ft			
Δ Elev:		ft	Min. Depth:	1	ft
Slope:	0.019	ft/ft	Left Slope	3	: 1
	1.88	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	2.3	cfs
Depth:	2.9	in
	0.240	ft
Freeboard:	9.1	in

Flow Depth (10yr):		
Q:	4.6	cfs
Depth:	4.3	in
	0.356	ft
Freeboard:	7.7	in

Flow Depth (25yr):		
Q:	6.2	cfs
Depth:	5.0	in
	0.421	ft
Freeboard:	7.0	in

Flow Depth (100yr):		
Q:	9.3	cfs
Depth:	6.3	in
	0.526	ft
Freeboard:	5.7	in

Manning's Equation (2yr):		
n:	0.035	
A:	1.132	sqft
P:	5.517	ft
R:	0.205	ft/ft
S:	0.0188	ft/ft
Q =	2.3	cfs
V =	2.03	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	1.804	sqft
P:	6.252	ft
R:	0.289	ft/ft
S:	0.0188	ft/ft
Q =	4.6	cfs
V =	2.55	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	2.214	sqft
P:	6.661	ft
R:	0.332	ft/ft
S:	0.0188	ft/ft
Q =	6.2	cfs
V =	2.80	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	2.933	sqft
P:	7.326	ft
R:	0.400	ft/ft
S:	0.0188	ft/ft
Q =	9.3	cfs
V =	3.17	ft/s

Travel time =	5.66	min

Travel time =	4.51	min

Travel time =	4.11	min

Travel time =	3.63	min

NPC-02

Channel Dimensions					
Bw:	4	ft	Top width:	13	ft
Length:	445.0	ft	Offset (LB):	6.5	
$Elev_0$:		ft	Offset (RB):	6.5	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	1.5	ft
Slope:	0.014	ft/ft	Left Slope	3	: 1
	1.35	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	9.3	cfs
Depth:	6.9	in
	0.575	ft
Freeboard:	11.1	in

Flow Depth (10yr):		
Q:	19.5	cfs
Depth:	10.2	in
	0.851	ft
Freeboard:	7.8	in

Flow Depth (25yr):		
Q:	27.0	cfs
Depth:	12.1	in
	1.005	ft
Freeboard:	5.9	in

Flow Depth (100yr):		
Q:	40.9	cfs
Depth:	14.8	in
	1.237	ft
Freeboard:	3.2	in

Manning's Equation (2yr):		
n:	0.035	
A:	3.294	sqft
P:	7.638	ft
R:	0.431	ft/ft
S:	0.0135	ft/ft
Q =	9.3	cfs
V =	2.823	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	5.577	sqft
P:	9.382	ft
R:	0.594	ft/ft
S:	0.0135	ft/ft
Q =	19.5	cfs
V =	3.497	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	7.053	sqft
P:	10.358	ft
R:	0.681	ft/ft
S:	0.0135	ft/ft
Q =	27.0	cfs
V =	3.828	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	9.541	sqft
P:	11.825	ft
R:	0.807	ft/ft
S:	0.0135	ft/ft
Q =	40.9	cfs
V =	4.287	ft/s

Travel time =	2.63	min

Travel time =	2.12	min

Travel time =	1.94	min

Travel time =	1.73	min

NPC-03

Channel Dimensions					
Bw:	4	ft	Top width:	16	ft
Length:	640	ft	Offset (LB):	8	
$Elev_0$:		ft	Offset (RB):	8	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	2	ft
Slope:	0.009	ft/ft	Left Slope	3	: 1
	0.94	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	21.9	cfs
Depth:	11.9	in
	0.991	ft
Freeboard:	12.1	in

Flow Depth (10yr):		
Q:	46.7	cfs
Depth:	17.3	in
	1.442	ft
Freeboard:	6.7	in

Flow Depth (25yr):		
Q:	65.1	cfs
Depth:	20.3	in
	1.690	ft
Freeboard:	3.7	in

Flow Depth (100yr):		
Q:	99.5	cfs
Depth:	24.7	in
	2.061	ft
Freeboard:	-0.7	in

Manning's Equation (2yr):		
n:	0.035	
A:	6.909	sqft
P:	10.267	ft
R:	0.673	ft/ft
S:	0.0094	ft/ft
Q =	21.9	cfs
V =	3.170	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	12.004	sqft
P:	13.119	ft
R:	0.915	ft/ft
S:	0.0094	ft/ft
Q =	46.7	cfs
V =	3.890	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	15.330	sqft
P:	14.689	ft
R:	1.044	ft/ft
S:	0.0094	ft/ft
Q =	65.1	cfs
V =	4.247	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	20.979	sqft
P:	17.032	ft
R:	1.232	ft/ft
S:	0.0094	ft/ft
Q =	99.5	cfs
V =	4.743	ft/s

Travel time =	3.37	min

Travel time =	2.74	min

Travel time =	2.51	min

Travel time =	2.25	min

2 x 36" pipe (Northern Channels)

Pipe Dimensions		
Diameter:	36	in
	3	ft
Radius:	1.5	ft
# of Pipes:	2	
Initial Elev:	30	ft
Terminal Elev:	27.87	ft
Δ Elevation:	2.13	ft
Length:	426	ft

Converter	
gpm	0
cfs	0
cfs	0
gpm	0

Flow Depth (2yr):		
y:	14.0	in
	1.167	ft
θ:	2.694379	

Flow Depth (10yr):		
y:	22.3	in
	1.862	ft
θ:	3.629646	

Flow Depth (25yr):		
y:	29.2	in
	2.434	ft
θ:	4.485757	

Manning's Equation (2yr):		
n:	0.013	
A:	2.545	sqft
R:	0.630	ft/ft
S:	0.0050	ft/ft
Q Total:	26.70	cfs
Q Req/Pipe:	13.35	cfs
Q =	15.15	cfs
V =	5.954	ft/s

Manning's Equation (10yr):		
n:	0.013	
A:	4.611	sqft
R:	0.847	ft/ft
S:	0.0050	ft/ft
Q Total	57.90	cfs
Q Req/Pipe:	28.95	cfs
Q =	33.45	cfs
V =	7.255	ft/s

Manning's Equation (25yr):		
n:	0.013	
A:	6.143	sqft
R:	0.913	ft/ft
S:	0.0050	ft/ft
Q Total	81.10	cfs
Q Req/Pipe:	40.55	cfs
Q =	46.85	cfs
V =	7.627	ft/s

Travel time =	1.19	min

Travel time =	0.98	min

Travel time =	0.93	min

SPC-01

Channel Dimensions					
Bw:	4	ft	Top width:	10	ft
Length:	585	ft	Offset (LB):	5	
$Elev_0$:		ft	Offset (RB):	5	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	1	ft
Slope:	0.019	ft/ft	Left Slope	3	: 1
	1.88	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	2.4	cfs
Depth:	3.0	in
	0.246	ft
Freeboard:	9.0	in

Flow Depth (10yr):		
Q:	4.7	cfs
Depth:	4.3	in
	0.360	ft
Freeboard:	7.7	in

Flow Depth (25yr):		
Q:	6.3	cfs
Depth:	5.1	in
	0.424	ft
Freeboard:	6.9	in

Flow Depth (100yr):		
Q:	9.3	cfs
Depth:	6.3	in
	0.526	ft
Freeboard:	5.7	in

Manning's Equation (2yr):		
n:	0.035	
A:	1.165	sqft
P:	5.555	ft
R:	0.210	ft/ft
S:	0.0188	ft/ft
Q =	2.4	cfs
V =	2.060	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	1.831	sqft
P:	6.279	ft
R:	0.292	ft/ft
S:	0.0188	ft/ft
Q =	4.7	cfs
V =	2.567	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	2.238	sqft
P:	6.684	ft
R:	0.335	ft/ft
S:	0.0188	ft/ft
Q =	6.3	cfs
V =	2.815	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	2.933	sqft
P:	7.326	ft
R:	0.400	ft/ft
S:	0.0	ft/ft
Q =	9.3	cfs
V =	3.171	ft/s

Travel time =	4.73	min

Travel time =	3.80	min

Travel time =	3.46	min

Travel time =	3.07	min

SPC-02

Channel Dimensions					
Bw:	4	ft	Top width:	16	ft
Length:	890	ft	Offset (LB):	8	
$Elev_0$:		ft	Offset (RB):	8	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	2.0	ft
Slope:	0.004	ft/ft	Left Slope	3	: 1
	0.449	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	11.3	cfs
Depth:	10.2	in
	0.853	ft
Freeboard:	13.8	in

Flow Depth (10yr):		
Q:	23.3	cfs
Depth:	14.8	in
	1.230	ft
Freeboard:	9.2	in

Flow Depth (25yr):		
Q:	32.2	cfs
Depth:	17.3	in
	1.440	ft
Freeboard:	6.7	in

Flow Depth (100yr):		
Q:	48.7	cfs
Depth:	21.1	in
	1.754	ft
Freeboard:	2.9	in

Manning's Equation (2yr):		
n:	0.035	
A:	5.596	sqft
P:	9.396	ft
R:	0.596	ft/ft
S:	0.0045	ft/ft
Q =	11.3	cfs
V =	2.019	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	9.456	sqft
P:	11.777	ft
R:	0.803	ft/ft
S:	0.0045	ft/ft
Q =	23.3	cfs
V =	2.464	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	11.984	sqft
P:	13.109	ft
R:	0.914	ft/ft
S:	0.0045	ft/ft
Q =	32.2	cfs
V =	2.687	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	16.253	sqft
P:	15.096	ft
R:	1.077	ft/ft
S:	0.0045	ft/ft
Q =	48.7	cfs
V =	2.996	ft/s

Travel time =	7.35	min

Travel time =	6.02	min

Travel time =	5.52	min

Travel time =	4.95	min

SPC-03

Channel Dimensions					
Bw:	4	ft	Top width:	16	ft
Length:	415	ft	Offset (LB):	8	
$Elev_0$:		ft	Offset (RB):	8	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	2	ft
Slope:	0.007	ft/ft	Left Slope	3	: 1
	0.72	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	18.9	cfs
Depth:	11.8	in
	0.984	ft
Freeboard:	12.2	in

Flow Depth (10yr):		
Q:	40.3	cfs
Depth:	17.2	in
	1.432	ft
Freeboard:	6.8	in

Flow Depth (25yr):		
Q:	56.2	cfs
Depth:	20.2	in
	1.679	ft
Freeboard:	3.8	in

Flow Depth (100yr):		
Q:	85.7	cfs
Depth:	24.5	in
	2.045	ft
Freeboard:	-0.5	in

Manning's Equation (2yr):		
n:	0.035	
A:	6.840	sqft
P:	10.223	ft
R:	0.669	ft/ft
S:	0.0072	ft/ft
Q =	18.9	cfs
V =	2.763	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	11.881	sqft
P:	13.057	ft
R:	0.910	ft/ft
S:	0.0072	ft/ft
Q =	40.3	cfs
V =	3.392	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	15.176	sqft
P:	14.620	ft
R:	1.038	ft/ft
S:	0.0072	ft/ft
Q =	56.2	cfs
V =	3.703	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	20.732	sqft
P:	16.936	ft
R:	1.224	ft/ft
S:	0.0072	ft/ft
Q =	85.7	cfs
V =	4.134	ft/s

Travel time =	2.50	min

Travel time =	2.04	min

Travel time =	1.87	min

Travel time =	1.67	min

SPC-04

Channel Dimensions					
Bw:	4	ft	Top width:	19	ft
Length:	700	ft	Offset (LB):	9.5	
$Elev_0$:		ft	Offset (RB):	9.5	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	2.5	ft
Slope:	0.006	ft/ft	Left Slope	3	: 1
	0.57	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	35.1	cfs
Depth:	17.0	in
	1.417	ft
Freeboard:	13.0	in

Manning's Equation (2yr):		
n:	0.035	
A:	11.696	sqft
P:	12.964	ft
R:	0.902	ft/ft
S:	0.0057	ft/ft
Q =	35.1	cfs
V =	3.001	ft/s

Travel time =	3.89	min

Flow Depth (10yr):		
Q:	76.4	cfs
Depth:	24.6	in
	2.047	ft
Freeboard:	5.4	in

Manning's Equation (10yr):		
n:	0.035	
A:	20.762	sqft
P:	16.948	ft
R:	1.225	ft/ft
S:	0.0057	ft/ft
Q =	76.4	cfs
V =	3.680	ft/s

Travel time =	3.17	min

Flow Depth (25yr):		
Q:	107.1	cfs
Depth:	28.7	in
	2.389	ft
Freeboard:	1.3	in

Manning's Equation (25yr):		
n:	0.035	
A:	26.677	sqft
P:	19.109	ft
R:	1.396	ft/ft
S:	0.0057	ft/ft
Q =	107.1	cfs
V =	4.015	ft/s

Travel time =	2.91	min

Flow Depth (100yr):		
Q:	164.3	cfs
Depth:	34.7	in
	2.893	ft
Freeboard:	-4.7	in

Manning's Equation (100yr):		
n:	0.035	
A:	36.682	sqft
P:	22.297	ft
R:	1.645	ft/ft
S:	0.0057	ft/ft
Q =	164.3	cfs
V =	4.479	ft/s

Travel time =	2.60	min

SB DITCH

Channel Dimensions					
Bw:	4	ft	Top width:	19	ft
Length:	430	ft	Offset (LB):	9.5	
$Elev_0$:		ft	Offset (RB):	9.5	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	2.5	ft
Slope:	0.009	ft/ft	Left Slope	3	: 1
	0.93	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	37.7	cfs
Depth:	15.6	in
	1.303	ft
Freeboard:	14.4	in

Flow Depth (10yr):		
Q:	84.1	cfs
Depth:	22.9	in
	1.911	ft
Freeboard:	7.1	in

Flow Depth (25yr):		
Q:	118.7	cfs
Depth:	26.9	in
	2.240	ft
Freeboard:	3.1	in

Flow Depth (100yr):		
Q:	184	cfs
Depth:	32.7	in
	2.729	ft
Freeboard:	-2.7	in

Manning's Equation (2yr):		
n:	0.035	
A:	10.301	sqft
P:	12.239	ft
R:	0.842	ft/ft
S:	0.0093	ft/ft
Q =	37.7	cfs
V =	3.660	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	18.596	sqft
P:	16.085	ft
R:	1.156	ft/ft
S:	0.0093	ft/ft
Q =	84.1	cfs
V =	4.522	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	24.008	sqft
P:	18.165	ft
R:	1.322	ft/ft
S:	0.0093	ft/ft
Q =	118.7	cfs
V =	4.944	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	33.258	sqft
P:	21.260	ft
R:	1.564	ft/ft
S:	0.0093	ft/ft
Q =	184.0	cfs
V =	5.532	ft/s

Travel time =	1.96	min

Travel time =	1.58	min

Travel time =	1.45	min

Travel time =	1.30	min

Largest Bench

Channel Dimensions					
Bw:	0	ft	Top width:	72	ft
Length:	722	ft	Offset (LB):	67.5	
$Elev_0$:		ft	Offset (RB):	4.5	
$Elev_1$:		ft			
Δ Elev:	0	ft	Depth:	1.5	ft
Slope:	0.008	ft/ft	Left Slope	45	: 1
	0.76	%	Right Slope	3	: 1

Flow Depth (2yr):		
Q:	5.9	cfs
Depth:	5.16	in
	0.430	ft
Freeboard:	12.84	in

Flow Depth (10yr):		
Q:	13.2	cfs
Depth:	6.98	in
	0.582	ft
Freeboard:	11.02	in

Flow Depth (25yr):		
Q:	18.7	cfs
Depth:	7.95	in
	0.663	ft
Freeboard:	10.05	in

Flow Depth (100yr):		
Q:	29.1	cfs
Depth:	9.39	in
	0.782	ft
Freeboard:	8.61	in

Manning's Equation (2yr):		
n:	0.035	
A:	4.440	sqft
P:	20.719	ft
R:	0.214	ft/ft
S:	0.0076	ft/ft
Q =	5.9	cfs
V =	1.33	ft/s

Manning's Equation (10yr):		
n:	0.035	
A:	8.122	sqft
P:	28.023	ft
R:	0.290	ft/ft
S:	0.0076	ft/ft
Q =	13.2	cfs
V =	1.63	ft/s

Manning's Equation (25yr):		
n:	0.035	
A:	10.546	sqft
P:	31.933	ft
R:	0.330	ft/ft
S:	0.0076	ft/ft
Q =	18.7	cfs
V =	1.77	ft/s

Manning's Equation (100yr):		
n:	0.035	
A:	14.694	sqft
P:	37.693	ft
R:	0.390	ft/ft
S:	0.0076	ft/ft
Q =	29.1	cfs
V =	1.98	ft/s

Travel time =	9.05	min

Travel time =	7.40	min

Travel time =	6.79	min

Travel time =	6.08	min

3 x 36" pipe to SB Ditch

Pipe Dimensions		
Diameter:	36	in
	3	ft
Radius:	1.5	ft
# of Pipes:	3	
Initial Elev:	28.97	ft
Terminal Elev:	28.74	ft
Δ Elevation:	0.23	ft
Length:	40	ft

Converter	
gpm	0
cfs	0
cfs	0
gpm	0

Flow Depth (2yr):		
y:	11.8	in
	0.980	ft
θ:	2.433676	

Flow Depth (10yr):		
y:	18.0	in
	1.504	ft
θ:	3.146871	

Flow Depth (25yr):		
y:	22.3	in
	1.856	ft
θ:	3.62146	

Manning's Equation (2yr):		
n:	0.013	
A:	2.006	sqft
R:	0.550	ft/ft
S:	0.0058	ft/ft
Q Total:	35.1	cfs
Q Req/Pipe:	11.70	cfs
Q =	11.70	cfs
V =	5.831	ft/s

Manning's Equation (10yr):		
n:	0.013	
A:	3.546	sqft
R:	0.751	ft/ft
S:	0.0058	ft/ft
Q Total	76.4	cfs
Q Req/Pipe:	25.47	cfs
Q =	25.47	cfs
V =	7.182	ft/s

Manning's Equation (25yr):		
n:	0.013	
A:	4.594	sqft
R:	0.846	ft/ft
S:	0.0058	ft/ft
Q Total	107.1	cfs
Q Req/Pipe:	35.70	cfs
Q =	35.70	cfs
V =	7.772	ft/s

Travel time =	0.11	min

Travel time =	0.09	min

Travel time =	0.09	min

SB Ditch Culverts 2 x 36" pipe

Pipe Dimensions		
Diameter:	36	in
	3	ft
Radius:	1.5	ft
# of Pipes:	2	
Initial Elev:	25.74	ft
Terminal Elev:	25.54	ft
Δ Elevation:	0.2	ft
Length:	32	ft

Converter	
gpm	0
cfs	0
cfs	0
gpm	0

Flow Depth (2yr):		
y:	14.9	in
	1.238	ft
Θ:	2.790057	

Flow Depth (10yr):		
Y:	24.3	in
	2.021	ft
Θ:	3.851167	

Manning's Equation (2yr):		
n:	0.013	
A:	2.751	sqft
R:	0.657	ft/ft
S:	0.0062	ft/ft
Q Total:	37.70	cfs
Q Req/Pipe:	18.85	cfs
Q =	18.85	cfs
V =	6.851	ft/s

Manning's Equation (10yr):		
n:	0.013	
A:	5.066	sqft
R:	0.877	ft/ft
S:	0.0062	ft/ft
Q Total	84.10	cfs
Q Req/Pipe:	42.05	cfs
Q =	42.05	cfs
V =	8.301	ft/s

Travel time =	0.08	min

Travel time =	0.06	min

Flow Depth (25yr):

Culvert Summary

Allowable HW Elevation	4.00 ft	Headwater Depth/Height	1.60
Computed Headwater Elevation	5.01 ft	Discharge	118.70 cfs
Inlet Control HW Elev.	5.01 ft	Tailwater Elevation	2.25 ft
Outlet Control HW Elev.	4.73 ft	Control Type	Inlet Control

Grades

Upstream Invert	0.20 ft	Downstream Invert	0.00 ft
Length	32.00 ft	Constructed Slope	0.006250 ft/ft

Hydraulic Profile

Profile	M2	Depth, Downstream	2.49 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	2.49 ft
Velocity Downstream	9.46 ft/s	Critical Slope	0.007746 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev.	4.73 ft	Upstream Velocity Head	1.23 ft
Ke	0.50	Entrance Loss	0.62 ft

Inlet Control Properties

Inlet Control HW Elev.	5.01 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	14.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

DA-8 and DA-12 (1 x 24" pipe)

Pipe Dimensions		
Diameter:	24	in
	2	ft
Radius:	1	ft
# of Pipes:	1	
Initial Elev:	28.07	ft
Terminal Elev:	26.74	ft
Δ Elevation:	1.33	ft
Length:	50	ft

Converter	
gpm	0
cfs	0
cfs	0
gpm	0

Flow Depth (2yr):		
y:	7.3	in
	0.607	ft
θ:	2.332957	

Flow Depth (10yr):		
y:	10.9	in
	0.906	ft
θ:	2.953881	

Flow Depth (25yr):		
y:	13.2	in
	1.098	ft
θ:	3.337608	

Manning's Equation (2yr):		
n:	0.013	
A:	0.805	sqft
R:	0.345	ft/ft
S:	0.0266	ft/ft
Q Total:	7.40	cfs
Q Req/Pipe:	7.40	cfs
Q =	7.40	cfs
V =	9.195	ft/s

Manning's Equation (10yr):		
n:	0.013	
A:	1.384	sqft
R:	0.468	ft/ft
S:	0.0266	ft/ft
Q Total	15.60	cfs
Q Req/Pipe:	15.60	cfs
Q =	15.60	cfs
V =	11.275	ft/s

Manning's Equation (25yr):		
n:	0.013	
A:	1.766	sqft
R:	0.529	ft/ft
S:	0.0266	ft/ft
Q Total	21.60	cfs
Q Req/Pipe:	21.60	cfs
Q =	21.60	cfs
V =	12.230	ft/s

Travel time =	0.09	min

Travel time =	0.07	min

Travel time =	0.07	min

DA-11 (1 x 24" culvert)

Pipe Dimensions		
Diameter:	24	in
	2	ft
Radius:	1	ft
# of Pipes:	1	
Initial Elev:	27.24	ft
Terminal Elev:	26.28	ft
Δ Elevation:	0.96	ft
Length:	57	ft

Converter	
gpm	0
cfs	0
cfs	0
gpm	0

Flow Depth (2yr):		
y:	3.6	in
	0.297	ft
θ:	1.58193	

Flow Depth (10yr):		
y:	5.1	in
	0.424	ft
θ:	1.913944	

Flow Depth (25yr):		
y:	5.9	in
	0.492	ft
θ:	2.075071	

Manning's Equation (2yr):		
n:	0.013	
A:	0.291	sqft
R:	0.184	ft/ft
S:	0.0168	ft/ft
Q Total:	1.40	cfs
Q Req/Pipe:	1.40	cfs
Q =	1.40	cfs
V =	4.811	ft/s

Manning's Equation (10yr):		
n:	0.013	
A:	0.486	sqft
R:	0.254	ft/ft
S:	0.0168	ft/ft
Q Total	2.90	cfs
Q Req/Pipe:	2.90	cfs
Q =	2.90	cfs
V =	5.966	ft/s

Manning's Equation (25yr):		
n:	0.013	
A:	0.600	sqft
R:	0.289	ft/ft
S:	0.0168	ft/ft
Q Total	3.90	cfs
Q Req/Pipe:	3.90	cfs
Q =	3.90	cfs
V =	6.502	ft/s

Travel time =	0.20	min

Travel time =	0.16	min

Travel time =	0.15	min

DA-7 & DA-10 (2 x 36" culverts)

Pipe Dimensions		
Diameter:	36	in
	3	ft
Radius:	1.5	ft
# of Pipes:	2	
Initial Elev:	23.98	ft
Terminal Elev:	23.35	ft
Δ Elevation:	0.63	ft
Length:	52	ft

Converter	
gpm	0
cfs	0
cfs	0
gpm	0

Flow Depth (2yr):		
y:	6.2	in
	0.516	ft
θ:	1.711395	

Flow Depth (10yr):		
y:	8.8	in
	0.737	ft
θ:	2.07493	

Flow Depth (25yr):		
y:	10.4	in
	0.867	ft
θ:	2.26994	

Manning's Equation (2yr):		
n:	0.013	
A:	0.811	sqft
R:	0.316	ft/ft
S:	0.0121	ft/ft
Q Total:	9.50	cfs
Q Req/Pipe:	4.75	cfs
Q =	4.75	cfs
V =	5.854	ft/s

Travel time =	0.15	min

Manning's Equation (10yr):		
n:	0.013	
A:	1.349	sqft
R:	0.434	ft/ft
S:	0.0121	ft/ft
Q Total	19.50	cfs
Q Req/Pipe:	9.75	cfs
Q =	9.75	cfs
V =	7.226	ft/s

Travel time =	0.12	min

Manning's Equation (25yr):		
n:	0.013	
A:	1.693	sqft
R:	0.497	ft/ft
S:	0.0121	ft/ft
Q Total	26.80	cfs
Q Req/Pipe:	13.40	cfs
Q =	13.40	cfs
V =	7.917	ft/s

Travel time =	0.11	min

ATTACHMENT 4
RUSLE CALCULATION

Golder Associates Richmond, Virginia	Subject: RUSLE Calculation – Yorktown Ash Landfill SWP #457		
	Job No. 1239-6405	Made By: DPM	Date: 8/3/15
	Ref:	Checked: KAL	
		Reviewed: JRD	Sheet 1 of 1

OBJECTIVE

To compute the expected amount of soil to be lost from the site after closure, by using the Revised Universal Soil Loss Equation (RUSLE).

METHOD

RUSLE is an empirically derived formula based on several decades of field research by the National Resource Conservation Service (NRCS). It is based on several site-specific factors involving precipitation, soil type, slope, and cover/conservation practices employed.

REFERENCES

1. Predicting Soil erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE) USDA Handbook Number 703 (AH-703), July 1996.

CALCULATIONS

The RUSLE equation is as follows:

A=R*K*LS*C*P

Variable	Description	Value Used
A	soil loss in tons/yr/acre	-
R	Rainfall-Runoff erosivity factor	250 (for York County, VA)
K	Soil Erodibility factor	0.30 (aggregate)
LS	Slope Length/Steepness factor	0.37 (2% slope, 400' long, moderate rill to interrill erosion (Table 4-2))
C	Cover management factor	.005 (good stand of dense grass)
P	Support Practice Factor	1.0 (no specific measures)

Values for each of the above variables were chosen based on guidance presented in AH-703. Soil erodibility factor (K) was selected as an aggregate average value of soils in the vicinity of the Facility, based on the NRCS's Web Soil Survey website.

RESULTS

A=250*0.30*0.37*.005*1.0 = 0.14 tons/acre/year

CONCLUSIONS

The landfill final cover as designed meets the criteria of less than two tons of soil loss per acre per year.

ATTACHMENT 8
CLOSURE COST ESTIMATE

Yorktown Power Station Ash Landfill, Permit No. 457
Yorktown, VA

Worksheet CEW-01: FORMAT FOR THE ESTIMATION OF CLOSURE COSTS

FILL IN THE BOXES. THE REST WILL BE CALCULATED FOR YOU

Soil Cap Components

				Calculation or Conversion	
I.	Slope & Fill				
a.	Area to be capped	48.5	acres	x 4,840yd2/ac	234,740 yd2
b.	Depth of soil needed for slope and fill	6	inches	x 1yd/36in	0.17 yd
c.	Quantity of soil needed			a x b	39,123 yd3
d.	Percentage of soil from off-site	33%			
e.	Purchace unit cost for off-site material	$15.00	/yd3		
f.	Percentage of soil from on-site			(1 - d)	67%
g.	Excavation unit cost (on-site material)	$5.00	/yd3		0
h.	Total soil unit cost			(d x e) + (f x g)	$8.30 /yd3
i.	Hauling, Placement and Spreading unit cost	$3.00	/yd3		0
j.	Compaction unit cost	$0.62	/yd3		
k.	Total soil unit cost			h + i + j	$11.92 /yd3
l.	Soil subtotal			k x b	$466,350
m.	Percent compaction	10%			
	Total Slope & Fill Cost			l x (1 + m)	***$512,985***
II.	Infiltration Layer Soil				
Infiltration Soil Cost					
a.	Area to be capped	48.5	acres	x 4,840yd2/ac	234,740 yd2
b.	Depth of infiltration soil needed	0	inches	x 1yd/36in	0.00 yd
c.	Quantity of infiltration soil needed			a x b	0 yd3
d.	Percentage of soil from off-site	100%			
e.	Purchace unit cost for off-site material	$18.00	/yd3		
f.	Percentage of soil from on-site			(1 - d)	0%
g.	Excavation unit cost (on-site material)	$0.00	/yd3		
h.	Total infiltration soil unit cost			(d x e) + (f x g)	$18.00 /yd3
i.	Hauling, Placement and Spreading unit cost	$3.00	/yd3		
j.	Compaction unit cost	$0.62	/yd3		
k.	Total infiltration soil unit cost			h + i + j	$21.62 /yd3
l.	Infiltration soil subtotal			k x b	$0
m.	Percent compaction	10%			
n.	*Subtotal Infiltration Soil Cost*			l x (1 + m)	*$0*
Soil Admixture Cost					
o.	Area to be capped	0	acres	x 4,840yd2/ac	0 yd2
p.	Soil admixture unit cost	$2.85	/yd2		
q.	*Subtotal admixture cost*			a x b	*$0*
Soil Testing					
r.	Area to be capped	48.5	acres		
s.	Testing unit cost	$2,500.00	/acre		
t.	*Subtotal soil testing cost*			a x b	*$121,250*
	Total Infiltration Soil Cost (soil, admixtures, and testing)			n + q + t	***$121,250***

III.	Erosion Control / Protective Cover Soil				
a.	Area to be capped	48.5	acres	x 4,840yd2/ac	234,740 yd2
b.	Depth of soil needed	18	inches	x 1yd/36in	0.50 yd
c.	Quantity of soil needed			a x b	117,370 yd3
d.	Percentage of soil from off-site	100%			
e.	Purchace unit cost for off-site material	$15.00	/yd3		
f.	Percentage of soil from on-site			(1 - d)	0%
g.	Excavation unit cost (on-site material)	$0.00	/yd3		
h.	Total erosion/protective soil unit cost			(d x e) + (f x g)	$15.00 /yd3
i.	Hauling, Placement and Spreading unit cost	$3.00	/yd3		
j.	Compaction unit cost	$0.62	/yd3		
k.	Total soil unit cost			h + i + j	$18.62 /yd3
l.	Erosion/Protective soil subtotal			k x b	$2,185,429
m.	Percent compaction	10%			
	Total Erosion Control/Protective Cover Soil Cost			l x (1 + m)	***$2,403,972***
IV.	Vegetative support soil (Topsoil)				
a.	Area to be capped	48.5	acres	x 4,840yd2/ac	234,740 yd2
b.	Depth of topsoil needed	6	inches	x 1yd/36in	0.17 yd
c.	Quantity of topsoil needed			a x b	39,123 yd3
d.	Percentage of topsoil from off-site	100%			
e.	Purchace unit cost for off-site material	$15.00	/yd3		
f.	Percentage of topsoil from on-site			(1 - d)	0%
g.	Excavation unit cost (on-site material)	$0.00	/yd3		
h.	Total topsoil unit cost			(d x e) + (f x g)	$15.00 /yd3
i.	Hauling, Placement and Spreading unit cost	$3.00	/yd3		
j.	Total soil unit cost			h + i	$18.00 /yd3
	Total Topsoil Cost			c x j	***$704,220***
V.	Vegetative Cover				
a.	Area to be vegetated	48.5	acres		
b.	Vegetative cover (seeding) unit cost	$3,250	/acre		
c.	Erosion control matting unit cost	$6,000	/acre		
	Total Vegetative Cover Cost			a x (b + c)	***$448,625.00***

Soil Cap Component Subtotal (I + II + III + IV + V): $4,191,052

Geosynthetic Barrier & Infiltration Layers

				Calculation or Conversion	
VI.	Flexible Membrane Liner				
a.	Quantity of FML needed	53.35	acres (+10%)	x 43,560ft2/ac	2,323,926 ft2
b.	Purchase unit cost	$0.26	/ft2		
c.	Installation unit cost	$0.18	/ft2		
d.	Total FML unit cost			b + c	$0.44
	Total FML cost			a x d	***$1,022,527***
VII.	Geosynthetic Clay Liner				
a.	Quantity of GCL needed	0	acres	x 43,560ft2/ac	0 ft2
b.	Purchase unit cost	$0.00	/ft2		
c.	Installation unit cost	$0.00	/ft2		
d.	Total GCL unit cost			b + c	$0.00 /ft2
	Total GCL Cost			a x d	***$0***

Geosynthetic Layers Subtotal (VI + VII): $1,022,527

Drainage Components

				Calculation or Conversion	
VIII.	Sand or Gravel Drainage				
a.	Area to be capped	48.5	acres	x 4,840yd2/ac	234,740 yd2
b.	Depth of sand or gravel needed	0	inches	x 1yd/36in	0.00 yd
c.	Quantity of drainage material needed			a x b	0 yd3
d.	Percentage of media from off-site	100%			
e.	Purchace unit cost for off-site material	$16.49	/yd3		
f.	Percentage of material from on-site			(1 - d)	0%
g.	Excavation unit cost (on-site material)	$0.00	/yd3		
h.	Total drainage material unit cost			(d x e) + (f x g)	$16.49 /yd3
i.	Hauling, Placement and Spredding unit cost	$1.65	/yd3		
j.	Compaction unit cost	$0.82	/yd3		
k.	Total drainage material unit cost			h + i + j	$18.96 /yd3
l.	Drainage material subtotal			k x b	$0.00
m.	Percent compaction	10%			
	Total drainage material cost			l x (1 + m)	***$0***
IX.	Geotextile				
a.	Quantity of geotextile needed	0	acres	x 43,560ft2/ac	0 ft2
b.	Purchase unit cost	$0.11	/ft2		
c.	Installation unit cost	$0.05	/ft2		
d.	Total geotextile unit cost			b + c	$0.16 /ft2
	Total Geotextile Cost			a x d	***$0***
X.	Geonet Composite				
a.	Quantity of geonet composite needed	53.35	acres (+10%)	x 43,560ft2/ac	2,323,926 ft2
b.	Purchase unit cost	$0.45	/ft2		
c.	Installation unit cost	$0.12	/ft2		
d.	Total geonet composite unit cost			b + c	$0.57 /ft2
	Total Geonet Composite Cost			a x d	***$1,324,638***
XI.	Drainage Tile (cap drains)				
a.	Length of drainage tile needed	4,500	LF		
b.	Purchase unit cost	$10.00	/LF		
c.	Trenching and backfilling cost	$15.00	/LF		
d.	Total drainage tile unit cost			b + c	$25.00 /ft2
	Total Drainage Tile Cost			a x d	***$112,500***

XII. Drainage Channels (Stormwater Control)

Drainage benches and berms

a.	Length of drainage bench needed	5,500	LF		
b.	Drainage bench unit cost	$25	/LF		
c.	*Subtotal drainage bench cost*			a x b	*$137,500*
d.	Length of 24" drainage pipe needed	300	LF		
e.	Drainage pipe unit cost	$55	/LF		
f.	*Subtotal drainage swale/berm cost*			d x e	*$16,500*

Rip Rap

g.	Quantity of Rip Rap needed	200	yd2		
h.	Rip rap unit cost	$35.00	/yd2		
i.	*Total rip rap cost*			g x h	*$7,000*

Gabian Baskets

j.	Quantity of gabian baskets needed	100	yd3		
k.	Gabian basket unit cost	$55.00	/yd3		
l.	Subtotal gabian basket cost			j x k	*$5,500*
	Total Stormwater Control			c + f + i + l	***$166,500***

Drainage Component Subtotal (VIII + IX + X + XI+ XII): $1,603,638

Landfill Gas and Groundwater Features

XIII. Landfill Gas Monitoring & Control Components — Calculation

Landfill Perimeter System

a.	Number of probes to be installed	0	probes		
b.	LFG probe unit cost	$1,099	/probe		
c.	*Subtotal LFG probe cost*			a x b	*$0*

Landfill Control Systems

d.	Area to be closed	28	acres		
e.	Average number of vents per acre	0	vents / acre		
f.	LFG vent unit cost	$3,518	/vent		
g.	*Subtotal LFG vent cost*			d x e x f	*$0*
h.	Length of header pipe needed	-	LF		
i.	Header pipe unit cost	$2.79	/LF		
j.	Header pipe installation cost	$5.59	/LF		
k.	*Subtotal LFG active vent hook-up*			h x (i + j)	*$0*
	Total Landfill Gas Management Cost			c + g + k	***$0***

XIV. Groundwater Monitoring Components

a.	Hydrogeologic study cost	$0			
b.	Number of wells to be installed	0	wells		
c.	GW Monitoring Well unit cost	$1,270	/well		
d.	Number of wells > 50 ft length	0	wells		
e.	Additional well length over 50 ft	0	LF/well		
f.	Unit cost for additional well length	$25	/LF		
	Total Groundwater Monitoring Well Cost			a + (b x c) + (d x e x f)	***$0***

Landfill Gas & Groundwater Features Subtotal (XIII + XIV): $0

Miscellaneous

XV.	Removal and Disposal of Stockpiled Material			Calculation	
a.	Quantity of stockpiled materials	-	yd3		
b.	Loading and Hauling unit cost	$1.68	/yd3		
c.	Disposal unit cost	$25.40	/yd3		
d.	***Total Removal/Disposal Cost***			a x (b + c)	***$0***
XVI.	Erosion/Sediment Control				
a.	Quantity of silt fence needed	15,000	LF		
b.	Silt Fence unit cost	$2.50	/LF		
	Total Silt Fence Cost			a x b	***$37,500***
XVII.	Landfill Access Road				
a.	Size of LF access road	3,500	yd2		
b.	Depth of gravel needed	6	inches	x 1yd/36in	0.2 yd
c.	Depth of asphalt needed	0	inches	x 1yd/36in	0.0 yd
d.	Total material needed			a x (b + c)	583 yd3
e.	Road material unit cost	$35.00	/yd3		
f.	Placement/Spreading unit cost	$3.56	/yd3		
	Total access road cost			c x (d + e)	***$22,491***
XVIII.	Site Security				
Fencing					
a.	Length of fencing needed	-	ft		
b.	Fence unit cost	$15.24	/ft		
c.	*Subtotal fencing cost*			a x b	*$0*
Gate or Barrier					
d.	Number of gates required	1			
e.	Gate unit cost	$1,219.20	/gate		
f.	*Subtotal gate cost*			d x e	*$1,219*
Closed Sign					
g.	Number of signs required	2			
h.	Sign unit cost	$75.00	/sign		
i.	*Subtotal sign cost*			g x h	*$150*
	Total site security cost			c + f + i	***$1,369***
XIX.	Mobilization / Demobilization				
a.	Cost for mobilization/demobilization	$145,000			
	Total mobilization/demobilization cost				***$145,000***

Miscellaneous Subtotal (XV + ... + XIX): $207,579

Closure Cost Subtotal (CCS):		(I + ... + XIX)	$7,024,797
City Cost Index (Small City)	100%=1		1
Adjusted Closure Cost (ACC)			$7,024,797
Contingency (10%):		CCS x 0.10	$702,480
Adjusted Closure Cost + Contingency (ACC+C)			$7,727,277
Engineering & Documentation:			
Construction QA/QC		$12,500 / Acre	$600,000
Closure Certification and CQA Report (1%)		ACC x 0.01	$70,248
Survey and as-builts (3%)		ACC x 0.03	$210,744
Cost for survey and deed notation			$15,000
Total Engineering & Documentation Costs			***$895,992***
Total Closure Cost:	ACC + Contingency + Engineering		$8,623,269