NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) INDIVIDUAL PERMIT APPLICATION

ET - Braddock Well Pad

East Pittsburgh Borough, North Braddock Borough, & North Versailles Twp.
Allegheny County, Pennsylvania

Submitted to:

Pennsylvania Department of Environmental Protection
Southwest District Oil & Gas Operations
400 Waterfront Dr.
Pittsburgh, PA 15222

Prepared on Behalf of:

610 Reilly Avenue
Farmington, NM 87401

Original Application Prepared by:
Trant Corporation
11279 Perry Highway, Suite 206
Wexford, PA 15090
May 31, 2018

PADEP Administrative Incompleteness Review Letter Response Prepared by:

ARM Group Inc.
2548 Park Center Boulevard
State College, PA 16801

October 2018
ARM Project No. 180539

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Project No: 25383
May 31, 2018

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APPENDIX A

Completeness Review Checklist

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

COMPLETENESS REVIEW CHECKLIST

Check-off: C = Complete, NC = Not Complete

STANDARD E & S AND PCSM COMPLETENESS REVIEW CHECKLIST

General

Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. C	☐	☐	Fully completed and properly signed Notice of Intent Form (1 original and 2 copies)	N
☒	Attached	☐	☐	Permit filing fee of $500 (general permit) or $1500 (individual permit) payable to the appropriate Clean Water Fund	NPDES App.
☒	Attached	☐	☐	Disturbed acre fee payable to the Commonwealth of Pennsylvania Clean Water Fund	NPDES App.
☒	App. F	☐	☐	Proof of receipt of municipal and county Acts 14, 67, 68, and 127 notifications; copies of certified mail receipts or acknowledgment letters from the local municipality and county government.	N
☒	App. G	☐	☐	A signed PNDI receipt for the project area showing "No Known Impact", or "Avoidance Measures" or "Potential Impact" and proof of delivery to the appropriate jurisdictional agency(ies) where further coordination is required, as appropriate) (Reference the *Instructions for a General (PAG-02) OR Individual NPDES Permit for stormwater discharges associated with construction activities-* Pennsylvania Natural Heritage Program (PNHP) & Pennsylvania Natural Diversity Inventory)	N
☒	App. D	☐	☐	Complete Erosion and Sediment Control Plans (3 copies)	N
☒	App. E	☐	☐	Complete Post Construction Stormwater Management Plan (3 copies)	N
☒	App. B	☐	☐	Fully completed General Information Form (GIF) (Individual Permits	N
☒	App. H	☐	☐	PHMC coordination letter/clearance (Individual Permits for 10 acres or more of disturbance only)	N
☒	App. C	☐	☐	Appendix A land use questions	N

Item Location: D = E&S Drawings, N = E&S Narrative, D or N = Drawings or Narrative
D & N = Drawings and Narrative

E&S Plan Planning & Design 102.4(b)(4)

Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. D	☐	☐	The E&S Plan is separate from the PCSM Plan and labeled "E&S" or "Erosion and Sediment Control Plan" and is the final plan for construction.	D & N
☒	App. D, title page	☐	☐	Documentation provided that E&S Plan was prepared by person trained and experienced in E&S design methods and techniques applicable to the size and scope of the project	D & N
☒	App. D	☐	☐	E&S Plan minimizes extent and & duration of earth disturbance	D & N
☒	App. D	☐	☐	E&S Plan maximizes protection of existing drainage features and vegetation	D & N
☒	App. D	☐	☐	E&S Plan minimizes soil compaction	D & N
☒	App. D	☐	☐	E&S Plan utilizes other measures or controls that prevent or minimize generation of increased stormwater runoff	D & N

Existing topographic features of the project site and the immediate surrounding area §102.4(b)(5)(i)

Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	c701-705	☐	☐	Topographic map(s) of the project site provided	D
☒	App. D	☐	☐	Location map (USGS quadrangle) provided	D & N

Types, depth, slope, locations and limitations of the soils §102.4(b)(5)(ii)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. D, c702	☐	☐	Soil map provided	D & N
☒	App. D	☐	☐	Soil use limitations and their resolutions provided	N

Past, present and proposed land uses and proposed alteration to project site §102.4(b)(5)(iii)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. B	☐	☐	Past land uses for past 50 years addressed	N
☒	App. B	☐	☐	Present land uses for last 5 years addressed	N
☒	c704-c705	☐	☐	Proposed alteration/land uses shown on a plan map	D

Volume and rate of runoff from the project site and its upstream watershed area §102.4(b)(5)(iv)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	c704, CH-1	☐	☐	Drainage area maps provided for proposed channels, basins, and traps	D
☒	App. D&E	☐	☐	Runoff calculations provided for proposed channels	N

Location of all surface waters and their classification under Chapter 93 §102.4(b)(5)(v)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	c701-c705	☐	☐	Surface waters shown on plan map(s)	D
☒	c701-705, App. D	☐	☐	Existing/designated uses of all streams, lakes, ponds, wetlands or other surface waters identified	D & N

Narrative description of the location and type of perimeter and onsite BMPs §102.4(b)(5)(vi)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. D	☐	☐	E&S BMPs identified/described	N
☒	c705	☐	☐	E&S BMPs shown on plan map(s)	D

Sequence of BMP installation and removal §102.4(b)(5)(vii)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. D, C708	☐	☐	Construction sequence provided	D & N

Supporting calculations and measurements §102.4(b)(5)(viii)					
Applicant		Department			
Included	Page Number	C	NC	Item	Item Location
☒	App. D&E	☐	☐	Calculations provided for all proposed channels, traps, and basins	N
☒	App. E	☐	☐	Standard E&S worksheets or equivalents completely filled out	N

Plan drawings §102.4(b)(5)(ix)					
Applicant		Department			
Included	Page Number	C	NC	Item	Item Location
☒	c704	☐	☐	Plan map(s) showing proposed earthmoving provided	D
☒	c706-c707	☐	☐	Details and/or typicals provided for each proposed E&S BMP	D

Maintenance program §102.4(b)(5)(x)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. D, c709	☐	☐	Maintenance of proposed BMPs addressed	D & N
☒	App. D, c709	☐	☐	Inspection schedule for proposed BMPs provided	D & N
☒	App. D., c708	☐	☐	Written report documenting inspections and repairs specified	D & N

Recycling or disposal of materials §102.4(b)(5)(xi)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App.D, c705	☐	☐	Anticipated construction wastes identified	D & N
☒	App. D, c705	☐	☐	Instructions provided for proper recycling/disposal of materials provided	D & N

Geologic formations/soil conditions that may have the potential to cause pollution §102.4(b)(5)(xii)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. D	☐	☐	Geologic/soil conditions addressed	N
☒	App. D	☐	☐	Where potential for pollution identified, measures provided to avoid/minimize/or mitigate	N

Potential thermal impacts to surface waters §102.4(b)(5)(xiii)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. C&D	☐	☐	Potential for thermal impacts addressed	N
☒	App. C, c705	☐	☐	Where potential for impacts exists, measures provided to avoid/minimize/or mitigate	D & N

E&S Plan designed and implemented to be consistent with PCSM Plan §102.4(b)(5)(xiv)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	c705	☐	☐	Proposed structural PCSM BMPs shown on the E&S plan map(s)	D
☐	N/A	☐	☐	Existing/proposed riparian buffers outside limits of disturbance	
☐	N/A	☐	☐	Proposed infiltration BMPs outside proposed grading areas	

Existing/proposed riparian forest buffers §102.4(b)(5)(xv)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☐	N/A	☐	☐	Existing/proposed riparian forest buffers shown on plan map(s)	
☐	N/A	☐	☐	Existing/proposed riparian forest buffers outside limits of disturbance	
☐	N/A	☐	☐	Protection provided for wetlands within riparian forest buffer	
☐	N/A	☐	☐	Riparian buffer offset shown, if necessary	

Antidegradation Analysis					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. C	☐	☐	Equivalency demonstration for alternative BMPs to a riparian buffer or riparian forest buffer	N
☒	App. C	☐	☐	Evaluation of nondischarge alternatives, including demonstration that a nondischarge alternative does not exist for both E&S and PCSM	N
☒	App. D & C705A	☐	☐	ABACT included where a nondischarge alternative does not exist for both E&S and PCSM	D & N

☒	App. D, c705	☐	☐	Nondischarge and ABACT BMPs have been identified for both E&S and PCSM	D or N

Item Location: D = PCSM Drawings, N = PCSM Narrative, D or N = Drawings or Narrative
D & N = Drawings and Narrative

General PCSM planning and design 102.8(b)

PCSM Plan - General

Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E	☐	☐	The PCSM Plan is separate from the E&S Plan and labeled "PCSM" or "Post Construction Stormwater Management Plan" and is the final plan for construction.	D & N
☒	App. F	☐	☐	Municipal or county engineer consistency letter provided	N
☒	App. K	☐	☐	Act 167 plan is dated January 2005 or later	N
☒	App. E	☐	☐	Documentation provided that PCSM Plan was prepared by person trained and experienced in PCSM design methods and techniques applicable to the size and scope of the project	N
☒	App. E	☐	☐	Preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving stream	D & N
☒	App. E	☐	☐	Prevent an increase in the rate of stormwater runoff	N
☒	App. E	☐	☐	Minimize any increase in stormwater runoff volume	N
☒	App. E, WS-2	☐	☐	Minimize impervious areas	D & N
☒	App. E, WS-2	☐	☐	Maximize the protection of existing drainage features and existing vegetation	D & N
☒	App. E, WS-2	☐	☐	Minimize land clearing and grading	D & N
☒	App. E, WS-2	☐	☐	Minimize soil compaction	D & N
☒	App. E, WS-2	☐	☐	Utilize other structural or nonstructural BMPs that prevent or minimize changes in stormwater runoff	D & N

Existing topographic features of the project site and the immediate surrounding area §102.8(f)(1)

Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	WS-1	☐	☐	Topographic map(s) of the project site provided	D
☒	COVER, App. E	☐	☐	Location map (USGS quadrangle) provided	D & N
☒	WS-1	☐	☐	Type of cover	D

Types, depth, slope, locations and limitations of the soils and geologic formations §102.8(f)(2)

Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	WS-1	☐	☐	Soil map provided	D
☒	App. E	☐	☐	Soil use limitations and their resolutions provided	D or N
☒	WS-1, App. E & J	☐	☐	Site characterization of soil and geology, including appropriate infiltration and geological studies that identify location, depths, and methodology	D & N
☒	WS-1, App. E & J	☐	☐	Geologic mapping features addressed where appropriate	D or N

Characteristics of the project site, including the past, present and proposed land uses and the proposed alteration to the project site §102.8(f)(3)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	c701	☐	☐	Permit boundaries	D
☒	c701	☐	☐	Proposed limits of disturbance	D
☒	WS-2	☐	☐	Proposed contours and grades	D
☒	WS-2	☐	☐	Proposed improvements (i.e. roads, buildings, utilities etc.)	D
☒	App. B	☐	☐	Past, present and proposed land uses	N
☒	WS-2	☐	☐	Proposed waterways and stormwater management facilities shown on the plan maps	D
☒	WS-2	☐	☐	Proposed impervious areas minimized & shown on plan map(s)	D

Net change in volume and rate of stormwater §102.8(f)(4)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E	☐	☐	Design storm used for calculations identified	N
☒	App. E	☐	☐	Pre- and post-construction hydrology runoff rate and volume are identified for each drainage area of entire project site	N
☒	App. E	☐	☐	The net change in runoff rate and volume are identified for each drainage area of the entire project site	N
☒	App. C	☐	☐	Summary table in NOI consistent with runoff calculations, when applicants have utilized the manual to meet design standards	N
☒	App. E	☐	☐	Documentation summarizing the PCSM requirements (rate, volume, and water quality) for a DEP approved Act 167 plan, if applicable	N
☒	App. E	☐	☐	Documentation summarizing the alternative approach's design criteria for rate, volume and water quality, if applicable	N

Receiving surface waters §102.8(f)(5)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	WS-1	☐	☐	Existing streams, wetlands, floodways, and watercourses shown on plan map(s)	D
☒	WS-1, App. E	☐	☐	Existing and designated uses identified	D & N
☐	N/A	☐	☐	Boundaries for HQ or EV watersheds shown on plan map(s)	
☐	N/A	☐	☐	Wetland boundaries consistent with delineation report	

Written Description of the PCSM BMPs §102.8(f)(6)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E, WS-2	☐	☐	All permanent PCSM BMPs identified in the narrative and shown on plan drawings	D & N
☒	App. E, C601	☐	☐	Specifications for all permanent PCSM BMPs provided	D & N
☐	N/A	☐	☐	Proprietary BMP systems are illustrated on the drawings in accordance with their manufacturer's requirements	D

Sequence of PCSM BMP implementation or installation §102.8(f)(7)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E, N-1, c708	☐	☐	Complete and site specific sequence of BMP installations provided	D & N
☒	App. E, N-1, c708	☐	☐	Construction sequence addresses all structural BMPs	D & N
☒	App. E,	☐	☐	Sequence for individual BMP installation	D & N

	N-1, c708				
☒	App. E, N-1, c708	☐	☐	Critical stages of BMP installation are identified	D & N
☐	N/A	☐	☐	Protection provided for infiltration BMPs until drainage areas completely stabilized	

Supporting calculations §102.8(f)(8)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E	☐	☐	Worksheets from the Stormwater BMP Manual provided when applicants have utilized the manual to meet design standards	N
☒	App. E	☐	☐	Figures contained on worksheets consistent with those in NOI/application when applicants have utilized the manual to meet design standards	N
☒	App. E	☐	☐	Calculations for all permanent BMPs and points of interest provided	N
☒	App. E	☐	☐	Methodology used for all calculations is identified. Calculations demonstrating that rate, volume, and water quality were met in accordance with 102.8(g)(2)(i-iii) and 102.8(g)(3)(i-ii) AND/OR a DEP approved Act 167 plan OR an alternative approach	N
☒	App. E	☐	☐	Routing analysis to demonstrate peak control for the 2-, 10-, 50-, and 100-year/24-hour storm events, which considers benefits of proposed BMPs provided	N

Plan drawings §102.8(f)(9)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	WS-2, WS-3	☐	☐	Locations of all proposed BMPs shown along with tributary drainage areas	D
☒	WS-1 to WS-3	☐	☐	Existing and proposed discharges & points of interest shown	D
☒	All	☐	☐	PCSM Plan drawings consistent with E&S Plan in relation to proposed contours, improvements, soils, wetlands, floodways, streams, discharge locations, etc.	D
☒	C601	☐	☐	Construction details provided for all PCSM BMPs	D
☒	App. E C601	☐	☐	Dimensions and elevations consistent with those used in supporting calculations	D & N

Long-term operation and maintenance schedule §102.8(f)(10)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E, N-1	☐	☐	Inspection schedule of each permanent BMP is provided	D & N
☒	App. E, N-1	☐	☐	Directions for maintenance and/or replacement of each BMP provided	D & N

Recycling or disposal of materials §102.8(f)(11)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	N-1	☐	☐	Project wastes identified	D
☒	N-1	☐	☐	Directions for recycling /disposal of wastes provided	D

Geologic formations or soil conditions §102.8(f)(12)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E	☐	☐	Potential for geologic or soil conditions to cause pollution during construction identified	N
☒	N-1	☐	☐	Instructions for proper handling and/or disposal of all materials which could cause pollution are provided	D
☒	N-1	☐	☐	Typical details & instructions provided for proper handling and/or disposal of all such materials	D
☒	WS-1, C701	☐	☐	Locations of all such materials clearly shown on plan maps	D

Potential thermal impacts §102.8(f)(13)					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	App. E	☐	☐	Description provided of how thermal impacts of stormwater runoff from project site were avoided, minimized, or mitigated	N

Riparian forest buffer management plan §102.8(f)(14) N/A					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☐	N/A	☐	☐	Existing and/or proposed riparian forest buffers shown on plan map(s)	
☐	N/A	☐	☐	Impairment and TMDL status of the receiving water(s) for the project indicated	
☐	N/A	☐	☐	Riparian buffer offset areas shown, if necessary	
☐	N/A	☐	☐	Riparian buffer or riparian forest buffer equivalency demonstration included, if necessary	
☐	N/A	☐	☐	Checklist for functional equivalency of riparian buffers and riparian buffers included	

COMPLETENESS ITEMS BY PERMIT TYPE

Check-off: C = Complete, NC = Not Complete

Item Location: D = E&S/PCSM Drawings, N = E&S/PCSM Narrative, D or N = Drawings or Narrative
D & N = Drawings and Narrative

CHECKLIST FOR NEW NPDES PERMITS					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☒	all	☐	☐	1. All items included in the standard E&S and PCSM completeness review checklist	Response Package

CHECKLIST FOR NPDES PERMIT RENEWALS					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☐	N/A	☐	☐	1. If no changes have been made to the approved E & S and PCSM plan, the applicant does not need to submit these plans and letters again. However, if changes have been made to the plans, the revised plans must be resubmitted for approval and all letters must be reapplied for and included.	

CHECKLIST FOR PHASED NPDES PERMIT					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☐	N/A	☐	☐	1. All items included in new NPDES permit application	
☐	N/A	☐	☐	2. Anticipated project plan for entire project	
☐	N/A	☐	☐	3. Estimated time frame for phases	

CHECKLIST FOR NPDES PERMIT MAJOR AMENDMENT					
Applicant		Reviewer			
Included	Page Number	C	NC	Item	Item Location
☐	N/A	☐	☐	1. All items included in new NPDES permit application.	

APPENDIX B

GIF Form

0210-PM-PIO0001 4/2018
Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related IDs (If Known)		DEP USE ONLY
Client ID# 329655	**APS ID#**	Date Received & General Notes
Site ID# 830242	**Auth ID#**	
Facility ID#		

CLIENT INFORMATION

DEP Client ID#	Client Type / Code
329655	NPACO

Organization Name or Registered Fictitious Name	Employer ID# (EIN)	Dun & Bradstreet ID#
Merrion Oil & Gas	850232430	

Individual Last Name	First Name	MI	Suffix	SSN

Additional Individual Last Name	First Name	MI	Suffix	SSN

Mailing Address Line 1	Mailing Address Line 2
610 Reilly Ave.	

Address Last Line – City	State	ZIP+4	Country
Farmington	NM	87401-2634	USA

Client Contact Last Name	First Name	MI	Suffix
Davis	Ryan		

Client Contact Title	Phone	Ext
Operations Manager	505-214-3292	

Email Address	FAX
rdavis@merrion.bz	NA

SITE INFORMATION

DEP Site ID#	Site Name
830242	ET - Braddock Well Pad

EPA ID# **Estimated Number of Employees to be Present at Site** 1

Description of Site
Gas Well, Gas Gathering Pipeline, Temporary Water Tanks and Temporary Water Pipeline

County Name	Municipality	City	Boro	Twp	State
Allegheny	East Pittsburgh, North Braddock	☐	☒	☐	
County Name	**Municipality**	**City**	**Boro**	**Twp**	**State**
Allegheny	North Versailles	☐	☐	☒	

Site Location Line 1	Site Location Line 2
573 Braddock Avenue	

Site Location Last Line – City	State	ZIP+4
East Pittsburgh	PA	15112-1224

Detailed Written Directions to Site
Take PA-28 S from Waterfront Dr. Continue on PA-28 S. Take I-579 S to Blvd of the Allies. Take exit toward I-376 E/Oakland/Monroeville from I-579 S. Get on I-376 E. Follow I-376 E to US-30 E/Ardmore Blvd. take exit 78A from I-376 E. Continue on US-30 E/Ardmore Blvd. Turn Right onto Electric Avenue. Turn Right onto Woods Street. Woods Street turns slightly left and becomes Beech Avenue. Turn right on Braddock Ave in East Pittsburgh. Travel approximately 1-mile and site entrance will be on the left.

Site Contact Last Name	First Name	MI	Suffix
Davis	Ryan		

Site Contact Title	Site Contact Firm
Operations Manager	Merrion Oil & Gas

Mailing Address Line 1	Mailing Address Line 2
610 Reilly Ave.	
Mailing Address Last Line – City	**State** / **ZIP+4**
Farmington	NM / 87401-2634
Phone / **Ext** / **FAX**	**Email Address**
505-215-3292	rdavid@merrion.bz
NAICS Codes (Two- & Three-Digit Codes – List All That Apply)	**6-Digit Code** (Optional)
21 & 211	211130
Client to Site Relationship	
LESOP	

FACILITY INFORMATION

Modification of Existing Facility

		Yes	No
1.	**Will this project modify an existing facility, system, or activity?**	☒	☐
2.	**Will this project involve an addition to an existing facility, system, or activity?**	☒	☐

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

	Facility Type	DEP Fac ID#		Facility Type	DEP Fac ID#
☒	Air Emission Plant	245986	☐	Industrial Minerals Mining Operation	
☐	Beneficial Use (water)		☐	Laboratory Location	
☐	Blasting Operation		☐	Land Recycling Cleanup Location	
☒	Captive Hazardous Waste Operation	245986	☐	Mine DrainageTrmt/LandRecyProjLocation	
☐	Coal Ash Beneficial Use Operation		☐	Municipal Waste Operation	
☐	Coal Mining Operation		☐	Oil & Gas Encroachment Location	
☐	Coal Pillar Location		☐	Oil & Gas Location	
☐	Commercial Hazardous Waste Operation		☐	Oil & Gas Water Poll Control Facility	
☐	Dam Location		☐	Oil & Gas Wastewater Storage Impoundment	
☐	Deep Mine Safety Operation -Anthracite		☐	Public Water Supply System	
☐	Deep Mine Safety Operation -Bituminous		☐	Radiation Facility	
☐	Deep Mine Safety Operation -Ind Minerals		☐	Residual Waste Operation	
☐	Encroachment Location (water, wetland)		☐	Storage Tank Location	
☐	Erosion & Sediment Control Facility		☐	Water Pollution Control Facility	
☐	Explosive Storage Location		☐	Water Resource	
			☒	Other: Steel Plant	245986

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Well Pad	40	23	**35**	79	50	**45**

Horizontal Accuracy Measure Feet --or-- Meters

Horizontal Reference Datum Code
- ☐ North American Datum of 1927
- ☒ North American Datum of 1983
- ☐ World Geodetic System of 1984

Horizontal Collection Method Code

Reference Point Code

Altitude Feet --or-- Meters

Altitude Datum Name
- ☐ The National Geodetic Vertical Datum of 1929
- ☐ The North American Vertical Datum of 1988 (NAVD88)

Altitude (Vertical) Location Datum Collection Method Code

Geometric Type Code

Data Collection Date

Source Map Scale Number Inch(es) = Feet
--or-- Centimeter(s) = Meters

PROJECT INFORMATION

Project Name
ET - Braddock Well Pad

Project Description
The project consists of an unconventional gas well pad, access roads, freshwater storage tank facility, natural gas and freshwater pipelines, and stormwater facilities. The proposed project area is located on a vacant portion of property owned by the Mon Valley Works Edgar Thompson Steel Plant. A portion of the site will drain to the North Braddock Borough MS4 Storm Sewer System along Braddock Ave.

Project Consultant Last Name	First Name	MI	Suffix
Antolick	Tessa	M	

Project Consultant Title	Consulting Firm
Senior Engineer	ARM Group Inc.

Mailing Address Line 1	Mailing Address Line 2
2548 Park Center Blvd.	

Address Last Line – City	State	ZIP+4
State College	PA	16801-3005

Phone	Ext	FAX	Email Address
814-272-0455	2205	NA	tantolick@armgroup.net

Time Schedules	Project Milestone (Optional)

1. **Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department?** ☒ Yes ☐ No

2. **Is your project funded by state or federal grants?** ☐ Yes ☒ No
   Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.
   Aspect of Project Related to Grant
   Grant Source: _____
   Grant Contact Person: _____
   Grant Expiration Date: _____

3. **Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions)** ☒ Yes ☐ No
   Note: If "No" to Question 3, the application is not subject to the Land Use Policy.
   If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1. **Is there an adopted county or multi-county comprehensive plan?** ☒ Yes ☐ No
2. **Is there an adopted municipal or multi-municipal comprehensive plan?** ☒ Yes ☐ No
3. **Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?** ☒ Yes ☐ No
   Note: If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.
   If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.
4. **Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval?** If zoning approval has been received, attach documentation. ☒ Yes ☐ No
5. **Have you attached Municipal and County Land Use Letters for the project?** ☐ Yes ☒ No

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	**Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0.	☐	Yes	☒	No
1.1	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?**	☐	Yes	☐	No
1.2	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?**	☐	Yes	☐	No
1.3	**Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?**	☐	Yes	☐	No
1.4	**For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?**	☐	Yes	☐	No
1.5	**Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?**	☐	Yes	☐	No
1.6	**Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?**	☐	Yes	☐	No
2.0	**Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0.	☐	Yes	☒	No
2.1	**Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?**	☐	Yes	☐	No
2.2	**Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?**	☐	Yes	☐	No
2.3	**Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?**	☐	Yes	☐	No
2.4	**For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?**	☐	Yes	☐	No
2.5	**Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?**	☐	Yes	☐	No

3.0	**Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0.	☒	Yes	☐	No
3.1	**Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?**	☒	Yes	☐	No
3.2	**Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description.*	☒	Yes	☐	No
3.3	**Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?**	☐	Yes	☒	No
4.0	**Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage. **4.0.1 Total Disturbed Acreage** 13.4	☒	Yes	☐	No
5.0	**Does the project involve any of the following?** If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0.	☒	Yes	☐	No
5.1	**Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?**	☒	Yes	☐	No
5.2	**Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?**	☐	Yes	☒	No
5.3	**Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain?**	☐	Yes	☒	No
6.0	**Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?**	☒	Yes	☐	No
7.0	**Will the project involve the construction and operation of industrial waste treatment facilities?**	☐	Yes	☒	No
8.0	**Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable. **8.0.1 Estimated Proposed Flow (gal/day)**	☐	Yes	☒	No
9.0	**Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?**	☐	Yes	☒	No
	9.0.1 Was Act 537 sewage facilities planning submitted and approved by DEP? If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval.	☐	Yes	☒	No
10.0	**Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year). **10.0.1 Gallons Per Year (residential septage)** _____ **10.0.2 Dry Tons Per Year (biosolids)**	☐	Yes	☒	No

11.0	**Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam.	☐	Yes	☒	No
	11.0.1 Dam Name				
12.0	**Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam.	☐	Yes	☒	No
	12.0.1 Dam Name				
13.0	**Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission.	☒	Yes	☐	No
	13.0.1 Enter all types & amounts of emissions; separate each set with semicolons. Air emmisions are permitted through Allegheny County Health Department.				
14.0	**Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year?** If "Yes", check all proposed sub-facilities.	☐	Yes	☒	No
	14.0.1 Number of Persons Served				
	14.0.2 Number of Employee/Guests				
	14.0.3 Number of Connections				
	14.0.4 Sub-Fac: Distribution System	☐	Yes	☐	No
	14.0.5 Sub-Fac: Water Treatment Plant	☐	Yes	☐	No
	14.0.6 Sub-Fac: Source	☐	Yes	☐	No
	14.0.7 Sub-Fac: Pump Station	☐	Yes	☐	No
	14.0.8 Sub Fac: Transmission Main	☐	Yes	☐	No
	14.0.9 Sub-Fac: Storage Facility	☐	Yes	☐	No
15.0	**Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?**	☐	Yes	☒	No
16.0	**Is your project to be served by an existing public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project.	☐	Yes	☒	No
	16.0.1 Supplier's Name				
	16.0.2 Letter of Approval from Supplier is Attached	☐	Yes	☐	No
17.0	**Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", should reference both Water Supply and Watershed Management.	☐	Yes	☒	No
	17.0.1 Stream Name				
18.0	**Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed.	☒	Yes	☐	No
	18.0.1 Type & Amount Napthalene, manganese, unknown quantity. The site is an urban area with land use as an industrial steel plant. metals and pH are elevated.				
19.0	**Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?**	☐	Yes	☒	No
20.0	**Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit.	☐	Yes	☒	No
	20.0.1 Enter all substances & capacity of each; separate each set with semicolons.				
21.0	**Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit.	☐	Yes	☒	No
	21.0.1 Enter all substances & capacity of each; separate each set with semicolons.				

22.0	**Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **22.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
23.0	**Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **23.0.1 Enter all substances & capacity of each; separate each set with semicolons.** All tanks Temporary. Fresh water (FW) @ 1,159,200 gal	☒	Yes	☐	No
24.0	**Will the intended activity involve the use of a radiation source?**	☐	Yes	☒	No

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Tessa Antolick, P.E.

Tessa M. Antolick — **Signature**

Senior Engineer/Director of Oil and Gas Services — **Title**

10/22/2018 — **Date**

APPENDIX C

Notice of Intent (NOI) for Coverage under the PAG-02 (NPDES) Permit

3800-PM-BCW0405b Rev. 12/2017
Application

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

OFFICIAL USE ONLY
NPDES Permit ID # _____
Date Received _____
NOI Complete Date _____
Issue Date _____
Effective Date _____
Expiration Date _____

NOTICE OF INTENT FOR COVERAGE UNDER THE GENERAL (PAG-02) NPDES PERMIT OR APPLICATION FOR AN INDIVIDUAL NPDES PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES

PLEASE READ THE PERMIT SUMMARY SHEET AND INSTRUCTIONS PROVIDED IN THIS PERMIT APPLICATION PACKAGE BEFORE COMPLETING THIS FORM. COMPLETE THE ATTACHED CHECKLIST AND APPROPRIATE WORKSHEETS.

PLEASE PRINT OR TYPE INFORMATION IN BLACK OR BLUE INK.

PERMIT TYPE	**GENERAL** ☐	**INDIVIDUAL** ☒		
APPLICATION TYPE	**NEW** ☒	**RENEWAL** ☐	**MAJOR MODIFICATION** ☐	**PHASED** ☐

SECTION A. APPLICANT INFORMATION

Corporations for profit, corporations not-for-profit, limited liability companies, partnerships or sole proprietorships, limited partnerships, professional associations and business or statutory trusts that were not created or formed under the laws of Pennsylvania desiring to do business in this Commonwealth must register with the Pennsylvania Department of State.

Applicant/Organization Name Merrion Oil & Gas		Phone FAX	(505)-215-3292
Mailing Address 610 Reilly Avenue	City Farmington	State NM	ZIP + 4 87401-2634
Supplemental Mailing Address (if needed)			
Employer ID (EIN) 85-0232430			
Email Address			
Contact Name Ryan Davis	Contact Title Operations Manager		
Contact Phone 505-215-3292	Contact Email Address rdavis@merrion.bz		
Co-Applicant/Organization Name N/A		Phone FAX	
Mailing Address	City	State	ZIP + 4
Supplemental Mailing Address (if needed)			
Employer ID (EIN)			
Email Address			
Contact Name	Contact Title		
Contact Phone	Contact Email Address		

SECTION B. PROJECT INFORMATION

1. Project Name: ET - Braddock Well Pad

2. Total Project Site (Acres): 13.4

3. Total Disturbed Area (Acres): 13.4

4. Project Description: The project consists of an unconventional gas well pad, access roads, freshwater storage tank facility, natural gas and freshwater pipelines, and stormwater facilities. The proposed project area is located on a vacant portion of property owned by the Mon Valley Works Edgar Thompson Steel Plant. A portion of the site will drain to the North Braddock borough MS4 Storm Sewer System along Braddock Ave.

5. Project Location or Physical Address:

Address	City	State	ZIP + 4
573 Braddock Ave	East Pittsburgh	PA	15112-1224

Supplemental Address (If needed)

6. Project County / Project Municipality

Project County	Project Municipality	City	Boro	Twp
Allegheny	East Pittsburgh, North Braddock	☐	☒	☐
Allegheny	North Versailles	☐	☐	☒

7. Type of Ownership:

☐ County Government ☐ Municipality (local) ☐ School District
☐ Federal Facility (U.S. Government) ☒ Non-Government ☐ State Government
☐ Mixed Ownership (e.g. Public/Private)

8.

Pad Latitude:	40 °/	23 '/35.42"	Pad Longitude:	79 °/	50 '/ 45.90 "
Water Terminus Latitude:	40 °/	23 '/43.21"	Water Terminus Longitude:	79 °/	51 '/ 04.83 "
Gas Terminus Latitude:	40 °/	23 '/31.06"	Gas Terminus Longitude:	79 °/	51 '/ 02.78 "

8a. Collection Method: ☐ EMAP ☒ HGIS ☐ GISDR ☐ ITPMP ☐ GPS ☐ WAAS ☐ LORAN

8b. Horizontal reference datum (or projection datum) employed in the collection method. (EMAP has a known datum of WGS84 and HGIS (PNDI) has a known datum of NAD83) ☐ NAD27 ☒ NAD83 ☐ WGS84 (GEO84)

9. U.S.G.S. Quad Map Name(s) Braddock

10. Primary NAICS Code (check one):

☐ 236115 New Single-Family Housing Construction (except For-Sale Builders)
☐ 236116 New Multifamily Housing Construction (except For-Sale Builders)
☐ 236117 New Housing For-Sale Builders
☐ 236210 Industrial Building Construction
☐ 236220 Commercial and Institutional Building Construction
☐ 237110 Water and Sewer Line and Related Construction
☒ 237120 Oil and Gas Pipeline and Related Structures Construction
☐ 237130 Power and Communication Line and Related Structures Construction
☐ 237310 Highway, Street, and Bridge Construction
☐ 237990 Other Heavy and Civil Engineering Construction
☐ Other Primary NAICS Code (specify)

11. Additional NAICS Code(s) (list all additional codes that apply from the list above): 211130, 237120

SECTION C. SITE ANALYSIS

1. Existing and Previous Uses of the Project Site:

1a. Existing Land Uses:

☐ Agriculture _____ % ☐ Forest/Woodland _____ % ☐ Barren _____ %
☐ Urban _____ % ☐ Brownfield _____ % ☒ Other Steel Plant 100 %

1b. Historical Land Uses: ☐ Agriculture _____ % ☐ Forest/Woodland _____ % ☐ Barren _____ %
☐ Urban _____ % ☐ Brownfield _____ % ☒ Other Steel Plant 100 %

2. Potential Toxic or Hazardous Pollutants: ☐ N/A

Pollutant	Concentration w/Units	Source	Sample Type	Date(s) / Number of Samples
napthalene	159.00 mg/kg	boring B-13	split spoon	1/15/18
manganese	2,080 - 6,190 mg/kg	all 5 borings	split spoon	1/15/18

3. Fill Material

Will the applicant need to import or export fill for the project site? Clean fill can not be placed in or on waters of the Commonwealth. If fill will be imported or exported, Form FP-001 (Document # 258-2182-773) must be used to certify origin of the fill material.

Form FP-001 is included as App. F to the E&S plan.

Check the appropriate box

☒ Import fill – the applicant will, in most situations, be responsible to perform environmental due diligence and determine that all fill imported to the site meets the department's definition of clean fill. The plan designer must include a note on the drawings to identify the operator(s) responsibility and provide the definition of Clean Fill and Environmental Due Diligence.

☒ Export fill – the Applicant is responsible for performing environmental due diligence at the time this application was submitted to determine that any fill exported from the site will be certified as clean fill.

☐ Balance all cuts and fills with the amount of rock and soil available on the site.

4. Estimated Timetable for Phased Projects (Complete for phased projects only) – N/A

Phase No. or Name	Proposed Type of Activity	Total Area	Disturbed Area	Start Date	End Date

5 Waters to Which Project Discharges (Check all that apply)

5.a. ☒ Waters of the Commonwealth to which the project discharges or has the potential to discharge to (including EV wetlands) other than MS4s, CSOs, private storm sewers:

Name of Waters	Designated Use of Water	Existing Use of Water
Turtle Creek, T64495 to Turtle Creek	WWF	

☐ Combined Sewer Overflow System to which the project discharges:	☒ Municipal Separate Storm Sewer (MS4) to which the project discharges: Braddock Avenue, North Braddock Boro.	☐ Private Storm Sewer to which the project discharges:	☐ Non Surface Water: (including off-site discharges):

5b. Does the site discharge to waters classified as impaired according to Category 4 of PA Integrated Water Quality Monitoring and Assessment Report? ☒ Yes ☐ No

If yes, list source and cause of impairment: Aquatic Life: Abondoned mine drainage - siltation

5c. Does the site discharge to waters with a TMDL according to Category 5 of the PA Integrated Water Quality Monitoring & Assessment Report? ☒ Yes ☐ No

If yes, list source and cause of impairment TMDL addresses: metals, pH

SECTION D. EROSION & SEDIMENTATION (E&S) AND POST CONSTRUCTION STORMWATER MANAGEMENT (PCSM)

Note: For projects involving multiple points of discharge, please submit a complete, separate Section D for each additional point of discharge.

1. E&S Plan - The E&S Plan must satisfy at least one of subparagraph A or B below.

   A. ☒ E&S plan is designed using BMPs in the Pennsylvania Erosion & Sedimentation Pollution Control Manual (ESPC) (Technical Guidance #363-2134-008/March 2012)

   OR

   B. ☐ E&S plan is designed using an alternative BMP or design standard

2. PCSM Plan

The PCSM Plan must satisfy either subparagraph A, or B **or** C below.

A. ☒ Act 167 Plan approved on or after January 2005 – The attached PCSM Plan, in its entirety, is consistent with all requirements pertaining to rate, volume, and water quality from an approved Act 167 Stormwater Management Plan.

Complete the following table for all applicable approved Act 167 Stormwater Management Plans. (use additional sheets if necessary)

ACT 167 Plan Name	Date Adopted	Consistency Letter Included ☒
Allegheny County Act 167 Plan	December 2017	Consistency Letter Pending ☐

If the PCSM Plan is consistent with a DEP approved Act 167 plan from 2005 or later and the Act 167 plan is without variance consistent with the standard design criteria from the 25 Pa. Code Chapter 102.8(g)(2) and (3) then utilizing worksheets 1-5 and the *Summary table for Supporting Calculation and Measurement Data* are recommended, otherwise check the applicable box(es) in Section D.3

OR

B. ☒ The PCSM Plan meets the standard design criteria from the 25 Pa. Code Chapter 102.8(g)(2) and (3).

OR

C. ☐ Alternative Design Standard – The attached PCSM plan was developed using approaches other than those in 25 Pa. Code Chapter 102.8(g)(2) and (3). Demonstrate how this standard will be either more protective than what is required in 25 Pa. Code Chapter 102.8(g)(2) and (3). and will maintain and protect existing water quality and existing and designated uses as allowed in 102.8(g)(2)(iv) and 102.8(g)(3)(iii).

3. Summary Table for Supporting Calculation and Measurement Data

☐ Not Applicable in accordance with 102.8(g)(2)(iv)- provide supporting calculations and documentation in the Narrative. **If checked, proceed to Peak Rate Analysis** (provide supporting details to include a summary, calculations, and a statement and demonstration of attainment in the Narrative- Reference the *Instructions for a General (PAG-02) OR Individual NPDES Permit for stormwater discharges associated with construction activities* Section D)

☐ Not Applicable PCSM Plan satisfies an Act 167 Plan approved on or after January 2005, in its entirety- provide supporting calculations and documentation in the Narrative. **If checked proceed to Section D.4** (provide supporting details to include a summary, calculations and a statement and demonstration of attainment in the Narrative- Reference the *Instructions for a General (PAG-02) OR Individual NPDES Permit for stormwater discharges associated with construction activities* Section D)

Please reference the stormwater methodology used (Numbers generated in the table below should be consistent with Worksheets 3,4, and 5 and be accompanied by supporting calculations in the Narrative)

TR-55 & Wkst #4

	Pre-construction	Post Construction	Net Change
Design storm frequency 2-yr Rainfall amount 2.36 inches			
Impervious area (acres)	1		
Volume of stormwater runoff ☐ acre-feet or ☐ cubic feet (check appropriate box)	4		
Volume of stormwater runoff ☐ acre-feet or ☐ cubic feet (check appropriate box)			

See attached **3. Summary Table for Supporting Calculation and Measurement Data** for Drainage Areas 1 & 2.

Peak Rate Analysis: Complete Boxes 9-20 (Numbers generated in table should be accompanied by supporting calculations in the narrative)

☐ Exempt in accordance 102.8(g)(3)(ii), Complete Boxes 9-20

☐ Not Applicable in accordance with 102.8(g)(3)(iii)

{If any of the above is checked, provide supporting calculations and documentation in the Narrative}

Stormwater peak discharge rate for the 2-year/24-hour storm (cubic feet per second (cfs))	9	10	11
Stormwater peak discharge rate for 10-year/24-hour storm (cfs)	12		
Stormwater peak discharge rate for 50-year/24-hour storm (cfs)	15		
Stormwater peak discharge rate for the 100-year/24-hour storm	18	19	20

See attached **3. Summary Table for Supporting Calculation and Measurement Data** for Drainage Areas 1 & 2.

Box 1. **Pre-construction impervious area**: The total acres of impervious area on the project site before construction activities begin, based on land use for five years preceding the planned project.

Box 2. **Post construction impervious area**: The total acres of impervious area on the project site after construction activities have been completed.

Box 3. **Net change of impervious area**: The change in the impervious area (acres) listed in Box 1 and Box 2. Zero or negative values are acceptable. (Box 2- Box 1)

Box 4. **Pre-construction stormwater runoff volume**: The amount of stormwater runoff volume from the project site that would result from the design storm occurrence before construction activities begin based on land use for five years preceding the project.

Box 5. **Post construction stormwater runoff volume**: The amount of stormwater runoff volume from the project site that would result from the design storm occurrence after construction activities have finished assuming that no non-structural/structural BMP(s) have been installed.

Box 6. **Net change in stormwater volume**: The change in stormwater runoff volumes listed in Box 4 and Box 5. (Box 5 - Box 4)

Box 7. **Post construction stormwater runoff volume reduction**: The amount of stormwater runoff volume reduction that would result from the planned non-structural/structural BMP(s) installation. (Total non-structural volume credit (*from worksheet 3*) + Total Structural volume (*from worksheet 5*)))

Box 8. **Net change in stormwater runoff volume with planned BMPs**: The change in stormwater runoff volume and volume reduction listed in Box 6 and Box 7. (Box 6 – Box 7)

Figures contained in the "*Summary table for supporting calculation and measurement data*" should be consistent with those on Worksheets 3, 4, and 5, when applicants have utilized the Stormwater Best Management Practices (BMP) Manual to meet design standards. Below is a depiction of which worksheet(s) corresponds (i.e. WKST 4) to each Box and where on the worksheet to find the information (i.e. 2-Year Volume Increase).

Numbers generated in the sumamry table should be consistent with Worksheets (WKST) 3, 4 and 5			
	Pre-construction	**Post Construction**	**Net Change**
Design storm frequency 2-year/24-hour storm Rainfall amount WKST 4 "2-Year Rainfall" inches			
Impervious area (acres)	1 WKST 4 Existing Condition: Impervious cover type	2 WKST 4 Developed Condition: Impervious cover type	3 Box 2 - Box 1
Volume of stormwater runoff ☒ acre-feet or ☐ cubic feet (check appropriate box)	4 WKST 4 Existing Condition: Total Runoff Volume	5 WKST 4 Developed Condition: Total Runoff Volume	6 WKST 4 2-Year Volume Increase
Volume of stormwater runoff ☒ acre-feet or ☐ cubic feet (check appropriate box)		7 WKST 3 Total non-structural volume credit + WKST 5 Total structural volume	8 WKST 5 Difference

Box 9. **Pre-construction stormwater discharge rate**: The stormwater runoff discharge rate for the 2-year/24-hour storm as determined by the land use for the past five years.

Box 10. **Post construction stormwater discharge rate**: The stormwater runoff discharge rate for the 2-year/24-hour storm after all planned stormwater BMPs are installed.

Box 11. **Net change stormwater discharge rate**: The change in stormwater runoff discharge rates listed in Box 9 and Box 10. (Box 10 – Box 9)

Box 12. **Pre-construction stormwater discharge rate**: The stormwater runoff discharge rate for the 10-year/24-hour storm as determined by the land use for the past five years.

Box 13. **Post construction stormwater discharge rate**: The stormwater runoff discharge rate for the 10-year/24-hour storm after all planned stormwater BMPs are installed.

Box 14. **Net change stormwater discharge rate**: The change in stormwater runoff discharge rates listed in Box 12 and Box 13. (Box 13 – Box 12)

Box 15. **Pre-construction stormwater discharge rate**: The stormwater runoff discharge rate for the 50-year/24-hour storm as determined by the land use for the past five years.

Box 16. **Post construction stormwater discharge rate**: The stormwater runoff discharge rate for the 50-year/24-hour storm after all planned stormwater BMPs are installed.

Box 17. **Net change stormwater discharge rate**: The change in stormwater runoff discharge rates listed in Box 15 and Box 16. (Box 16 – Box 15)

Box 18. **Pre-construction stormwater discharge rate:** The stormwater runoff discharge rate for the 100-year/24-hour storm as determined by the land use for the past five years.

Box 19. **Post construction stormwater discharge rate:** The stormwater runoff discharge rate for the 100-year/24-hour storm after all planned stormwater BMPs are installed.

Box 20. **Net change stormwater discharge rate:** The change in stormwater runoff discharge rates listed in Box 18 and Box 19. (Box 19 – Box 18)

4. Summary Description of Post Construction Stormwater BMPs (consistent with the design or applicable worksheets)

Key: RC = Rate Control VC = Volume Control WQ = Water Quality

In the lists below, check the BMPs identified in the PCSM Plan, and their function(s) using the above Key. More than one function may be checked for a BMP. A BMP may have more than one function (rate, volume, water quality), therefore, there may be more than one volume/acres listed. For example, a Rain garden/Bio-retention BMP may have a volume treated and acres treated for volume control and water quality, that differs from the volume treated and acres treated for rate control. If any BMP in the PCSM Plan is not listed below, it must be described in the space provided after "Other". Attach additional sheet(s) as needed

For Rate Control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event

For Volume Control and Water Quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event

BMP	Function(s)	Volume of stormwater treated	Acres treated
☒ Wet ponds	☒ VC ☒ RC ☒ WQ	19,024	5.0
☐ Constructed wetlands	☐ VC ☐ RC ☐ WQ		
☐ Retention basins	☐ VC ☐ RC ☐ WQ		
☐ Detention basin	☐ VC ☐ RC ☐ WQ		
☐ Underground detention	☐ VC ☐ RC ☐ WQ		
☐ Dry Extended detention basin	☐ VC ☐ RC ☐ WQ		
☒ Sediment fore bay	☐ VC ☒ RC ☒ WQ	0	4.21
☐ Infiltration trench	☐ VC ☐ RC ☐ WQ		
☐ Infiltration Berm/Retentive Grading	☐ VC ☐ RC ☐ WQ		
☐ Subsurface Infiltration bed	☐ VC ☐ RC ☐ WQ		
☐ Infiltration basin	☐ VC ☐ RC ☐ WQ		
☐ Pervious pavement	☐ VC ☐ RC ☐ WQ		
☐ Dry well/Seepage pit	☐ VC ☐ RC ☐ WQ		
☐ Bio-infiltration areas	☐ VC ☐ RC ☐ WQ		
☐ Rain gardens/Bio-retention	☐ VC ☐ RC ☐ WQ		
☒ Vegetated swales	☐ VC ☒ RC ☒ WQ	0	6.96
☐ Constructed filters	☐ VC ☐ RC ☐ WQ		
☐ Protect Sensitive & Special Value Features	☐ VC ☐ RC ☐ WQ		
☐ Protect/Convert/Establish Riparian buffers	☐ VC ☐ RC ☐ WQ		
☒ Restoration: Buffers/ Landscape/Floodplain	☐ VC ☐ RC ☒ WQ	0	2.65
☐ Disconnection from storm sewers	☐ VC ☐ RC ☐ WQ		
☐ Rooftop disconnection	☐ VC ☐ RC ☐ WQ		
☐ Vegetated roofs	☐ VC ☐ RC ☐ WQ		
☐ Runoff capture/Reuse	☐ VC ☐ RC ☐ WQ		
☐ Oil/grit separators	☐ WQ		
☐ Water quality inserts/inlets	☐ WQ		
☐ Street sweeping	☐ WQ		
☒ Other Vegetative Filter Strips	☐ VC ☒ RC ☒ WQ	0	6.21
☐ Other _____	☐ VC ☐ RC ☐ WQ		

5. Off Site Discharge Analysis

Does the project propose any off-site discharges to areas other than surface waters? ☒ Yes ☐ No

If yes, the applicant must have appropriate easement that provides the legal authority for this off-site discharge. In addition, applicant must provide a demonstration in both the E&S and PCSM plans that the discharge will not cause erosion, damage, or nuisance to off-site properties. North Braddock Borough MS4, existing discharge, quantity will be reduced.

6. Potential Pollution Causing Materials

Identify naturally occurring geologic formations or soil conditions that may have the potential to cause pollution during earth disturbance activities and include BMPs to avoid or minimize potential pollution and its impacts from the formation.

The site is an urban area with past and existing land use as an industrial steel plant. Metals and PH are elevated on site. These conditions are being mitigated through the use of an impermeable PVC liner for all ponded water within the wet pond and discharge contained on-site through the use of a level spreader and vegetative filter strips.

7. Riparian Buffers

A. Does the project discharge to a river, stream, creek, lake, pond or reservoir with a designated use of high quality or exceptional value? If so, is earth disturbance occurring within 150 feet of the river, stream, creek, lake, pond or reservoir?
☐ Yes ☒ No

If yes, go to B. If no, continue to Section 8.

B. Will you be protecting, converting, or establishing a 150 foot riparian buffer throughout the project area?

Protect ☐ Yes ☐ No Convert ☐ Yes ☐ No Establish ☐ Yes ☐ No

If No to all above, the application must contain a demonstration of riparian buffer or riparian forest buffer equivalency. (Continue to C)

C. What BMPs will you be using that will be functionally equivalent to that of either a riparian buffer or a riparian forest buffer whatever is applicable to the project? Please attach an equivalency demonstration.

An equivalency demonstration must be completed, including worksheets 12-15 and a narrative that shows that the alternative BMPs implemented will be functionally equivalent to that of either a riparian buffer or a riparian forest buffer, whichever is applicable to the project according to 102.14(a)(1) and (2).

D. Will the project propose any earth disturbance within 100 feet of a surface water? ☐ Yes ☐ No

If yes, the applicant shall provide an offset riparian forest buffer at a ratio of one to one for the disturbed area.

8. Thermal Impacts Analysis

Explain how thermal impacts associated with this project were avoided, minimized, or mitigated. Potential thermal impacts are minimized by limiting the disturbed area as much as practical for the safe and efficient development of the site. Potential thermal impacts are mitigated as both the volume and rate of runoff on site is reduced due to the proposed storm water facilities; including a wet pond, level spreader, and vegetative filter strip. The use of a level spreader to return discharge to sheet flow on site disconnects stormwater outflows from the streams reducing the potential for thermal impact. In addition, the use of vegetative filter strips to treat the water from impervious areas slows down runoff and helps to reduce the potential for thermal impact.

9. Critical Stages

Identify the critical stages of implementation of the PCSM plan for which a licensed professional or designee shall be present on the project site. An engineer or designated representative will be present during construciton of the structural components of the PCSM plan, including: wet pond embankment, liner systerm,outlet structure, and spillway.

SECTION E. ANTIDEGRADATION ANALYSIS MODULE

This Section is to be completed for Special Protection Waters Only (Projects that drain to HQ/EV Waters and EV Wetlands).

PART 1 NONDISCHARGE ALTERNATIVES EVALUATION

E & S Plan	Official Use Only	PCSM Plan	Official Use Only
Check off the environmentally sound nondischarge Best Management Practices (BMPs) listed below to be used prior to, during, and after earth disturbance activities that have been incorporated into the E & S Plan based on the site analysis. For BMPs not checked, provide an explanation of why they were not utilized, attach additional sheets if necessary. **Refer to the attached pages at the back of this NOI Form for explanations of each item.**		**Check off the environmentally sound nondischarge Best Management Practices (BMPs) listed below to be used after construction that have been incorporated into the PCSM Plan based on the site analysis. For BMPs not checked, provide an explanation of why they were not utilized, attach additional sheets if necessary.** **Refer to the attached pages at the back of this NOI Form for explanations of each item.**	
Nondischarge BMPs ☒ Alternative Siting ☒ Alternative location ☒ Alternative configuration ☒ Alternative location of discharge ☒ Limited Disturbed Area ☐ Limiting Extent & Duration of Disturbance (Phasing, Sequencing) ☐ Riparian Buffers (150 ft min) ☐ Riparian Forest Buffer (150 ft min) ☒ Other* See Attached		**Nondischarge BMPs** ☒ Alternative Siting ☒ Alternative location ☒ Alternative configuration ☒ Alternative location of discharge ☒ Low Impact Development (LID / BSD) ☐ Riparian Buffers (150 ft min) ☐ Riparian Forest Buffer (150 ft min) ☐ Infiltration ☐ Water Reuse ☒ Other* See Attached	

*☒ Identify any and all best management practices, design standards and alternatives that collectively are substantially equivalent to a riparian buffer or riparian forest buffer in effectiveness, to minimize the potential for accelerated erosion and sedimentation and to protect, maintain, reclaim and restore water quality and for existing and designated uses of a perennial or intermittent river, stream or creek or lake, pond or reservoir of this Commonwealth to ensure compliance with 25 Pa. Code Chapter 93 (relating to water quality standards).

Will the nondischarge alternative BMPs eliminate the change in rate, volume, or quality during construction? ☐ Yes ☒ No If yes, the antidegradation analysis is complete. If no, proceed to Part 2.	Will the nondischarge alternative BMPs eliminate the change in rate, volume, or quality after construction? ☐ Yes ☒ No If yes, the antidegradation analysis is complete. If no, proceed to Part 2.

Part 2 Antidegradation Best Available Combination of Technologies (ABACT)

If the net change in stormwater discharge during or after construction is not fully eliminated by nondischarge BMPs, the applicant must utilize ABACT BMPs to manage the change. The applicant must specify whether the discharge will occur during construction, post-construction or both, and identify the technologies that will be used to ensure that the discharge will be a non-degrading discharge.

E & S Plan	Official Use Only	PCSM Plan	Official Use Only
☒ **Treatment BMPs:** ☒ Sediment basin with skimmer ☐ Sediment basin ratio of 4:1 or greater (flow length to basin width) ☐ Sediment basin with 4-7 day detention ☐ Flocculants ☒ **Land disposal:** ☒ Vegetated filters ☐ Riparian buffers <150ft. ☐ Riparian Forest Buffer <150ft. ☒ **Pollution prevention:** ☒ PPC Plans ☒ Immediate stabilization ☐ Street sweeping ☒ Channels, collectors and diversions lined with permanent vegetation, rock, geotextile or other non-erosive materials ☐ **Stormwater reuse technologies:** ☐ Sediment basin water for dust control ☐ Sediment basin water for irrigation ☐ **Other*** _____		☒ **Treatment BMPs:** ☐ Infiltration Practices ☒ Wet ponds ☐ Created wetland treatment systems ☒ Vegetated swales ☐ Manufactured devices ☐ Bio-retention/infiltration ☐ Green Roofs ☒ **Land disposal:** ☒ Vegetated filters ☐ Riparian Buffers <150ft. ☐ Riparian Forest Buffer <150ft. ☒ **Pollution prevention:** ☐ Disconnection of roof drainage ☐ Bio-retention/bio-infiltration ☐ Street sweeping ☐ Nutrient, pesticide, herbicide or other chemical application plan alternatives ☒ PPC Plans ☐ Non-structural Practices ☐ Land Preservation ☒ Restoration BMPs ☐ **Stormwater reuse technologies:** ☐ Cisterns ☐ Rain barrels ☐ Dry hydrant with underground storage ☐ Spray/Drip Irrigation ☐ **Other*** _____	

*☒ Identify any and all best management practices, design standards and alternatives that collectively are substantially equivalent to a riparian buffer or riparian forest buffer in effectiveness, to minimize the potential for accelerated erosion and sedimentation and to protect, maintain, reclaim and restore water quality and for existing and designated uses of a perennial or intermittent river, stream or creek or lake, pond or reservoir of this Commonwealth to ensure compliance with 25 Pa. Code Chapter 93 (relating to water quality standards).

Are the ABACT BMPs selected sufficient to minimize E & S discharges to the extent that existing or designated surface water uses are protected? ☒ Yes If yes, antidegradation analysis is complete. ☐ No If no, and the project discharges to a HQ water, proceed to Part 3. If no and the project discharges to an EV Water, contact the local conservation district or Department regional office.		Are the ABACT BMPs selected sufficient to manage the net change and assure that existing or designated surface water uses are protected? ☒ Yes If yes, antidegradation analysis is complete. ☐ No If no, and the project is located in a HQ water, proceed to Part 3. If no and the project discharges to an EV Water, contact the local conservation district or Department regional office.	

Part 3 Social or Economic Justification (SEJ) (for projects in high quality waters only) – N/A

If the project discharges to HQ waters only, is there an important economic or social justification for the project?

☐ Yes ☐ No If yes, please contact the Department regional office for the county in which the project is located.

SECTION F. CONSULTANT FOR THIS PROJECT

Plan Preparer's Name		eFACTS Consultant ID
Tessa M. Antolick, P.E.		322445
Title	Consulting Firm	Seal (if applicable)
Senior Engineer	ARM Group Inc.	

Mailing Address				
2548 Park Center Boulevard				
City	State	ZIP+4		
State College	PA	16801		
Email		Phone	814-272-0455	Ext 2205
tantolick@armgroup.net		FAX	814-272-0467	

SECTION G. COMPLIANCE HISTORY REVIEW

Is/was the applicant(s) in violation of any Department regulation, order, schedule of compliance or permit or in violation of any Department regulated activities within the past five years?

☐ Yes ☒ No

If yes, list each permit order, schedule of compliance or project that is/was in violation and provide compliance status of the activity (use additional sheets to provide information on all permits).

Permit Program or Activity: Permit Number (if applicable):

Brief description of non-compliance:

Steps taken to achieve compliance	Date(s) compliance achieved

Current Compliance Status: ☒ In-Compliance ☐ In Non-Compliance

If in non-compliance, please attach schedule for achieving compliance.

SECTION H. PERMIT COORDINATION

1. Are there pending permits or any other permits, approvals or planning requirements for this project?

   ☒ Yes ☐ No If yes, list each permit or approval, permit number, and description.

   PA DEP Permits:

   - NPDES PAD0200114
   - GP-5 Water encroachment GP05020718-002
   - Unconventional Well Drilling Permit

   PA DEP Plans:

   - Water Management Plan
   - PPC
   - Emergency Response Plan

   Allegheny Department of Health:

   - Air Quality Permit

   Municipal Permits:

   - East Pittsburgh Conditional Use Permit
   - North Versailles Conditional Use Permit

2. Does the project involve any of the following: placement of fill and/or excavation within or a placement of a structure located in, along, across, or projecting into a water course, floodway or body of water (including wetlands)?

   ☒ Yes ☐ No If yes, identify which authorization under Chapter 105 is applicable.

   ☐ Joint Permit ☒ General Permit ☐ Waiver

3. What is the project's 537 Plan status? Please note that 537 Plan approval is required prior to initiation of earth disturbance activity.

   Pending

4. Is the project associated with a brownfield remediation and/or requires an Act 2 approval? ☐ Yes ☒ No If yes, please indicate any coordination to date with the Department's Environmental Cleanup Program.

SECTION I. CERTIFICATION

Applicant Certification

I certify under penalty of law that this application and all related attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my own knowledge and on inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. The responsible official's signature also verifies that the activity is eligible to participate in the NPDES permit, and that BMP's, E&S Plan, PPC Plan, PCSM Plan, and other controls are being or will be, implemented to ensure that water quality standards and effluent limits are attained. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment or both for knowing violations pursuant to Section 309(c)(4) of the Clean Water Act and, 18 Pa. C.S. §§4903-4904.

I grant permission to the agencies responsible for the permitting of this work, or their duly authorized representative to enter the project site for inspection purposes. I will abide by the conditions of the permit if issued and will not begin work prior to permit issuance.

(For individuals no indication of title is necessary, choose the box below. All others proceed to the next paragraph)

☐ **Individual; proceed to signature portion.**

I hereby certify that I am the signatory pursuant to 25 Pa, Code § 92a.22 and 40 CFR §122.22 and that I am the person who is responsible for decision-making regarding environmental compliance functions for Merrion Oil & Gas, the manager of one or more manufacturing, production, or operating facilities of the applicant and am authorized to make management decisions which govern the operation of regulated facility including having explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure the applicant's long term environmental compliance with environmental laws and regulations; and I am responsible for ensuring that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements.

(choose one of the following; not applicable for individuals):

☑ The responsible corporate officer ☐ president ☑ vice president ☐ secretary ☐ treasure of Merrion Oil & Gas Corporation/Company
Entity name

☐ The ☐ member or ☐ manager of _____ LLC
Entity name

☐ The general partner of _____ partnership/LP/LLP
Entity name

☐ The principal executive officer or ranking elected official of _____ Municipality/State/Federal/other public agency
Entity name

☐ Power of Attorney/delegation of contractual authority (documentation supporting delegation of contracting authority must be provided) for _____
Entity name

SIGNATURES

Applicant	**Co-Applicant (if applicable)**
Ryan G. Merrion Vice President of Board	
Print Name and Title of Person Signing	Print Name and Title of Person Signing
Ryan G. Merrion	
Signature of Applicant	Signature of Co-Applicant
10-19-2018	
Date Signed	Date Signed

Please note below the name, address and telephone number of the individual that should be contacted in the event additional information is required.

Name Ryan Davis, 610 Reilly Ave, Farmington, NM, 87401 Phone 505-215-3292

FAX _____

APPENDIX A

Land Use Information Questions

Responses to the following questions are required to determine applicability of DEP's Land Use Policy for Permitting of Infrastructure and Facilities.

Note: Applicants are encouraged to submit copies of local zoning approvals with their authorization application.

LAND USE INFORMATION		
1.	Is there an adopted county or multi-county comprehensive plan?	Yes ☒ No ☐
2.	Is there an adopted municipal or multi-municipal comprehensive plan?	Yes ☒ No ☐
3.	Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?	Yes ☒ No ☐
If the applicant answers NO to either Question 1, 2, <u>or</u> 3, <u>the provisions of the PA MPC are not applicable and the applicant does not need to respond to questions 4 and 5 below</u>. *If the applicant answers YES to questions 1, 2 <u>and</u> 3, the applicant should respond to questions 4 and 5 below.*		
4.	Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval? *If zoning approval has been received, attach documentation.*	Yes ☒ No ☐
5.	Have you attached Municipal and County Land Use Letters for the project?	Yes ☒ No ☐

Antidegradation Analysis

A R M G r o u p I n c .

SECTION E. ANTIDEGRADATION ANALYSIS

E & S Plan:

Nondischarge BMPs

☒ Alternative Siting

☒ Alternative location – The well pad and pipeline alignments, including its associated entrances and staging areas, were carefully selected and were determined to be in the most optimal location for the Well Pad and Pipelines during the design/permitting phase. This well pad and pipeline alignment was strategically selected by the applicant, the land owner, engineers, and biologists to maintain functionality at the existing site and to minimize impacts to natural resources and to provide a cost effective approach for construction and operation.

☒ Alternative configuration – When designing the Well Pad and Pipelines, Low Impact Development (LID) techniques were used. The site was laid out to minimize disturbance, located to minimize impacts to streams/wetlands, and the pipeline corridor will be reclaimed to existing conditions.

☒ Alternative location of discharge – The well pad will drain to TMDL and siltation impaired waters (Turtle Creek). The impact to Special Protection waters was minimized where possible.

☒ Limited Disturbed Area – Earth disturbance activities will be kept to a minimum during the construction/reclamation phases, while maintaining a safe and efficient work process.

☒ Limiting Extent & Duration of Disturbance (Phasing, Sequencing) – Earth disturbance will be staged so that not all areas of the project site are disturbed at once. Temporary and permanent seeding requirements will be followed throughout the earth disturbance activities.

☐ Riparian Buffers (150 ft. min.) – Riparian buffers were not used in the siting of this project.

☐ Riparian Forest Buffer (150 ft. min.) – Riparian forest buffers were not used in the siting of this project.

☒ Other – Sediment trap, level spreader, vegetated swales, vegetative filter strips, rock construction entrances with wash racks, compost filter socks, permanent revegetation, maintaining vegetated areas throughout the site, and restoring all areas to original conditions, or better will be used in conjunction to eliminate the net change in stormwater volume, rate and water quality at the site.

PCSM/Site Restoration Plan

Nondischarge BMPs

☒ Alternative Siting

☒ Alternative location – The well pad and pipeline alignments, including its associated entrances and staging areas, were carefully selected and were determined to be in the most optimal location for the Well Pad and Pipelines during the design/permitting phase. This well pad and pipeline alignment was strategically selected by the applicant, the land owner, engineers, and biologists to maintain functionality at the existing site and to minimize impacts to natural resources and to provide a cost effective approach for construction and operation.

☒ Alternative configuration - When designing the Well Pad and Pipelines, Low Impact Development (LID) techniques were used. The site was laid out to minimize disturbance, located to minimize impacts to streams/wetlands, and the pipeline corridor will be reclaimed to existing conditions.

SECTION E. ANTIDEGRADATION ANALYSIS

☒ Alternative location of discharge - The well pad will drain to TMDL and siltation impaired waters (Turtle Creek). The impact to Special Protection waters was minimized where possible.

☒ Low Impact Development (LID / BSD) – Low Impact Development / Better Site Design was implemented during the design phase of this project. The site was designed and constructed with these techniques in mind.

☐ Riparian Buffers (150 ft. min.) - Riparian buffers were not used in the siting of this project.

☐ Riparian Forest Buffer (150 ft. min.) - Riparian forest buffers were not used in the siting of this project.

☐ Infiltration – As agreed upon with the PADEP, infiltration BMP's will not be used at this site to minimize the potential transfer of pollution causing materials through the ground.

☐ Water Reuse – N/A

☒ Other - Sediment trap, level spreader, vegetated swales, vegetative filter strips, rock construction entrances with wash racks, compost filter socks, permanent revegetation, maintaining vegetated areas throughout the site, and restoring all areas to original conditions, or better will be used in conjunction to eliminate the net change in stormwater volume, rate and water quality at the site.

Summary Tables for Supporting Calculations & Measurement Data

A R M G r o u p I n c .

3. SUMMARY TABLE FOR SUPPORTING CALCULATION AND MEASUREMENT DATA			
See Attachment D in the Instructions on how to Complete This Section			
This section does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.			
Watershed Name: *DA 1 - Merrion Oil & Gas - ET - Braddock Well Pad*			
Design storm frequency *2-YR/24-HR* Rainfall amount *2.36*	Pre-construction	Post Construction	Net Change
Impervious area (acres)	*1.40*	*1.91*	*0.52*
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	*1.269*	*1.299*	*0.030*
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		*0.863*	*-0.407*
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	*20.38 CFS*	*9.05 CFS*	*-11.33 CFS*
2) 10-Year/24-Hour	*29.32 CFS*	*13.35 CFS*	*-15.97 CFS*
3) 50-year/24-Hour	*39.46 CFS*	*24.47 CFS*	*-14.99 CFS*
4) 100-year/24-Hour	*44.24 CFS*	*31.16 CFS*	*-13.08 CFS*

3. SUMMARY TABLE FOR SUPPORTING CALCULATION AND MEASUREMENT DATA			
See Attachment D in the Instructions on how to Complete This Section			
This section does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.			
Watershed Name: *DA 2 - Merrion Oil & Gas - ET - Braddock Well Pad*			
Design storm frequency *2-YR/24-HR* Rainfall amount *2.36*	Pre-construction	Post Construction	Net Change
Impervious area (acres)	*1.98*	*0.33*	*-1.66*
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	*0.325*	*0.230*	*-0.095*
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		*0.230*	*-0.095*
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	*5.62 CFS*	*4.66 CFS*	*-0.96 CFS*
2) 10-Year/24-Hour	*8.55 CFS*	*7.75 CFS*	*-0.80 CFS*
3) 50-year/24-Hour	*11.88 CFS*	*11.38 CFS*	*-0.50 CFS*
4) 100-year/24-Hour	*13.44 CFS*	*13.10 CFS*	*-0.34 CFS*

3. SUMMARY TABLE FOR SUPPORTING CALCULATION AND MEASUREMENT DATA			
See Attachment D in the Instructions on how to Complete This Section			
This section does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.			
Watershed Name: *DA 1 - Merrion Oil & Gas - ET - Braddock Well Pad*			
Design storm frequency *2-YR/24-HR* Rainfall amount *2.36*	Pre-construction	Post Construction (SR)	Net Change
Impervious area (acres)	*1.40*	*1.73*	*0.33*
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	*1.269*	*1.299*	*0.030*
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		*0.863*	*-0.407*
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	*20.39 CFS*	*10.02 CFS*	*-10.37 CFS*
2) 10-Year/24-Hour	*29.32 CFS*	*14.76 CFS*	*-14.56 CFS*
3) 50-year/24-Hour	*39.47 CFS*	*24.37 CFS*	*-15.10 CFS*
4) 100-year/24-Hour	*44.25 CFS*	*31.27 CFS*	*-12.98 CFS*

3. SUMMARY TABLE FOR SUPPORTING CALCULATION AND MEASUREMENT DATA			
See Attachment D in the Instructions on how to Complete This Section			
This section does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.			
Watershed Name: *DA 2 - Merrion Oil & Gas - ET - Braddock Well Pad*			
Design storm frequency *2-YR/24-HR* Rainfall amount *2.36*	Pre-construction	Post Construction (SR)	Net Change
Impervious area (acres)	*1.98*	*0.11*	*-1.88*
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	*0.325*	*0.230*	*-0.095*
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		*0.230*	*-0.095*
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	*5.62 CFS*	*4.66 CFS*	*-0.96 CFS*
2) 10-Year/24-Hour	*8.55 CFS*	*7.75 CFS*	*-0.80 CFS*
3) 50-year/24-Hour	*11.88 CFS*	*11.38 CFS*	*-0.50 CFS*
4) 100-year/24-Hour	*13.44 CFS*	*13.10 CFS*	*-0.34 CFS*

APPENDIX D

Erosion and Sediment (E&S) Control Plan

A R M G r o u p I n c .

EROSION AND SEDIMENT CONTROL PLAN

ET - Braddock Well Pad

ARM Project No. 180539

East Pittsburgh Borough, North Braddock Borough, & North Versailles Twp.
Allegheny County, Pennsylvania

Submitted to:

Pennsylvania Department of Environmental Protection
Southwest District Oil & Gas Operations
400 Waterfront Dr.
Pittsburgh, PA 15222

Prepared for:

MERRION
OIL & GAS

Prepared by:

ARM Group Inc.
Engineers and Scientists

October 2018

Note: The original Erosion and Sediment Control Plan was prepared and submitted by Trant Corporation. ARM Group Inc. has prepared responses to the PADEP's Administrative Incompleteness letter and, in doing so, has applied minor modifications to the E&S design, narrative and corresponding drawings contained herein.

EROSION AND SEDIMENT CONTROL PLAN

ET - Braddock Well Pad

ARM Project No. 180539

East Pittsburgh Borough, North Braddock Borough, & North Versailles Twp.
Allegheny County, Pennsylvania

Submitted to:

Department of Environmental Protection
Bureau of Oil and Gas Management
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

Prepared for:

Merrion Oil & Gas
610 Reilly Ave
Farmington, NM 87401

Prepared by:

ARM Group Inc.
2548 Park Center Boulevard
State College, PA 16801

October 2018

I do hereby Certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Respectfully submitted:

Tessa M. Antolick

Tessa M. Antolick, P.E.
Senior Engineer

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SOIL EROSION AND SEDIMENTATION CONTROL NARRATIVE

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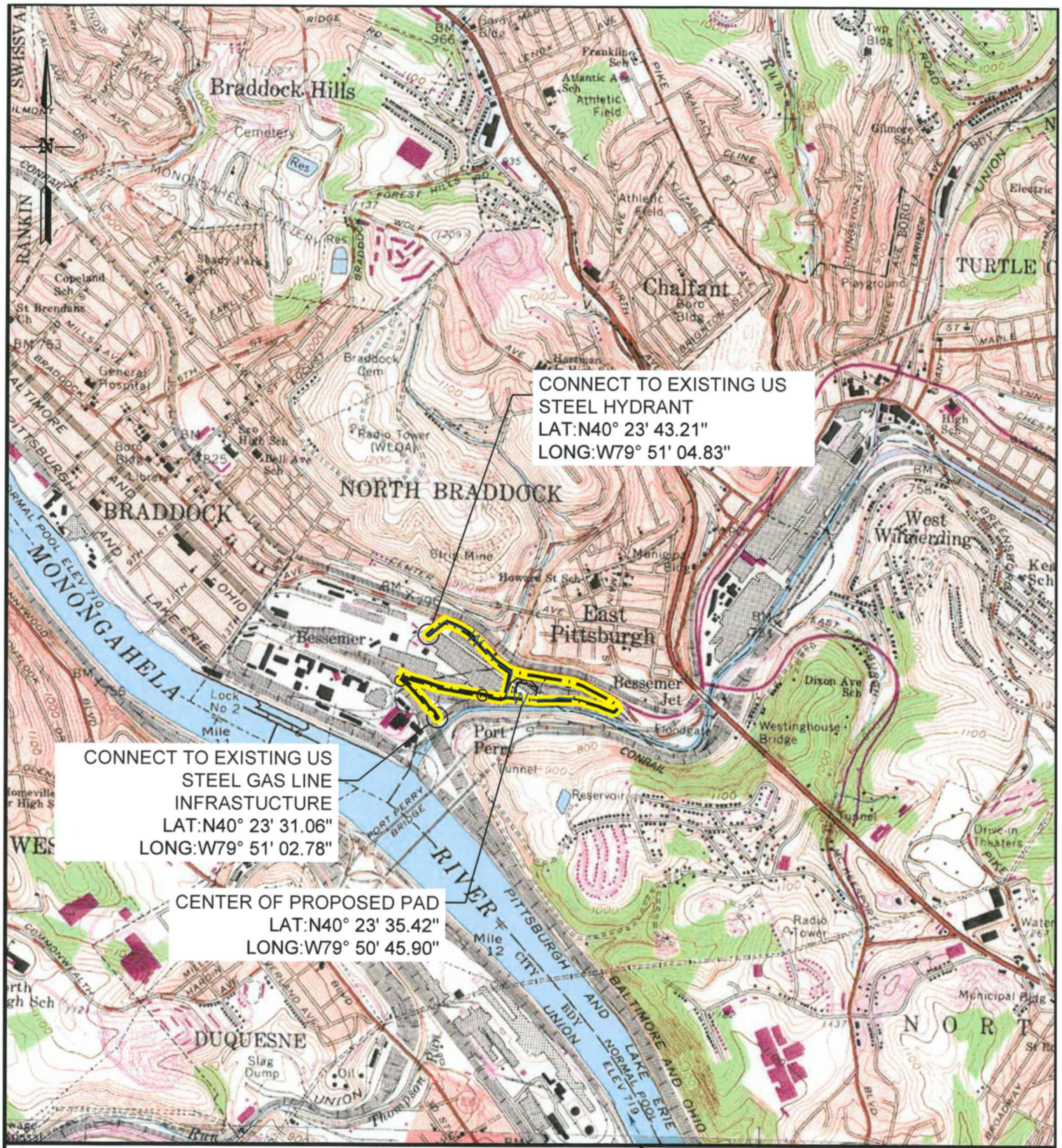
Appendix A – Silt Sock
Appendix B – Sediment Trap
Appendix C – Spillway
Appendix D – Anti-Seep Collar
Appendix E – Channels
Appendix F – Form FP-01
Appendix G – Soils Handling Plan

PLAN SHEETS:

C701:	E&S PERMIT BOUNDARY, LIMIT OF DISTURBANCE, & EXISTING CONDITIONS OVERLAY MAP
C702:	E&S EXISTING CONDITIONS, PERMIT BOUNDARY, LIMIT OF DISTURBANCE, & SOILS MAP
C703A-B:	E&S EXISTING CONDITIONS AND LIMIT OF DISTURBANCE
C704A-B:	E&S GRADING AND DRAINAGE PLAN
C705A-C:	E&S CONTROL PLAN
C706-C707:	E&S CONSTRUCTION DETAILS
C708:	E&S NOTES
C709:	E&S MAINTENANCE SPECIFICATIONS
C710:	E&S SEEDING AND MULCHING SPECIFICATIONS

LOCATION MAP



Base map from the following USGS 7½ minute quadrangles: Braddock in 1960 photorevised 1979.

LEGEND

W — PROPOSED WATERLINE	PROPOSED LOD
G — PROPOSED GASLINE	PROPOSED WELL PAD

0 2000 4000 6000

SCALE IN FEET

This drawing, its contents, and each component of this drawing are the property of and proprietary to ARM Group Inc. and shall not be reproduced or used in any manner except for the purpose identified on the Title Block, and only by or on behalf of this client for the identified project unless otherwise authorized by the express, written consent of ARM Group Inc.

SITE LOCATION MAP

SOIL EROSION AND SEDIMENT POLLUTION CONTROL PLAN
ET - BRADDOCK WELL PAD
MERRION OIL & GAS
EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

09/28/2018	Scale: 1" = 2000'	180539

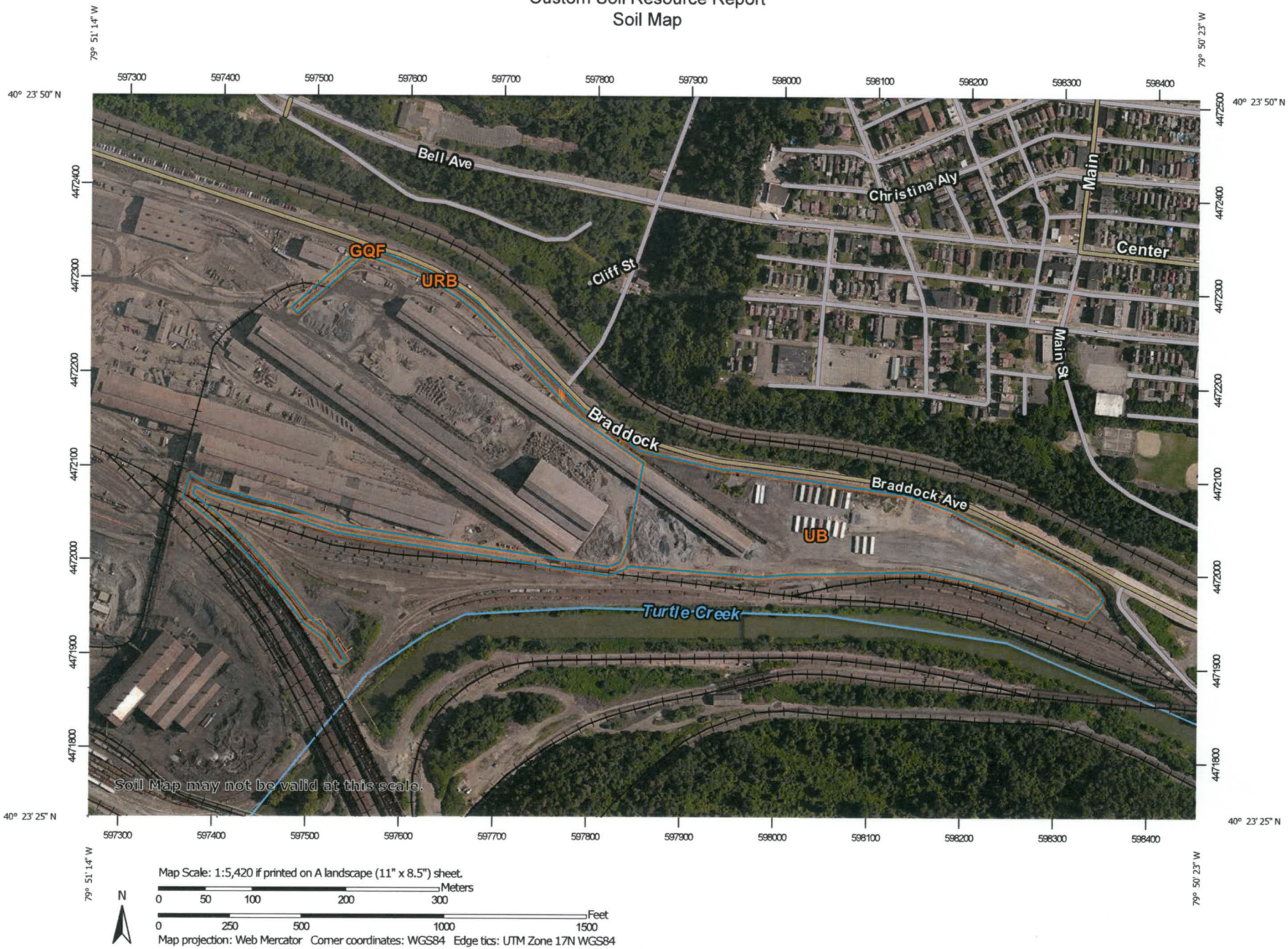
ARM Group Inc.
Engineers and Scientists
www.armgroup.net

Figure 1

P:\Merrion Oil & Gas\180539-1-1-ET Braddock 1H\Drwg\Production\Figures\180539-Site Location Map.dwg Plotted: October 19, 2018

SOILS MAP

Custom Soil Resource Report
Soil Map



Map Scale: 1:5,420 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Allegheny County, Pennsylvania
Survey Area Data: Version 14, Sep 18, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 5, 2014—Aug 28, 2014

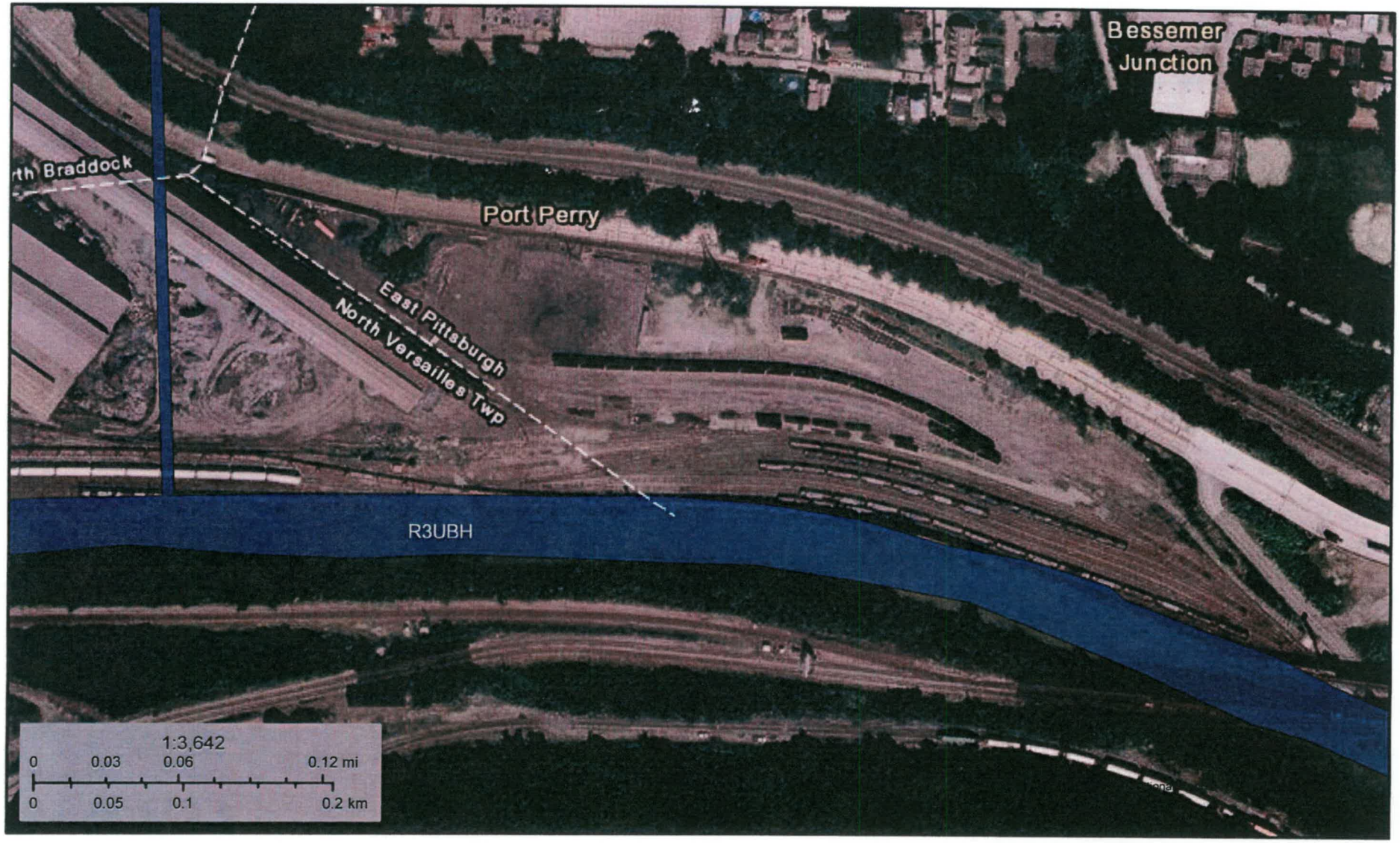
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

WETLAND MAP

U.S. Fish and Wildlife Service

National Wetlands Inventory

Merrion Oil & Gas ET Braddock 1H



May 16, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

EROSION AND SEDIMENTATION CONTROL NARRATIVE

1.0 GENERAL REQUIREMENTS

It shall be the responsibility of the applicant to implement this plan in the field and meet all state and local regulations pertaining to Erosion and Sediment Control. These include proper construction, stabilization, and maintenance of all temporary and permanent erosion and sedimentation control measures. Modifications and/or deviations from this plan will be prohibited. A copy of this plan and narrative, must be kept at the project site at all times until construction and soil stabilization is complete.

All soil erosion and sediment control practices called for in this document and shown on these drawings shall be constructed in accordance with the, "Erosion and Sediment Pollution Control Program Manual" of the Commonwealth of Pennsylvania, Department of Environmental Protection dated March 2000 or later.

1.1 GENERAL

A.) ***Fully completed, properly signed and notarized Notice of Intent Form. (1 original and 2 copies)***

Response: 1 original and 2 copies of the signed and notarized Notice of Intent Form are included in the submission package.

B.) Permit filing fee of $500 (general permit) or $1,500 (individual permit) payable to the appropriate Clean Water Fund.

Response: A check for the sum of $1,500 (individual permit) has been made payable to the Clean Water Fund, and has been included in the submission package.

C.) Disturbed acre fee made payable to the Commonwealth of Pennsylvania Clean Water Fund.

Response: A check for the sum of $1,400 has been made payable to the Commonwealth of Pennsylvania Clean Water Fund, and has been included in the submission package.

D.) Proof of receipt of municipal and county Acts 14, 67, 68, and 127 notifications; copies of certified mail receipts or acknowledgement letters from the local municipality and county government.

Response: 3 copies of the municipal and county Acts 14, 67, 68, and 127 notifications, and copies of the certified mail receipts have been included in the submission package.

E.) A signed PNDI receipt for the project area showing "No known Impact", or "Avoidance Measures", or "Potential Impact" and proof of delivery to the appropriate jurisdictional agency(ies) where further coordination is required, as appropriate).

Response: 3 copies of a signed PNDI showing "Potential Impacts" to the development site has been included in the submission package. Proof of coordination with PAFBC has also been included.

F.) Complete Erosion and Sediment Control Plans (3 copies).

Response: 3 copies of the Erosion and Sediment Control Plans have been included in the submission package.

G.) Complete Post Construction Stormwater Management Plan (3 copies).

Response: 3 Copies of the Stormwater Management Plans have been included in the submission package.

H.) Fully completed General Information Form (GIF) (Individual Permits).

Response: 3 copies of the General Information Form for an individual permit has been included in the submission.

I.) PHMC coordination letter/clearance (individual Permits for 10 acres or more of disturbance only).

Response: The scope of work for the site is under 10 acres. The Edgar Thompson Works plant is listed as eligible for the National Register of Historic Places. A PHMC coordination/clearance letter is provided for the site. Find included the PHMC response letter for the scope of work on site.

J.) ***Appendix A land use questions.***

Response: Appendix A land use questions have been completed in Appendix A "Land Use Information Questions", of the NOI-NPDES.

1.2 E & S PLAN PLANNING & DESIGN 102.4(b)(4)

A.) The E&S Plan is separate from the PCSM Plan and labeled "E&S" or "Erosion and Sediment Control Plan" and is the final plan for construction.

Response: "Erosion and Sediment Control Plan" is the title listed on the cover sheet to distinguish between the E&S Plans and the PCSM Plans.

B.) Documentation provided that the E&S Plan was prepared by a person trained and experienced in E&S design methods and techniques applicable to the size and scope of the project.

Response: See attached documentation of plan preparers training and experience.

C.) E&S Plan minimizes extent and duration of earth disturbance.

Response: ET - Braddock Well Pad is an industrial development located on Braddock Avenue in Braddock Borough, Allegheny County, Pennsylvania (see Site Location Map). The existing and future contours are shown at 2-foot intervals on the plan. The limit of disturbance for the ET - Braddock Well Pad is 13.4 acres. All attempts were made in minimizing the extent and duration of earth disturbance, this is shown on sheet C705.

D.) E&S Plan maximizes protection of existing drainage features and vegetation.

Response: All construction will be in accordance with applicable Borough requirements. Impacts to existing drainage patterns will be minimized throughout construction. This is shown on sheet C705.

E.) E&S Plan minimizes soil compaction.

Response: All attempts were made to prevent soil compaction while preserving existing natural features. This is shown on sheet C705.

F.) E&S Plan utilizes other measures or controls that prevent or minimize generation of increased stormwater runoff.

Response: Through the use of E&S controls such as compost filter socks, channels, and a sediment trap, runoff will be minimized. This is shown on sheet C705.

1.3 EXISTING TOPOGRAPHIC FEATURES OF THE PROJECT SITE AND THE IMMEDIATE SURROUNDING AREA 102.4(b)(5)(i)

A.) Topographic map(s) of the project site provided.

Response: The topography for this portion of the site is primarily gentle slopes with some moderate and steep slopes included. See Plan Sheets with two-foot contours. Sheets C701 is at a scale of 1"=200', C702 is at a scale of 1"=200', C703 is at a scale of 1"=60', C704 is at a scale of 1"=60', and C705 is at a scale of 1"=60'. Plans show existing and proposed roadways, streams, watercourses, existing structures, and other visible landmarks, and outline of woods. This is shown on sheets C701-C705.

B.) location map (USGS quadrangle) provided.

Response: The development site is located on the Braddock Quadrangle. The location map is located on page 3 of the E&S narrative.

1.4 TYPES, DEPTH, SLOPE, LOCATIONS, AND LIMITATIONS OF THE SOILS 102.4(b)(5)(ii)

A.) Soil Map provided.

Response: The soil map of the Braddock Quadrangle is located on page 4 of the E&S Narrative.

B.) Soil use limitation and their resolutions provided.

Response: See information listed below.

THE AREA EXTENT OF SOILS
NOTES:

The person(s) responsible for earthmoving activities shall consult a geotechnical engineer to solve any site-specific E&S challenges that may occur during the implementation of this plan.

Grading shall be done so that water does not pond and saturate the soil. Top and sub soils will be removed to stable material in the areas of road, building and dam construction. Soils will be mixed with other soils on the site to provide for compaction per Penn DOT publication #408. Disturbed areas will be seeded and mulched per the specifications on DEP standard worksheet #7.

When necessary a soils engineer will be made available to be on site to insure proper placement and compaction of all soils and oversee any mixing of soils.

Summary of Soil Limitation Precautionary Measures for BMP Construction

1. **Cutbanks Cave** (Urban/Gilpin).
    a. Erosion control blanketing will be installed on all slopes 3:1 and greater to aid the establishment of vegetative stabilization on steep slopes prone to rapid runoff and high erodibility.
    b. Collection channels or swales are used to carry runoff around work areas and newly graded steep slopes to help decrease soil saturation, erosion and rapid runoff.
    c. Weak soils are to be mixed with other soils for strength under the direction of a soils engineer.
    d. Slope benches at 30' vertical intervals will be installed on all fill slopes 3:1 or steeper and more than 40' high unless directed differently by a licensed geotechnical engineer.
    e. Specific seeding and mulching specifications have been outlined on Standard Worksheet #7 to address soil nutrients and increase the speed of vegetative stabilization.
2. **Corrosive to Concrete\Steel** (Urban/Gilpin).
    a Sediment control BMPs will use a Sediment Storage Dewatering Facility or Pumped Water Filter Bag to dewater control facilities built on slow permeating soils.
    b Proper equipment is to be onsite to deal with shallow bedrock depths.
    c When a high water table interferes with the construction of pipelines, use the techniques described

in the section for dewatering pipe trenches.

d French drains required around foundations in soils with poor drainage.

e Specific seeding and mulching specifications have been outlined on Standard Worksheet #7 to address soil nutrients and increase the speed of vegetative stabilization.

3. **Droughty** (Urban/Gilpin).
   a. Weak soils are to be mixed with other soils for strength under the direction of a soils engineer.
   b. Erosion control blanketing will be installed on all slopes 3:1 and greater to aid the establishment of vegetative stabilization on steep slopes prone to rapid runoff and high erodibility.
   c. Specific seeding and mulching specifications have been outlined on Standard Worksheet #7 to address soil nutrients and increase the speed of vegetative stabilization.
4. **Easily Erodible** (Urban/Gilpin) see number 1 above.
5. **Flooding** (Urban) see number 2 above.
6. **Piping** (Urban/Gilpin)
   a Ponds in unsuitable soils may require clay lining, or a mixing of soils.
   b Key trench used to reduce the potential for piping.
   c Anti-seep collars will be placed on basin/pond barrel to prevent piping.
7. **Poor Source of Topsoil** (Urban/Gilpin)
   a Topsoil is to be stockpiled for later use.
8. **Frost Action** (Urban/Gilpin) see number 3 above.
9. **Shrink-Swell** (Urban) see number 3 above.
10. **Ponding** (Urban) see number 2 above.
11. **Wetness** (Urban) see numbers 2 and 3 above.

SOILS:

USDA Soil Conservation Service – Soil Survey of Butler County Pennsylvania

UB-Urban Land and URB-Urban Land Rainsboro Complex:
Urban soils are located in areas that have been so altered by earthmoving activities or so obscured by buildings that the original soils cannot be identified. Depth, strength, and wetness are variable and onsite investigation may be required to determine suitability of land use. Other soils may have to be mixed with these soils to address strength and wetness limitations.

GQF—Gilpin-Upshur complex, very steep:

The Gilpin component makes up 45 percent of the map unit. Slopes are 25 to 75 percent. This component is on uplands, hillslopes. The parent material consists of acid fine-loamy residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. This soil does not meet hydric criteria. The Upshur component makes up 35 percent of the map unit. Slopes are 25 to 75 percent. This component is on hillslopes, uplands. The parent material consists of clayey residuum weathered from limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 40 to 70 inches. The natural drainage class is well drained. This soil does not meet hydric criteria.

1.5 PAST, PRESENT AND PROPOSED LAND USES AND PROPOSED ALTERATION TO PROJECT SITE 102.4(b)(5)(iii)

A.) Past land uses for past 50 years addressed.

Response: Past 50 year land use was an industrial steel plant.

B.) Present land uses for the last 5 years addressed.

Response: Existing 5 year land use is an industrial steel plant.

C.) Proposed alteration/land uses shown on plan map.

Response: This is shown on plan sheet C705.

1.6 VOLUME AND RATE OF RUNOFF FROM THE PROJECT SITE AND ITS UPSTREAM WATERSHED AREA 102.4(b)(5)(iv)

A.) Drainage area maps provided for proposed channels, basins, and traps.

Response: Drainage areas to hydraulic BMP's are shown on plan sheet C704. Drainage areas for channels are shown on sheet CH-1 of the PCSM plan.

B.) Runoff calculations provided for proposed channels.

Response: Channel calculations are provided in Appendix E.

1.7 LOCATION OF ALL SURFACE WATERS AND THEIR CLASSIFICATION UNDER CHAPTER 93 102.4(b)(5)(v)

A.) Surface waters shown on plan map(s).

Response: This is shown on plan sheets C701-C705.

B.) Existing/designated uses of all streams, lakes, ponds, wetlands, or other surface waters identified.

Response: Existing drainage is to Turtle Creek and Tributary 64495 to Turtle Creek, contained within the Ohio River Basin, classified as "WWF" by chapter 93, Water Quality Standards Drainage list V. The runoff flows into a sediment trap, or compost filter sock, which are designed to remove sediment and silt from runoff before it can flow into the Turtle Creek watershed. All attempts were made to preserve the physical, biological and chemical qualities of the receiving streams. This is shown on plan sheets C701-C705.

1.8 NARRAVIVE DESCRIPTION OF THE LOCATION AND TYPE OF PERIMETER AND ONSITE BMPs 102.4(b)(5)(vi)

A.) E&S BMPs identified/described.

Response: See information listed below.

All Best Management Practices (BMP's) required by the Soil Erosion and Sedimentation Control Plans shall meet or exceed the standards of the Commonwealth of Pennsylvania Department of Environmental Protection Office of Water Management's "Erosion and Sediment Pollution Control Program Manual" dated March 2000 or newer.

ALTERATIONS PROPOSED TO THE AREA. See Plan Sheets.

METHOD OF CALCULATION
The methods of calculation for the storm water runoff and detention requirements for this project were established by D.E.P. –erosion and sediment pollution control program manual. This method was chosen because it is acceptable to all governmental bodies involved.

COMPOST FILTER SOCK INSTALLATION:
Sock fabric shall meet standards of table 4.1 of the PA DEP Erosion Control Manual. Compost shall meet the standards of table 4.2 of the PA DEP Erosion Control Manual.

Compost filter sock shall be placed at existing level grade. Both ends of the barrier shall be extended at least 8 feet up slope at 45 degrees to the main barrier alignment. Maximum slope length shall not exceed that specified for the size of the sock and the slope of the tributary area.

Traffic shall not be permitted to cross compost filter sock.

EROSION CONTROL BLANKET INSTALLATION:
Seed and soil amendments shall be applied according to the rates in the plan drawings before installing the blanket.

Provide anchor trench at toe of slope in similar fashion as at top of slope.

Slope surface shall be free of rocks, clods, sticks, and grass.

Blanket shall have good continuous contact with underlying soil throughout entire length, lay blanket loosely and stake or staple to maintain direct contact with soil do not stretch blanket.

The blanket shall be stapled in accordance with the manufacturer's recommendations.

SEDIMENT TRAP EMBANKMENT INSTALLATION:

Fill material for the embankments shall be free of roots, or other woody vegetation, organic material, large stones and other objectionable materials. The embankment shall be compacted in layer lifts of not more than 9 inches. The maximum rock size shall be no greater than 6 inches. Upon completion, the embankment shall be seeded and mulched or otherwise stabilized according to the specifications of the E&S plan drawings.

SEDIMENT TRAP TRASH RACK/RISER INSTALLATION:
Box shall be bolted, strapped or otherwise secured to the temporary riser.

Top of the riser shall be at least as high as the top of the dewatering zone and shall be 6 inches minimum below crest of emergency spillway.

All joints shall be watertight.

ROCK CONSTRUCTION ENTRANCE INSTALLATION:
Remove topsoil prior to installation of rock construction entrance. Extend rock over full width of entrance.

Runoff shall be diverted from roadway to a suitable sediment removal BMP prior to entering rock construction entrance.

Mountable berm shall be installed whenever optional culvert pipe is used and proper pipe cover as specified by manufacturer is not otherwise provided. Pipe shall be sized appropriately for size of ditch be crossed.

Rock construction entrances shall be fitted with wash racks to be ABACT for special protection watersheds.

ROCK APRON INSTALLATION:
All aprons shall be constructed to the dimensions shown. Terminal widths shall be adjusted as necessary to match receiving channels.

PROGRAM OF OPERATIONS

STAGE 1

1) Access to site will be via Braddock Avenue.
2) Access and construction disturbance of the site shall be kept to a minimum for installation of Best Management Practices [BMP] facilities. The extent of disturbed area should be kept to a minimum to protect existing vegetation and drainage features on site, and minimize unnecessary soil compaction. Sediment shall not be permitted to enter waters of the Commonwealth. No organic material is to be buried on site.
3) The extent of the disturbance as well as the duration between initial disturbance and final stabilization shall be minimized with the following techniques:

a Erosion Control Blanketing and seeding are to be done as soon as possible after final grades are reached,
b immediate vegetative stabilization of disturbed areas upon temporary cessation of work for 4 days or longer,
c a maximum of 15000 square feet of disturbed area may reach final grade before initiating seeding and mulching operations,
d limiting the disturbance to one watershed at a time,
e limit the total length of excavated trench to less than the length of utility line which can be placed and back filled at end of workday,
f only 50 lineal feet of open trench at the end of the workday,

4) Excavate area for installation of the Rock Construction Entrance #1 and #2. Lay geotextile at edge of existing pavement. Install stone base and wash rack per construction entrance detail. Stockpile additional stone for maintenance of entrance. Construction equipment and material will be delivered to the site via this entrance.
5) Install 12" silt socks.

STAGE 2

6) Begin earthwork and installation of Pond 1 and Forebay.
7) As embankment is formed, install **permanent outlet structure** (do not install dewatering orifices in permanent structure), **install pipe**, **anti-seep collar**, **skimmer** as per Construction Detail #7-2, rock apron RA-100, and create the berm. Install impermeable PVC liner in sediment trap to 100 year storm elevation (473.71'). A geo-technical engineer shall verify soils are suitable for trap embankments. Strict adherence to the Geotechnical report is to be followed during the Trap installation. Install impermeable PVC liner. Sediment Trap Storage Dewatering Facility must be installed at the time of Trap installation as per Standard Construction Detail #8-2. **(Critical Stages are in bold text).**
8) Install Sediment Trap Outlet Basin as per Construction Detail #8-6.
9) Install **Emergency Spillway** as per construction details. **(Critical Stage)**
10) Install Clean Out Stake as per plan and details.
11) Install Channels 1-3 and diversion berm.
12) Install Trench Drain within Channel 1. Trench drain is to be installed the length of the proposed roadway that crosses over said channel. Location of trench drain can be found on sheet C705.
13) All exposed embankment slopes should be limed, fertilized, seeded and mulched. Permanent vegetative ground cover should be established upon completion of basin construction.

STAGE 3

14) Excavate/place fill on site until design grade has been established for site. Immediately stabilize fill slopes every ten feet of vertical elevation by seeding per permanent seeding schedule. All slope areas brought to finish grade are to be stabilized with rock or seeded with mulch applied to slopes as specified on detail sheet.
15) Install erosion control matting on any seeded areas greater than 3:1 slope.
16) Install proposed gravel road and cul-de-sac.
17) Install concrete washout in cul-de-sac.
18) Install water and gas lines.
19) All disturbed areas and sub areas are to be stabilized as soon as possible upon reaching finished grade as per the specifications.

STAGE 4 – Erosion Control Removal and Conversions

1) Concrete Washout facility to be removed at completion of construction. Disposal of the waste is to be handled by an experienced contractor following the appropriate rules and regulations.
2) When a uniform 70% perennial vegetative cover stabilizes drainage area to Sediment Trap and the Trap itself, it can be converted. Convert Sediment Trap as follows during the growing season:
   - Pump sediment laden water from Trap through a sediment filter bag. Pump capacity cannot exceed 750gpm or 50% of manufacturer's recommendation pump rate. Or a barrel and #57 gravel and pump per detail.
   - Remove sediment and stockpile in an area surrounded with filter sock to dry and then mix with topsoil.
   - Remove the clean out stake. Dispose of properly, at an approved landfill.
   - Any damage to design dimensions during removal of temporary facilities and sediment shall be corrected by regarding, restabilization, etc. immediately.

- Convert Trap to Detention Pond 1 as per plan and details. Seed disturbed area per permanent seeding schedule.
- Convert Sediment Trap outlet basin as per plans and details to a level spreader.

3) Existing E&S controls can be removed once a uniform 70% perennial vegetative cover is obtained. Silt will be disposed of by being mixed with other soils on the site or spread to dry in an area protected with filter sock and then seeded per permanent seeding specifications when dry. Compost from the filter sock can be used as a soil supplement.
    - Silt sock and erosion control matting is to be removed and disposed of properly, at an approved landfill.

TEMPORARY CONTROL MEASURES AND FACILITIES USED DURING EARTH MOVING.
Program of operations: The life of this project is such that soil erosion and sedimentation measures must be continually applied and maintained during construction activities. This will be preceded by proper interim measures on a scheduled basis as outlined in this application.

PURPOSE - The purpose of the use of temporary or interim control measures is to prevent needless accumulation of sediment in the major drainage channels and to minimize the creation of difficult and undesired conditions in and around the site during construction.

B.) E&S BMPs shown on plan map(s).

Response: This is shown on plan sheet C705.

1.9 SEQUENCE OF BMP INSTALLATION AND REMOVAL 102.4(b)(5)(vii)

A.) Construction sequence provided.

Response: This is located on plan sheet C708.

2.0 SUPPORTING CALCULATIONS AND MEASUREMENTS 102.4(b)(5)(viii)

A.) Calculations provided for all proposed channels, traps, and basins.

Response: Calculations for all proposed channels are located in Appendix E, and all calculations for proposed traps are located in Appendix B, C, and D of the E&S narrative.

B.) Standard E&S worksheets or equivalents completely filled out.

Response: Standard E&S worksheets and equivalent calculations can be found throughout the Appendixes of the E&S narrative.

2.1 PLAN DRAWINGS 102.4(b)(5)(ix)

A.) Plan map(s) showing proposed earthmoving provided.

Response: Proposed earthmoving is located on plan sheet C704.

B.) Details and/or typicals provided for each proposed E&S BMP.

Response: Details and/or typicals for each proposed E&S BMP is located on plan sheets C706-C707.

2.2 MAINTENANCE PROGRAM 102.4(b)(5)(x)

A.) Maintenance of proposed BMPs addressed.

Response: See information listed below for typical construction maintenance. Maintenance of proposed BMPs are also located on plan sheet C709.

PROJECT AREA MAINTENANCE
Areas within the project, not in the immediate work area, will be interim seeded, if necessary, to avoid problems with accelerated erosion. This will include any temporary grading, channels, etc. Sedimentation control will be achieved by limiting the total amount of disturbance to the site on a scheduled basis. Sedimentation Basin and silt socks will be provided to intercept the runoff from site prior to the discharge to waters of the Commonwealth.

ROCK CONSTRUCTION ENTRANCE MAINTENANCE:
Structure's thickness will be constantly maintained to the specified dimension by adding rock. A stockpile of rock material will be maintained at the site for this purpose. At the end of each construction workday, all sediment deposited on public roadways, will be removed and returned to the site. Washing with water is not permitted. If excessive amounts of sediment are being deposited on roadway, extend length of rock construction entrance by 50 foot increments until condition is alleviated.

EROSION CONTROL BLANKET MAINTENANCE:
Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to minimum uniform 70% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 4 calendar days.

SEDIMENT TRAPS MAINTENANCE:
All sediment traps shall be inspected on at least a weekly basis <u>and</u> after each runoff event.

Access for sediment removal and other required maintenance activities shall be provided.

A clean out stake shall be placed near the center of each trap. Accumulated sediment shall be removed when it has reached the elevation indicated on the clean out stake and the trap restored to its original dimensions. Dispose of materials removed from the trap in the manner described in the E&S plan.

Check embankments, spillways, and outlets for erosion, piping and settlement. Clogged or damaged spillways and/or embankments shall be immediately restored to design specifications.

Displaced riprap within the spillway or outlet protection shall be replaced immediately.

Accumulated sediment shall be removed and disturbed areas inside the trap shall be stabilized before conversion to a storm water management facility. To assist in removing sediment, which may be saturated, a device such as shown in standard construction detail #7-18 may be used to dewater the sediment prior to its removal.

TRASH RACK/ RISER MAINTENANCE:
Clogged or damaged spillways shall be repaired immediately. Trash and other debris shall be removed from the basin and riser.

DEWATERING FACILITY MAINTENANCE:
Dewatering Facility shall be continuously monitored during operation. If for any reason the dewatering facility ceases to function properly, it shall be immediately shut down and not restarted until the problem has been corrected.

ROCK APRON MAINTENANCE:
All aprons shall be inspected at least weekly and after each runoff event, displaced riprap within the apron shall be replaced immediately.

SPILLWAY MAINTENANCE:

Displaced riprap within the spillway or outlet channel shall be replaced immediately.

COMPOST FILTER SOCK MAINTENANCE:
Compost filter sock shall be inspected weekly and after each runoff event. Damaged sock shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Accumulated sediment shall be removed when it reaches ½ the above ground height of the barrier and disposed in the manner described in the plan.

Biodegradable compost filter socks shall be replaced after 6 months. Photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed, the sock may be left in place and vegetated or removed by cutting open the mesh and spreading the mulch as a soil supplement.

B.) Inspection schedule for proposed BMPs provided.

Response: See information listed below for seeding scheduling. Inspection schedule for proposed BMPs are also located on plan sheet C709.

TYPES OF MEASURES AND FACILITIES –
The types of measures and facilities will include the use of positive grading techniques and practices which will be implemented during construction to insure positive drainage in the work area. This is to prevent the creation of difficult and undesired working conditions. The drainage in these areas will be minimized to prevent excess erosion. If construction should cease during non-growing season disturbed areas shall be covered with straw or excelsior mats.

Those areas where cover is removed will be exposed for a minimum period of time to final grading and reseeding. The seeding of disturbed areas will be in one of three schedules.

SEEDING
If grass does not grow within 20 days of application [during growing season] the area shall be seeded again.

APPLICABILITY.
Upon completion of the development and construction of buildings all disturbed areas will be seeded per permanent seeding schedule.

TEMPORARY SEEDING SCHEDULE AND FERTILIZER RATES:
Early spring (April 15 up to June 15)
- Annual grass (rye) at a rate of 40 pounds per acre.

Late spring and early summer (June 16 to August 15)
- Japanese or foxtail millet at a rate of 35 pounds per acre.

Late summer and fall (August 16 and later)
- Annual Rye at a rate of 40 pounds per acre or Winter wheat at a rate of 180 pounds (3 bu) per acre.

Prepare the ground surface apply ground lime stone and fertilizer per Table 5.10 of DER's "Erosion and Sediment Control Program Manual" (page 5.40), Lime at a rate of 6 ton of agriculture limestone per acre and apply 20 lbs. of N (nitrogen), 40 lbs. of N/2 O/2 (Phosphate) of & 40 lbs. of K2O (Potash) per acre or as indicated by soil testing.

If grading is completed developed during non-growing season, October 15 and April 15, disturbed areas shall be covered with straw mulch applied at 3 tons of mulch per acre to produce a loose layer of .75 to 1.0 inch deep per Penn DOT Standards 408.

PERMANENT SEEDING SCHEDULE AND FERTILIZER RATES
Seed will be applied by approved hydro seeding methods to areas that are graded to final section, for slopes less than 10 feet in height and will not be disturbed, Using Kentucky 31 tall fescue, at a rate of 40 pounds per square acre, or, with fine fescue 10 pounds per square acre. Liming of soil shall be per soil testing or 6 ton of agricultural grade

limestone per acre and fertilizer added per soil testing or at a rate of 100 lb. of Nitrogen (N) 200 lb. of Phosphate (P/2 O/5) and 200 lb. of Potash (K/2 O) per acre or as indicated by soil testing. Apply 3 tons of straw mulch per acre to produce a loose layer of .75 to 1.0 inch deep or paper mulch per manufacturer's specifications.

PERMANENT SEEDING SCHEDULE STEEP SLOPES OVER 10 FEET HIGH FERTILIZER & LIMING RATES

Seed will be applied by approved hydro seeding methods to areas that are graded to final section, for steep slopes over 10 feet in height which will not be disturbed, Using a mixture of crown vetch, at a rate of 10 pounds per acre and perennial ryegrass, at a rate of 20 pounds per acre. Liming of soil shall be per soil testing or 6 ton of agricultural grade limestone per acre and fertilizer added per soil testing or at a rate of 100 lb. of Nitrogen (N) 200 lb. of Phosphate (P/2 O/5) and 200 lb. of Potash (K/2 O) per acre or as indicated by soil testing. Apply 3 tons of straw mulch per acre to produce a loose layer of .75 to 1.0 inch deep or paper mulch per manufacturer's specifications. For construction between October and March use straw blanket applied at a rate of 3 ton per acre.

MULCHING SEEDED AREAS.

Immediately after seeding or within 48 hours after seeding is completed. Place straw, wood cellulose over topsoil areas. Use hay, straw or wood cellulose on other areas as indicated in specifications PENNDOT 408, 805.3

C.) Written report documenting inspections and repairs specified.

Response: Written report documenting inspections and repairs are located on plan sheet C708.

2.3 RECYCLING OR DISPOSAL OF MATERIALS 102.4(b)(5)(xi)

A.) Anticipated construction wastes identified.

Response: See information listed below for typical construction wastes. Anticipated construction wastes are also located on plan sheet C708.

ANTICIPATED PROJECT CONSTRUCTION WASTES

A. E&S Control wastes such as accumulated sediment and rocks.
B. Portable sanitary facility waste.
C. Trash from onsite workers (food bags and wrappers; beverage containers).
D. Trimmings and cuttings of wood, pipe, and other construction material.
E. Brush, trees and other cleared vegetation.
F. Concrete wash water.
G. Required and removed non-reusable non-biodegradable BMP material.

B.) Instructions provided for proper recycling/disposal of materials provided.

Response: See information listed below for typical recycling options and/or proper disposal methods. Instructions for proper recycling/disposal of materials are also located on plan sheet C708.

MAINTENANCE PROGRAM FOR THE CONTROL FACILITIES - METHOD OF DISPOSAL

The silt sock and weighted sediment filter tube will be cleaned when silt is accumulated to a depth of half the height of the barrier. This debris will be disposed of off the site at an approved land fill or mixed with other soils on the site or spread to dry in an area protected with filter sock and then seeded per permanent seeding specifications when dry.

METHODS, FREQUENCY AND ULTIMATE DISPOSAL SITE

The accumulation of debris in the control facility will be continually **monitored weekly and after each runoff event unless otherwise required.** The developer shall be responsible for the monitoring and maintenance of all E&S measures. All solid waste will be disposed of at the developers approved disposal area. There will not be any burying of trees, stumps, brush, etc. permitted on the site. This material must be trucked from the site and disposed

of at a DEP approved landfill site. All accumulated debris may be removed from the site. The facilities will be monitored and maintained to prevent the compromise of their designed operation and adequate performance. **A log, DEP form 3150-FM-BWEW0083 dated 02/2012, showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection**.
Any repair, removal or conversion of BMPs during required maintenance which causes damage to design dimensions will be corrected by replacement, regrading, restabilization, etc. immediately. Final site removal or conversion is to be completed during the germinating season.

MEASURES FOR THE RECYCLING OR DISPOSAL OF MATERIALS FOR THE PROJECT SITE.

A. Recycling or reuse of wastes materials where feasible is required.
   - Silt will be disposed of by being mixed with other soils on the site or spread to dry in an area protected with filter sock and then seeded per permanent seeding specifications when dry. Compost from the filter sock can be used as a soil supplement.
   - Brush, trees and other cleared vegetation can be chipped and mulched.
   - Clean masonry and rocks can be used in fill.
   - Metal, plastic, glass and cardboard may be recycled.
   - Excess construction material can be donated to nonprofits.

B. If wastes are to be disposed of off-site, the disposal facility must be a DEP permitted site.
C. During site construction there is to be a portable sanitary facility to be supplied by the contractor. An experienced contractor is to dispose of this waste following appropriate rules and regulations concerning this type of waste.
D. Concrete wash water will be discharged into clearly marked washout facilities. Maintenance of the washout and disposal of the waste is to be handled by an experienced contractor following the appropriate rules and regulations.
E. Replaced or removed non-reusable non-biodegradable materials from BMPs are to be disposed of as per manufacturer's recommendations in a DEP permitted site.

MEASURES FOR THE REDUCING OTHER POTENTIAL POLLUTION SOURCES FOR THE PROJECT SITE.

A. Thermal impacts are minimized through infiltration and by detaining the 2-yr, 24hr storm to dewater over a period of greater than 24 hours.
B. There are no naturally occurring geologic formations or soils on site that will cause excessive erosion. No soils have been identified with high erodibility on site. BMP's used to counter erosion are listed in detail in this narrative.
C. The following Non-discharge alternatives utilized in the E&S plan include but are not limited to:
   a. Limiting Disturbed Areas
   b. Limiting extent and duration of the disturbance
D. The follwing ABACT BMP's utilized in the E&S plan include but are not limited to:
   1. Rock Construction Access with wash rack.
   2. Use of compost filter sock.
   3. Blanket disturbed areas within 50 feet of receiving surface water and slopes of 3H:1V or steeper.
   4. Sediment Trap dewatering zone dewaters in no less than 4 days and no more than 7 days.
   5. Upon completion or temporary cessation of the earth disturbance activity or at any stage thereof, the project shall be immediately stabilized.
   6. Channels are lined with permanent vegetation and rock.
   7. Channels are designed to carry 100 yr. storm.
   8. Suitable protective lining proposed for all channels.

2.4 GEOLOGIC FORMATIONS/SOIL CONDITIONS THAT MAY HAVE THE POTENTIAL TO CAUSE POLLUTION 102.4(b)(5)(xii)

A.) Geologic/soil conditions addressed.

Response: No known geologic conditions exist on site which will cause excessive erosion. The site is an urban area with past and existing land use as an industrial steel plant. Metals and PH are elevated on site.

B.) Where potential for pollution identified, measures provided to avoid/minimize/or mitigate.

Response: These conditions are being mitigated through the use of an impermeable PVC liner for all stormwater storage BMP's to reduce potential contamination of groundwater and discharge contained on-site through the use of a level spreader to reduce potential impacts to surface waters.

2.5 POTENTIAL THERMAL IMPACTS TO SURFACE WATERS 102.4(b)(5)(xiii)

A.) Potential for thermal impacts addressed.

Response: Potential thermal impacts are minimized by limiting the disturbed area as much as practical for the safe and efficient development of the site. Potential thermal impacts are mitigated as both the volume and rate of runoff on site is reduced due to the proposed storm water facilities; including a wet pond, level spreader vegetated filter strip. The use of a level spreader to return discharge to sheet flow on site disconnects stormwater outflows from the streams reducing the potential for thermal impact. In addition, the use of vegetated filter strips to treat the water from impervious areas slows down runoff and helps to reduce the potential for thermal impact.

B.) Where potential for impacts exists, measures provided to avoid/minimize/or mitigate.

Response: Measures provided to avoid/minimize/or mitigate potential for impacts are located on plan sheet C705.

2.6 E&S PLAN DESIGNED AND IMPLEMENTED TO BE CONSISTENT WITH PCSM PLAN 102.4(b)(5)(xiv)

A.) Proposed structural PCSM BMPs shown on the E&S plan map(s).

Response: Proposed structural PCSM BMPs are located on plan sheet C705.

B.) Existing/proposed riparian buffers outside limits of disturbance.

Response: There are no riparian buffers proposed outside the limit of disturbance.

C.) Proposed infiltration BMPs outside proposed grading areas.

Response: There are no proposed infiltration BMPs outside the proposed grading areas.

2.7 EXISTING/PROPOSED RIPARIAN FOREST BUFFERS 102.4(b)(5)(xv)

A.) Existing/proposed riparian forest buffers shown on plan map(s).

Response: There are no proposed riparian forest buffers for this project.

B.) Existing/proposed riparian forest buffers outside the limit of disturbance.

Response: There are no proposed riparian forest buffers outside the limit of disturbance.

C.) Protection provided for wetlands within riparian forest buffer.

Response: There are no proposed riparian forest buffers for this project.

D.) Riparian buffer offset shown, if necessary.

Response: There are no proposed riparian forest buffers for this project.

2.8 ANTIDEGRADATION ANALYSIS

A.) Equivalency demonstration for alternative BMPs to a riparian buffer or riparian forest buffer.

Response: There are no proposed riparian buffers or riparian forest buffers for this project.

B.) Evaluation of nondischarge alternatives, including demonstration that a nondischarge alternative does not exist for both E&S and PCSM.

Response: See the antidegradation analysis attached to the NOI for nondischarge BMPs utilized at the site.

C.) ABACT included where a nondischarge alternative does not exist for both E&S and PCSM.

Response: As noted in Part D of *MEASURES FOR THE REDUCING OTHER POTENTIAL POLLUTION SOURCES FOR THE PROJECT SITE*, as listed above. ABACT BMPs are utilized to control discharge from the site.

D.) Nondischarge and ABACT BMPs have been identified for both E&S and PCSM.

Response: As outlined in the E&S and PCSM narratives, nondischarge and ABACT BMPs have been used to manage runoff from the site.

ACCD EROSION & SEDIMENT CONTROL PLAN STANDARD NOTES

1. All earth disturbances, including clearing and grubbing as well as cuts and fills shall be done in accordance with the approved E&S plan. A copy of the approved drawings (stamped, signed and dated by the reviewing agency) must be available at the project site at all times. The reviewing agency shall be notified of any changes to the approved plan prior to implementation of those changes. The reviewing agency may require a written submittal of those changes for review and approval at its discretion.
2. At least 7 days prior to starting any earth disturbance activities, including clearing and grubbing, the owner and/or operator shall invite all contractors, the landowner, appropriate municipal officials, the E&S plan preparer, the PCSM plan preparer, the licensed professional responsible for oversight of critical stages of implementation of the PCSM plan, and a representative from the local conservation district to an on-site preconstruction meeting.
3. At least 3 days prior to starting any earth disturbance activities, or expanding into an area previously unmarked, the Pennsylvania One Call System Inc. shall be notified at 1-800-242-1776 for the location of existing underground utilities.
4. All earth disturbance activities shall proceed in accordance with the sequence provided on the plan drawings. Deviation from that sequence must be approved in writing from the local conservation district or by the Department prior to implementation.
5. Areas to be filled are to be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots and other objectionable material.
6. Clearing, grubbing, and topsoil stripping shall be limited to those areas described in each stage of the construction sequence. General site clearing, grubbing and topsoil stripping may not commence in any stage or phase of the project until the E&S BMPs specified by the BMP sequence for that stage or phase have been installed and are functioning as described in this E&S plan.
7. At no time shall construction vehicles be allowed to enter areas outside the limit of disturbance boundaries shown on the plan maps. These areas must be clearly marked and fenced off before clearing and grubbing operations begin.

8. Topsoil required for the establishment of vegetation shall be stockpiled at the location(s) shown on the plan maps(s) in the amount necessary to complete the finish grading of all exposed areas that are to be stabilized by vegetation. Each stockpile shall be protected in the manner shown on the plan drawings. Stockpile heights shall not exceed 35 feet. Stockpile slopes shall be 2H:1V or flatter.

9. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate best management practices to minimize the potential for erosion and sediment pollution and notify the local conservation district and/or the regional office of the Department.

10. All building materials and wastes shall be removed from the site and recycled or disposed of in accordance with the Department's Solid Waste Management Regulations at 25 Pa. Code 260.1 et seq., 271.1, and 287.1 et. seq. No building materials or wastes or unused building materials shall be burned, buried, dumped, or discharged at the site.

11. All off-site waste and borrow areas must have an E&S plan approved by the Allegheny County Conservation District or the Department fully implemented prior to being activated.

12. The contractor is responsible for ensuring that any material brought on site is clean fill. Form FP-001 must be retained by the property owner for any fill material affected by a spill or release of a regulated substance but qualifying as clean fill due to analytical testing. The contractor is responsible for ensuring that any material brought on site is clean fill. Form FP-001 must be retained by the property owner for any fill material affected by a spill or release of a regulated substance but qualifying as clean fill due to analytical testing. Clean fill includes soil, rock, stone, dredged material, used asphalt and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such. The contractor is responsible for performing environmental due diligence regarding the import of clean fill as defined as: Investigative techniques, including, but not limited to, visual property inspections, electronic database searches, review of ownership and use history of property, Sanborn maps, environmental questionnaires, transaction screens, analytical testing, environmental assessments and audits.

13. All pumping of water from any work area shall be done according to the procedure described in this plan, over undisturbed vegetated areas.

14. Vehicles and equipment may neither enter directly nor exit directly from site onto Braddock Avenue.

15. Until the site is stabilized, all erosion and sediment BMPs shall be maintained properly. Maintenance shall include inspections of all erosion and sediment BMPs after each runoff event and on a weekly basis. All preventative and remedial maintenance work, including clean out, repair, replacement, regrading, reseeding, remulching and renetting must be performed immediately. If the E&S BMPs fail to perform as expected, replacement BMPs, or modifications of those installed will be required.

16. A log, DEP form 3150-FM-BWEW0083 dated 02/2012, showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

17. Sediment tracked onto any public roadway or sidewalk shall be returned to the construction site by the end of each work day and disposed in the manner described in this plan. In no case shall the sediment be washed, shoveled, or swept into any roadside ditch, storm sewer, or surface water.

18. All sediment removed from BMPs shall be disposed of in the manner described on the plan drawings.

19. Areas which are to be topsoiled shall be scarified to a minimum depth of 3 to 5 inches - 6 to 12 inches on compacted soils - prior to placement of topsoil. Areas to be vegetated shall have a minimum 4 inches of topsoil in place prior to seeding and mulching. Fill outslopes shall have a minimum of 2 inches of topsoil.

20. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence or other related problems. Fill intended to support buildings, structures and conduits, etc. shall be compacted in accordance with local requirements or codes.

21. All earthen fills shall be placed in compacted layers not to exceed 9 inches in thickness.

22. Fill materials shall be free of frozen particles, brush, roots, sod, or other foreign or objectionable materials that would interfere with or prevent construction of satisfactory fills.

23. Frozen materials or soft, mucky, or highly compressible materials shall not be incorporated into fills.

24. Fill shall not be placed on saturated or frozen surfaces.

25. Seeps or springs encountered during construction shall be handled in accordance with the standard and specification for subsurface drain or other approved method.

26. All graded areas shall be permanently stabilized immediately upon reaching finished grade. Cut slopes in competent bedrock and rock fills need not be vegetated. Seeded areas within 50 feet of a surface water, or as otherwise shown on the plan drawings, shall be blanketed according to the standards of this plan.

27. Immediately after earth disturbance activities cease in any area or subarea of the project, the operator shall stabilize all disturbed areas. During non-germinating months, mulch or protective blanketing shall be applied as described in the plan. Areas not at finished grade, which will be reactivated within 1 year, may be stabilized in accordance with the temporary stabilization specifications. Those areas which will not be reactivated within 1 year shall be stabilized in accordance with the permanent stabilization specifications.

28. Permanent stabilization is defined as a minimum uniform, perennial 70% vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated erosion. Cut and fill slopes shall be capable of resisting failure due to slumping, sliding, or other movements.

29. E&S BMPs shall remain functional as such until all areas tributary to them are permanently stabilized or until they are replaced by another BMP approved by the local conservation district or the Department.

30. Upon completion of all earth disturbance activities and permanent stabilization of all disturbed areas, the owner and/or operator shall contact the local conservation district for an inspection prior to removal/conversion of the E&S BMPs.

31. After final site stabilization has been achieved, temporary erosion and sediment BMPs must be removed or converted to permanent post construction stormwater management BMPs. Areas disturbed during removal or conversion of the BMPs shall be stabilized immediately. In order to ensure rapid revegetation of disturbed areas, such removal/conversions are to be done only during the germinating season.

32. Upon completion of all earth disturbance activities and permanent stabilization of all disturbed areas, the owner and/or operator shall contact the local conservation district to schedule a final inspection.

33. Failure to correctly install E&S BMPs, failure to prevent sediment-laden runoff from leaving the construction site, or failure to take immediate corrective action to resolve failure of E&S BMPs may result in administrative, civil, and/or criminal penalties being instituted by the Department as defined in Section 602 of the Pennsylvania Clean Streams Law. The Clean Streams Law provides for up to $10,000 per day in civil penalties, up to $10,000 in summary criminal penalties, and up to $25,000 in misdemeanor criminal penalties for each violation.

34. Concrete wash water shall be handled in the manner described on the plan drawings. In no case shall it be allowed to enter any surface waters or groundwater systems.

35. Erosion control blanketing shall be installed on all slopes 3H: 1V or steeper within 50 feet of a surface water and on all other disturbed areas specified on the plan maps and/or detail sheets.

STANDARD WORKSHEET #21
Temporary and Permanent Stabilization Specifications

PROJECT NAME: ET - Braddock Well Pad
LOCATION: East Pittsburgh Borough, Allegheny County
PREPARED BY: APT DATE
CHECKED BY: MDK DATE:

SPECIFICATIONS: The Department recommends the use of the Penn State publication "Erosion Control & Conservation Plantings on Non-cropland" as the standard to use for the selection of species, seed specifications, mixtures, liming and fertilizing, time of seeding, and seeding methods. Specifications for these items may also be obtained from Penn DOT's Publication # 408, Section 804 or by contacting the applicable county conservation district. Upon selection of a reference, that reference must be used to provide all specifications for seeding, mulching, and soil amendments. The following specification will be used for this project:

(TEMPORARY)	SPECIES:	Annual Rye
	% PURE LIVE SEED:	95 %
	APPLICATION RATE:	40 LB. /ACRE
	FERTILIZER TYPE:	5-10-10 (X-X-X)
	FERTILIZER APPL. RATE:	30 LB. /ACRE
	LIMING RATE:	6 T. /ACRE
	MULCH TYPE:	Straw
	MULCHING RATE:	3 T. /ACRE
(PERMANENT)	SPECIES:	(Kentucky 31) Tall Fescue
	% PURE LIVE SEED:	98 %
	APPLICATION RATE	40 LB. /ACRE
	FERTILIZER TYPE:	5-10-10 (X-X-X)
	FERTILIZER APPL. RATE:	(Per Testing) Minimum 30 LB. /ACRE
	LIMING RATE:	6 T. /ACRE
	MULCH TYPE:	Straw
	MULCHING RATE:	3 T. /ACRE
	ANCHOR MATERIAL:	Nonasphaltic Emulsion
	ANCHORING METHOD:	Spray
	RATE OF ANCHOR MATERIAL APPL.:	100 gallons per acre LB. /ACRE
	SEEDING SEASON DATES:	April-September
(PERMANENT – STEEP SLOPE)	SPECIES:	Crown Vetch
	% PURE LIVE SEED:	99 %
	APPLICATION RATE:	10 LB. /ACRE
	FERTILIZER TYPE:	5-10-10 (X-X-X)
	FERTILIZER APPL. RATE:	(Per Testing) 30 LB. /ACRE
	LIMING RATE:	6 T. /ACRE
	MULCH TYPE:	Straw
	MULCHING RATE:	3 T. /ACRE
	ANCHOR MATERIAL:	Nonasphaltic Emulsion
	ANCHORING METHOD:	Spray
	RATE OF ANCHOR MATERIAL APPL.:	100 gallons per acre LB. /ACRE
	SEEDING SEASON DATES:	April-September

*If more than one species is used, indicate application rate for each species.

Plan Preparer Qualifications

A R M G r o u p I n c .

STANDARD E&S WORKSHEET # 22
PLAN PREPARER RECORD OF TRAINING AND EXPERIENCE IN EROSION AND SEDIMENT POLLUTION CONTROL METHODS AND TECHNIQUES

NAME OF PLAN PREPARER: Tessa M. Antolick, P.E.

FORMAL EDUCATION:

Name of College or Technical Institute: Pennsylvania State University

Curriculum or Program: College of Engineering

Dates of Attendance: **From:** 2000 **To:** 2004

Degree Received B.S. - Civil Engineering; Minor - Environmental Engineering

OTHER TRAINING:

Name of Training: E&S Manual

Presented By: PADEP-Bureau of Waterways Engineering and Wetlands

Date: July 2014

EMPLOYMENT HISTORY:

Current Employer: ARM Group Inc.

Telephone: 724-743-5793

Former Employer: BAI Group Inc. (formerly Blazosky Assoc.)

Telephone: 814-238-2060

RECENT E&S PLANS PREPARED:

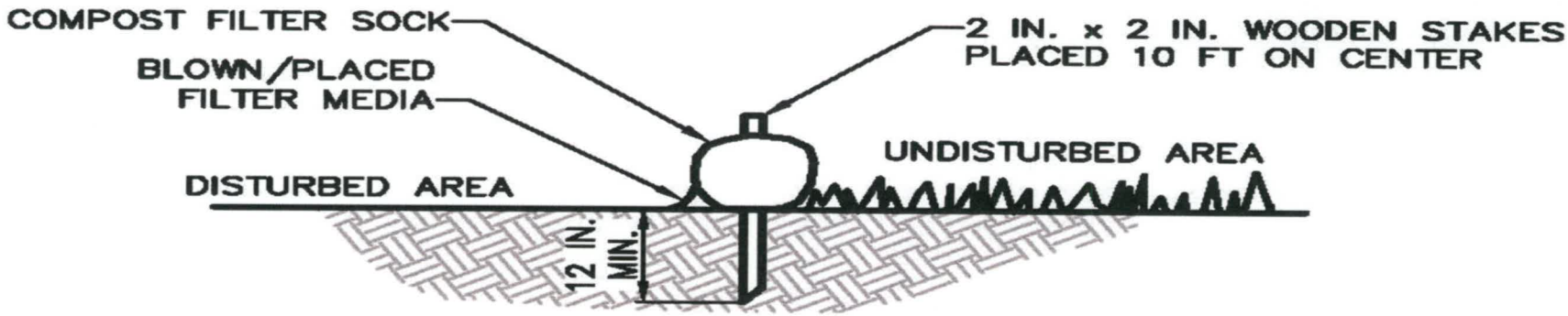
Name of Project:	Tigris Waterline	NV34HS Well Site	Potts to Weitz Pipelines
County:	Butler	Washington	Westmoreland
Municipality:	Allegheny Twp	Morris Township	Salem Township
Permit Number:	ESX17-129-0012	ESX13-125-0013	ESX16-129-0005
Approving Agency:	PADEP	PADEP	PADEP (Major Mod)

Appendix A

Silt Sock

MODIFIED E&S WORKSHEET #1
COMPOST FILTER SOCK

PROJECT NAME:	**MERRION OIL & GAS: ET - BRADDOCK Well Pad**		PROJ:	
	MULTIPLE SLOPE LENGTH CALCULATIONS			
LOCATION:	EAST PITTSBURGH BOROUGH ALLEGHENY COUNTY			
PREPARED BY:	KGJ		DATE:	10/9/2018
CHECKED BY:	MDR		DATE:	10/9/2018



Barrier #	Type	Size	Slope 1 (%)	Slope 1 Length Above Barrier (FT.)	Allowable Slope 1 Length (FT.)	Unused Slope (FT.)	Used %	Unused %	Slope 2 (%)	Slope 2 Length Above Barrier (FT.)	Allowable Slope 2 Length (FT.)	OK?
SS-1	SILT SOCK	12"	6	143	150	7	95.33	4.67	0	0	0.00	Y
SS-2	SILT SOCK	12"	5	120	250	130	48.00	52.00	0	0	0.00	Y
SS-3	SILT SOCK	12"	13	38	100	62	38.00	62.00	0	0	0.00	Y
SS-4	SILT SOCK	12"	11	28	100	72	28.00	72.00	0	0	0.00	Y
SS-5	SILT SOCK	12"	2	200	520	320	38.46	61.54	0	0	0.00	Y
SS-6	SILT SOCK	12"	2	300	520	220	57.69	42.31	0	0	0.00	Y
SS-7	SILT SOCK	12"	2	150	520	370	28.85	71.15	0	0	0.00	Y
SS-8	SILT SOCK	12"	5	25	250	225	10.00	90.00	0	0	0.00	Y
SS-9	SILT SOCK	12"	5	25	250	225	10.00	90.00	0	0	0.00	Y
SS-10	SILT SOCK	12"	5	25	250	225	10.00	90.00	0	0	0.00	Y
SS-11	SILT SOCK	12"	5	25	250	225	10.00	90.00	0	0	0.00	Y
SS-12	SILT SOCK	12"	4	63	250	187	25.20	74.80	0	0	0.00	Y
SS-13	SILT SOCK	12"	5	100	250	150	40.00	60.00	0	0	0.00	Y
SS-14	SILT SOCK	12"	5	27	250	223	10.80	89.20	0	0	0.00	Y
SS-15	SILT SOCK	12"	5	34	250	216	13.60	86.40	0	0	0.00	Y
SS-16	SILT SOCK	12"	5	85	250	165	34.00	66.00	0	0	0.00	Y
SS-17	SILT SOCK	12"	7	67	150	83	44.67	55.33	0	0	0.00	Y

Appendix B

Sediment Trap

WORKSHEET 8
Sediment Trap Data

PROJECT NAME: MERRION OIL & GAS: ET - BRADDOCK WELL PAD
LOCATION: EAST PITTSBURGH BOROUGH
NPDES #: 0

TRAP NUMBER	POND-1				
DRAINAGE AREA (5 ACRES MAX)	5.00				
REQUIRED CAPACITY (2,000 CF/AC)	10000				
*** AVERAGE BOTTOM LENGTH (FT)**	145.0				
*** AVERAGE BOTTOM WIDTH (FT)**	40.0				
2:1 FLOW LENGTH TO WIDTH RATIO?	**YES**				
BOTTOM ELEVATION	741.0				
TOP OF EMBANKMENT ELEVATION	745.0				
CREST OF SPILLWAY ELEVATION	743.0				
STORAGE CAPACITY (CF)	41,449				
SUFFICIENT STORAGE PROVIDED?	**YES**				
CLEAN-OUT ELEVATION (@ 700 CF/AC)	742.0				
SEDIMENT STORAGE (CF)	6,572				
SUFFICIENT SEDIMENT STORAGE?	**YES**				
FLOW LENGTH/WIDTH RATIO (2:1 MIN)	2.58				

EMBANKMENT SPILLWAYS

OUTLET WIDTH (FT)	N/A				
GREATER OF 2 X # AC OR 2 X h	N/A				
SUFFICIENT OUTLET WIDTH PROVIDED?	**N/A**				
OUTLET SIDE SLOPES (2:1 MIN)	N/A				

RISER PIPE SPILLWAYS

Dr (RISER DIAMETER, 8" MIN)	24 x 48				
Db (BARREL DIAMETER, 6" MIN)	21.0				
BARREL OUTLET ELEVATION	740.5				
MAX WATER SURFACE ELEVATION	743.5				
DISCHARGE CAPACITY (CFS)	**13.2**				
1.5 CFS/AC DISCHARGE PROVIDED?	**YES**				

OUTLET BASIN

LENGTH (6 Db)	10.5				
WIDTH (3Db)	5.3				
MINIMUM RIPRAP PROTECTION (SIZE)	R-3				
FULL FLOW OUTLET VELOCITY (FPS)	5.5				

*** For Irregular shaped traps, provide stage storage data (Worksheet 14)**

WORKSHEET #14

Sediment Trap Storage Data

PROJECT NAME:	MERRION OIL & GAS: ET - BRADDOCK WELL PAD
LOCATION:	EAST PITTSBURGH BOROUGH
NPDES#:	0
TRAP NO.	POND-1

WATER SURFACE ELEVATION	AREA (SQ. FT.)	AVERAGE AREA (SQ. FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME	
				INCREMENTAL	TOTAL
741	17,366				0
		19,024	1.0	19,024	
742	20,681				19,024
		22,426	1.0	22,426	
743	24,170				41,449
		25,999	1.0	25,999	
744	27,827				67,448
		29,730	1.0	29,730	
745	31,633				97,178

Appendix C

Spillway

Merrion Oil & Gas: ET - Braddock Well Pad
EMERGENCY SPILLWAY DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft²	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft) Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Pond 1 Emergency Spillway	6.3	0.330	R-4 riprap	0.064	25.0	2	0.092	2.307	25.41	0.091	2.71	9.00	1.89	2.00	6.2	0.131	Stable	0.59	25.0	1.00	2	29.0	445.73
Voids	6.3	0.330	R-4 riprap	0.064	25.0	2	0.004	0.100	25.02	0.004	0.34	9.00	0.08	2.00	0.0	0.371	Unstable	0.50	25.0	1.00	2	29.0	445.73

Channel Void Space Calculation [8,9]

Channel I.D.	Peak Discharge cfs	Void Space %	Lining Type	Nominal Thickness ft	Base Width ft	Total Stone Area ft²	Void Space ft²	Excess Flow Area ft²
Pond 1 Emergency Spillway	6.3	0.40	R-4 riprap	1.5	25.0	37.5	15.00	0.100

Notes:

1 Lining: Appropriate channel lining is chosen based on velocity and shear stress considerations.
2 Manning's roughness coefficient (n-value) for channel linings are based on the PA DEP Erosion and Sediment Pollution Control Manual, March 31, 2012, and Manufacturers specifications.
3 Design criteria is based on tables within the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012, and Manufacturers specifications.
4 Critical slope is calculated to determine the stability of each channel following the procedures on Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012.
Critical slope = $S_c = 14.56\, n^2 D_m / R^{4/3}$
where: n = Manning's n
D_m = mean depth of flow (ft)
R = hydraulic radius (ft)
5 Channels are checked for stable vs. unstable conditions in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. Unstable flow occurs when $0.7S_c$ **≤ Channel Slope ≤** $1.3S_c$.
6 Minimum channel depth is the sum of the flow depth and the minimum required freeboard. The minimum required freeboard is calculated in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. The required freeboard calculation is based on the stability of the channel.
For unstable flow conditions:
F = (0.025*V)*(3*D)
where: F = minimum freeboard (ft)
V = velocity (fps)
D = flow depth (ft)
For stable flow conditions, the minimum freeboard should be 25% of the flow depth or a minimum of 6 inches, whichever is greater.
7 Channel depths are rounded up to the nearest 0.25 foot increment for construction purposes.
8 The void space in the channel bottom can be accounted for per recommendations in the Pennsylvania Erosion and Sediment Pollution Control Program Manual to reduce the calculated shear stress for the channel.
The separate Channels Void Space Calculation, determines the void space for of the stone on the channels bottom. The sides of the channel are ignored and only the base width is used in determining this area.
The nominal thickness is adjusted based of the type of rock or the thickness of the gabion or reno mattress. The void space area is found by multiplying the total stone area by the void space, assuming 33% void space for slopes< 10 % and 40% for slopes ≥ 10%.
The excess flow area is the void space area subtracted from the channels cross sectional flow area found initially for the full depth needed to handle the required peak discharge. (If this would result in a flow area less than 0.1 ft2, 0.1 ft2 is assumed.)
On the line labeled **"With Void"**, the new reduced excess flow area is used to determine the new depth of flow over the top of the stone. From the reduced depth the channels final velocity, shear stress and channel dimensions are determined.
9 Peak discharge based on routing of 100 year storm with the primary outlet plugged.

Sources for Design Inputs

Lining	Max Velocity	Max Shear Stress	Mannings n
Vegitation	Table 6.4	Table 6.2	Equation on pg. 129
Riprap	Table 6.6	Table 6.2	Figure 6.2
Gabion	Table 6.10	Table 6.10	Table 6.10
ECM	Manufacturer's Specifications	Manufacturer's Specifications	Manufacturer's Specifications

Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 3.92" for 100-yr event				
Inflow =	29.27 cfs @	12.00 hrs,	Volume=	1.643 af	
Outflow =	6.25 cfs @	12.22 hrs,	Volume=	0.829 af,	Atten= 79%, Lag= 12.8 min
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	6.25 cfs @	12.22 hrs,	Volume=	0.829 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.71' @ 12.22 hrs Surf.Area= 0 sf Storage= 59,794 cf (40,770 cf above start)

Plug-Flow detention time= 474.6 min calculated for 0.392 af (24% of inflow)
Center-of-Mass det. time= 137.4 min (924.3 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert X 0.00** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=6.23 cfs @ 12.22 hrs HW=743.71' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 6.23 cfs @ 1.21 fps)

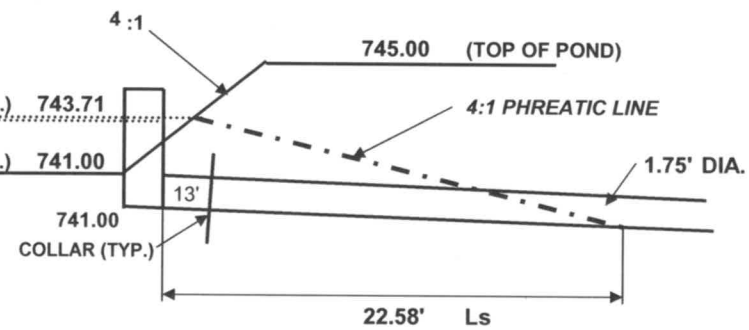
Appendix D

Anti-Seep Collar

MERRION O&G: ET - BRADDOCK WELL PAD

EAST PITTSBURGH BOROUGH, ALLEGHENY COUNTY

ANTI-SEEP COLLAR DESIGN - POND 1



(DRAWING NOT TO SCALE)

UPSTREAM PIPE INV.:	741.00
POND INV.:	741.00
TOP OF POND:	745.00
DESIGN HIGH WATER EL.:	743.71
Ls (see below)	22.58'
EMBANKMENT SLOPE:	4 :1
OUTLET PIPE DIA.:	1.75'

INCREASE SEEPLINE 15% x Ls (L):	3.39'			
COLLAR HEIGHT :	5.75'	COLLAR WIDTH:	5.75'	
PIPE DIA :	1.75'			
VERTICAL PROJECTION (V):	2.88'	OR	2.00'	ABOVE & BELOW PIPE
NUMBER OF ANTI-SEEP COLLARS REQUIRED : L/(2 x P):	1			
MAX. SPACING OF COLLARS = 14 x V:	40.25'			

Length of pipe in saturated zone

Ls = y(z + 4)[1 + pipe slope(ft/ft)/0.25 - pipe slope] = **22.58'**

Slope	**1.00%**	- Pipe slope
y:	**2.71'**	- Distance from upstream invert of principal spillway invert to high water elevation
z (z:1)	**4**	- Horizontal component of upstream embankment slope (ft.)

Appendix E

Channels

Channel Drainage Area Summary Table

Channel	Drainage Area (acres)
PC-1A	1.77
PC-1B	1.24
PC-1C	1.24
PC-2	0.77
PC-3	2.22
Diversion Berm	2.19

Merrion Oil & Gas: ET - Braddock Well Pad
CHANNEL DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft) Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Channel PC-1A	4.9	0.010	NAG S150	0.049	2.0	2	0.747	2.609	5.34	0.489	1.87	6.00	0.47	1.75	4.9	0.048	Stable	1.25	2.0	1.25	2	7.0	18.01
Channel PC-1A (Vegetated)	4.9	0.010	Vegitative, C Retardence	0.071	2.0	2	0.898	3.408	6.02	0.567	1.43	4.00	0.56	1.00	4.9	0.096	Stable	1.40	2.0	1.50	2	8.0	16.74

Notes:

1 Lining: Appropriate channel lining is chosen based on velocity and shear stress considerations.
2 Manning's roughness coefficient (n-value) for channel linings are based on the PA DEP Erosion and Sediment Pollution Control Manual, March 31, 2012, and Manufacturers specifications.
3 Design criteria is based on tables within the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012, and Manufacturers specifications.
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Critical slope = $S_c = 14.56\, n^2 D_m / R^{4/3}$

where: n = Manning's n
D_m = mean depth of flow (ft)
R = hydraulic radius (ft)

5 Channels are checked for stable vs. unstable conditions in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. Unstable flow occurs when $0.7S_c \leq$ Channel Slope $\leq 1.3S_c$.
6 Minimum channel depth is the sum of the flow depth and the minimum required freeboard. The minimum required freeboard is calculated in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. The required freeboard calculation is based on the stability of the channel.

For unstable flow conditions:

F = (0.025*V)*(3*D)

where: F = minimum freeboard (ft)
V = velocity (fps)
D = flow depth (ft)

For stable flow conditions, the minimum freeboard should be 25% of the flow depth or a minimum of 6 inches, whichever is greater.
7 Channel depths are rounded up to the nearest 0.25 foot increment for construction purposes.
8 Peak discharge based on 2.75 cfs/acre for permanent channel design per DEP guidence.

Sources for Design Inputs			
Lining	**Max Velocity**	**Max Shear Stress**	**Mannings n**
Vegitation	Table 6.4	Table 6.2	Equation on pg. 129
Riprap	Table 6.6	Table 6.2	Figure 6.2
Gabion	Table 6.10	Table 6.10	Table 6.10
ECM	Manufacturer's Specifications	Manufacturer's Specifications	Manufacturer's Specifications

Merrion Oil & Gas: ET - Braddock Well Pad
CHANNEL DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft): Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Channel PC-1B	3.4	0.020	Concrete	0.015	1.0	0	0.584	0.584	2.17	0.269	5.84	Unlim.	0.73	Unlim.	3.4	0.011	Stable	1.08	1.0	1.25	0	1.0	8.82

Notes:

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For stable flow conditions, the minimum freeboard should be 25% of the flow depth or a minimum of 6 inches, whichever is greater.
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Merrion Oil & Gas: ET - Braddock Well Pad
CHANNEL DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft) Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Channel PC-1C	3.4	0.010	NAG S150	0.052	2.0	2	0.638	2.089	4.85	0.430	1.63	6.00	0.40	1.75	3.4	0.055	Stable	1.14	2.0	1.25	2	7.0	18.01
Channel PC-1C (Vegetated)	3.4	0.010	Vegitative, C Retardence	0.071	2.0	2	0.898	3.408	6.02	0.567	1.43	4.00	0.56	1.00	4.9	0.096	Stable	1.40	2.0	1.50	2	8.0	16.74

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where: n = Manning's n
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where: F = minimum freeboard (ft)
V = velocity (fps)
D = flow depth (ft)

For stable flow conditions, the minimum freeboard should be 25% of the flow depth or a minimum of 6 inches, whichever is greater.
7 Channel depths are rounded up to the nearest 0.25 foot increment for construction purposes.
8 Peak discharge based on 2.75 cfs/acre for permanent channel design per DEP guidence.

Sources for Design Inputs			
Lining	**Max Velocity**	**Max Shear Stress**	**Mannings n**
Vegitation	Table 6.4	Table 6.2	Equation on pg. 129
Riprap	Table 6.6	Table 6.2	Figure 6.2
Gabion	Table 6.10	Table 6.10	Table 6.10
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Merrion Oil & Gas: ET - Braddock Well Pad
CHANNEL DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft) Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Channel PC-2	2.1	0.010	NAG S150	0.055	2.0	2	0.510	1.541	4.28	0.360	1.37	6.00	0.32	1.75	2.1	0.065	Stable	1.01	2.0	1.25	2	7.0	18.01
Channel PC-2 (Vegetated)	2.1	0.010	Vegitative, C Retardence	0.071	2.0	2	0.898	3.408	6.02	0.567	1.43	4.00	0.56	1.00	4.9	0.096	Stable	1.40	2.0	1.50	2	8.0	16.74

Notes:

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3 Design criteria is based on tables within the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012, and Manufacturers specifications.
4 Critical slope is calculated to determine the stability of each channel following the procedures on Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012.

Critical slope = $S_c = 14.56\, n^2 D_m / R^{4/3}$

where: n = Manning's n
D_m = mean depth of flow (ft)
R = hydraulic radius (ft)

5 Channels are checked for stable vs. unstable conditions in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. Unstable flow occurs when $0.7S_c \leq$ Channel Slope $\leq 1.3S_c$.
6 Minimum channel depth is the sum of the flow depth and the minimum required freeboard. The minimum required freeboard is calculated in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. The required freeboard calculation is based on the stability of the channel.

For unstable flow conditions:

F = (0.025*V)*(3*D)

where: F = minimum freeboard (ft)
V = velocity (fps)
D = flow depth (ft)

For stable flow conditions, the minimum freeboard should be 25% of the flow depth or a minimum of 6 inches, whichever is greater.
7 Channel depths are rounded up to the nearest 0.25 foot increment for construction purposes.
8 Peak discharge based on 2.75 cfs/acre for permanent channel design per DEP guidence.

Sources for Design Inputs			
Lining	Max Velocity	Max Shear Stress	Mannings n
Vegitation	Table 6.4	Table 6.2	Equation on pg. 129
Riprap	Table 6.6	Table 6.2	Figure 6.2
Gabion	Table 6.10	Table 6.10	Table 6.10
ECM	Manufacturer's Specifications	Manufacturer's Specifications	Manufacturer's Specifications

Merrion Oil & Gas: ET - Braddock Well Pad
CHANNEL DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft) Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Channel PC-3	6.1	0.010	NAG S150	0.048	2.0	2	0.823	2.999	5.68	0.528	2.04	6.00	0.51	1.75	6.1	0.044	Stable	1.32	2.0	1.50	2	8.0	31.20
Channel PC-3 (Vegetated)	6.1	0.010	Vegitative, C Retardence	0.069	2.0	2	0.989	3.933	6.42	0.612	1.55	4.00	0.62	1.00	6.1	0.088	Stable	1.49	2.0	1.50	2	8.0	16.74

Notes:

1 Lining: Appropriate channel lining is chosen based on velocity and shear stress considerations.
2 Manning's roughness coefficient (n-value) for channel linings are based on the PA DEP Erosion and Sediment Pollution Control Manual, March 31, 2012, and Manufacturers specifications.
3 Design criteria is based on tables within the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012, and Manufacturers specifications.
4 Critical slope is calculated to determine the stability of each channel following the procedures on Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012.

Critical slope = $S_c = 14.56\, n^2 D_m / R^{4/3}$

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5 Channels are checked for stable vs. unstable conditions in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. Unstable flow occurs when $0.7S_c \leq$ Channel Slope $\leq 1.3S_c$.
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Sources for Design Inputs			
Lining	**Max Velocity**	**Max Shear Stress**	**Mannings n**
Vegitation	Table 6.4	Table 6.2	Equation on pg. 129
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Merrion Oil & Gas: ET - Braddock Well Pad
CHANNEL DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft): Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Diversion Berm	6.0	0.002	NAG S150	0.041	2.0	2	1.125	4.784	7.03	0.680	1.26	6.00	0.14	1.75	6.0	0.030	Stable	1.63	2.0	1.75	2	9.0	23.66
Diversion Berm (Vegetated)	6.0	0.002	Vegitative, C Retardence	0.108	2.0	2	1.777	9.873	9.95	0.992	0.61	4.00	0.22	1.00	6.0	0.187	Stable	2.28	2.0	2.50	2	12.0	14.56

Notes:

1 Lining: Appropriate channel lining is chosen based on velocity and shear stress considerations.
2 Manning's roughness coefficient (n-value) for channel linings are based on the PA DEP Erosion and Sediment Pollution Control Manual, March 31, 2012, and Manufacturers specifications.
3 Design criteria is based on tables within the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012, and Manufacturers specifications.
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ECM	Manufacturer's Specifications	Manufacturer's Specifications	Manufacturer's Specifications

Appendix F

Form FP-01

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

FORM FP-001 - CERTIFICATION OF CLEAN FILL

Prior to completing this form and signing this certification, please review the entire Management of Fill policy (#258-2182-773), including the certification requirements. Please note that historic fill, as defined in the Management of Fill policy, may meet the definition of clean fill if the material is limited to uncontaminated soil, rock, stone, dredged material, used asphalt, and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such.

Fill containing a concentration of total PCBs greater than 2 ppm may be subject to regulation under the Toxic Substances Control Act (TSCA), 15 U.S.C. Section 2601 *et seq.*, and 40 C.F.R. Part 761, which is administered and implemented by the USEPA. For all such material, contact the PCB Coordinator for EPA Region 3 by email at R3_PCB_Coor@epa.gov to determine the allowable PCB level for your site and situation prior to transporting the material off the site of origin or accepting the material for use.

Instructions: Sections 1 and 2 of this form must be completed by the person making the determination of clean fill at the site of origin. Section 3 must be completed by the person using the material as clean fill. Both the person determining clean fill and the user of the clean fill are responsible for maintaining copies of this completed form on site for a period of five (5) years for Department inspection.

Section 1: Person Determining Clean Fill

Name (Print): _____ Title: _____ Date: _____

Company Name: Lincoln Way Supply_____

Street Address: 2704 Lincoln Way_____ City: White Oak_____ State: PA___ Zip Code: 15131____

Telephone Number: _____ E-mail Address: _____

Clean Fill Material originated on the following property:

Site Name: _____

Street Address: _____ City: _____ State: _____ Zip Code: _____

Section 2: Site Characterization

Check the following that applies:

☐ **A. IF the site of origin for the fill material has undergone or is undergoing cleanup or remediation pursuant to a local state or federal regulatory program that requires site characterization, provide the following information along with a copy of the entire site characterization and laboratory analysis for the material to be used as clean fill.**

Name of local, state, or federal agency: _____

Identification number assigned to the project: _____

Name of the local, state, or federal contact person: _____

Telephone Number: _____ E-mail Address: _____

Name of the Laboratory that conducted the analysis: _____

Laboratory Accreditation Number: _____

☐ **B. IF the material proposed to be used as clean fill has otherwise been subject to analytical testing or other procedure identified in the definition of "environmental due diligence" contained in the Management of Fill policy, provide or attach the following:**

Copies of **ALL** lab analytical testing performed as part of environmental due diligence (see Management of Fill policy, #258-2182-773).

Name of the Laboratory that conducted the analysis: _____

Laboratory Accreditation Number: _____

☐ **C. IF the proposed material to be used as clean fill was subject to environmental due diligence procedures as defined in the Management of Fill policy other than those listed in A and B, describe those procedures.**

_____

_____

I, the undersigned, certify under penalty of law (18 Pa. C.S.A. §4904) that the information provided in Sections 1 and 2 of this form is true and correct to the best of my knowledge, information and belief.

Signature: _____

Section 3: Person Receiving or Placing Clean Fill

Name and address of person completing this form:

Name (Print): Ryan Davis_____ Date: 10/22/18_____

Mailing Address: 610 Reilly Ave._____ City: Farmington_____ State: NM___ Zip Code: 87401___

Telephone Number: 505-215-3292_____ E-mail Address: rdavis@merrion.bz_____

Fill material that has been determined to be clean fill will be placed on the following property solely for property improvement or construction purposes:

Property Address: 573 Braddock Ave._____ City: East Pittsburgh_ State: PA____ Zip Code: 15112-1224_

Current Owner of Property: US Steel (Contact: Coleen Davis)_____

Telephone Number: 412-273-4730 _____ E-mail Address: cdavis@uss.com_____

The quantity of clean fill to be placed on the property is:

☒ <3,000 cubic yards ☐ 3,000 cubic yards to 20,000 cubic yards ☐ >20,000 cubic yards

I, the undersigned, certify under penalty of law (18 Pa. C.S.A. §4904) that the information provided is true and correct to the best of my knowledge, information and belief.

Signature: _____

* * * * *

Prior to placement of the clean fill, the owner of the property receiving fill material shall provide a copy of this completed form and attachments to the DEP Regional Office serving the county in which the receiving site is located. If a property receives fill from multiple sources, a separate Form FP-001 is required for each source.

Appendix G

Soils Handling Plan

SOILS HANDLING PLAN

The purpose of this plan is to outline the appropriate procedures for handling earthen materials, and water that has come into contact with those materials, during site construction activities. The existing earthen material present at the site is a mixture of disturbed urban soils and slag produced from the steel mill. For the purposes of this report all onsite earthen material shall be referred to as "soil".

1.1. SOIL EXCAVATION AND UTILITY TRENCHING

A pre-excavation meeting shall be held to address proper operating procedures for working on-site and managing excavations and utility trenching in potentially contaminated material. This meeting shall include the construction manager and the Engineer or Engineer's Representative (Engineer) providing oversight on the project. During the meeting, the construction manager and the Engineer shall review the proposed excavation and trenching locations and any associated utility inverts. The construction manager will be responsible for conveying all relevant information regarding excavation/grading and/or utility work to the site workers who will be involved with these activities. Elevated levels of metals were identified in the site soils during the geotechnical investigation of the site.

The Engineer will provide oversight of soil excavation/trenching activities as described in Section 1.3. Soil excavation/trenching will occur during various phases of construction. In general, and based on the existing sampling information, all excavated materials are expected to be suitable for reuse on the site.

To the extent practical, all excavation activities should be conducted in a manner to minimize double or extra handling of materials. Any stockpiles shall be kept within the Site footprint, and in a location that is not subjected to concentrated stormwater runoff. Stockpiles shall be managed as necessary to prevent the erosion and off-site migration of stockpiled materials, and in accordance with the applicable provisions of the PaDEP Erosion and Sediment Pollution Control Manual.

All utility trenches will be backfilled with onsite material or imported clean fill. Measures shall be taken (including the use of compost filter socks) to ensure that sediment from utility trenches does not flow to surface waters.

Excavated materials not intended for reuse on site shall be transported to an appropriate permitted disposal facility.

1.2. WATER MANAGEMENT

This plan presents the protocols for handling any groundwater or surface water that needs to be removed to facilitate construction. While it is not anticipated that a significant volume of groundwater will be encountered during the proposed development, dewatering may be necessary during the installation of underground utilities (within trenches/excavations). If dewatering is required, it shall be done in accordance with all local, state, and federal regulations.

Water that collects in excavations/trenches due to intrusion of groundwater, stormwater, and/or dust control waters will be pumped to the proposed sediment trap forebay or an alternative location approved by the Engineer to prevent the discharge of sediment laden water to surface waters.

The Engineer will inspect any water that collects in the excavations/trenches. If the water exhibits indications of significant contamination (sheen, odor, discoloration, presence of product), the water may be sampled and analyzed. The analyses run will be dependent on the suspected source of contamination and local site conditions. The results of the analyses will be reviewed by the Engineer to determine if alternate disposal of the water at an appropriate off-site facility is necessary.

1.3. CONSTRUCTION OVERSIGHT

Construction oversight by the Engineer, or approved representative, will ensure and document that the project is built as designed and appropriate environmental and safety protocols are followed.

The Engineer will monitor all soil excavation and utility trenching activities for signs of potential contamination that may not have been previously identified. In particular, soils will be visually inspected for the presence of staining, petroleum waste materials, or other indications of significant contamination. If screening of excavated materials by the Engineer indicates the presence of conditions of potential concern such materials shall be segregated for additional sampling and special management (as described in Section 1.1; Soil Excavation and Utility Trenching). The EP will also inspect any water that collects in the excavations/trenches on an as-needed basis to coordinate appropriate sampling prior to disposal (as described in Section 1.2; Dewatering).

Records shall be provided by the Engineer to document:

- Daily records of work completed.
- Documentation of any testing or offsite disposal.

Appendix H

Drawings

ET - BRADDOCK WELL PAD
SOIL EROSION AND SEDIMENT POLLUTION CONTROL PLAN
PERMIT NO. PAD0200114

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

MAY 2018
OCTOBER 2018

PERMITTEE:

MERRION OIL & GAS
CONTACT: RYAN DAVIS
610 REILLY AVENUE
FARMINGTON, NM 87401
(505) 402-5998

PENNSYLVANIA ONE CALL SYSTEM
PA. ACT 287 OF 1974 AS AMENDED BY ACT 121 OF 2008
REQUIRES THREE WORKING DAYS NOTICE

SERIAL # 20171993045

DURING DESIGN, TRANT CORPORATION PERFORMED A PA ONE CALL INQUIRY FOR THE PROPOSED PROJECT AREA. ALL UNDERGROUND UTILITY OWNERS THAT RESPONDED TO THE PA ONE CALL HAVE BEEN CONTACTED AND THEIR REPORTED UTILITIES ADDED TO PLANS BASED ON INFORMATION PROVIDED BY THE UTILITY. HOWEVER, IN VIOLATION OF LAWS OF THE COMMONWEALTH OF PENNSYLVANIA, NOT ALL UNDERGROUND UTILITY OWNERS ARE REGISTERED WITH THE PA ONE CALL SYSTEM. NEITHER THE PERMIT OPERATOR, ARM GROUP INC., NOR THE PROFESSIONAL ENGINEER SIGNING THESE PLANS CERTIFIES THAT THE FOLLOWING DEPICTS UNDERGROUND UTILITIES OWNED BY THOSE NOT REGISTERED WITH THE PA ONE CALL SYSTEM.

GENERAL UTILITY & ACT 187 INFORMATION

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

2. CONTRACTOR SHALL NOTIFY THE PA ONE CALL SYSTEM NOT LESS THAN THREE (3) DAYS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL PLACE THE CALL AND REFERENCE. THE SERIAL NUMBER GIVEN, AND PROVIDE AN APPROXIMATE DATE AND TIME THAT DIGGING WILL OCCUR. THE ONE CALL SYSTEM WILL AGAIN NOTIFY THE PUBLIC UTILITIES IN THE AREA. PUBLIC UTILITIES WILL THEN COORDINATE DIRECTLY WITH THE CONTRACTOR FOR ACTUAL FIELD LOCATIONS.

ELECTRIC:
DUQUENSE LIGHT COMPANY
2645 NEW BEAVER AVE.
PITTSBURGH, PA 15233
ATTN: JOHN ANDZELIK
EMAIL: JANDZELIK@DUQLIGHT.COM

TELEPHONE:
VERIZON PENNSYLVANIA LLC
15 E MONTEGOMERY AVE.
PITTSBURGH, PA 15212
ATTN: OFFICE PERSONNEL

CABLE:
CENTURYLINK FORMERLY EMBARQ
700 W MINERAL AVE.
GRID NO: UT00-D27.34
LITTLETON, CO 80120
ATTN: GEORGE MCELVAIN
EMAIL: GEORGE.MCELVAIN@CENTURYLINK.COM

COMCAST CABLEVISION
2300 ELDO ROAD
MONROEVILLE, PA 15146
ATTN: KEVIN MYERS
EMAIL: KEVIN_MYERS@CABLE.COMCAST.COM

WATER:
WILKINSBURG PENN JT WATER AUTHORITY
2200 ROBINSON BLVD.
WILKINSBURG, PA 15221
ATTN: TOM SORCE
EMAIL: TSORCE@WPJWA.COM

PUBLIC SEWER:
ALLEGHENY COUNTY SANITARY AUTHORITY
3300 PREBLE AVE. PITTSBURGH, PA 15233
ATTN: KEN BABIN

GAS:
PEOPLES NATURAL GAS
261 CENTER ST.
MCKEESPORT, PA 15132
ATTN: DON ZOMBEK
EMAIL: DON.ZOMBEK@PEOPLES-GAS.COM

BOROUGH:
EAST PITTSBURGH BOROUGH
813 LINDEN AVE.
EAST PITTSBURGH, PA 15112
ATTN: LORI FRUNCEK
EMAIL: EPPDCHEIF@EASTPITTSBURGHBORO.COM

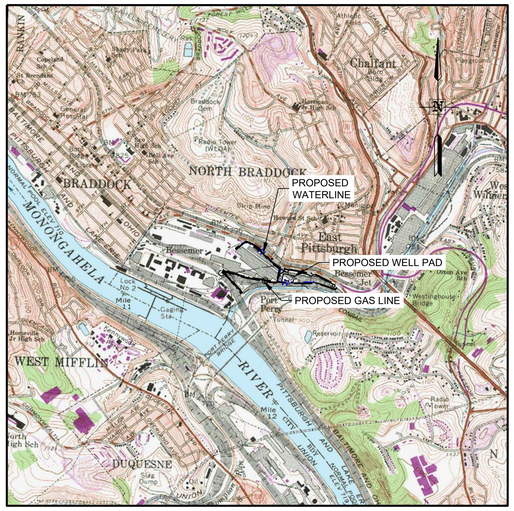
LIST OF SHEETS

SHEET NO.	DESCRIPTION
C701	EXISTING CONDITIONS OVERLAY MAP
C702	EXISTING CONDITIONS & SOILS PLAN
C703A	E&S EXISTING CONDITIONS AND LIMIT OF DISTURBANCE PLAN
C703B	E&S EXISTING CONDITIONS AND LIMIT OF DISTURBANCE PLAN
C704A	E&S GRADING AND DRAINAGE PLAN
C704B	E&S GRADING AND DRAINAGE PLAN
C705A	E&S CONTROL PLAN
C705B	E&S CONTROL PLAN
C705C	E&S CONTROL PLAN
C706	E&S CONSTRUCTION DETAILS
C707	E&S CONSTRUCTION DETAILS
C708	E&S CONSTRUCTION DETAILS
C709	CONSTRUCTION DETAILS
C710	CONSTRUCTION DETAILS

LEGEND

NOTE: LEGEND IS TYPICAL, NOT ALL OBJECTS IN LEGEND APPEAR IN PLAN.

- 1550 — EXISTING CONTOURS
- FEMA FLOODPLAIN
- 50' FLOODWAY
- FEMA FLOODWAY
- EXISTING MAPPED WATERCOURSE
- EXISTING STRUCTURE
- EXISTING VEGETATION
- EXISTING PROPERTY LINE
- EXISTING MUNICIPAL BOUNDARIES
- X — EXISTING FENCE
- OE — EXISTING OVERHEAD ELECTRIC LINE
- EXISTING ELECTRIC POLE
- G — EXISTING GAS LINE
- W — EXISTING WATER LINE
- EXISTING CULVERT
- EXISTING WALL
- EXISTING RAILLINE
- EXISTING SLAG PILE
- WeB — EXISTING SOIL BOUNDARY AND DESCRIPTOR
- 1490 — PROPOSED CONTOURS
- PROPOSED LIMIT OF DISTUBANCE
- PROPOSED CHANNEL
- PROPOSED WATER FEATURES
- PROPOSED WELL PAD
- PROPOSED TEMPORARY TANK
- W — PROPOSED WATERLINE
- G — PROPOSED GASLINE
- PROPOSED SLOPE STABILIZATION
- PROPOSED ROCK CONSTRUCTION ENTRANCE WITH WASH RACK
- PROPOSED ACCESS ROAD
- 12 — PROPOSED 12" FILTER SOCK
- 24 — PROPOSED 24" FILTER SOCK
- PROPOSED CULVERT
- DIV — PROPOSED DIVERSION BERM
- PROPOSED GRAVEL
- PROPOSED INLET



Base map from the following USGS 7½ minute quadrangles: Braddock dated 1960 and photorevised 1979.

LOCATION MAP
SCALE: 1" = 2000'

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

This Drawing shall not be used for tender or construction unless sealed.

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TESSA MICHELE ANTOLICK, PE - 077667

PREPARED BY:

ARM Group Inc.
Engineers and Scientists
www.armgroup.net

2548 Park Center Boulevard • State College, PA 16801
Ph: (814) 272-0455 Fax: (814) 272-0467

HEADQUARTERS:

1129 West Governor Road • Hershey, PA 17033-0797
Ph: (717) 533-8600 Fax: (717) 533-8605

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ARM Group Inc.
Engineers and Scientists
www.armgroup.net

No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

scale: AS NOTED
date: 10/22/2018
project no.: 180539
designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

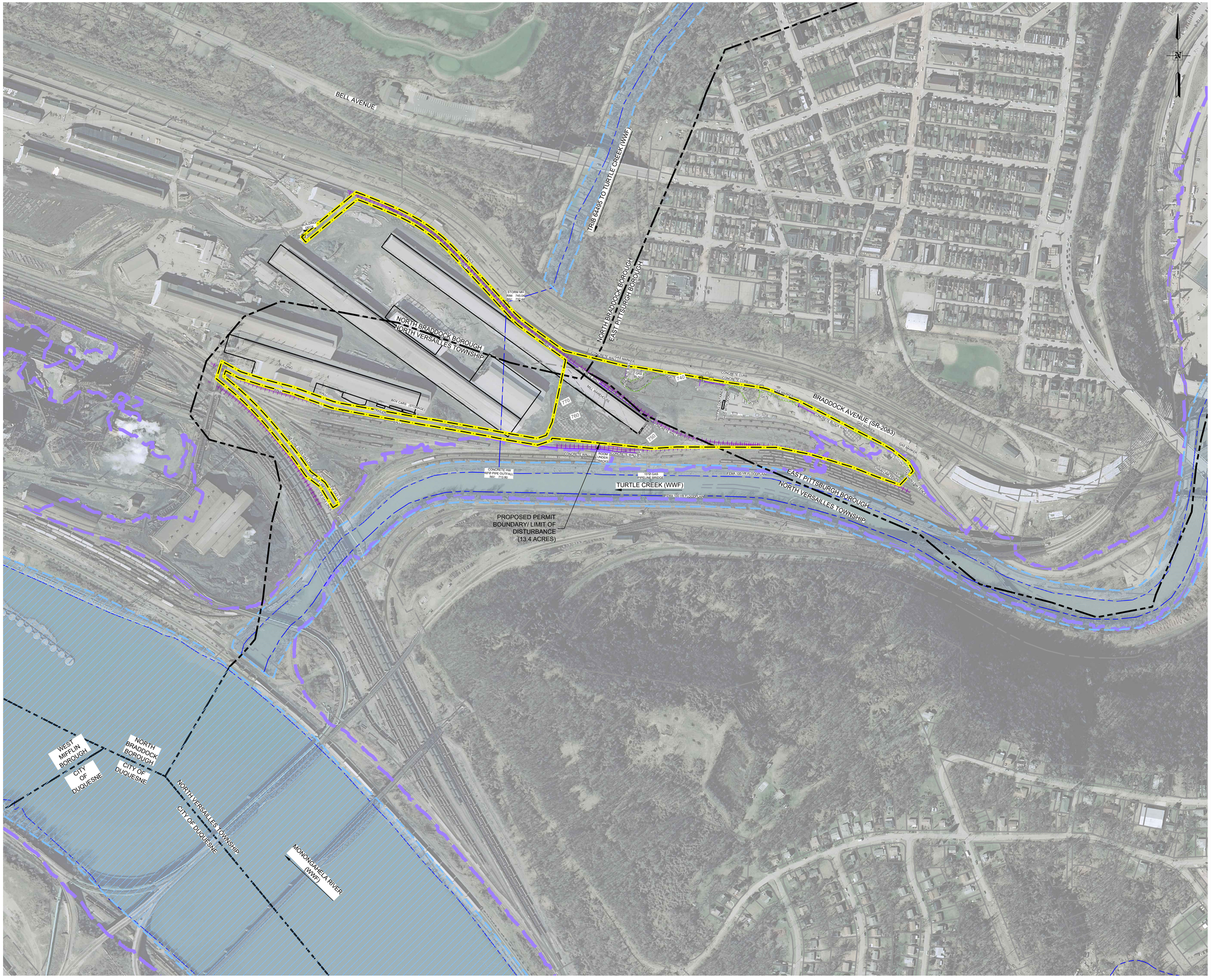
drawing title: COVER SHEET
EROSION AND SEDIMENT CONTROL PLAN

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet 1

T:\Merrion Oil & Gas\180539-2 - ET Braddock 1 WD\my Production\2A&C\SA\180539-SS-COVER SHEET.dwg Plotted: October 18, 2018



NOTES:

1. THE BASE MAP HAS BEEN CREATED USING SURVEY DATA (WITHIN LIMIT OF DISTURBANCE) PROVIDED BY TRANT CORPORATION, DATED 05/31/2018, SUPPLEMENTED BY AERIAL PHOTOGRAPHY OF PAMAP TILES 40001380PAS PROVIDED BY TRANT CORPORATION. SITE TOPOGRAPHY IS SUBJECT TO CHANGE DUE TO ACTIVE STOCKPILE BY US STEEL.
2. AERIAL IMAGE ON SHEET C701 WAS PROVIDED BY AERIAL PHOTOGRAPHY OF PAMAP TILES 40001380PAS DATED 2010.
3. PROPERTY LINES INFORMATION OF ALLEGHENY COUNTY ARE PROVIDED BY TRANT CORPORATION. THIS BASEMAP IS NOT THE RESULT OF AN ACTUAL FIELD SURVEY OF PROPERTIES SHOWN AND SHOULD NOT BE USED AS SUCH.
4. THIS PLAN IS IN THE PENNSYLVANIA STATE PLANE SOUTH, NORTH AMERICAN DATUM 1983 (NAD 83) COORDINATE SYSTEM.
5. SLOPE AREAS 3:1 OR GREATER BROUGHT TO FINISH GRADE ARE TO BE STABILIZED WITH ROCK OR SEEDED WITH MULCH APPLIED TO SLOPES AS SPECIFIED ON DETAIL SHEETS.
6. EXISTING RAILROAD TRACKS WITHIN WELL PAD PROJECT AREA WILL BE REMOVED.
7. THE TEMPORARY WATER STORAGE TANK DIMENSIONS AND LAYOUT ARE DISPLAYED FOR ILLUSTRATIVE PURPOSES ONLY. THE FINAL TANK DIMENSIONS AND LAYOUT WILL BE DETERMINED PRIOR TO CONSTRUCTION. THE OPEN-TOP TANKS ARE NOT ACCOUNTED FOR IN THE PCSM CALCULATIONS. THE ENTIRE TANK AREA IS MODELED AS A 'GRAVEL' COVER TYPE TO ACCOUNT FOR RUNOFF BEFORE THE TANKS ARE ERECTED.

LEGEND

NOTE: LEGEND IS TYPICAL, NOT ALL OBJECTS IN LEGEND APPEAR IN PLAN.

- 1550 — EXISTING CONTOURS
- FEMA FLOODPLAIN
- 50' FLOODWAY
- FEMA FLOODWAY
- EXISTING MAPPED WATERCOURSE
- EXISTING STRUCTURE
- EXISTING VEGETATION
- EXISTING PROPERTY LINE
- EXISTING MUNICIPAL BOUNDARIES
- X — EXISTING FENCE
- OE — OE — EXISTING OVERHEAD ELECTRIC LINE
- EXISTING ELECTRIC POLE
- G — G — G — EXISTING GAS LINE
- W — W — W — EXISTING WATER LINE
- EXISTING CULVERT
- EXISTING WALL
- EXISTING RAILLINE
- EXISTING SLAG PILE
- WeB — EXISTING SOIL BOUNDARY AND DESCRIPTOR
- 1490 — PROPOSED CONTOURS
- PROPOSED LIMIT OF DISTUBANCE
- PROPOSED CHANNEL
- PROPOSED WATER FEATURES
- PROPOSED WELL PAD
- PROPOSED TEMPORARY TANK
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- PROPOSED SLOPE STABILIZATION
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- PROPOSED ACCESS ROAD
- 12 — 12 — 12 — PROPOSED 12" FILTER SOCK
- 24 — 24 — 24 — PROPOSED 24" FILTER SOCK
- PROPOSED CULVERT
- DIV — DIV — PROPOSED DIVERSION BERM
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REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
(No. PE077667)

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

designed: KGJ
checked: MDR
drawn: QZ
scale: 1" = 200'
date: 10/22/2018
project no: 180539

graphic scale: 0 200 400 800 SCALE IN FEET

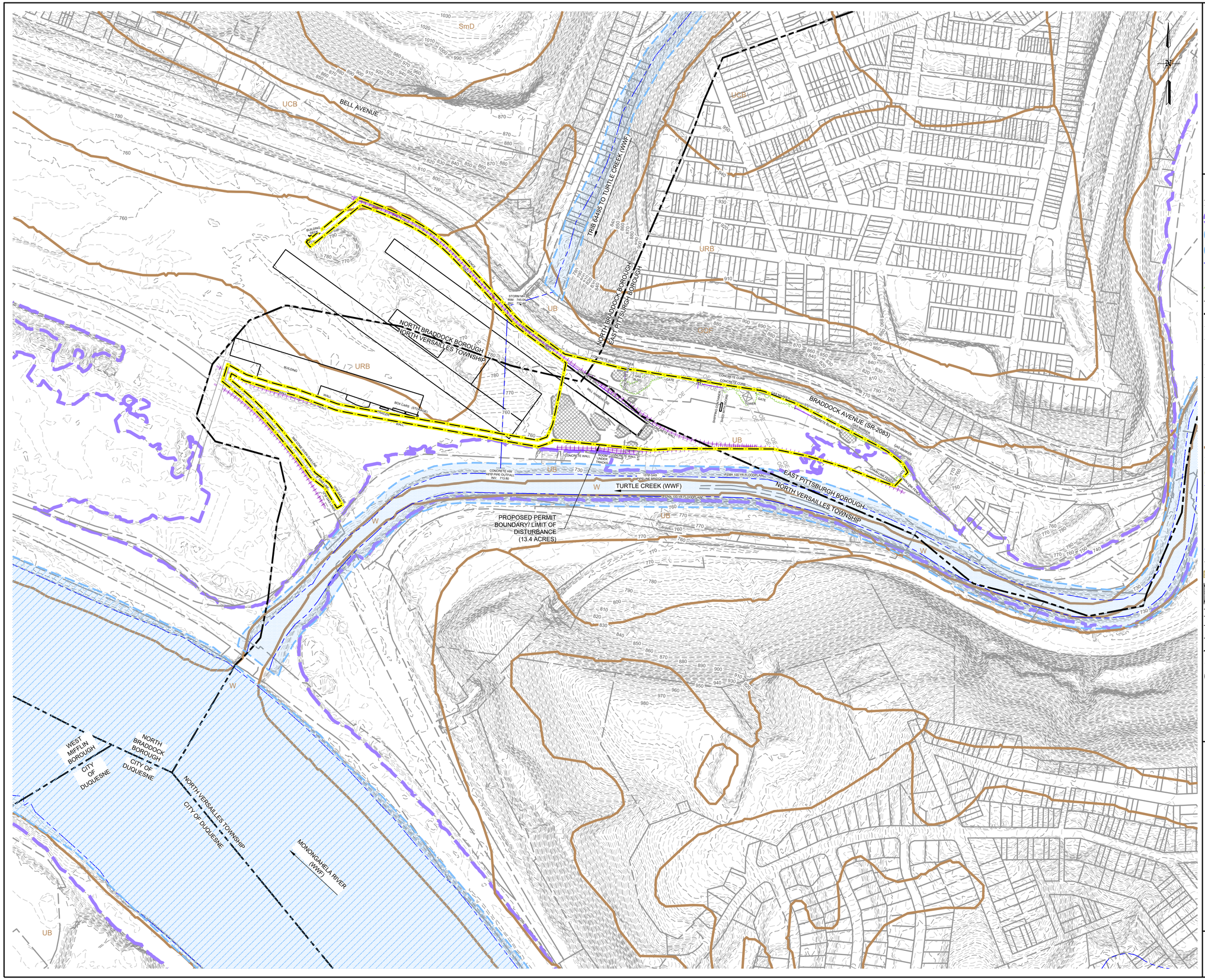
drawing title: EXISTING CONDITIONS OVERLAY MAP
EROSION AND SEDIMENT CONTROL PLAN

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet
C701

Z:\Merrion Oil & Gas\180539-1-ET Braddock 1\Dwg\Production\EAS\24x36\180539-ES-C701&C702.dwg Plotted: October 19, 2018



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- EXISTING STRUCTURE
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scale:	1" = 200'
date:	10/22/2018
project no.	180539
designed	KGJ
checked	MDR
drawn	QZ
graphic scale	0 200 400 800 SCALE IN FEET

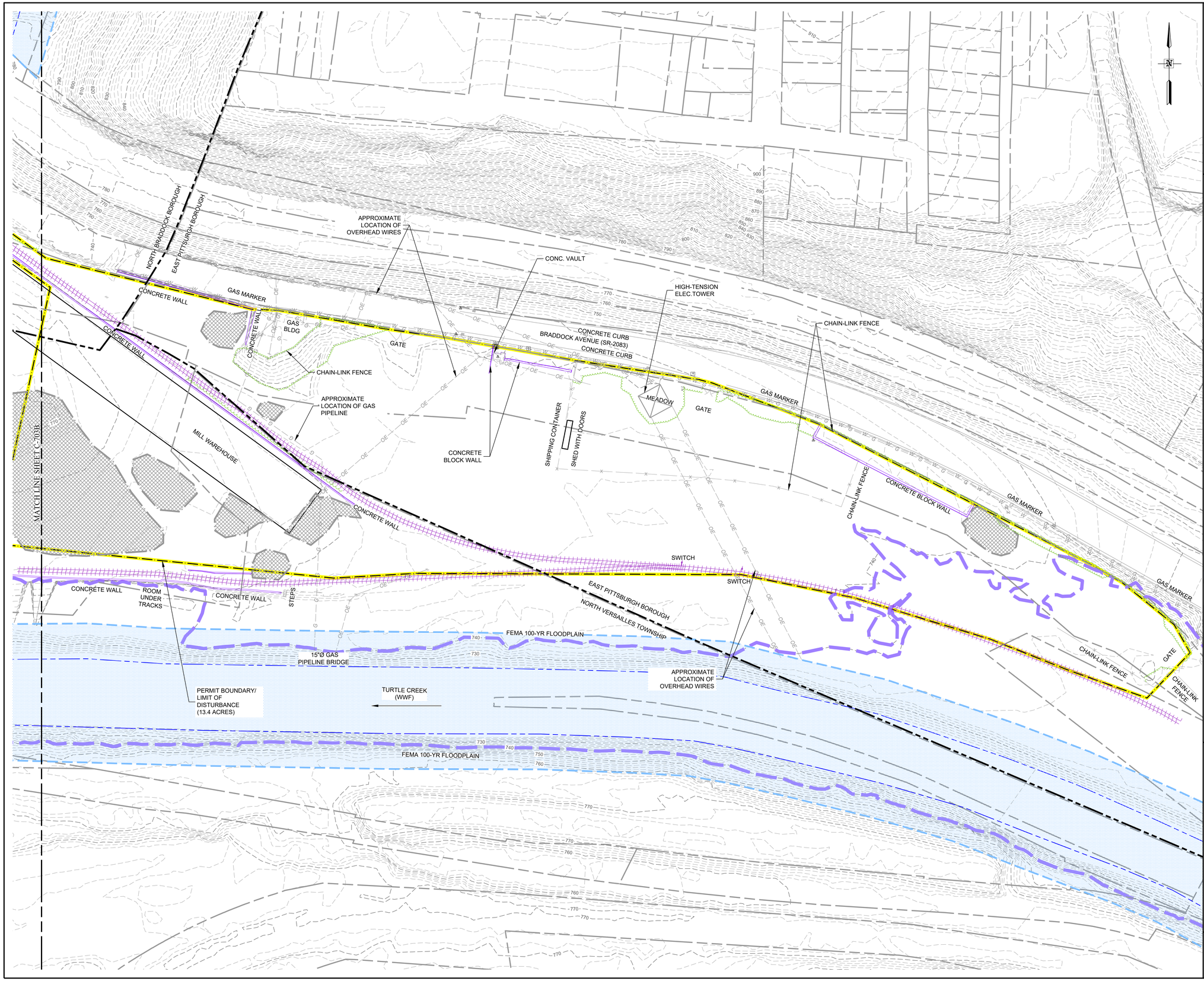
drawing title:
EXISTING CONDITIONS & SOILS PLAN
EROSION AND SEDIMENT CONTROL PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title:
ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet
C702

M:\Merrion Oil & Gas\180539-11 ET Braddock 1\1110\wp\Production\FAA\C3A-SO1\180539-ESC-TSOLAC702.dwg - Plotted: October 17, 2018



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0	PADEP SUBMISSION	05/31/2018	TRANT

designed	KGJ
checked	MDR
drawn	QZ
scale	1" = 60'
date	10/22/2018
project no.	180539

SCALE IN FEET 0 60 120 180

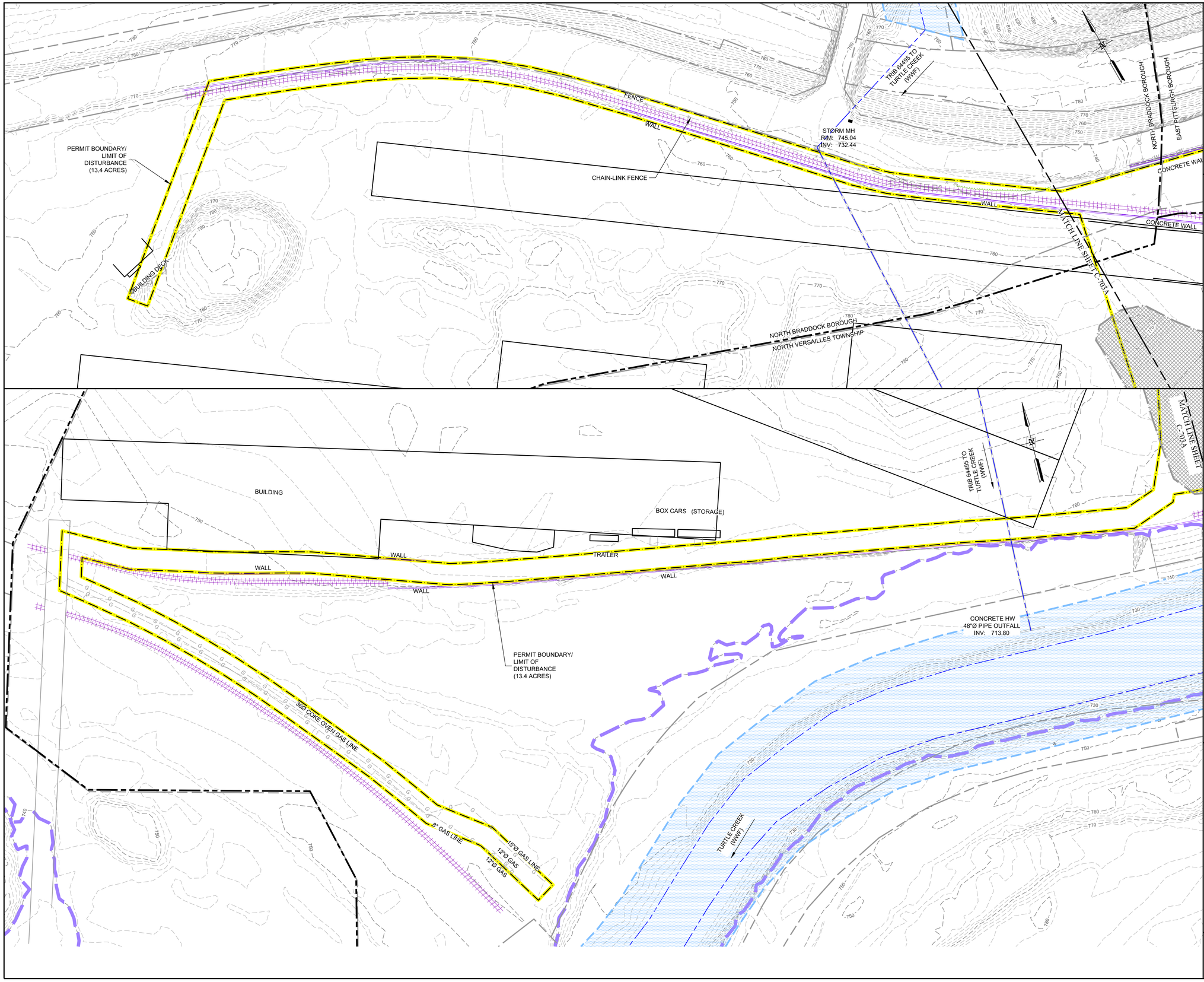
drawing title: E&S EXISTING CONDITIONS AND LIMIT OF DISTURBANCE PLAN
EROSION AND SEDIMENT CONTROL PLAN

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TWP.
ALLEGHENY COUNTY, PENNSYLVANIA

Sheet C703A

Z:\Merrion Oil & Gas\180539-11-ET Braddock 1\Dwg\Production\E&S\C3A.dwg Printed: October 19, 2018



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designed	KGJ	scale	1" = 60'
checked	MDR	date	10/22/2018
drawn	QZ	project no.	180539

graphic scale: 0 60 120 180 SCALE IN FEET

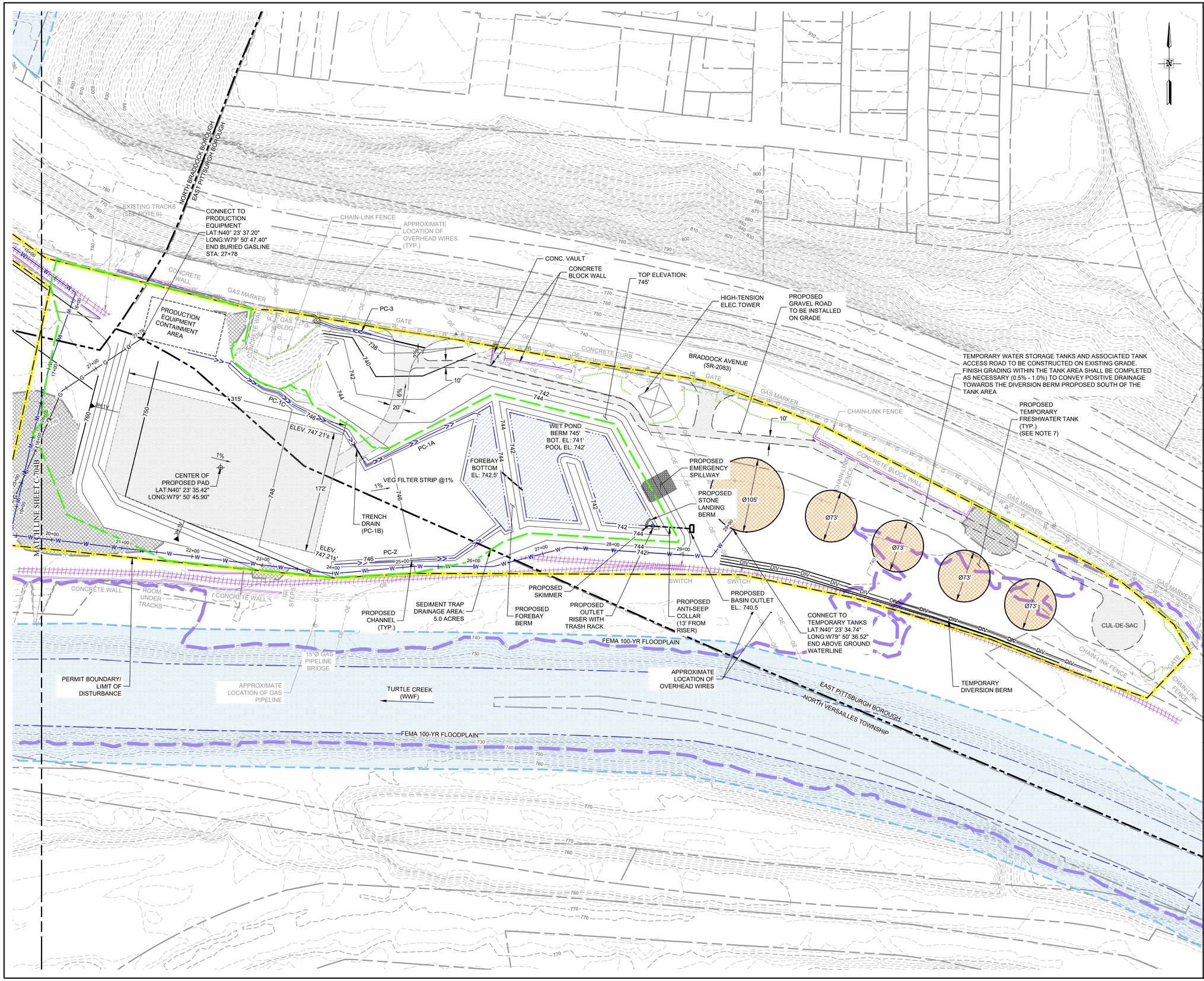
drawing title: E&S EXISTING CONDITIONS AND LIMIT OF DISTURBANCE PLAN
EROSION AND SEDIMENT CONTROL PLAN

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

Sheet
C703B

Z:\Merrion Oil & Gas\180539-1-ET Braddock 1\Dwg\Production\E&S\25\180539-25-C703.dwg Plotted: October 18, 2018



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- PROPOSED GRAVEL
- PROPOSED INLET
- SEDIMENT TRAP DRAINAGE AREA

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date	10/22/2018
project no.	180539

SCALE IN FEET: 0 60 120 180

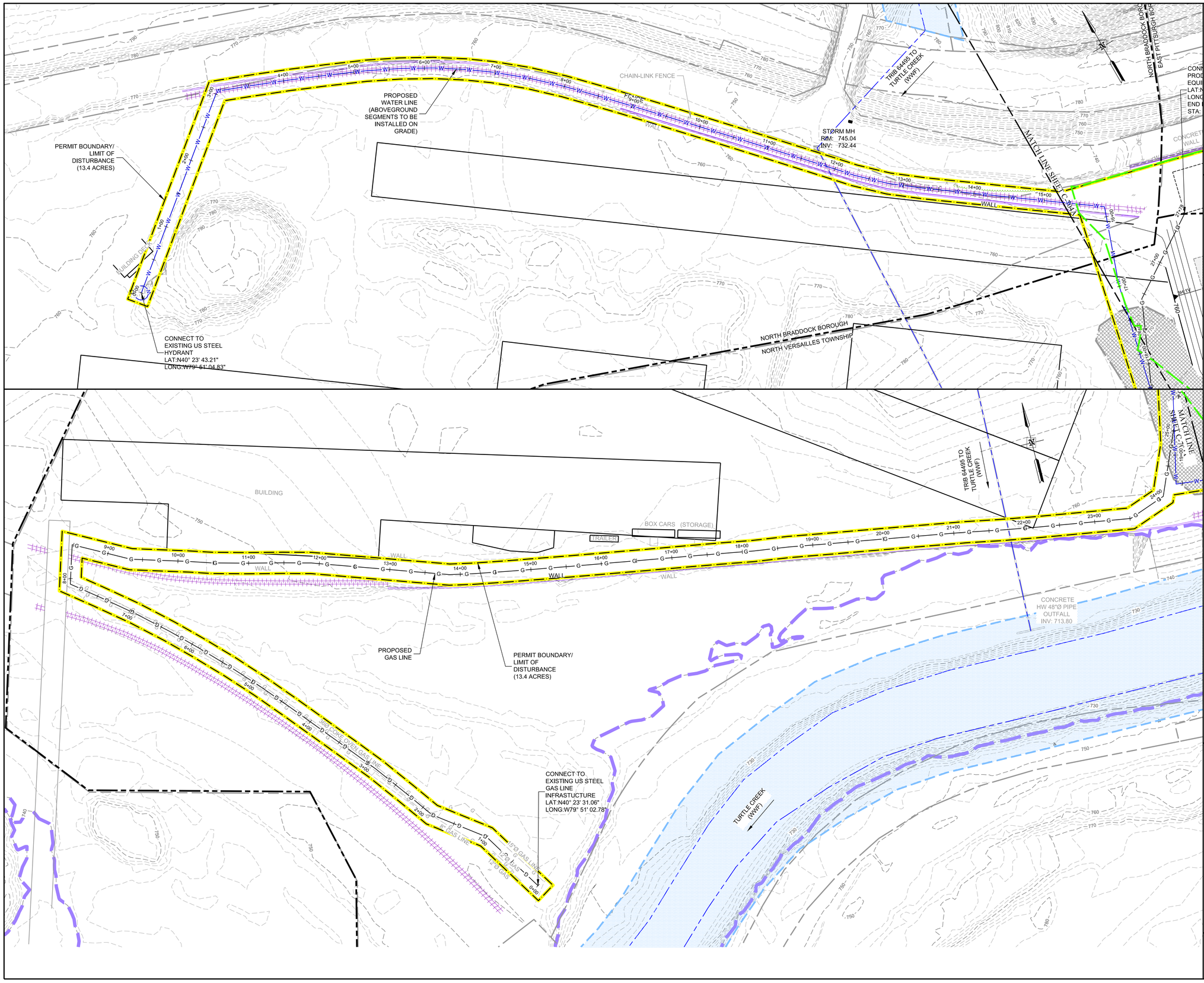
drawing title: E&S GRADING AND DRAINAGE PLAN
EROSION AND SEDIMENT CONTROL PLAN

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

Sheet C704A

Z:\Merrion Oil & Gas\180539-1-2 ET Braddock 1\Dwg\Production\E&S\2-D\A01\B0539-E&S-C704.dwg - Printed: October 19, 2018



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- PROPOSED WATERLINE
- PROPOSED GASLINE
- PROPOSED SLOPE STABILIZATION
- PROPOSED ROCK CONSTRUCTION ENTRANCE WITH WASH RACK
- PROPOSED ACCESS ROAD
- PROPOSED 12" FILTER SOCK
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- PROPOSED CULVERT
- PROPOSED DIVERSION BERM
- PROPOSED GRAVEL
- PROPOSED INLET

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
Lic. PE077667

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0	PADEP SUBMISSION	05/31/2018	TRANT

scale: 1" = 60'
date: 10/22/2018
project no.: 180539
SCALE IN FEET 0 60 120 180

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

E&S GRADING AND DRAINAGE PLAN EROSION AND SEDIMENT CONTROL PLAN

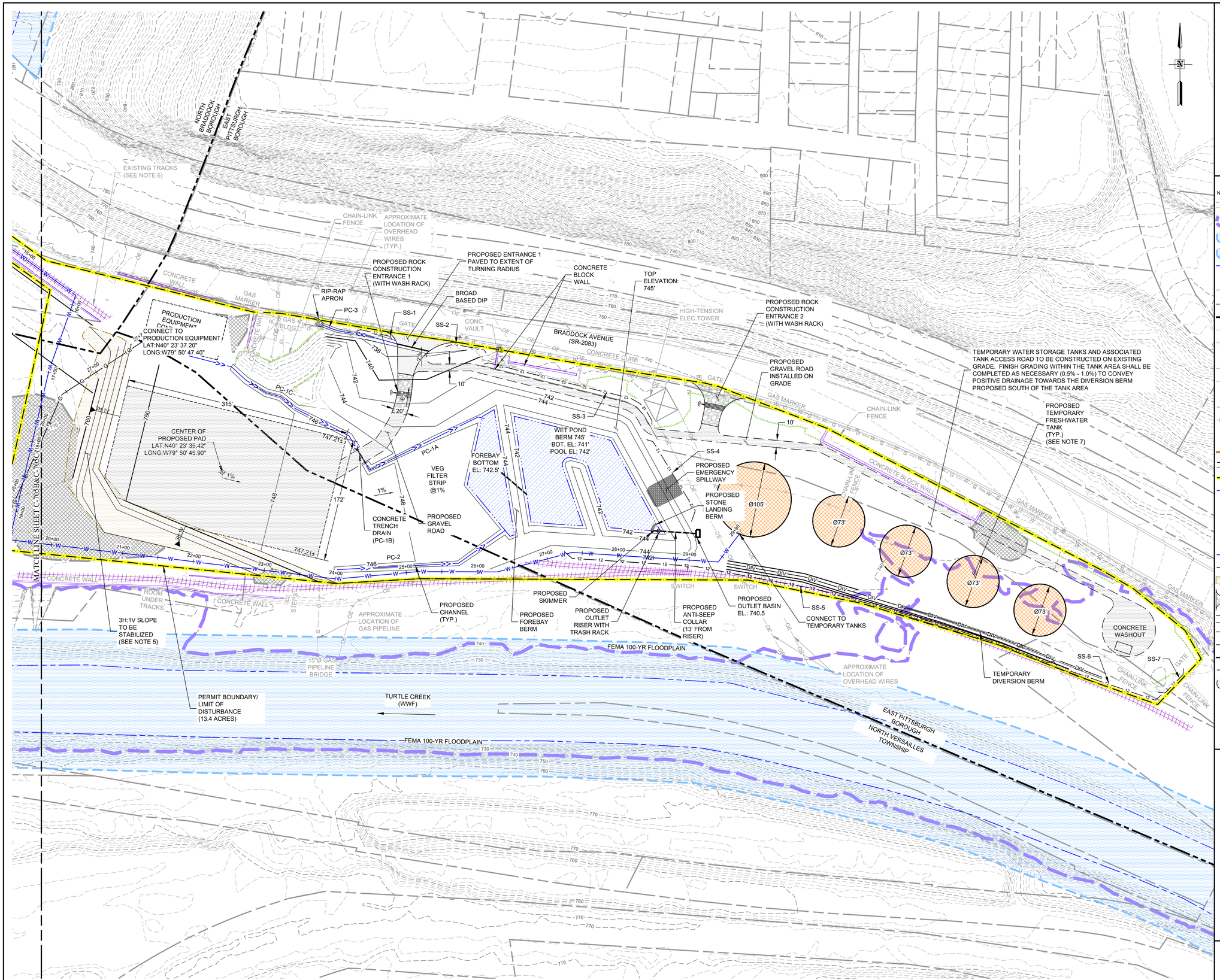
EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

drawing title:

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet C704B

T:\Merrion Oil & Gas\180539.2 - ET Braddock 1 HI\Dwg\Production\E&S\C6-180539-ESC-704.dwg Plotted: October 18, 2018



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- G — G — G — EXISTING GAS LINE
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- EXISTING WALL
- EXISTING RAILLINE
- EXISTING SLAG PILE
- WeB — EXISTING SOIL BOUNDARY AND DESCRIPTOR
- 1490 — PROPOSED CONTOURS
- PROPOSED LIMIT OF DISTUBANCE
- PROPOSED CHANNEL
- PROPOSED WATER FEATURES
- PROPOSED WELL PAD
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drawn	QZ	project no.	180539

graphic scale: 0 60 120 180 SCALE IN FEET

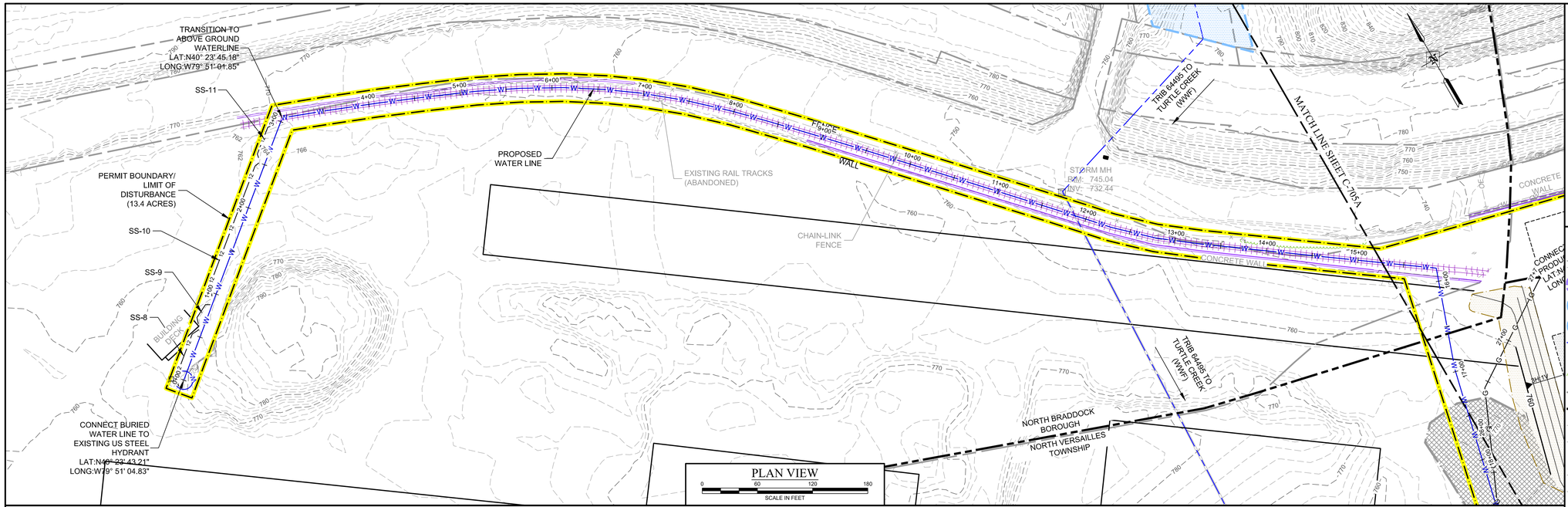
drawing title: E&S CONTROL PLAN
EROSION AND SEDIMENT CONTROL PLAN

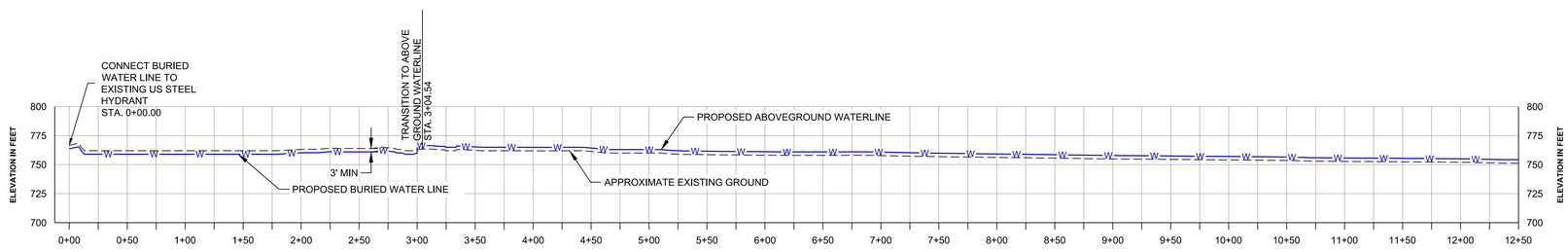
EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

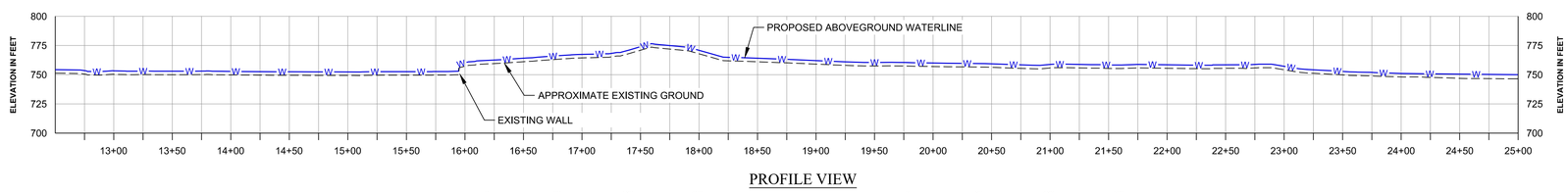
Sheet C705A

Z:\Merrion Oil & Gas\180539-1-2 ET Braddock 1\Dwg\Production\E&S\24x36\180539-E&S-C705.dwg - Printed October 19, 2018





PROFILE VIEW



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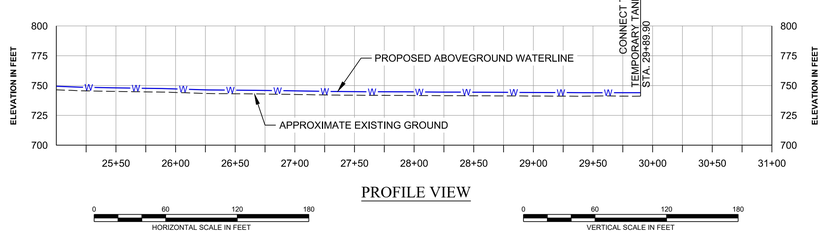

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project no.	180539
designed	KGJ
checked	MDR
drawn	QZ
graphic scale	

drawing title: EROSION AND SEDIMENT CONTROL PLAN

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

Sheet C705B

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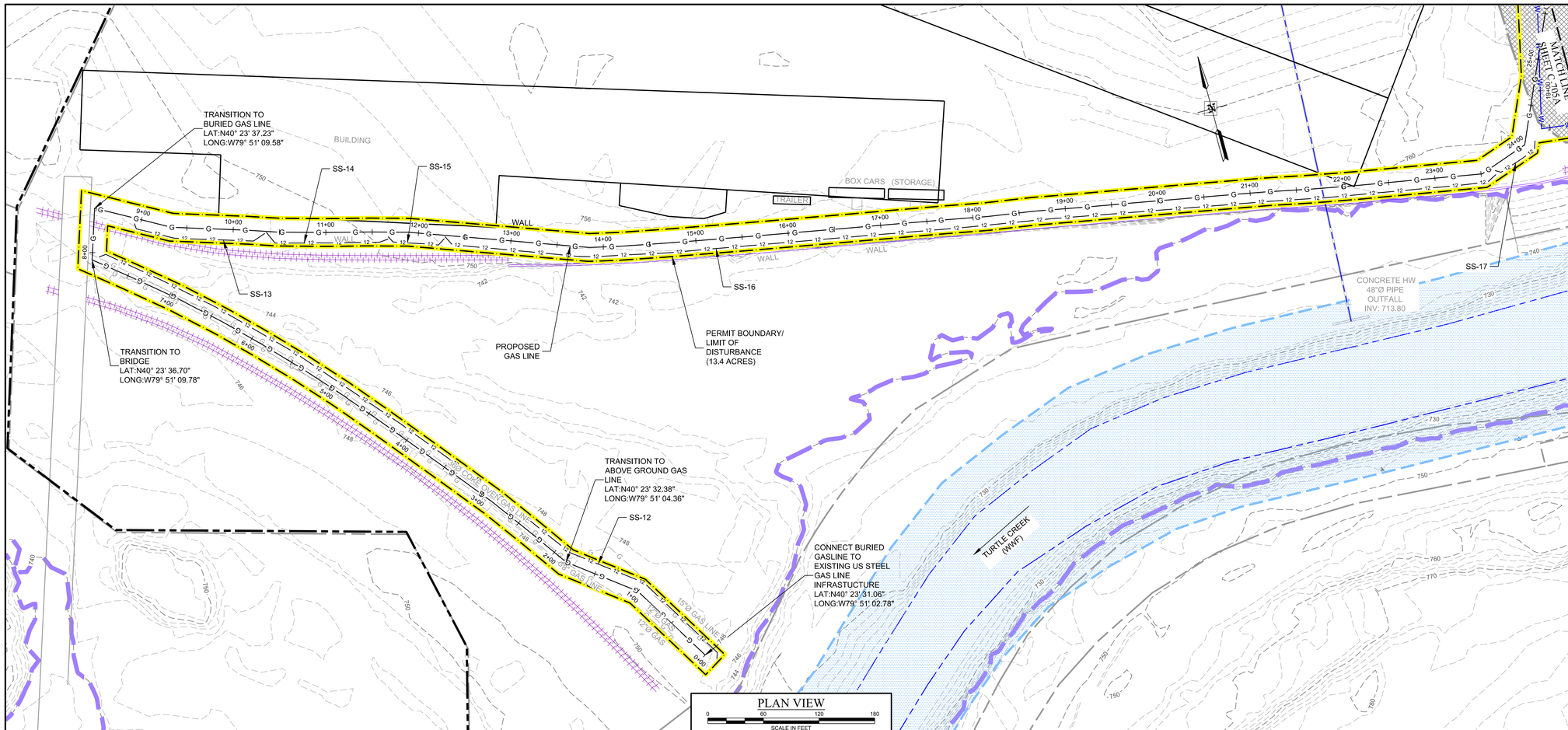
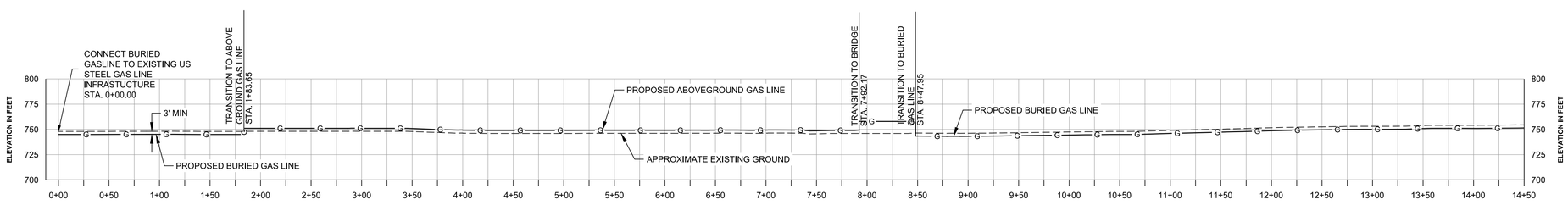
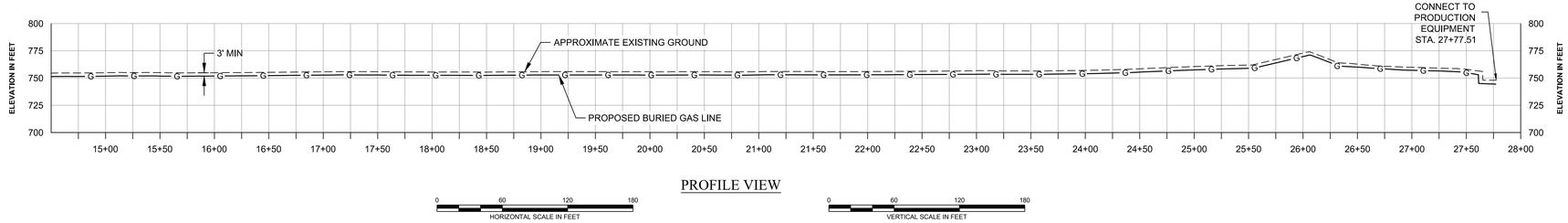




PROFILE VIEW



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drawn: QZ
graphic mode:

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project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS
EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

E&S CONTROL PLAN

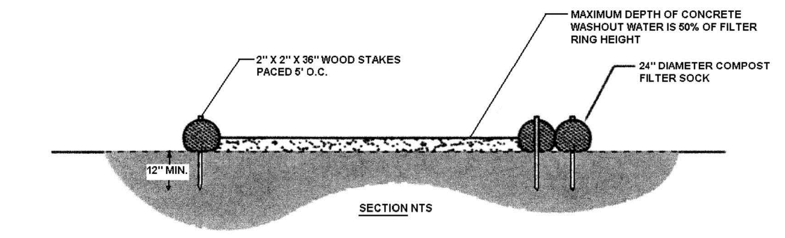
Sheet C705C

Z:\Merrion Oil & Gas\180539.14 ET Braddock 1 TI\Dwg\Production\E&S\23x36\180539-E&S-C705.dwg Plotted: October 18, 2018

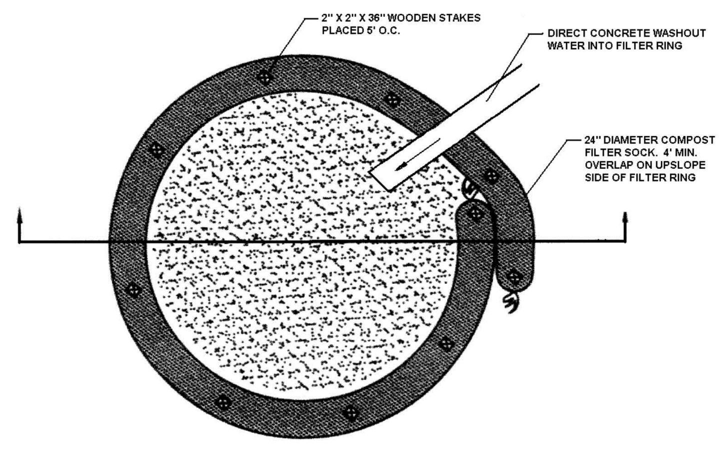
CONFIDENTIAL

Filtrexx

FIGURE 3.18
Typical Compost Sock Washout Installation



NOTES:
1. INSTALL ON FLAT GRADE FOR OPTIMUM PERFORMANCE
2. 18" DIAMETER FILTER SOCK MAY BE STACKED ONTO DOUBLE 24" DIAMETER SOCKS IN PYRAMIDAL CONFIGURATION FOR ADDED HEIGHT.

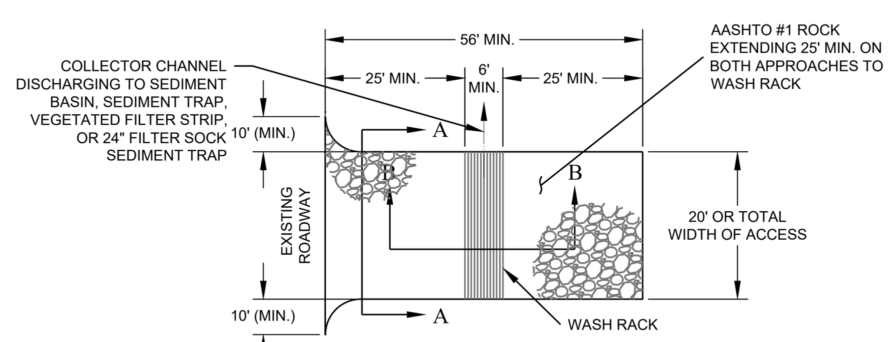


A suitable impervious geomembrane shall be placed at the location of the washout prior to installing the socks.
Adapted from Filtrexx

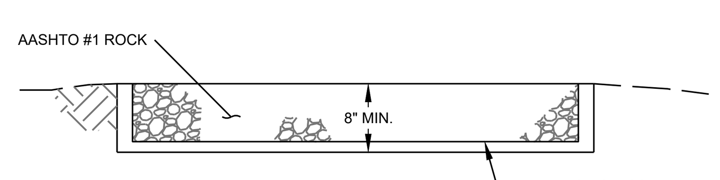
363-2134-008 / March 31, 2012 / Page 58

CONCRETE WASHOUT

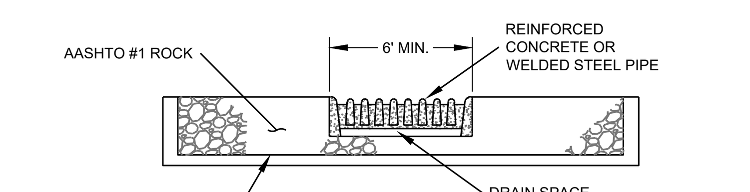
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.

RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.

WASH RACK - SHALL BE 20 FEET WIDE MINIMUM, DESIGNED AND CONSTRUCTED TO ACCOMMODATE ANTICIPATED CONSTRUCTION VEHICLE TRAFFIC, AND HAVE A WATER SUPPLY AVAILABLE TO WASH THE WHEELS OF VEHICLES LEAVING THE SITE.

PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FURTHER USE OF THE RACK ALL SEDIMENT DEPOSITS ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER COURSES IN NOT ACCEPTABLE.

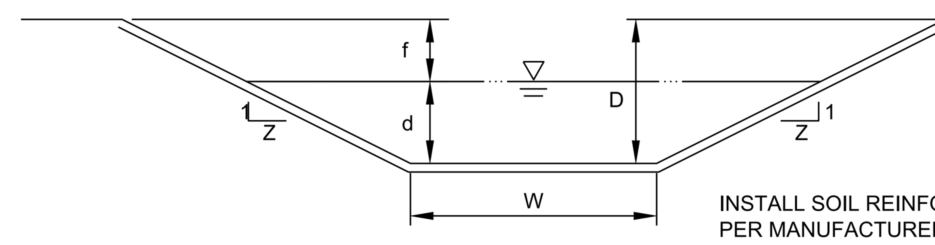
WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

STANDARD CONSTRUCTION DETAIL #3-1
ROCK CONSTRUCTION ENTRANCE

NOT TO SCALE

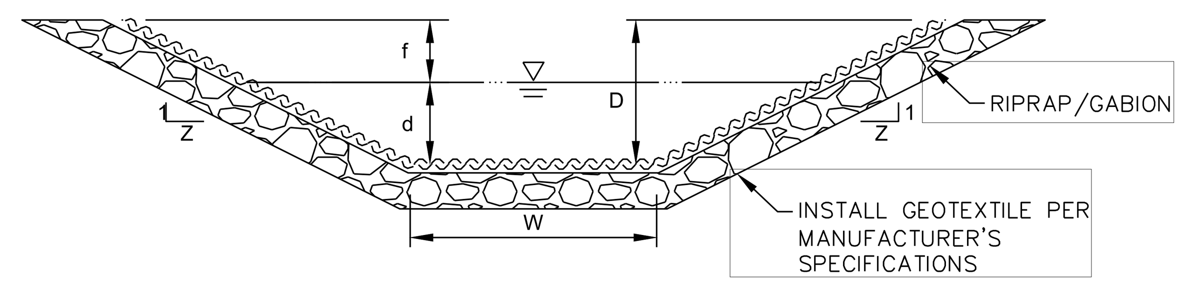
CHANNEL SCHEDULE

CHANNEL	LINING	PLACEMENT THICKNESS	VEG. RET.	SLOPE (%)	D (ft.)	W (ft.)	Z	DESIGN FLOW (cfs)	VELOCITY (fps)	d (ft.)	f (ft.)
PC-1A	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	4.9	1.87	0.747	0.753
PC-1A	VEGETATED	NA	C	1.0%	1.5	2	2	4.9	1.43	0.898	0.602
PC-1B	CONC. TRENCH DRAIN	NA	NA	2.0%	1.1	1	0	3.4	5.84	0.584	0.516
PC-1C	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	3.4	1.63	0.638	0.862
PC-1C	VEGETATED	NA	C	1.0%	1.5	2	2	3.4	1.43	0.898	0.602
PC-2	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	2.1	1.37	0.510	0.990
PC-2	VEGETATED	NA	C	1.0%	1.5	2	2	2.1	1.43	0.898	0.602
PC-3	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	6.1	2.04	0.823	0.677
PC-3	VEGETATED	NA	C	1.0%	1.5	2	2	6.1	1.55	0.989	0.511
DIVERSION BERM	SYNTHETIC MAT	NA	NA	0.2%	2.5	2	2	6.0	1.25	1.125	1.375
DIVERSION BERM	VEGETATED	NA	C	0.2%	2.5	2	2	6.0	0.61	1.777	0.723



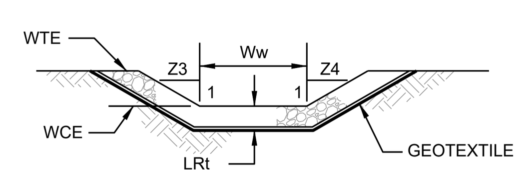
INSTALL SOIL REINFORCEMENT MAT PER MANUFACTURER'S SPECIFICATIONS

CHANNEL DETAIL

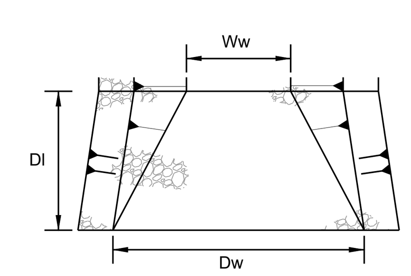


ECM SHALL BE NAG-S150 OR APPROVED EQUIVIALENT

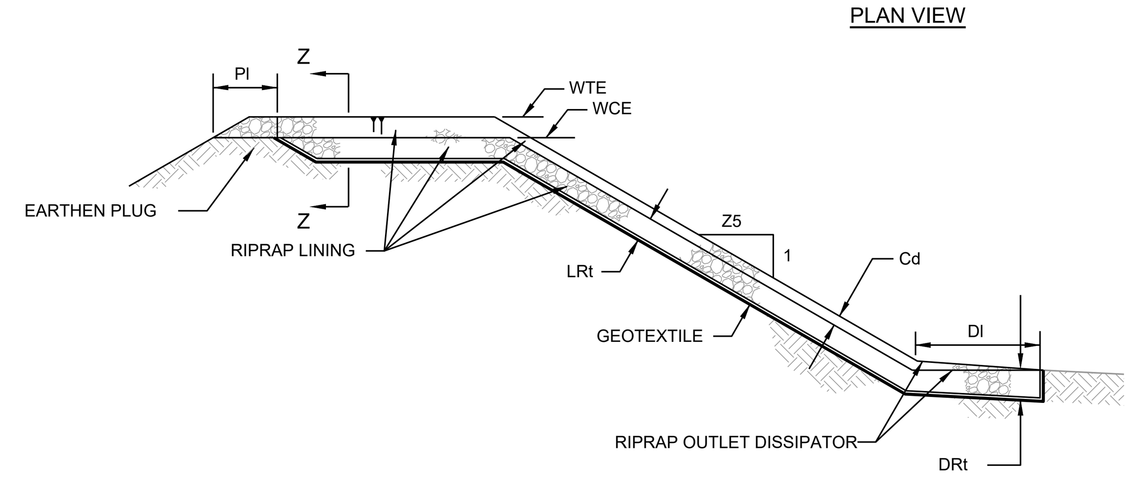
RIPRAPPED/GABION CHANNEL DETAIL



WEIR
SECTION Z-Z



RIPRAP OUTLET DISSIPATOR
PLAN VIEW



EMBANKMENT SECTION ALONG EMERGENCY SPILLWAY

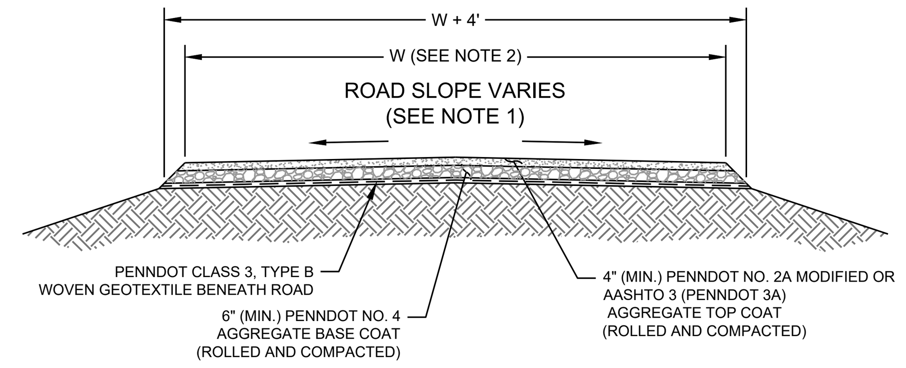
BASIN NO.	WEIR					LINING		CHANNEL		DISSIPATOR			
	Z3 (FT)	Z4 (FT)	TOP ELEV WTE (FT)	CREST ELEV WCE (FT)	WIDTH Ww (FT)	RIPRAP SIZE (R-_)	RIPRAP THICK. LRt (IN)	Z5 (FT)	DEPTH Cd (FT)	LENGTH Dl (FT)	WIDTH Dw (FT)	RIPRAP SIZE (R-_)	RIPRAP THICK. DRt (IN)
POND 1	2	2	745.00	743.50	25	R-4	18	2	1.5	15	32	R-4	18

NOTES:

DIMENSION Pl SHALL BE 5' MINIMUM.
DISPLACED RIPRAP WITHIN THE SPILLWAY AND/OR OUTLET CHANNEL SHALL BE REPLACED IMMEDIATELY.

STANDARD CONSTRUCTION DETAIL #7-12
SEDIMENT BASIN EMERGENCY SPILLWAY
WITH RIPRAP LINING

NOT TO SCALE



NOTE:

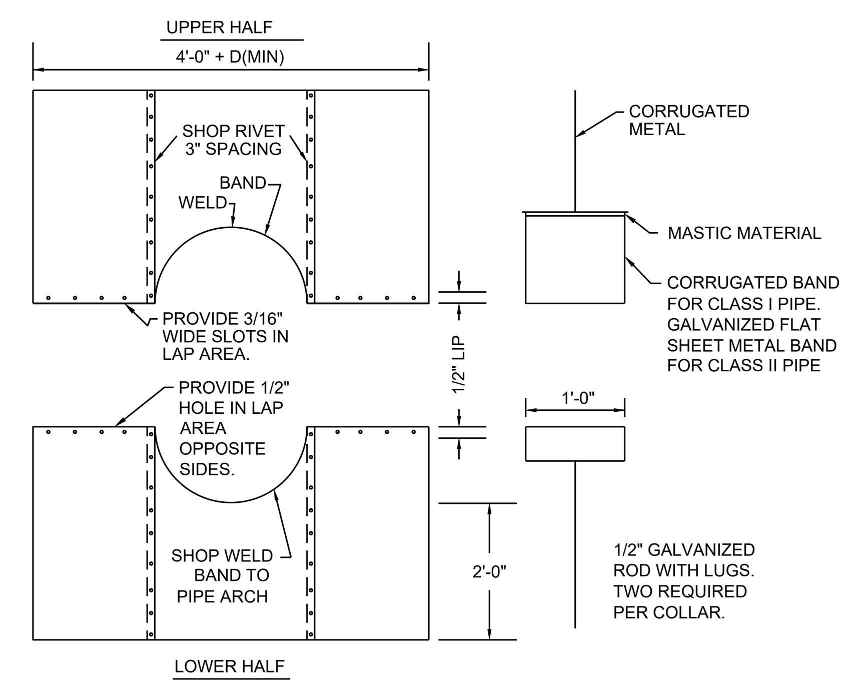
1. IN CASES WHERE THE ACCESS ROAD IS ACCOMPANIED BY A GRASS-LINED CHANNEL, THE ROAD SHALL BE GRADED AT A SLOPE OF 2% TOWARDS THE CHANNEL. IN ALL OTHER CASES, THE ACCESS ROAD SHALL BE CROWNED WITH A 2% SLOPE.
2. SEE PLAN VIEW SHEET FOR EXACT ACCESS ROAD WIDTH.

ACCESS ROAD

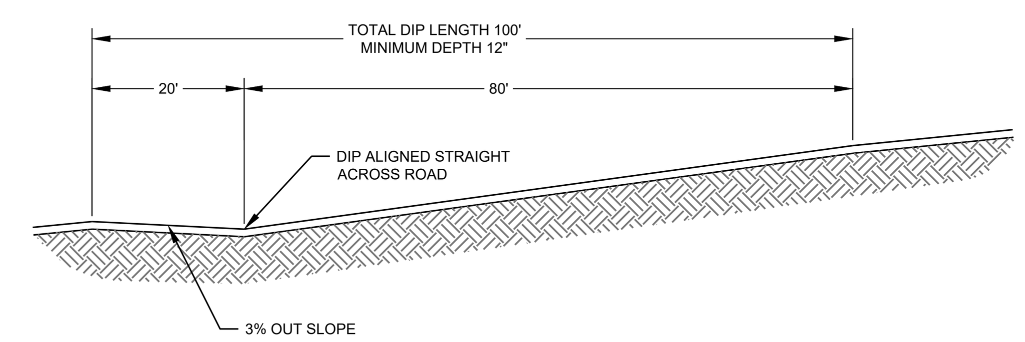
NOT TO SCALE

ANTI-SEEP COLLAR SCHEDULE

	COLLAR SIZE (FT.)	NUMBER OF COLLARS
POND 1	5.75 x 5.75	1



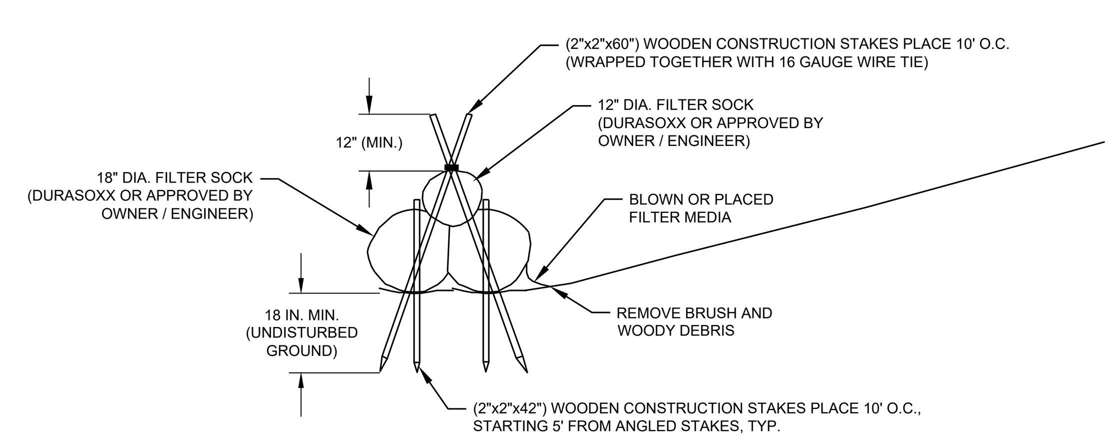
ANTI-SEEPAGE COLLAR DETAIL



NOTES:
1. DIPS SHALL BE ORIENTED SO AS TO DISCHARGE TO THE LOW SIDE OF THE ROADWAY.
2. DIPS SHALL BE INSPECTED DAILY. DAMAGED OR NON-FUNCTIONING DIPS SHALL BE REPAIRED BY THE END OF THE WORKDAY.

BROAD-BASED DIP

NOT TO SCALE



NOTES:
1. SEDIMENT ACCUMULATION SHALL NOT EXCEED 1/3 THE TOTAL HEIGHT OF THE TRAP.
2. ENDS OF THE TRAP SHALL BE A MINIMUM OF 1 FOOT HIGHER IN ELEVATION THAN THE MID-SECTION, WHICH SHALL BE LOCATED AT THE POINT OF DISCHARGE.

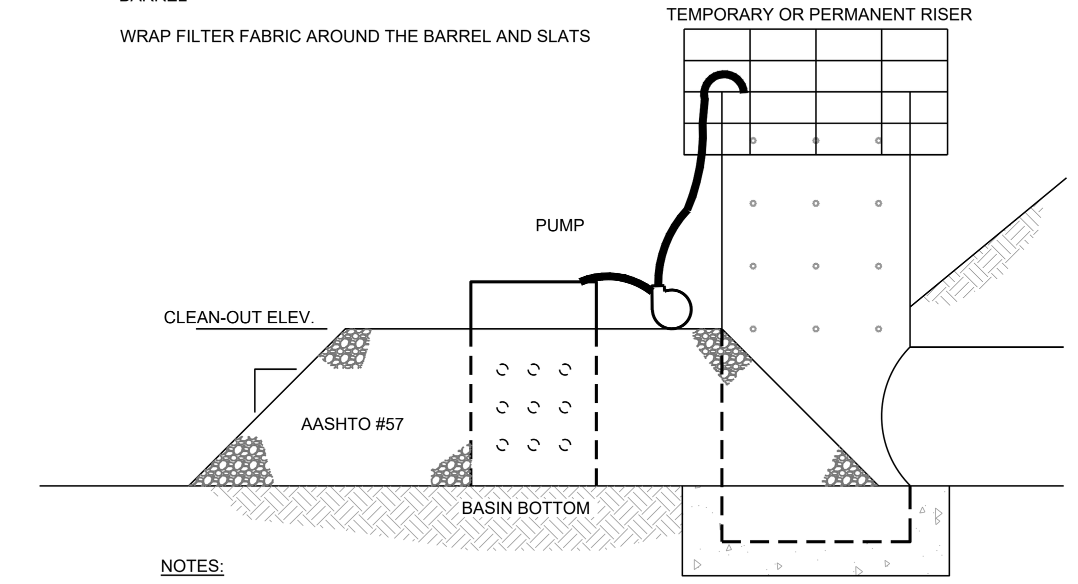
FILTER SOCK SEDIMENT TRAP

NOT TO SCALE

30 TO 55 GALLON BARREL WITH 1 IN DIA. PERFORATIONS AT 6 IN. HORIZONTAL AND 6 IN. VERTICAL SPACING

PLACE 2 IN. x 2 IN. VERTICAL WOOD SLATS @ 6 IN. HORIZONTAL SPACING AROUND THE BARREL

WRAP FILTER FABRIC AROUND THE BARREL AND SLATS



NOTES:

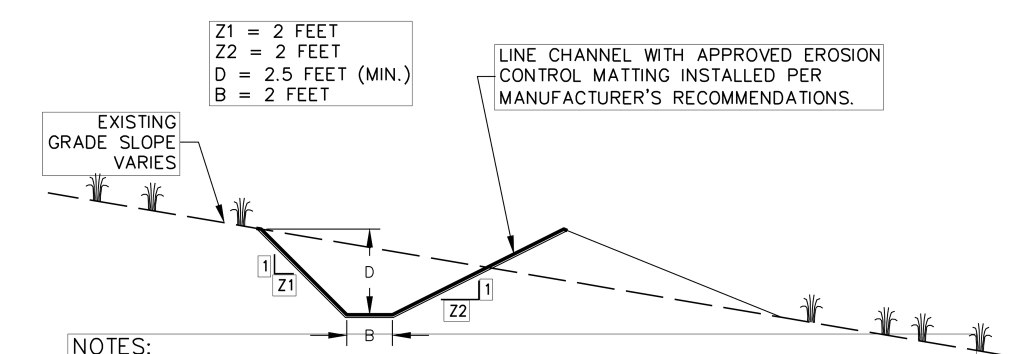
DEWATERING FACILITY SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF BASIN/TRAP.

PRIOR TO INITIATING OPERATION OF DEWATERING FACILITY, ALL ACCUMULATED SEDIMENT SHALL BE CLEANED FROM THE INSIDE OF THE BARREL.

DEWATERING FACILITY SHALL BE CONTINUOUSLY MONITORED DURING OPERATION. IF FOR ANY REASON THE DEWATERING FACILITY CEASES TO FUNCTION PROPERLY, IT SHALL BE IMMEDIATELY SHUT DOWN AND NOT RESTARTED UNTIL THE PROBLEM HAS BEEN CORRECTED.

STANDARD CONSTRUCTION DETAIL #7-18
SEDIMENT STORAGE DEWATERING FACILITY

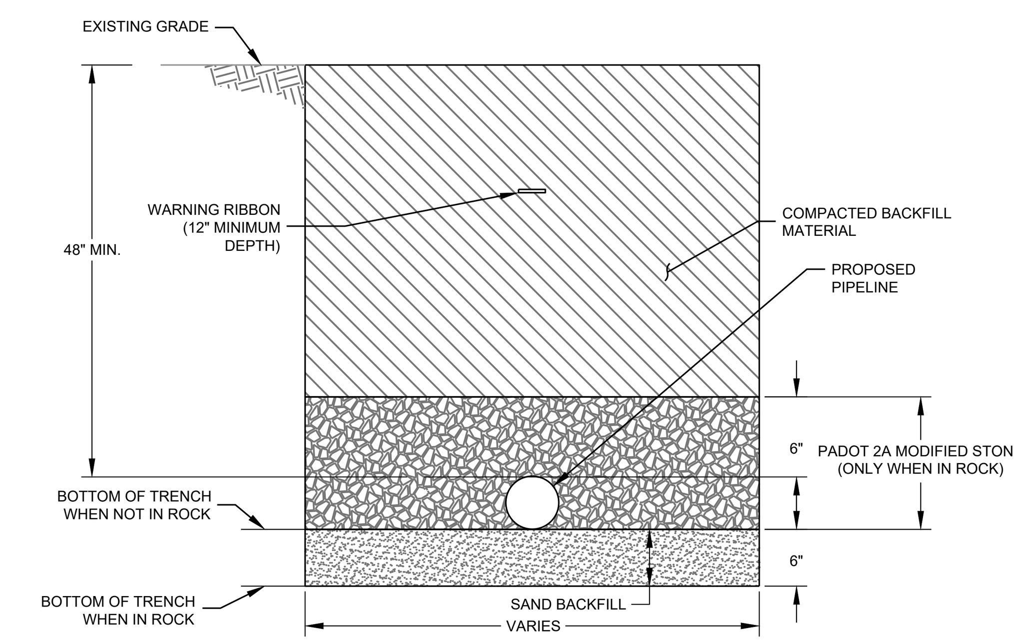
NOT TO SCALE



NOTES:
1. PLACE TEMPORARY STONE CHECK DAM / ROCK FILTER AT DOWNSLOPE END OF TEMPORARY DIVERSION CHANNELS WHERE DISTURBED AREAS OR SEDIMENT-LADEN RUNOFF MAY ENTER CHANNEL. REMOVE STONE FILTER WHEN CONTRIBUTING DRAINAGE AREAS ARE STABILIZED.
2. ECM SHALL BE NAG-S150 OR APPROVED EQUIVALENT.
3. SEE CHANNEL SCHEDULE FOR ADDITIONAL DESIGN INFORMATION.

DIVERSION BERM

NOT TO SCALE



NOTES:
1. PIPE BEDDING WILL BE PLACED BENEATH THE PIPELINE A MINIMUM OF 6" THICK IN AREAS OF EXPOSED STONE.
2. PIPELINE WILL BE PLACED IN THE TRENCH AND BACKFILLED USING EXISTING MATERIALS.
2. WARNING RIBBON WILL BE PLACED A MINIMUM OF 12" BELOW THE EXISTING SURFACE GRADE.

TYPICAL TRENCH SECTION

NOT TO SCALE

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
TESSA MICHELE ANTOLICK
No. PE077667

This Drawing shall not be used for tender or construction unless sealed.

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TESSA MICHELE ANTOLICK, PE - 077667

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Engineers and Scientists
www.armgroup.net

No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

designed	KGJ	scale	AS NOTED
checked	MDR	date	10/22/2018
drawn	QZ	project no.	180539

graphic scale

drawing title: E&S CONSTRUCTION DETAILS
EROSION AND SEDIMENT CONTROL PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet C707

P:\Merrion Oil & Gas\180539-1-1-ET Braddock 1H\Drwg\Production\E&S (24x36)\180539-ES-C707.dwg Plotted: October 19, 2018

CONSTRUCTION SEQUENCE

PROGRAM OF OPERATIONS

STAGE 1

1) Access to site will be via Braddock Avenue.
2) Access and construction disturbance of the site shall be kept to a minimum for installation of Best Management Practices [BMP] facilities. Sediment shall not be permitted to enter waters of the Commonwealth. No organic material is to be buried on site.
3) The extent of the disturbance as well as the duration between initial disturbance and final stabilization shall be minimized with the following techniques:

a Erosion Control Blanketing and seeding are to be done as soon as possible after final grades are reached,
b immediate vegetative stabilization of disturbed areas upon temporary cessation of work for 4 days or longer,
c a maximum of 15000 square feet of disturbed area may reach final grade before initiating seeding and mulching operations,
d limiting the disturbance to one watershed at a time,
e limit the total length of excavated trench to less than the length of utility line which can be placed and back filled at end of workday,
f only 50 lineal feet of open trench at the end of the workday,

4) Excavate area for installation of the Rock Construction Entrance #1 and #2. Lay geotextile at edge of existing pavement. Install stone base per construction entrance detail. Stockpile additional stone for maintenance of entrance. Construction equipment and material will be delivered to the site via this entrance.
5) Install 12” silt socks.

STAGE 2

6) Begin earthwork and installation of Pond 1 and Forebay.
7) As embankment is formed, install **permanent outlet structure** (do not install dewatering orifices in permanent structure), **install pipe**, **anti-seep collar**, **skimmer** as per Construction Detail #7-2, rock apron RA-100, and create the berm**.** A geo-technical engineer shall verify soils are suitable for trap embankments. Strict adherence to the Geotechnical report is to be followed during the Trap installation. Install impermeable PVC liner. Sediment Trap Storage Dewatering Facility must be installed at the time of Trap installation as per Standard Construction Detail #8-2. **(Critical Stages are in bold text).**
8) Install Sediment Trap Outlet Basin as per Construction Detail #8-6.
9) Install **Emergency Spillway** as per construction details. **(Critical Stage)**
10) Install Clean Out Stake as per plan and details.
11) Install Channels 1-3 and diversion berm.
12) Install Trench Drain within Channel 1. Trench drain is to be installed the length of the proposed roadway that crosses over said channel. Location of trench drain can be found on sheet C705.
13) All exposed embankment slopes should be limed, fertilized, seeded and mulched. Permanent vegetative ground cover should be established upon completion of basin construction.

STAGE 3

14) Excavate/place fill on site until design grade has been established for site. Immediately stabilize fill slopes every ten feet of vertical elevation by seeding per permanent seeding schedule. All slope areas, brought to finish grade are to be stabilized with rock or seeded with mulch applied to slopes as specified on detail sheet.
15) Install erosion control matting on seeded areas greater than 3:1 slope.
16) Install proposed gravel road and cul-de-sac.
17) Install concrete washout in cul-de-sac.
18) Install water and gas lines.
19) All disturbed areas and sub areas are to be stabilized as soon as possible upon reaching finished grade as per the specifications.

STAGE 4 - Erosion Control Removal and Conversions

1) Concrete Washout facility to be removed at completion of construction. Disposal of the waste is to be handled by an experienced contractor following the appropriate rules and regulations.
2) When a uniform 70% perennial vegetative cover stabilizes drainage area to Sediment Trap and the Trap itself, and lots within the tributary are constructed, it can be converted. Convert Sediment Trap as follows during the growing season:
   - Pump sediment laden water from Trap through a sediment filter bag. Pump capacity cannot exceed 750gpm or 50% of manufacturer's recommendation pump rate. Or a barrel and #57 gravel and pump per detail.
   - Remove sediment and stockpile in an area surrounded with filter sock to dry and then mix with topsoil.
   - Remove the clean out stake. Dispose of properly, at an approved landfill.
   - Any damage to design dimensions during removal of temporary facilities and sediment shall be corrected by regarding, restabilization, etc. immediately.
   - Convert Trap to Detention Pond 1 as per plan and details. Seed disturbed area per permanent seeding schedule.
   - Convert Sediment Trap outlet basin as per plans and details to a level spreader.
3) Existing E&S controls can be removed once a uniform 70% perennial vegetative cover is obtained. Silt will be disposed of by being mixed with other soils on the site or spread to dry in an area protected with filter sock and then seeded per permanent seeding specifications when dry. Compost from the filter sock can be used as a soil supplement.
   - Silt sock and erosion control matting is to be removed and disposed of properly, at an approved landfill.

TEMPORARY CONTROL MEASURES AND FACILITIES USED DURING EARTH MOVING.
Program of operations: The life of this project is such that soil erosion and sedimentation measures must be continually applied and maintained during construction activities. This will be preceded by proper interim measures on a scheduled basis as outlined in this application.

PURPOSE - The purpose of the use of temporary or interim control measures is to prevent needless accumulation of sediment in the major drainage channels and to minimize the creation of difficult and undesired conditions in and around the site during construction.

BMP INSTALLATION

All Best Management Practices (BMP's) required by the Soil Erosion and Sedimentation Control Plans shall meet or exceed the standards of the Commonwealth of Pennsylvania Department of Environmental Protection Office of Water Management's “Erosion and Sediment Pollution Control Program Manual” dated March 2000 or newer.

ALTERATIONS PROPOSED TO THE AREA. See Plan Sheets.

METHOD OF CALCULATION
The methods of calculation for the storm water runoff and detention requirements for this project were established by D.E.P. -erosion and sediment pollution control program manual. This method was chosen because it is acceptable to all governmental bodies involved.

COMPOST FILTER SOCK INSTALLATION:
Sock fabric shall meet standards of table 4.1 of the PA DEP Erosion Control Manual. Compost shall meet the standards of table 4.2 of the PA DEP Erosion Control Manual.

Compost filter sock shall be placed at existing level grade. Both ends of the barrier shall be extended at least 8 feet up slope at 45 degrees to the main barrier alignment. Maximum slope length shall not exceed that specified for the size of the sock and the slope of the tributary area.

Traffic shall not be permitted to cross compost filter sock.

EROSION CONTROL BLANKET INSTALLATION:
Seed and soil amendments shall be applied according to the rates in the plan drawings before installing the blanket.

Provide anchor trench at toe of slope in similar fashion as at top of slope.

Slope surface shall be free of rocks, clods, sticks, and grass.

Blanket shall have good continuous contact with underlying soil throughout entire length, lay blanket loosely and stake or staple to maintain direct contact with soil do not stretch blanket.

The blanket shall be stapled in accordance with the manufacturer's recommendations.

SEDIMENT TRAP INSTALLATION:
Fill material for the embankments shall be free of roots, or other woody vegetation, organic material, large stones and other objectionable materials. The embankment shall be compacted in layer lifts of not more than 9 inches. The maximum rock size shall be no greater than 6 inches. Upon completion, the embankment shall be seeded and mulched or otherwise stabilized according to the specifications of the E&S plan drawings.

SEDIMENT TRAP TRASH RACK/RISER INSTALLATION:
Box shall be bolted, strapped or otherwise secured to the temporary riser.

Top of temporary riser extension shall be at least as high as sediment basin temporary riser and shall be 6 inches minimum below crest of emergency spillway.

All joints shall be watertight.

ROCK CONSTRUCTION ENTRANCE INSTALLATION:
Remove topsoil prior to installation of rock construction entrance. Extend rock over full width of entrance.

Runoff shall be diverted from roadway to a suitable sediment removal BMP prior to entering rock construction entrance.

Mountable berm shall be installed whenever optional culvert pipe is used and proper pipe cover as specified by manufacturer is not otherwise provided. Pipe shall be sized appropriately for size of ditch be crossed.

Rock construction entrances shall befitted with wash racks to be ABACT for special protection watersheds.

ROCK APRON INSTALLATION:
All aprons shall be constructed to the dimensions shown. Terminal widths shall be adjusted as necessary to match receiving channels.

BMP MAINTENANCE

PROJECT AREA MAINTENANCE
Areas within the project, not in the immediate work area, will be interim seeded, if necessary, to avoid problems with accelerated erosion. This will include any temporary grading, channels, etc. Sedimentation control will be achieved by limiting the total amount of disturbance to the site on a scheduled basis. Sedimentation Basin and silt socks will be provided to intercept the runoff from site prior to the discharge to waters of the Commonwealth.

ROCK CONSTRUCTION ENTRANCE MAINTENANCE:
Structure's thickness will be constantly maintained to the specified dimension by adding rock. A stockpile of rock material will be maintained at the site for this purpose. At the end of each construction workday, all sediment deposited on public roadways, will be removed and returned to the site. Washing with water is not permitted. If excessive amounts of sediment are being deposited on roadway, extend length of rock construction entrance by 50 foot increments until condition is alleviated.

EROSION CONTROL BLANKET MAINTENANCE:
Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to minimum uniform 70% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 4 calendar days.

SEDIMENT TRAPS MAINTENANCE:
All sediment traps shall be inspected on at least a weekly basis and after each runoff event.

Access for sediment removal and other required maintenance activities shall be provided.

A clean out stake shall be placed near the center of each trap. Accumulated sediment shall be removed when it has reached the elevation indicated on the clean out stake and the trap restored to its original dimensions. Dispose of materials removed from the trap in the manner described in the E&S plan.

Check embankments, spillways, and outlets for erosion, piping and settlement. Clogged or damaged spillways and/or embankments shall be immediately restored to design specifications.

Displaced riprap within the spillway or outlet protection shall be replaced immediately.

Accumulated sediment shall be removed and disturbed areas inside the trap shall be stabilized before conversion to a storm water management facility. To assist in removing sediment, which may be saturated, a device such as shown in standard construction detail #7-18 may be used to dewater the sediment prior to its removal.

TRASH RACK/ RISER MAINTENANCE:
Clogged or damaged spillways shall be repaired immediately. Trash and other debris shall be removed from the basin and riser.

DEWATERING FACILITY MAINTENANCE:
Dewatering Facility shall be continuously monitored during operation. If for any reason the dewatering facility ceases to function properly, it shall be immediately shut down and not restarted until the problem has been corrected.

ROCK APRON MAINTENANCE:
All aprons shall be inspected at least weekly and after each runoff event, displaced riprap within the apron shall be replaced immediately.

SPILLWAY MAINTENANCE:
Displaced riprap within the spillway or outlet channel shall be replaced immediately.

COMPOST FILTER SOCK MAINTENANCE:
Compost filter sock shall be inspected weekly and after each runoff event. Damaged sock shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Accumulated sediment shall be removed when it reaches ½ the above ground height of the barrier and disposed in the manner described in the plan.

Biodegradable compost filter socks shall be replaced after 6 months. Photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed, the sock may be left in place and vegetated or removed by cutting open the mesh and spreading the mulch as a soil supplement.

B.) Inspection schedule for proposed BMPs provided.

Response: See information listed below for seeding scheduling. Inspection schedule for proposed BMPs are also located on plan sheet C710.

TYPES OF MEASURES AND FACILITIES -
The types of measures and facilities will include the use of positive grading techniques and practices which will be implemented during construction to insure positive drainage in the work area. This is to prevent the creation of difficult and undesired working conditions. The drainage in these areas will be minimized to prevent excess erosion. If construction should cease during non-growing season disturbed areas shall be covered with straw or excelsior mats.

Those areas where cover is removed will be exposed for a minimum period of time to final grading and reseeding. The seeding of disturbed areas will be in one of three schedules.

SEEDING AND MULCHING MAINTEANENCE/SPECIFICATIONS

SEEDING
If grass does not grow within 20 days of application [during growing season] the area shall be seeded again.

APPLICABILITY.
Upon completion of the development and construction of buildings all disturbed areas will be seeded per permanent seeding schedule.

TEMPORARY SEEDING SCHEDULE AND FERTILIZER RATES:
Early spring (April 15 up to June 15)
- Annual grass (rye) at a rate of 40 pounds per acre.

Late spring and early summer (June 16 to August 15)
- Japanese or foxtail millet at a rate of 35 pounds per acre.

Late summer and fall (August 16 and later)
- Annual Rye at a rate of 40 pounds per acre or Winter wheat at a rate of 180 pounds (3 bu) per acre.

Prepare the ground surface apply ground lime stone and fertilizer per Table 5.10 of DER's "Erosion and Sediment Control Program Manual" (page 5.40), Lime at a rate of 6 ton of agriculture limestone per acre and apply 20 lbs. of N (nitrogen), 40 lbs. of N/2 O/2 (Phosphate) of & 40 lbs. of K2O (Potash) per acre or as indicated by soil testing.

If grading is completed developed during non-growing season, October 15 and April 15, disturbed areas shall be covered with straw mulch applied at 3 tons of mulch per acre to produce a loose layer of .75 to 1.0 inch deep per Penn DOT Standards 408.

PERMANENT SEEDING SCHEDULE AND FERTILIZER RATES
Seed will be applied by approved hydro seeding methods to areas that are graded to final section, for slopes less than 10 feet in height and will not be disturbed, Using Kentucky 31 tall fescue, at a rate of 40 pounds per square acre, or, with fine fescue 10 pounds per square acre. Liming of soil shall be per soil testing or 6 ton of agricultural grade limestone per acre and fertilizer added per soil testing or at a rate of 100 lb. of Nitrogen (N) 200 lb. of Phosphate (P/2 O/5) and 200 lb. of Potash (K/2 O) per acre or as indicated by soil testing. Apply 3 tons of straw mulch per acre to produce a loose layer of .75 to 1.0 inch deep or paper mulch per manufacturer's specifications.

PERMANENT SEEDING SCHEDULE STEEP SLOPES OVER 10 FEET HIGH FERTILIZER & LIMING RATES
Seed will be applied by approved hydro seeding methods to areas that are graded to final section, for steep slopes over 10 feet in height which will not be disturbed, Using a mixture of crown vetch, at a rate of 10 pounds per acre and perennial ryegrass, at a rate of 20 pounds per acre. Liming of soil shall be per soil testing or 6 ton of agricultural grade limestone per acre and fertilizer added per soil testing or at a rate of 100 lb. of Nitrogen (N) 200 lb. of Phosphate (P/2 O/5) and 200 lb. of Potash (K/2 O) per acre or as indicated by soil testing. Apply 3 tons of straw mulch per acre to produce a loose layer of .75 to 1.0 inch deep or paper mulch per manufacturer's specifications.
For construction between October and March use straw blanket applied at a rate of 3 ton per acre.

MULCHING SEEDED AREAS.
Immediately after seeding or within 48 hours after seeding is completed. Place straw, wood cellulose over topsoil areas. Use hay, straw or wood cellulose on other areas as indicated in specifications PENNDOT 408, 805.3

ACCD EROSION & SEDIMENT CONTROL PLAN STANDARD NOTES

1. All earth disturbances, including clearing and grubbing as well as cuts and fills shall be done in accordance with the approved E&S plan. A copy of the approved drawings (stamped, signed and dated by the reviewing agency) must be available at the project site at all times. The reviewing agency shall be notified of any changes to the approved plan prior to implementation of those changes. The reviewing agency may require a written submittal of those changes for review and approval at its discretion.

2. At least 7 days prior to starting any earth disturbance activities, including clearing and grubbing, the owner and/or operator shall invite all contractors, the landowner, appropriate municipal officials, the E&S plan preparer, the PCSM plan preparer, the licensed professional responsible for oversight of critical stages of implementation of the PCSM plan, and a representative from the local conservation district to an on-site preconstruction meeting.

3. At least 3 days prior to starting any earth disturbance activities, or expanding into an area previously unmarked, the Pennsylvania One Call System Inc. shall be notified at 1-800-242-1776 for the location of existing underground utilities.

4. All earth disturbance activities shall proceed in accordance with the sequence provided on the plan drawings. Deviation from that sequence must be approved in writing from the local conservation district or by the Department prior to implementation.

5. Areas to be filled are to be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots and other objectionable material.

6. Clearing, grubbing, and topsoil stripping shall be limited to those areas described in each stage of the construction sequence. General site clearing, grubbing and topsoil stripping may not commence in any stage or phase of the project until the E&S BMPs specified by the BMP sequence for that stage or phase have been installed and are functioning as described in this E&S plan.

7. At no time shall construction vehicles be allowed to enter areas outside the limit of disturbance boundaries shown on the plan maps. These areas must be clearly marked and fenced off before clearing and grubbing operations begin.

8. Topsoil required for the establishment of vegetation shall be stockpiled at the location(s) shown on the plan maps(s) in the amount necessary to complete the finish grading of all exposed areas that are to be stabilized by vegetation. Each stockpile shall be protected in the manner shown on the plan drawings. Stockpile heights shall not exceed 35 feet. Stockpile slopes shall be 2H:1V or flatter.

9. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate best management practices to minimize the potential for erosion and sediment pollution and notify the local conservation district and/or the regional office of the Department.

10. All building materials and wastes shall be removed from the site and recycled or disposed of in accordance with the Department's Solid Waste Management Regulations at 25 Pa. Code 260.1 et seq., 271.1, and 287.1 et. seq. No building materials or wastes or unused building materials shall be burned, buried, dumped, or discharged at the site.

11. All off-site waste and borrow areas must have an E&S plan approved by the Allegheny County Conservation District or the Department fully implemented prior to being activated.

12. The contractor is responsible for ensuring that any material brought on site is clean fill. Form FP-001 must be retained by the property owner for any fill material affected by a spill or release of a regulated substance but qualifying as clean fill due to analytical testing. Clean fill includes soil, rock, stone, dredged material, used asphalt and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such. The contractor is responsible for performing environmental due diligence regarding the import of clean fill as defined as: investigative techniques, including, but not limited to, visual property inspections, electronic database searches, review of ownership and use history of property, sanborn maps, environmental questionnaires, transaction screens, analytical testing, environmental assessments and audits.

13. All pumping of water from any work area shall be done according to the procedure described in this plan, over undisturbed vegetated areas.

14. Vehicles and equipment may neither enter directly nor exit directly from site onto Braddock Avenue.

15. Until the site is stabilized, all erosion and sediment BMPs shall be maintained properly. Maintenance shall include inspections of all erosion and sediment BMPs after each runoff event and on a weekly basis. All preventative and remedial maintenance work, including clean out, repair, replacement, regrading, reseeding, remulching and renetting must be performed immediately. If the E&S BMPs fail to perform as expected, replacement BMPs, or modifications of those installed will be required.

16. A log, DEP form 3150-FM-BWEW0083 dated 02/2012, showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

17. Sediment tracked onto any public roadway or sidewalk shall be returned to the construction site by the end of each work day and disposed in the manner described in this plan. In no case shall the sediment be washed, shoveled, or swept into any roadside ditch, storm sewer, or surface water.

18. All sediment removed from BMPs shall be disposed of in the manner described on the plan drawings.

19. Areas which are to be topsoiled shall be scarified to a minimum depth of 3 to 5 inches - 6 to 12 inches on compacted soils - prior to placement of topsoil. Areas to be vegetated shall have a minimum 4 inches of topsoil in place prior to seeding and mulching. Fill outslopes shall have a minimum of 2 inches of topsoil.

20. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence or other related problems. Fill intended to support buildings, structures and conduits, etc. shall be compacted in accordance with local requirements or codes.

21. All earthen fills shall be placed in compacted layers not to exceed 9 inches in thickness.

22. Fill materials shall be free of frozen particles, brush, roots, sod, or other foreign or objectionable materials that would interfere with or prevent construction of satisfactory fills.

23. Frozen materials or soft, mucky, or highly compressible materials shall not be incorporated into fills.

24. Fill shall not be placed on saturated or frozen surfaces.

25. Seeps or springs encountered during construction shall be handled in accordance with the standard and specification for subsurface drain or other approved method.

26. All graded areas shall be permanently stabilized immediately upon reaching finished grade. Cut slopes in competent bedrock and rock fills need not be vegetated. Seeded areas within 50 feet of a surface water, or as otherwise shown on the plan drawings, shall be blanketed according to the standards of this plan.

27. Immediately after earth disturbance activities cease in any area or subarea of the project, the operator shall stabilize all disturbed areas. During non-germinating months, mulch or protective blanketing shall be applied as described in the plan. Areas not at finished grade, which will be reactivated within 1 year, may be stabilized in accordance with the temporary stabilization specifications. Those areas which will not be reactivated within 1 year shall be stabilized in accordance with the permanent stabilization specifications.

28. Permanent stabilization is defined as a minimum uniform, perennial 70% vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated erosion. Cut and fill slopes shall be capable of resisting failure due to slumping, sliding, or other movements.

29. E&S BMPs shall remain functional as such until all areas tributary to them are permanently stabilized or until they are replaced by another BMP approved by the local conservation district or the Department.

30. Upon completion of all earth disturbance activities and permanent stabilization of all disturbed areas, the owner and/or operator shall contact the local conservation district for an inspection prior to removal/conversion of the E&S BMPs.

31. After final site stabilization has been achieved, temporary erosion and sediment BMPs must be removed or converted to permanent post construction stormwater management BMPs. Areas disturbed during removal or conversion of the BMPs shall be stabilized immediately. In order to ensure rapid revegetation of disturbed areas, such removal/conversions are to be done only during the germinating season.

32. Upon completion of all earth disturbance activities and permanent stabilization of all disturbed areas, the owner and/or operator shall contact the local conservation district to schedule a final inspection.

33. Failure to correctly install E&S BMPs, failure to prevent sediment-laden runoff from leaving the construction site, or failure to take immediate corrective action to resolve failure of E&S BMPs may result in administrative, civil, and/or criminal penalties being instituted by the Department as defined in Section 602 of the Pennsylvania Clean Streams Law. The Clean Streams Law provides for up to $10,000 per day in civil penalties, up to $10,000 in summary criminal penalties, and up to $25,000 in misdemeanor criminal penalties for each violation.

34. Concrete wash water shall be handled in the manner described on the plan drawings. In no case shall it be allowed to enter any surface waters or groundwater systems.

35. Erosion control blanketing shall be installed on all slopes 3H: 1V or steeper within 50 feet of a surface water and on all other disturbed areas specified on the plan maps and/or detail sheets.

A log, DEP form 3150-FM-BWEW0083 dated 02/2012. showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

This Drawing shall not be used for tender or construction unless sealed.

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TESSA MICHELE ANTOLICK, PE - 077667

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

designed KGJ
checked MDR
drawn QZ
scale AS NOTED
date 10/22/2018
project no. 180539
graphic scale

drawing title
E&S CONSTRUCTION DETAILS
EROSION AND SEDIMENT CONTROL PLAN

project title
ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

Sheet
C708

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EROSION CONTROL OPERATION & MAINTENANCE SCHEDULE

MINIMUM MAINTENANCE REQUIREMENTS

NOTE: All erosion controls are to be inspected weekly and after each runoff event unless otherwise noted below.
Any deficiencies found during inspection should be repaired or replaced immediately after inspection unless otherwise noted below.

EROSION & SEDIMENT CONTROLS	E&S CONTROLS APPLICABLE TO THIS PLAN					
BMP's		INSPECT	CLEAN	REPAIR	REPLACE	DESCRIPTION
SILT SOCKS	X	WEEKLY AND EVERY RUNOFF EVENT	SEDIMENT 1/2 BARRIER HEIGHT	WITHIN 24 HOURS	6 MONTHS IF SOCK BIODEGRADABLE 1 YEAR IF SOCK PHOTODEGRADABLE POLYPROPYLENE SOCKS ACCORDING TO MANUFACTURERS RECOMMENDATIONS	1. Compost filter sock shall be inspected weekly and after each runoff event. Damaged sock shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection. 2. Biodegradable compost filter socks shall be replaced after 6 months. Photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations. 3. Accumulated sediment shall be removed when it reaches ½ the above ground height of the barrier and disposed in the manner described in the plan. 4. Upon stabilization of the area tributary to the sock, stakes shall be removed, the sock may be left in place and vegetated or removed by cutting open the mesh and spreading the mulch as a soil supplement.
SILT FENCE		WEEKLY AND EVERY RUNOFF EVENT	SEDIMENT 1/2 BARRIER HEIGHT	IMMEDIATELY	WHEN TOPPED OR UNDERMINED IMMEDIATELY WITH ROCK FILTER OUTLET	1. Filter fence shall be inspected weekly and after each runoff event. Any fence section which has been undermined or topped shall be immediately replaced with a rock filter outlet. 2. Accumulated sediment shall be removed when it reaches ½ the above ground height of the barrier and disposed in the manner described in the plan. 3. Upon stabilization of the area tributary to the fence, fence shall be removed, and properly disposed of in a DEP approved facility.
ROCK CONSTRUCTION ENTRANCE	X	DAILY	DAILY	AS NECESSARY	AS NECESSARY	1. The structure's thickness will be constantly maintained to the specified dimension by adding rock. A stockpile of rock material shall be maintained on site for this purpose. 2. All sediment deposits on paved roadways, will be removed and returned to the construction site immediately. If excessive amounts of sediment are being deposited on roadway extend length of rock construction entrance by 50 foot increments until condition is alleviated or install wash rack. 3. Washing of the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable.
CONCRETE WASHOUT	X	DAILY	75% OF CAPACITY	IMMEDIATELY	DAMAGED OR LEAKING WASHOUT IMMEDIATELY LINER WITH EACH CLEANING	1. All concrete washout facilities should be inspected daily. Damaged or leaking washouts should be deactivated and repaired or replaced immediately. 2. Accumulated materials should be removed when they reach 75% capacity. Plastic liners should be replaced with each cleaning of the washout facility.
CHANNELS	X	WEEKLY AND EVERY RUNOFF EVENT	DEPOSITS WITHIN 24 HOURS 1/4 FULL OF SEDIMENT	LINING WITHIN 48 HOURS	LINING WITHIN 48 HOURS	1. Channel dimensions shall be constantly maintained. Channels shall be cleaned whenever total channel depth is reduced by 1/4 at any location. Sediment deposits shall be removed within 24 hours of discovery or as soon as soil conditions permit access to channel without further damage. Damaged lining shall be repaired or replaced within 48 hours of discovery. No more than 1/3 of the shoot (grass leaf) shall be removed in any mowing. Grass height shall be maintained between 2 and 3 inches unless otherwise specified. Excess vegetation shall be removed from permanent channels to ensure sufficient channel capacity.
SEDIMENT TRAP	X	WEEKLY AND EVERY RUNOFF EVENT	CLEAN OUT ELEVATION=______	IMMEDIATELY	RIPRAP REPLACE IMMEDIATELY	1. All sediment traps shall be inspected on a weekly basis and after each runoff event. Accumulated sediment shall be removed when it has reached the clean out elevation on the stake and the basin restored to its original dimensions. Trap embankments,spillways and outlets shall be checked for erosion, piping and settlement. Clogged or damaged spillways shall be repaired immediately. Accumulated sediment shall be removed and disturbed areas inside the trap stabilized before conversion to a stormwater management facility. Trash and debris shall be removed from the trap and riser. Displaced riprap within the spillway and/or outlet channel shall be replaced immediately.
SEDIMENT BASIN		WEEKLY AND EVERY RUNOFF EVENT	CLEAN OUT ELEVATION=______	IMMEDIATELY	RIPRAP REPLACE IMMEDIATELY	1. All sediment basins shall be inspected on a weekly basis and after each runoff event. Accumulated sediment shall be removed when it has reached the clean out elevation on the stake and the basin restored to its original dimensions. Basin embankments,spillways and outlets shall be checked for erosion, piping and settlement. Clogged or damaged spillways shall be repaired immediately. Accumulated sediment shall be removed and disturbed areas inside the basin stabilized before conversion to a stormwater management facility. Trash and debris shall be removed from the basin and riser. Displaced riprap within the spillway and/or outlet channel shall be replaced immediately.
EROSION CONTROL MAT/BLANKET	X	WEEKLY AND EVERY RUNOFF EVENT	N/A	WITHIN 4 DAYS	WITHIN 4 DAYS	1. Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to a minimum uniform 70% coverage throughout the blanketed area. 2. Damaged sediment filter logs shall be replaced within 4 calendar days of inspection.
PUMPED WATER FILTER BAG		DAILY	N/A	IMMEDIATELY	1/2 FULL OF SEDIMENT	1. Filter bags shall be replaced when bag is 1/2 full of sediment. Spare bags shall be kept available for replacement of those that have failed or are filled. Bags shall be placed on straps to facilitate removal unless bags come with lifting straps already attached. 2. The pump discharge hose shall be inserted into the bags in a manner specified by the manufacturer and securely clamped. A piece of PVC pipe is recommended for this purpose. The pumping rate shall be no greater than 750 gpm or 1/2 the maximum specified by the manufacturer which ever is less. Pump intakes shall be floating and screened. 3. Filter bags should be inspected daily. If any problem is detected, pumping shall cease immediately and not resume until the problem is corrected.
CONSTRUCTION VEHICLE CROSSING		DAILY	DAILY	IMMEDIATELY	IMMEDIATELY	1. The structure's thickness will be constantly maintained to the specified dimension by adding rock. A stockpile of rock material will be maintained on the site for this purpose. 2. After each runoff event, the inlet & outlet condition of the temporary pipe should be evaluated and any "wash-out" areas immediately repaired with compacted backfill materials.
INLET PROTECTION		WEEKLY AND EVERY RUNOFF EVENT	1/2 FULL OF SEDIMENT OR IF FLOODING OCCURS OR IF WATER BYPASSES THE INLET	IMMEDIATELY	IMMEDIATELY	1. Inspect filter bags weekly and after every runoff event. Filter bags shall be emptied, rinsed and/or replaced when bag is 1/2 full or when flow capacity has been reduced so as to cause flooding or bypassing the inlet. Damaged or clogged bags shall be replaced. A supply shall be maintained onsite for replacement of bags. All needed repairs shall be initiated immediately after the inspection. Dispose of accumulated sediment as well as all used bags according to the plan notes.
SEDIMENT FILTER LOG		WEEKLY AND EVERY RUNOFF EVENT	SEDIMENT 1/2 BARRIER HEIGHT	WITHIN 24 HOURS	WITHIN 24 HOURS	1. Sediment filter logs shall be inspected weekly and after each runoff event. 2. Accumulated sediment shall be removed when it reaches ½ the above ground height of the barrier and disposed in the manner described in the plan. 3. Damaged sediment filter logs shall be replaced within 24 hours of inspection.
ROCK APRONS		WEEKLY AND EVERY RUNOFF EVENT	TRASH AND DEBRIS RECYCLED OR DISPOSED OF IN DEP APPROVED FACILITY	IMMEDIATELY	RIPRAP REPLACE IMMEDIATELY	1. Sediment shall be removed when accumulations reach 1/2 the height of the outlet. 2. Materials must be washed completely free of all foreign materials or new rock used to rebuild the filter.
SPILLWAY	X	WEEKLY AND EVERY RUNOFF EVENT	TRASH AND DEBRIS RECYCLED OR DISPOSED OF IN DEP APPROVED FACILITY	IMMEDIATELY	RIPRAP REPLACE IMMEDIATELY	1. Sediment shall be removed when accumulations reach 1/2 the height of the outlet. 2. Materials must be washed completely free of all foreign materials or new rock used to rebuild the filter.
BAFFLES		WEEKLY AND EVERY RUNOFF EVENT	N/A	N/A	WITHIN 7 DAYS	1. In pools with depths exceeding 7', the top of the plywood baffle does not need to extend to the temporary riser crest. Super silt fence baffles need not extend to TRCE elevation. 2. Baffles shall be tied into one side of the basin unless otherwise shown on the plan drawings. 3. Substitution of materials not specified in this detail shall be approved by the department or the local conservation district before installation. 4. Damaged or warped baffles shall be replaced within 7 days of inspection. 5. Baffles requiring support posts shall not be installed in basins requiring impervious liners.
UTILITY TRENCH CONTROLS		WEEKLY AND EVERY RUNOFF EVENT	SEDIMENT 1/2 BARRIER HEIGHT	AS NECESSARY	AS NECESSARY	1. Clean and rake areas where excavated materials have been stockpiled to original vegetation. 2. Backfill, seed and mulch any washout areas as necessary to assure reestablishment of a perenial vegetative cover over disturbed areas. 3. Maintain silt barrier fence/hay bale barriers as specified above.

EROSION CONTROL SITE MAINTENANCE REPORT

Contractor is required to establish a maintenance schedule log, documenting, but not limited to, the following information:

1. Individual or individuals responsible for preparation of report and maintenance of Erosion Controls.
2. Date of Erosion Control review, findings and recomendations.
3. Basic statement as to the effectiveness of the controls with specific attention given to problem areas.

GENERAL INFORMATION

1. Construction and materials shall be in accordance with PennDOT Publication 408, current edition.
2. Grading of site shall be done in increments so that entire site will not be open at one time.
3. As disturbed areas are completed, seed/mulched within 24 hours to establish permanent vegetation.
4. All disturbed areas and stockpiled earth exposed for 7 days or more, with no activity shall be seeded and mulched with a temporary vegetative cover. See DEP Standard Worksheet #21

FINAL SITE STABILIZATION REPAIR PARAMATERS	
AREAS DISTURBED DURING REMOVAL OR CONVERSION SHALL BE STABILIZED IMMEDIATELY. REMOVAL OR CONVERSION ARE TO BE DONE ONLY DURING THE GERMINATING SEASON.	
TEMPORARY E&S BMPs TO BE REMOVED AS PER PLAN	NO CONVERSION OF TEMPORARY E&S BMP's
ROCK CONSTRUCTION ENTRANCE, EROSION CONTROL BLANKET, SILT SOCK, PUMPED FILTER BAG, SEDIMENT BASIN, UNDERGROUND SEDIMENT TRAP	SED. TRAP TO REMAIN AFTER SITE STABILIZATION. TRAP WILL OPERATE AS OVERSIZED PIPE.
ANY REPAIR OR REMOVAL OF BMPs DURING REQUIRED MAINTENANCE WHICH CAUSES DAMAGE TO DESIGN DIMENSIONS WILL BE CORRECTED BY REPLACEMENT, REGRADING, RESTABILIZATION, ETC. IMMEDIATELY.	

A log, DEP form 3150-FM-BWEW0083 dated 02/2012. showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

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I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TESSA MICHELE ANTOLICK, PE - 077667

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

designed	KGJ	scale	AS NOTED
checked	MDR	date	10/22/2018
drawn	QZ	project no.	180539
graphic scale			

drawing title
CONSTRUCTION DETAILS
EROSION AND SEDIMENT CONTROL PLAN

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

project title
ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet
C709

P:\Merrion Oil & Gas\180539-1-1-ET Braddock 1H\Drwg\Production\E&S (24x36)\180539-ES-C709.dwg Plotted: October 19, 2018

TABLE 11.1

CUBIC YARDS OF TOPSOIL REQUIRED FOR APPLICATION TO VARIOUS DEPTHS

Depth (in)	Per 1000 Square Feet	Per Acre
1	3.1	134
2	6.2	268
3	9.3	403
4	12.4	537
5	15.5	672
6	18.6	806
7	21.7	940
8	24.8	1074

TABLE 11.2

SOIL AMENDMENT APPLICATION RATE EQUIVALENTS

SOIL AMENDMENT	PERMANENT SEEDING APPLICATION RATE			NOTES
	PER ACRE	PER 1,000 SQ.FT.	PER 1,000 SQ.YD.	
AGRICULTURAL LIME	6 TONS	240 LB.	2,480 LB.	OR AS PER SOIL TEST; MAY NOT BE REQUIRED IN AGRICULTURAL FIELDS
10–20–20 FERTILIZER	1,000 LB.	25 LB.	210 LB.	OR AS PER SOIL TEST; MAY NOT BE REQUIRED IN AGRICULTURAL FIELDS
	TEMPORARY SEEDING APPLICATION RATE			
AGRICULTURAL LIME	1 TON	40 LB.	410 LB.	TYPICALLY NOT REQUIRED FOR TOPSOIL STOCKPILES
10–10–10 FERTILIZER	500 LB.	12.5 LB.	100 LB.	TYPICALLY NOT REQUIRED FOR TOPSOIL STOCKPILES

ADAPTED FROM PENN STATE, "EROSION CONTROL AND CONSERVATION PLANTINGS ON NON-CROPLAND."

NOTE: A COMPOST BLANKET WHICH MEETS THE STANDARDS OF THIS CHAPTER MAY BE SUBSTITUTED FOR THE SOIL AMENDMENTS SHOWN IN TABLE 11.2 REVISION OF FERTILIZER TYPE TO 10-20-20. MISPRINT WAS BROUGHT TO ATTENTION ON THE COMMENT SHEET FROM JANUARY 14, 2015 FROM THE ALLEGHENY COUNTY CONSERVATION DISTRICT.

TABLE 11.3

PLANT TOLERANCES OF SOIL LIMITATION FACTORS

SPECIES	GROWTH HABIT (1)	TOLERATES				MINIMUM SEED SPECIFICATIONS (3)				
		WET SOIL	DRY SITE	LOW FERTILITY	ACID SOIL (pH 5–5.5) (2)	PURITY (%)	READY GERM (%)	HARD SEED (%)	TOTAL GERM (%)	SEEDS/LB (1,000s)
WARM–SEASON GRASSES										
DEERTONGUE	BUNCH	YES	YES	YES	YES	95	75		75	250
WEEPING LOVEGRASS	BUNCH	NO	YES	YES	YES	97	75		75	1,500
SWITCHGRASS (4)	BUNCH	YES	YES	YES	NO	(60 PLS)				390
BIG BLUESTERN	BUNCH	NO	YES	YES	YES	(60 PLS)				150
COOL–SEASON GRASSES										
TALL FESCUE	BUNCH	YES	NO	YES	NO	95	80		80	227
REDTOP	SOD	YES	YES	YES	YES	92	80		80	5,000
FINE FESCUES	SOD	NO	NO	YES	NO	95	80		80	400
PERENNIAL RYEGRASS	BUNCH	YES	NO	NO	NO	95	85		85	227
ANNUAL RYEGRASS	BUNCH	YES	NO	YES	NO	95	85		85	227
KENTUCKY BLUEGRASS	SOD	NO	NO	NO	NO	85	75		75	2,200
REED CANARYGRASS	SOD	YES	YES	YES	NO	95	70		70	520
ORCHARDGRASS	BUNCH	YES	YES	YES	YES	95	80		80	654
TIMOTHY	BUNCH	YES	NO	YES	YES	95	80		80	1,230
SMOOTH BROMEGRASS	SOD	NO	YES	YES	NO	95	80		80	136
LEGUMES (5)										
CROWNVETCH	SOD	NO	YES	YES	NO	98	40	30	65	120
BIRDSFOOT TREFOIL (6)	BUNCH	YES	NO	YES	YES	98	60	20	80	400
FLATPEA	SOD	NO	NO	YES	YES	98	55	20	75	10
SERECIA LESPEDEZA	BUNCH	NO	YES	YES	YES	98	60	20	80	335
CEREALS										
WINTER WHEAT	BUNCH	NO	NO	NO	NO	98	85		85	15
WINTER RYE	BUNCH	NO	NO	YES	YES	98	85		85	18
SPRING OATS	BUNCH	NO	NO	NO	NO	98	85		85	13
SUNDANGRASS	BUNCH	NO	YES	NO	NO	98	85		85	55
JAPANESE MILLET	BUNCH	YES	NO	YES	YES	98	80		80	155

(1) GROWTH HABIT REFERS TO THE ABILITY OF THE SPECIES TO EITHER FORM A DENSE SOD BY VEGETATIVE MEANS (STOLONS, RHIZOMES, OR ROOTS) OR REMAIN IN A BUNCH OR SINGLE PLANT FORM. IF SEEDED HEAVILY ENOUGH, EVEN BUNCH FORMERS CAN PRODUCE A VERY DENSE SOD. THIS IS SOMETIMES CALLED A SOD, BUT NOT IN THE SENSE OF A SOD FORMED BY VEGETATIVE MEANS.

(2) ONCE ESTABLISHED, PLANTS MAY GROW AT A SOMEWHAT LOWER pH, BUT COVER GENERALLY IS ONLY ADEQUATE AT pH 6.0 OR ABOVE.

(3) MINIMUM SEED LOTS ARE TRULY MINIMUM, AND SEED LOTS TO BE USED FOR REVEGETATION PURPOSES SHOULD EQUAD OR EXCEED THESE STANDARDS. THUS, DEERTONGUE GRASS SHOULD GERMINATE 75% OR BETTER. CROWNVETCH WHOULD HAVE AT LEAST 40% READILY GERMINABLE SEED AND 30% HARD SEED. COMMONLY, SEED LOTS ARE AVAILABLE THAT EQUAL OR EXCEED MINIMUM SPECIFICATIONS. REMEMBER THAAT DISTURBED SITES ARE ADVERSE FOR PLANT ESTABLISHMENT. READY GERMINATION REFERS TO SEED THAT GERMINATES DURING THE PERIOD OF THE GERMINATION TEST AND THAT WOULD BE EXPECTED, IF CONDITIONS ARE FAVORABLE, TO GERMINATE RAPIDLY WHEN PLANTED. THE OPPOSITE OF READY GERMINATION IS DORMANT SEED, OF WHICH HARD SEED IS ONE TYPE.

(4) SWITCHGRASS SEED IS SOLD ONLY ON THE BASES OF PLS.

(5) NEED SPECIFIC LEGUME INNOCULANT. INNOCULANT SUITABLE FOR GARDEN PEAS AND SWEETPEASE USUALLY IS SATISFACTORY FOR FLATPEA.

(6) BIRDSFOOT TREFOIL IS ADAPTED OVER THE ENTIRE STATE, EXCEPT IN THE EXTREME SOUTHEAST WHERE CROWN AND ROOT ROTS MAY INJURE STANDS.

ADAPTED FROM PENN STATE, "EROSION CONTROL AND CONSERVATION PLANTINGS ON NON-CROPLAND."

TABLE 11.4

RECOMMENDED SEED MIXTURES

MIXTURE NUMBER	SPECIES	SEEDING RATE – PURE LIVE SEED (1)	
		MOST SITES	ADVERSE SITES
1 (2)	SPRING OATS (SPRING), OR	64	96
	ANNUAL RYEGRASS (SPING OR FALL), OR	10	15
	WINTER WHEAT (FALL), OR	90	120
	WINTER RYE (FALL)	56	112
2 (3)	TALL FESCUE, OR	60	75
	FINE FESCUE, OR	35	40
	KENTUCKY BLUEGRASS, PLUS	25	30
	REDTOP (4), OR	3	3
	PERENNIAL RYEGRASS	15	20
3	BIRDSFOOT TREFOIL, PLUS	6	10
	TALL FESCUE	30	15
4	BIRDSFOOT TREFOIL, PLUS	6	10
	REED CANARYGRASS	10	15
5 (8)	CROWNVETCH, PLUS	10	15
	TALL FESCUE, OR	20	25
	PERENNIAL RYEGRASS	20	25
6 (5),(8)	CROWNVETCH, PLUS	10	15
	ANNUAL RYEGRASS	20	25
7 (8)	BIRDSFOOT TREFOIL, PLUS	6	10
	CROWNVETCH, PLUS	10	15
	TALL FESCUE	20	30
8	FLATPEA, PLUS	20	30
	TALL FESCUE, OR	20	30
	PERENNIAL RYEGRASS	20	25
9 (6)	SERECIA LESPEDEZA, PLUS	10	20
	TALL FESCUE, PLUS	20	25
	REDTOP	3	3
10	TALL FESCUE, PLUS	40	60
	FINE FESCUE	10	15
11	DEERTONGUE, PLUS	15	20
	BIRDSFOOT TREFOIL	6	10
12 (7)	SWITCHGRASS, OR	15	20
	BIG BLUESTREAM, PLUS	15	20
	BIRDSFOOT TREFOIL	6	10
13	ORCHARDGRASS, OR	20	30
	SMOOTH BROMEGRASS, PLUS	25	35
	BIRDSFOOT TREFOIL	6	10

(1) PLS IS THE PRODUCT OF THE PERCENTAGE OF PURE SEED TIMES PERCENTAGE GERMINATION DIVIDED BY 100. FOR EXAMPLE, TO SECURE THE ACTUAL PLANTING RATE FOR SWITCHGRASS, DIVIDE 12 POUNDS PLS SHOWN ON THE SEED TAG. THUS, IF THE PLS CONTENT OF A GIVEN SEED LOT IS 35%, DIVIDE 12 pls BY 0.35 TO OBTAIN 34.3 POUNDS OF SEED REQUIRED TO PLANT ONE ACRE. ALL MIXTURES IN THIS TABLE ARE SHOWN IN TERMS OF PLS.

(2) IF HIGH-QUALITY SEED IS USED, FOR MOST SITES SEED SPRING OATS AT A RATE OF 2 BUSHELS PER ACRE, WINTER WHEAT AT 11.5 BUSHELS PER ACRE, AND WINTER RYE AT 1 BUSHEL PER ACRE. IF GERMINATION IS BELOW 90%, INCREASE THESE SUGGESTED SEEDING RATES BY 0.5 BUSHEL PER ACRE.

(3) THIS MUXTURE IS SUITABLE FOR FREQUENT MOWING. DO NOT CUT SHORTER THAN 4 INCHES.

(4) KEEP SEEDING RATE TO THAT RECOMMENDED IN TABLE. THESE SPECIES HAVE MANY SEEDS PER POUND AND ARE VERY COMPETITIVE. TO SEED SMALL QUANTITIES OF SMALL SEEDS SUCH AS WEEPING LOVEGRASS AND REDTOP, DILUTE WITH DRY SAWDUST, SAND, RICE HULLS, BUCKWHEAT HULLS, ETC.

(5) USE FOR HIGHWAY SLOPES AND SIMILAR SITES WHERE THE DESIRED SPECIES AFTER ESTABLISHMENT IS CROWNVETCH.

(6) USE ONLY IN EXTREME SOUTHEASTERN OR EXTREME SOUTHWESTERN PENNSYLVANIA. SERECIA LESPEDEZA IS NOT WELL-ADAPTED TO MOST OF PENNSYLVANIA.

(7) DO NOT MOW SHORTER THAN 9 TO 10 INCHES.

(8) SEED MIXTURES CONTAINING CROWN VETCH SHOULD NOT BE USED IN AREAS ADJACENT TO WETLANDS OR STREAM CHANNELS DUE TO THE INVASIVE NATURE OF THIS SPECIEA

ADAPTED FROM PENN STATE, "EROSION CONTROL AND CONSERVATION PLANTINGS ON NON-CROPLAND."

TABLE 11.5

RECOMMENDED SEED MIXTURES FOR STABILIZING DISTURBED AREAS

SITE CONDITION	NURSE CROP	SEED MIXTURE (SELECT ONE MIXTURE)
SLOPES AND BANKS (NOT MOWED)		
WELL DRAINED	1 PLUS	3, 5, 8, OR 12 (1)
VARIABLE DRAINAGE	1 PLUS	3 OR 7
SLOPES AND BANKS (MOWED)		
WELL DRAINED	1 PLUS	2 OR 10
SLOPES AND BANKS (GRAZED / HAY)		
WELL–DRAINED	1 PLUS	2, 3, OR 13
GULLIES AND ERODED AREAS	1 PLUS	3, 5, 7, OR 12 (1)
EROSION CONTROL FACILITIES (BMP's)		
SOD WATERWAYS, SPILLWAYS, FREQUENT WATER FLOW AREAS	1 PLUS	2, 3, OR 4
DRAINAGE DITCHES		
SHALLOW, LESS THAN 3 FEET DEEP	1 PLUS	2, 3, OR 4
DEEP, NOT MOWED	1 PLUS	5 OR 7
POND BANKS, DIKES, LEVEES, DAMS, DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS		
MOWED AREAS	1 PLUS	2 OR 3
NON–MOWED AREAS	1 PLUS	5 OR 7
FOR HAY OR SILAGE ON DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS	1 PLUS	3 OR 13
HIGHWAYS (2)		
NON–MOWED AREAS		
PURE CROWNVETCH (3)	1 PLUS	5 OR 6
WELL–DRAINED	1 PLUS	5, 7, 8, 9, OR 10
VARIABLE–DRAINED	1 PLUS	3 OR 7
AREAS MOWED SEVERAL TIMES A YEAR	1 PLUS	2, 3, OR 10
UTILITY RIGHT–OF–WAY		
WELL–DRAINED	1 PLUS	5, 8, OR 12 (1)
VARIABLE–DRAINED	1 PLUS	3 OR 7
WELL–DRAINED AREAS FOR GRAZING / HAY	1 PLUS	2, 3, OR 13
EFFLUENT DISPOSAL AREAS	1 PLUS	3 OR 4
SANITARY LANDFILLS	1 PLUS	3, 5, 7, 11 (1), OR 12 (1)
SURFACE MINES		
SPOILS, MINE WASTS, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST)	1 PLUS	3,4,5,7,8,9, 11 (1), OR 12 (1)
SEVERELY DISTURBED AREAS FOR GRAZING / HAY	1 PLUS	3 OR 13

(1) FOR SEED MIXTURES 11 AND 12, ONLY USE SPRING OATS OR WEEPING LOVEGRASS (INCLUDED IN MIX) AS NURSE CROP.

(2) CONTACT THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION DISTRICT ROADSIDE SPECIALIST FOR SPECIFIC SUGGESTIONS ON TREATMENT TECHNIQUES AND MANAGEMENT PRACTICES.

(3) SEED MIXTURES CONTAINING CROWNVETCH SHOULD NOT BE USED IN AREAS ADJACENT TO WETLANDS OR STREAM CHANNELS DUE TO THE INVASIVE NATURE OF THIS SPECIES.

ADAPTED FROM PENN STATE, "EROSION CONTROL AND CONSERVATION PLANTINGS ON NON-CROPLAND."

STANDARD WORKSHEET #21
Temporary and Permanent Stabilization Specifications

PROJECT NAME: Merrion Oil & Gas ET Braddock 1H
LOCATION: East Pittsburgh Borough, Allegheny County
PREPARED BY: APT DATE:
CHECKED BY: MDK DATE:

SPECIFICATIONS: The Department recommends the use of the Penn State publication "Erosion Control & Conservation Plantings on Non-cropland" as the standard to use for the selection of species, seed specifications, mixtures, liming and fertilizing, time of seeding, and seeding methods. Specifications for these items may also be obtained from Penn DOT's Publication # 408, Section 804 or by contacting the applicable county conservation district. Upon selection of a reference, that reference must be used to provide all specifications for seeding, mulching, and soil amendments. The following specification will be used for this project:

(TEMPORARY)
SPECIES: Annual Rye
% PURE LIVE SEED: 95 %
APPLICATION RATE: 40 LB. /ACRE
FERTILIZER TYPE: 5-10-10 (X-X-X)
FERTILIZER APPL. RATE: 30 LB. /ACRE
LIMING RATE: 6 T. /ACRE
MULCH TYPE: Straw
MULCHING RATE: 3 T. /ACRE

(PERMANENT)
SPECIES: (Kentucky 31) Tall Fescue
% PURE LIVE SEED: 98 %
APPLICATION RATE: 40 LB. /ACRE
FERTILIZER TYPE: 5-10-10 (X-X-X)
FERTILIZER APPL. RATE: (Per Testing) Minimum 30 LB. /ACRE
LIMING RATE: 6 T. /ACRE
MULCH TYPE: Straw
MULCHING RATE: 3 T. /ACRE
ANCHOR MATERIAL: Nonasphaltic Emulsion
ANCHORING METHOD: Spray
RATE OF ANCHOR MATERIAL APPL.: 100 gallons per acre LB. /ACRE
SEEDING SEASON DATES: April-September

(PERMANENT – STEEP SLOPE)
SPECIES: Crown Vetch
% PURE LIVE SEED: 99 %
APPLICATION RATE: 10 LB. /ACRE
FERTILIZER TYPE: 5-10-10 (X-X-X)
FERTILIZER APPL. RATE: (Per Testing) 30 LB. /ACRE
LIMING RATE: 6 T. /ACRE
MULCH TYPE: Straw
MULCHING RATE: 3 T. /ACRE
ANCHOR MATERIAL: Nonasphaltic Emulsion
ANCHORING METHOD: Spray
RATE OF ANCHOR MATERIAL APPL.: 100 gallons per acre LB. /ACRE
SEEDING SEASON DATES: April-September

*If more than one species is used, indicate application rate for each species.

A log, DEP form 3150-FM-BWEW0083 dated 02/2012. showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

This Drawing shall not be used for tender or construction unless sealed.

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TESSA MICHELE ANTOLICK, PE - 077667

This drawing, its contents, and each component of this drawing are the property of and proprietary to ARM Group Inc. and shall not be reproduced or used in any manner except for the purpose identified on the Title Block, and only by or on behalf of this client for the identified project unless otherwise authorized by the express, written consent of ARM Group Inc.

ARM Group Inc.
Engineers and Scientists
www.armgroup.net

No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

designed KGJ
checked MDR
drawn QZ
graphic scale
scale AS NOTED
date 10/22/2018
project no. 180539

drawing title: CONSTRUCTION DETAILS
EROSION AND SEDIMENT CONTROL PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet C710

Z:\Merrion Oil & Gas\180539-1-1 ET Braddock 1H\Dwg\Production\E&S\230-501180539-ESC-C710.dwg Plotted: October 18, 2018

APPENDIX E

Site Restoration Plan/Post-Construction Stormwater Management (PCSM) Plan

A R M G r o u p I n c .

POST CONSTRUCTION STORMWATER MANAGEMENT / SITE RESTORATION PLAN

ET - Braddock Well Pad

ARM Project No. 180539

East Pittsburgh Borough, North Braddock Borough, & North Versailles Twp.
Allegheny County, Pennsylvania

Submitted to:

Pennsylvania Department of Environmental Protection
Southwest District Oil & Gas Operations
400 Waterfront Dr.
Pittsburgh, PA 15222

Prepared for:

MERRION
OIL & GAS

Prepared by:

ARM Group Inc.
Engineers and Scientists

October 2018

Note: The original Erosion and Sediment Control Plan was prepared and submitted by Trant Corporation. ARM Group Inc. has prepared responses to the PADEP's Administrative Incompleteness letter and, in doing so, has applied minor modifications to the E&S design, narrative and corresponding drawings contained herein.

POST CONSTRUCTION STORMWATER MANAGEMENT / SITE RESTORATION PLAN

ET - Braddock Well Pad

ARM Project No. 180539

East Pittsburgh Borough, North Braddock Borough, & North Versailles Twp.
Allegheny County, Pennsylvania

Submitted to:

Department of Environmental Protection
Bureau of Oil and Gas Management
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

Prepared for:

Merrion Oil & Gas
610 Reilly Ave
Farmington, NM 87401

Prepared by:

ARM Group Inc.
2548 Park Center Boulevard
State College, PA 16801

October 2018

I do hereby Certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

Respectfully submitted:

Tessa M. Antolick

Tessa M. Antolick, P.E.
Senior Engineer

ET - Braddock Well Pad
North Versailles Township, East Pittsburgh Borough, and North Braddock Borough, Allegheny County

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  - 1.4.2 Emergency Spillway
  - 1.4.3 Outlet Protection / Level Spreader
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- 3.1 PSCM Phase Calculations
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4.0 Emergency Spillway Calculations

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6.0 Stormwater Facilities Maintenance and Inspection Plan

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Infiltration Testing
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ET - Braddock Well Pad
North Versailles Township, East Pittsburgh Borough, and North Braddock Borough, Allegheny County

1.0 PROJECT NARRATIVE

1.1 Project Description

The Merrion Oil and Gas ET – Braddock Well Pad at USS Edgar Thomson is a proposed unconventional well site located on the south side of Braddock Avenue. The property is located at the junction of North Versailles Township, East Pittsburgh Borough, and North Braddock Borough, Allegheny County (See Site Location Map). The stormwater retention facilities will be in East Pittsburgh Borough. The current plans of the project includes the construction of an unconventional gas well and pad to supply natural gas to the US Steel facility. Excess gas would be sold back to the gas provider. Construction also includes the well pad, access roads, utilities, stormwater facilities, etc. necessary for the development. This stormwater management report details the calculation and design for the project.

This report will address the stormwater management controls for the ET - Braddock Well Pad project and will focus on flows at Points of Interest (POI) 1 and 2. POI 1 is located at the discharge point of the site's stormwater runoff at the Eastern edge of the project watershed boundary. POI 2 is located at a stormwater inlet to the storm sewer along Braddock Ave.

POI 1 runoff flows towards Turtle Creek, which is classified as "WWF" by chapter 93, Water Quality Standards, Drainage list V. Turtle Creek is within the Turtle Creek minor plan, the Monongahela River major plan and is part of the Ohio River basin. The watershed has an established 167 plan. (see Watershed Location Map). Turtle Creek is listed as impaired for Aquatic Life with the source causes listed as: Abandoned mine drainage - Siltation. TMDL requirements listed for this stream are for metals and pH. Turtle Creek is not listed as a high quality (HQ) or exceptional Value (EV) watershed. The topography for the site contains primarily gentle slopes with some moderate and steep slopes included. Past and existing land use is entirely urban, industrial, comprised mostly of disturbed earth, gravel, asphalt, and buildings. The site is subject to a release rate of 100%. The total watershed analyzed for the site is 10.6 Acres.

This plan will address the stormwater management controls necessary for the above construction as shown on the project plans. Currently there are no known existing stormwater facilities on site.

Through the use of BMP's all attempts were made to preserve the physical, biological and chemical qualities of the Turtle Creek, as well as minimizing impervious areas, land clearing, soil compaction and minimizing the changes in stormwater runoff while preserving existing natural features. No known geologic conditions exist on site which will cause excessive erosion. Conditions on site that may potentially lead to contaminated runoff are: elevated pH, elevated

BMPs are proposed for the site and efforts will be taken to minimize infiltration from storage BMPs and potential resulting impacts to groundwater. These conditions are being mitigated through the use of an impermeable PVC liner for all stormwater storage BMP's and discharge being contained on-site through the use of a level spreader. Potential thermal impacts are mitigated as both the volume and rate of runoff on site is reduced due to the proposed stormwater facilities. Proposed shade trees will aid in cooling the permanent pool in the retention pond. All construction will be in accordance with applicable township, county, and state requirements. This project is expected to begin upon receipt of necessary approvals and permits.

The Landowner(s) and/or Responsible Official(s) of the above mentioned property are as follows:	**The Plan Preparer of this project is as follows:**
Merrion Oil and Gas	Trant Corporation
610 Reilly Ave.	11279 Perry Hwy – Suite 206
Farmington, NM 87401	Wexford, PA 15090
Contact: Ryan Davis	Contact: Matt Kneidel
Phone: 505-402-5798 215-3292	Phone: 724-935-7900

1.2 Soils Information

SOILS:
USDA Soil Conservation Service – Soil Survey of Butler County Pennsylvania

UB-Urban Land and URB-Urban Land Rainsboro Complex:
Urban soils are located in areas that have been so altered by earthmoving activities or so obscured by buildings that the original soils cannot be identified. Depth, strength, and wetness are variable and onsite investigation may be required to determine suitability of land use. Other soils may have to be mixed with these soils to address strength and wetness limitations.

GQF—Gilpin-Upshur complex, very steep:
The Gilpin component makes up 45 percent of the map unit. Slopes are 25 to 75 percent. This component is on uplands, hillslopes. The parent material consists of acid fine-loamy residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. This soil does not meet hydric criteria. The Upshur component makes up 35 percent of the map unit. Slopes are 25 to 75 percent. This component is on hillslopes, uplands. The parent material consists of clayey residuum weathered from limestone and shale. Depth to a root restrictive layer, bedrock, lithic, is 40 to 70 inches. The natural drainage class is well drained. This soil does not meet hydric criteria.

<u>Summary of Soil Limitation Precautionary Measures for BMP Construction</u>

1. **Cutbanks Cave** (Urban/Gilpin).
    a. Erosion control blanketing will be installed on all slopes 3:1 and greater to aid the establishment of vegetative stabilization on steep slopes prone to rapid runoff and

high erodibility.

b. Collection channels or swales are used to carry runoff around work areas and newly graded steep slopes to help decrease soil saturation, erosion and rapid runoff.
c. Weak soils are to be mixed with other soils for strength under the direction of a soils engineer.
d. Slope benches at 30' vertical intervals will be installed on all fill slopes 3:1 or steeper and more than 40' high unless directed differently by a licensed geotechnical engineer.
e. Specific seeding and mulching specifications have been outlined on Standard Worksheet #7 to address soil nutrients and increase the speed of vegetative stabilization.

2. **Corrosive to Concrete\Steel** (Urban/Gilpin).
   a Sediment control BMPs will use a Sediment Storage Dewatering Facility or Pumped Water Filter Bag to dewater control facilities built on slow permeating soils.
   b Proper equipment is to be onsite to deal with shallow bedrock depths.
   c When a high water table interferes with the construction of pipelines, use the techniques described in the section for dewatering pipe trenches.
   d French drains required around foundations in soils with poor drainage.
   e Specific seeding and mulching specifications have been outlined on Standard Worksheet #7 to address soil nutrients and increase the speed of vegetative stabilization.
3. **Droughty** (Urban/Gilpin).
   a. Weak soils are to be mixed with other soils for strength under the direction of a soils engineer.
   b. Erosion control blanketing will be installed on all slopes 3:1 and greater to aid the establishment of vegetative stabilization on steep slopes prone to rapid runoff and high erodibility.
   c. Specific seeding and mulching specifications have been outlined on Standard Worksheet #7 to address soil nutrients and increase the speed of vegetative stabilization.
4. **Easily Erodible** (Urban/Gilpin) see number 1 above.
5. **Flooding** (Urban) see number 2 above.
6. **Piping** (Urban/Gilpin)
   a Ponds in unsuitable soils may require clay lining, or a mixing of soils.
   b Key trench used to reduce the potential for piping.
   c Anti-seep collars will be placed on basin/pond barrel to prevent piping.
7. **Poor Source of Topsoil** (Urban/Gilpin)
   a Topsoil is to be stockpiled for later use.
8. **Frost Action** (Urban/Gilpin) see number 3 above.
9. **Shrink-Swell** (Urban) see number 3 above.
10. **Ponding** (Urban) see number 2 above.
11. **Wetness** (Urban) see numbers 2 and 3 above.

11. **Wetness** (Urban) see numbers 2 and 3 above.

Additional information on the soils can be found in the **Soils Data Appendix.**

1.3 Pre/Post-Development Hydrology

The basis for the allowable Post-Development flow rate will be determined by the Pre-Development flow rate at each POI. The Pre-Development peak runoff was calculated using HydroCAD utilizing the TR-55 Method as specified as an allowable computation method by both the Township and the PA DEP. The DEP requires the two (2), ten (10), fifty (50) and one hundred (100) year peak runoffs. The County Act 167 plan also requires calculations for the one (1), five (5), and twenty-five (25) year storms. Rainfall depths for the 24-hour events were taken from NOAA PFDS data as can be found attached to this report.

1.3.1 Pre-Development Hydrology

Areas contributing to the Pre-Development stormwater runoff for the site were identified as Area 1 draining to the discharge point of the site's stormwater runoff at the Eastern edge of the project watershed boundary (POI 1), and Area 2 draining towards a stormwater inlet along Braddock avenue (POI 2). The total flow at each POI was determined by analyzing the land use, soil type and flow paths of the watershed to generate a hydrograph for the watershed. All grass cover and 20% of the existing impervious was considered as meadow in good condition.

These watershed areas and their designations are shown on sheet **WS-1A and WS-1B** in the **Stormwater Management Plans.** A summary of the Pre-Development flows to POI 1 and POI 2 can be found in the summary sheets attached as **Section 2**. The Pre development rates will provide the basis for the allowable Post-Development peak flow rates. Calculations can be found in **Section 3.0**

1.3.2 Post-Development Hydrology (PCSM & SR)

The post-development stormwater flows are to the same POIs as pre-development flows. POI 1 has been broken into two (2) sub-watersheds that contribute to the flow at POI 1; flow to the wet pond and undetained flow. The Post-Development Hydrology was analyzed for 2 phases, the PCSM phase where the site is constructed and well development operations are occurring, and the SR phase after well development is complete and part of the site has been restored. The total flow at each POI was determined by analyzing the land use, soil type and flow paths, and pond routing of the watershed to generate a hydrograph for the watershed.

During the PCSM phase it is assumed that all site construction, including the tank access road and cul-de-sac are constructed and in place. To be conservative, it is assumed that the freshwater storage tanks are not yet installed. The tanks will be open topped and capture rainfall, so the highest rate of runoff will occur before the tanks are erected. The PCSM watershed areas are shown on sheet

WS-2A and WS-2B in the **Stormwater Management Plans.**

In the SR phase it is assumed that the tanks, tank access road, and cul-de-sac have been restored to original gravel condition. The SR watershed areas are shown on sheet **WS-3A and WS-3B** in the **Stormwater Management Plans.**

A summary of the Post-Development flows to POI 1 and POI 2 in each phase can be found in the summary sheets attached as **Section 2**. Calculations can be found in **Section 3.0.**

1.4 Retention Facility Design

In order to prevent an increase in runoff rate and volume to POI 1, Pond 1 has been proposed. Retention basin routing/design has been calculated HydroCAD. The required 24 hour storm events were used to evaluate the performance of the facility Pond 1 will receive the same flows in both PCSM and SR phases.

Pond-1 Configuration is as follows:

The retention facility, Pond 1, has a bottom elevation of 741.00 and a berm top elevation of 745.00. Control in the Pond will be accomplished by a 2' x 4'concrete outlet structure with a 4" diameter orifice at elevation 742.00. The top of the outlet structure is at elevation 743.00. The bottom of the outlet structure is set at 741.00. This facility will outlet through a 21" diameter pipe to a level spreader. The retention facility has a forebay incorporated into the upstream end in for sediment and debris collection and removal.

The routing calculations for the retention facilitiy can be found in **Section 3.0**. Details for the retention facilities can be found on sheet **C601-Construction Details** of the final approved PCSM plan drawings.

1.4.1 Summary of Peak Flows

HydroCAD was used to model the routing of each 24 hour storm through the pond. The hydrographs from the pond discharges will be combined with the hydrographs from the undetained area to determine the runoff rate to POI 1. Calculations related to pond routing can be found in **Section 3.0**.

1.4.2 Emergency Spillways

The retention pond will be provided with an earthen trapezoidal weir emergency spillway capable of safely passing the unattenuated 100-year peak storm flows. The spillway is intended for use only if the flow controls for the retention facilities become inoperable. Spillway weir design has been calculated according to standard PCSM guidelines found in the Post Construction Stormwater Management Manual.

The following table summarizes the spillway configuration.

Spillway Table (broad crested weir)

	Pond 1
Spillway Width	25
Q_{100} Design Outflow (cfs) (Primary Spillway Plugged)	6.23
Spillway Invert Elevation	743.5
Depth of Flow (ft.)	0.21
H2O Elevation	743.71
Top of Embankment Elevation	745.00
Freeboard (ft.)	1.29

Calculations can be found in **Section 4.0.** Details for the emergency spillway can be found on sheet **C601-Construction Details** of the PCSM drawings.

1.4.3 Outlet Protection / Level Spreader

An outflow level spreader is proposed at the end of the outlet barrel of the stormwater pond in order to diffuse the discharge. The level spreader is sized according to guidance found in the *PADEP Erosion and Sediment Pollution Control Program Manual, Chapter 6.8.1 – Level Spreader.*

Details of the level spreader construction can be found on the sheet **C601-Construction Details.**

1.4.4 Anti-Seep Collars

Anti-seep collars are proposed for the pond outlet pipes to eliminate piping. Anti-seep collars are sized according to guidance found in the *PADEP Erosion and Sediment Pollution Control Program Manual, Chapter 7 – Sediment Basins.* Collars have been upsized by 15% for use in the permanent stormwater retention facility.

Calculations can be found in the E&S Report**.** Details of the anti-seep collar construction can be found on the sheet **C601-Construction Details.**

1.4.5 Forebay

The retention facility has a forebay incorporated into the upstream end in for sediment and debris collection and removal. The forebay is sized according to guidance found in the *PADEP Erosion and Sediment Pollution Control Program Manual, Chapter 6.6.2 –Wet Pond/Retention Basin.*

Details of the Forebay construction can be found on sheet **C601-Construction Details.**

1.5 Volume Control and Water Quality BMPs

To meet water quality standards a reduction will be made between the pre-development 2-yr, 24-hr storm event runoff volume and the post-development 2-yr, 24-hr storm runoff volume as calculated via methods dictated by the *PA DEP Pennsylvania Stormwater BMP*. The pre-development and post-development volumes are calculated according to the DEP's Permit Application Notice of Intent for Coverage Under the General (PAG-02) NPDES Permit, *Worksheet 4, "Change in Runoff Volume for the 2-yr Storm Event"*. According to PADEP standards, all predevelopment non-pervious, non-forested areas and 20% of the existing impervious area are analyzed as meadow in good condition. The pre and post development volume for both PCSM and SR phases are summarized are summarized on the tables in **Section 2.** The site achieves required volume reduction for flows to both POIs in both phases. Worksheet 10 was completed for Nitrate reduction.

Calculations and DEP volume and water quality worksheets can be found in **Section 5.0.**

1.5.1 Retention Basins

Included in the design of the stormwater facilities is a retention basin as a water quality BMP. The retention basin will be constructed in the base of the proposed Pond 1 with the first rate control orifice placed above the bottom elevation of the pond providing enough storage to hold and evaporate the difference between pre and post-development 2-yr 24-hr storm events.

Retention Table

	Pond
Storage Volume (ft^3)	19,024
Depth from First Orifice to Pond Bottom (ft)	1.00

The retention of this water will aid in removal of sediments, pollutants and will promote evaporation. The retention basin will discharge into a level spreader with eventual conveyance to the POI. Calculations for the volume requirements can be found in **Section 6.0.** The areas tributary to the retention basin is shown on sheet **WS-2B** and **WS-3B** of the PCSM Drawing Set**.** Details of the retention basins can be found on sheet **C601-Construction Details.**

1.5.2 Vegetated Filter Strip

Vegetated filter strips (VFS) are proposed to be installed directly upstream of the Pond-1 forebay and at the eastern end of the site as a water quality BMPs. Sheet flow will enter the VFS above Pond-1 from the well pad and flow over a length of approximately 200' at a 1% slope. Sheet flow will enter the VFS at the eastern edge of the site and flow over an minimum length of 25' at 1% slope. Both VFSs are proposed to be turf grass filter strips. The VFSs are sized according to the *PADEP Erosion and Sediment Pollution Control Program Manual, Chapter 6 – Vegetated Filter Strip.* The VFS at the eastern edge of the site has been constructed to the 25'

minimum recommended length to comply with landowner requests to minimize obstructions to operations in this area.

Proposed VFS locations can be seen on sheet **SR-1** of the PCSM Drawing Set.

1.5.3 Landscape Restoration

Landscape restoration is proposed on the disturbed areas of the site as a water quality BMP. Landscape restoration on site will consist of soil amendment and planting of native grasses to establish a groundcover of meadow.

Proposed landscape restoration areas can be seen on sheet **SR-1** of the PCSM Drawing Set.

1.6 Channels / Swales

Proposed collection channels convey runoff through the project as shown on the design plans. The proposed vegetated collection channels on site are designed as vegetated swales to be used as a water quality BMP. Channels were designed to convey the ten (10) year flows with 0.5-ft. of freeboard. Calculations for the channels can be found in the E&S plan.

Calculations

Section 2.0

Pre/Post-Development Hydrology Summary

ARM Group Inc.

SUMMARY OF HYDROLOGIC CALCULATIONS
Merrion Oil & Gas - ET - Braddock Well Pad
DA 1

Volume of Runoff Summary

	Pre-development	Post-development	Net Change
Impervious Area	1.40 acres	1.91 acres	0.52 acres
Volume of runoff without planned BMPs	1.269 acre-ft	1.299 acre-ft	0.030 acre-ft
Volume of runoff with planned BMPs		0.863 acre-ft	-0.407 acre-ft

Note: See attached worksheets 4 and 5 for detailed volume of runoff calculations.

Peak Rate of Runoff Summary

Storm Event	Pre-development	Post-development	Net Change
1-yr/24-hr	16.82 ft^3/sec	7.32 ft^3/sec	-9.50 ft^3/sec
2-yr/24-hr	20.38 ft^3/sec	9.05 ft^3/sec	-11.33 ft^3/sec
5-yr/24-hr	25.33 ft^3/sec	11.43 ft^3/sec	-13.90 ft^3/sec
10-yr/24-hr	29.32 ft^3/sec	13.35 ft^3/sec	-15.97 ft^3/sec
25-yr/24-hr	34.86 ft^3/sec	18.27 ft^3/sec	-16.59 ft^3/sec
50-yr/24-hr	39.46 ft^3/sec	24.47 ft^3/sec	-14.99 ft^3/sec
100-yr/24-hr	44.24 ft^3/sec	31.16 ft^3/sec	-13.08 ft^3/sec

Note: See attached HydroCAD routing analysis for detailed peak rate of runoff calculations.

ARM Group Inc.

SUMMARY OF HYDROLOGIC CALCULATIONS
Merrion Oil & Gas - ET - Braddock Well Pad
DA 2

Volume of Runoff Summary

	Pre-development	Post-development	Net Change
Impervious Area	0.00 acres	0.33 acres	0.33 acres
Volume of runoff without planned BMPs	0.325 acre-ft	0.230 acre-ft	-0.095 acre-ft
Volume of runoff with planned BMPs		0.230 acre-ft	-0.095 acre-ft

Note: See attached worksheets 4 and 5 for detailed volume of runoff calculations.

Peak Rate of Runoff Summary

Storm Event	Pre-development	Post-development	Net Change
1-yr/24-hr	4.46 ft^3/sec	3.48 ft^3/sec	-0.98 ft^3/sec
2-yr/24-hr	5.62 ft^3/sec	4.66 ft^3/sec	-0.96 ft^3/sec
5-yr/24-hr	7.24 ft^3/sec	6.35 ft^3/sec	-0.89 ft^3/sec
10-yr/24-hr	8.55 ft^3/sec	7.75 ft^3/sec	-0.80 ft^3/sec
25-yr/24-hr	10.37 ft^3/sec	9.73 ft^3/sec	-0.64 ft^3/sec
50-yr/24-hr	11.88 ft^3/sec	11.38 ft^3/sec	-0.50 ft^3/sec
100-yr/24-hr	13.44 ft^3/sec	13.10 ft^3/sec	-0.34 ft^3/sec

Note: See attached HydroCAD routing analysis for detailed peak rate of runoff calculations.

ARM Group Inc.

SUMMARY OF HYDROLOGIC CALCULATIONS

Merrion Oil & Gas - ET - Braddock Well Pad

DA 1

Volume of Runoff Summary

	Pre-development	Post-development (SR)	Net Change
Impervious Area	1.40 acres	1.73 acres	0.33 acres
Volume of runoff without planned BMPs	1.269 acre-ft	1.299 acre-ft	0.030 acre-ft
Volume of runoff with planned BMPs		0.863 acre-ft	-0.407 acre-ft

Note: See attached worksheets 4 and 5 for detailed volume of runoff calculations.

Peak Rate of Runoff Summary

Storm Event	Pre-development	Post-development (SR)	Net Change
1-yr/24-hr	16.82 ft^3/sec	8.11 ft^3/sec	-8.71 ft^3/sec
2-yr/24-hr	20.39 ft^3/sec	10.02 ft^3/sec	-10.37 ft^3/sec
5-yr/24-hr	25.33 ft^3/sec	12.64 ft^3/sec	-12.69 ft^3/sec
10-yr/24-hr	29.32 ft^3/sec	14.76 ft^3/sec	-14.56 ft^3/sec
25-yr/24-hr	34.87 ft^3/sec	18.30 ft^3/sec	-16.57 ft^3/sec
50-yr/24-hr	39.47 ft^3/sec	24.37 ft^3/sec	-15.10 ft^3/sec
100-yr/24-hr	44.25 ft^3/sec	31.27 ft^3/sec	-12.98 ft^3/sec

Note: See attached HydroCAD routing analysis for detailed peak rate of runoff calculations.

ARM Group Inc.

SUMMARY OF HYDROLOGIC CALCULATIONS
Merrion Oil & Gas - ET - Braddock Well Pad
DA 2

Volume of Runoff Summary

	Pre-development	Post-development (SR)	Net Change
Impervious Area	0.00 acres	0.11 acres	0.11 acres
Volume of runoff without planned BMPs	0.325 acre-ft	0.230 acre-ft	-0.095 acre-ft
Volume of runoff with planned BMPs		0.230 acre-ft	-0.095 acre-ft

Note: See attached worksheets 4 and 5 for detailed volume of runoff calculations.

Peak Rate of Runoff Summary

Storm Event	Pre-development	Post-development (SR)	Net Change
1-yr/24-hr	4.46 ft^3/sec	3.48 ft^3/sec	-0.98 ft^3/sec
2-yr/24-hr	5.62 ft^3/sec	4.66 ft^3/sec	-0.96 ft^3/sec
5-yr/24-hr	7.24 ft^3/sec	6.35 ft^3/sec	-0.89 ft^3/sec
10-yr/24-hr	8.55 ft^3/sec	7.75 ft^3/sec	-0.80 ft^3/sec
25-yr/24-hr	10.37 ft^3/sec	9.73 ft^3/sec	-0.64 ft^3/sec
50-yr/24-hr	11.88 ft^3/sec	11.38 ft^3/sec	-0.50 ft^3/sec
100-yr/24-hr	13.44 ft^3/sec	13.10 ft^3/sec	-0.34 ft^3/sec

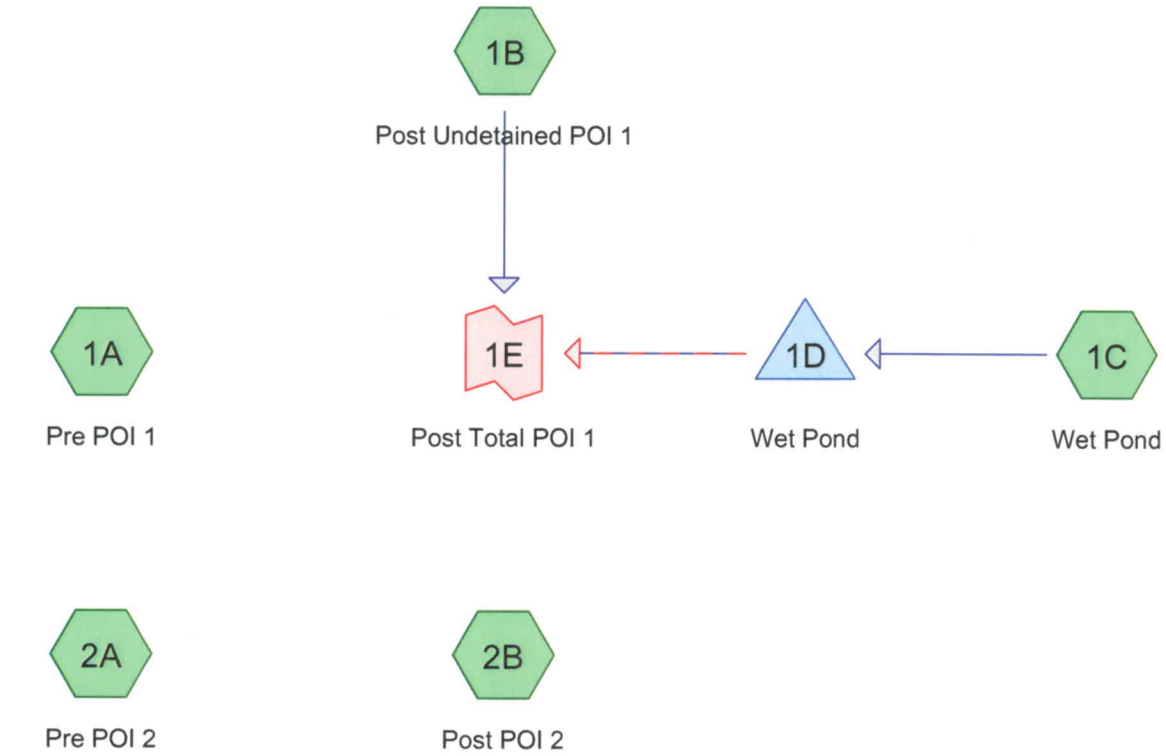
Note: See attached HydroCAD routing analysis for detailed peak rate of runoff calculations.

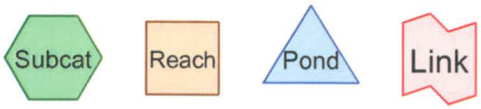
Section 3.0

Pre/Post-Development Hydrology Calculations

Section 3.1

PCSM Hydrology Calculations





Routing Diagram for PCSM Rate Calcs
Prepared by Microsoft, Printed 10/19/2018
HydroCAD® 10.00-15 s/n 06760 © 2015 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=1.65"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=16.82 cfs 1.178 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=1.46"
Flow Length=824' Tc=15.4 min CN=95 Runoff=7.12 cfs 0.477 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=1.15"
Flow Length=658' Tc=9.1 min CN=91 Runoff=9.11 cfs 0.480 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=1.30"
Flow Length=790' Tc=14.0 min CN=93 Runoff=4.46 cfs 0.281 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=0.89"
Flow Length=339' Tc=6.5 min CN=87 Runoff=3.48 cfs 0.165 af

Pond 1D: Wet Pond Peak Elev=742.59' Storage=32,317 cf Inflow=9.11 cfs 0.480 af
Primary=0.27 cfs 0.454 af Secondary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.454 af

Link 1E: Post Total POI 1 Inflow=7.32 cfs 0.932 af
Primary=7.32 cfs 0.932 af

Total Runoff Area = 22.318 ac Runoff Volume = 2.581 af Average Runoff Depth = 1.39"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

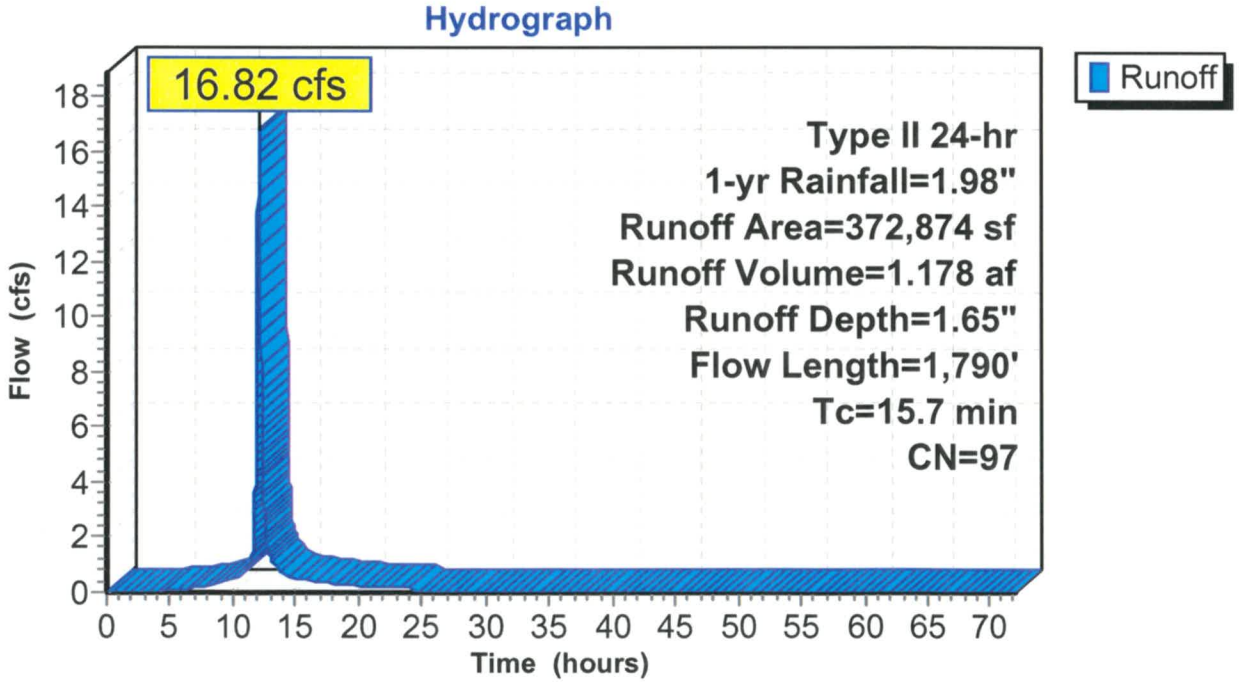
Runoff = 16.82 cfs @ 12.07 hrs, Volume= 1.178 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

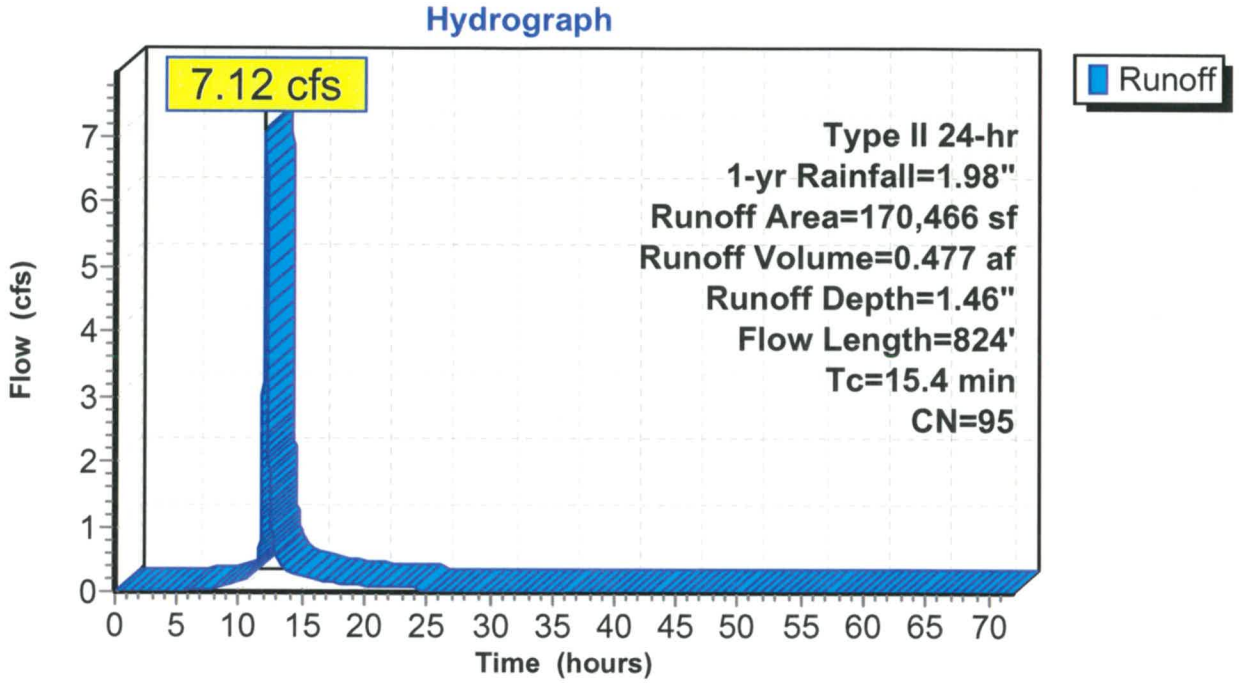
Runoff = 7.12 cfs @ 12.07 hrs, Volume= 0.477 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

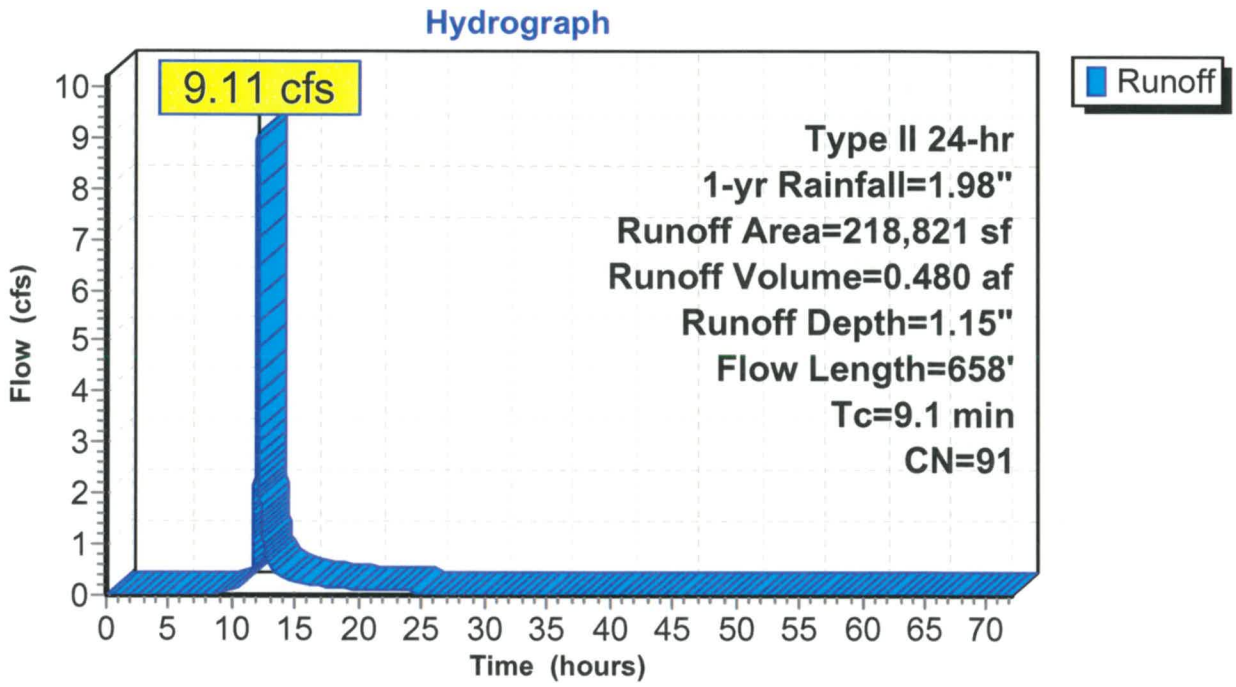
Runoff = 9.11 cfs @ 12.01 hrs, Volume= 0.480 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

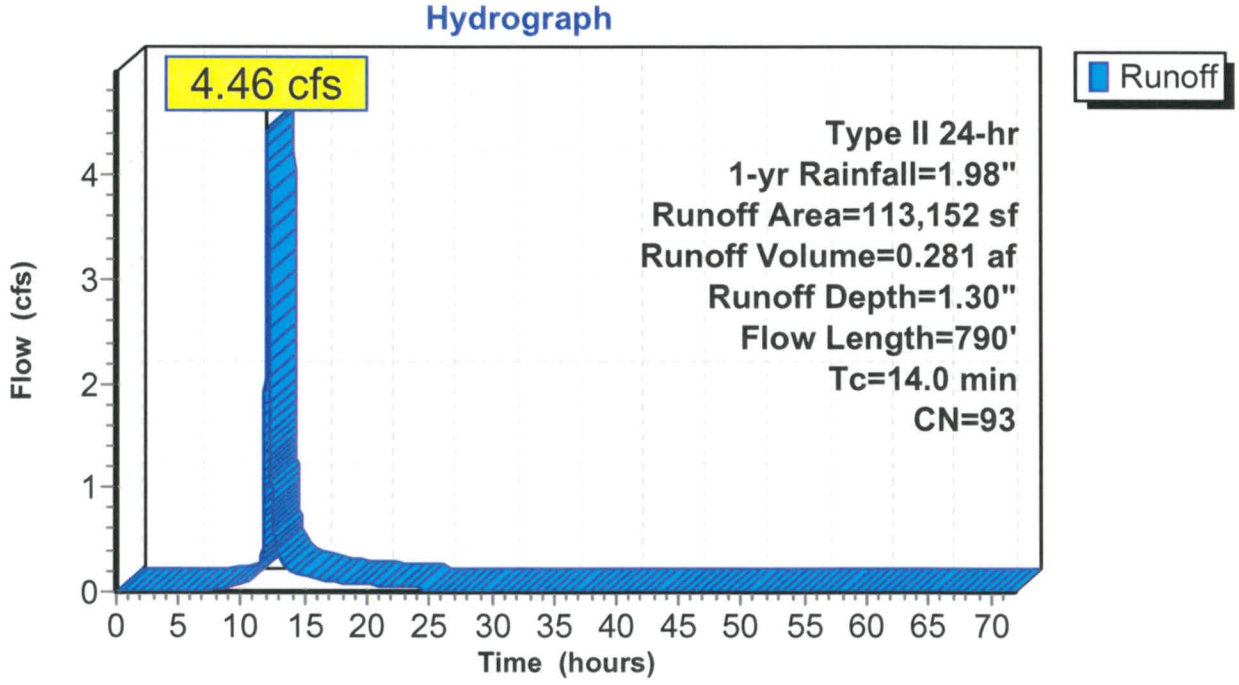
Runoff = 4.46 cfs @ 12.06 hrs, Volume= 0.281 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

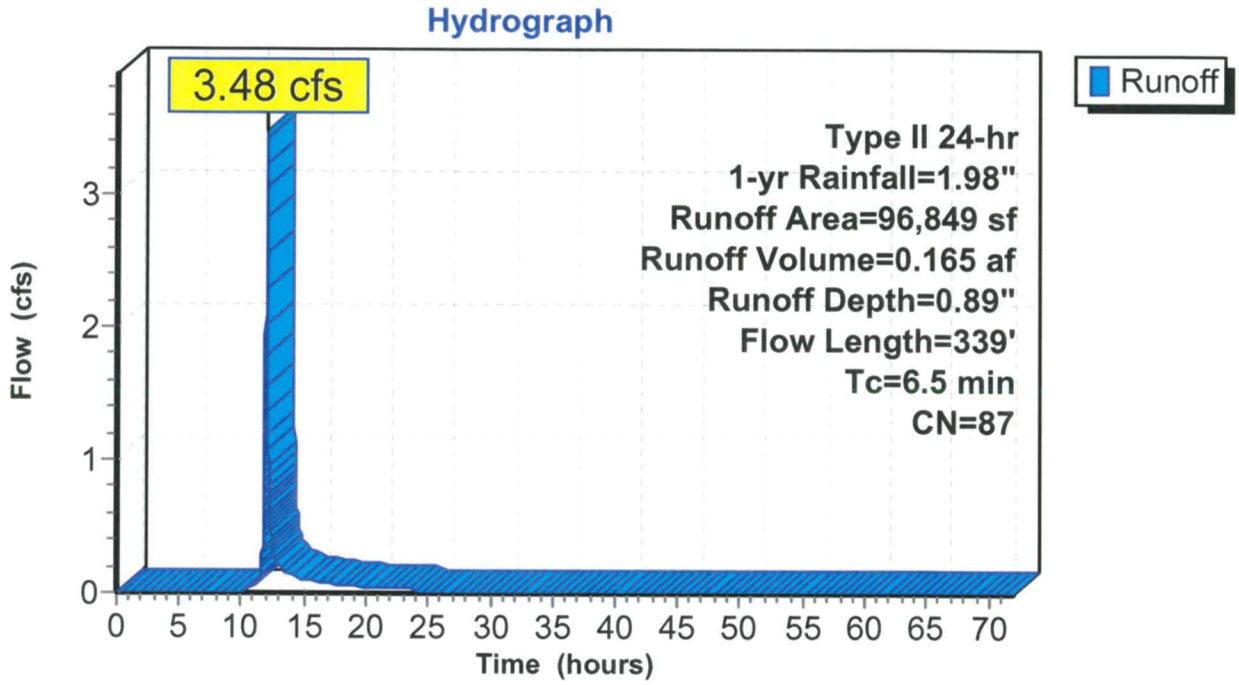
Runoff = 3.48 cfs @ 11.98 hrs, Volume= 0.165 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 1.15" for 1-yr event				
Inflow =	9.11 cfs @	12.01 hrs,	Volume=	0.480 af	
Outflow =	0.27 cfs @	14.77 hrs,	Volume=	0.454 af,	Atten= 97%, Lag= 165.6 min
Primary =	0.27 cfs @	14.77 hrs,	Volume=	0.454 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 742.59' @ 14.77 hrs Surf.Area= 0 sf Storage= 32,317 cf (13,293 cf above start)

Plug-Flow detention time= 3,061.4 min calculated for 0.018 af (4% of inflow)
Center-of-Mass det. time= 697.4 min (1,518.9 - 821.5)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

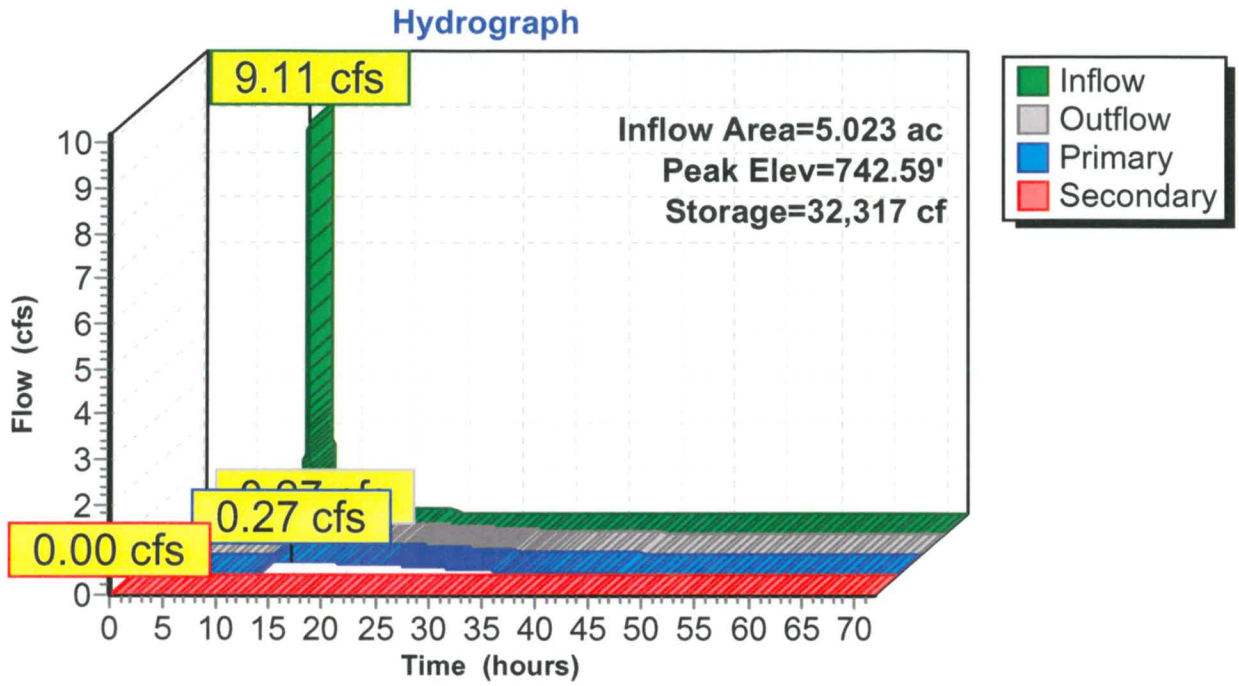
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.27 cfs @ 14.77 hrs HW=742.59' (Free Discharge)
└─**1=Culvert** (Passes 0.27 cfs of 9.18 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 3.14 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

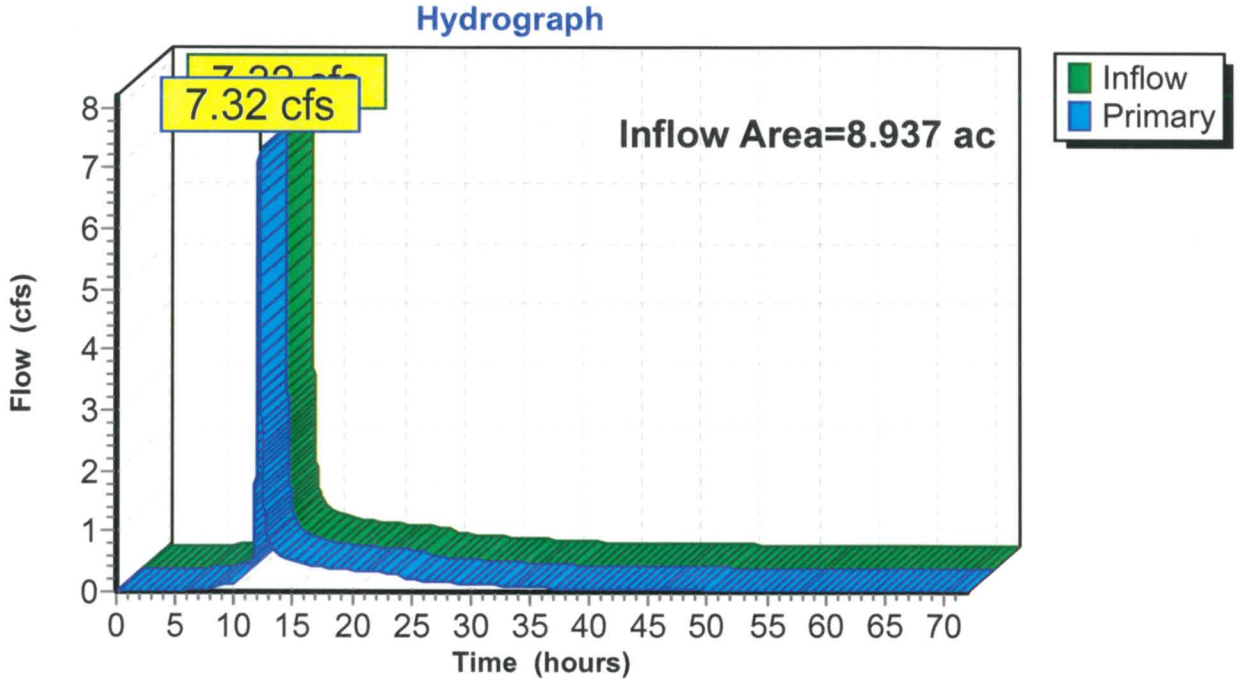


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 1.25" for 1-yr event
Inflow = 7.32 cfs @ 12.07 hrs, Volume= 0.932 af
Primary = 7.32 cfs @ 12.07 hrs, Volume= 0.932 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=2.03"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=20.38 cfs 1.445 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=1.83"
Flow Length=824' Tc=15.4 min CN=95 Runoff=8.79 cfs 0.596 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=1.48"
Flow Length=658' Tc=9.1 min CN=91 Runoff=11.69 cfs 0.621 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=1.65"
Flow Length=790' Tc=14.0 min CN=93 Runoff=5.62 cfs 0.357 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=1.19"
Flow Length=339' Tc=6.5 min CN=87 Runoff=4.66 cfs 0.221 af

Pond 1D: Wet Pond Peak Elev=742.79' Storage=36,665 cf Inflow=11.69 cfs 0.621 af
Primary=0.33 cfs 0.593 af Secondary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.593 af

Link 1E: Post Total POI 1 Inflow=9.05 cfs 1.189 af
Primary=9.05 cfs 1.189 af

Total Runoff Area = 22.318 ac Runoff Volume = 3.240 af Average Runoff Depth = 1.74"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

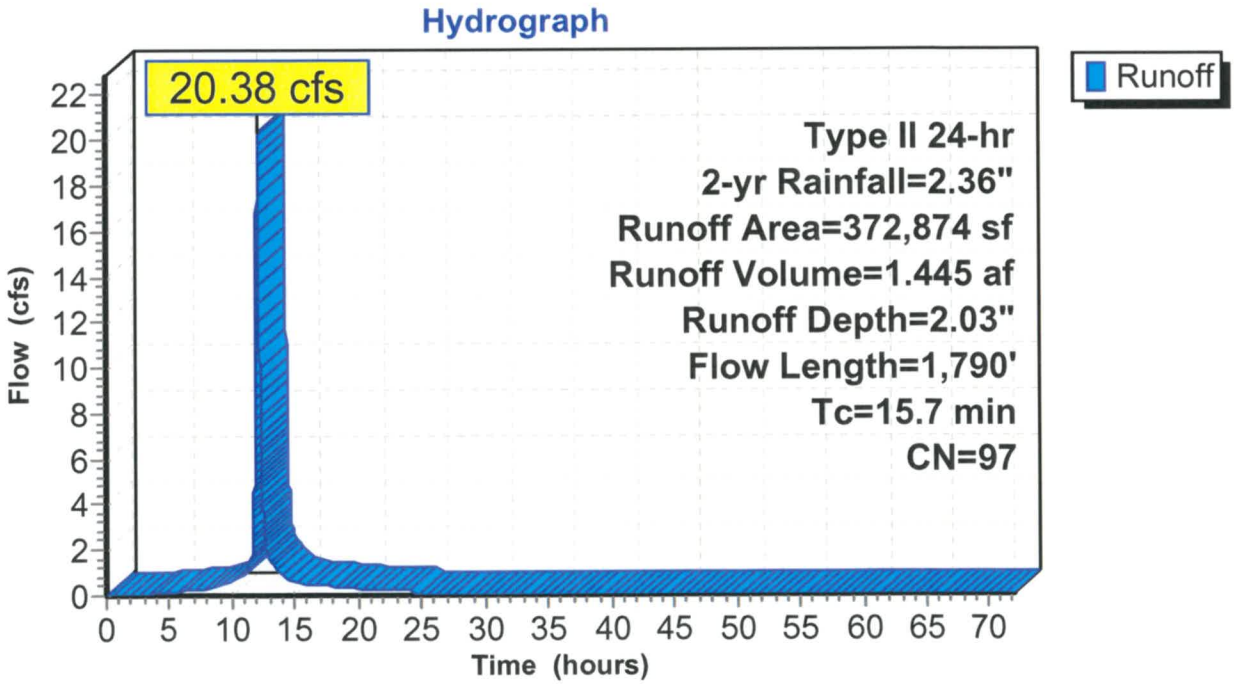
Runoff = 20.38 cfs @ 12.07 hrs, Volume= 1.445 af, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

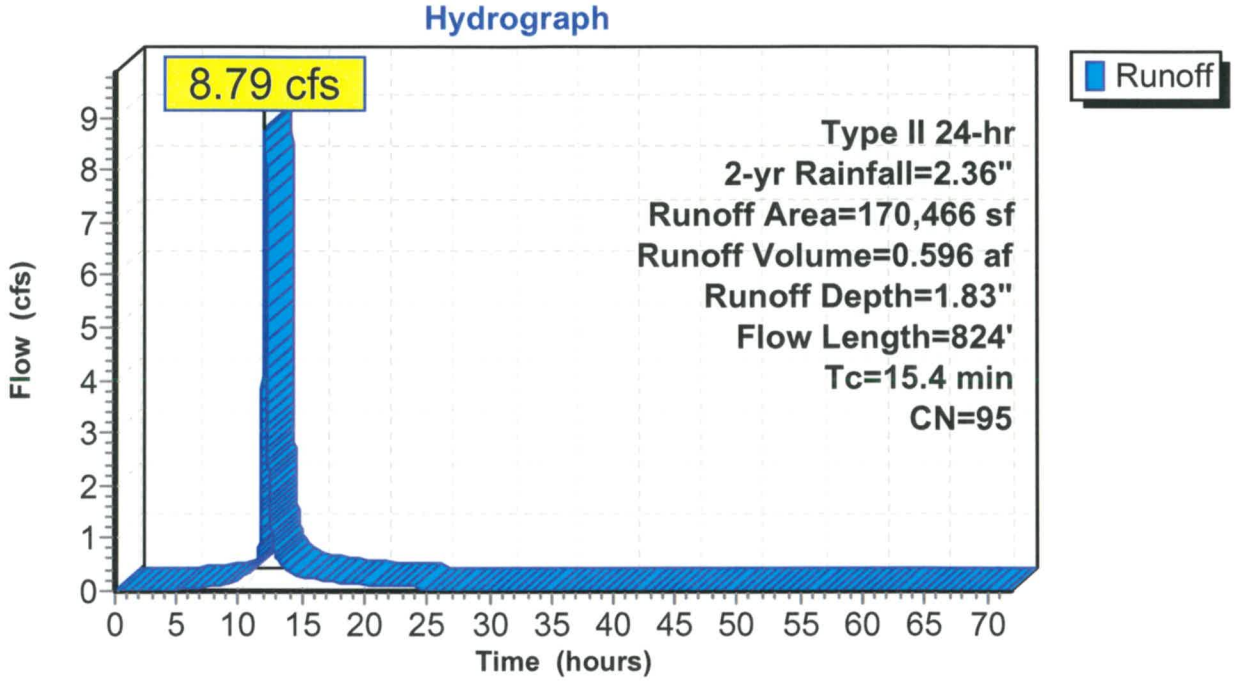
Runoff = 8.79 cfs @ 12.07 hrs, Volume= 0.596 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

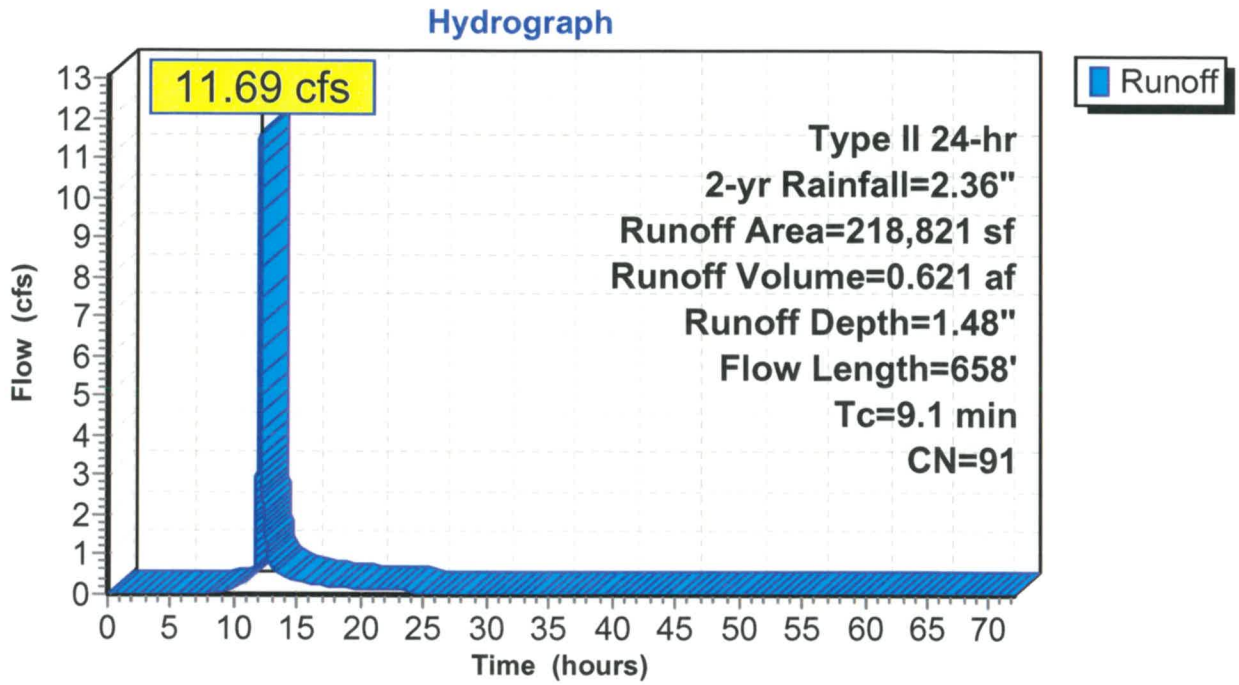
Runoff = 11.69 cfs @ 12.00 hrs, Volume= 0.621 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

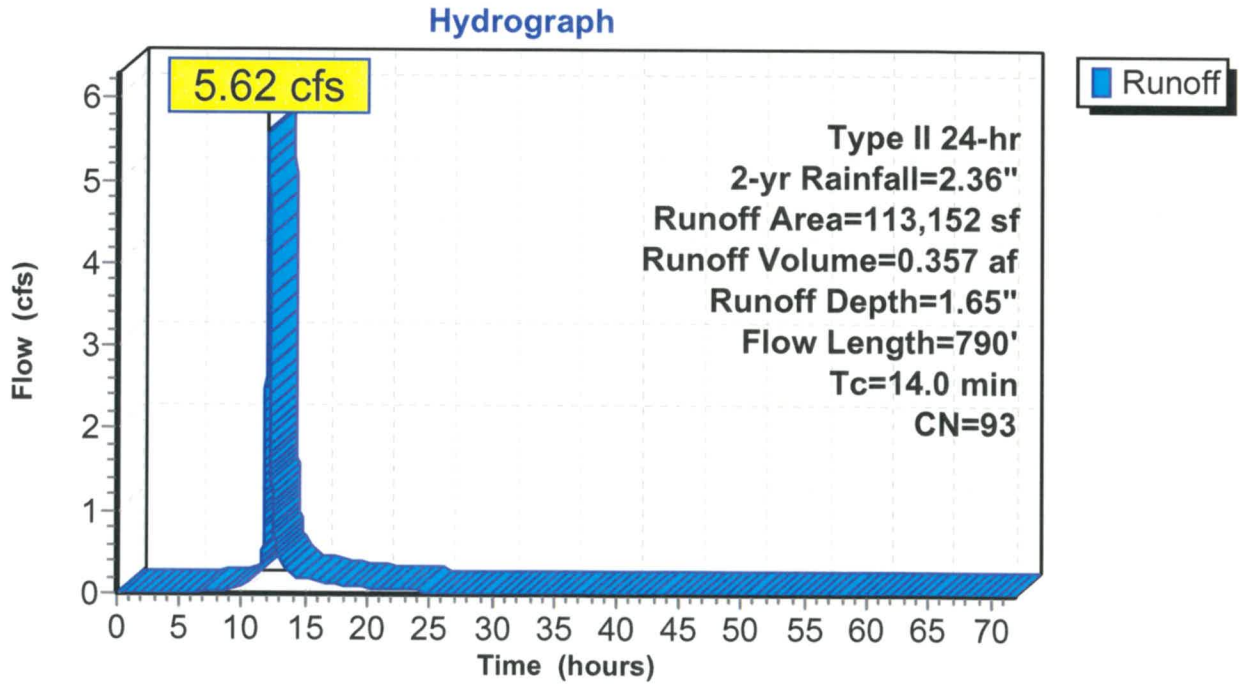
Runoff = 5.62 cfs @ 12.06 hrs, Volume= 0.357 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

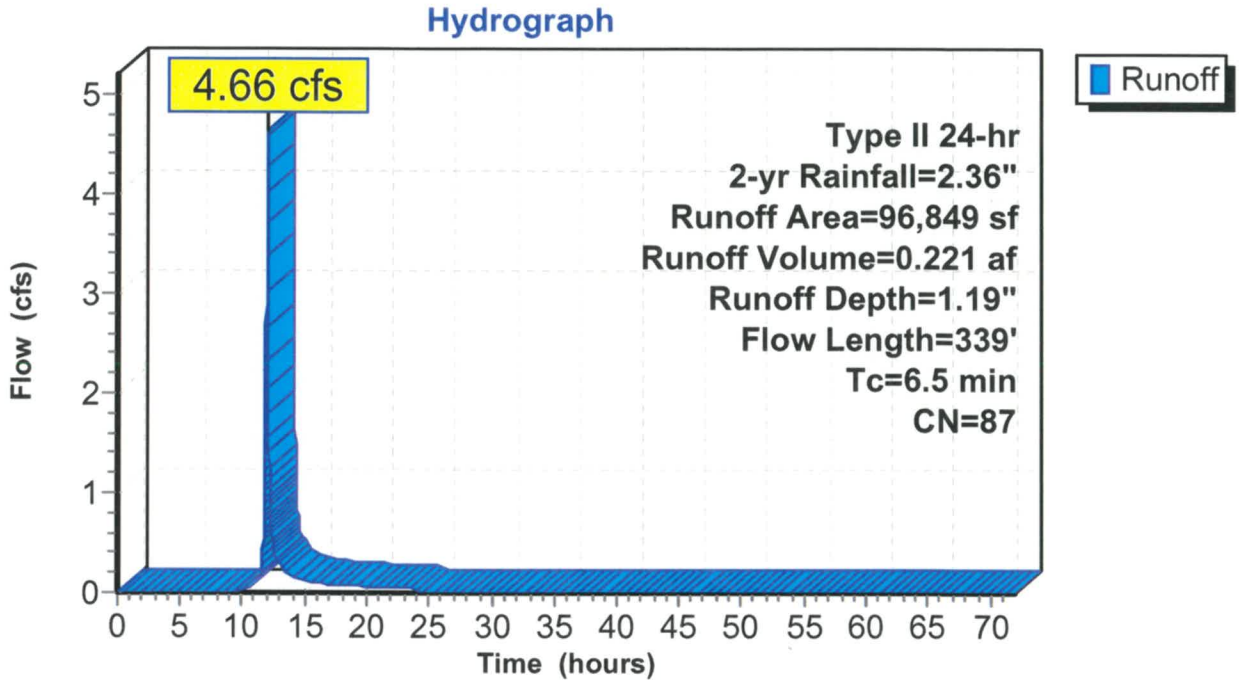
Runoff = 4.66 cfs @ 11.98 hrs, Volume= 0.221 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 1.48" for 2-yr event				
Inflow =	11.69 cfs @	12.00 hrs,	Volume=	0.621 af	
Outflow =	0.33 cfs @	14.91 hrs,	Volume=	0.593 af, Atten= 97%, Lag= 174.0 min	
Primary =	0.33 cfs @	14.91 hrs,	Volume=	0.593 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 742.79' @ 14.91 hrs Surf.Area= 0 sf Storage= 36,665 cf (17,641 cf above start)

Plug-Flow detention time= 1,778.8 min calculated for 0.156 af (25% of inflow)
Center-of-Mass det. time= 734.8 min (1,549.0 - 814.2)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

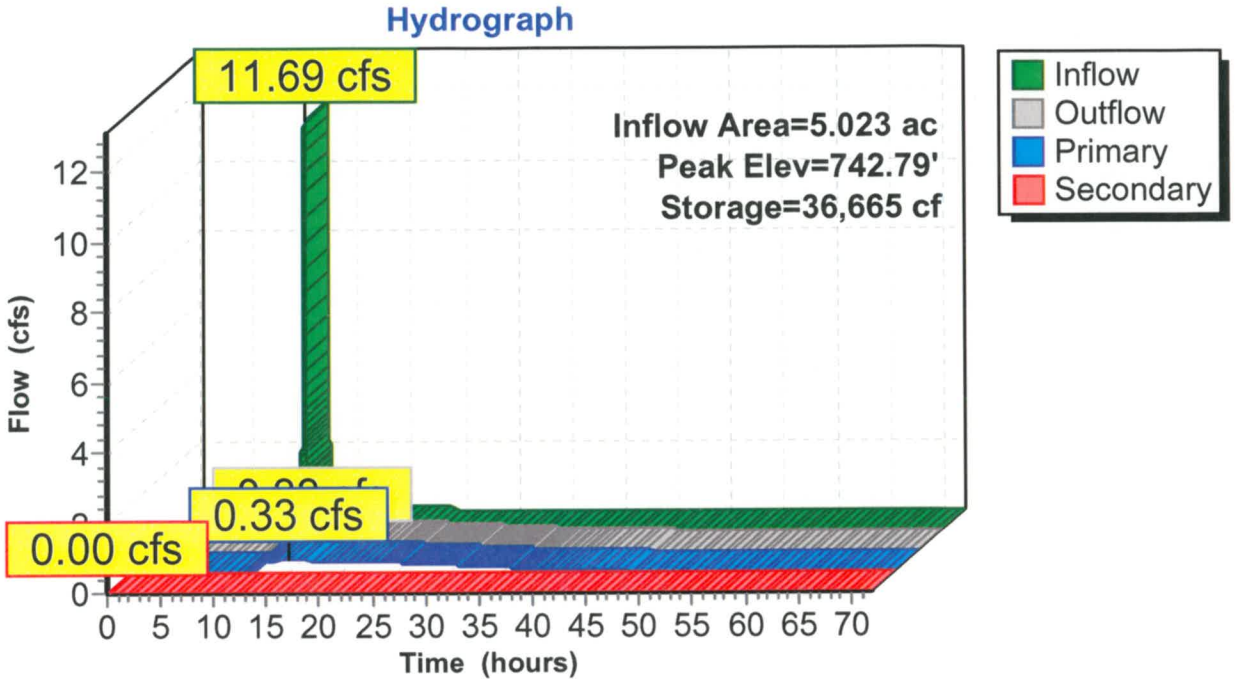
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.33 cfs @ 14.91 hrs HW=742.79' (Free Discharge)
└─**1=Culvert** (Passes 0.33 cfs of 10.71 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 3.79 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

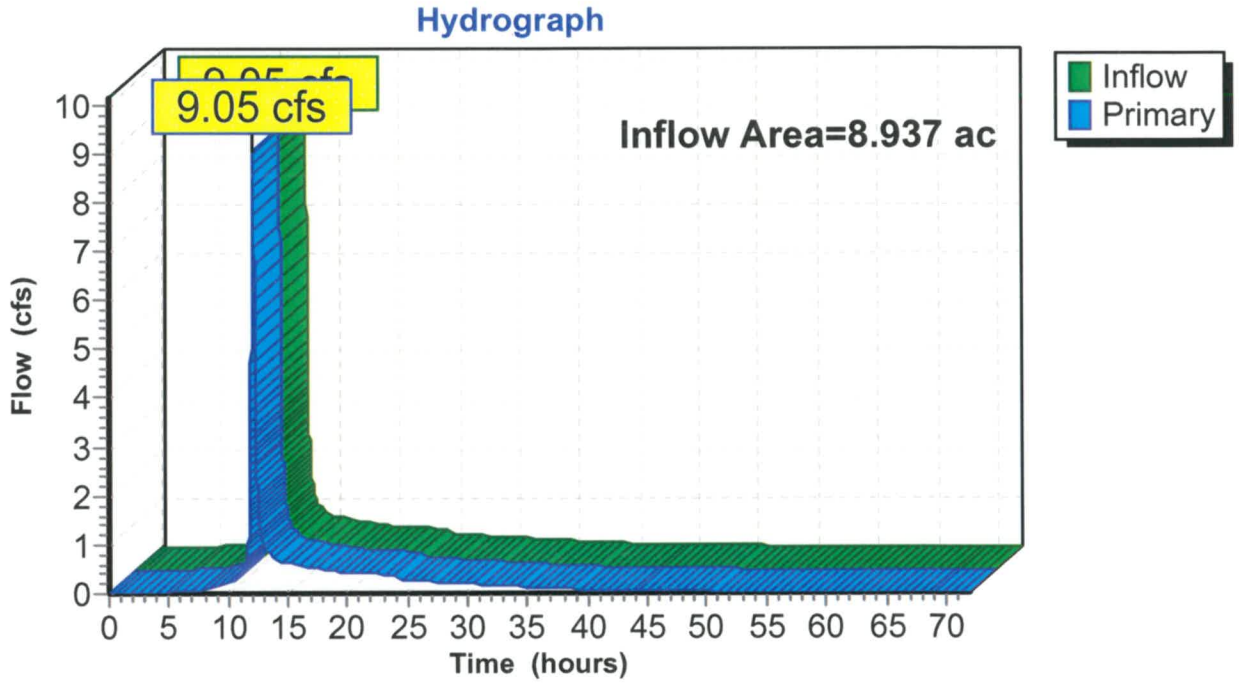


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 1.60" for 2-yr event
Inflow = 9.05 cfs @ 12.07 hrs, Volume= 1.189 af
Primary = 9.05 cfs @ 12.07 hrs, Volume= 1.189 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=2.55"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=25.33 cfs 1.819 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=2.34"
Flow Length=824' Tc=15.4 min CN=95 Runoff=11.12 cfs 0.764 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=1.97"
Flow Length=658' Tc=9.1 min CN=91 Runoff=15.33 cfs 0.824 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=2.15"
Flow Length=790' Tc=14.0 min CN=93 Runoff=7.24 cfs 0.465 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=1.64"
Flow Length=339' Tc=6.5 min CN=87 Runoff=6.35 cfs 0.304 af

Pond 1D: Wet Pond Peak Elev=743.03' Storage=42,182 cf Inflow=15.33 cfs 0.824 af
Primary=0.61 cfs 0.793 af Secondary=0.00 cfs 0.000 af Outflow=0.61 cfs 0.793 af

Link 1E: Post Total POI 1 Inflow=11.43 cfs 1.557 af
Primary=11.43 cfs 1.557 af

Total Runoff Area = 22.318 ac Runoff Volume = 4.176 af Average Runoff Depth = 2.25"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

Runoff = 25.33 cfs @ 12.07 hrs, Volume= 1.819 af, Depth= 2.55"

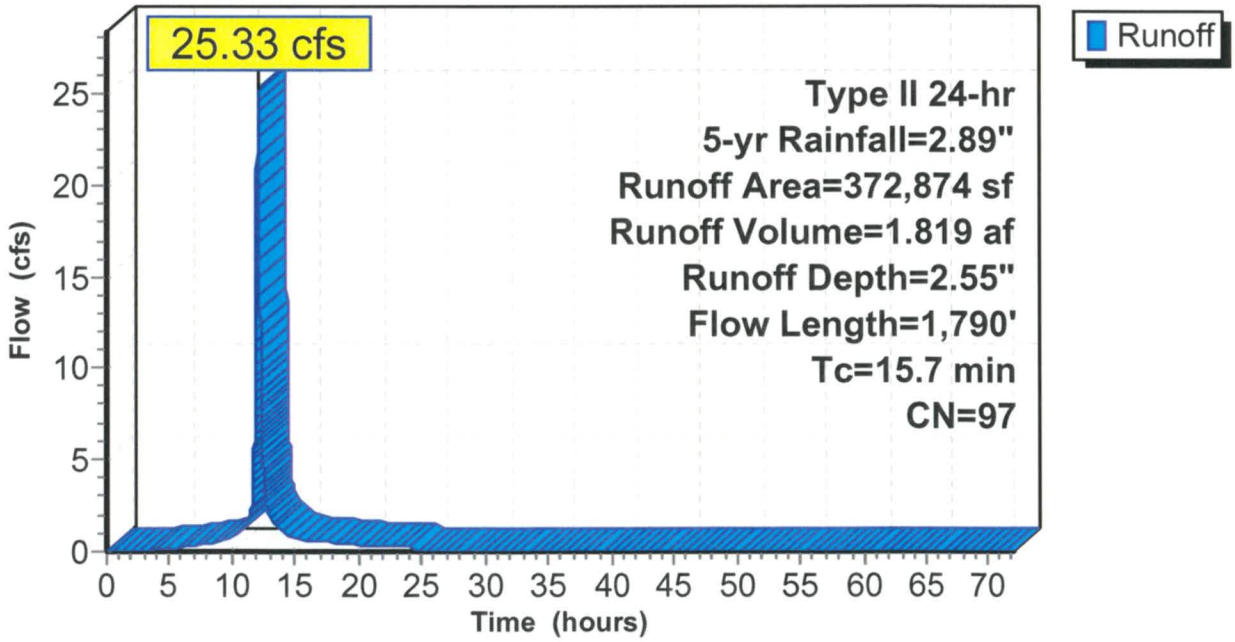
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1

Hydrograph



Summary for Subcatchment 1B: Post Undetained POI 1

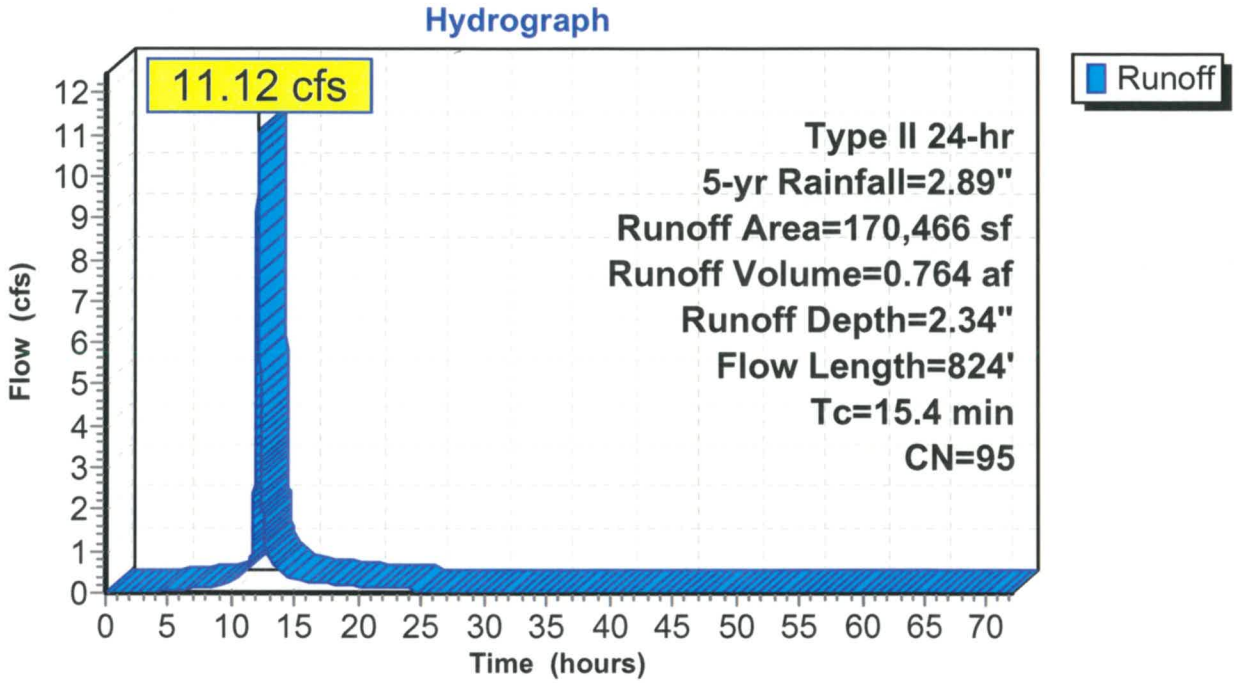
Runoff = 11.12 cfs @ 12.07 hrs, Volume= 0.764 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

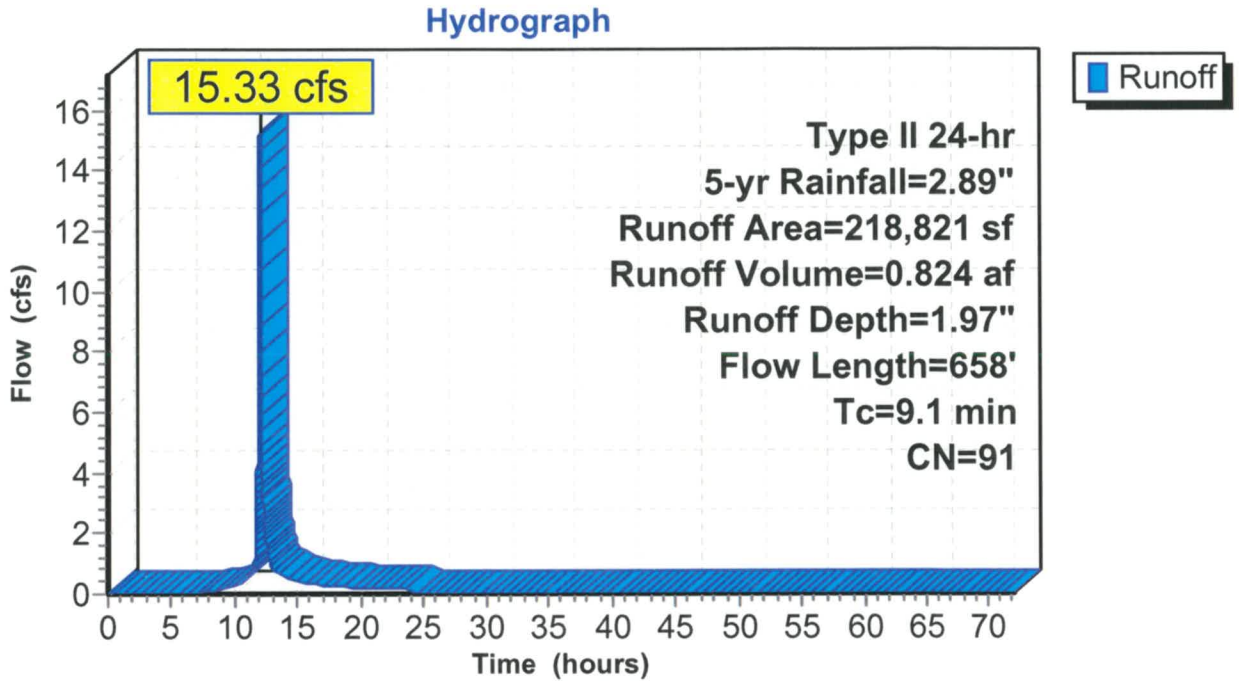
Runoff = 15.33 cfs @ 12.00 hrs, Volume= 0.824 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

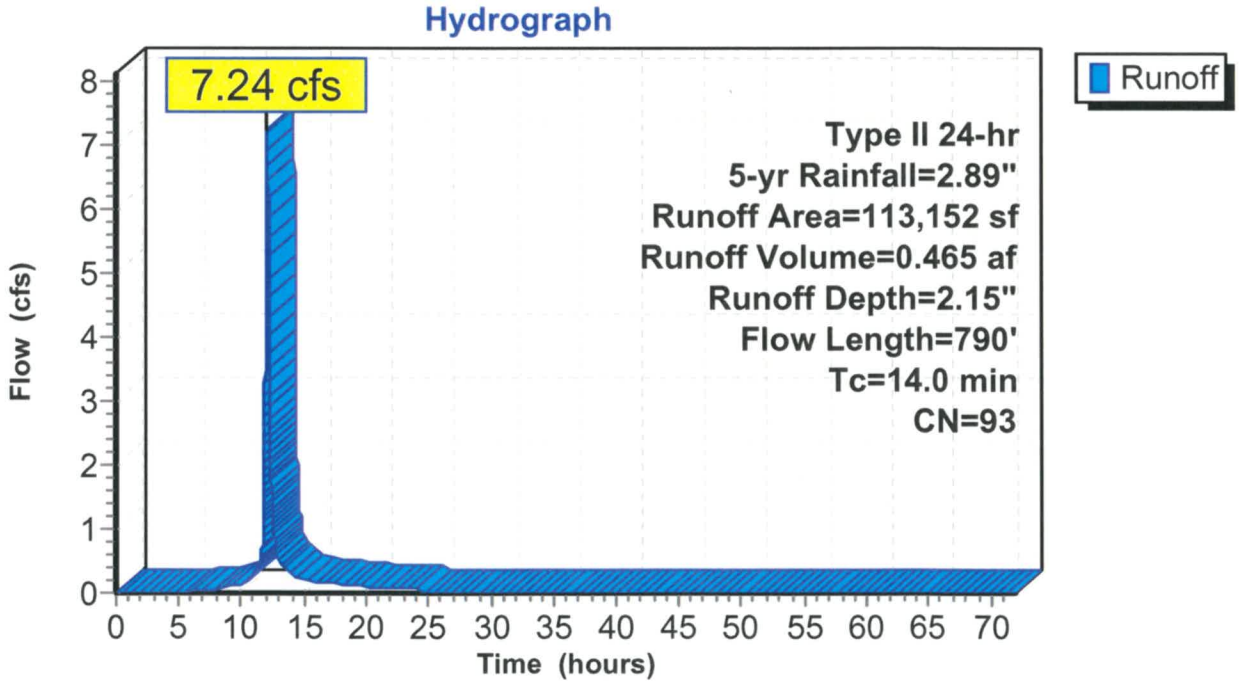
Runoff = 7.24 cfs @ 12.05 hrs, Volume= 0.465 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

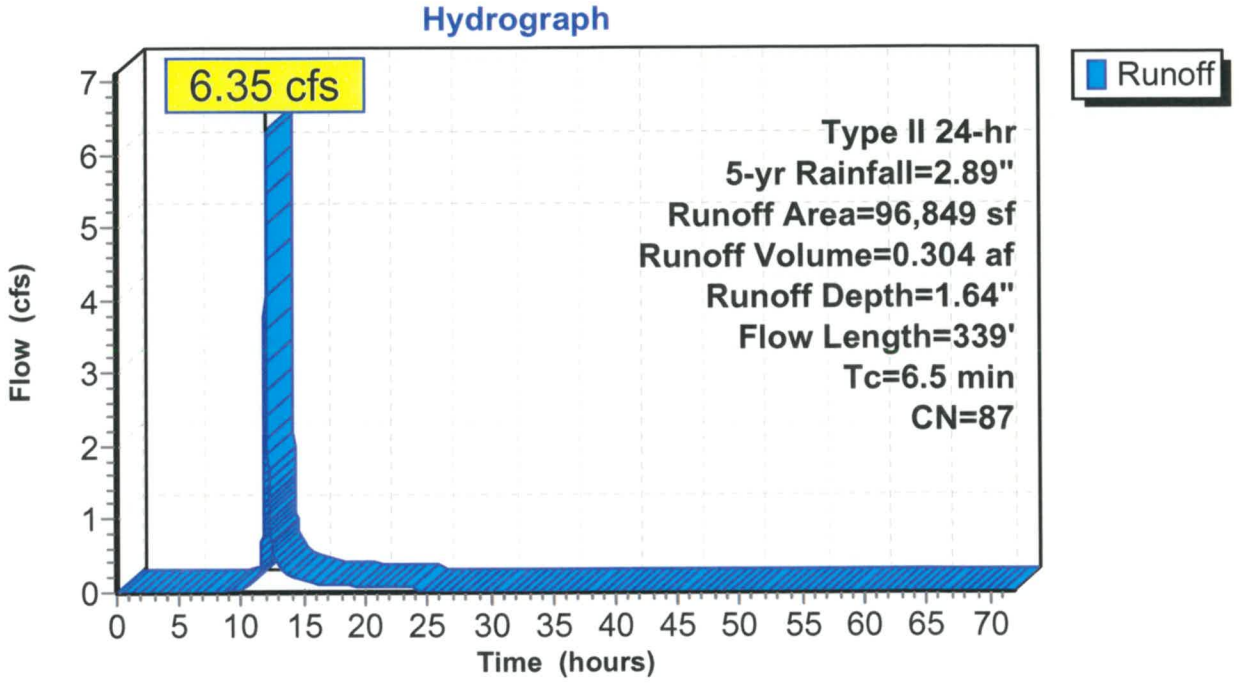
Runoff = 6.35 cfs @ 11.98 hrs, Volume= 0.304 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 1.97" for 5-yr event				
Inflow =	15.33 cfs @	12.00 hrs,	Volume=	0.824 af	
Outflow =	0.61 cfs @	13.69 hrs,	Volume=	0.793 af,	Atten= 96%, Lag= 100.9 min
Primary =	0.61 cfs @	13.69 hrs,	Volume=	0.793 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.03' @ 13.69 hrs Surf.Area= 0 sf Storage= 42,182 cf (23,158 cf above start)

Plug-Flow detention time= 1,466.4 min calculated for 0.356 af (43% of inflow)
Center-of-Mass det. time= 751.0 min (1,557.1 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

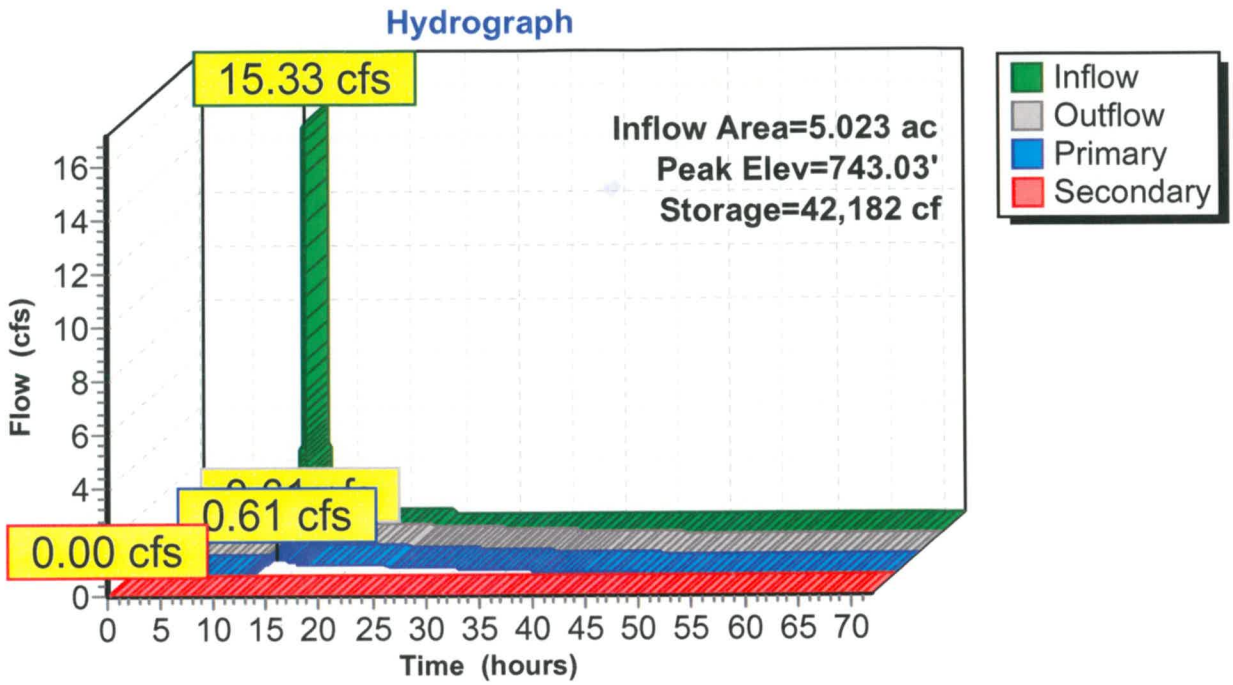
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.57 cfs @ 13.69 hrs HW=743.03' (Free Discharge)
└─**1=Culvert** (Passes 0.57 cfs of 12.40 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.47 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

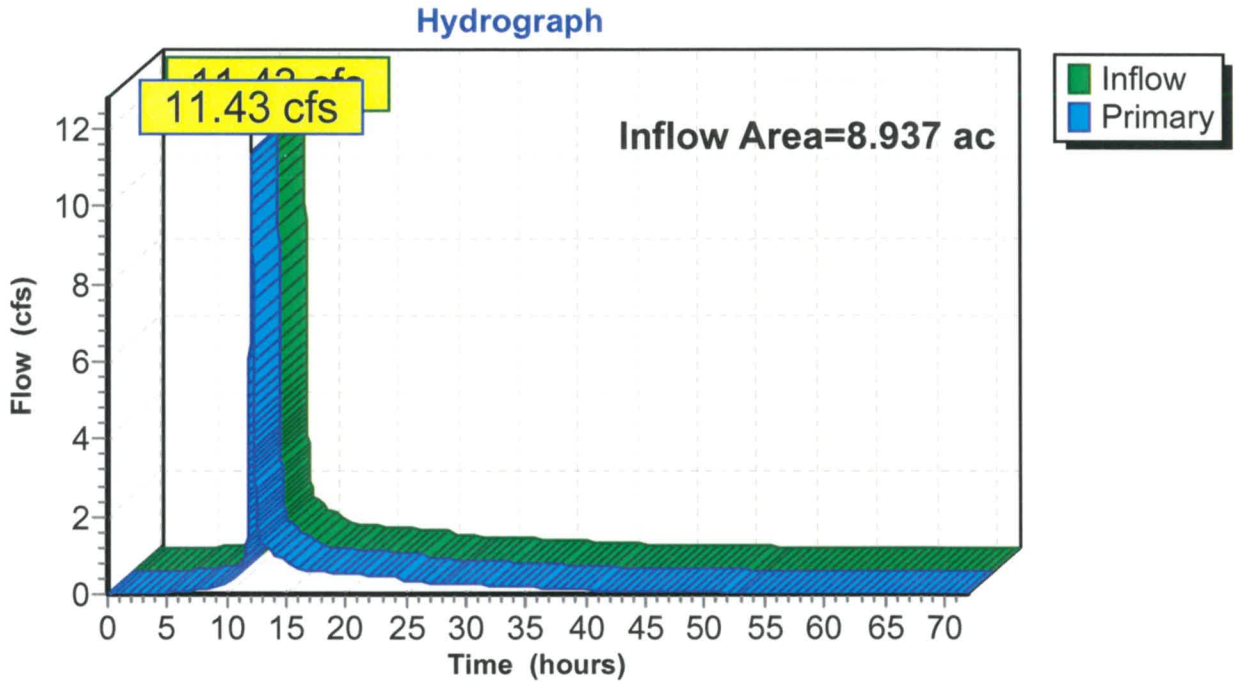


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 2.09" for 5-yr event
Inflow = 11.43 cfs @ 12.07 hrs, Volume= 1.557 af
Primary = 11.43 cfs @ 12.07 hrs, Volume= 1.557 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=2.98"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=29.32 cfs 2.123 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=2.76"
Flow Length=824' Tc=15.4 min CN=95 Runoff=12.99 cfs 0.901 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=2.37"
Flow Length=658' Tc=9.1 min CN=91 Runoff=18.29 cfs 0.993 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=2.56"
Flow Length=790' Tc=14.0 min CN=93 Runoff=8.55 cfs 0.554 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=2.02"
Flow Length=339' Tc=6.5 min CN=87 Runoff=7.75 cfs 0.375 af

Pond 1D: Wet Pond Peak Elev=743.10' Storage=44,100 cf Inflow=18.29 cfs 0.993 af
Primary=1.69 cfs 0.961 af Secondary=0.00 cfs 0.000 af Outflow=1.69 cfs 0.961 af

Link 1E: Post Total POI 1 Inflow=13.35 cfs 1.862 af
Primary=13.35 cfs 1.862 af

Total Runoff Area = 22.318 ac Runoff Volume = 4.945 af Average Runoff Depth = 2.66"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

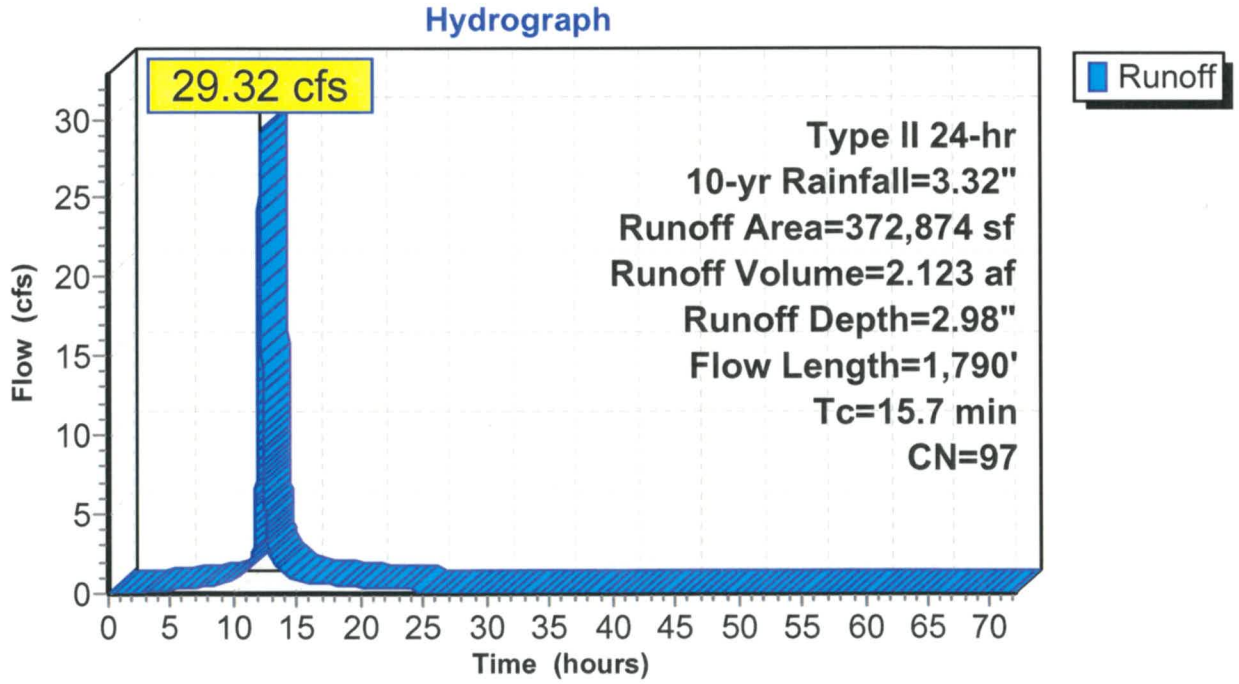
Runoff = 29.32 cfs @ 12.07 hrs, Volume= 2.123 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

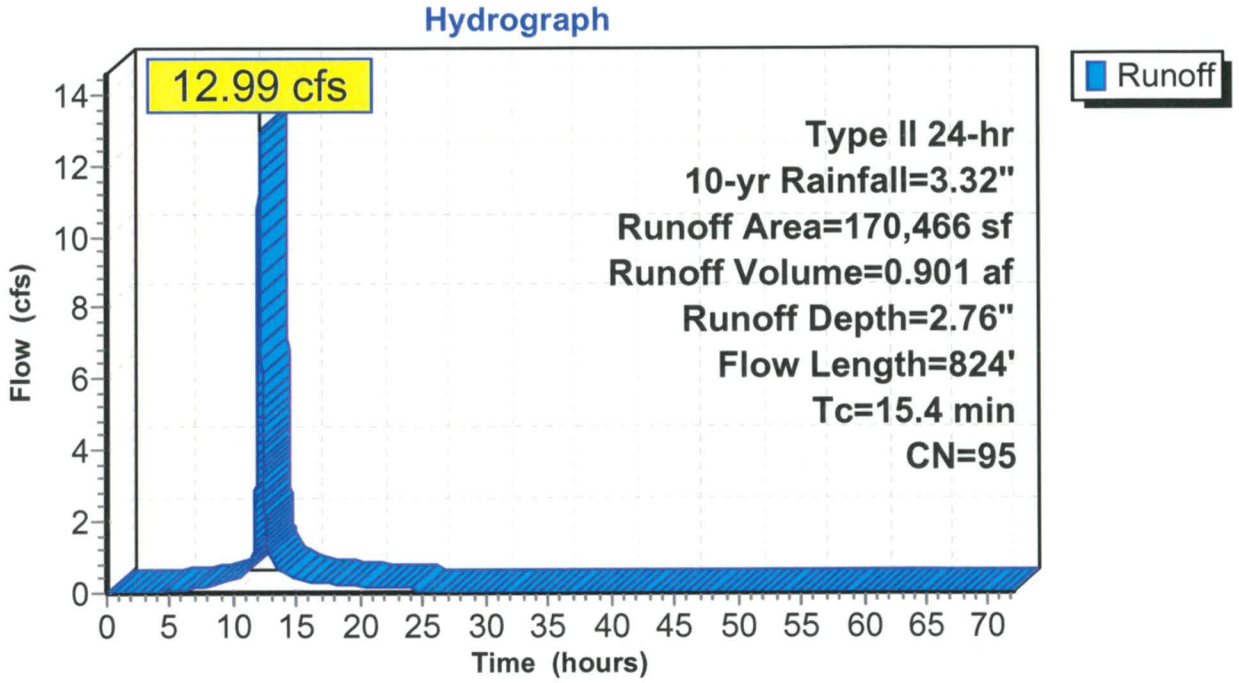
Runoff = 12.99 cfs @ 12.07 hrs, Volume= 0.901 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

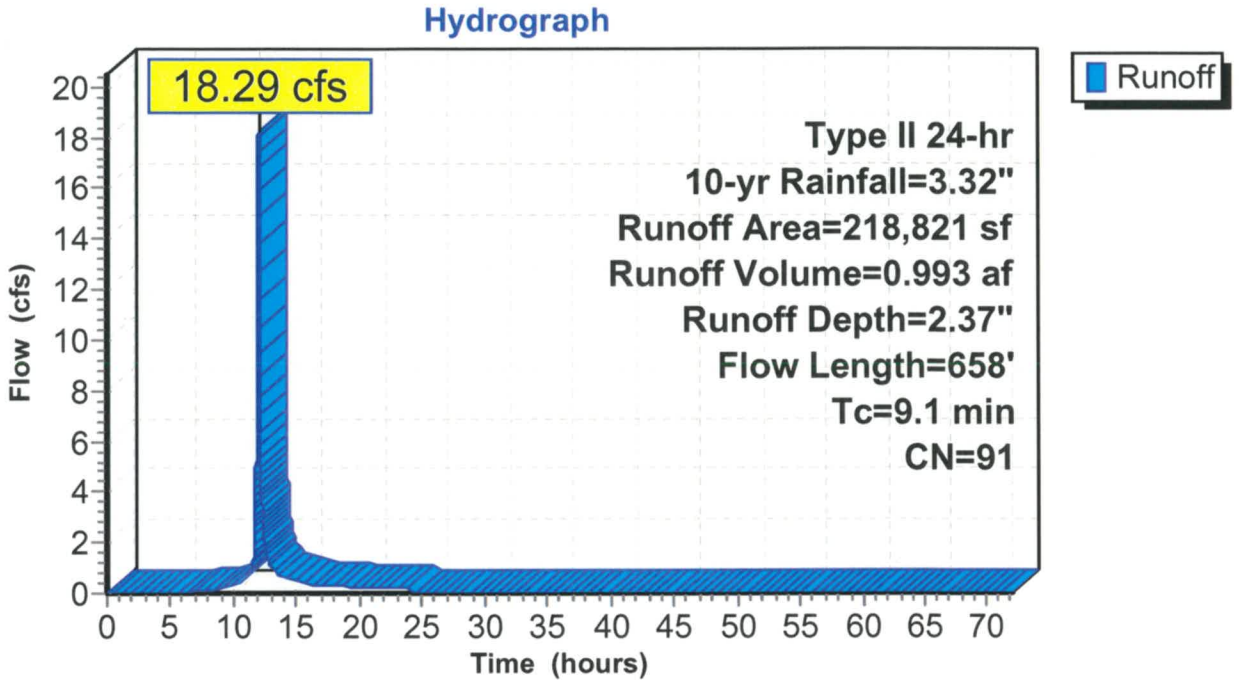
Runoff = 18.29 cfs @ 12.00 hrs, Volume= 0.993 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

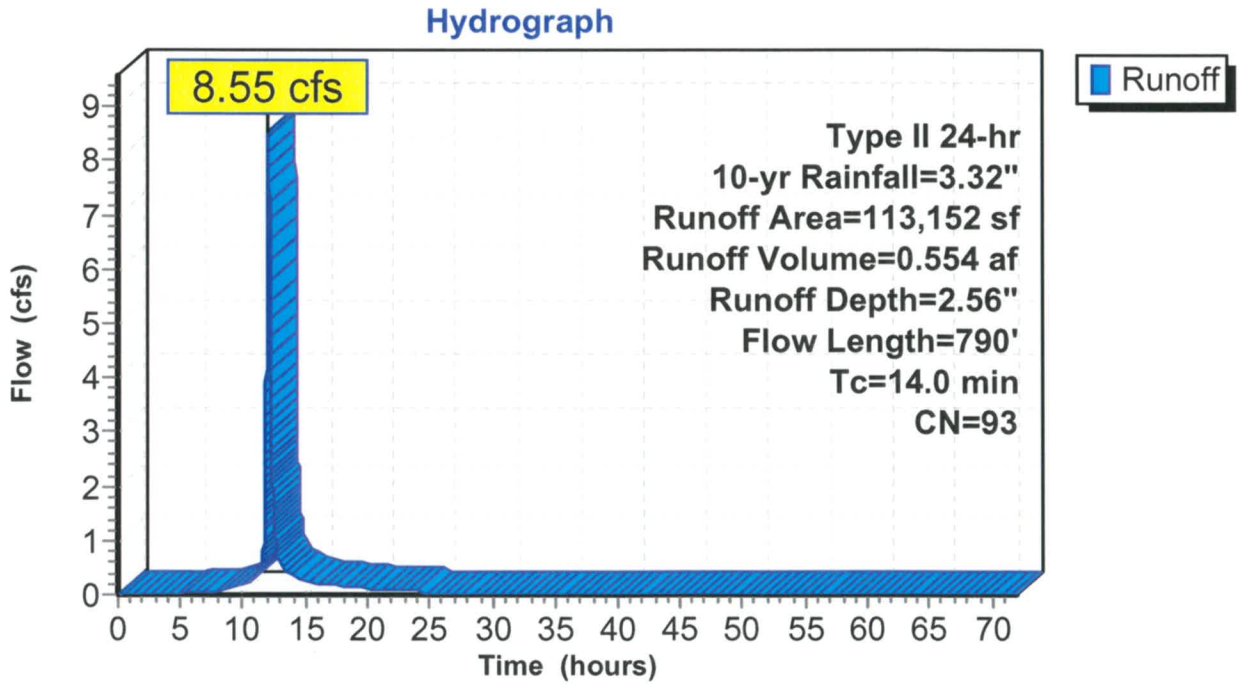
Runoff = 8.55 cfs @ 12.05 hrs, Volume= 0.554 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

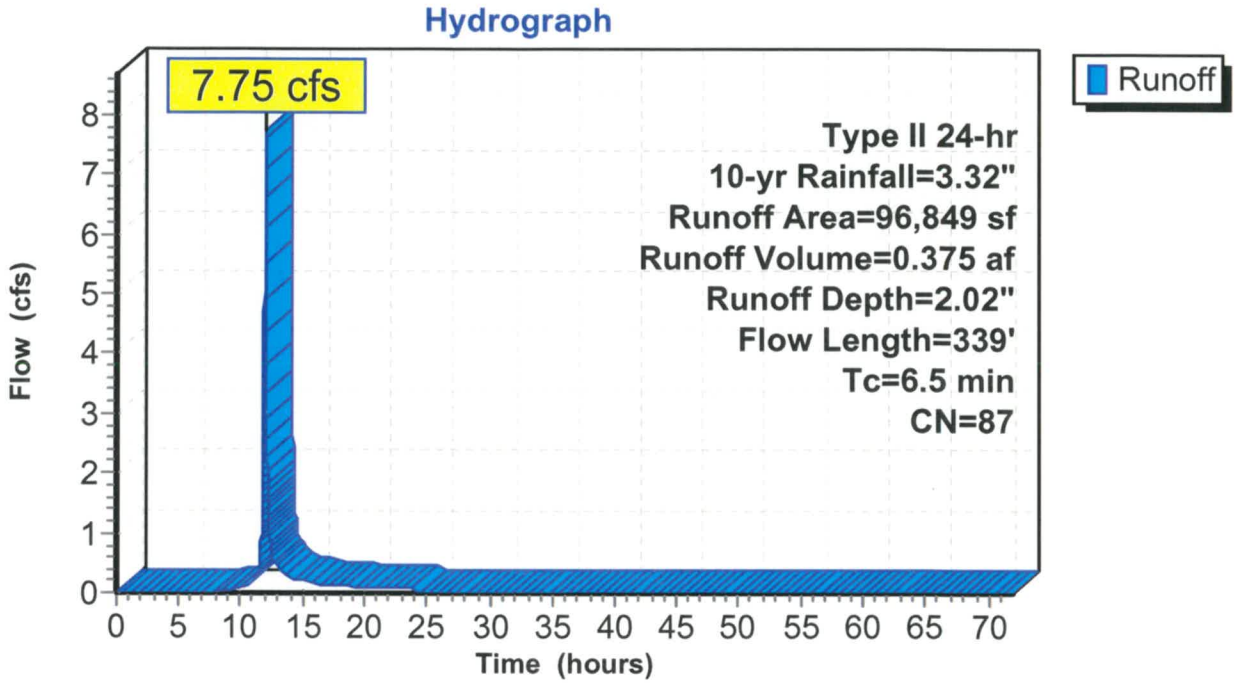
Runoff = 7.75 cfs @ 11.98 hrs, Volume= 0.375 af, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 2.37" for 10-yr event				
Inflow =	18.29 cfs @	12.00 hrs,	Volume=	0.993 af	
Outflow =	1.69 cfs @	12.53 hrs,	Volume=	0.961 af,	Atten= 91%, Lag= 31.8 min
Primary =	1.69 cfs @	12.53 hrs,	Volume=	0.961 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.10' @ 12.53 hrs Surf.Area= 0 sf Storage= 44,100 cf (25,076 cf above start)

Plug-Flow detention time= 1,238.7 min calculated for 0.524 af (53% of inflow)
Center-of-Mass det. time= 654.4 min (1,455.3 - 800.9)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

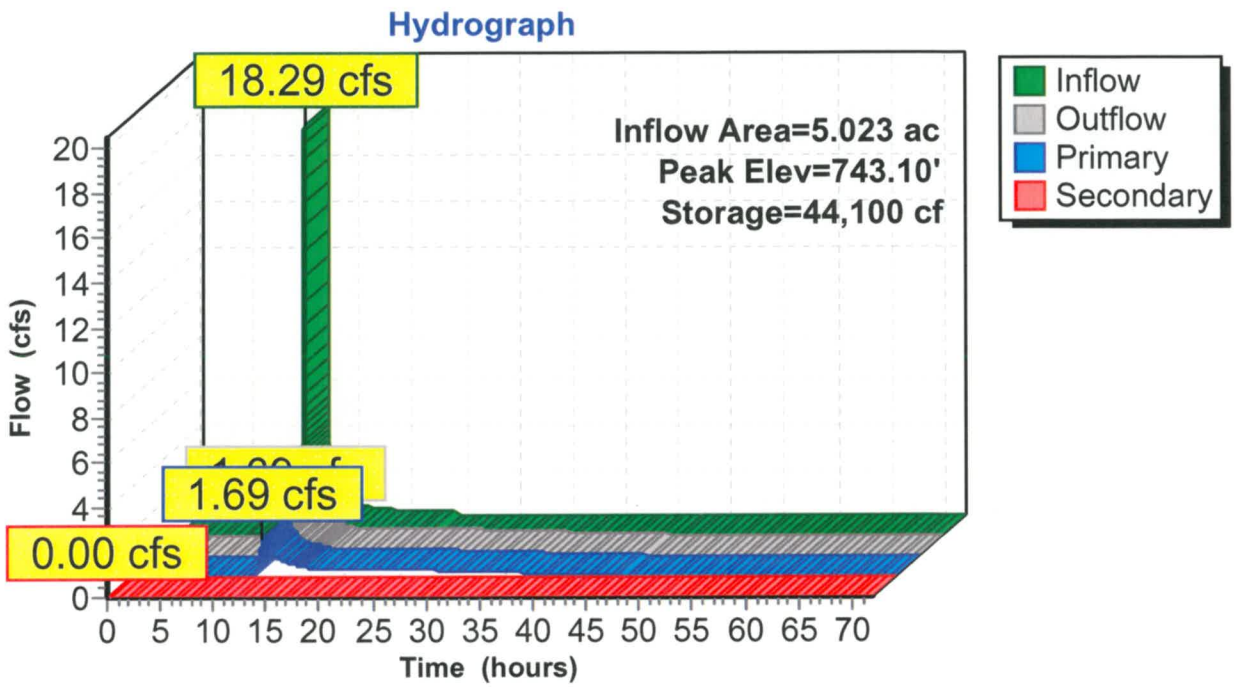
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.68 cfs @ 12.53 hrs HW=743.10' (Free Discharge)
└─**1=Culvert** (Passes 1.68 cfs of 12.83 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.41 cfs @ 4.66 fps)
  └─**3=Orifice/Grate** (Weir Controls 1.27 cfs @ 1.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

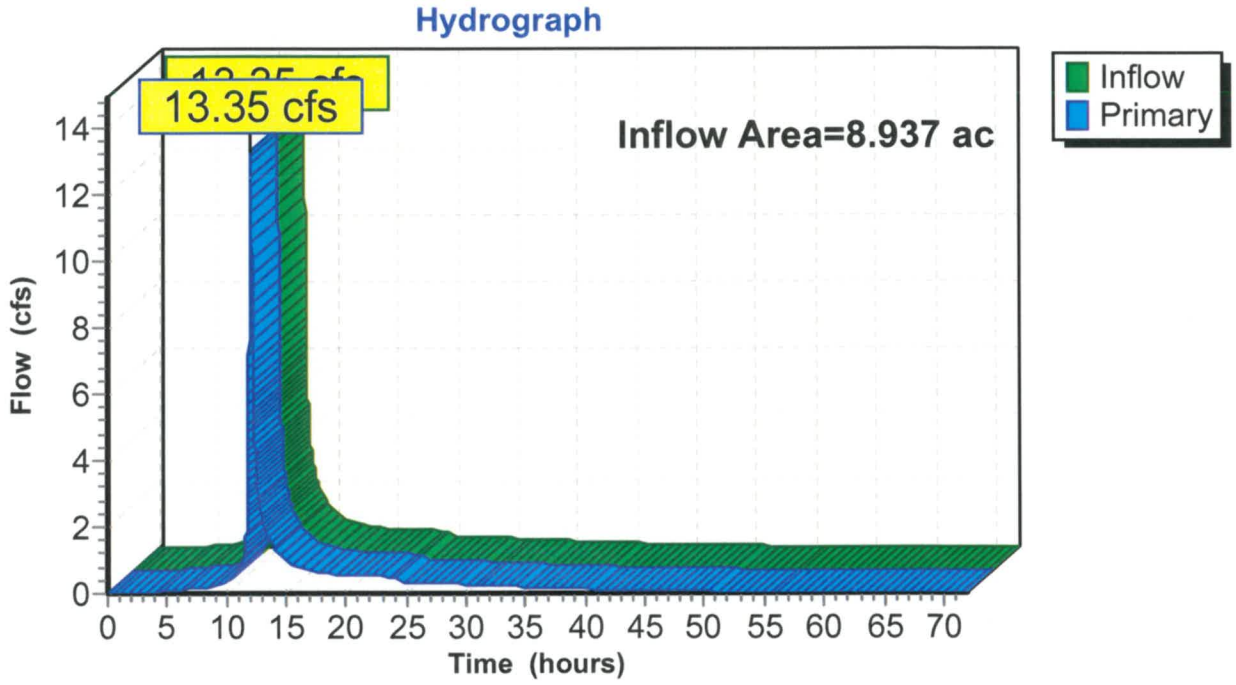


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 2.50" for 10-yr event
Inflow = 13.35 cfs @ 12.07 hrs, Volume= 1.862 af
Primary = 13.35 cfs @ 12.07 hrs, Volume= 1.862 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=3.57"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=34.86 cfs 2.548 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=3.35"
Flow Length=824' Tc=15.4 min CN=95 Runoff=15.59 cfs 1.093 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=2.94"
Flow Length=658' Tc=9.1 min CN=91 Runoff=22.41 cfs 1.231 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=3.14"
Flow Length=790' Tc=14.0 min CN=93 Runoff=10.37 cfs 0.680 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=2.56"
Flow Length=339' Tc=6.5 min CN=87 Runoff=9.73 cfs 0.475 af

Pond 1D: Wet Pond Peak Elev=743.23' Storage=47,383 cf Inflow=22.41 cfs 1.231 af
Primary=4.71 cfs 1.199 af Secondary=0.00 cfs 0.000 af Outflow=4.71 cfs 1.199 af

Link 1E: Post Total POI 1 Inflow=18.27 cfs 2.292 af
Primary=18.27 cfs 2.292 af

Total Runoff Area = 22.318 ac Runoff Volume = 6.027 af Average Runoff Depth = 3.24"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

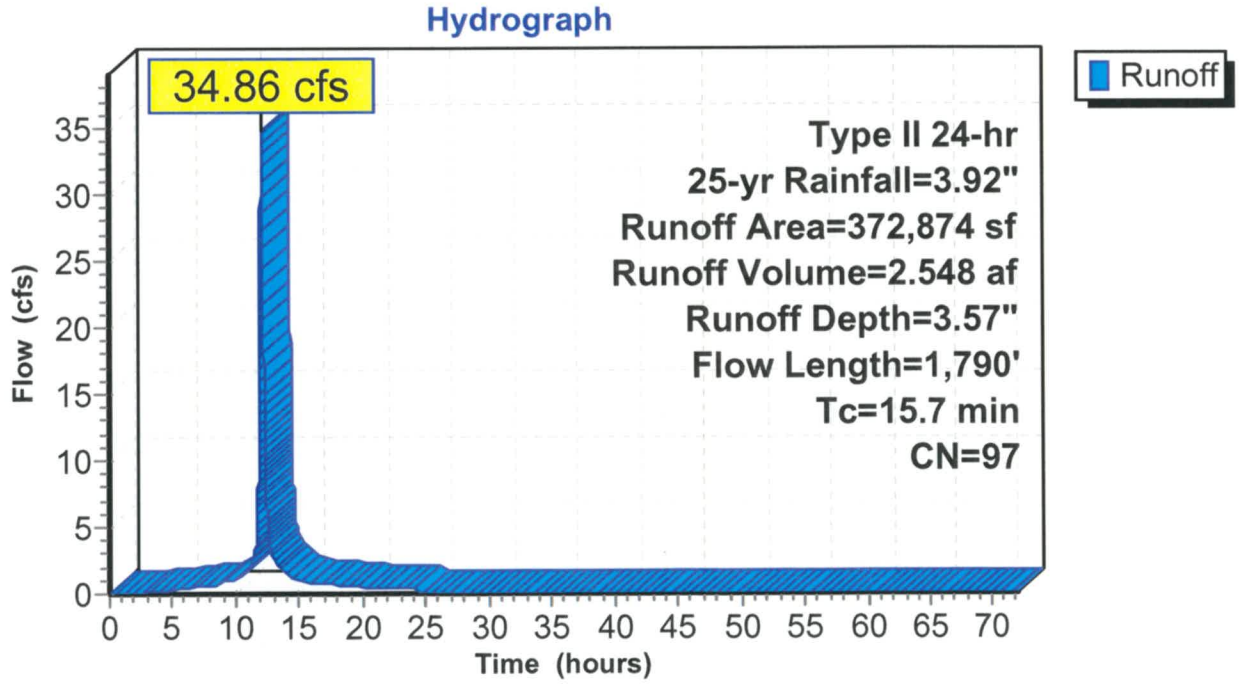
Runoff = 34.86 cfs @ 12.07 hrs, Volume= 2.548 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

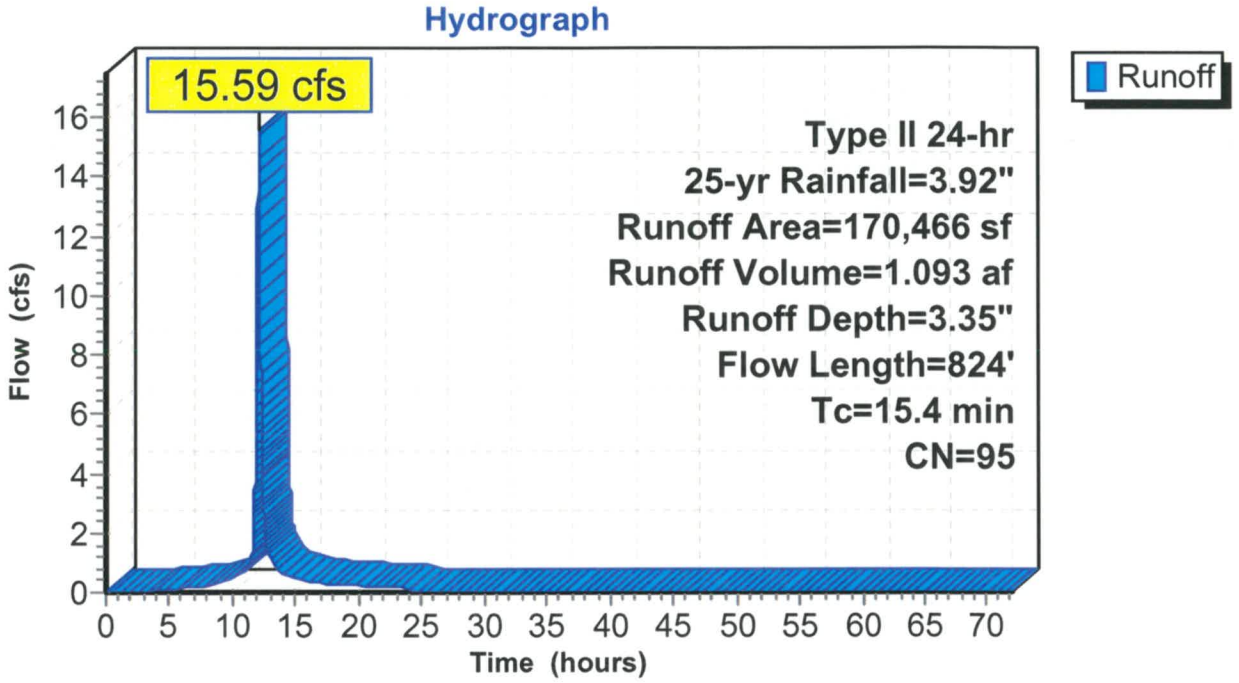
Runoff = 15.59 cfs @ 12.07 hrs, Volume= 1.093 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

Runoff = 22.41 cfs @ 12.00 hrs, Volume= 1.231 af, Depth= 2.94"

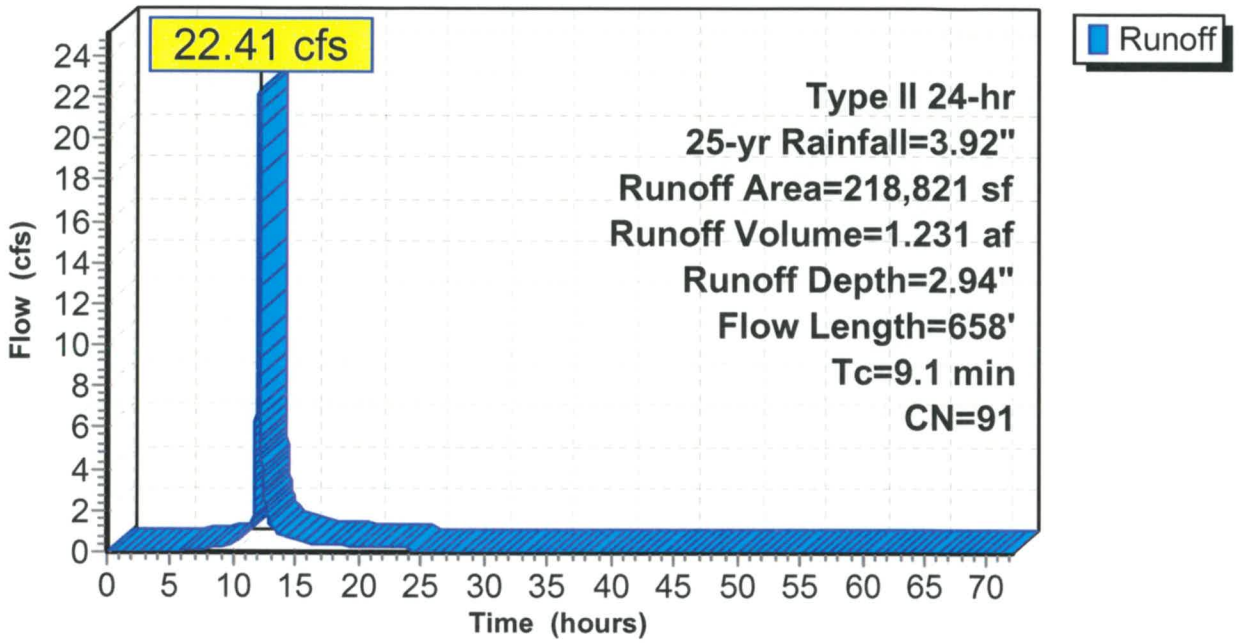
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond

Hydrograph



Summary for Subcatchment 2A: Pre POI 2

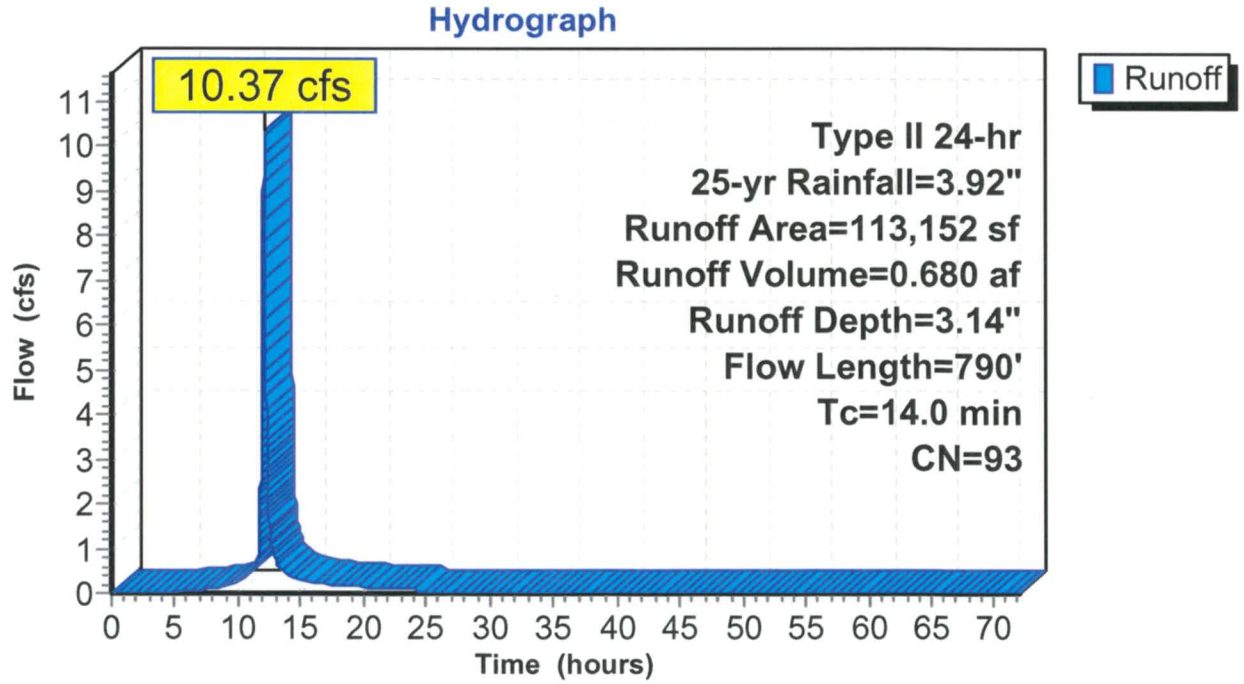
Runoff = 10.37 cfs @ 12.05 hrs, Volume= 0.680 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

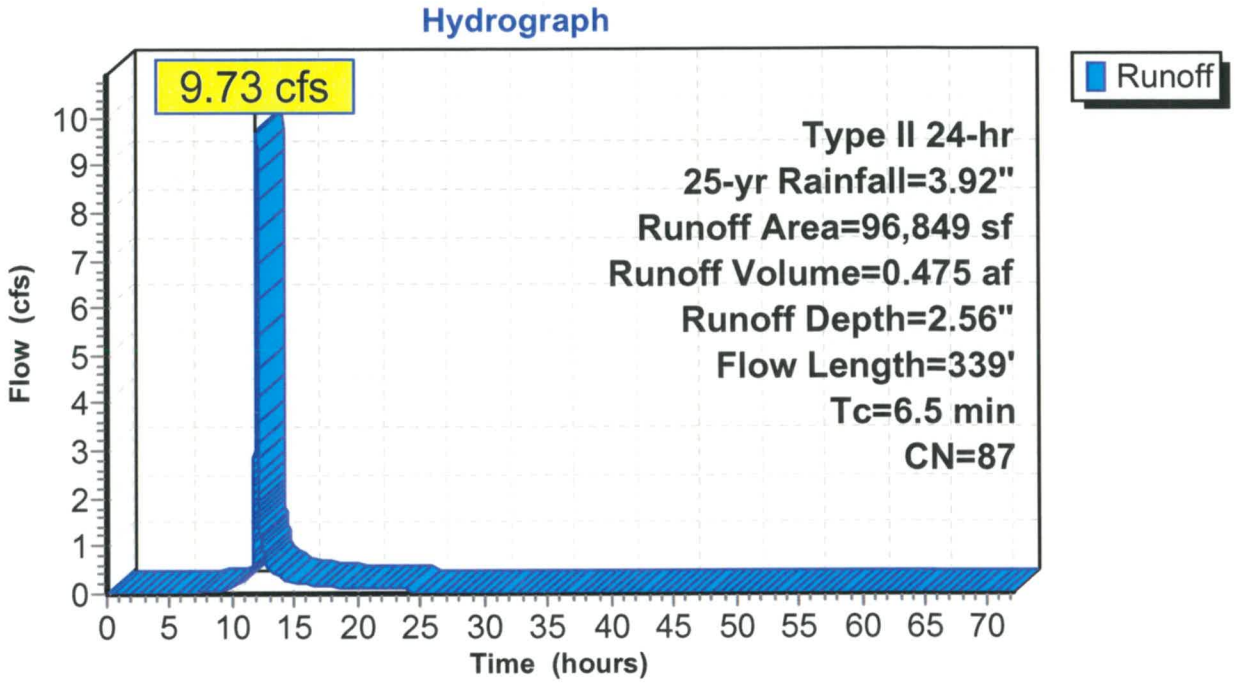
Runoff = 9.73 cfs @ 11.98 hrs, Volume= 0.475 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 2.94" for 25-yr event				
Inflow =	22.41 cfs @	12.00 hrs, Volume=	1.231 af		
Outflow =	4.71 cfs @	12.22 hrs, Volume=	1.199 af, Atten= 79%, Lag= 13.0 min		
Primary =	4.71 cfs @	12.22 hrs, Volume=	1.199 af		
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.23' @ 12.22 hrs Surf.Area= 0 sf Storage= 47,383 cf (28,359 cf above start)

Plug-Flow detention time= 991.3 min calculated for 0.762 af (62% of inflow)
Center-of-Mass det. time= 555.0 min (1,349.8 - 794.8)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

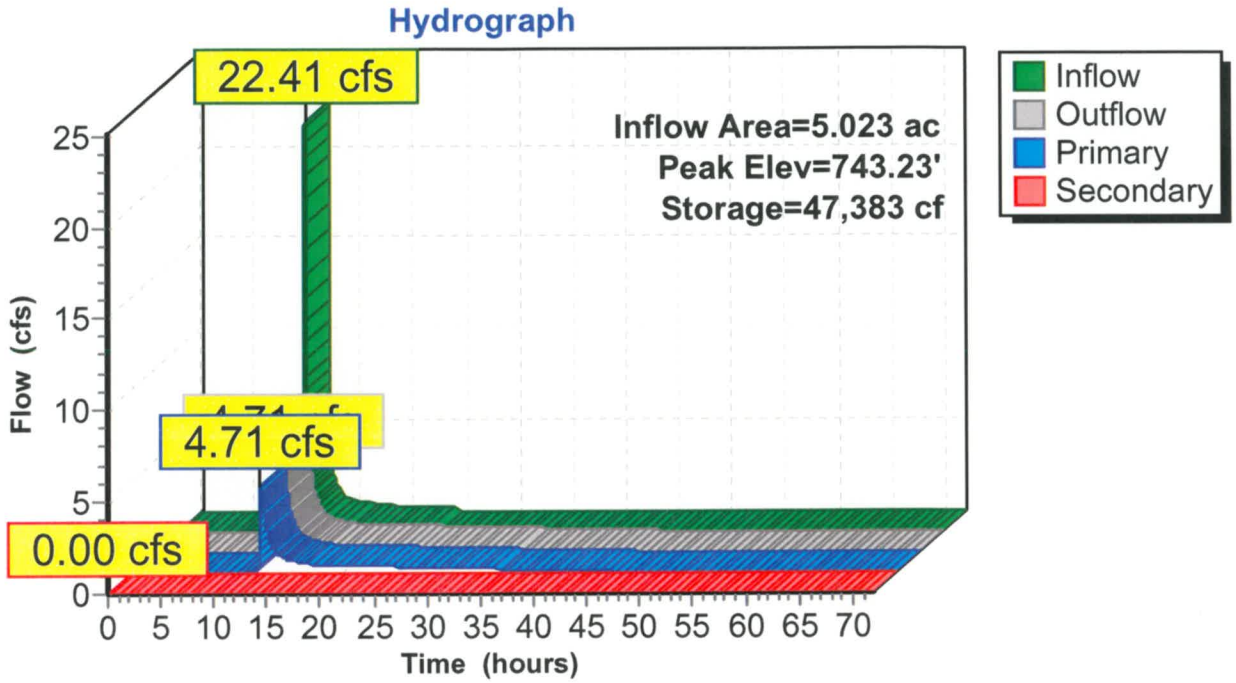
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.70 cfs @ 12.22 hrs HW=743.23' (Free Discharge)
└─**1=Culvert** (Passes 4.70 cfs of 13.39 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.43 cfs @ 4.96 fps)
  └─**3=Orifice/Grate** (Weir Controls 4.27 cfs @ 1.56 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

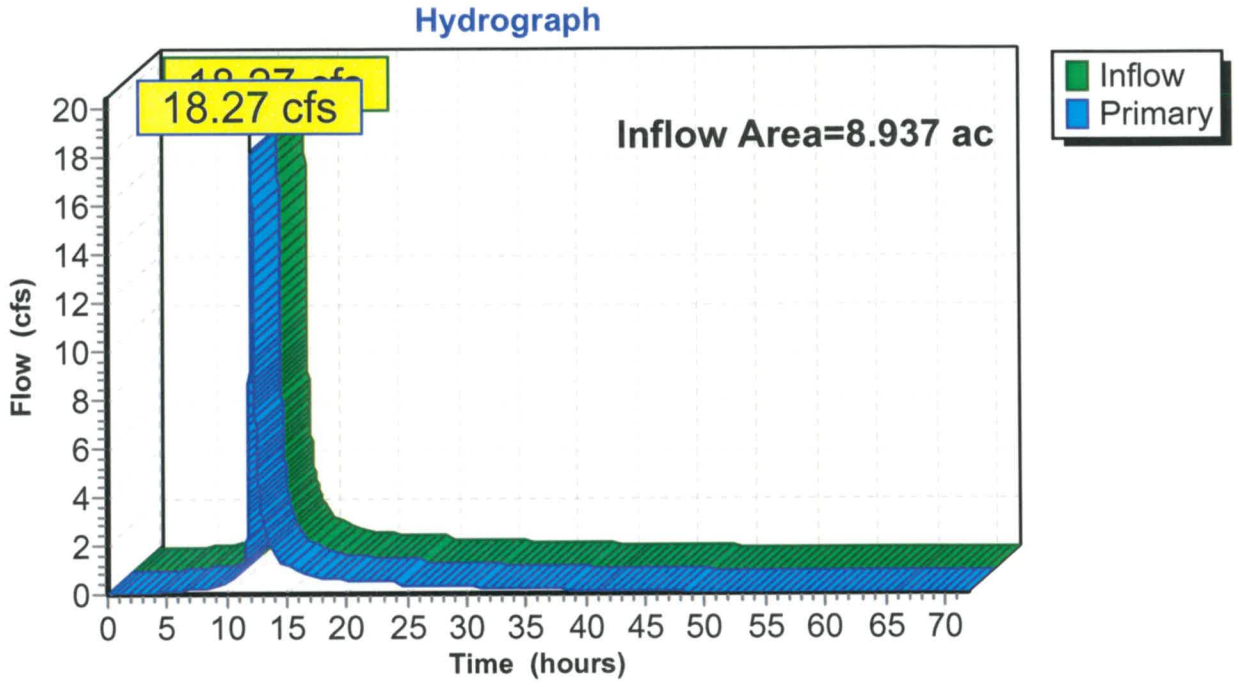


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 3.08" for 25-yr event
Inflow = 18.27 cfs @ 12.10 hrs, Volume= 2.292 af
Primary = 18.27 cfs @ 12.10 hrs, Volume= 2.292 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=4.07"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=39.46 cfs 2.903 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=3.85"
Flow Length=824' Tc=15.4 min CN=95 Runoff=17.76 cfs 1.254 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=3.42"
Flow Length=658' Tc=9.1 min CN=91 Runoff=25.84 cfs 1.432 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=3.63"
Flow Length=790' Tc=14.0 min CN=93 Runoff=11.88 cfs 0.786 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=3.02"
Flow Length=339' Tc=6.5 min CN=87 Runoff=11.38 cfs 0.560 af

Pond 1D: Wet Pond Peak Elev=743.34' Storage=50,283 cf Inflow=25.84 cfs 1.432 af
Primary=8.22 cfs 1.399 af Secondary=0.00 cfs 0.000 af Outflow=8.22 cfs 1.399 af

Link 1E: Post Total POI 1 Inflow=24.47 cfs 2.653 af
Primary=24.47 cfs 2.653 af

Total Runoff Area = 22.318 ac Runoff Volume = 6.935 af Average Runoff Depth = 3.73"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

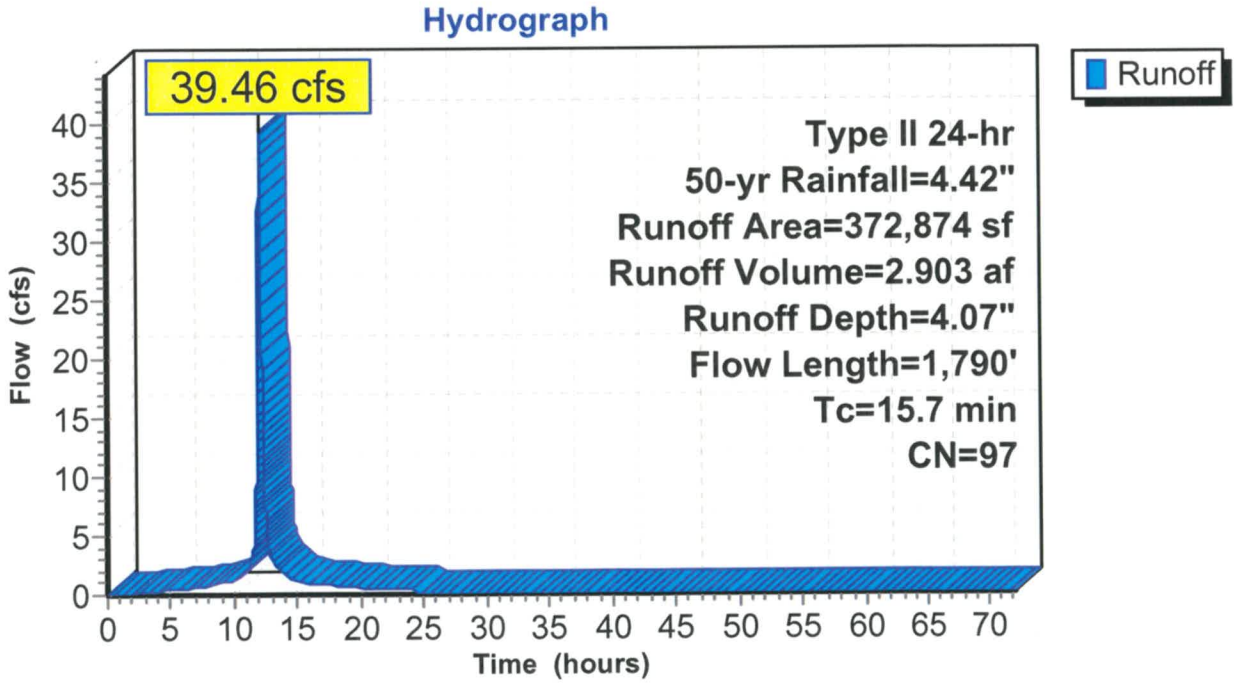
Runoff = 39.46 cfs @ 12.07 hrs, Volume= 2.903 af, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

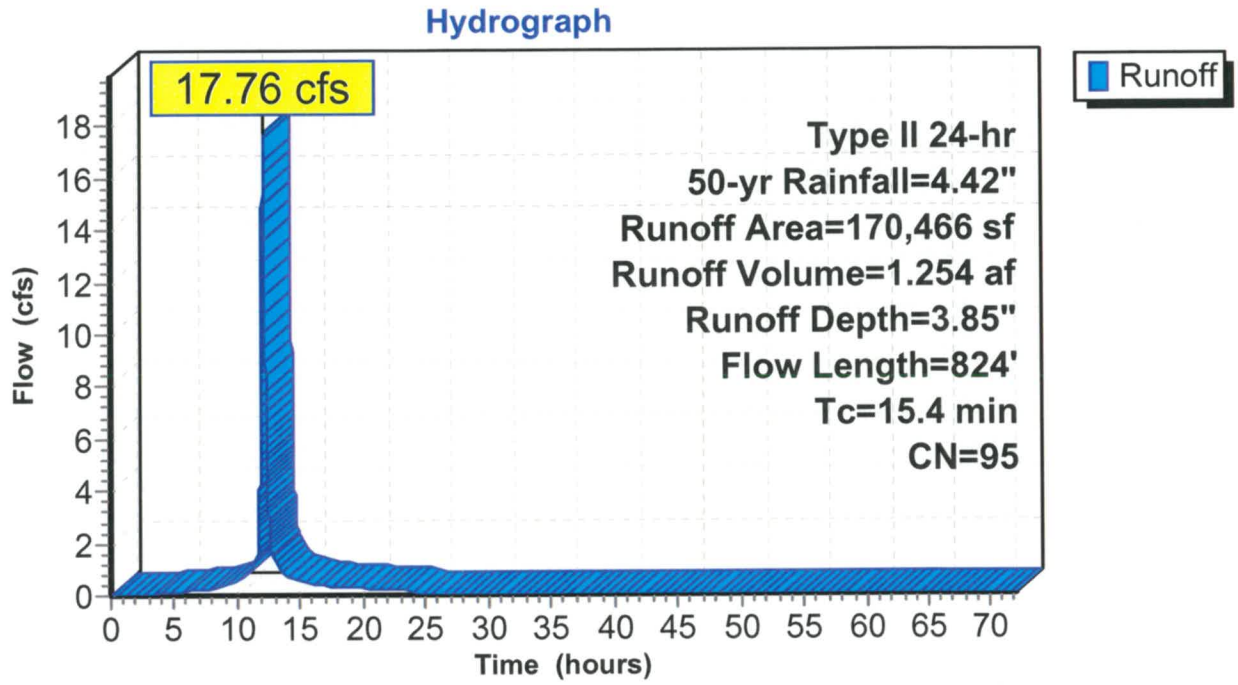
Runoff = 17.76 cfs @ 12.06 hrs, Volume= 1.254 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

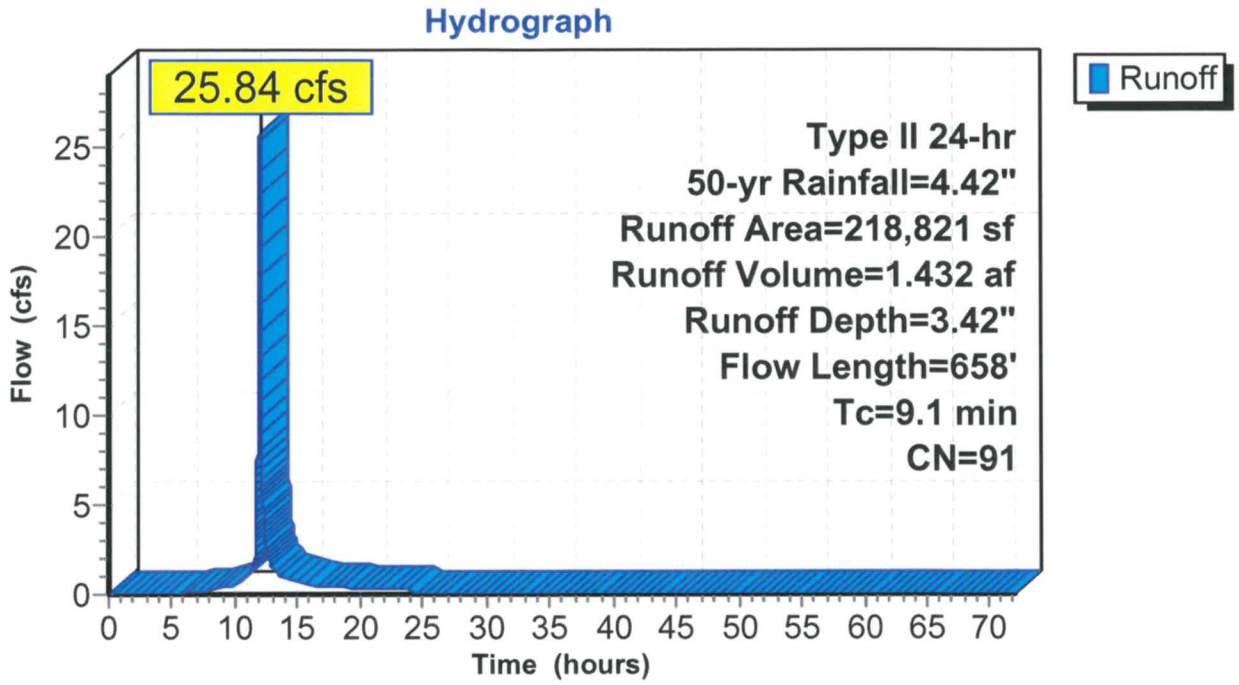
Runoff = 25.84 cfs @ 12.00 hrs, Volume= 1.432 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

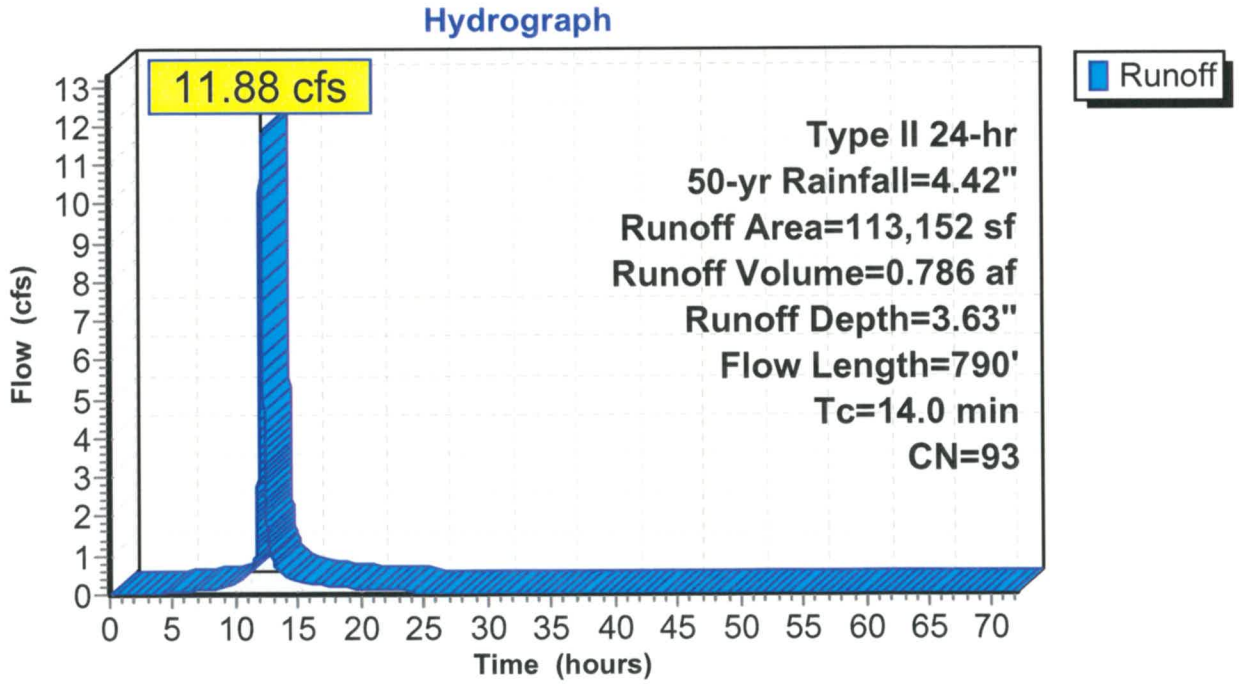
Runoff = 11.88 cfs @ 12.05 hrs, Volume= 0.786 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

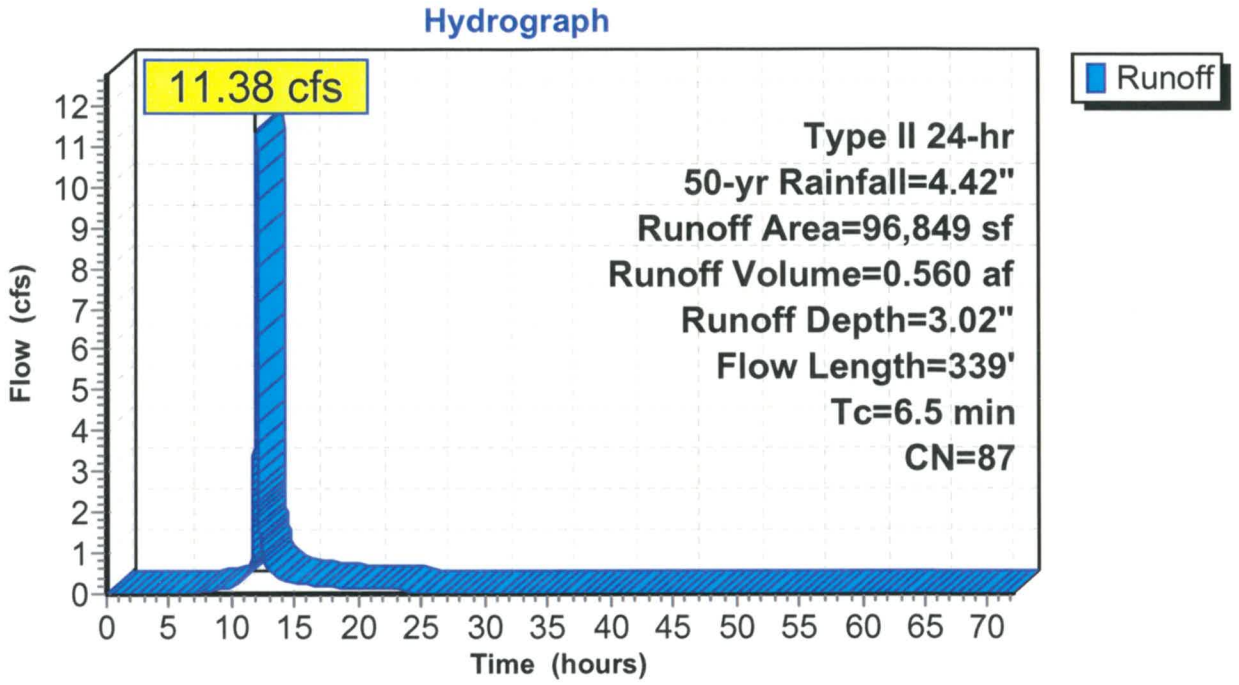
Runoff = 11.38 cfs @ 11.98 hrs, Volume= 0.560 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac,	65.91% Impervious,	Inflow Depth =	3.42"	for 50-yr event
Inflow =	25.84 cfs @	12.00 hrs,	Volume=	1.432 af	
Outflow =	8.22 cfs @	12.16 hrs,	Volume=	1.399 af,	Atten= 68%, Lag= 9.4 min
Primary =	8.22 cfs @	12.16 hrs,	Volume=	1.399 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.34' @ 12.16 hrs Surf.Area= 0 sf Storage= 50,283 cf (31,259 cf above start)

Plug-Flow detention time= 840.4 min calculated for 0.962 af (67% of inflow)
Center-of-Mass det. time= 494.0 min (1,284.6 - 790.6)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

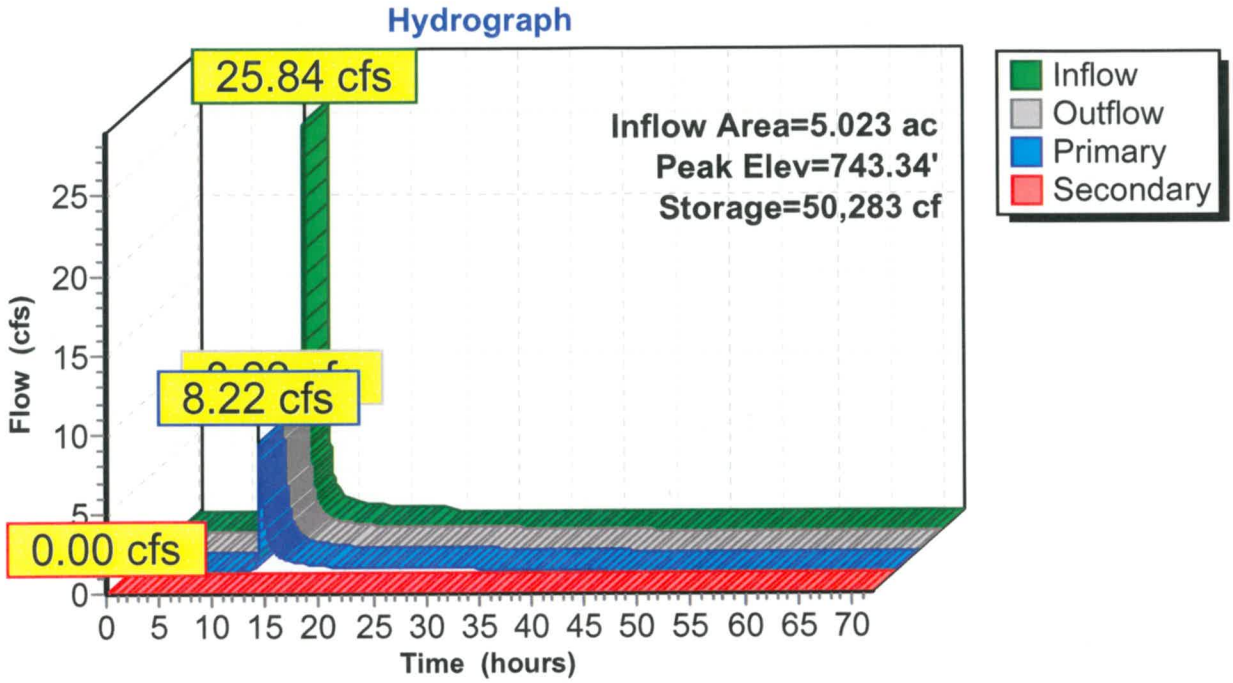
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.21 cfs @ 12.16 hrs HW=743.34' (Free Discharge)
└─**1=Culvert** (Passes 8.21 cfs of 13.45 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 5.21 fps)
  └─**3=Orifice/Grate** (Weir Controls 7.76 cfs @ 1.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

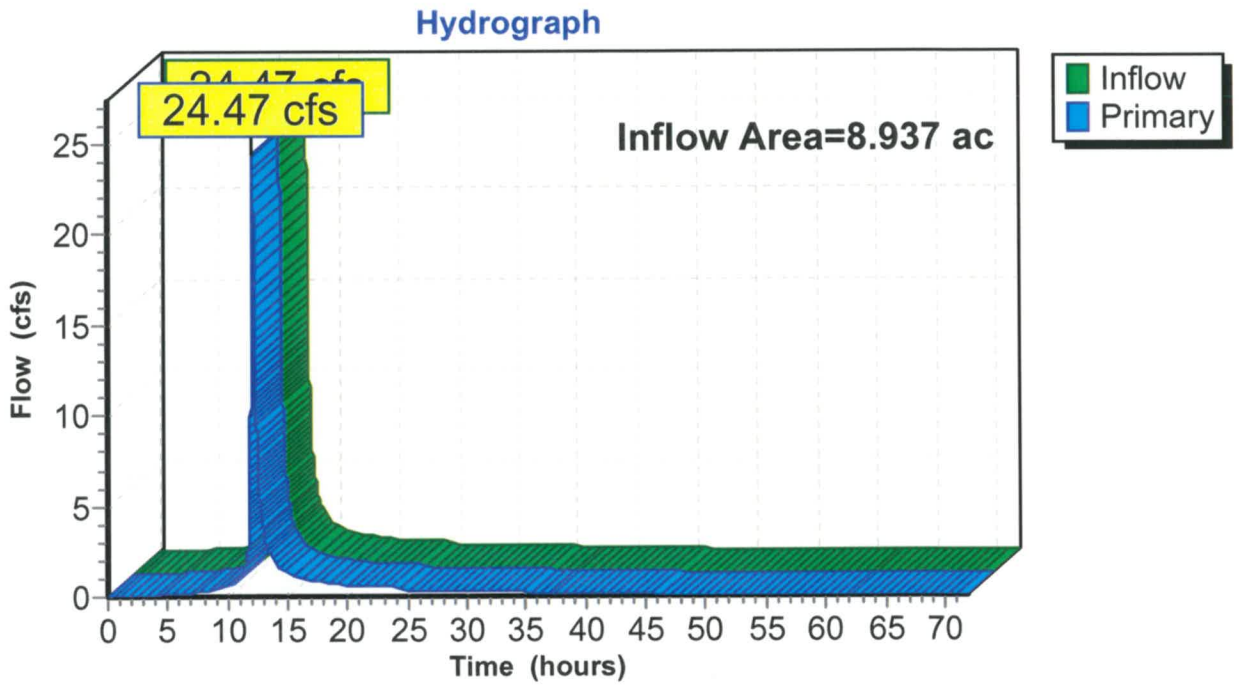


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 3.56" for 50-yr event
Inflow = 24.47 cfs @ 12.10 hrs, Volume= 2.653 af
Primary = 24.47 cfs @ 12.10 hrs, Volume= 2.653 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,874 sf 96.09% Impervious Runoff Depth=4.59"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=44.24 cfs 3.272 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=4.36"
Flow Length=824' Tc=15.4 min CN=95 Runoff=20.00 cfs 1.422 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=3.92"
Flow Length=658' Tc=9.1 min CN=91 Runoff=29.39 cfs 1.643 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=4.14"
Flow Length=790' Tc=14.0 min CN=93 Runoff=13.44 cfs 0.896 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=3.51"
Flow Length=339' Tc=6.5 min CN=87 Runoff=13.10 cfs 0.650 af

Pond 1D: Wet Pond Peak Elev=743.45' Storage=53,094 cf Inflow=29.39 cfs 1.643 af
Primary=12.23 cfs 1.609 af Secondary=0.00 cfs 0.000 af Outflow=12.23 cfs 1.609 af

Link 1E: Post Total POI 1 Inflow=31.16 cfs 3.031 af
Primary=31.16 cfs 3.031 af

Total Runoff Area = 22.318 ac Runoff Volume = 7.883 af Average Runoff Depth = 4.24"
20.09% Pervious = 4.483 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

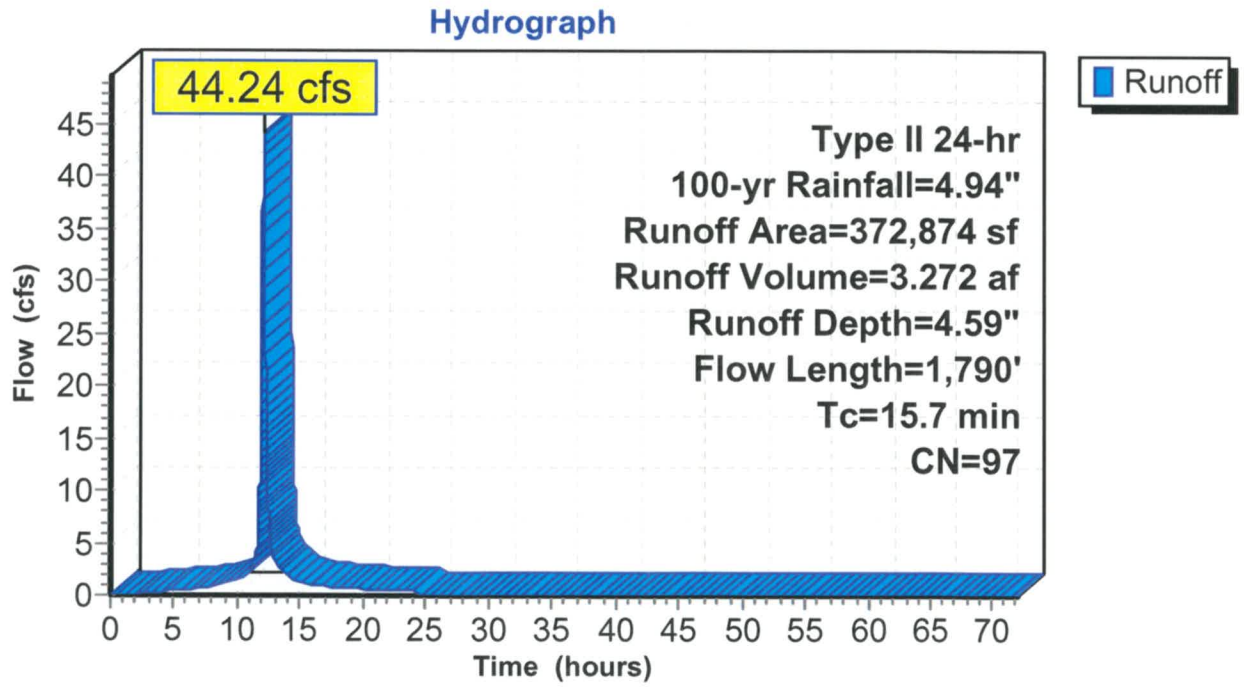
Runoff = 44.24 cfs @ 12.07 hrs, Volume= 3.272 af, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,898	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,874	97	Weighted Average
	14,592		3.91% Pervious Area
	358,282		96.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

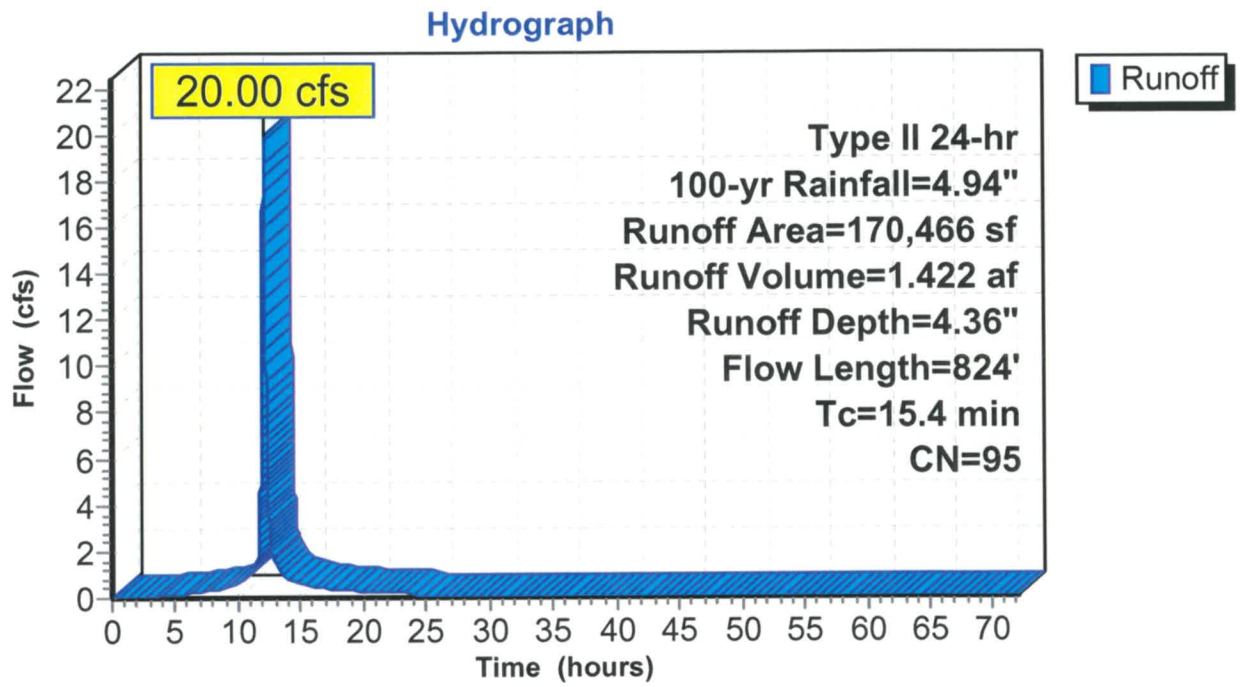
Runoff = 20.00 cfs @ 12.06 hrs, Volume= 1.422 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	123,256	98	Gravel
*	22,371	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
1.5	148	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.8	541	0.0020	1.15	3.46	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
2.0	85	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.4	824	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

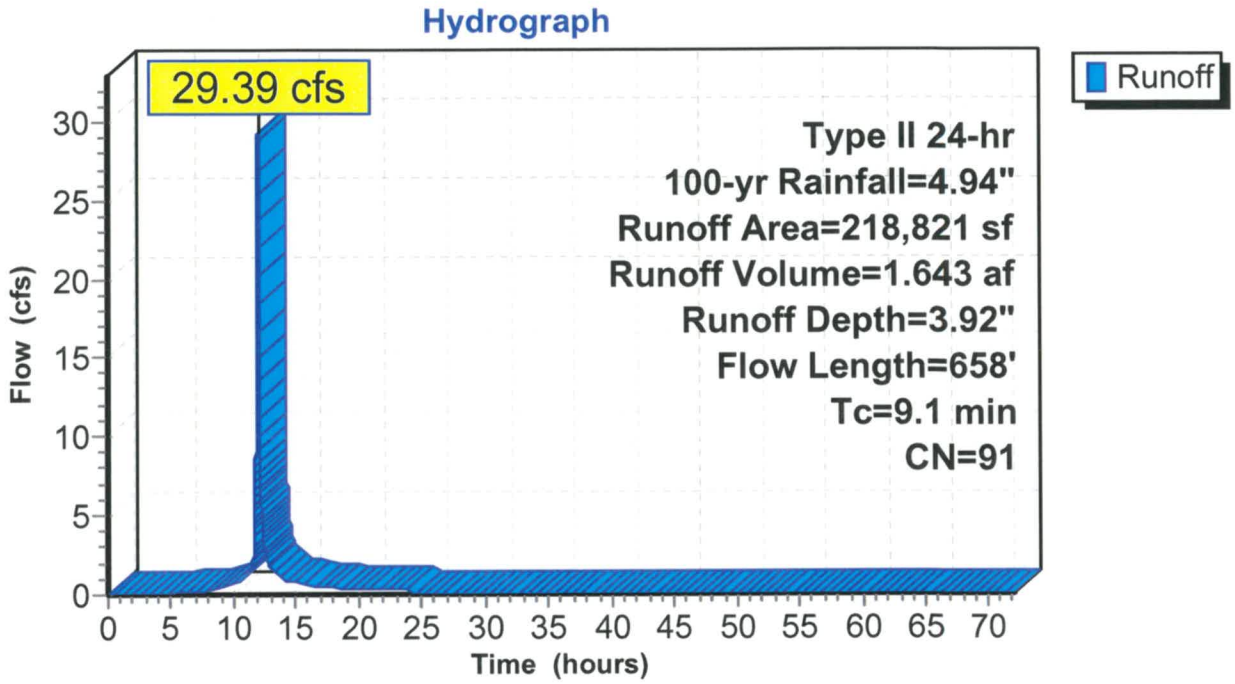
Runoff = 29.39 cfs @ 12.00 hrs, Volume= 1.643 af, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

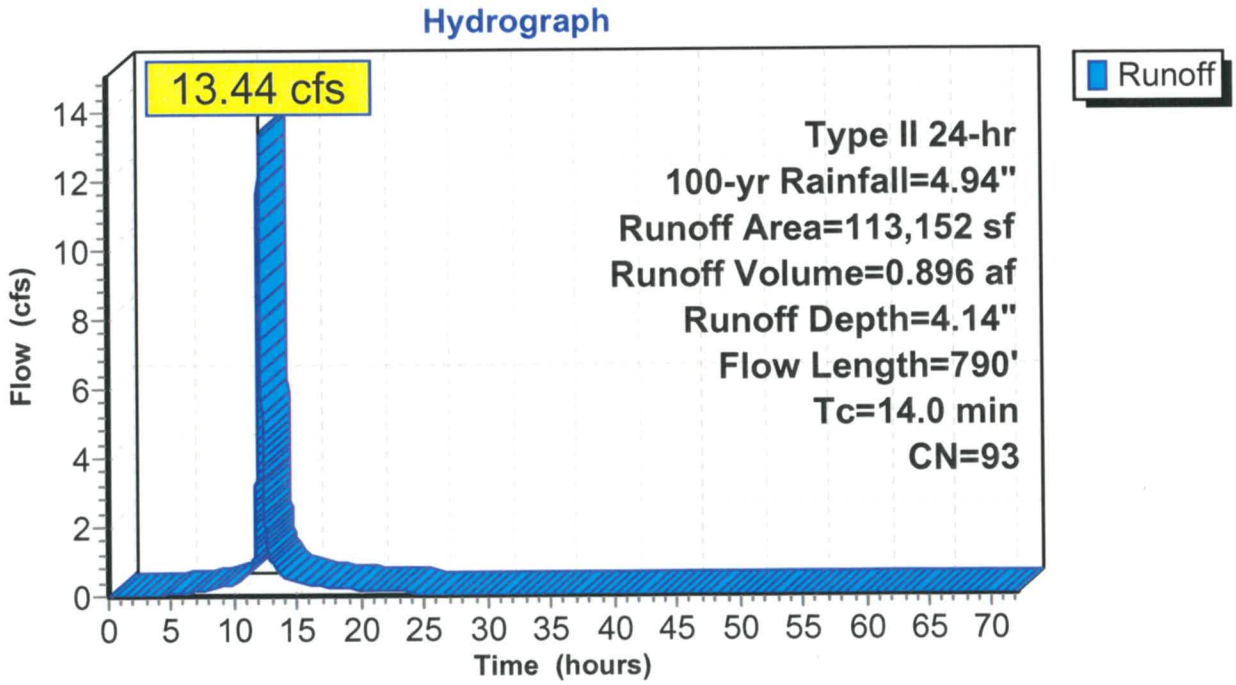
Runoff = 13.44 cfs @ 12.05 hrs, Volume= 0.896 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

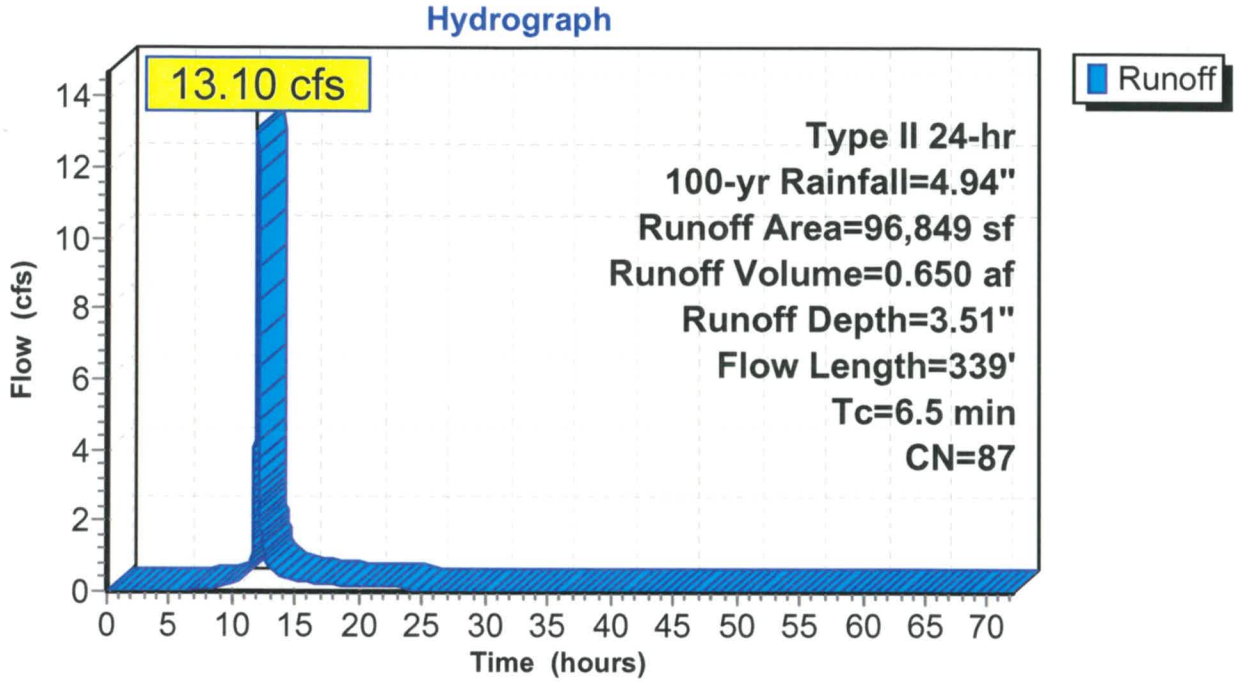
Runoff = 13.10 cfs @ 11.98 hrs, Volume= 0.650 af, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	21,973	98	Gravel
*	20,366	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac,	65.91% Impervious,	Inflow Depth =	3.92"	for 100-yr event
Inflow =	29.39 cfs @	12.00 hrs, Volume=	1.643 af		
Outflow =	12.23 cfs @	12.13 hrs, Volume=	1.609 af,	Atten= 58%,	Lag= 7.7 min
Primary =	12.23 cfs @	12.13 hrs, Volume=	1.609 af		
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.45' @ 12.13 hrs Surf.Area= 0 sf Storage= 53,094 cf (34,070 cf above start)

Plug-Flow detention time= 726.6 min calculated for 1.173 af (71% of inflow)
Center-of-Mass det. time= 444.5 min (1,231.3 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

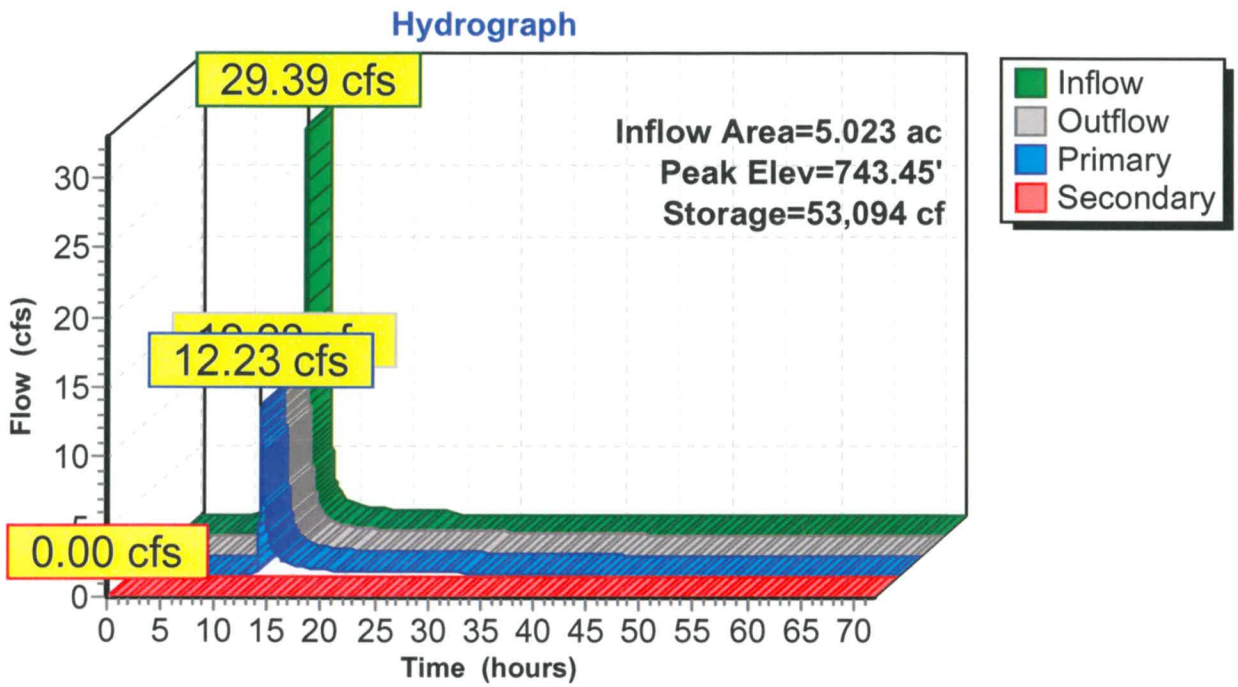
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=12.22 cfs @ 12.13 hrs HW=743.45' (Free Discharge)
└─**1=Culvert** (Passes 12.22 cfs of 14.10 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.48 cfs @ 5.45 fps)
  └─**3=Orifice/Grate** (Weir Controls 11.74 cfs @ 2.19 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

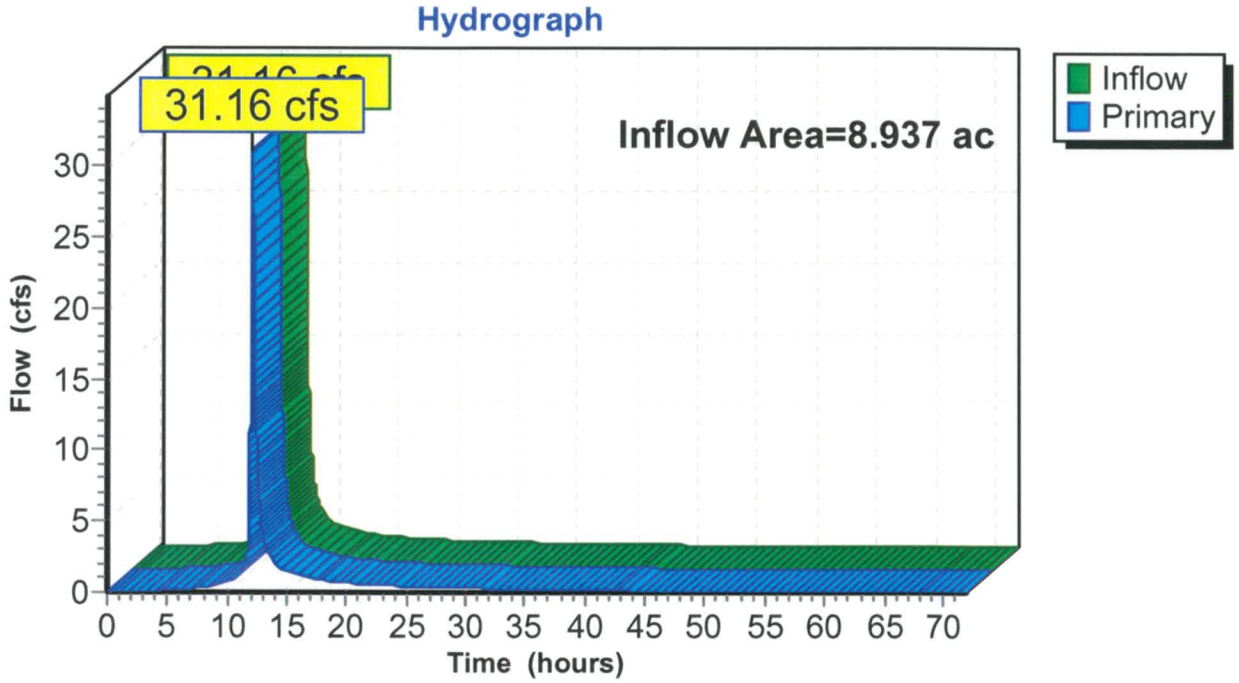


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 4.07" for 100-yr event
Inflow = 31.16 cfs @ 12.09 hrs, Volume= 3.031 af
Primary = 31.16 cfs @ 12.09 hrs, Volume= 3.031 af, Atten= 0%, Lag= 0.0 min

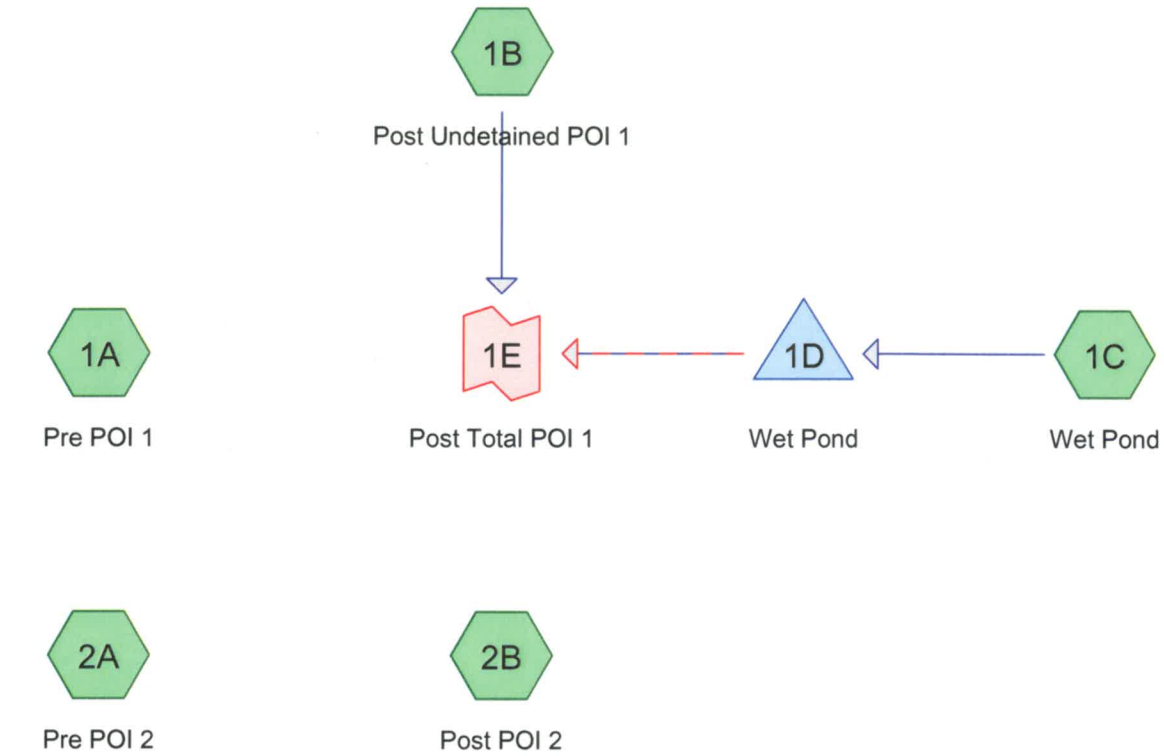
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

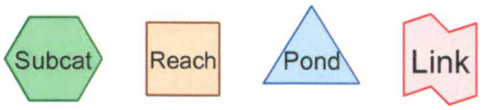
Link 1E: Post Total POI 1



Section 3.2

SR Hydrology Calculations





Routing Diagram for SR Rate Calcs
Prepared by Microsoft, Printed 10/19/2018
HydroCAD® 10.00-15 s/n 06760 © 2015 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=1.65"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=16.82 cfs 1.179 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=1.46"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=7.93 cfs 0.477 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=1.15"
Flow Length=658' Tc=9.1 min CN=91 Runoff=9.11 cfs 0.480 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=1.30"
Flow Length=790' Tc=14.0 min CN=93 Runoff=4.46 cfs 0.281 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=0.89"
Flow Length=339' Tc=6.5 min CN=87 Runoff=3.48 cfs 0.165 af

Pond 1D: Wet Pond Peak Elev=742.59' Storage=32,317 cf Inflow=9.11 cfs 0.480 af
Primary=0.27 cfs 0.454 af Secondary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.454 af

Link 1E: Post Total POI 1 Inflow=8.11 cfs 0.932 af
Primary=8.11 cfs 0.932 af

Total Runoff Area = 22.320 ac Runoff Volume = 2.581 af Average Runoff Depth = 1.39"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

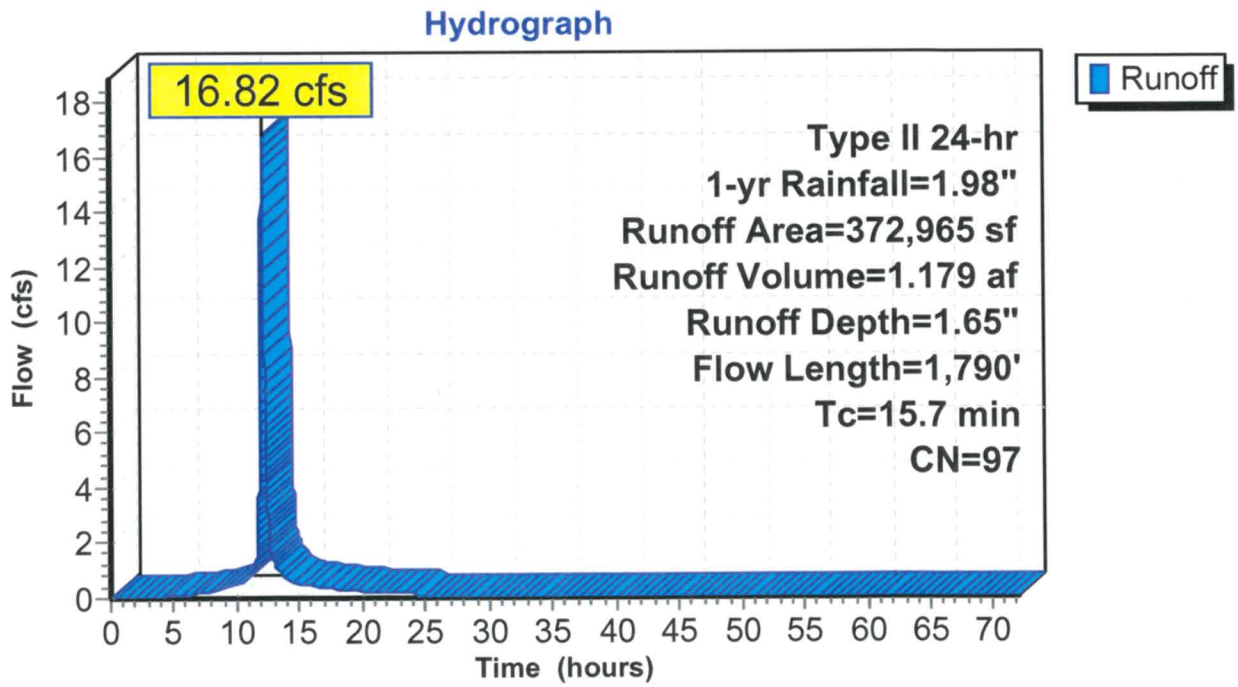
Runoff = 16.82 cfs @ 12.07 hrs, Volume= 1.179 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

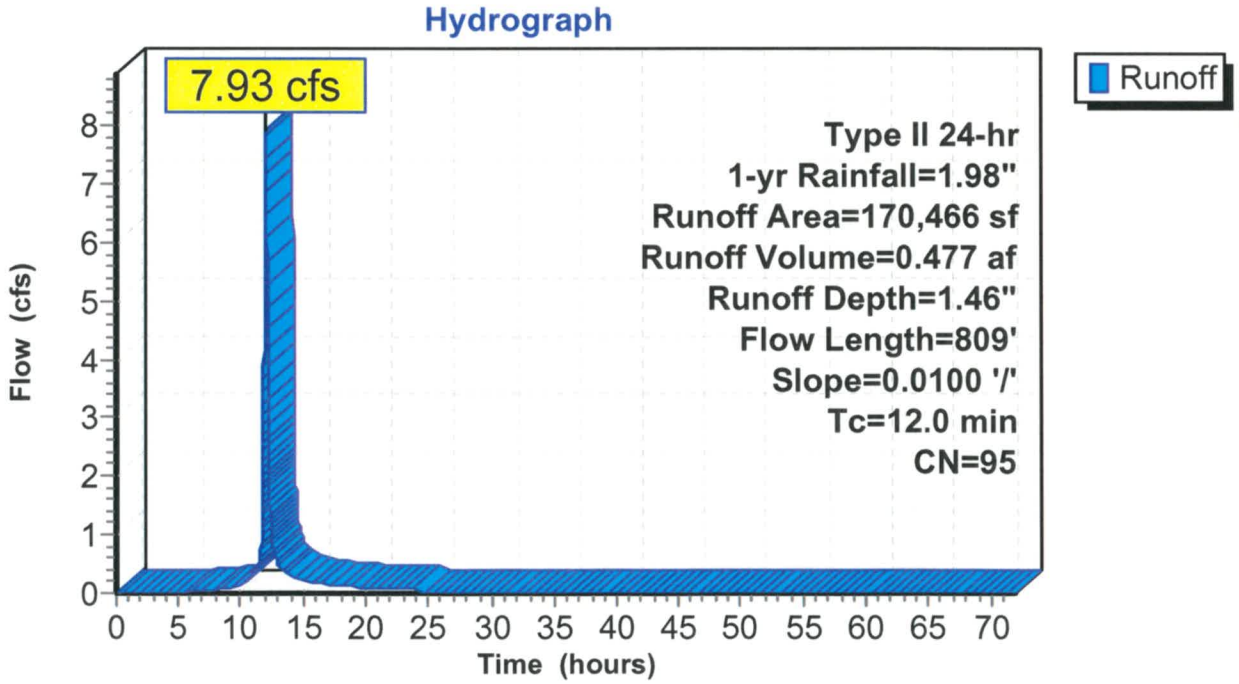
Runoff = 7.93 cfs @ 12.04 hrs, Volume= 0.477 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

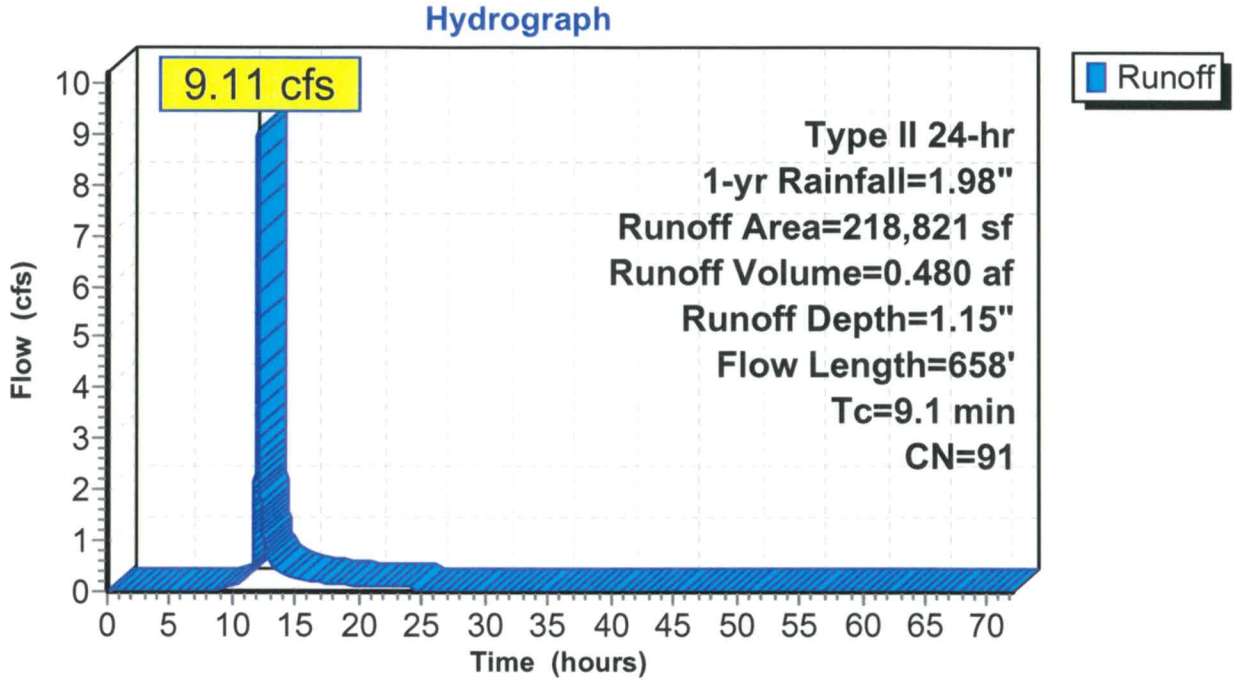
Runoff = 9.11 cfs @ 12.01 hrs, Volume= 0.480 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

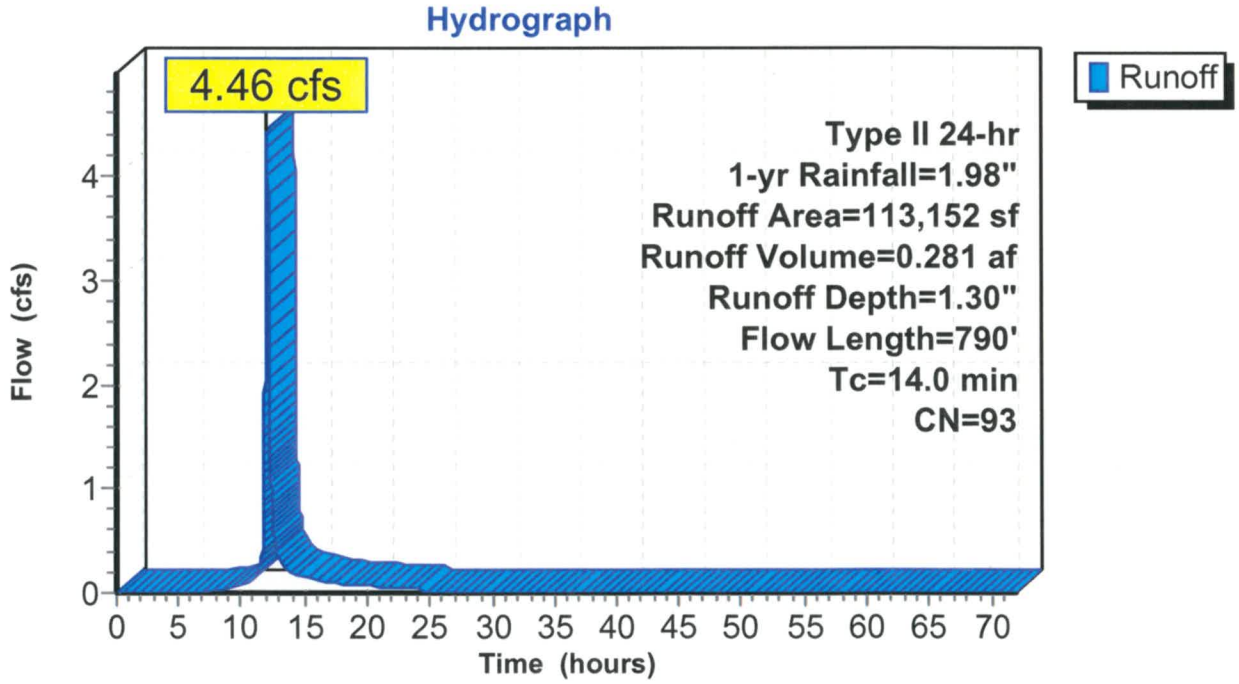
Runoff = 4.46 cfs @ 12.06 hrs, Volume= 0.281 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

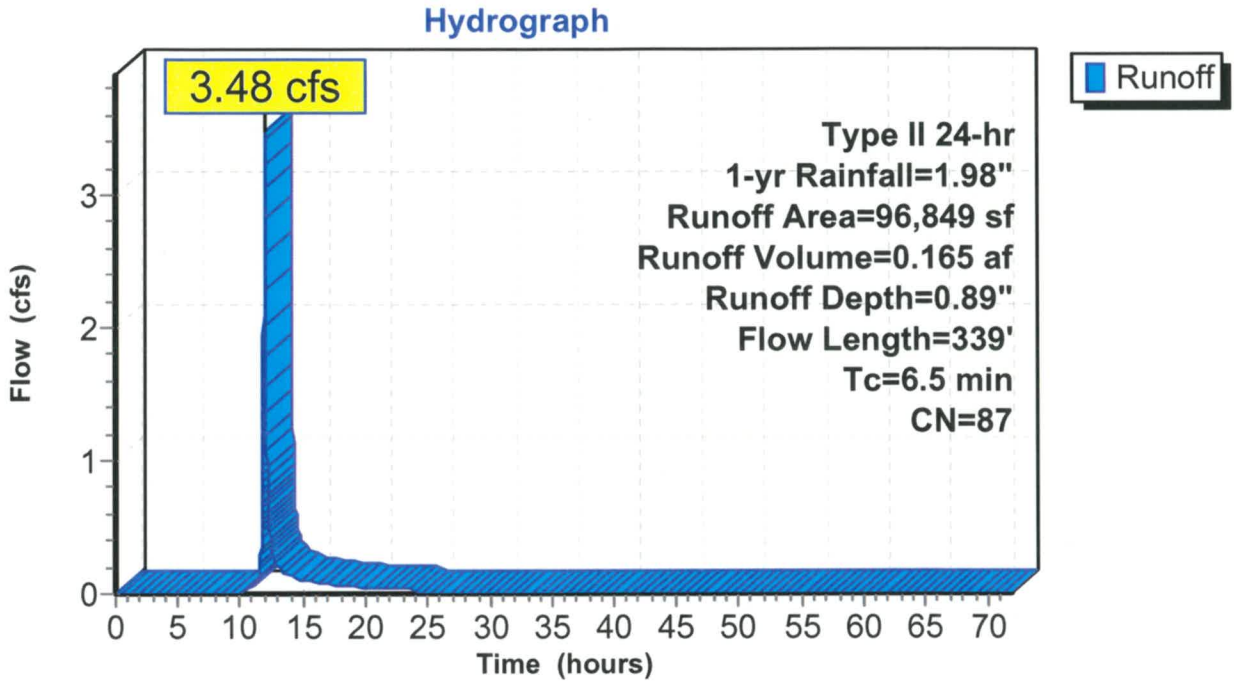
Runoff = 3.48 cfs @ 11.98 hrs, Volume= 0.165 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=1.98"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 1.15" for 1-yr event				
Inflow =	9.11 cfs @	12.01 hrs,	Volume=	0.480 af	
Outflow =	0.27 cfs @	14.77 hrs,	Volume=	0.454 af,	Atten= 97%, Lag= 165.6 min
Primary =	0.27 cfs @	14.77 hrs,	Volume=	0.454 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 742.59' @ 14.77 hrs Surf.Area= 0 sf Storage= 32,317 cf (13,293 cf above start)

Plug-Flow detention time= 3,061.4 min calculated for 0.018 af (4% of inflow)
Center-of-Mass det. time= 697.4 min (1,518.9 - 821.5)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

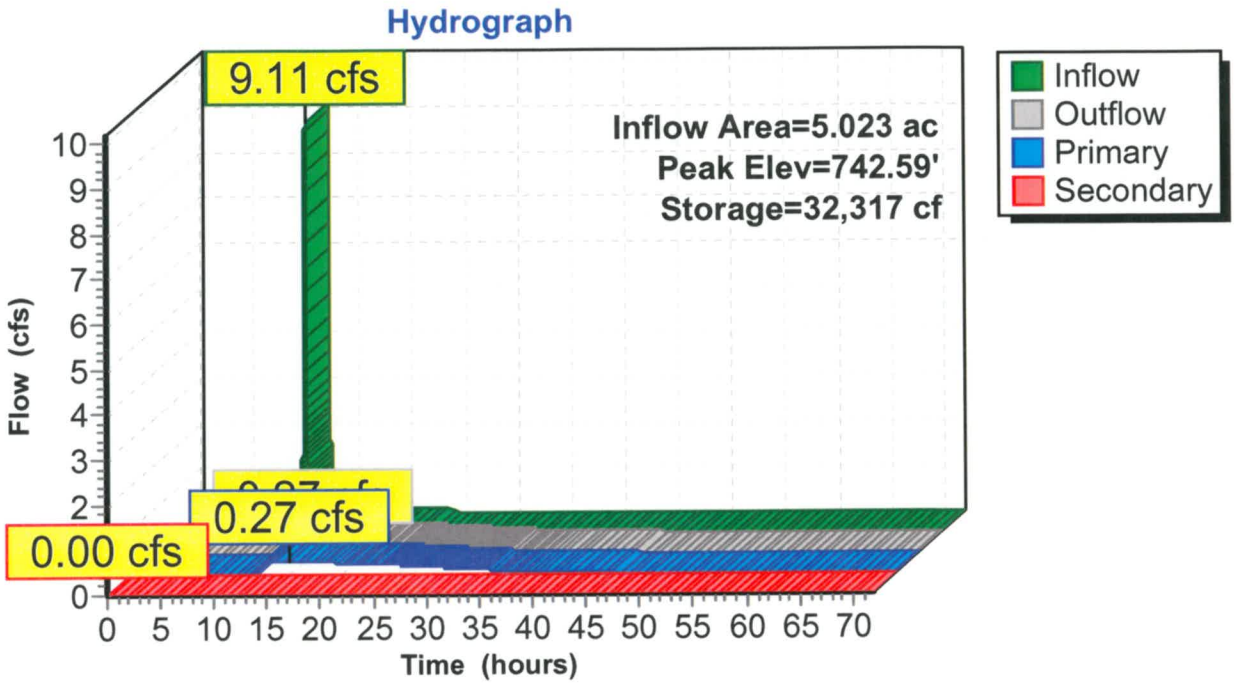
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.27 cfs @ 14.77 hrs HW=742.59' (Free Discharge)
└─**1=Culvert** (Passes 0.27 cfs of 9.18 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 3.14 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

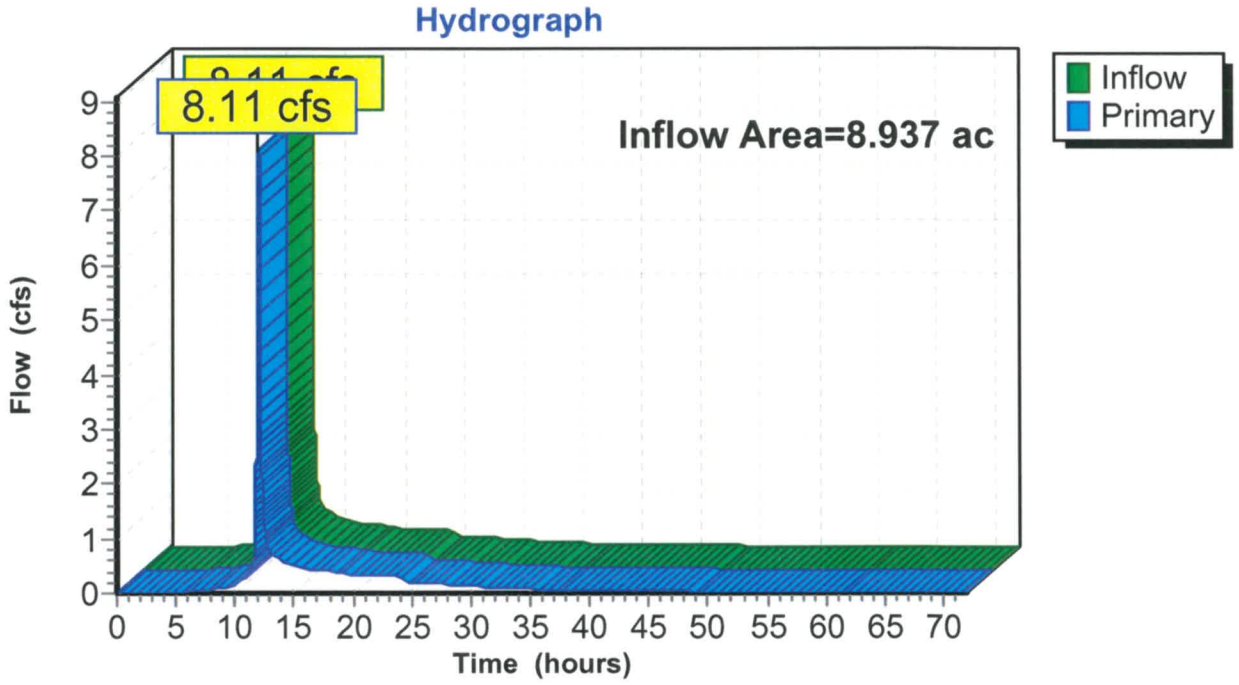


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 1.25" for 1-yr event
Inflow = 8.11 cfs @ 12.04 hrs, Volume= 0.932 af
Primary = 8.11 cfs @ 12.04 hrs, Volume= 0.932 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=2.03"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=20.39 cfs 1.445 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=1.83"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=9.78 cfs 0.596 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=1.48"
Flow Length=658' Tc=9.1 min CN=91 Runoff=11.69 cfs 0.621 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=1.65"
Flow Length=790' Tc=14.0 min CN=93 Runoff=5.62 cfs 0.357 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=1.19"
Flow Length=339' Tc=6.5 min CN=87 Runoff=4.66 cfs 0.221 af

Pond 1D: Wet Pond Peak Elev=742.79' Storage=36,665 cf Inflow=11.69 cfs 0.621 af
Primary=0.33 cfs 0.593 af Secondary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.593 af

Link 1E: Post Total POI 1 Inflow=10.02 cfs 1.189 af
Primary=10.02 cfs 1.189 af

Total Runoff Area = 22.320 ac Runoff Volume = 3.241 af Average Runoff Depth = 1.74"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

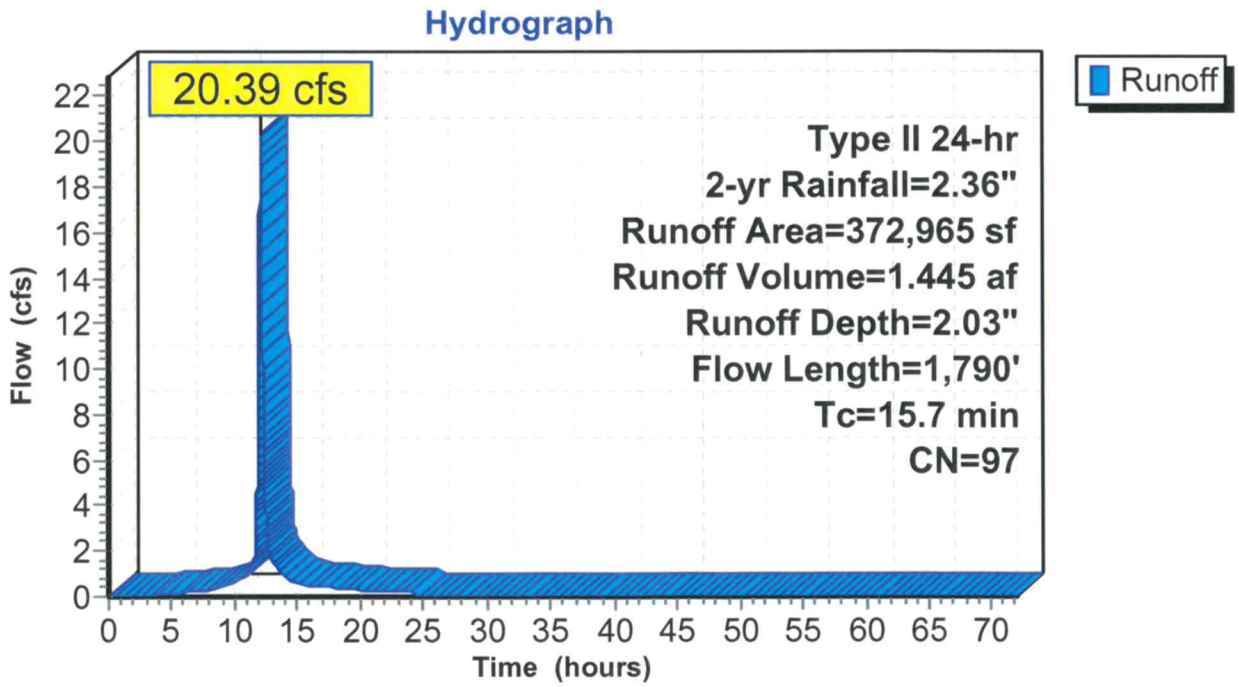
Runoff = 20.39 cfs @ 12.07 hrs, Volume= 1.445 af, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

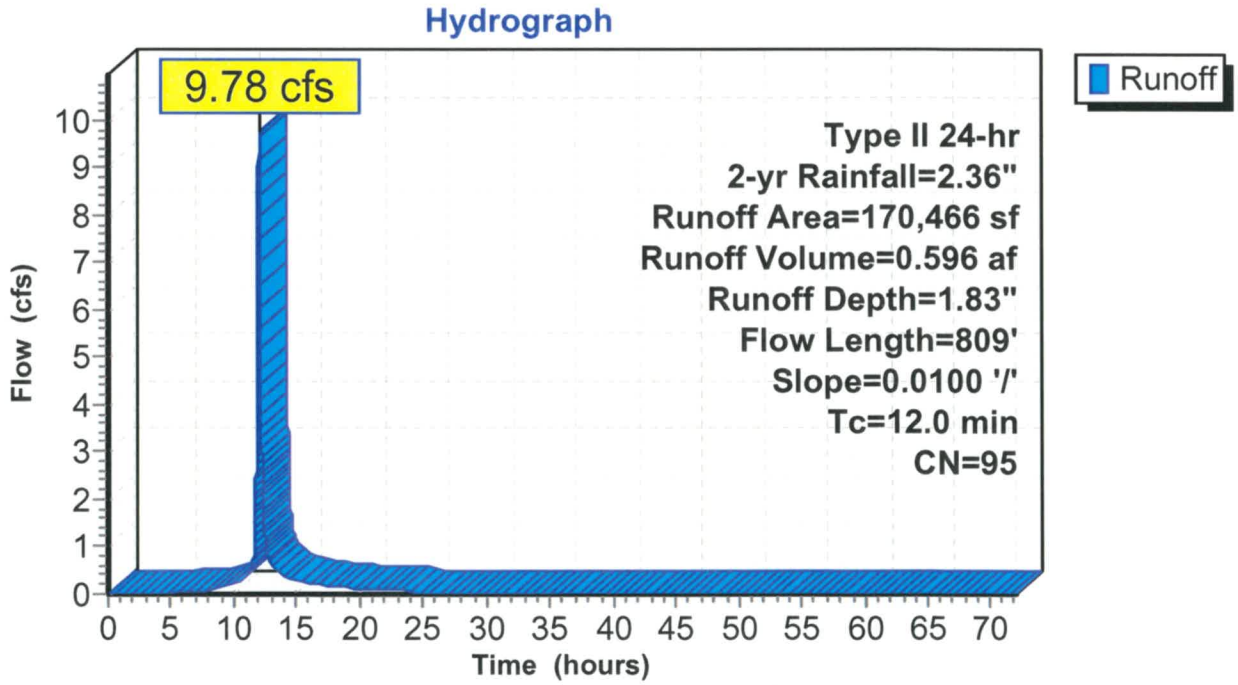
Runoff = 9.78 cfs @ 12.03 hrs, Volume= 0.596 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

Runoff = 11.69 cfs @ 12.00 hrs, Volume= 0.621 af, Depth= 1.48"

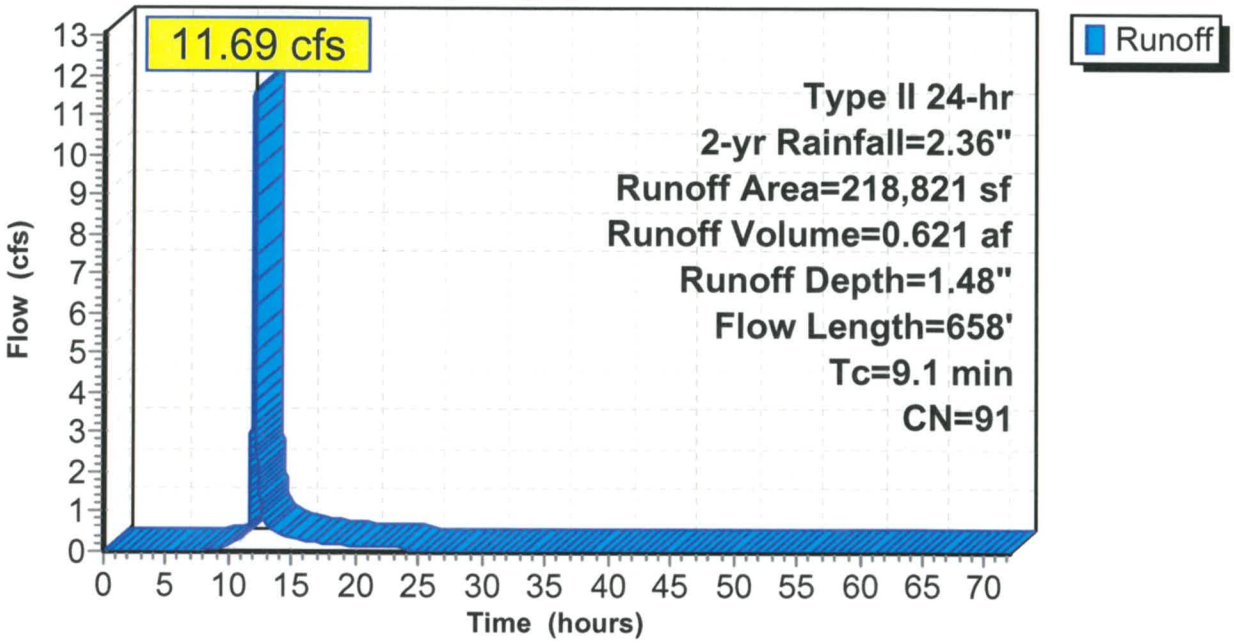
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond

Hydrograph



Summary for Subcatchment 2A: Pre POI 2

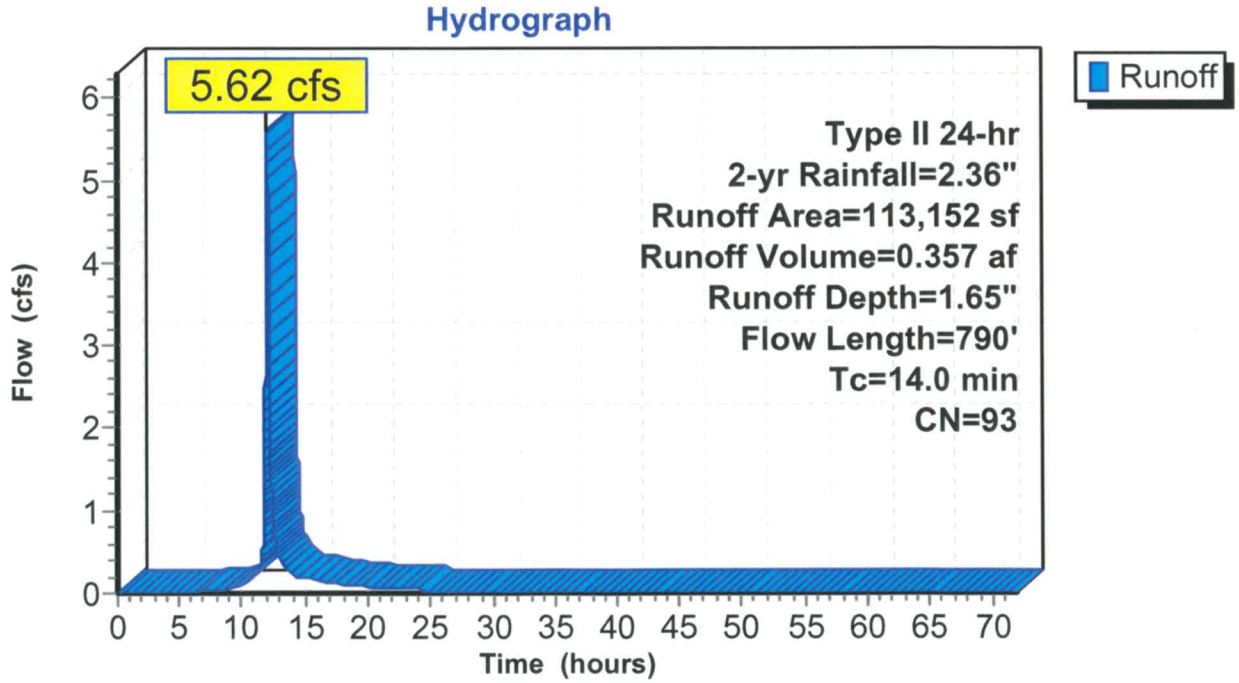
Runoff = 5.62 cfs @ 12.06 hrs, Volume= 0.357 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

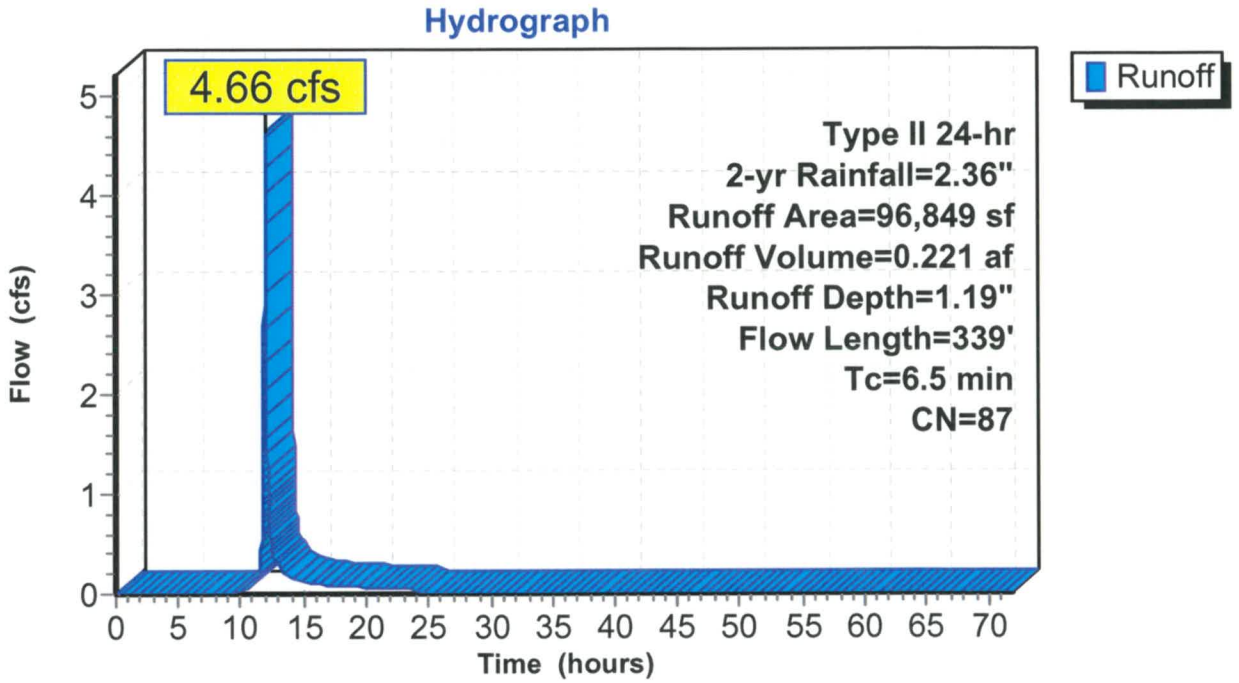
Runoff = 4.66 cfs @ 11.98 hrs, Volume= 0.221 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.36"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 1.48" for 2-yr event				
Inflow =	11.69 cfs @	12.00 hrs,	Volume=	0.621 af	
Outflow =	0.33 cfs @	14.91 hrs,	Volume=	0.593 af,	Atten= 97%, Lag= 174.0 min
Primary =	0.33 cfs @	14.91 hrs,	Volume=	0.593 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 742.79' @ 14.91 hrs Surf.Area= 0 sf Storage= 36,665 cf (17,641 cf above start)

Plug-Flow detention time= 1,778.8 min calculated for 0.156 af (25% of inflow)
Center-of-Mass det. time= 734.8 min (1,549.0 - 814.2)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

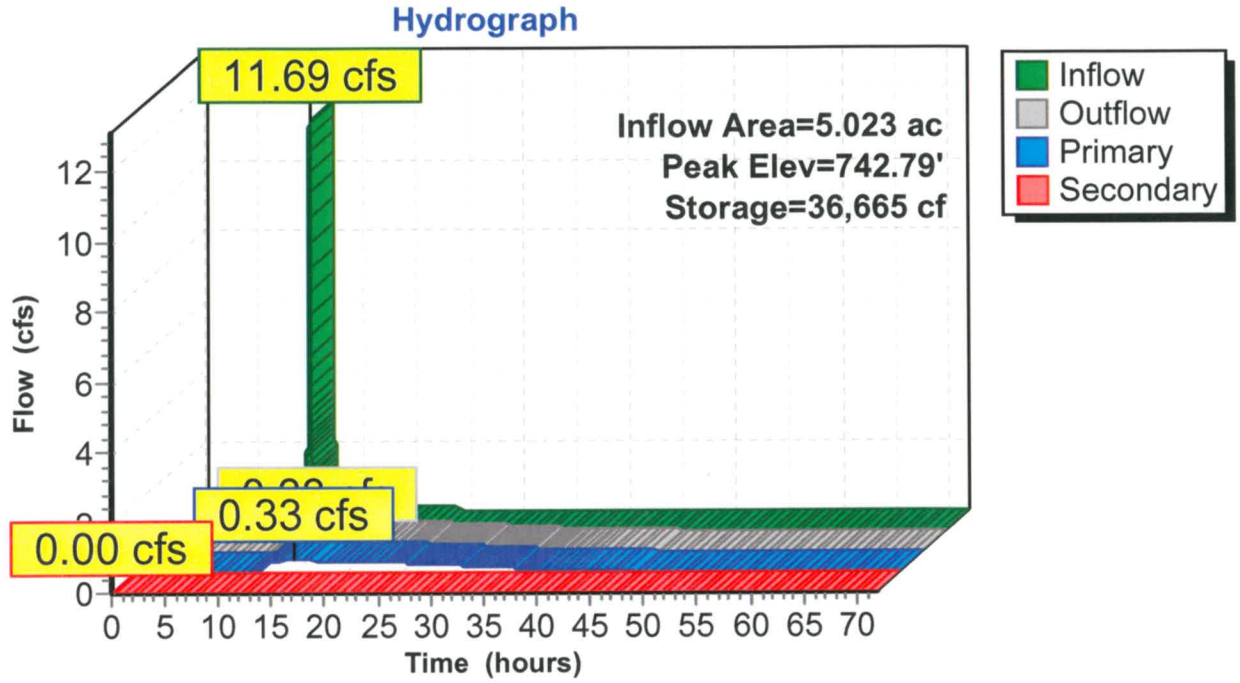
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.33 cfs @ 14.91 hrs HW=742.79' (Free Discharge)
└─**1=Culvert** (Passes 0.33 cfs of 10.71 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 3.79 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

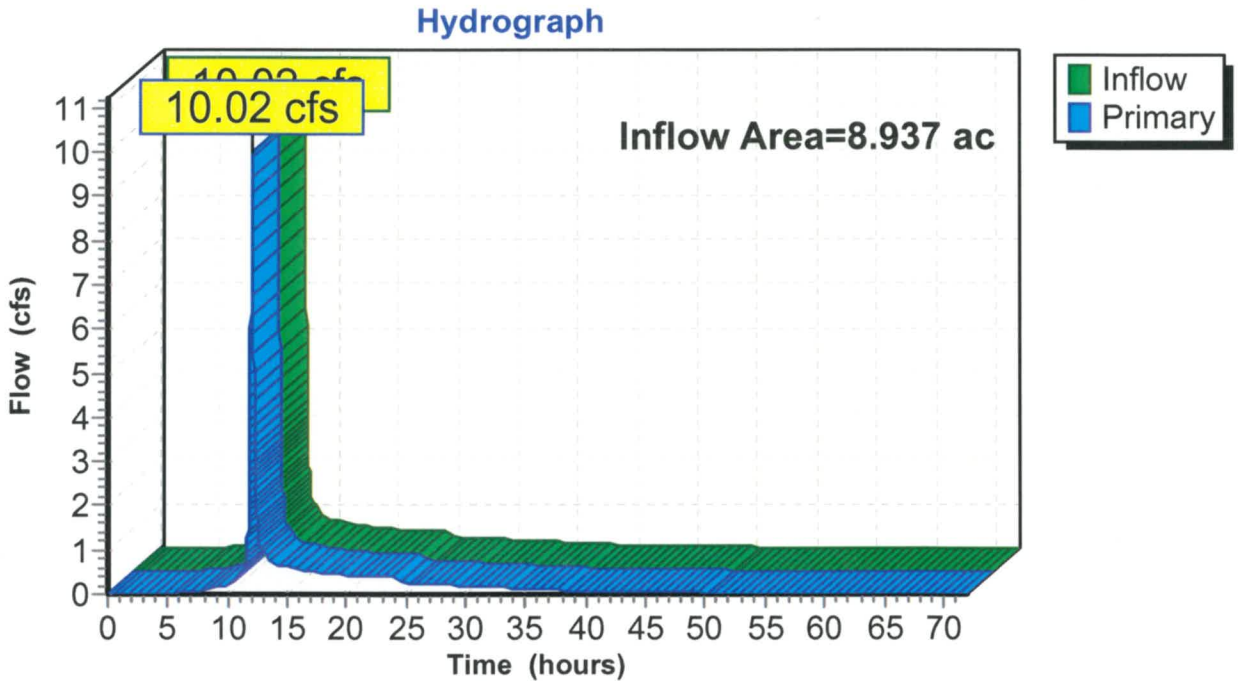


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 1.60" for 2-yr event
Inflow = 10.02 cfs @ 12.04 hrs, Volume= 1.189 af
Primary = 10.02 cfs @ 12.04 hrs, Volume= 1.189 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=2.55"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=25.33 cfs 1.819 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=2.34"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=12.35 cfs 0.764 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=1.97"
Flow Length=658' Tc=9.1 min CN=91 Runoff=15.33 cfs 0.824 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=2.15"
Flow Length=790' Tc=14.0 min CN=93 Runoff=7.24 cfs 0.465 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=1.64"
Flow Length=339' Tc=6.5 min CN=87 Runoff=6.35 cfs 0.304 af

Pond 1D: Wet Pond Peak Elev=743.03' Storage=42,182 cf Inflow=15.33 cfs 0.824 af
Primary=0.61 cfs 0.793 af Secondary=0.00 cfs 0.000 af Outflow=0.61 cfs 0.793 af

Link 1E: Post Total POI 1 Inflow=12.64 cfs 1.557 af
Primary=12.64 cfs 1.557 af

Total Runoff Area = 22.320 ac Runoff Volume = 4.177 af Average Runoff Depth = 2.25"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

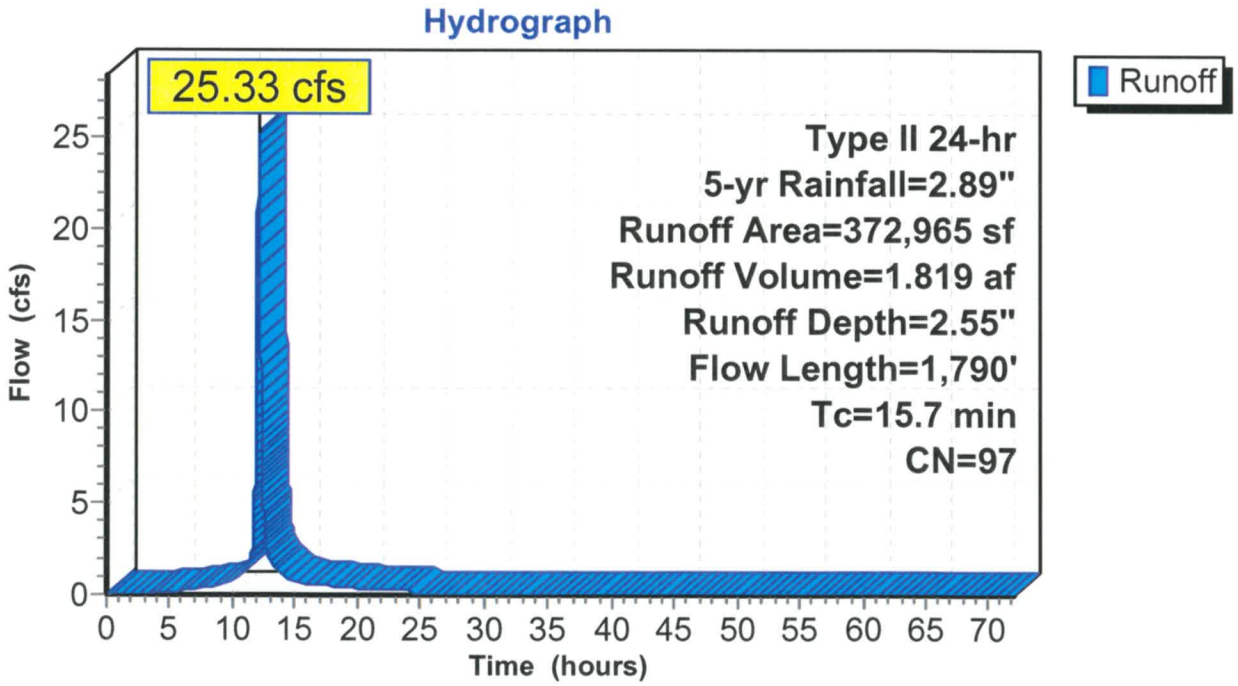
Runoff = 25.33 cfs @ 12.07 hrs, Volume= 1.819 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

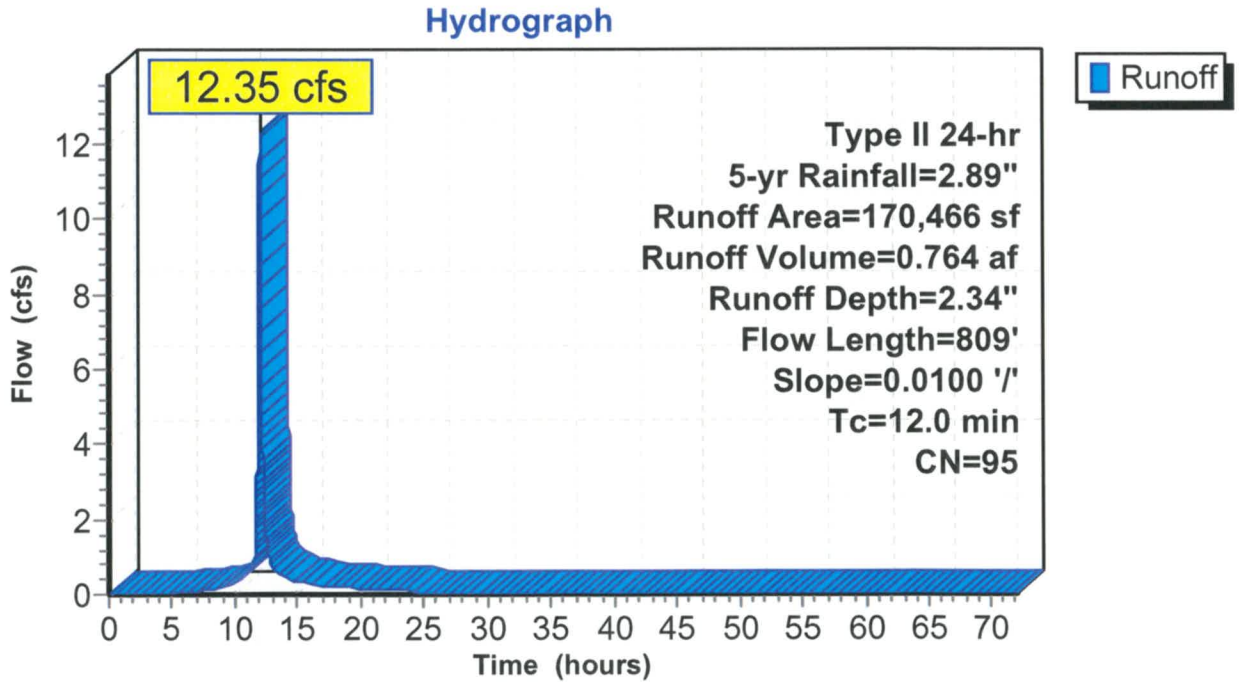
Runoff = 12.35 cfs @ 12.03 hrs, Volume= 0.764 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

Runoff = 15.33 cfs @ 12.00 hrs, Volume= 0.824 af, Depth= 1.97"

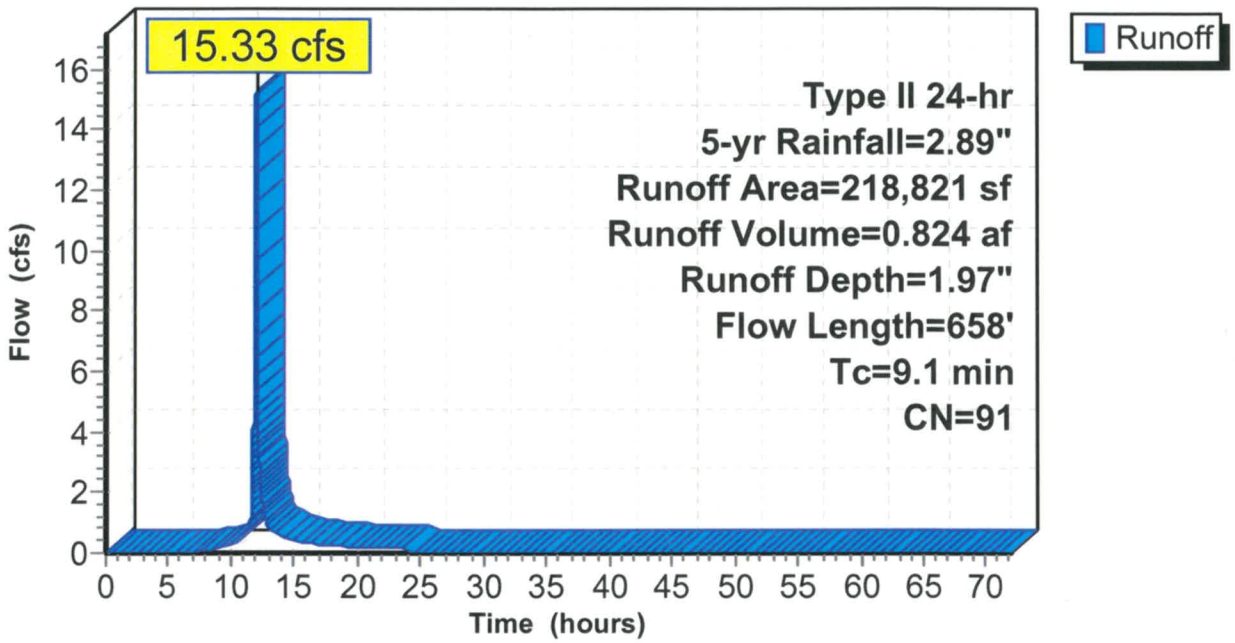
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond

Hydrograph



Summary for Subcatchment 2A: Pre POI 2

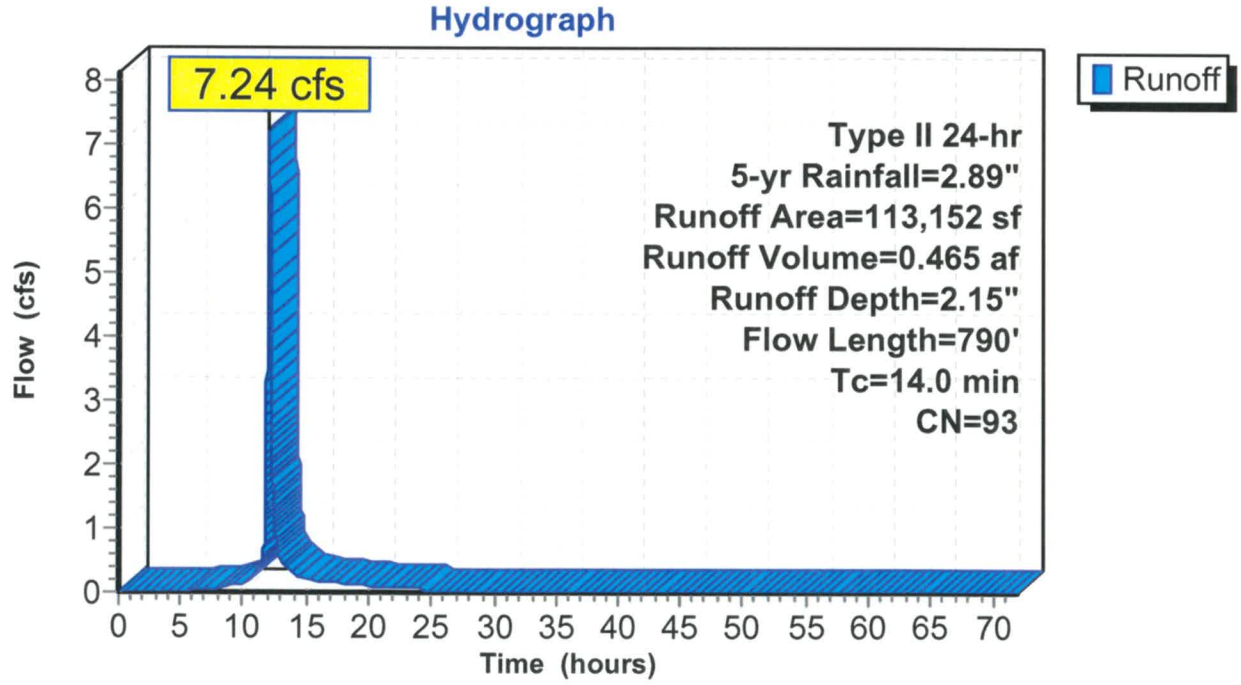
Runoff = 7.24 cfs @ 12.05 hrs, Volume= 0.465 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

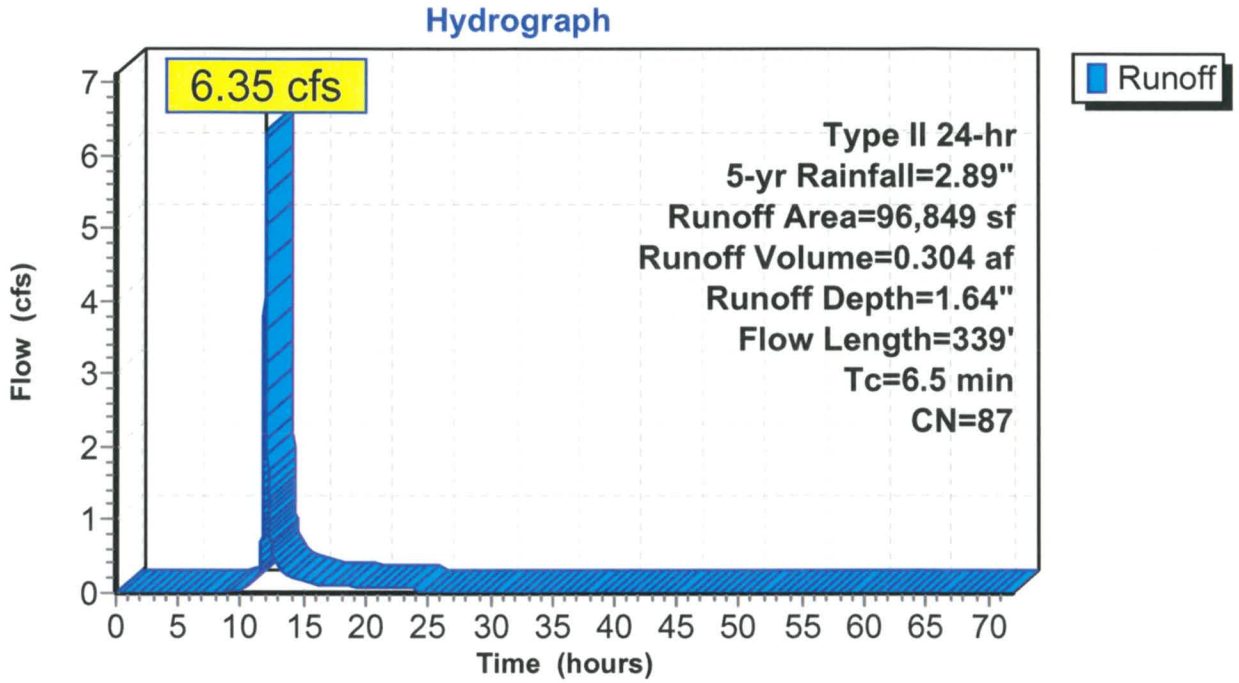
Runoff = 6.35 cfs @ 11.98 hrs, Volume= 0.304 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5-yr Rainfall=2.89"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 1.97" for 5-yr event				
Inflow =	15.33 cfs @	12.00 hrs,	Volume=	0.824 af	
Outflow =	0.61 cfs @	13.69 hrs,	Volume=	0.793 af, Atten= 96%, Lag= 100.9 min	
Primary =	0.61 cfs @	13.69 hrs,	Volume=	0.793 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.03' @ 13.69 hrs Surf.Area= 0 sf Storage= 42,182 cf (23,158 cf above start)

Plug-Flow detention time= 1,466.4 min calculated for 0.356 af (43% of inflow)
Center-of-Mass det. time= 751.0 min (1,557.1 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

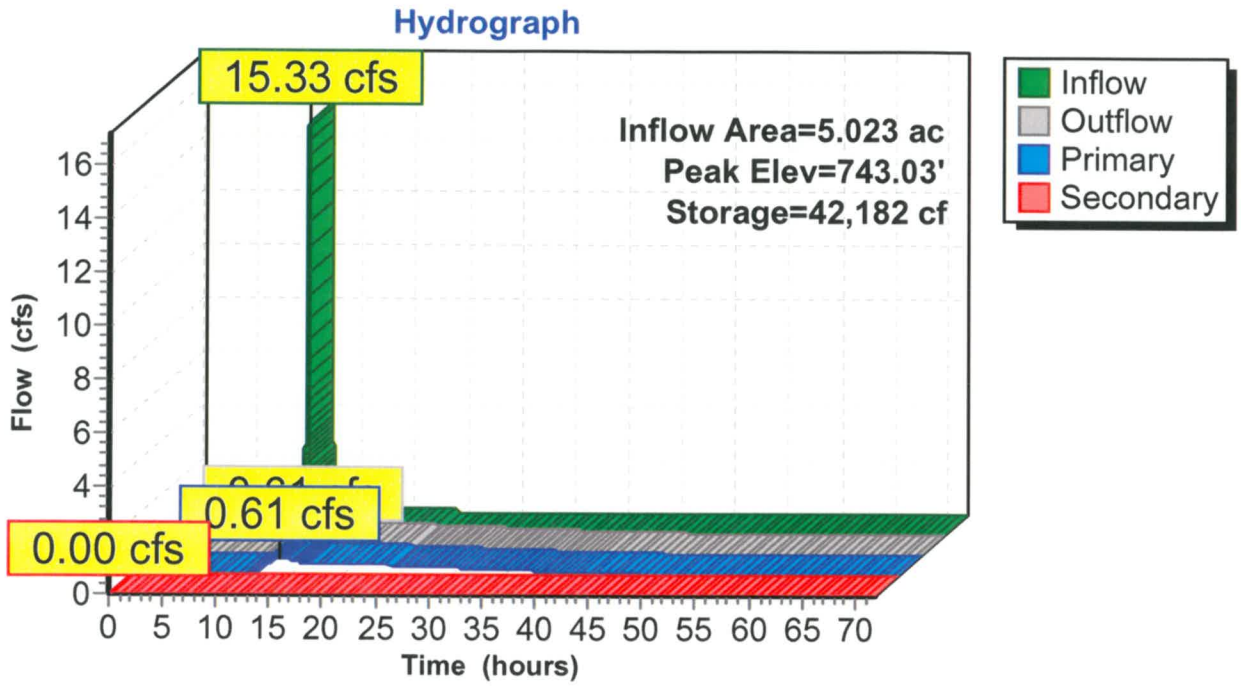
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.57 cfs @ 13.69 hrs HW=743.03' (Free Discharge)
└─**1=Culvert** (Passes 0.57 cfs of 12.40 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.47 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

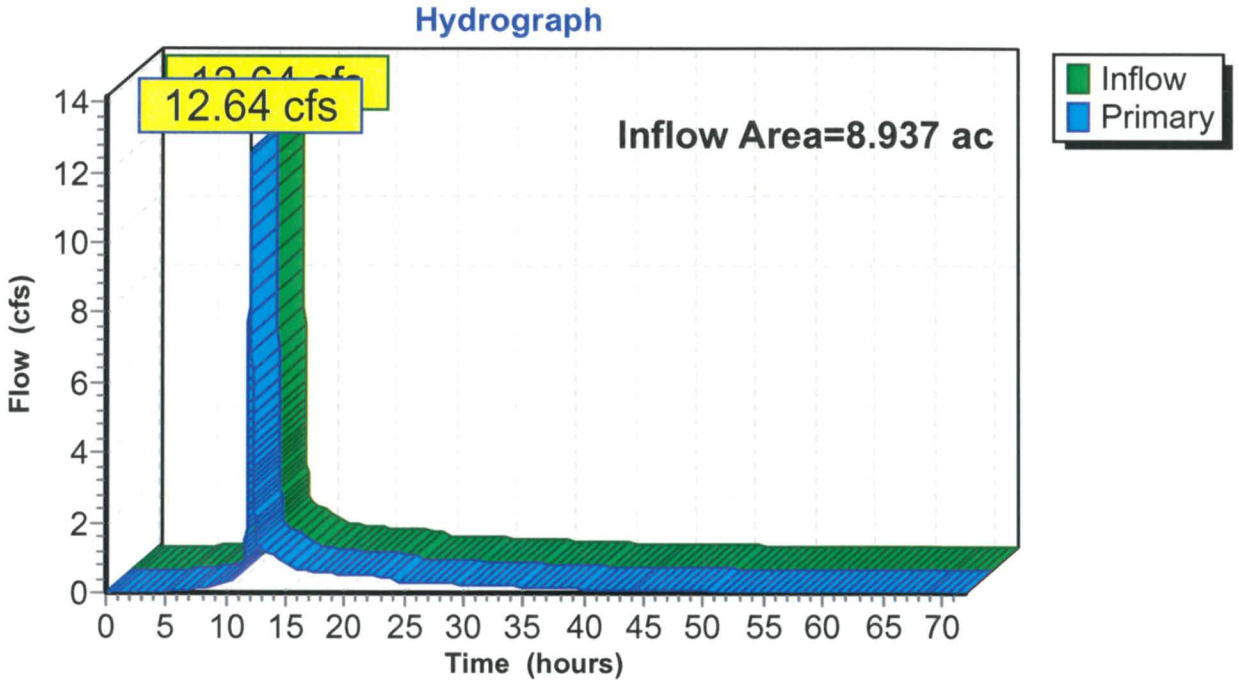


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 2.09" for 5-yr event
Inflow = 12.64 cfs @ 12.03 hrs, Volume= 1.557 af
Primary = 12.64 cfs @ 12.03 hrs, Volume= 1.557 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=2.98"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=29.32 cfs 2.123 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=2.76"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=14.42 cfs 0.901 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=2.37"
Flow Length=658' Tc=9.1 min CN=91 Runoff=18.29 cfs 0.993 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=2.56"
Flow Length=790' Tc=14.0 min CN=93 Runoff=8.55 cfs 0.554 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=2.02"
Flow Length=339' Tc=6.5 min CN=87 Runoff=7.75 cfs 0.375 af

Pond 1D: Wet Pond Peak Elev=743.10' Storage=44,100 cf Inflow=18.29 cfs 0.993 af
Primary=1.69 cfs 0.961 af Secondary=0.00 cfs 0.000 af Outflow=1.69 cfs 0.961 af

Link 1E: Post Total POI 1 Inflow=14.76 cfs 1.862 af
Primary=14.76 cfs 1.862 af

Total Runoff Area = 22.320 ac Runoff Volume = 4.946 af Average Runoff Depth = 2.66"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

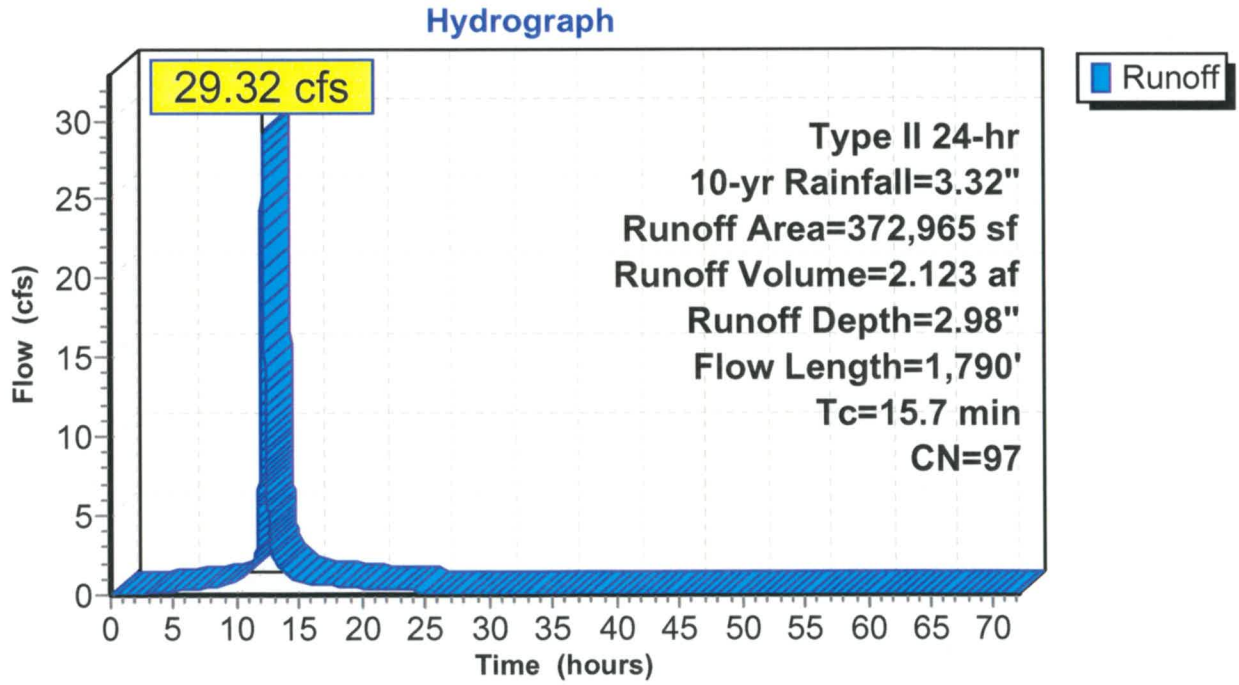
Runoff = 29.32 cfs @ 12.07 hrs, Volume= 2.123 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

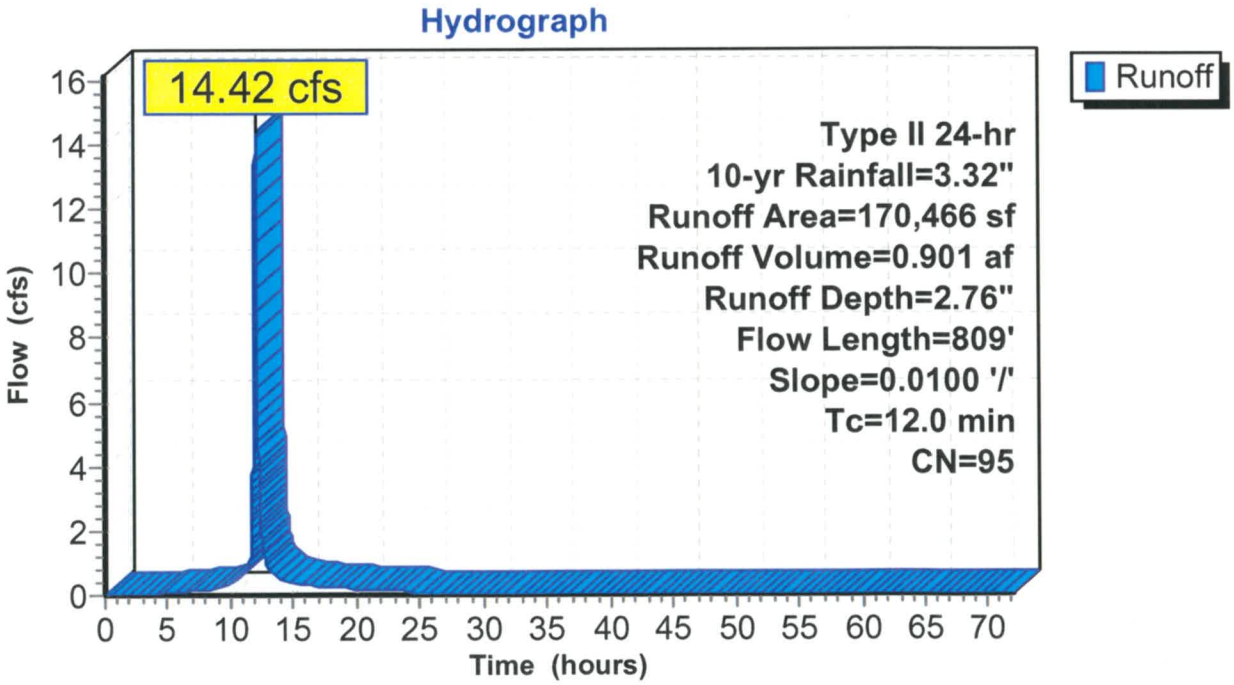
Runoff = 14.42 cfs @ 12.03 hrs, Volume= 0.901 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

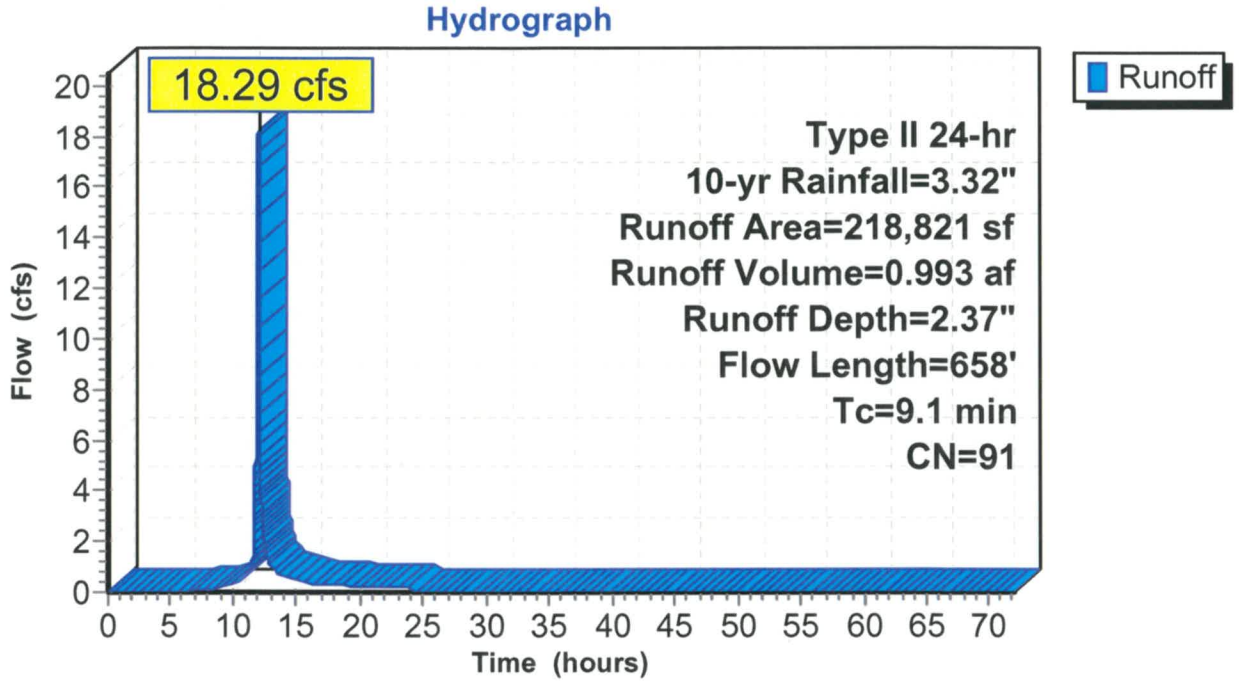
Runoff = 18.29 cfs @ 12.00 hrs, Volume= 0.993 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

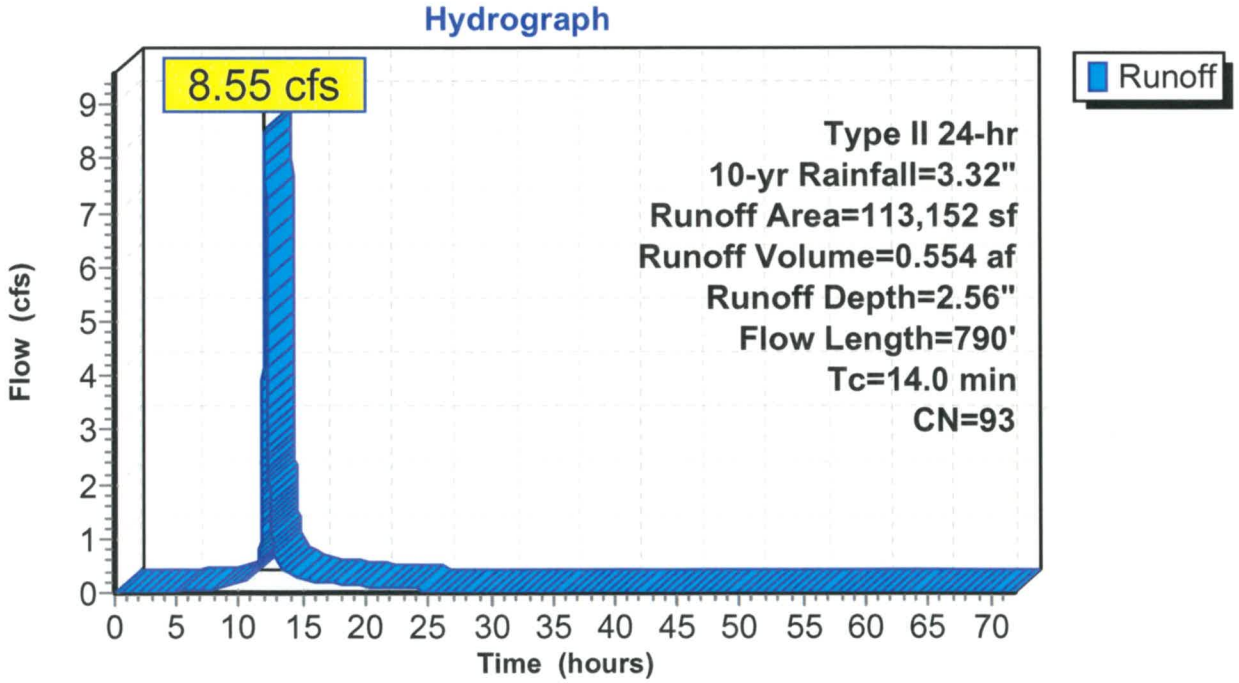
Runoff = 8.55 cfs @ 12.05 hrs, Volume= 0.554 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

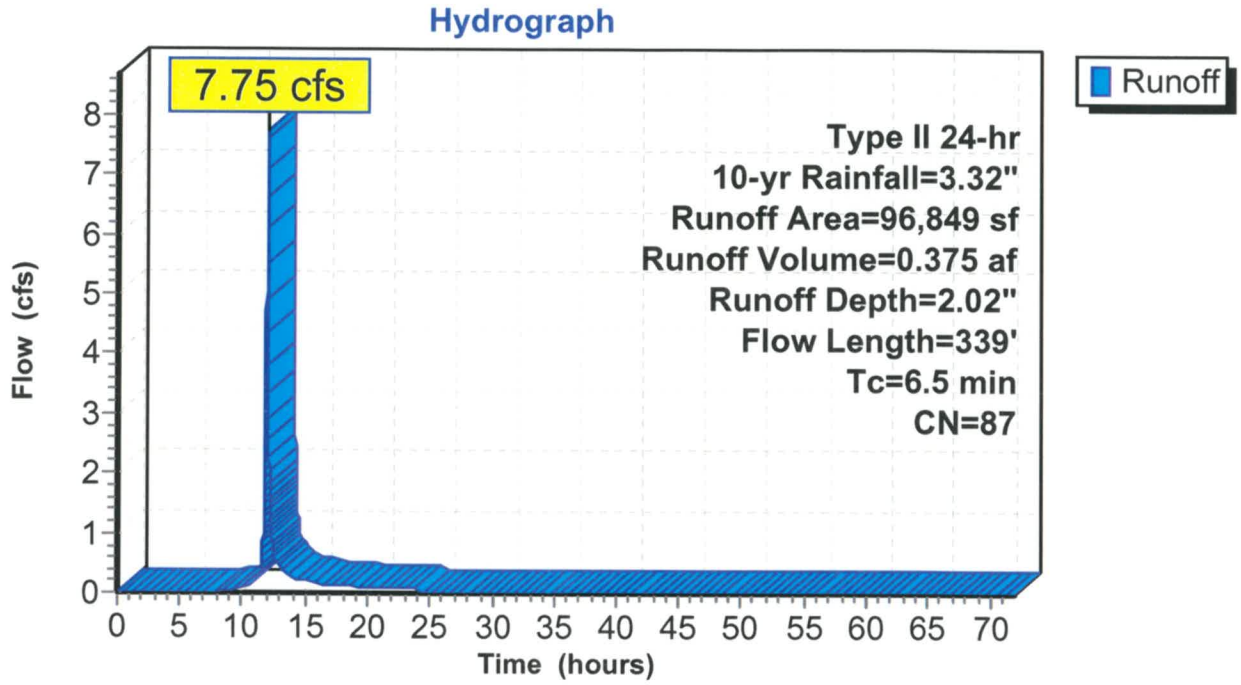
Runoff = 7.75 cfs @ 11.98 hrs, Volume= 0.375 af, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.32"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 2.37" for 10-yr event			
Inflow =	18.29 cfs @ 12.00 hrs, Volume=	0.993 af		
Outflow =	1.69 cfs @ 12.53 hrs, Volume=	0.961 af, Atten= 91%, Lag= 31.8 min		
Primary =	1.69 cfs @ 12.53 hrs, Volume=	0.961 af		
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.10' @ 12.53 hrs Surf.Area= 0 sf Storage= 44,100 cf (25,076 cf above start)

Plug-Flow detention time= 1,238.7 min calculated for 0.524 af (53% of inflow)
Center-of-Mass det. time= 654.4 min (1,455.3 - 800.9)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

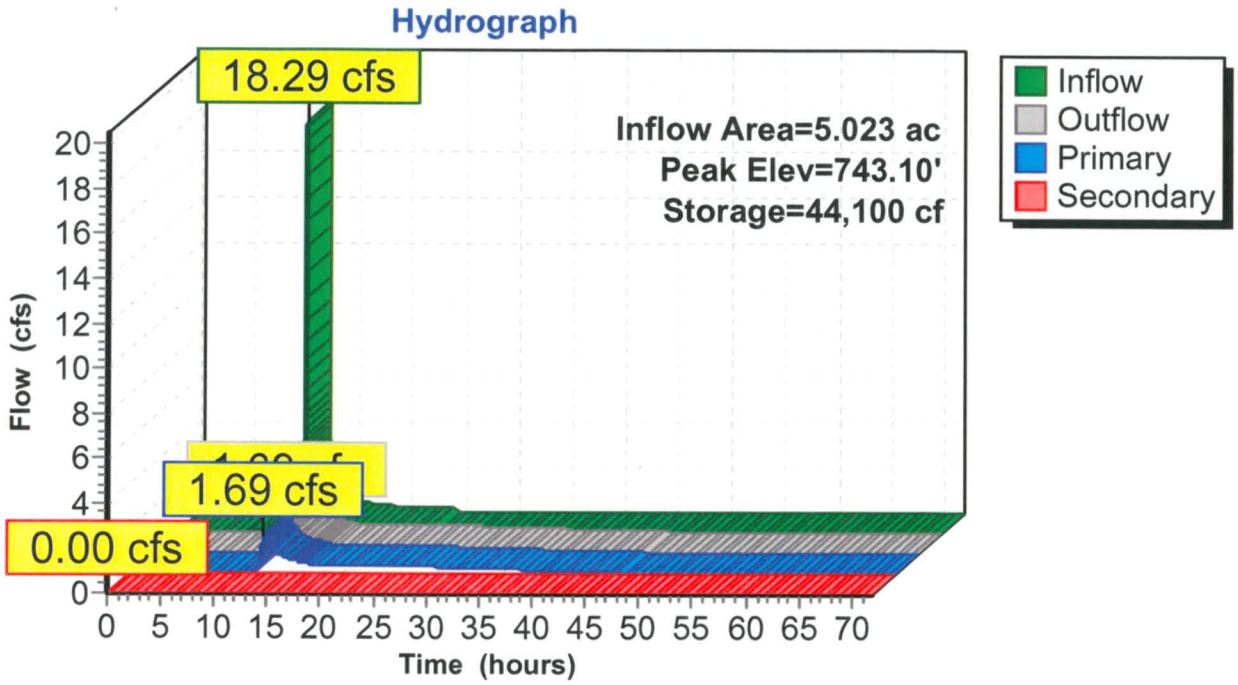
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.68 cfs @ 12.53 hrs HW=743.10' (Free Discharge)
└─**1=Culvert** (Passes 1.68 cfs of 12.83 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.41 cfs @ 4.66 fps)
  └─**3=Orifice/Grate** (Weir Controls 1.27 cfs @ 1.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

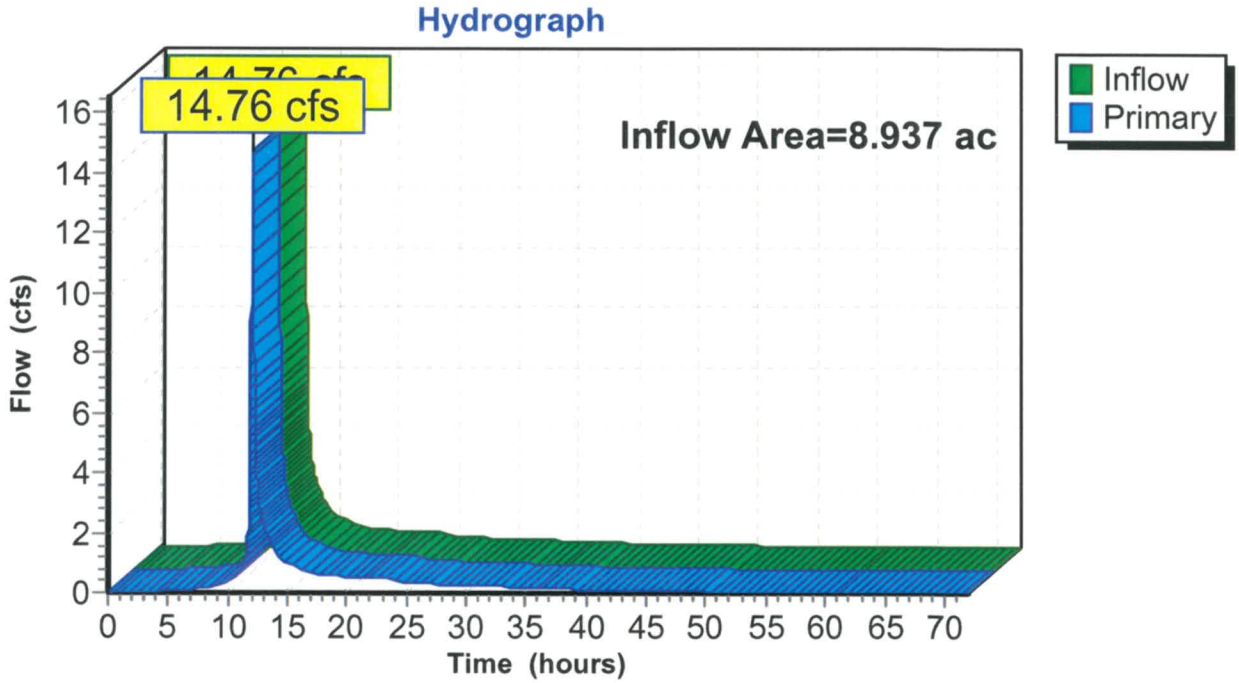


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 2.50" for 10-yr event
Inflow = 14.76 cfs @ 12.03 hrs, Volume= 1.862 af
Primary = 14.76 cfs @ 12.03 hrs, Volume= 1.862 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=3.57"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=34.87 cfs 2.549 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=3.35"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=17.29 cfs 1.093 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=2.94"
Flow Length=658' Tc=9.1 min CN=91 Runoff=22.41 cfs 1.231 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=3.14"
Flow Length=790' Tc=14.0 min CN=93 Runoff=10.37 cfs 0.680 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=2.56"
Flow Length=339' Tc=6.5 min CN=87 Runoff=9.73 cfs 0.475 af

Pond 1D: Wet Pond Peak Elev=743.23' Storage=47,383 cf Inflow=22.41 cfs 1.231 af
Primary=4.71 cfs 1.199 af Secondary=0.00 cfs 0.000 af Outflow=4.71 cfs 1.199 af

Link 1E: Post Total POI 1 Inflow=18.30 cfs 2.292 af
Primary=18.30 cfs 2.292 af

Total Runoff Area = 22.320 ac Runoff Volume = 6.028 af Average Runoff Depth = 3.24"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

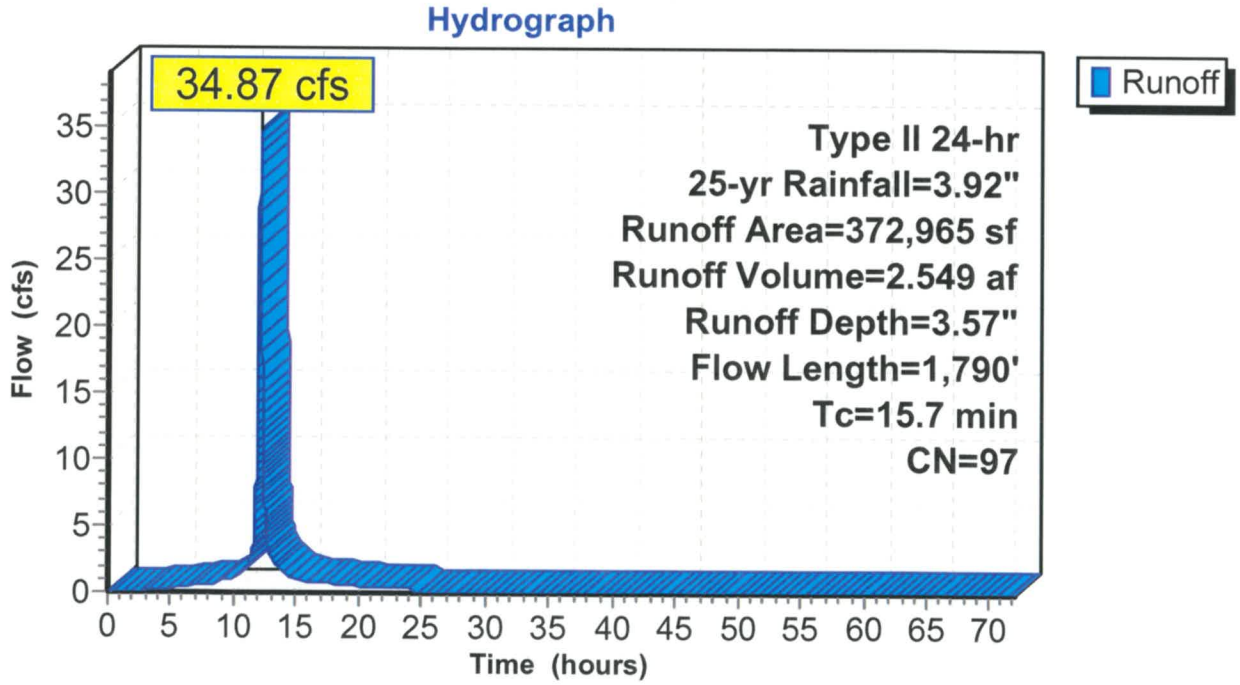
Runoff = 34.87 cfs @ 12.07 hrs, Volume= 2.549 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

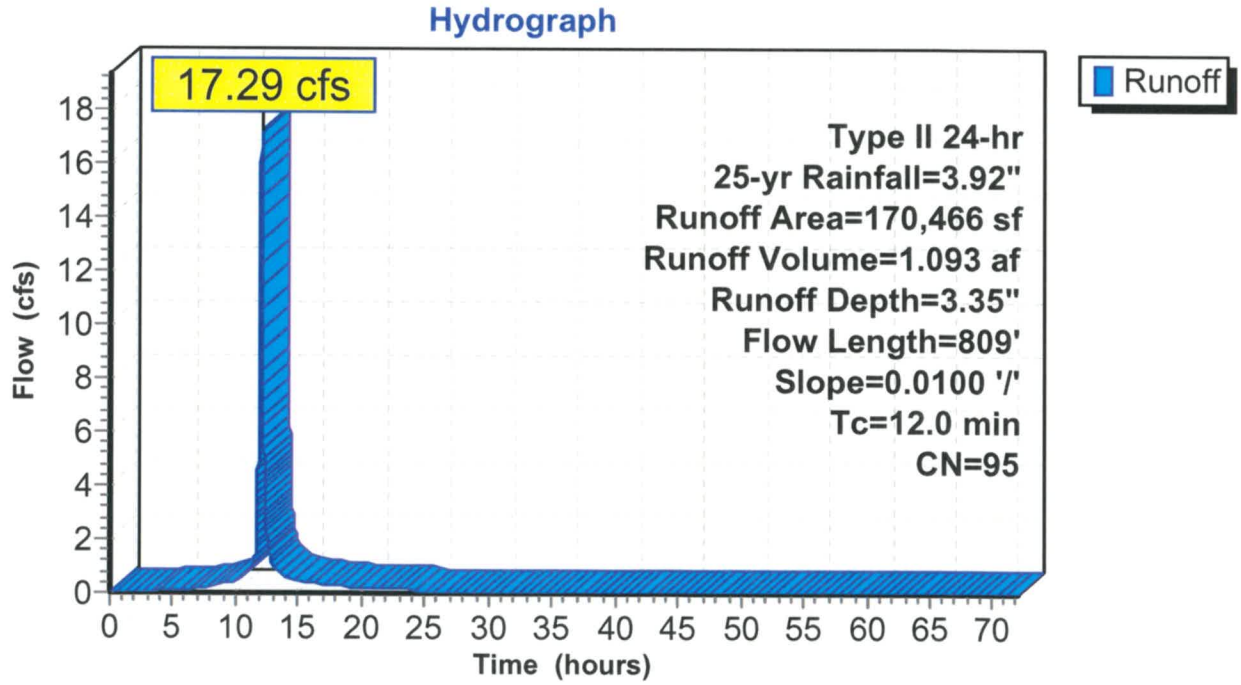
Runoff = 17.29 cfs @ 12.03 hrs, Volume= 1.093 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

Runoff = 22.41 cfs @ 12.00 hrs, Volume= 1.231 af, Depth= 2.94"

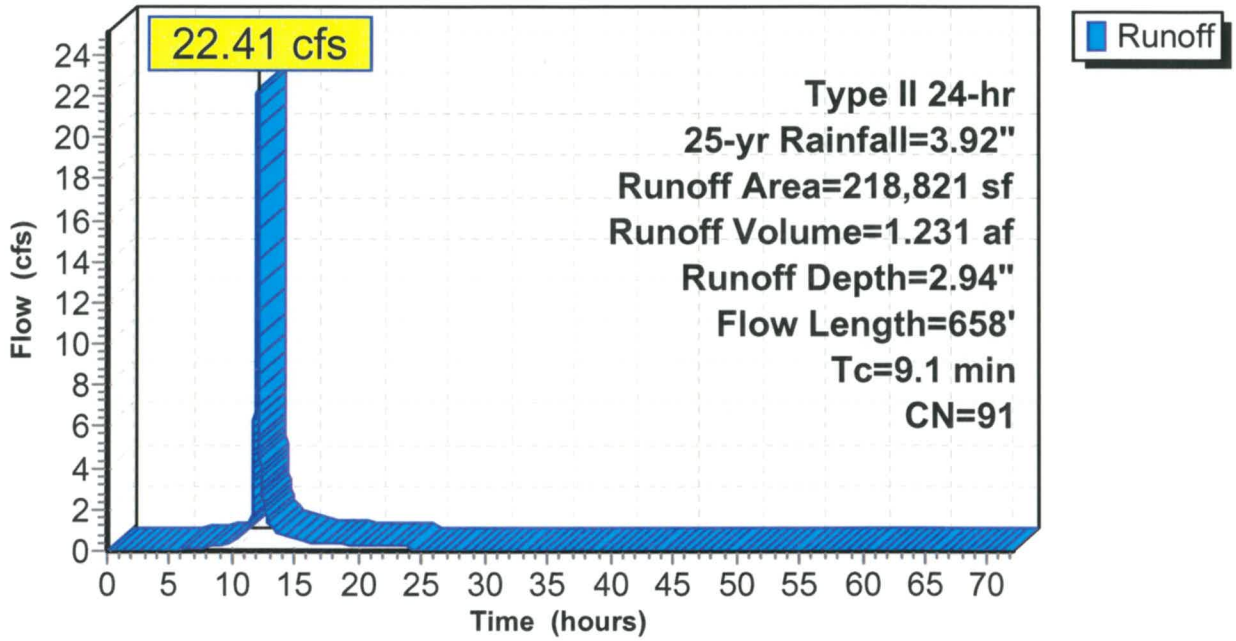
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond

Hydrograph



Summary for Subcatchment 2A: Pre POI 2

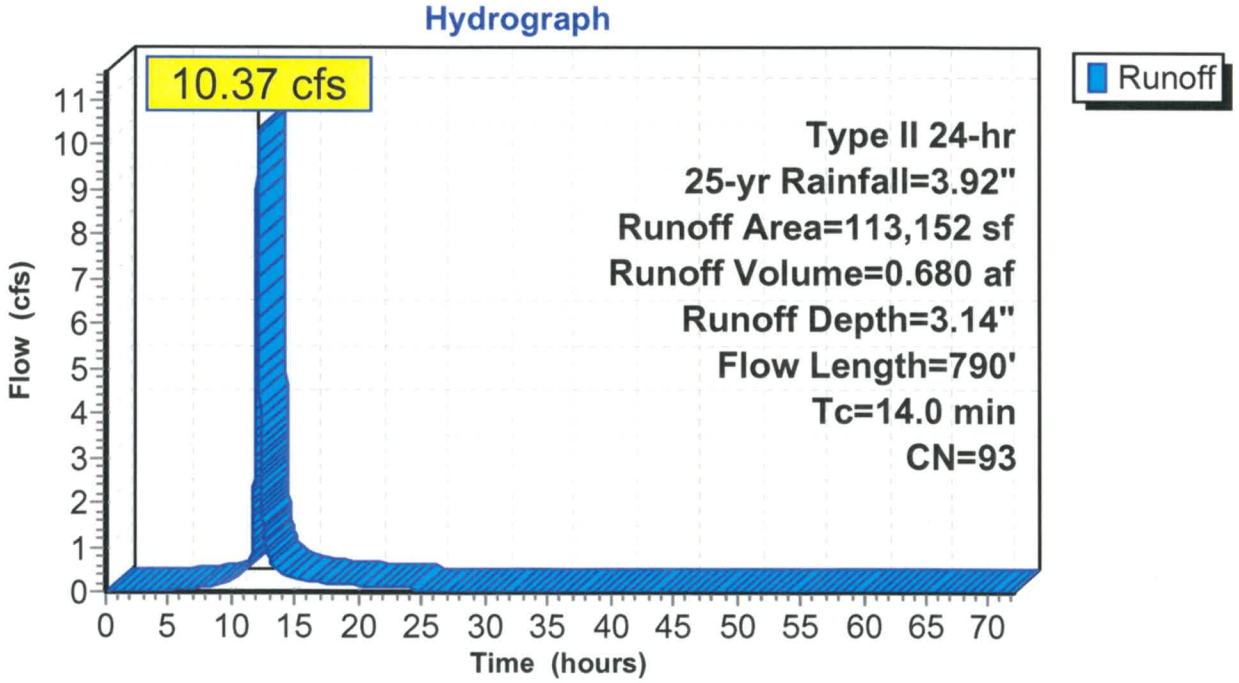
Runoff = 10.37 cfs @ 12.05 hrs, Volume= 0.680 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

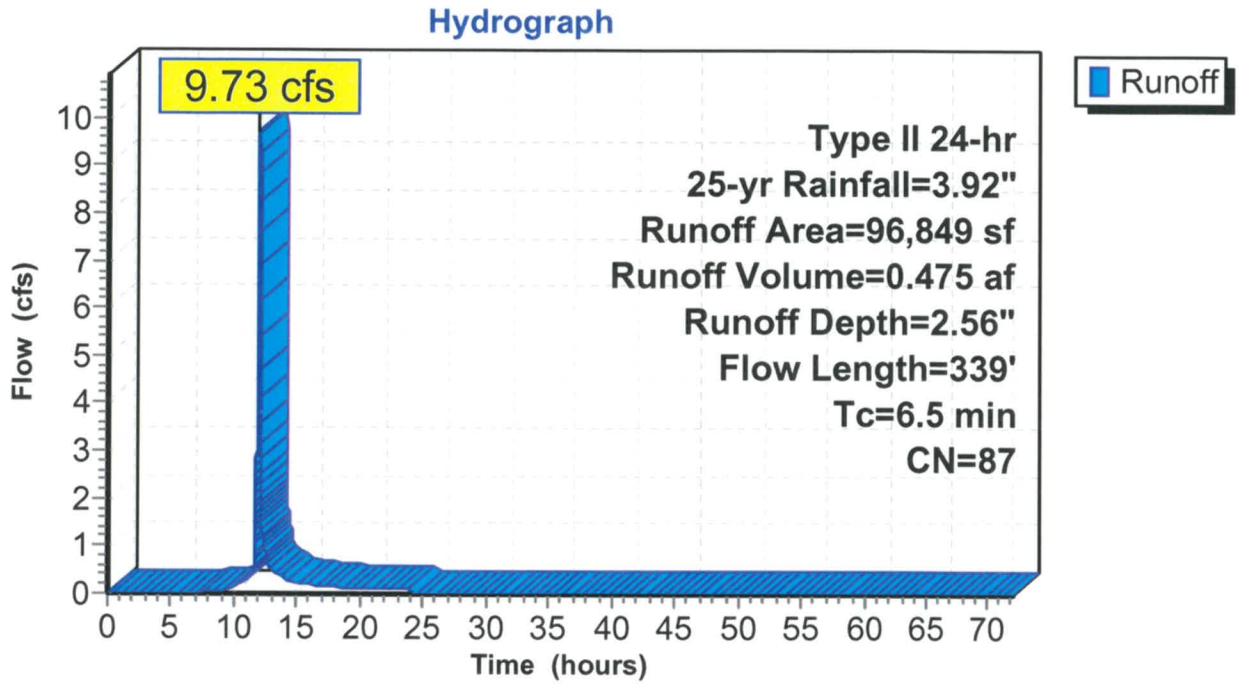
Runoff = 9.73 cfs @ 11.98 hrs, Volume= 0.475 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=3.92"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 2.94" for 25-yr event				
Inflow =	22.41 cfs @	12.00 hrs,	Volume=	1.231 af	
Outflow =	4.71 cfs @	12.22 hrs,	Volume=	1.199 af,	Atten= 79%, Lag= 13.0 min
Primary =	4.71 cfs @	12.22 hrs,	Volume=	1.199 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.23' @ 12.22 hrs Surf.Area= 0 sf Storage= 47,383 cf (28,359 cf above start)

Plug-Flow detention time= 991.3 min calculated for 0.762 af (62% of inflow)
Center-of-Mass det. time= 555.0 min (1,349.8 - 794.8)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

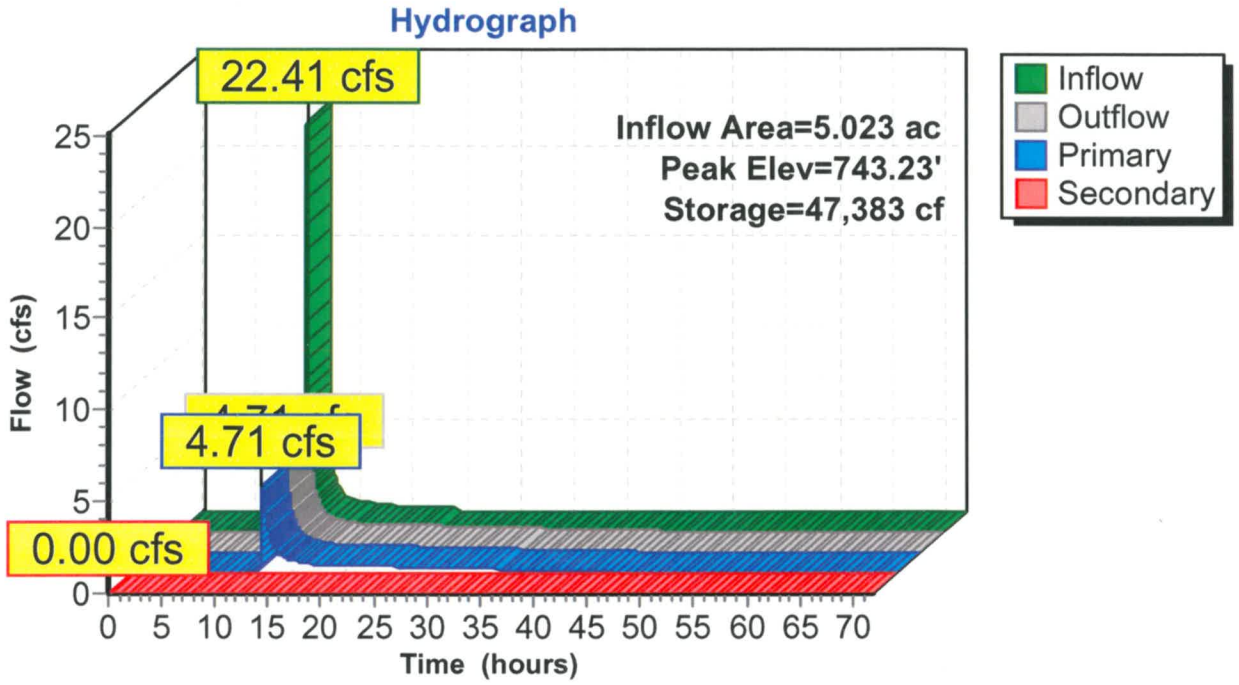
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.70 cfs @ 12.22 hrs HW=743.23' (Free Discharge)
└─**1=Culvert** (Passes 4.70 cfs of 13.39 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.43 cfs @ 4.96 fps)
  └─**3=Orifice/Grate** (Weir Controls 4.27 cfs @ 1.56 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

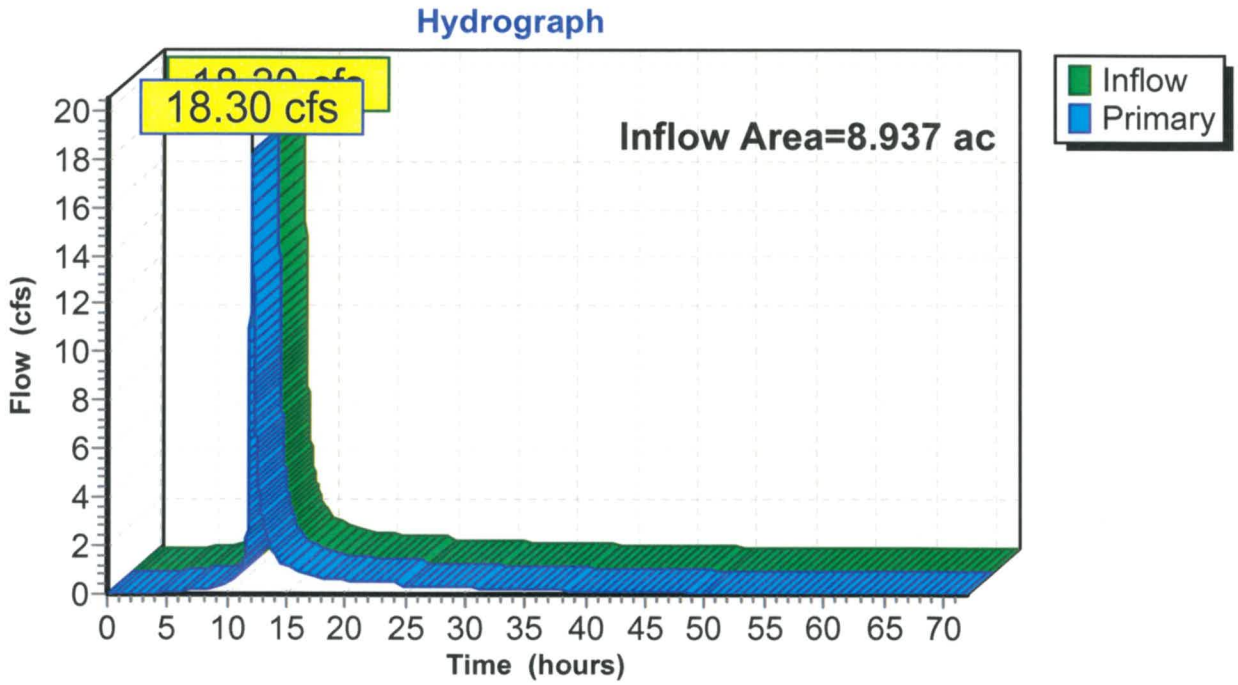


Summary for Link 1E: Post Total POI 1

Inflow Area =	8.937 ac,	74.46% Impervious,	Inflow Depth >	3.08"	for 25-yr event
Inflow =	18.30 cfs @	12.06 hrs,	Volume=	2.292 af	
Primary =	18.30 cfs @	12.06 hrs,	Volume=	2.292 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=4.07"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=39.47 cfs 2.904 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=3.85"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=19.68 cfs 1.254 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=3.42"
Flow Length=658' Tc=9.1 min CN=91 Runoff=25.84 cfs 1.432 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=3.63"
Flow Length=790' Tc=14.0 min CN=93 Runoff=11.88 cfs 0.786 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=3.02"
Flow Length=339' Tc=6.5 min CN=87 Runoff=11.38 cfs 0.560 af

Pond 1D: Wet Pond Peak Elev=743.34' Storage=50,283 cf Inflow=25.84 cfs 1.432 af
Primary=8.22 cfs 1.399 af Secondary=0.00 cfs 0.000 af Outflow=8.22 cfs 1.399 af

Link 1E: Post Total POI 1 Inflow=24.37 cfs 2.653 af
Primary=24.37 cfs 2.653 af

Total Runoff Area = 22.320 ac Runoff Volume = 6.936 af Average Runoff Depth = 3.73"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

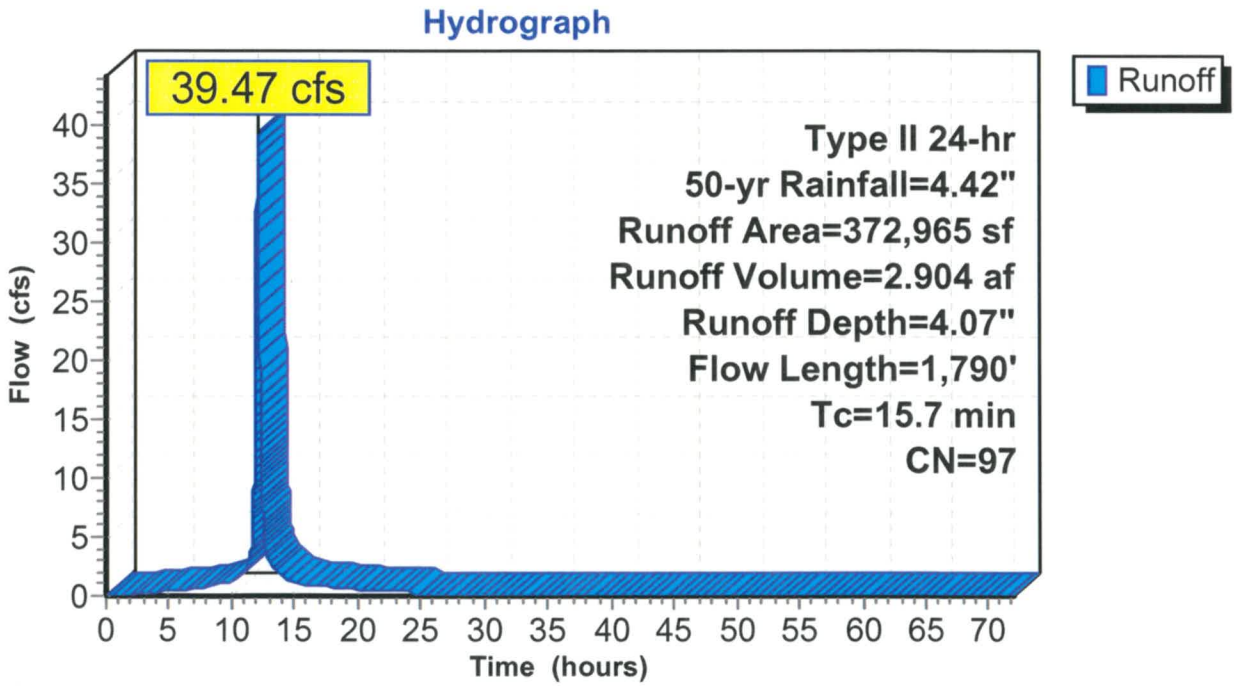
Runoff = 39.47 cfs @ 12.07 hrs, Volume= 2.904 af, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

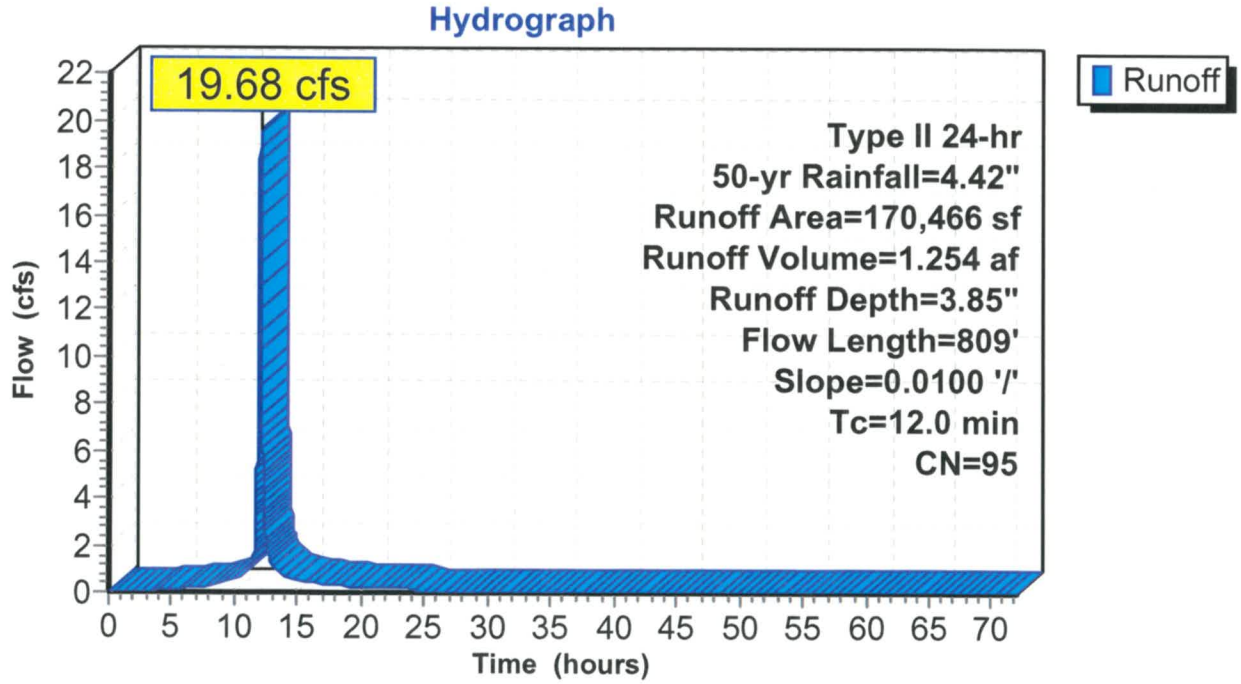
Runoff = 19.68 cfs @ 12.03 hrs, Volume= 1.254 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

Runoff = 25.84 cfs @ 12.00 hrs, Volume= 1.432 af, Depth= 3.42"

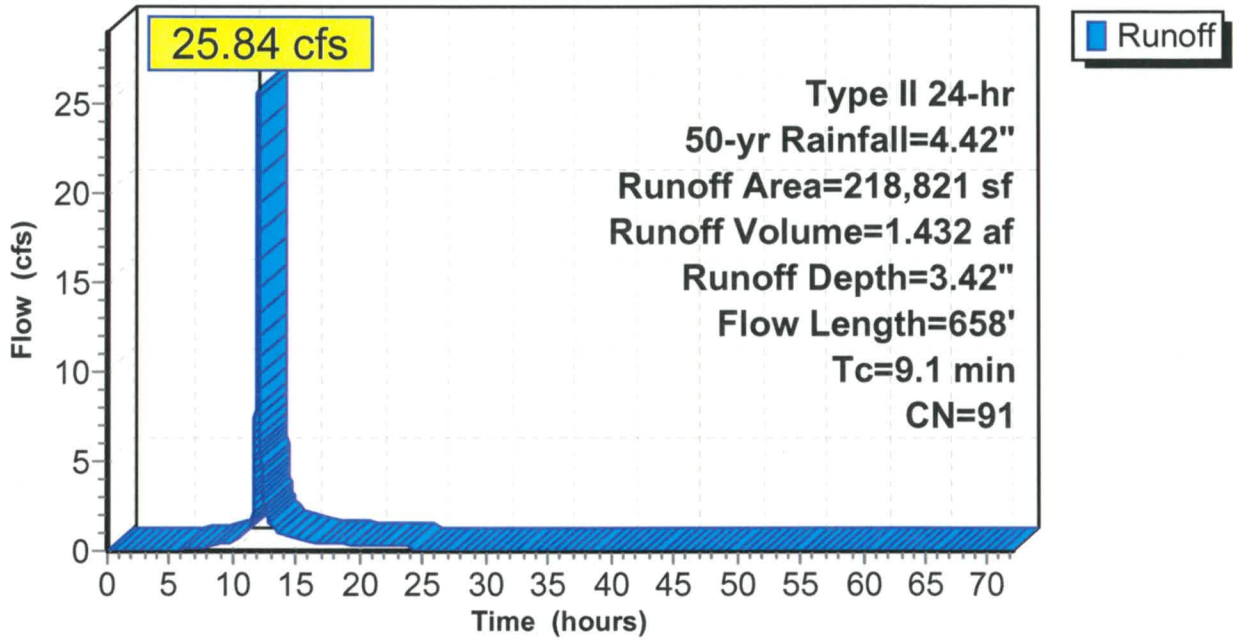
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond

Hydrograph



Summary for Subcatchment 2A: Pre POI 2

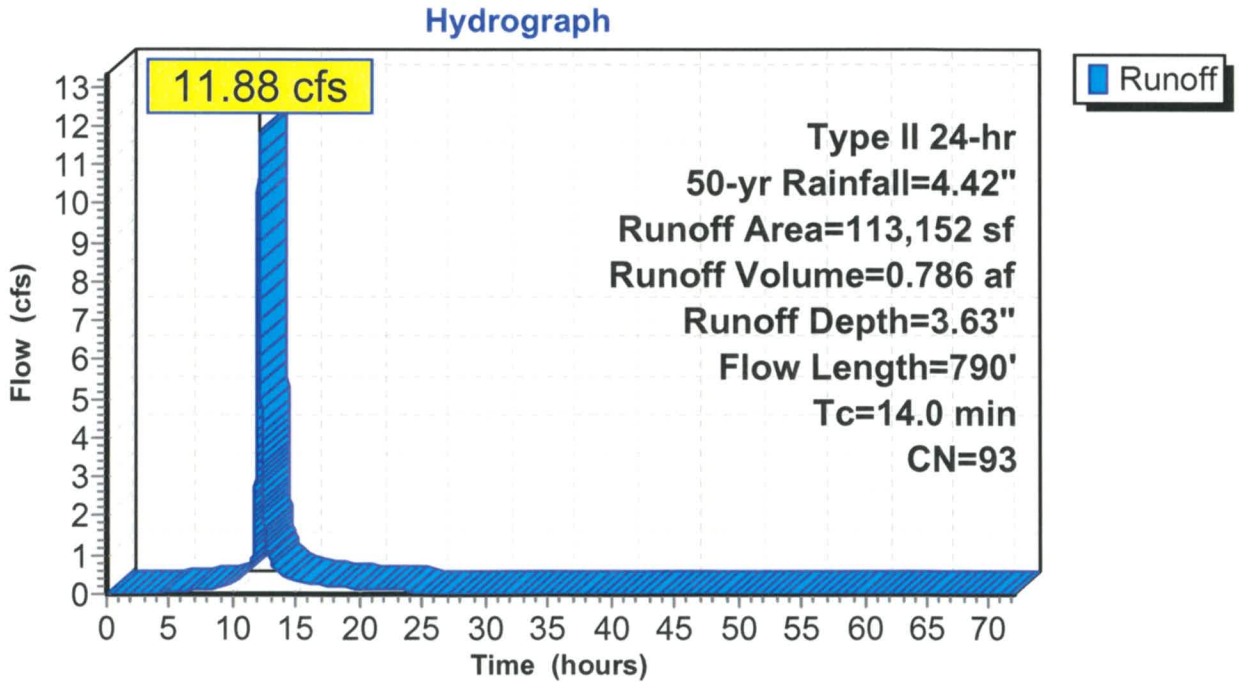
Runoff = 11.88 cfs @ 12.05 hrs, Volume= 0.786 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

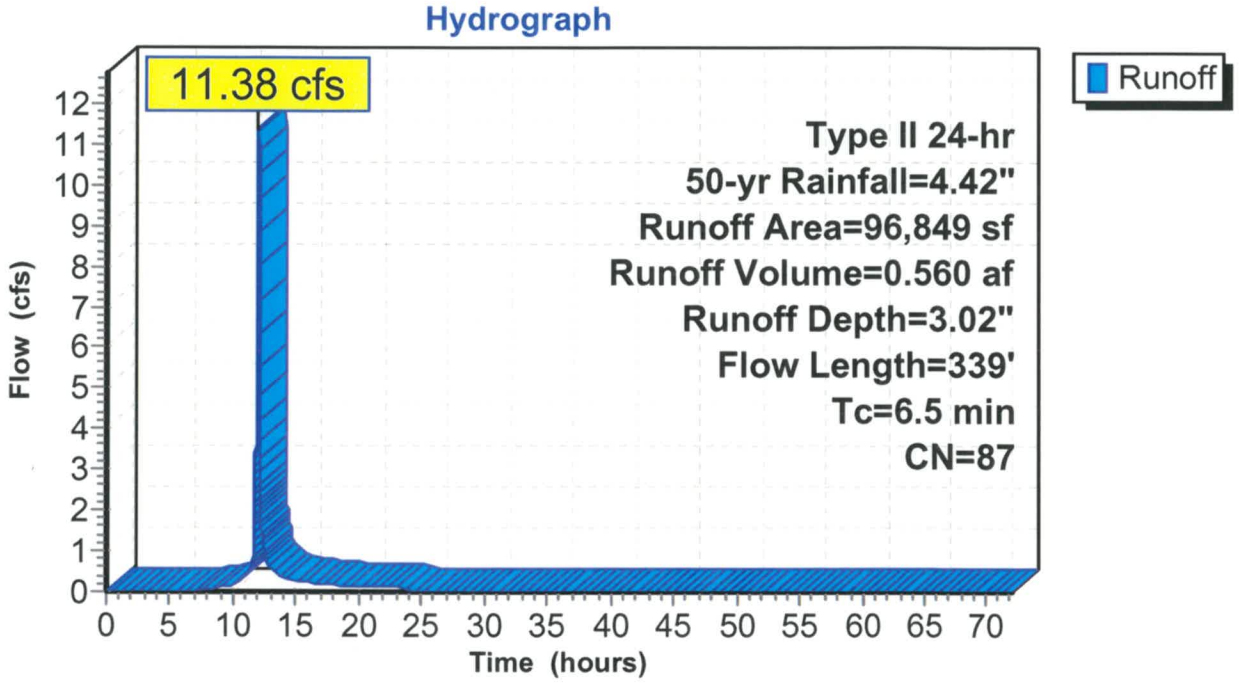
Runoff = 11.38 cfs @ 11.98 hrs, Volume= 0.560 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50-yr Rainfall=4.42"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 3.42" for 50-yr event				
Inflow =	25.84 cfs @	12.00 hrs,	Volume=	1.432 af	
Outflow =	8.22 cfs @	12.16 hrs,	Volume=	1.399 af,	Atten= 68%, Lag= 9.4 min
Primary =	8.22 cfs @	12.16 hrs,	Volume=	1.399 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.34' @ 12.16 hrs Surf.Area= 0 sf Storage= 50,283 cf (31,259 cf above start)

Plug-Flow detention time= 840.4 min calculated for 0.962 af (67% of inflow)
Center-of-Mass det. time= 494.0 min (1,284.6 - 790.6)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

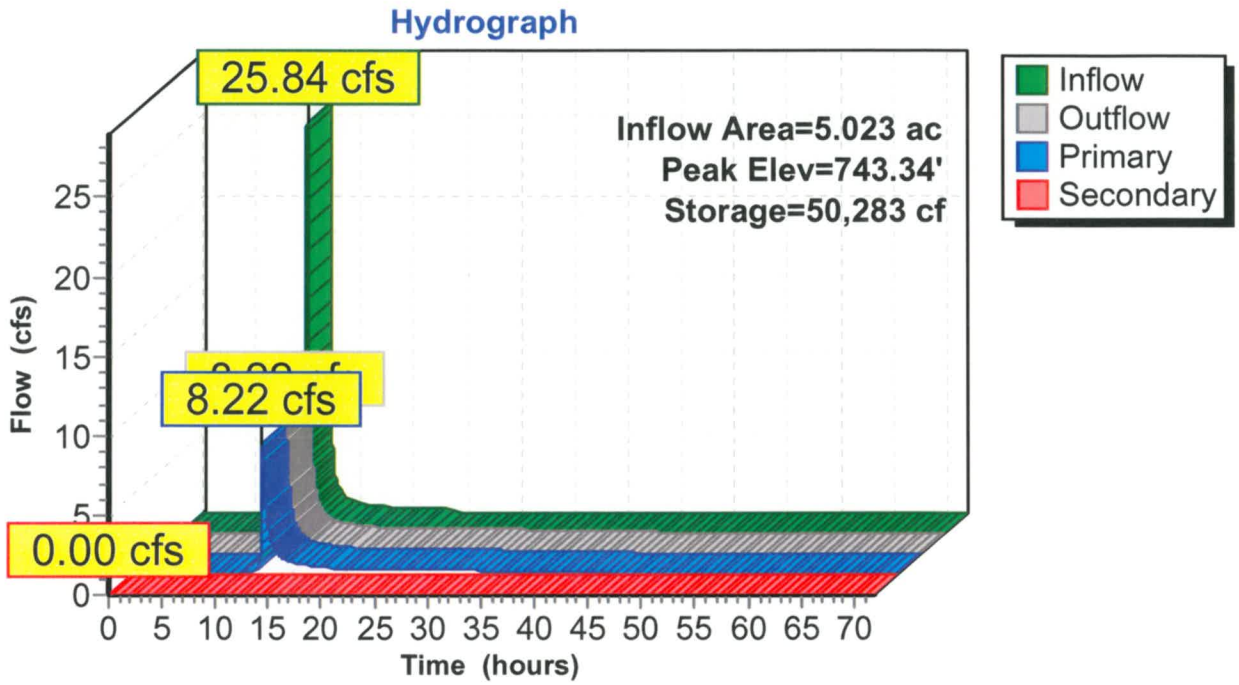
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.21 cfs @ 12.16 hrs HW=743.34' (Free Discharge)
└─**1=Culvert** (Passes 8.21 cfs of 13.45 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 5.21 fps)
  └─**3=Orifice/Grate** (Weir Controls 7.76 cfs @ 1.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

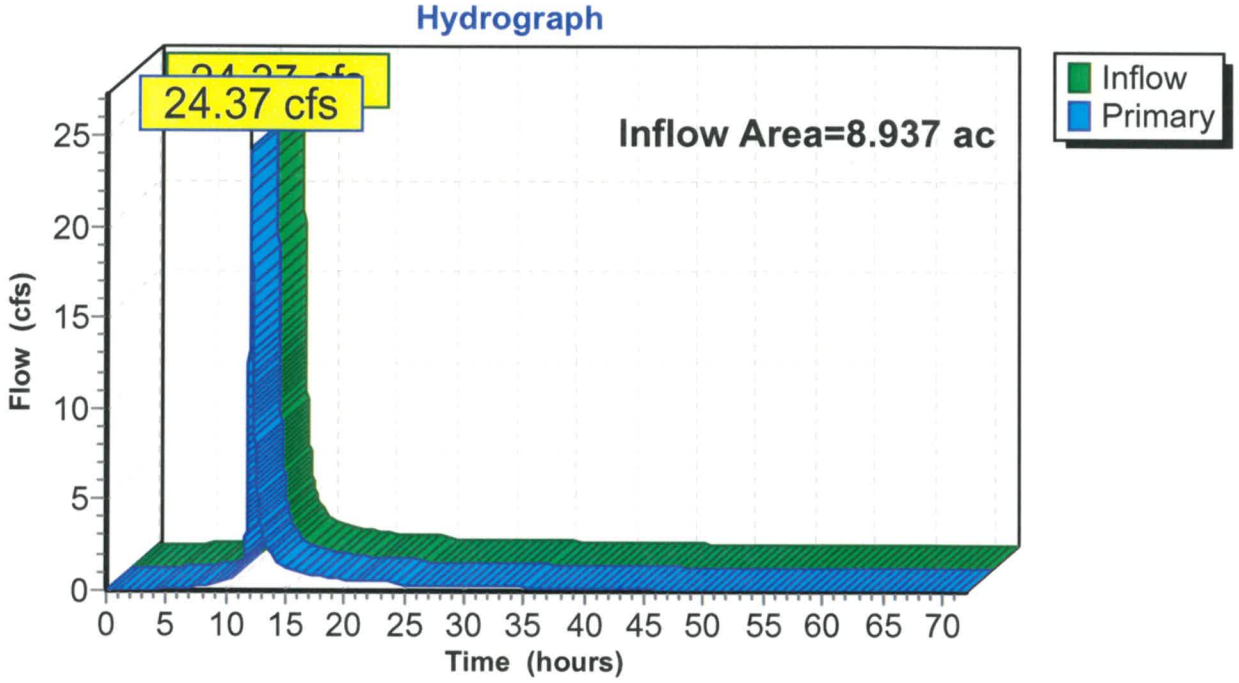


Summary for Link 1E: Post Total POI 1

Inflow Area = 8.937 ac, 74.46% Impervious, Inflow Depth > 3.56" for 50-yr event
Inflow = 24.37 cfs @ 12.07 hrs, Volume= 2.653 af
Primary = 24.37 cfs @ 12.07 hrs, Volume= 2.653 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: Pre POI 1 Runoff Area=372,965 sf 96.06% Impervious Runoff Depth=4.59"
Flow Length=1,790' Tc=15.7 min CN=97 Runoff=44.25 cfs 3.273 af

Subcatchment 1B: Post Undetained POI 1 Runoff Area=170,466 sf 85.43% Impervious Runoff Depth=4.36"
Flow Length=809' Slope=0.0100 '/' Tc=12.0 min CN=95 Runoff=22.15 cfs 1.422 af

Subcatchment 1C: Wet Pond Runoff Area=218,821 sf 65.91% Impervious Runoff Depth=3.92"
Flow Length=658' Tc=9.1 min CN=91 Runoff=29.39 cfs 1.643 af

Subcatchment 2A: Pre POI 2 Runoff Area=113,152 sf 76.37% Impervious Runoff Depth=4.14"
Flow Length=790' Tc=14.0 min CN=93 Runoff=13.44 cfs 0.896 af

Subcatchment 2B: Post POI 2 Runoff Area=96,849 sf 43.72% Impervious Runoff Depth=3.51"
Flow Length=339' Tc=6.5 min CN=87 Runoff=13.10 cfs 0.650 af

Pond 1D: Wet Pond Peak Elev=743.45' Storage=53,094 cf Inflow=29.39 cfs 1.643 af
Primary=12.23 cfs 1.609 af Secondary=0.00 cfs 0.000 af Outflow=12.23 cfs 1.609 af

Link 1E: Post Total POI 1 Inflow=31.27 cfs 3.031 af
Primary=31.27 cfs 3.031 af

Total Runoff Area = 22.320 ac Runoff Volume = 7.884 af Average Runoff Depth = 4.24"
20.09% Pervious = 4.485 ac 79.91% Impervious = 17.835 ac

Summary for Subcatchment 1A: Pre POI 1

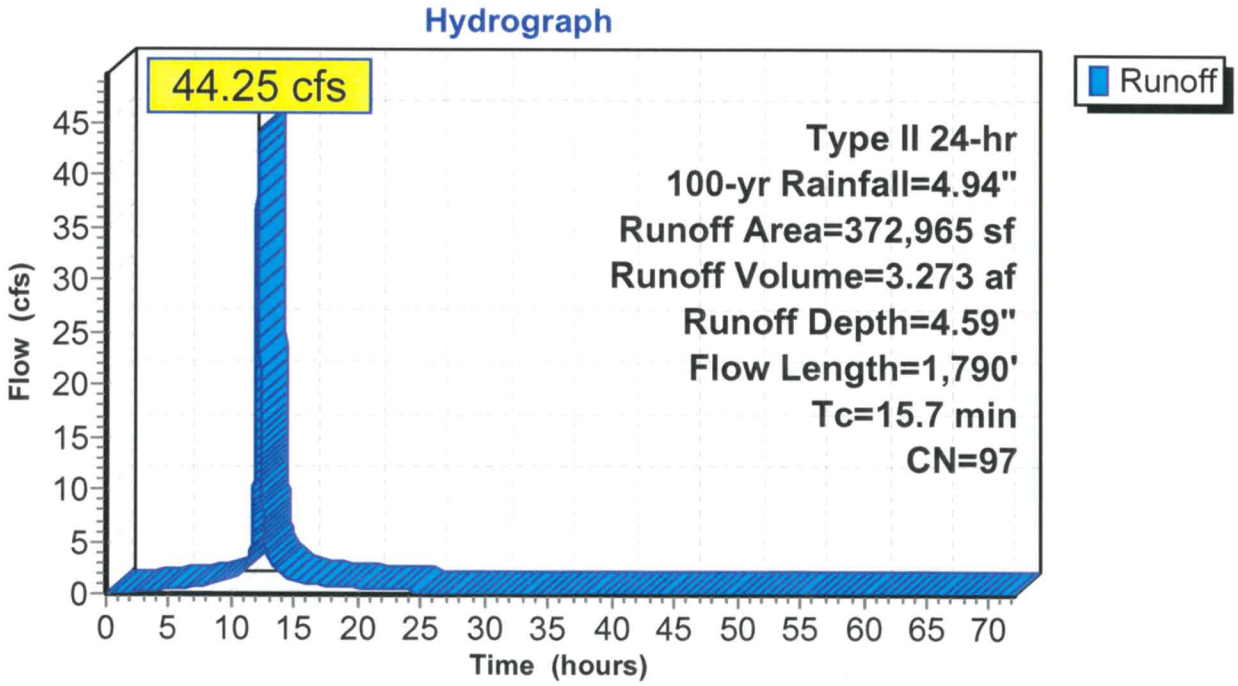
Runoff = 44.25 cfs @ 12.07 hrs, Volume= 3.273 af, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	2,694	77	Woods, Good, HSG D
	11,989	78	Meadow, non-grazed, HSG D
*	297,503	98	Gravel, D
*	60,779	98	Impervious
	372,965	97	Weighted Average
	14,683		3.94% Pervious Area
	358,282		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.60		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
15.2	1,740	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	1,790	Total			

Subcatchment 1A: Pre POI 1



Summary for Subcatchment 1B: Post Undetained POI 1

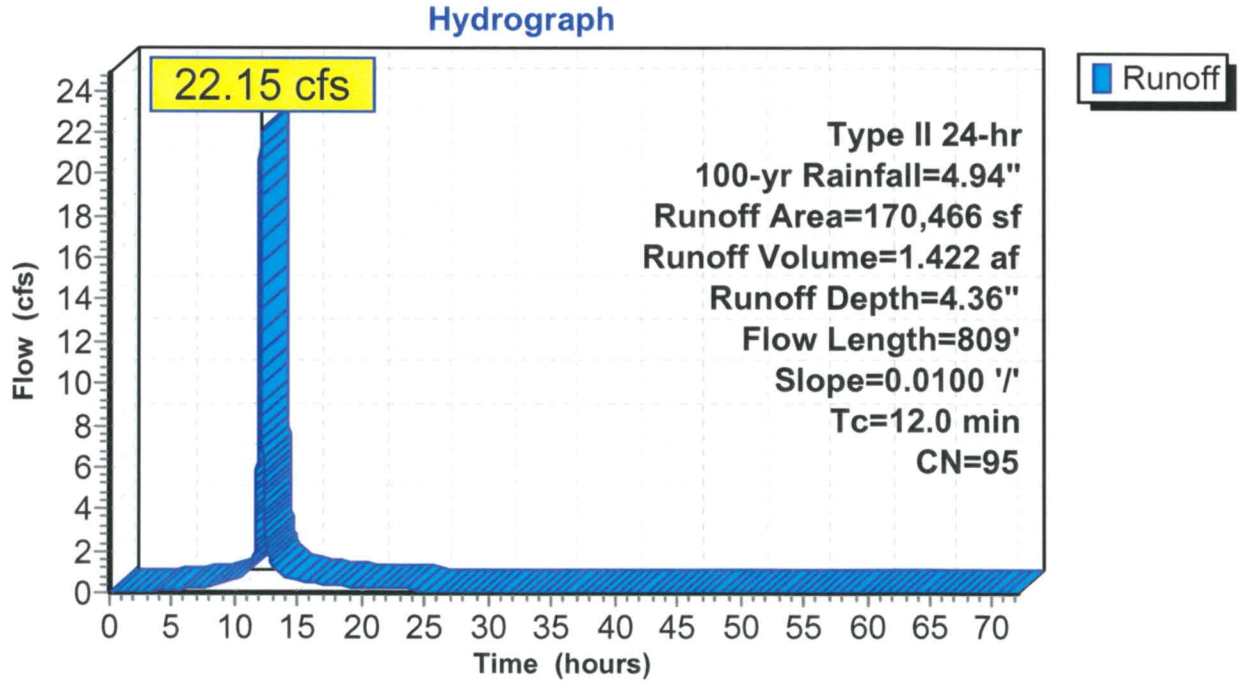
Runoff = 22.15 cfs @ 12.03 hrs, Volume= 1.422 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	24,839	78	Meadow, non-grazed, HSG D
*	131,291	98	Gravel
*	14,336	98	Impervious
	170,466	95	Weighted Average
	24,839		14.57% Pervious Area
	145,627		85.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	15	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.8	35	0.0100	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
7.9	759	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.0	809	Total			

Subcatchment 1B: Post Undetained POI 1



Summary for Subcatchment 1C: Wet Pond

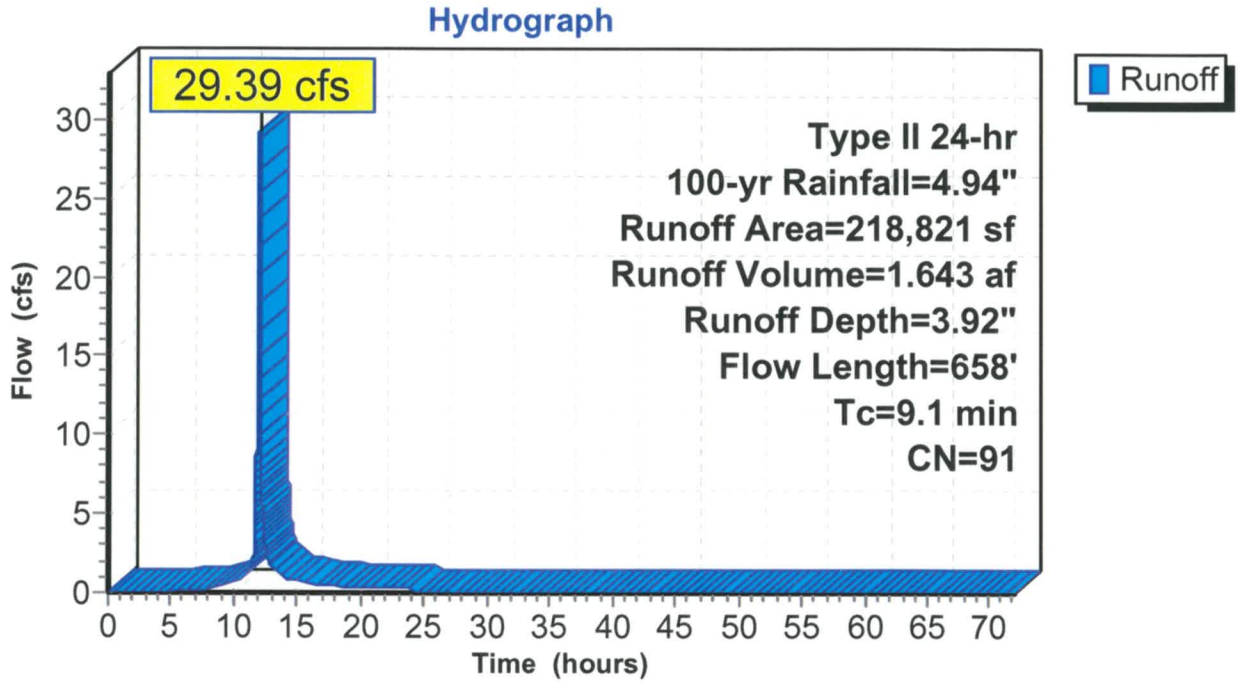
Runoff = 29.39 cfs @ 12.00 hrs, Volume= 1.643 af, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
*	65,875	98	Gravel
*	60,991	98	Impervious
	74,589	78	Meadow, non-grazed, HSG D
*	17,366	98	Water
	218,821	91	Weighted Average
	74,589		34.09% Pervious Area
	144,232		65.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0400	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.36"
0.3	79	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.2	310	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.0	211	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.2500	3.50		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	658	Total			

Subcatchment 1C: Wet Pond



Summary for Subcatchment 2A: Pre POI 2

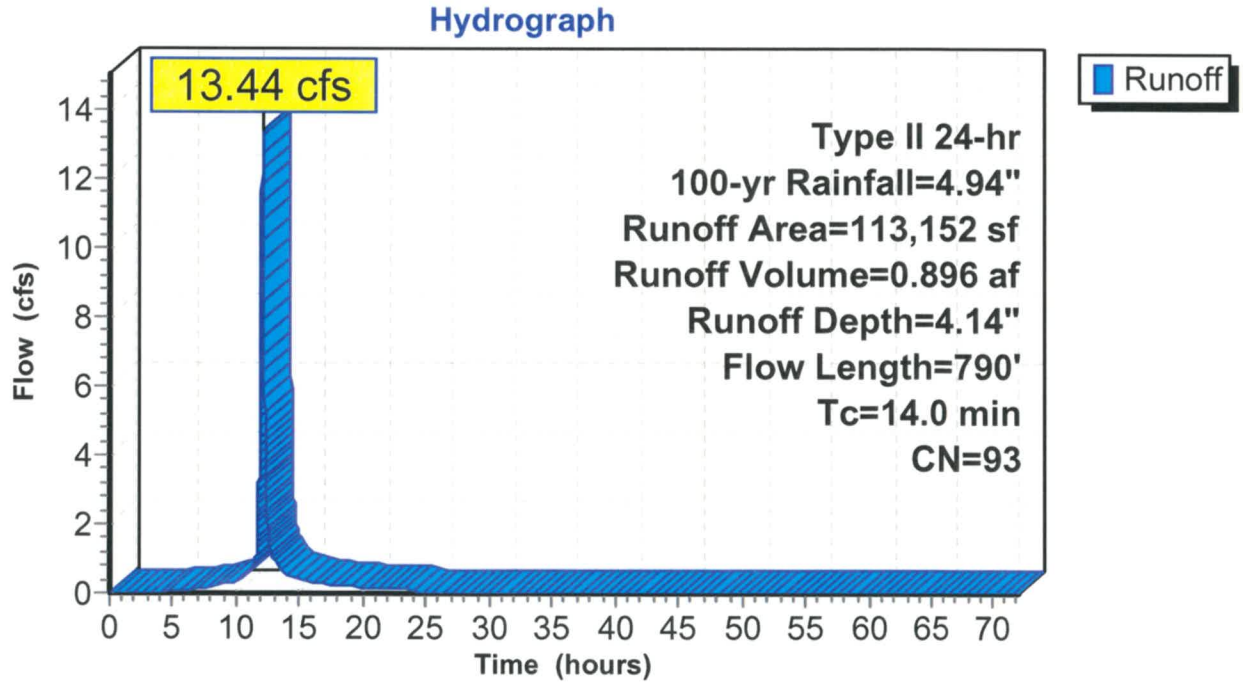
Runoff = 13.44 cfs @ 12.05 hrs, Volume= 0.896 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	24,986	78	Meadow, non-grazed, HSG D
*	86,410	98	Gravel D
	113,152	93	Weighted Average
	26,742		23.63% Pervious Area
	86,410		76.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0400	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.6	640	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	790	Total			

Subcatchment 2A: Pre POI 2



Summary for Subcatchment 2B: Post POI 2

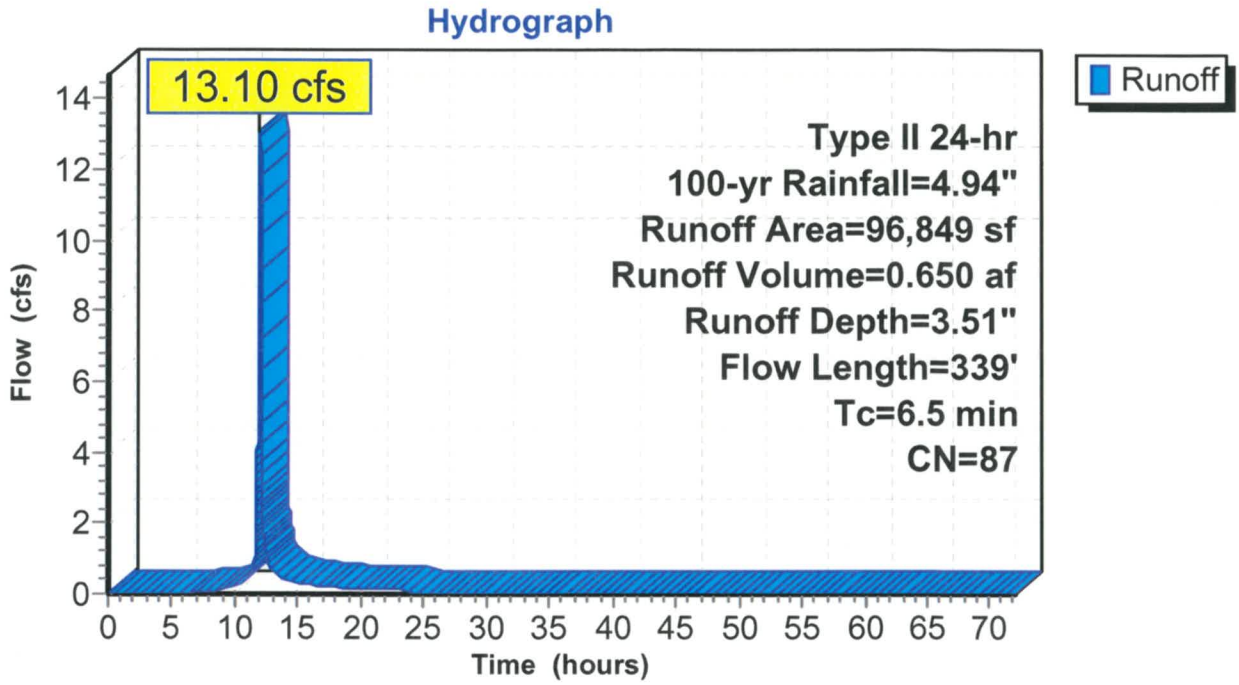
Runoff = 13.10 cfs @ 11.98 hrs, Volume= 0.650 af, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=4.94"

	Area (sf)	CN	Description
	1,756	77	Woods, Good, HSG D
	52,754	78	Meadow, non-grazed, HSG D
*	31,686	98	Gravel
*	10,653	98	Impervious
	96,849	87	Weighted Average
	54,510		56.28% Pervious Area
	42,339		43.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0600	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.36"
0.6	37	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	11	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	36	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.7	108	0.0100	2.58	7.73	**Channel Flow,** Area= 3.0 sf Perim= 8.0' r= 0.38' n= 0.030 Earth, grassed & winding
0.5	80	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	339	Total			

Subcatchment 2B: Post POI 2



Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 3.92" for 100-yr event				
Inflow =	29.39 cfs @	12.00 hrs, Volume=	1.643 af		
Outflow =	12.23 cfs @	12.13 hrs, Volume=	1.609 af, Atten= 58%, Lag= 7.7 min		
Primary =	12.23 cfs @	12.13 hrs, Volume=	1.609 af		
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.45' @ 12.13 hrs Surf.Area= 0 sf Storage= 53,094 cf (34,070 cf above start)

Plug-Flow detention time= 726.6 min calculated for 1.173 af (71% of inflow)
Center-of-Mass det. time= 444.5 min (1,231.3 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

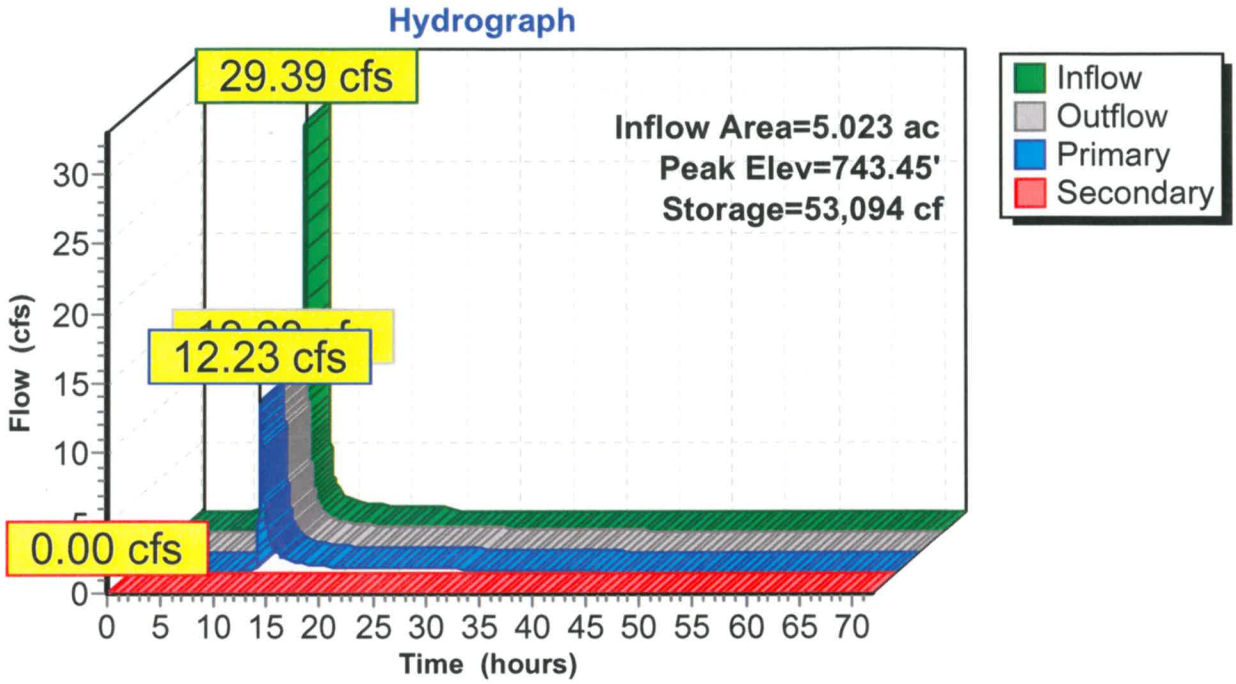
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=12.22 cfs @ 12.13 hrs HW=743.45' (Free Discharge)
└─**1=Culvert** (Passes 12.22 cfs of 14.10 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.48 cfs @ 5.45 fps)
  └─**3=Orifice/Grate** (Weir Controls 11.74 cfs @ 2.19 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1D: Wet Pond

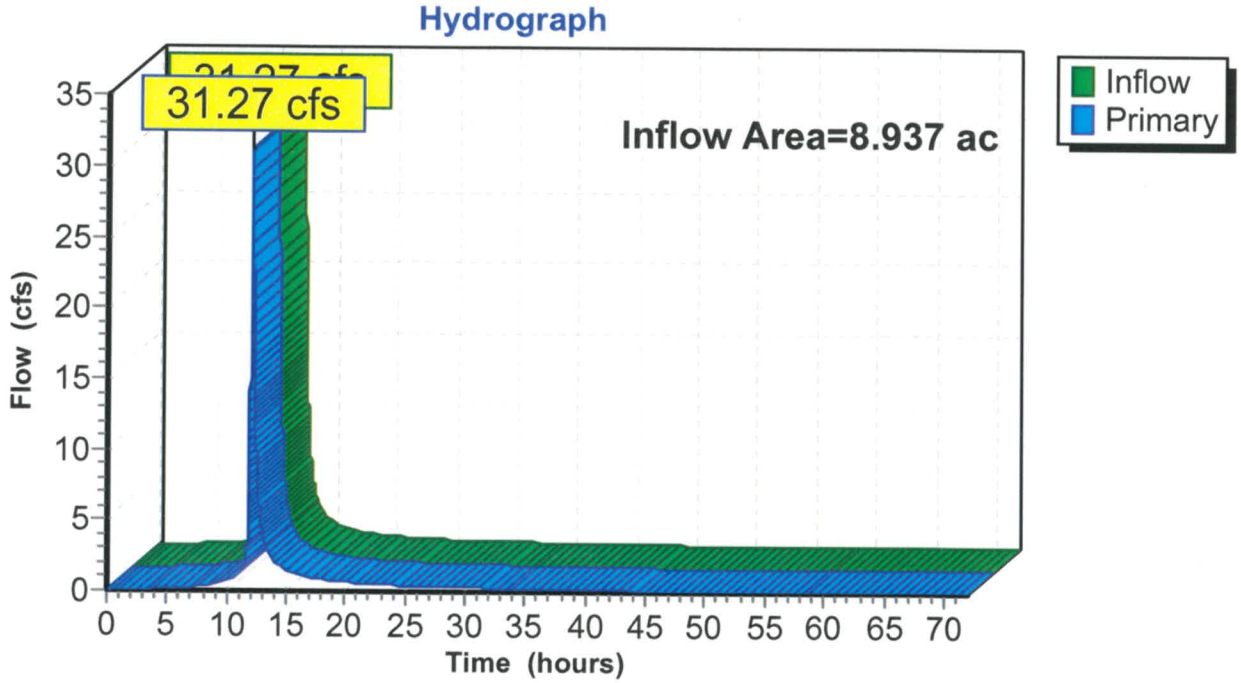


Summary for Link 1E: Post Total POI 1

Inflow Area =	8.937 ac, 74.46% Impervious, Inflow Depth > 4.07" for 100-yr event				
Inflow =	31.27 cfs @ 12.07 hrs, Volume=	3.031 af			
Primary =	31.27 cfs @ 12.07 hrs, Volume=	3.031 af, Atten= 0%, Lag= 0.0 min			

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1E: Post Total POI 1



Section 4.0

Emergency Spillway Calculations

Merrion Oil & Gas: ET - Braddock Well Pad
EMERGENCY SPILLWAY DESIGN CALCULATIONS

Channel I.D.	Peak Discharge cfs	Channel Slope ft/ft	Lining Type [1]	Manning's "n" [2]	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraul. Radius ft.	Vel. fps	Allow. Vel. [3] fps	Shear Stress <lb/ft^2	Allow. Shear [3] Stress	Avail. Flow cfs	Critical Slope [4] ft/ft	Flow Type [5]	Min. Depth [6] ft	Minimum Channel Dimensions (ft) Bottom Width	Depth [7]	Side Slopes	Top Width	Total Q Avail. (cfs)
Pond 1 Emergency Spillway	6.3	0.330	R-4 riprap	0.064	25.0	2	0.092	2.307	25.41	0.091	2.71	9.00	1.89	2.00	6.2	0.131	Stable	0.59	25.0	1.00	2	29.0	445.73
Voids	6.3	0.330	R-4 riprap	0.064	25.0	2	0.004	0.100	25.02	0.004	0.34	9.00	0.08	2.00	0.0	0.371	Unstable	0.50	25.0	1.00	2	29.0	445.73

Channel Void Space Calculation [8]

Channel I.D.	Peak Discharge cfs	Void Space %	Lining Type	Nominal Thickness ft	Base Width ft	Total Stone Area ft^2	Void Space ft^2	Excess Flow Area ft^2
Pond 1 Emergency Spillway	6.3	0.40	R-4 riprap	1.5	25.0	37.5	15.00	0.100

Notes:

1 Lining: Appropriate channel lining is chosen based on velocity and shear stress considerations.
2 Manning's roughness coefficient (n-value) for channel linings are based on the PA DEP Erosion and Sediment Pollution Control Manual, March 31, 2012, and Manufacturers specifications.
3 Design criteria is based on tables within the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012, and Manufacturers specifications.
4 Critical slope is calculated to determine the stability of each channel following the procedures on Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012.

Critical slope = $S_c = 14.56\, n^2 D_m / R^{4/3}$

where: n = Manning's n
D_m = mean depth of flow (ft)
R = hydraulic radius (ft)

5 Channels are checked for stable vs. unstable conditions in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. Unstable flow occurs when $0.7S_c \leq$ **Channel Slope** $\leq 1.3S_c$.
6 Minimum channel depth is the sum of the flow depth and the minimum required freeboard. The minimum required freeboard is calculated in accordance with Page 139 of the PA DEP Erosion and Sediment Pollution Control Program Manual, March 31, 2012. The required freeboard calculation is based on the stability of the channel.

For unstable flow conditions:

F = (0.025*V)*(3*D)

where: F = minimum freeboard (ft)
V = velocity (fps)
D = flow depth (ft)

For stable flow conditions, the minimum freeboard should be 25% of the flow depth or a minimum of 6 inches, whichever is greater.
7 Channel depths are rounded up to the nearest 0.25 foot increment for construction purposes.
8 The void space in the channel bottom can be accounted for per recommendations in the Pennsylvania Erosion and Sediment Pollution Control Program Manual to reduce the calculated shear stress for the channel.
The separate Channels Void Space Calculation, determines the void space for of the stone on the channels bottom. The sides of the channel are ignored and only the base width is used in determining this area.
The nominal thickness is adjusted based of the type of rock or the thickness of the gabion or reno mattress. The void space area is found by multiplying the total stone area by the void space, assuming 33% void space for slopes< 10 % and 40% for slopes ≥ 10%.
The excess flow area is the void space area subtracted from the channels cross sectional flow area found initially for the full depth needed to handle the required peak discharge. (If this would result in a flow area less than 0.1 ft2, 0.1 ft2 is assumed.)
On the line labeled **"With Void"**, the new reduced excess flow area is used to determine the new depth of flow over the top of the stone. From the reduced depth the channels final velocity, shear stress and channel dimensions are determined.
9 Peak discharge based on routing of 100 year storm with the primary outlet plugged.

Sources for Design Inputs

Lining	Max Velocity	Max Shear Stress	Mannings n
Vegitation	Table 6.4	Table 6.2	Equation on pg. 129
Riprap	Table 6.6	Table 6.2	Figure 6.2
Gabion	Table 6.10	Table 6.10	Table 6.10
ECM	Manufacturer's Specifications	Manufacturer's Specifications	Manufacturer's Specifications

Summary for Pond 1D: Wet Pond

Inflow Area =	5.023 ac, 65.91% Impervious, Inflow Depth = 3.92" for 100-yr event				
Inflow =	29.27 cfs @	12.00 hrs,	Volume=	1.643 af	
Outflow =	6.25 cfs @	12.22 hrs,	Volume=	0.829 af,	Atten= 79%, Lag= 12.8 min
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	6.25 cfs @	12.22 hrs,	Volume=	0.829 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 742.00' Surf.Area= 0 sf Storage= 19,024 cf
Peak Elev= 743.71' @ 12.22 hrs Surf.Area= 0 sf Storage= 59,794 cf (40,770 cf above start)

Plug-Flow detention time= 474.6 min calculated for 0.392 af (24% of inflow)
Center-of-Mass det. time= 137.4 min (924.3 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1	741.00'	97,189 cf	**Custom Stage Data** Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
741.00	0	0
742.00	19,024	19,024
743.00	22,436	41,460
744.00	25,999	67,459
745.00	29,730	97,189

Device	Routing	Invert	Outlet Devices
#1	Primary	741.00'	**21.0" Round Culvert X 0.00** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 741.00' / 740.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf
#2	Device 1	742.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	743.00'	**48.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	743.50'	**25.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=742.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=6.23 cfs @ 12.22 hrs HW=743.71' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 6.23 cfs @ 1.21 fps)

Section 5.0

Volume Control and Water Quality BMP's Calculations

(POI 1)

Appendix D. Worksheets

Worksheet 1. General Site Information

INSTRUCTIONS: Fill out Worksheet 1 for each watershed

Date: 09-26-2018

Project Name: ET - Braddock Well Pad

Municipality: North Braddock Borough, East Pittsburgh Borough, North Versailles Township

County: Allegheny

Total Area (acres): 8.68

Major River Basin: Ohio

Watershed: Monongahela River

Sub-Basin: Turtle Creek

Nearest Surface Water(s) to Receive Runoff: Turtle Creek

Chapter 93 – Designated Water Use/Existing Water Use: WWF

Impaired according to Category 4 or 5 of the Integrated Water Quality Monitoring and Assessment Report? Yes ☒ No ☐

List Causes of Impairment: Aquatic Life: Abandoned Mine Drainage- Siltation

Is there an established TMDL that applies: Yes ☐ No ☒

Total Maximum Daily Loads (TMDLS)

Is project subject to, or part of:

Municipal Separate Storm Sewer System (MS4) Requirements? Yes ☐ No ☒

Existing or planned drinking water supply? Yes ☐ No ☒

If yes, distance from proposed discharge (miles):

Approved Act 167 Plan? Yes ☒ No ☐

Existing River Conservation Plan? Yes ☐ No ☒

(POI 2)

Appendix D. Worksheets

Worksheet 1. General Site Information

INSTRUCTIONS: Fill out Worksheet 1 for each watershed

Date: 09-26-2018

Project Name: ET - Braddock Well Pad

Municipality: North Braddock Borough, East Pittsburgh Borough, North Versailles Township

County: Allegheny

Total Area (acres): 1.96

Major River Basin: Ohio

Watershed: Monongahela River

Sub-Basin: Turtle Creek

Nearest Surface Water(s) to Receive Runoff: North Braddock Boro. MS4, Braddock Ave.

Chapter 93 – Designated Water Use/Existing Water Use: N/A

Impaired according to Category 4 or 5 of the Integrated Water Quality Monitoring and Assessment Report? Yes ☐ No ☒

List Causes of Impairment:

Is there an established TMDL that applies: Yes ☐ No ☐

Total Maximum Daily Loads (TMDLS)

Is project subject to, or part of:

Municipal Separate Storm Sewer System (MS4) Requirements? Yes ☐ No ☒

Existing or planned drinking water supply? Yes ☐ No ☒

If yes, distance from proposed discharge (miles):

Approved Act 167 Plan? Yes ☒ No ☐

Existing River Conservation Plan? Yes ☐ No ☒

Worksheet 2. Sensitive Natural Resources from PA Stormwater Best Management Practices Chapter 5

INSTRUCTIONS

1. Provide Sensitive Resources Map according to non-structural BMP 5.4.1 in Chapter 5. This map should identify wetlands, woodlands, natural drainage ways, steep slopes, and other sensitive natural areas.

2. Summarize the existing extent of each sensitive resource in the Existing Sensitive Resources Table (below, using Acres). If none present, insert 0.

3. Summarize Total Protected Area as defined under BMPs in Chapter 5.

4. Do not count any area twice. For example, an area that is both a floodplain and a wetland may only be considered once.

EXISTING NATURAL SENSITIVE RESOURCE	MAPPED? Yes/no/n/a	TOTAL AREA (Ac.)	PROTECTED AREA (Ac.)
Waterbodies			
Floodplains			
Riparian Areas			
Wetlands			
Woodlands			
Natural Drainage Ways			
Steep Slopes, 15% - 25%			
Steep Slopes, over 25%			
Other:			
Other:			
TOTAL EXISTING:	0	**0**	**0**

(POI 1)

Worksheet 3. Nonstructural BMP Credits from PA Stormwater Best Management Practices Manual (SW BMP Manual)

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2) 0 **Ac.**

1.2 Area of Riparian Forest Buffer Protection (see WS 2) 0 **Ac.**

3.1 Area of Minimum Disturbance/Reduced Grading (See Chapter 8, page 21 – SW BMP Manual) 0 **Ac**

TOTAL 0 **Ac**

Site Area	Minus	Protected Area	=	Stormwater Management Area
8.68	-	0	=	8.68

This is the area that requires stormwater management

VOLUME CREDITS

3.1 Minimum Soil Compaction (See Chapter 8, page 22 – SW BMP Manual)

Lawn _____ ft^2 x 1/4" x 1/12 = _____ ft^3

_____

Meadow _____ ft^2 x 1/3" x 1/12 = _____ ft^3

3.3 Protect Existing Trees (See Chapter 8, page 23 – SW BMP Manual)

For Trees within 100 feet of impervious area:

Tree Canopy _____ ft^2 x 1/2" x 1/12 = _____ ft^3

_____ _____

5.1 Disconnect Roof Leaders to Vegetated Areas (See Chapter 8 page 25 – SW BMP Manual)

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area _____ ft^2 x 1/3" x 1/12 = _____ ft^3

For all other disconnected roof areas

Roof Area _____ ft^2 x 1/4" x 1/12 = _____ ft^3

5.2 Disconnect Non-Roof impervious to Vegetated Areas (See Chapter 8, page 26 – SW BMP Manual)

For Runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area _____ ft^2 x 1/3" x 1/12 = _____ ft^3

For all other disconnected roof areas

Impervious Area _____ ft^2 x 1/4" x 1/12 = _____ ft^3

TOTAL NON-STRUCTURAL VOLUME CREDIT* 0 ft

**For use on Worksheet 5*

(POI 2)

Worksheet 3. Nonstructural BMP Credits from PA Stormwater Best Management Practices Manual (SW BMP Manual)

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2) 0 **Ac.**

1.2 Area of Riparian Forest Buffer Protection (see WS 2) 0 **Ac.**

3.1 Area of Minimum Disturbance/Reduced Grading (See Chapter 8, page 21 – SW BMP Manual) 0 **Ac**

TOTAL 0 **Ac**

Site Area	Minus	Protected Area	=	Stormwater Management Area
1.96	-	0	=	1.96

This is the area that requires stormwater management

VOLUME CREDITS

3.1 Minimum Soil Compaction (See Chapter 8, page 22 – SW BMP Manual)

Lawn	_____ ft^2	x 1/4" x 1/12	=	_____ ft^3
Meadow	_____ ft^2	x 1/3" x 1/12	=	_____ ft^3

3.3 Protect Existing Trees (See Chapter 8, page 23 – SW BMP Manual)

For Trees within 100 feet of impervious area:

Tree Canopy	_____ ft^2	x 1/2" x 1/12	=	_____ ft^3

5.1 Disconnect Roof Leaders to Vegetated Areas (See Chapter 8 page 25 – SW BMP Manual)

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area	_____ ft^2	x 1/3" x 1/12	=	_____ ft^3

For all other disconnected roof areas

Roof Area	_____ ft^2	x 1/4" x 1/12	=	_____ ft^3

5.2 Disconnect Non-Roof impervious to Vegetated Areas (See Chapter 8, page 26 – SW BMP Manual)

For Runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area	_____ ft^2	x 1/3" x 1/12	=	_____ ft^3

For all other disconnected roof areas

Impervious Area	_____ ft^2	x 1/4" x 1/12	=	_____ ft^3

TOTAL NON-STRUCTURAL VOLUME CREDIT* 0 ft

**For use on Worksheet 5*

Worksheet 4. Change in Runoff Volume for 2-YR Storm Event

PROJECT:	*Merrion Oil & Gas - ET - Braddock Well Pad*	
Drainage Area:	*Project area within DA 1 (PCSM)*	
2-Year Rainfall	*2.36*	in
Total Site Area:	*10.6*	acres
Protected Site Area:	*0.0*	acres
Managed Area:	*10.6*	acres

Existing Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woods	*D*	*2,694*	*0.06*	*77*	*2.99*	*0.60*	*0.65*	*147*
Meadow	*D*	*941*	*0.02*	*78*	*2.82*	*0.56*	*0.70*	*55*
Impervious	*D*	*60,779*	*1.40*					
20% Meadow CN	*D*	*12,156*	*0.28*	*78*	*2.82*	*0.56*	*0.70*	*708*
80% Impervious CN	*D*	*48,623*	*1.12*	*98*	*0.20*	*0.04*	*2.13*	*8,637*
Gravel	*D*	*297,503*	*6.83*					
20% Meadow CN	*D*	*59,501*	*1.37*	*78*	*2.82*	*0.56*	*0.70*	*3,464*
80% Impervious CN	*D*	*238,002*	*5.46*	*98*	*0.20*	*0.04*	*2.13*	*42,277*
Total:		*361,917*	*8.31*					*55,288*

Developed Conditions

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Meadow	*D*	*88,636*	*2.03*	*78*	*2.82*	*0.56*	*0.70*	*5,160*
Gravel	*D*	*188,856*	*4.34*	*98*	*0.20*	*0.04*	*2.13*	*33,547*
Water	*D*	*17,366*	*0.40*	*98*	*0.20*	*0.04*	*2.13*	*3,085*
Impervious	*All*	*83,362*	*1.91*	*98*	*0.20*	*0.04*	*2.13*	*14,808*
Total:		*378,220*	*8.68*					*56,600*

2-Year Volume Increase (ft^3):	***1,312***

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P-0.2S)^2 / (P+0.8S)$ where
   P = 2-Year Rainfall (in)
   S = (1000 / CN)-10
2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land use area (sq. ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

Worksheet 4. Change in Runoff Volume for 2-YR Storm Event

PROJECT:	*Merrion Oil & Gas - ET - Braddock Well Pad*	
Drainage Area:	*Project area within DA 2 (PCSM)*	
2-Year Rainfall	*2.36*	in
Total Site Area:	*10.6*	acres
Protected Site Area:	*0.0*	acres
Managed Area:	*10.6*	acres

Existing Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woods	*D*	*1,756*	*0.04*	*77*	*2.99*	*0.60*	*0.65*	*96*
Meadow	*D*	*13,529*	*0.31*	*78*	*2.82*	*0.56*	*0.70*	*788*
Gravel	*D*	*86,410*	*1.98*					
20% Meadow CN	*D*	*17,282*	*0.40*	*78*	*2.82*	*0.56*	*0.70*	*1,006*
80% Impervious CN	*D*	*69,128*	*1.59*	*98*	*0.20*	*0.04*	*2.13*	*12,279*
Total:		*101,695*	*2.33*					*14,169*

Developed Conditions

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woods	*D*	*1,756*	*0.04*	*77*	*2.99*	*0.60*	*0.65*	*96*
Meadow	*D*	*41,297*	*0.95*	*78*	*2.82*	*0.56*	*0.70*	*2,404*
Gravel	*D*	*28,034*	*0.64*	*98*	*0.20*	*0.04*	*2.13*	*4,980*
Impervious	*All*	*14,305*	*0.33*	*98*	*0.20*	*0.04*	*2.13*	*2,541*
Total:		*85,392*	*1.96*					*10,021*

2-Year Volume Increase (ft^3):	***-4,148***

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P-0.2S)^2 / (P+0.8S)$ where
   P = 2-Year Rainfall (in)
   S = (1000 / CN)-10
2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land use area (sq. ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

Worksheet 4. Change in Runoff Volume for 2-YR Storm Event

PROJECT:	*Merrion Oil & Gas - ET - Braddock Well Pad*	
Drainage Area:	*Project area within DA 1 (SR)*	
2-Year Rainfall	*2.36*	in
Total Site Area:	*10.6*	acres
Protected Site Area:	*0.0*	acres
Managed Area:	*10.6*	acres

Existing Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woods	*D*	*2,694*	*0.06*	*77*	*2.99*	*0.60*	*0.65*	*147*
Meadow	*D*	*941*	*0.02*	*78*	*2.82*	*0.56*	*0.70*	*55*
Impervious	*D*	*60,779*	*1.40*					
20% Meadow CN	*D*	*12,156*	*0.28*	*78*	*2.82*	*0.56*	*0.70*	*708*
80% Impervious CN	*D*	*48,623*	*1.12*	*98*	*0.20*	*0.04*	*2.13*	*8,637*
Gravel	*D*	*297,503*	*6.83*					
20% Meadow CN	*D*	*59,501*	*1.37*	*78*	*2.82*	*0.56*	*0.70*	*3,464*
80% Impervious CN	*D*	*238,002*	*5.46*	*98*	*0.20*	*0.04*	*2.13*	*42,277*
Total:		*361,917*	*8.31*					*55,288*

Site Restoration Conditions

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Meadow	*D*	*88636*	*2.03*	*78*	*2.82*	*0.56*	*0.70*	*5,160*
Gravel	*D*	*196891*	*4.52*	*98*	*0.20*	*0.04*	*2.13*	*34,975*
Water	*D*	*17366*	*0.40*	*98*	*0.20*	*0.04*	*2.13*	*3,085*
Impervious	*All*	*75327*	*1.73*	*98*	*0.20*	*0.04*	*2.13*	*13,381*
Total:		*378,220*	*8.68*					*56,600*

2-Year Volume Increase (ft^3):	***1,312***

2-Year Volume Increase = Site Restoration Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P-0.2S)^2 / (P+0.8S)$ where
   P = 2-Year Rainfall (in)
   S = (1000 / CN)-10
2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land use area (sq. ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

Worksheet 4. Change in Runoff Volume for 2-YR Storm Event

PROJECT:	*Merrion Oil & Gas - ET - Braddock Well Pad*	
Drainage Area:	*Project area within DA 2 (SR)*	
2-Year Rainfall	*2.36*	in
Total Site Area:	*10.6*	acres
Protected Site Area:	*0.0*	acres
Managed Area:	*10.6*	acres

Existing Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woods	*D*	*1,756*	*0.04*	*77*	*2.99*	*0.60*	*0.65*	*96*
Meadow	*D*	*13,529*	*0.31*	*78*	*2.82*	*0.56*	*0.70*	*788*
Gravel	*D*	*86,410*	*1.98*					
20% Meadow CN	*D*	*17,282*	*0.40*	*78*	*2.82*	*0.56*	*0.70*	*1,006*
80% Impervious CN	*D*	*69,128*	*1.59*	*98*	*0.20*	*0.04*	*2.13*	*12,279*
Total:		*101,695*	*2.33*					*14,169*

Site Restoration Conditions

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woods	*D*	*1,756*	*0.04*	*77*	*2.99*	*0.60*	*0.65*	*96*
Meadow	*D*	*41,297*	*0.95*	*78*	*2.82*	*0.56*	*0.70*	*2,404*
Gravel	*D*	*37,747*	*0.87*	*98*	*0.20*	*0.04*	*2.13*	*6,705*
Impervious	*All*	*4,592*	*0.11*	*98*	*0.20*	*0.04*	*2.13*	*816*
Total:		*85,392*	*1.96*					*10,021*

2-Year Volume Increase (ft^3):	***-4,148***

2-Year Volume Increase = Site Restoration Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P-0.2S)^2 / (P+0.8S)$ where
   P = 2-Year Rainfall (in)
   S = (1000 / CN)-10
2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land use area (sq. ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

Worksheet 5. Structural BMP Volume Credits

PROJECT: *Merrion Oil & Gas - ET - Braddock Well Pad*

SUB-BASIN: *Project area within DA 1 (PCSM)*

Required Control Volume (ft^3) – *from Worksheet 4:* *1,312*

Non-structural Volume Credit (ft^3) – *from Worksheet 3*: - *0*

(maximum is 25% of required volume)

Structural Volume Reqmt (ft3) *1,312*

(Required Control Volume minus Non-structural Credit)

	Proposed BMP	Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin	*218,820*	*19,024*
6.7.1	Riparian Buffer/Riparian Forest Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (ft^3): *19,024*

Structural Volume Requirement (ft^3): *1,312*

DIFFERENCE *-17,712*

Worksheet 5. Structural BMP Volume Credits

PROJECT: *Merrion Oil & Gas - ET - Braddock Well Pad*

SUB-BASIN: *Project area within DA 2 (PCSM)*

Required Control Volume (ft^3) – *from Worksheet 4:* *-4,148*

Non-structural Volume Credit (ft^3) – *from Worksheet 3*: - *0*

(maximum is 25% of required volume)

Structural Volume Reqmt (ft3) *-4,148*

(Required Control Volume minus Non-structural Credit)

	Proposed BMP	Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin		
6.7.1	Riparian Buffer/Riparian Forest Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (ft^3): *0*

Structural Volume Requirement (ft^3): *-4,148*

DIFFERENCE *-4,148*

Worksheet 5. Structural BMP Volume Credits

PROJECT: *Merrion Oil & Gas - ET - Braddock Well Pad*

SUB-BASIN: *Project area within DA 1 (SR)*

Required Control Volume (ft^3) – *from Worksheet 4:* *1,312*

Non-structural Volume Credit (ft^3) – *from Worksheet 3*: - *0*

(maximum is 25% of required volume)

Structural Volume Reqmt (ft3) *1,312*

(Required Control Volume minus Non-structural Credit)

	Proposed BMP	Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin	*218,820*	*19,024*
6.7.1	Riparian Buffer/Riparian Forest Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (ft^3): *19,024*

Structural Volume Requirement (ft^3): *1,312*

DIFFERENCE *-17,712*

Worksheet 5. Structural BMP Volume Credits

PROJECT: *Merrion Oil & Gas - ET - Braddock Well Pad*

SUB-BASIN: *Project area within DA 2 (SR)*

Required Control Volume (ft^3) – *from Worksheet 4:* *-4,148*

Non-structural Volume Credit (ft^3) – *from Worksheet 3*: - *0*

(maximum is 25% of required volume)

Structural Volume Reqmt (ft3) *-4,148*

(Required Control Volume minus Non-structural Credit)

	Proposed BMP	Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin		
6.7.1	Riparian Buffer/Riparian Forest Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (ft^3): *0*

Structural Volume Requirement (ft^3): *-4,148*

DIFFERENCE *-4,148*

Worksheet 10 – Water Quality Compliance for Nitrate

Does the site design incorporate the following BMPs to address nitrate pollution? A summary "yes" rating is achieved if at least 2 Primary BMPs for nitrate are provided across the site or 4 secondary BMPs for nitrate are provided across the site (or the equivalent) "provided across the site" is taken to mean the specifications for that BMP set forward in Sections 5 and 6 are satisfied.

Proposed BMPs from PA Stormwater Best Management Practices Manual Chapter 5 & 6

	Yes	No
Primary BMPs for Nitrate:	☐	☐
NS BMP 5.4.2 – Protect/Conserve/Enhance Riparian Buffers	☐	☐
NS BMP 5.5.4 – Cluster Uses at Each Site	☐	☐
NS BMP 5.6.1 – Minimize Total Disturbed Area	☒	☐
NS BMP 5.6.3 – Re-Vegetate/Re-Forest Disturbed Areas (Native Species)	☐	☐
NS BMP 5.9.1 – Street Sweeping/Vacuuming	☐	☐
Structural BMP 6.7.1 – Riparian Buffer Restoration	☐	☐
Structural BMP 6.7.2 – Landscape Restoration	☒	☐
	☐	☐
Secondary BMPs for Nitrate:	☐	☐
NS BMP 5.4.1 – Protect Sensitive/Special Value Features	☐	☐
NS BMP 5.4.3 – Protect/Utilize Natural Drainage Features	☐	☐
NS BMP 5.6.2 – Minimize Soil Compaction	☐	☐
Structural BMP 6.4.5 – Rain Garden/Bioretention	☐	☐
Structural BMP 6.4.8 – Vegetated Swale	☒	☐
Structural BMP 6.4.9 – Vegetated Filter Strip	☒	☐
Structural BMP 6.6.1 – Constructed Wetland	☐	☐
Structural BMP 6.7.1 – Riparian Buffer Restoration	☐	☐
Structural BMP 6.7.2 – Landscape Restoration	☐	☐
Structural BMP 6.7.3 – Soils Amendment/Restoration	☐	☐

Section 6.0

Maintenance and Inspection Plan

Stormwater Facilities
Maintenance & Inspection Plan

The Stormwater Management Plan developed for the Project is supplemented by this Maintenance and Inspection Plan to help ensure continuing operation of all stormwater facilities. The following is a list of items that shall be inspected and corrective action taken by the owner

(Owner): Merrion Oil & Gas

a. Owner refers to individual ultimately responsible for storm facility condition and function.

1. Outlet conditions in Detention/Retention Facility.
2. Storm sewers, swales, concrete gutters and other conveyance devices.
3. Catch Basins, Manholes, and other stormwater catchment/transition structures.
4. Access for maintenance.

The following actions will be taken by the **Owner** to help ensure the facilities shown on the plan and identified above are in working order:

1. Replace or repair facilities so as to function as intended.
2. Remove silt debris, and trash in catch basin/storm sewers.
3. Repair outlet structures, trash racks, displaced riprap & low flow channel.
4. Remove any silt, debris and trash in Detention/Retention Facility.
5. Disposal of collected silt, debris and trash in a manner, which will not adversely affect the environment.
6. Replace eroded material and revegetate eroded areas.
7. Vegetation maintenance (i.e. mowing, brush cutting, debris removal, etc.) shall be performed a minimum of four (4) times per year. Additional vegetation maintenance may be required to maintain pond esthetics and function.
8. Visual inspection of the facility to identify conditions that may cause concern with the integrity of the facility (i.e. animal burrows, embankment subsidence, cracks, etc.).

The corrective actions to be taken are not limited to those listed above.

Stormwater Facilities

Maintenance & Inspection Plan

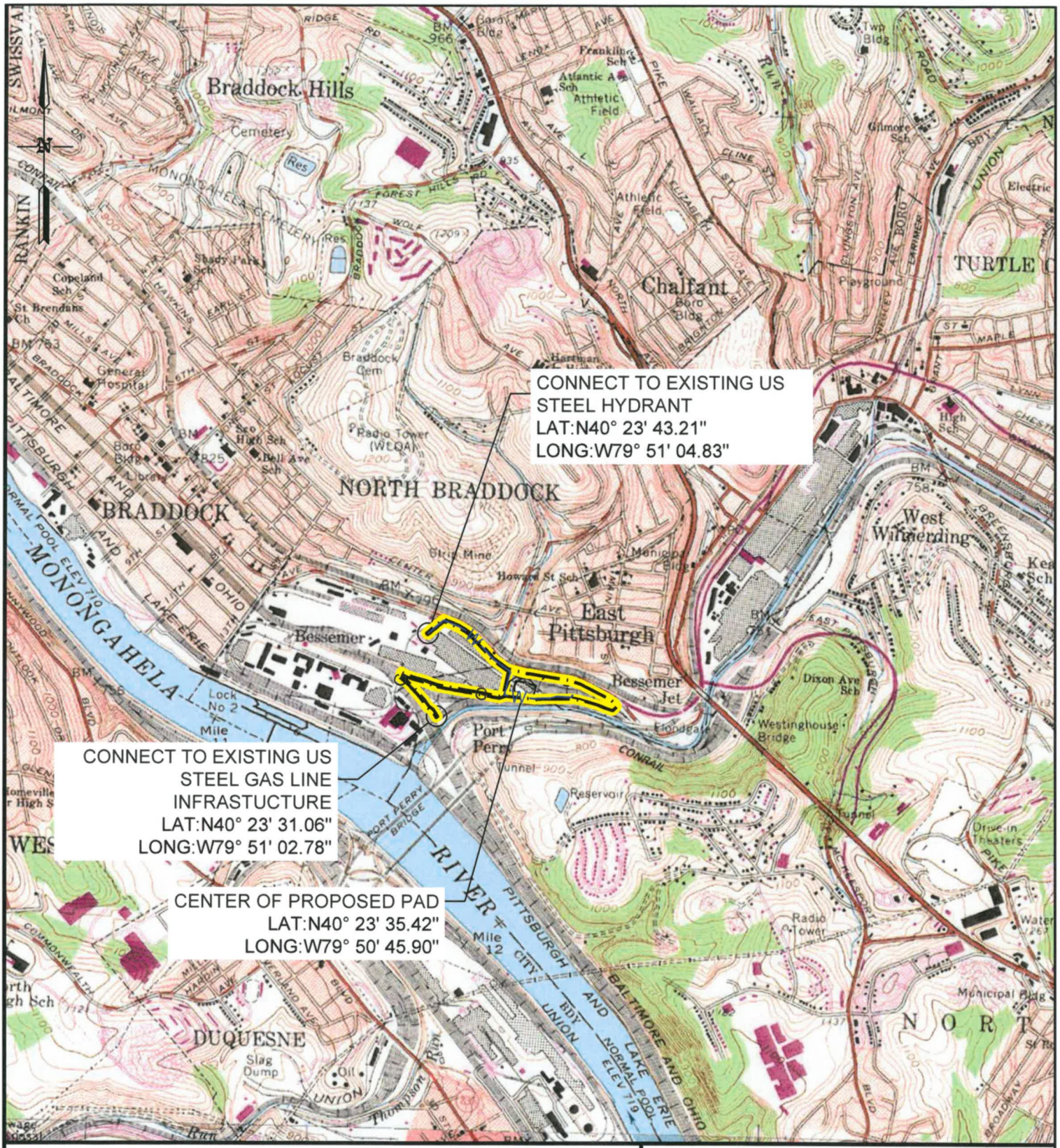
The inspection shall be undertaken by a minimum of one person at least two (2) times per year on or before March 1st, and October 1st. Additional inspections will be required if it becomes apparent facilities are not functioning properly. Corrective actions will then be taken as required to help ensure continuing operation of stormwater facilities. Any deficiencies noted in items inspected by the **Owner** shall be documented and corrective actions taken by the **Owner.** This recommended Maintenance Plan shall not be considered a guarantee as to the adequacy of the stormwater management facilities in the future.

The Township or governing body (**East Pittsburgh Borough**) may require other items to be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. If the **Borough** does not maintain the Stormwater Facilities, the **Owner** shall maintain all facilities in accordance with the approved maintenance schedule and shall keep all facilities maintained in a safe and attractive manner. The **Owner** shall convey to the **Borough** easements and/or rights-of-way to assure access for periodic inspections by the **Borough** and maintenance if required. ***The Owner shall keep on file with the Borough the name, address, and telephone number of the person or company responsible for maintenance activities.*** In the event of a change, new information will be submitted to the **Borough** within ten (10) days of the change. The **Owner** shall establish any special maintenance funds or other financing sources, in accordance with the approved maintenance plan. If the **Owner** fails to maintain the stormwater control facilities, following due notice by the **Borough** to correct deficiencies, the **Borough** shall perform the necessary maintenance or corrective work. The **Owner** shall reimburse the **Borough** for all costs associated with the required maintenance of the stormwater control facilities.

Appendix

Site Location Map
NOAA Atlas
Soils Data
Infiltration Testing
Post Construction Stormwater Management Plans

Site Location Map



Base map from the following USGS 7½ minute quadrangles: Braddock in 1960 photorevised 1979.

LEGEND

W — PROPOSED WATERLINE	PROPOSED LOD
G — PROPOSED GASLINE	PROPOSED WELL PAD

0 2000 4000 6000

SCALE IN FEET

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SITE LOCATION MAP

SOIL EROSION AND SEDIMENT POLLUTION CONTROL PLAN
ET - BRADDOCK WELL PAD
MERRION OIL & GAS
EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

09/28/2018	Scale: 1" = 2000'	180539

ARM Group Inc.
Engineers and Scientists
www.armgroup.net

Figure 1

P:\Merrion Oil & Gas\180539-1-1-ET Braddock 1H\Drwg\Production\Figures\180539-Site Location Map.dwg Plotted: October 19, 2018

NOAA Rainfall Atlas

NOAA Atlas 14, Volume 2, Version 3
Location name: East Pittsburgh, Pennsylvania, USA*
Latitude: 40.3932°, Longitude: -79.8457°
Elevation: 745.21 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.313 (0.283-0.345)	0.373 (0.338-0.412)	0.452 (0.409-0.499)	0.512 (0.462-0.564)	0.590 (0.530-0.648)	0.648 (0.582-0.712)	0.705 (0.630-0.773)	0.763 (0.679-0.836)	0.840 (0.743-0.918)	0.897 (0.790-0.979)
10-min	0.486 (0.440-0.536)	0.582 (0.527-0.643)	0.702 (0.635-0.775)	0.791 (0.713-0.871)	0.902 (0.811-0.991)	0.983 (0.882-1.08)	1.06 (0.948-1.16)	1.14 (1.01-1.25)	1.23 (1.09-1.35)	1.31 (1.15-1.43)
15-min	0.596 (0.539-0.657)	0.712 (0.645-0.787)	0.863 (0.780-0.952)	0.973 (0.878-1.07)	1.11 (1.00-1.22)	1.22 (1.09-1.34)	1.32 (1.18-1.45)	1.42 (1.26-1.55)	1.54 (1.36-1.68)	1.63 (1.44-1.78)
30-min	0.789 (0.713-0.870)	0.953 (0.863-1.05)	1.18 (1.07-1.30)	1.35 (1.22-1.49)	1.57 (1.42-1.73)	1.74 (1.56-1.91)	1.90 (1.70-2.09)	2.07 (1.84-2.26)	2.28 (2.02-2.49)	2.45 (2.16-2.67)
60-min	0.963 (0.871-1.06)	1.17 (1.06-1.29)	1.48 (1.34-1.64)	1.72 (1.55-1.89)	2.04 (1.84-2.24)	2.29 (2.06-2.52)	2.54 (2.27-2.79)	2.81 (2.50-3.07)	3.16 (2.80-3.45)	3.44 (3.03-3.75)
2-hr	1.12 (1.02-1.22)	1.36 (1.24-1.49)	1.71 (1.56-1.87)	1.98 (1.80-2.17)	2.36 (2.14-2.57)	2.66 (2.41-2.89)	2.97 (2.67-3.22)	3.30 (2.95-3.56)	3.73 (3.32-4.03)	4.08 (3.60-4.40)
3-hr	1.19 (1.09-1.30)	1.44 (1.32-1.57)	1.80 (1.65-1.97)	2.09 (1.91-2.29)	2.50 (2.27-2.72)	2.83 (2.56-3.07)	3.17 (2.85-3.43)	3.52 (3.15-3.81)	4.01 (3.57-4.32)	4.40 (3.89-4.73)
6-hr	1.42 (1.30-1.55)	1.70 (1.57-1.86)	2.12 (1.95-2.32)	2.46 (2.25-2.68)	2.94 (2.68-3.19)	3.33 (3.02-3.61)	3.74 (3.38-4.04)	4.17 (3.74-4.50)	4.78 (4.25-5.14)	5.27 (4.64-5.65)
12-hr	1.67 (1.54-1.82)	1.99 (1.83-2.18)	2.46 (2.26-2.69)	2.84 (2.60-3.10)	3.40 (3.09-3.69)	3.85 (3.49-4.17)	4.33 (3.90-4.67)	4.84 (4.33-5.20)	5.56 (4.92-5.96)	6.15 (5.40-6.57)
24-hr	1.98 (1.86-2.13)	2.36 (2.22-2.55)	2.89 (2.70-3.11)	3.32 (3.10-3.56)	3.92 (3.65-4.20)	4.42 (4.10-4.72)	4.94 (4.56-5.27)	5.48 (5.05-5.84)	6.25 (5.71-6.64)	6.86 (6.23-7.28)
2-day	2.32 (2.17-2.49)	2.76 (2.59-2.96)	3.34 (3.13-3.58)	3.81 (3.56-4.08)	4.47 (4.17-4.77)	4.99 (4.64-5.33)	5.54 (5.14-5.91)	6.10 (5.64-6.49)	6.88 (6.32-7.31)	7.49 (6.84-7.96)
3-day	2.49 (2.34-2.66)	2.96 (2.78-3.16)	3.56 (3.34-3.80)	4.04 (3.79-4.32)	4.72 (4.41-5.03)	5.26 (4.90-5.60)	5.81 (5.40-6.18)	6.38 (5.91-6.78)	7.17 (6.60-7.61)	7.78 (7.13-8.26)
4-day	2.67 (2.51-2.84)	3.16 (2.98-3.37)	3.77 (3.55-4.03)	4.28 (4.01-4.55)	4.97 (4.65-5.28)	5.52 (5.16-5.87)	6.09 (5.67-6.46)	6.66 (6.19-7.07)	7.45 (6.88-7.90)	8.07 (7.42-8.56)
7-day	3.19 (3.02-3.39)	3.77 (3.56-4.00)	4.44 (4.20-4.72)	4.99 (4.71-5.28)	5.72 (5.38-6.05)	6.30 (5.91-6.66)	6.87 (6.44-7.26)	7.46 (6.96-7.87)	8.23 (7.64-8.69)	8.83 (8.16-9.32)
10-day	3.68 (3.49-3.88)	4.32 (4.11-4.57)	5.05 (4.79-5.34)	5.63 (5.34-5.95)	6.41 (6.06-6.76)	7.01 (6.62-7.39)	7.60 (7.17-8.01)	8.20 (7.71-8.64)	8.97 (8.40-9.46)	9.56 (8.92-10.1)
20-day	5.15 (4.91-5.42)	6.04 (5.75-6.36)	6.96 (6.62-7.33)	7.69 (7.31-8.09)	8.64 (8.20-9.09)	9.37 (8.88-9.85)	10.1 (9.54-10.6)	10.8 (10.2-11.3)	11.7 (11.0-12.3)	12.3 (11.6-13.0)
30-day	6.48 (6.18-6.80)	7.57 (7.22-7.96)	8.64 (8.25-9.09)	9.49 (9.05-9.97)	10.6 (10.1-11.1)	11.4 (10.9-12.0)	12.2 (11.6-12.8)	13.0 (12.3-13.6)	14.0 (13.2-14.7)	14.7 (13.8-15.4)
45-day	8.28 (7.93-8.65)	9.65 (9.24-10.1)	10.9 (10.4-11.4)	11.9 (11.3-12.4)	13.1 (12.5-13.6)	14.0 (13.3-14.6)	14.8 (14.1-15.5)	15.6 (14.9-16.3)	16.6 (15.8-17.3)	17.3 (16.4-18.0)
60-day	9.99 (9.61-10.4)	11.6 (11.2-12.1)	13.0 (12.5-13.5)	14.1 (13.5-14.6)	15.4 (14.8-16.0)	16.3 (15.7-17.0)	17.2 (16.5-17.9)	18.1 (17.3-18.8)	19.1 (18.2-19.9)	19.8 (18.9-20.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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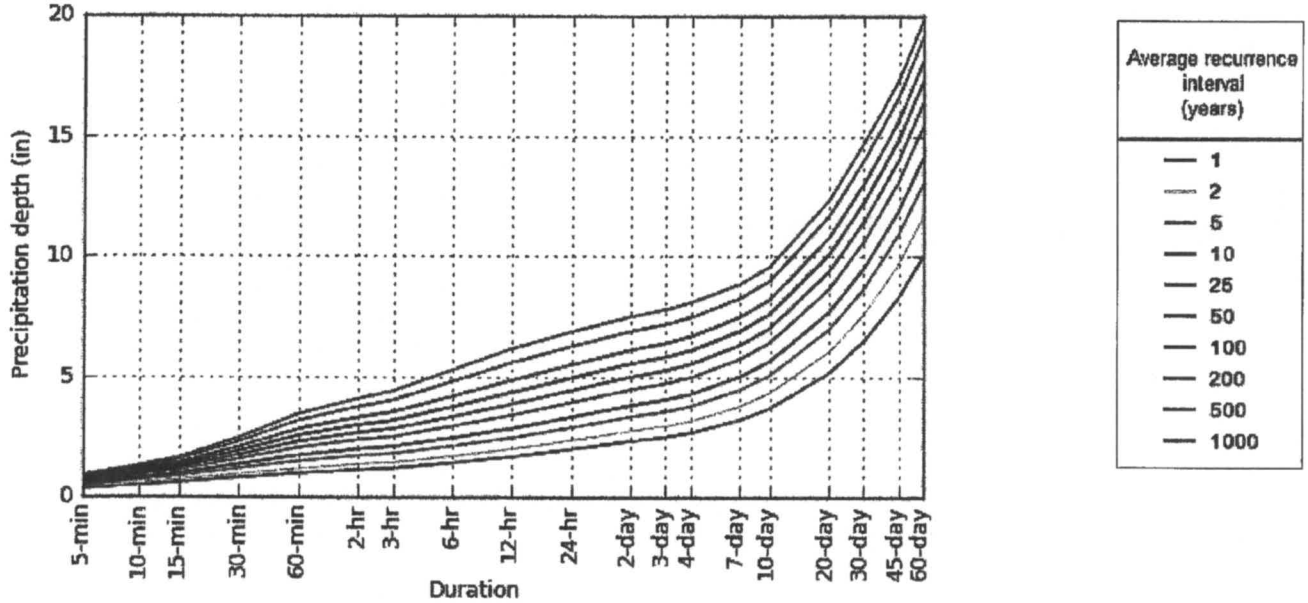
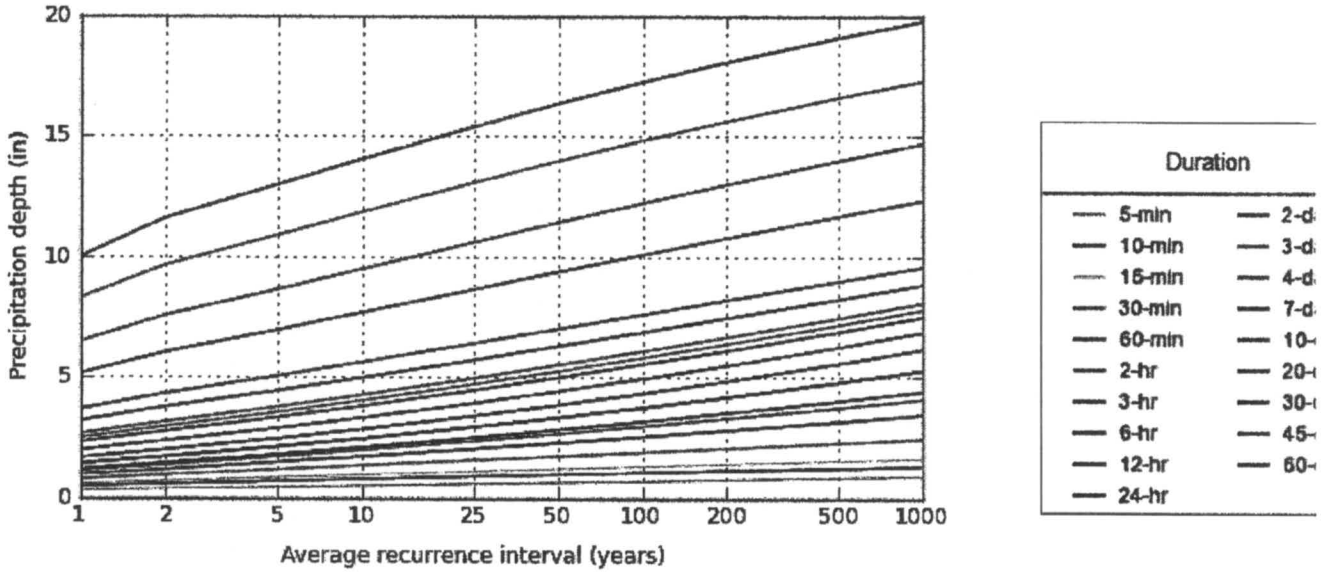
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 40.3932°, Longitude: -79.8457°





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Maps & aerials

Small scale terrain

Soils Data

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Allegheny County, Pennsylvania

ET - Braddock Well Pad

October 11, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

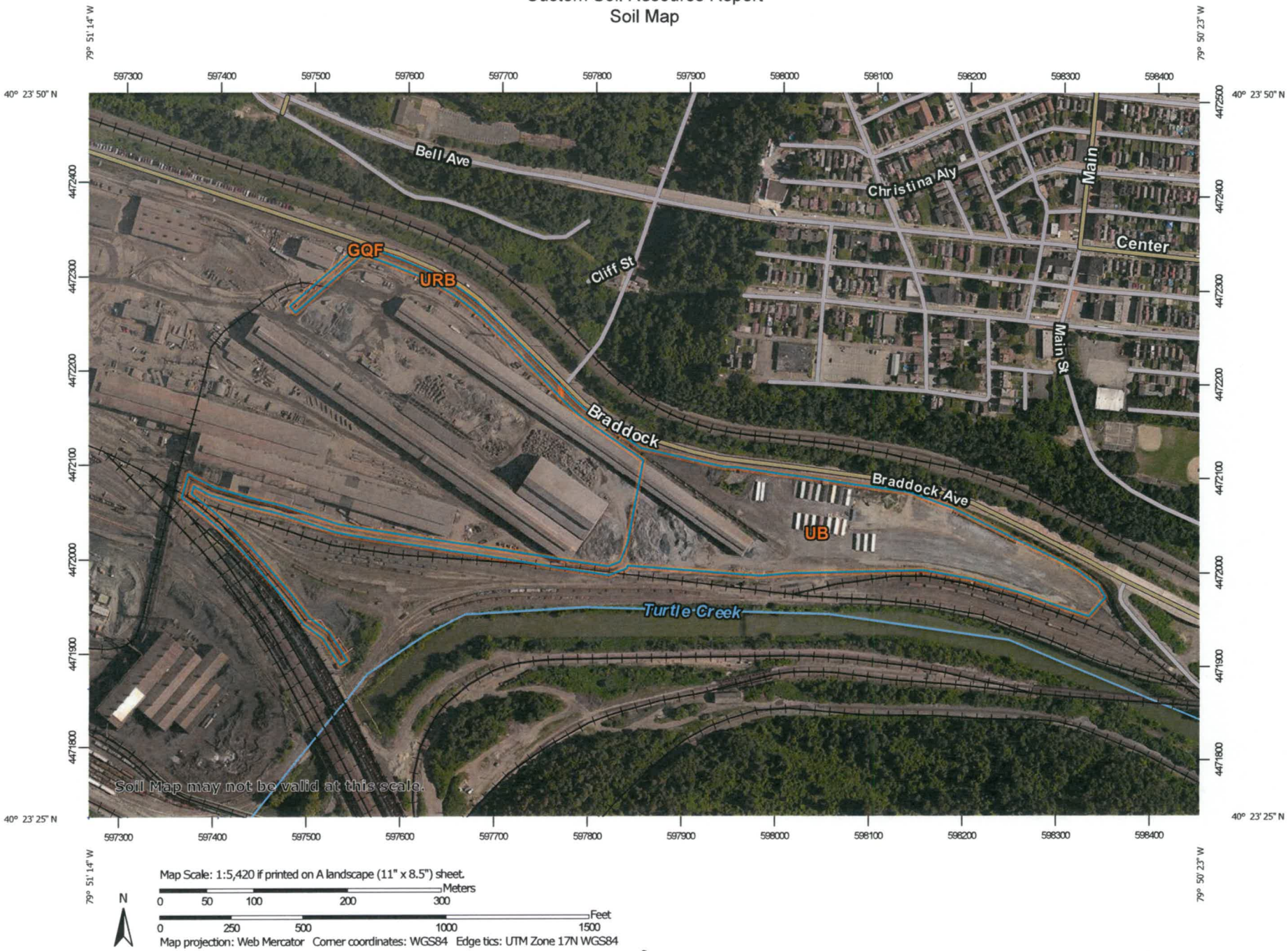
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Allegheny County, Pennsylvania
Survey Area Data: Version 14, Sep 18, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 5, 2014—Aug 28, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GQF	Gilpin-Upshur complex, very steep	0.0	0.3%
UB	Urban land	12.6	93.9%
URB	Urban land-Rainsboro complex, gently sloping	0.8	5.8%
Totals for Area of Interest		**13.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Allegheny County, Pennsylvania

GQF—Gilpin-Upshur complex, very steep

Map Unit Setting

National map unit symbol: l5nr
Elevation: 800 to 2,500 feet
Mean annual precipitation: 35 to 54 inches
Mean annual air temperature: 37 to 62 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 45 percent
Upshur and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Acid fine-loamy residuum weathered from shale and siltstone

Typical profile

Oi - 0 to 0 inches: slightly decomposed plant material
Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: channery silt loam
Bt - 6 to 24 inches: channery silt loam
C - 24 to 30 inches: very channery loam
R - 30 to 35 inches: bedrock

Properties and qualities

Slope: 25 to 75 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Upshur

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone and shale

Typical profile

Oi - 0 to 0 inches: slightly decomposed plant material
Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: silty clay loam
Bt - 8 to 46 inches: clay
C - 46 to 56 inches: channery clay
R - 56 to 68 inches: bedrock

Properties and qualities

Slope: 25 to 75 percent
Depth to restrictive feature: 40 to 70 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Wharton

Percent of map unit: 20 percent
Landform: Hillsides or mountainsides
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

UB—Urban land

Map Unit Setting

National map unit symbol: l5px
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 120 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pavement, buildings and other artifically covered areas

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to densic material
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Udorthents, steep

Percent of map unit: 10 percent
Landform: Mountains
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

URB—Urban land-Rainsboro complex, gently sloping

Map Unit Setting

National map unit symbol: l5q3
Elevation: 700 to 1,100 feet
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 41 to 62 degrees F
Frost-free period: 130 to 176 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 75 percent
Rainsboro and similar soils: 20 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Human transported material

Typical profile

H1 - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Rainsboro

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Old alluvium

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 26 inches: silt loam
H3 - 26 to 40 inches: silt loam
H4 - 40 to 60 inches: sandy clay loam
H5 - 60 to 72 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 19 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Ginat

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

References

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Infiltration Testing

Infiltration Testing Results Summary

Soils infiltration testing was performed by ACA Engineering at the Merrion Oil & Gas ET - Braddock Well Pad site in January 2018. This testing was conducted concurrently with the geotechnical investigation. Based on a preliminary stormwater design, six (6) percolation tests were conducted at potential BMP locations. The infiltration testing methodology and results (Section 5.4) have been extracted and are displayed as an inset below. The infiltration test locations are illustrated on Page 2 of this summary.

The geotechnical investigation revealed that the project site is underlain by variable depths (10.5' to >35') of fill material consisting of slag with varying amounts of sand, silt, brick, gravel, concrete, coal, wood fragments, and other materials. Refer to the Geotechnical Investigation report for detailed boring logs. Groundwater was encountered at depths ranging from approximately 11.5' to 36.5' below the existing ground surface. The environmental soil sampling results demonstrate that the naphthalene concentration in one bore hole and the manganese concentrations in all bore holes were present above their respective Medium Specific Concentrations when comparing to the Pennsylvania Land Recycling Program (Act 2) standards.

It has been determined through discussions with the PADEP that although infiltration testing results are favorable, the site will be designed to limit the infiltration potential to preserve the groundwater from the potential transfer of the underlying contaminated materials. An impermeable PVC liner will be utilized for all stormwater storage BMPs.

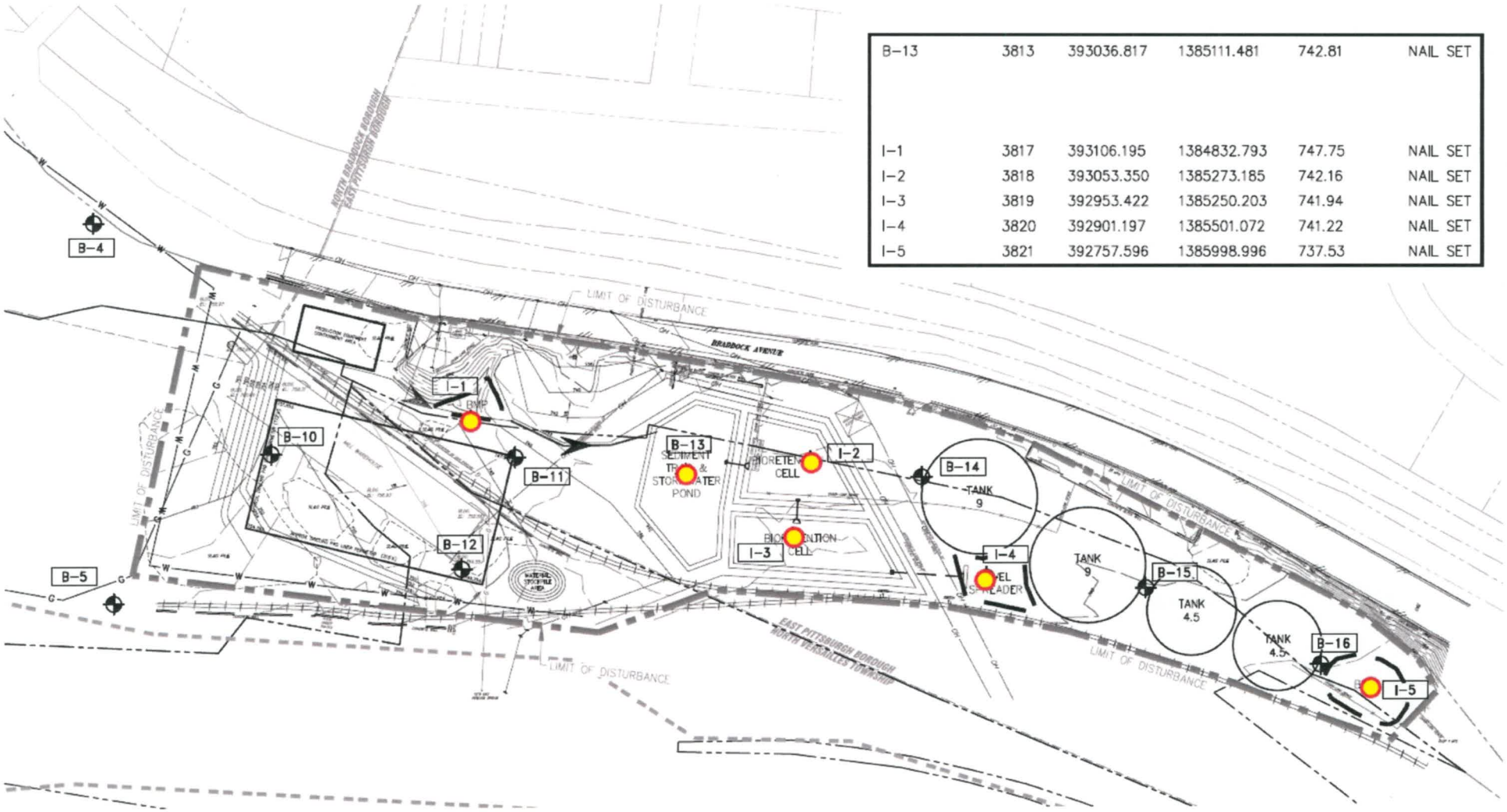
5.4 Infiltration Testing

In order to determine an infiltration rate for the proposed storm water management system, six (6) percolation tests were performed. The tests were performed in accordance with the Pennsylvania Department of Environmental Protection, Pennsylvania Stormwater Best Management Practices Manual, Appendix C – Site Evaluation and Soil Testing procedures. Due to the initial water level drop during the presoaking period, water level readings were generally taken every ten (10) to thirty (30) minutes for a two (2) hour time period or until a stabilized rate of drop was observed. The infiltration rate is the final reading. The results are summarized below:

INFILTRATION TESTING			
Test Boring Number	Ground Surface Elevation (ft)	Proposed Test Elevation (ft)	Infiltration Rate (in/hr)
I-1	747.45	2.0	0.57
I-2	742.16	2.0	2.62
I-3	741.94	2.0	5.64
I-4	741.22	2.0	13.57
I-5	737.53	2.0	1.42
B-13	738.17	2.0	2.33

Infiltration Testing Location Map

B-13	3813	393036.817	1385111.481	742.81	NAIL SET
I-1	3817	393106.195	1384832.793	747.75	NAIL SET
I-2	3818	393053.350	1385273.185	742.16	NAIL SET
I-3	3819	392953.422	1385250.203	741.94	NAIL SET
I-4	3820	392901.197	1385501.072	741.22	NAIL SET
I-5	3821	392757.596	1385998.996	737.53	NAIL SET



Edgard Thomson Infiltration Testing

Test Location I-1							
1/16/2018	Test Start	Presoak		Reading #1	Reading #2	Reading #3	Reading #4
Time	10:33	11:03	11:33	12:03	12:33	1:03	1:33
Depth (in)	18	19	19	18.75	18.75	18.75	18.75
Δd (in)	N/A	1	1	0.75	0.75	0.75	0.75

$$Rf = \frac{2d1 - \Delta d}{dia} + 1$$

	24	Percolation Hole Depth (in.)
d1=	6	Initial Water Depth (in.)
Δd=	0.75	Final Water Level Drop (in)
dia=	7	Diameter of Percolation Hole (in.)

Rf= 2.61

Corrected Percolation Final Percolation Rate (in.)= 0.2876712

Final infiltration rate= 0.5753425

Test Location I-2							
1/11/2018	Test Start	Presoak		Reading #1	Reading #2	Reading #3	Reading #4
Time	11:42	12:12	12:42	12:52	1:02	1:12	1:22
Depth (in)	19	13.25	13.125	20.0625	20	20	20
Δd (in)	N/A	5.75	5.875	1.0625	1	1	1

$$Rf = \frac{2d1 - \Delta d}{dia} + 1$$

	24	Percolation Hole Depth (in.)
d1=	5	Initial Water Depth (in.)
Δd=	1	Final Water Level Drop (in)
dia=	7	Diameter of Percolation Hole (in.)

Rf= 2.29

Corrected Percolation Final Percolation Rate (in.)= 0.4375

Final infiltration rate= 2.625

Test Location I-3							
1/11/2018	Test Start	Presoak		Reading #1	Reading #2	Reading #3	Reading #4
Time	1:52	2:22	2:52	3:02	3:12	3:22	3:32
Depth (in)	18	23.5	23.25	20.125	20.125	20.25	20.25
Δd (in)	N/A	5.5	5.25	2.125	2.125	2.25	2.25

$$Rf = \frac{2d1 - \Delta d}{dia} + 1$$

	24	Percolation Hole Depth (in.)
d1=	6	Initial Water Depth (in.)
Δd=	2.25	Final Water Level Drop (in)
dia=	7	Diameter of Percolation Hole (in.)

Rf= 2.39

Corrected Percolation Final Percolation Rate (in.)= 0.9402985

Final infiltration rate= 5.641791

Test Location I-4									
1/11/2018	Test Start	Presoak		Reading #1	Reading #2	Reading #3	Reading #4	Reading #5	Reading #6
Time	3:16	3:46	4:16	4:26	4:36	4:46	4:56	5:06	5:16
Depth (in)	18	Dry	Dry	21	21.5	22.5	22.75	22.5	22.625
Δd (in)	N/A	N/A	N/A	3	3.5	4.5	4.75	4.5	4.625

$$Rf = \frac{2d1 - \Delta d}{dia} + 1$$

	24	Percolation Hole Depth (in.)
d1=	6	Initial Water Depth (in.)
Δd=	4.625	Final Water Level Drop (in)
dia=	7	Diameter of Percolation Hole (in.)

Rf= 2.05

Corrected Percolation Final Percolation Rate (in.)= 2.2521739

Final infiltration rate= 13.513043

Test Location I-5							
1/11/2018	Test Start	Presoak		Reading #1	Reading #2	Reading #3	Reading #4
Time	9:26	9:56	10:26	10:36	10:46	10:56	11:06
Depth (in)	17	20.25	20.25	17.875	17.75	17.75	17.6875
Δd (in)	N/A	3.25	3.25	0.875	0.75	0.75	0.6875

$$Rf = \frac{2d1 - \Delta d}{dia} + 1$$

	24	Percolation Hole Depth (in.)
d1=	7	Initial Water Depth (in.)
Δd=	0.6875	Final Water Level Drop (in)
dia=	7	Diameter of Percolation Hole (in.)

Rf= 2.90

Corrected Percolation Final Percolation Rate (in.)= 0.2369231

Final infiltration rate= 1.4215385

Test Location B-13							
1/16/2018	Test Start	Presoak		Reading #1	Reading #2	Reading #3	Reading #4
Time	8:11	8:41	9:11	9:21	9:31	9:41	9:51
Depth (in)	18	15.5	15.5	19.25	19.25	19.25	19
Δd (in)	N/A	2.5	2.5	1.25	1.25	1.25	1

$$Rf = \frac{2d1 - \Delta d}{dia} + 1$$

	24	Percolation Hole Depth (in.)
d1=	6	Initial Water Depth (in.)
Δd=	1	Final Water Level Drop (in)
dia=	7	Diameter of Percolation Hole (in.)

Rf= 2.57

Corrected Percolation Final Percolation Rate (in.)= 0.3888889

Final infiltration rate= 2.3333333

Post Construction Stormwater Management Plans

ET - BRADDOCK WELL PAD
SITE RESTORATION / POST CONSTRUCTION
STORMWATER MANAGEMENT PLAN
PERMIT NO. PAD-0200114

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

MAY 2018

OCTOBER 2018

PERMITTEE:

MERRION OIL & GAS
CONTACT: RYAN DAVIS
610 REILLY AVENUE
FARMINGTON, NM 87401
(505) 402-5998

PENNSYLVANIA ONE CALL SYSTEM
PA. ACT 287 OF 1974 AS AMENDED BY ACT 121 OF 2008
REQUIRES THREE WORKING DAYS NOTICE

SERIAL # 20171993045

DURING DESIGN, TRANT CORPORATION PERFORMED A PA ONE CALL INQUIRY FOR THE PROPOSED PROJECT AREA. ALL UNDERGROUND UTILITY OWNERS THAT RESPONDED TO THE PA ONE CALL HAVE BEEN CONTACTED AND THEIR REPORTED UTILITIES ADDED TO PLANS BASED ON INFORMATION PROVIDED BY THE UTILITY. HOWEVER, IN VIOLATION OF LAWS OF THE COMMONWEALTH OF PENNSYLVANIA, NOT ALL UNDERGROUND UTILITY OWNERS ARE REGISTERED WITH THE PA ONE CALL SYSTEM. NEITHER THE PERMIT OPERATOR, ARM GROUP INC., NOR THE PROFESSIONAL ENGINEER SIGNING THESE PLANS CERTIFIES THAT THE FOLLOWING DEPICTS UNDERGROUND UTILITIES OWNED BY THOSE NOT REGISTERED WITH THE PA ONE CALL SYSTEM.

GENERAL UTILITY & ACT 187 INFORMATION

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

2. CONTRACTOR SHALL NOTIFY THE PA ONE CALL SYSTEM NOT LESS THAN THREE (3) DAYS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL PLACE THE CALL AND REFERENCE. THE SERIAL NUMBER GIVEN, AND PROVIDE AN APPROXIMATE DATE AND TIME THAT DIGGING WILL OCCUR. THE ONE CALL SYSTEM WILL AGAIN NOTIFY THE PUBLIC UTILITIES IN THE AREA. PUBLIC UTILITIES WILL THEN COORDINATE DIRECTLY WITH THE CONTRACTOR FOR ACTUAL FIELD LOCATIONS.

ELECTRIC:
DUQUENSE LIGHT COMPANY
2645 NEW BEAVER AVE.
PITTSBURGH, PA 15233
ATTN: JOHN ANDZELIK
EMAIL: JANDZELIK@DUQLIGHT.COM

TELEPHONE:
VERIZON PENNSYLVANIA LLC
15 E MONTEGOMERY AVE.
PITTSBURGH, PA 15212
ATTN: OFFICE PERSONNEL

CABLE:
CENTURYLINK FORMERLY EMBARQ
700 W MINERAL AVE.
GRID NO: UT00-D27.34
LITTLETON, CO 80120
ATTN: GEORGE MCELVAIN
EMAIL: GEORGE.MCELVAIN@CENTURYLINK.COM

COMCAST CABLEVISION
2300 ELDO ROAD
MONROEVILLE, PA 15146
ATTN: KEVIN MYERS
EMAIL: KEVIN_MYERS@CABLE.COMCAST.COM

WATER:
WILKINSBURG PENN JT WATER AUTHORITY
2200 ROBINSON BLVD.
WILKINSBURG, PA 15221
ATTN: TOM SORCE
EMAIL: TSORCE@WPJWA.COM

PUBLIC SEWER:
ALLEGHENY COUNTY SANITARY AUTHORITY
3300 PREBLE AVE. PITTSBURGH, PA 15233
ATTN: KEN BABIN

GAS:
PEOPLES NATURAL GAS
261 CENTER ST.
MCKEESPORT, PA 15132
ATTN: DON ZOMBEK
EMAIL: DON.ZOMBEK@PEOPLES-GAS.COM

BOROUGH:
EAST PITTSBURGH BOROUGH
813 LINDEN AVE.
EAST PITTSBURGH, PA 15112
ATTN: LORI FRUNCEK
EMAIL: EPPDCHEIF@EASTPITTSBURGHBORO.COM

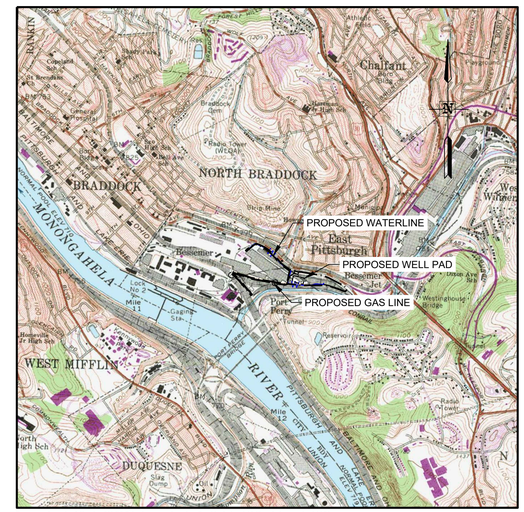
LIST OF SHEETS

SHEET NO.	DESCRIPTION
WS-1A	PRE-DEVELOPMENT WATERSHED AND SOILS MAP - VOLUME
WS-1B	PRE-DEVELOPMENT WATERSHED AND SOILS MAP - RATE
WS-2A	POST-DEVELOPMENT WATERSHED AND SOILS MAP - VOLUME
WS-2B	POST-DEVELOPMENT WATERSHED AND SOILS MAP - RATE
WS-3A	SITE RESTORATION WATERSHED AND SOILS MAP - VOLUME
WS-3B	SITE RESTORATION WATERSHED AND SOILS MAP - RATE
CH-1	CHANNEL WATERSHED MAP
SR-1	SITE RESTORATION PLAN
SR-2	SITE RESTORATION PLAN
N-1	PCSM NOTES
C601	CONNSTRUCTION DETAILS
C701	EXISTING CONDITIONS OVERLAY MAP

LEGEND

NOTE: LEGEND IS TYPICAL, NOT ALL OBJECTS IN LEGEND APPEAR IN PLAN.

1550	EXISTING CONTOURS
	FEMA FLOODPLAIN
	50' FLOODWAY
	FEMA FLOODWAY
	EXISTING MAPPED WATERCOURSE
	EXISTING STRUCTURE
	EXISTING VEGETATION
	EXISTING PROPERTY LINE
	EXISTING MUNICIPAL BOUNDARIES
	EXISTING FENCE
OE	EXISTING OVERHEAD ELECTRIC LINE
	EXISTING ELECTRIC POLE
G	EXISTING GAS LINE
W	EXISTING WATER LINE
	EXISTING CULVERT
	EXISTING WALL
	EXISTING RAILLINE
	EXISTING SLAG PILE
WeB	EXISTING SOIL BOUNDARY AND DESCRIPTOR
1490	PROPOSED CONTOURS
	PROPOSED LIMIT OF DISTUBANCE
	PROPOSED CHANNEL
	PROPOSED WATER FEATURES
	PROPOSED WELL PAD
	PROPOSED TEMPORARY TANK
W	PROPOSED WATERLINE
G	PROPOSED GASLINE
	PROPOSED SLOPE STABILIZATION
	PROPOSED ROCK CONSTRUCTION ENTRANCE WITH WASH RACK
	PROPOSED ACCESS ROAD
12	PROPOSED 12" FILTER SOCK
24	PROPOSED 24" FILTER SOCK
	PROPOSED CULVERT
DIV	PROPOSED DIVERSION BERM
	PROPOSED GRAVEL
	PROPOSED INLET



Base map from the following USGS 7½ minute quadrangles: Braddock dated 1960 and photorevised 1979.

LOCATION MAP

SCALE: 1" = 2000'

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

This Drawing shall not be used for tender or construction unless sealed.

I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TESSA MICHELE ANTOLICK, PE - 077667

PREPARED BY:

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

scale: AS NOTED
date: 10/22/2018
project no.: 180539

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

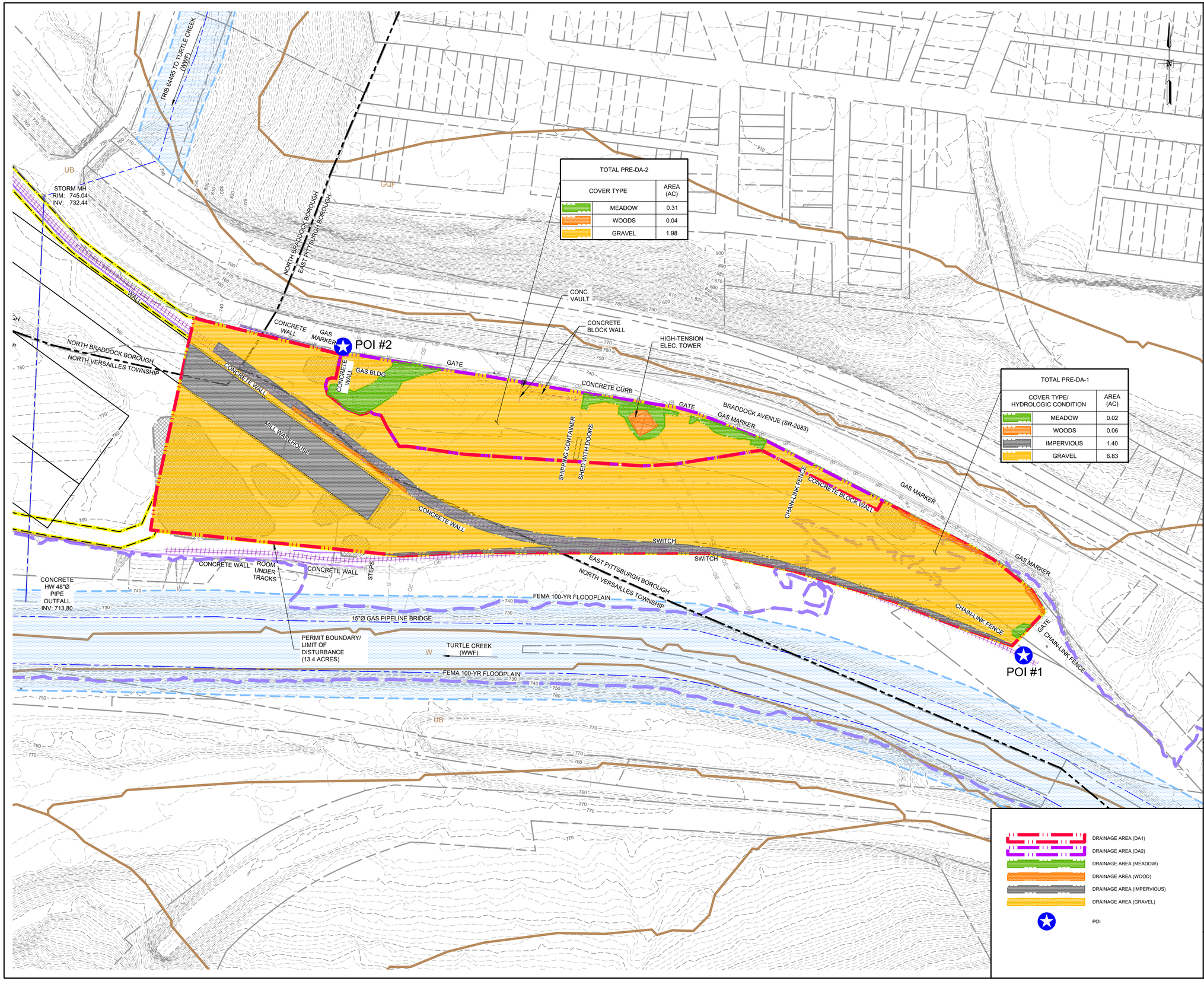
drawing title: COVER SHEET SR / PCSM PLAN

project title: ET - BRADDOCK WELL PAD MERRION OIL & GAS

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

Sheet 1

Z:\Merrion Oil & Gas\180539-1-ET Braddock 1\Dwg\Production\Erosion\180539-PCSM COVER SHEET.dwg Plotted: October 23, 2018



TOTAL PRE-DA-2

COVER TYPE	AREA (AC)
MEADOW	0.31
WOODS	0.04
GRAVEL	1.98

TOTAL PRE-DA-1

COVER TYPE/ HYDROLOGIC CONDITION	AREA (AC)
MEADOW	0.02
WOODS	0.06
IMPERVIOUS	1.40
GRAVEL	6.83

NOTES:

1. THE BASE MAP HAS BEEN CREATED USING SURVEY DATA (WITHIN LIMIT OF DISTURBANCE) PROVIDED BY TRANT CORPORATION, DATED 05/31/2018, SUPPLEMENTED BY AERIAL PHOTOGRAPHY OF PAMAP TILES 40001380PAS PROVIDED BY TRANT CORPORATION. SITE TOPOGRAPHY IS SUBJECT TO CHANGE DUE TO ACTIVE STOCKPILE BY US STEEL.
2. AERIAL IMAGE ON SHEET C701 WAS PROVIDED BY AERIAL PHOTOGRAPHY OF PAMAP TILES 40001380PAS DATED 2010.
3. PROPERTY LINES INFORMATION OF ALLEGHENY COUNTY ARE PROVIDED BY TRANT CORPORATION. THIS BASEMAP IS NOT THE RESULT OF AN ACTUAL FIELD SURVEY OF PROPERTIES SHOWN AND SHOULD NOT BE USED AS SUCH.
4. THIS PLAN IS IN THE PENNSYLVANIA STATE PLANE SOUTH, NORTH AMERICAN DATUM 1983 (NAD 83) COORDINATE SYSTEM.
5. SLOPE AREAS 3:1 OR GREATER BROUGHT TO FINISH GRADE ARE TO BE STABILIZED WITH ROCK OR SEEDED WITH MULCH APPLIED TO SLOPES AS SPECIFIED ON DETAIL SHEETS.
6. EXISTING RAILROAD TRACKS WITHIN WELL PAD PROJECT AREA WILL BE REMOVED.
7. THE TEMPORARY WATER STORAGE TANK DIMENSIONS AND LAYOUT ARE DISPLAYED FOR ILLUSTRATIVE PURPOSES ONLY. THE FINAL TANK DIMENSIONS AND LAYOUT WILL BE DETERMINED PRIOR TO CONSTRUCTION. THE OPEN-TOP TANKS ARE NOT ACCOUNTED FOR IN THE PCSM CALCULATIONS. THE ENTIRE TANK AREA IS MODELED AS A 'GRAVEL' COVER TYPE TO ACCOUNT FOR RUNOFF BEFORE THE TANKS ARE ERECTED.

LEGEND

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- 1550 — EXISTING CONTOURS
- FEMA FLOODPLAIN
- 50' FLOODWAY
- FEMA FLOODWAY
- EXISTING MAPPED WATERCOURSE
- EXISTING STRUCTURE
- EXISTING VEGETATION
- EXISTING PROPERTY LINE
- EXISTING MUNICIPAL BOUNDARIES
- EXISTING FENCE
- OE — OE — EXISTING OVERHEAD ELECTRIC LINE
- EXISTING ELECTRIC POLE
- G — G — G — EXISTING GAS LINE
- W — W — W — EXISTING WATER LINE
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- 12 — 12 — 12 — PROPOSED 12" FILTER SOCK
- 24 — 24 — 24 — PROPOSED 24" FILTER SOCK
- PROPOSED CULVERT
- DIV — DIV — PROPOSED DIVERSION BERM
- PROPOSED GRAVEL
- PROPOSED INLET

COMMONWEALTH OF PENNSYLVANIA
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TESSA MICHELE ANTOLICK, PE - 077667

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Engineers and Scientists
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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

scale: 1" = 80'
date: 10/22/2018
project no.: 180539
SCALE IN FEET 0 80 160 240

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

drawing no. PRE-DEVELOPMENT WATERSHED AND SOILS MAP - VOLUME SR / PCSM PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet WS-1A

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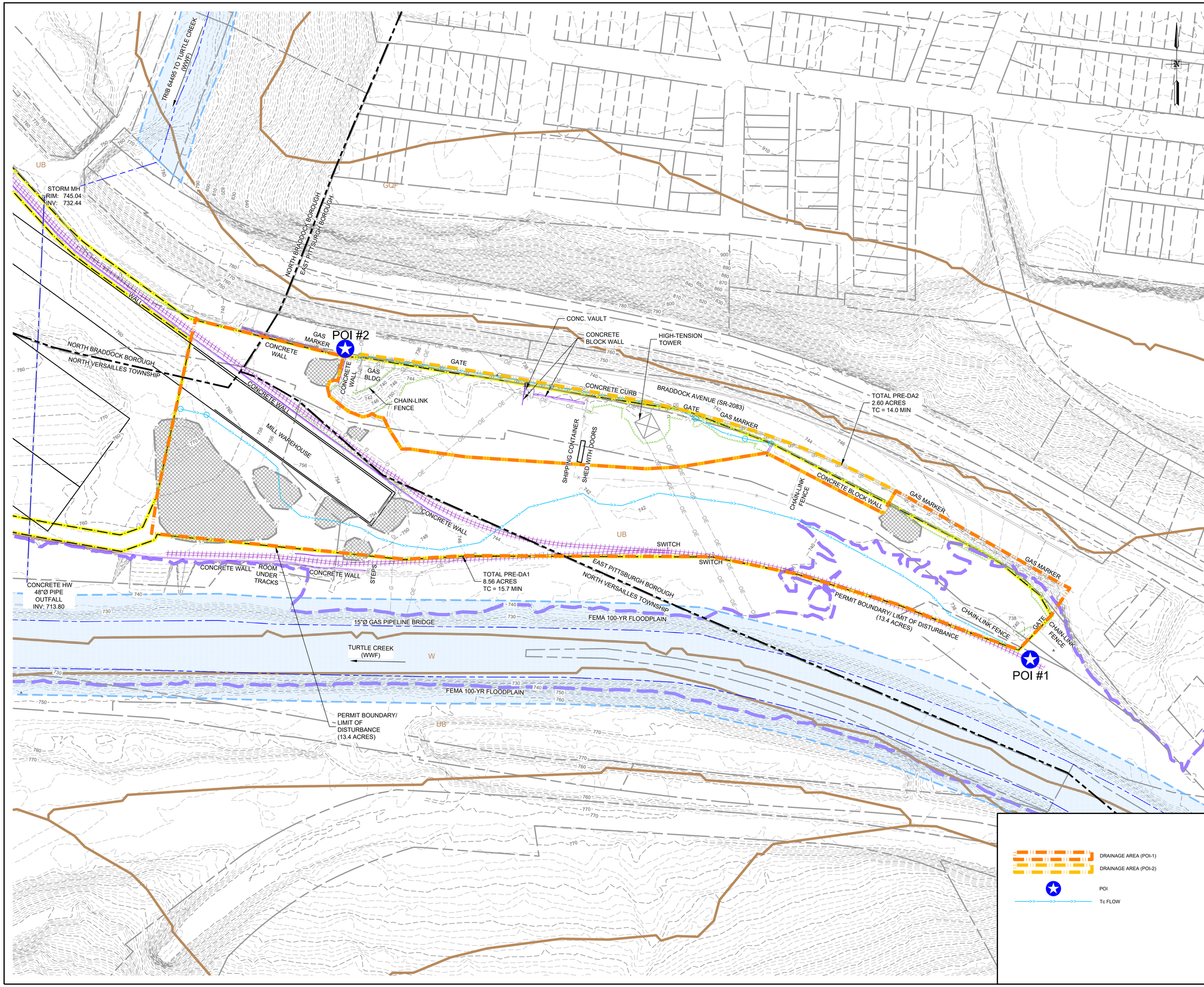

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0	PADEP SUBMISSION	05/31/2018	TRANT

scale: 1" = 80'
date: 10/22/2018
project no.: 180539
SCALE IN FEET 0 80 160 240

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

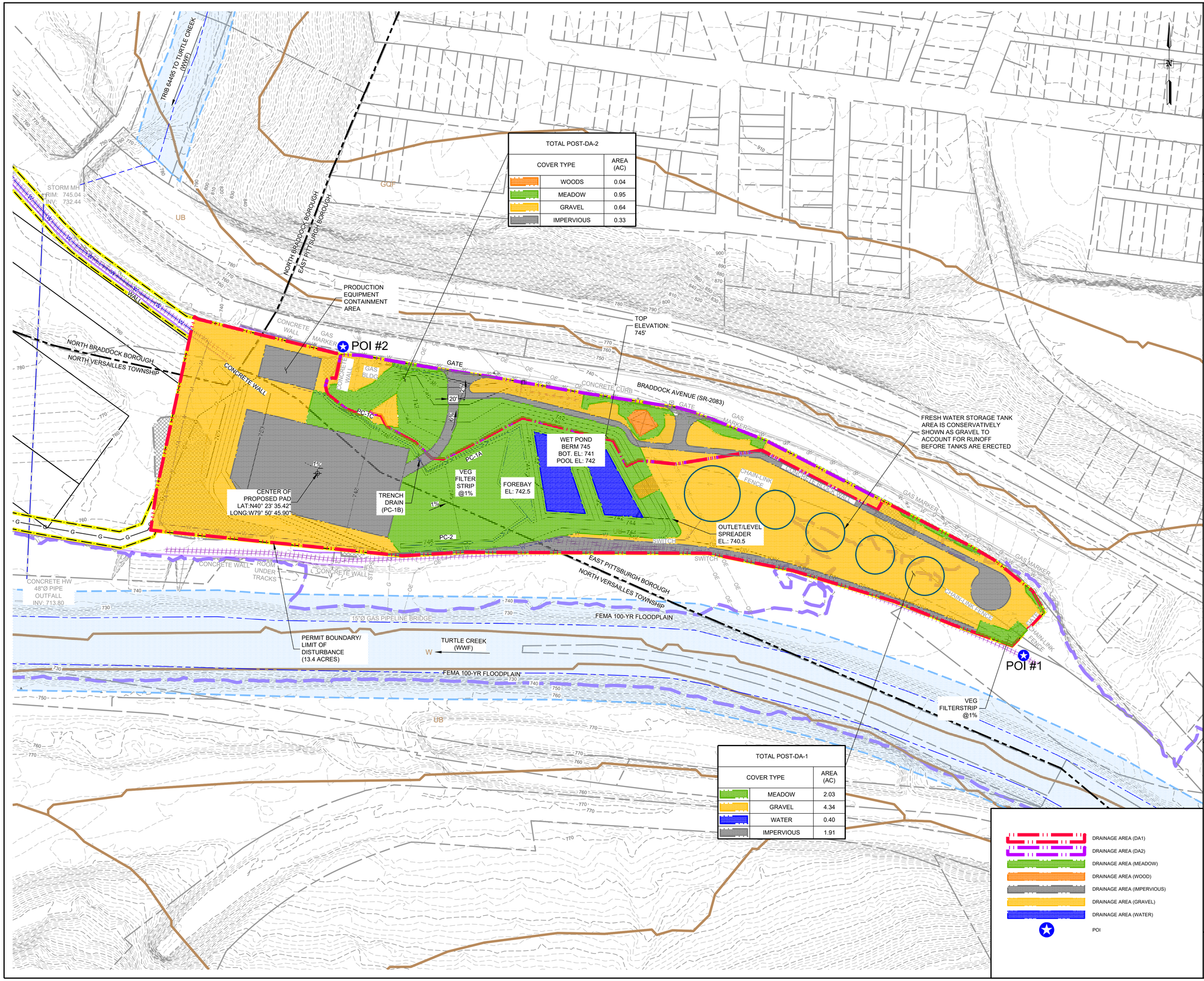
drawing title: PRE-DEVELOPMENT WATERSHED AND SOILS MAP - RATE SR / PCSM PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet WS-1B

R:\Merrion Oil & Gas\180539-11-ET Braddock 1\Dwg\Production\Revisions\180539-PCSM-WS-1B.dwg Plotted: October 18, 2018



TOTAL POST-DA-2		
COVER TYPE		AREA (AC)
	WOODS	0.04
	MEADOW	0.95
	GRAVEL	0.64
	IMPERVIOUS	0.33

TOTAL POST-DA-1		
COVER TYPE		AREA (AC)
	MEADOW	2.03
	GRAVEL	4.34
	WATER	0.40
	IMPERVIOUS	1.91

- DRAINAGE AREA (DA1)
- DRAINAGE AREA (DA2)
- DRAINAGE AREA (MEADOW)
- DRAINAGE AREA (WOOD)
- DRAINAGE AREA (IMPERVIOUS)
- DRAINAGE AREA (GRAVEL)
- DRAINAGE AREA (WATER)
- POI

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checked: MDR
drawn: QZ
graphic scale:

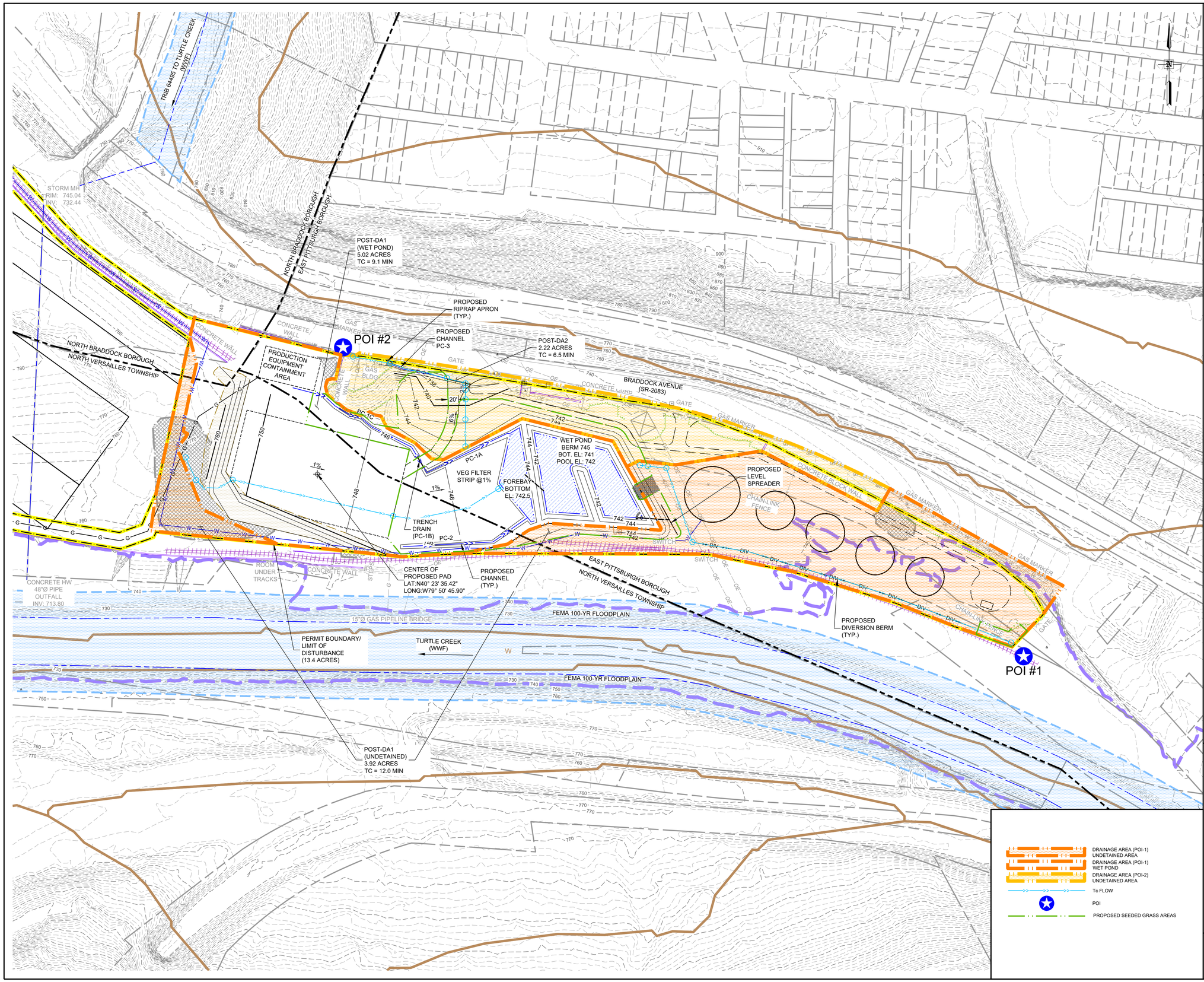
drawing title: POST-DEVELOPMENT WATERSHED AND SOILS MAP - VOLUME SR / PCSM PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet WS-2A

Z:\Merrion Oil & Gas\180539-1-1 ET Braddock 1\Dwg\Production\Restoration\180539-NS-2A.dwg - Plotted: October 19, 2018



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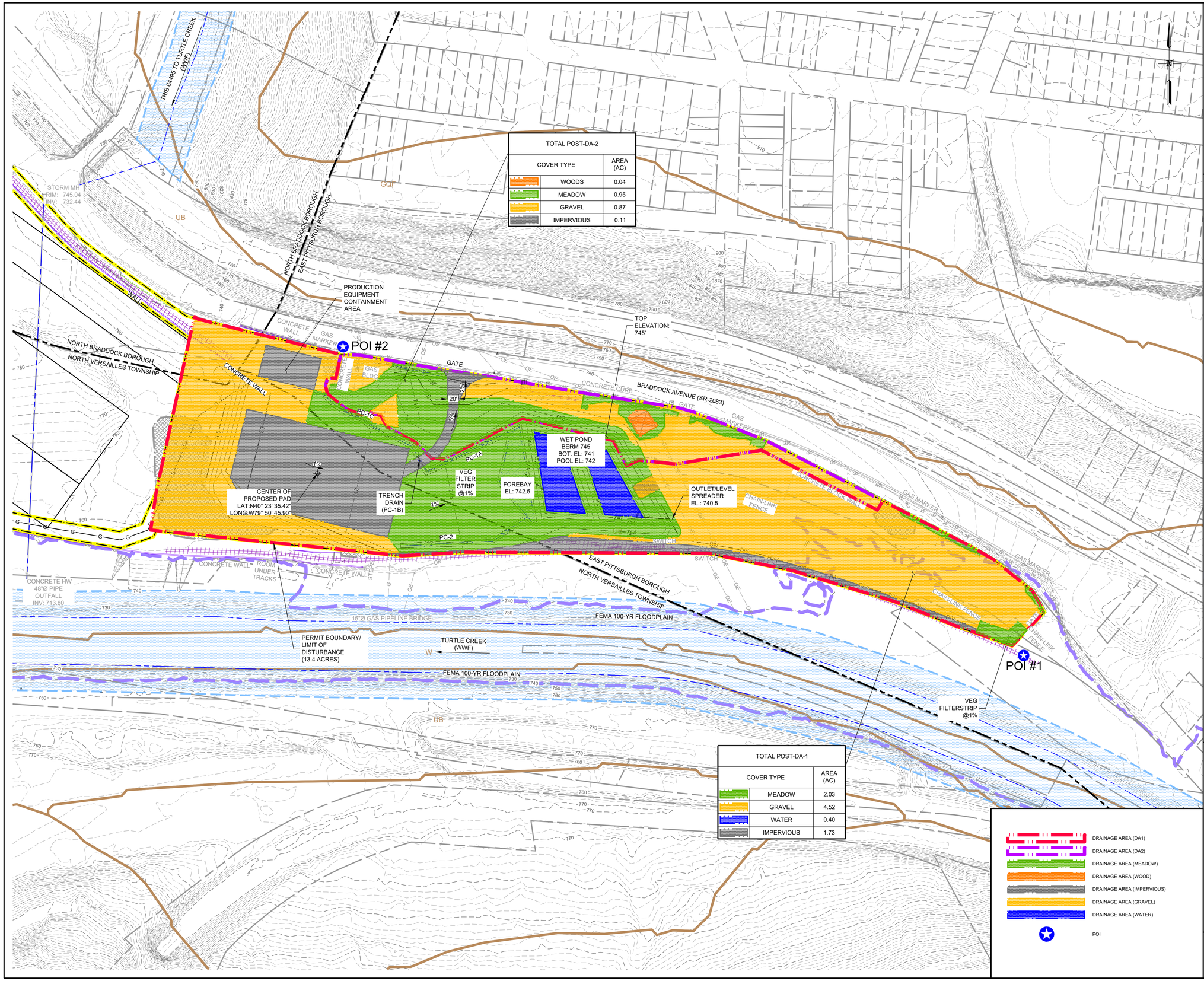
Sheet WS-2B

Z:\Merrion Oil & Gas\180539-11-ET Braddock 1 Well Dev\Production\Restoration\180539-post-rw-26.dwg Plotted: October 18, 2018



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SCALE IN FEET 0 80 160 240

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EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

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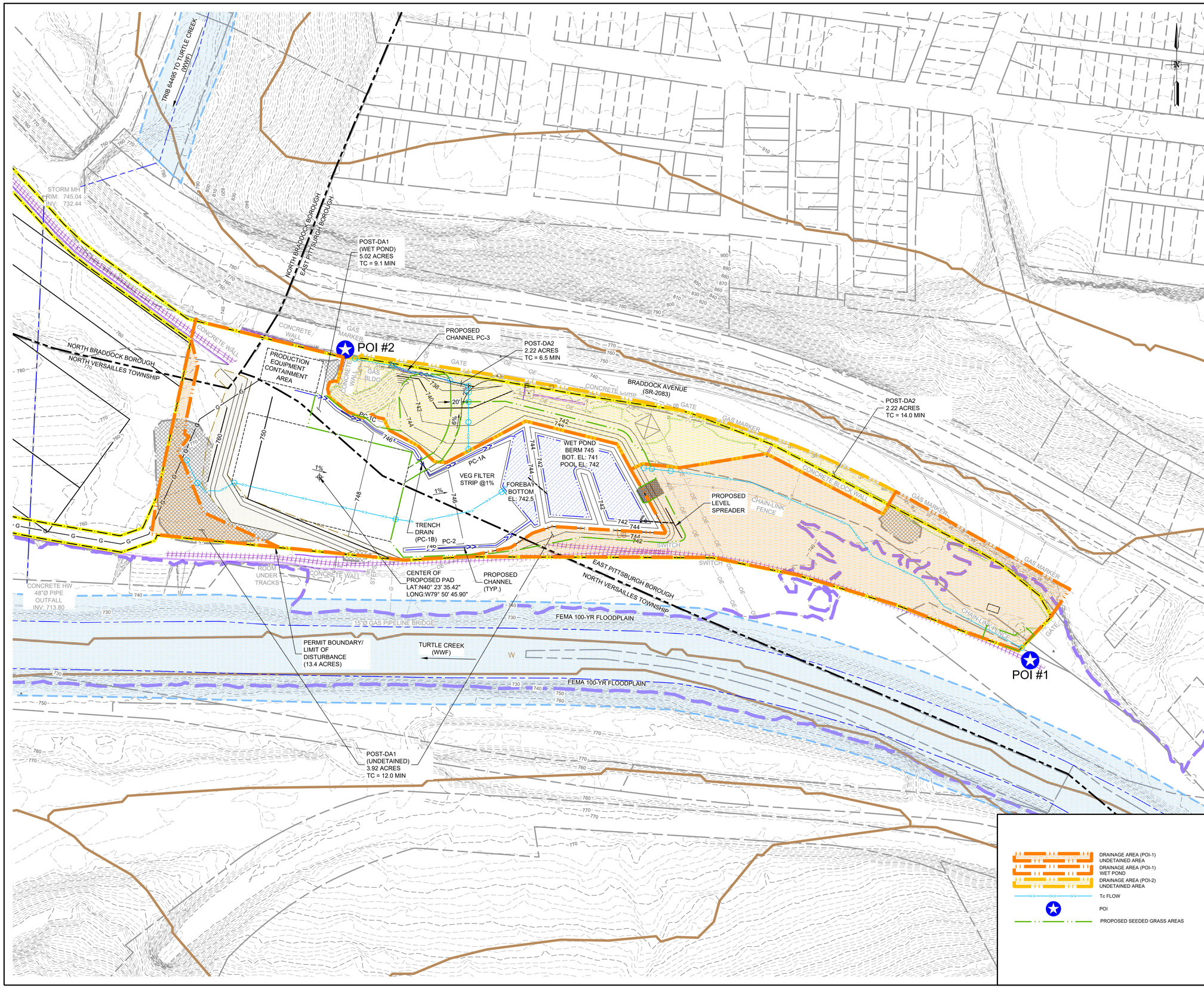
Sheet WS-3A

Z:\Merrion Oil & Gas\180539-11 ET Braddock 1\12\Dwg\Production\Environmental\180539-PCSM-WS-3A.dwg Plotted: October 19, 2018



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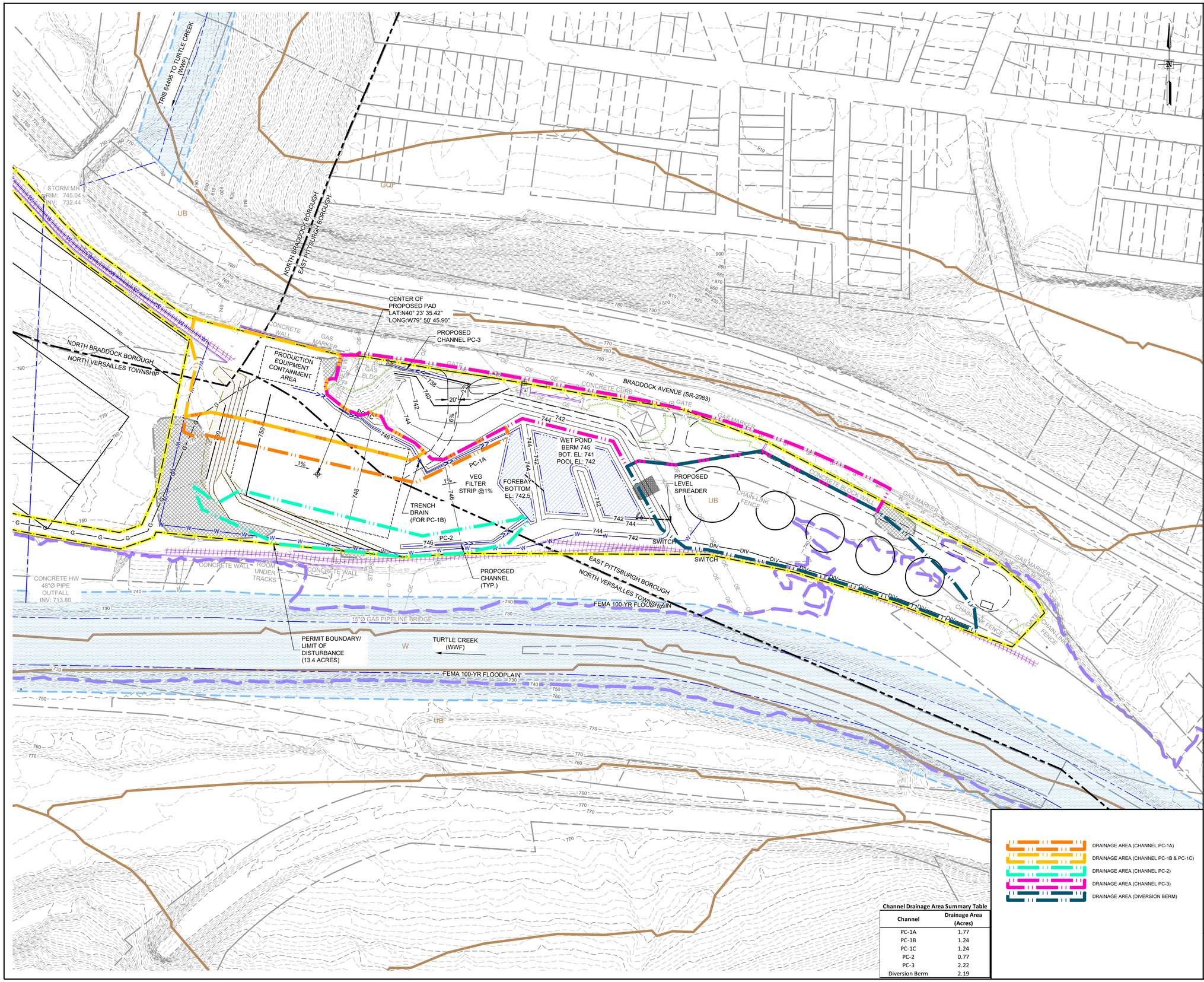

Channel Drainage Area Summary Table

Channel	Drainage Area (Acres)
PC-1A	1.77
PC-1B	1.24
PC-1C	1.24
PC-2	0.77
PC-3	2.22
Diversion Berm	2.19

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
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scale: 1" = 80'
date: 10/22/2018
project no.: 180539
SCALE IN FEET 0 80 160 240

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

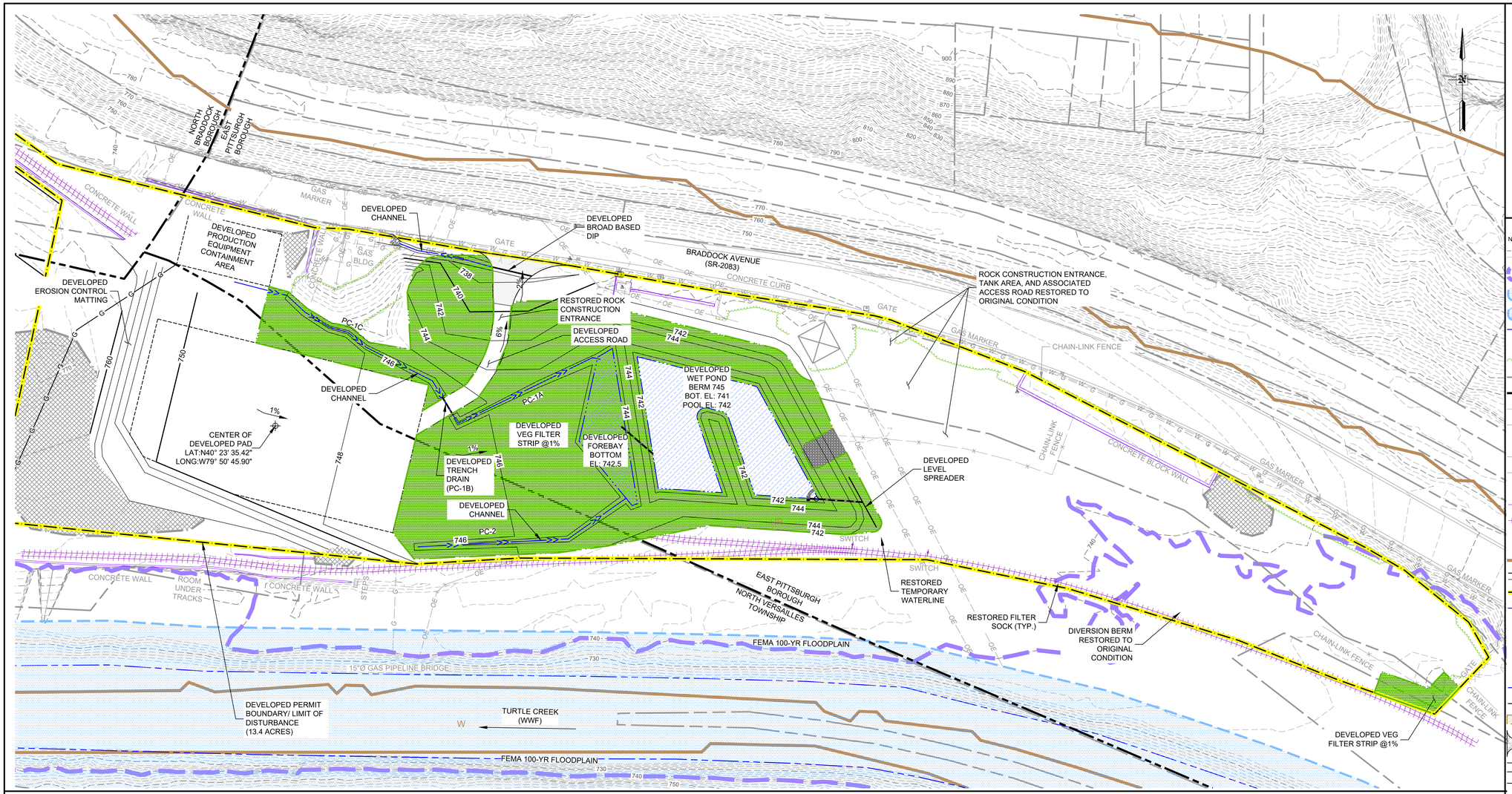
drawing title: CHANNEL WATERSHED MAP SR / PCSM PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

project title: ET - BRADDOCK WELL PAD MERRION OIL & GAS

Sheet CH-1

Z:\Merrion Oil & Gas\180539-11 ET Braddock 1\12\Dwg\Production\Environmental\180539-NCM-C11.dwg - Plotted: October 19, 2018



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scale: 1" = 60'
date: 10/22/2018
project no.: 180539
SCALE IN FEET 0 60 120 180

designed: KGJ
checked: MDR
drawn: QZ

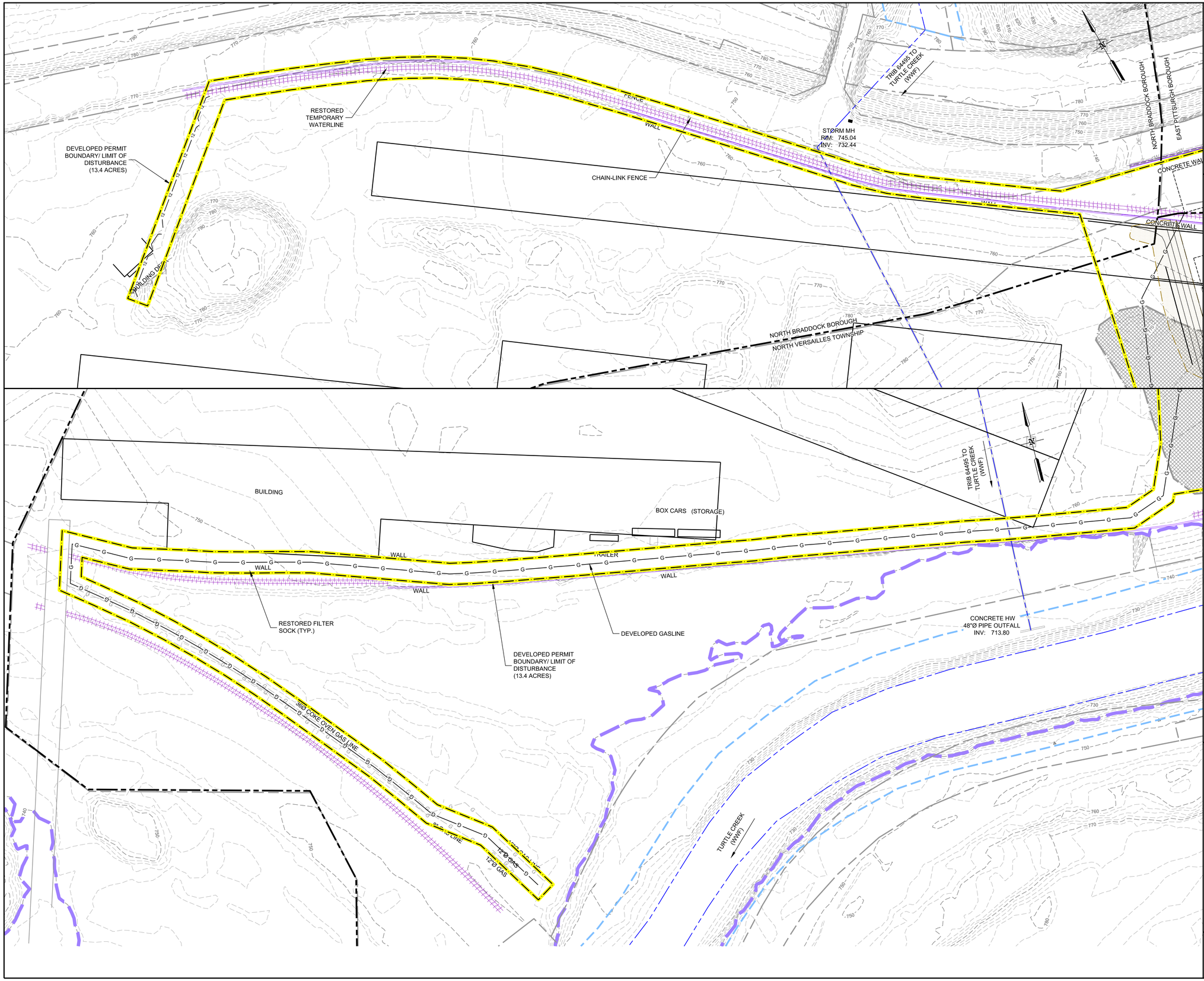
drawing title: SITE RESTORATION PLAN SR / PCSM PLAN

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

Sheet SR-1

Z:\Merrion Oil & Gas\180539-1-ET Braddock 1\Drawings\Production\Restoration\180539-PCSM.SR.1.dwg Plotted: October 22, 2018



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Sheet
SR-2

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Structural BMP Installation, Maintenance, & Inspection

Wet Pond/ Retention Basin

Construction Sequence

1. Separate wet pond from contributing drainage area.
   a. All channels/pipes conveying flows to the WP should be temporarily routed away from the WP area until it is completed and stabilized.
   b. The area immediately adjacent to the basin must be stabilized in accordance with the PADEP's *Erosion and Sediment Pollution Control Program Manual* (2000 or latest edition) prior to basin construction.
2. Prepare site for excavation and/or embankment construction.
   a. All existing vegetation should remain if feasible and should only be removed if necessary for construction.
   b. If excavation is required, clear the area to be excavated of all vegetation. Remove all tree roots, rocks, and boulders only in excavation area.
3. Excavate bottom of basin to desired elevation (if necessary).
4. Install surrounding embankments and inlet and outlet control structures.
5. Grade and prepare subsoil
6. Install impervious liner to prevent surface runoff water to contact/infiltrate to existing soil and substrata.
7. Apply and grade planting soil.
8. Apply geo-textiles and other erosion-control measures.
9. Seed, plant and mulch according to Planting Plan.
10. Install any anti-grazing measures, if necessary.
11. Follow required maintenance and monitoring guidelines

Specifications:

1. Excavation
   a. The area to be used for the WP should be excavated to the required depth below the desired bottom elevation to accommodate any required impermeable liner, organic matter, and/or planting soil.
   b. The compaction of the subgrade and/or the installation of any impermeable liners will follow immediately.

2. Subsoil Preparation
   a. Subsoil shall be free from hard clods, stiff clay, hardpan, ashes, slag, construction debris, petroleum hydrocarbons, or other undesirable material. Subsoil must not be delivered in a frozen or muddy state.
   b. Scarify the subsoil to a depth of 8 to 10 inches with a disk, rototiller, or similar equipment.
   c. Roll the subsoil under optimum moisture conditions to a dense layer with four to six passes of a sheepsfoot roller or equivalent. The compacted layer shall be at least 8 inches thick.

3. Planting Soil (Topsoil)
   a. Use a minimum of 12 inches of topsoil in the emergent vegetation zone (less than 18" deep) of the pond. If natural topsoil from the site is to be used it must have at least 8 percent organic carbon content (by weight) in the A-horizon for sandy soils and 12% for other soil types.
   b. If planting soil is being imported it should be made up of equivalent proportions of organic and mineral materials.
   c. Lime should not be added to planting soil unless absolutely necessary as it may encourage the propagation of invasive species.
   d. The final elevations and hydrology of the vegetative zones should be evaluated prior to planting to determine if grading or planting changes are required.

4. Vegetation
   a. No substitutions of specified plants will be accepted without prior approval of the designer. Planting locations shall be based on the Planting Plan and directed in the field by a qualified wetland ecologist.
   b. All Wet Pond plant stock shall exhibit live buds or shoots. All plant stock shall be turgid, firm, and resilient. Internodes of rhizomes may be flexible and not necessarily rigid. Soft or mushy stock shall be rejected. The stock shall be free of deleterious insect infestation, disease and defects such as knots, sun-scald, injuries, abrasions, or disfigurement that could adversely affect the survival or performance of the plants.
   c. All stock shall be free from invasive or nuisance plants or seeds.
   d. During all phases of the work, including transport and onsite handling, the plant materials shall be carefully handled and packed to prevent injuries and desiccation. During transit and onsite handling, the plant material shall be kept from freezing and shall be kept covered, moist, cool, out of the weather, and out of the wind and sun. Plants shall be watered to maintain moist soil and/or plant conditions until accepted.
   e. Plants not meeting these specifications or damaged during handling, loading, and unloading will be rejected.

5. Outlet Control Structure
   a. Outlet control structures shall be constructed of non-corrodible material.
   b. Outlets shall be resistant to clogging by debris, sediment, floatables, plant material, or ice.
   c. Materials shall comply with applicable specifications (PennDOT or AASHTO, latest edition)

Maintenance & Inspection

Maintenance is necessary to ensure proper functionality of the extended detention basin and should take place on a quarterly basis. A basin maintenance plan should be developed which included the following measures:

- All basin structures expected to receive and/or trap debris and sediment should be inspected for clogging and excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch.
  - Structures include basin bottoms, trash racks, outlets structures, riprap or gabion structures, and inlets.
- Sediment removal should be conducted when the basin is completely dry. Sediment should be disposed of properly and once sediment is removed, disturbed areas need to be immediately stabilized and revegetated.
- Mowing and/or trimming of vegetation should be performed as necessary to sustain the system, but all detritus should be removed from the basin.
  - Vegetated areas should be inspected annually for erosion.
- Vegetated areas should be inspected annually for unwanted growth of exotic/invasive species.
- Vegetative cover should be maintained at a minimum of 95 percent. If vegetative cover has been reduced by 10%, vegetation should be reestablished.

Level Spreader

Construction Sequence

1. Level spreaders are considered a permanent part of a site's Stormwater management system. Therefore, the uphill development should be stabilized before diverting runoff to any dispersing flow techniques. If the level spreader is used as an erosion and sedimentation control measure, it must be reconfigured (flush perforated pipe, clean out all sediment), to its original state before use as a permanent stormwater feature.
2. All contributing Stormwater elements (Infiltration beds, inlets, outlet control structures, pipes, etc.) should be installed.
3. Perforated pipe should be installed along a contour, with care taken to construct a level bottom. The pipe can be underground in a shallow infiltration trench (see Infiltration Trench for design guidance), or closer to the surface and covered with a 12-inch thick layer of AASHTO #57 stone. If the perforated pipe is in a trench, excavate to the design dimensions. If the pipe is to be at or near the surface, some minor excavation or filling may be necessary to maintain a level bottom
4. If necessary, install erosion control matting along the length of the level spreader and to a distance downhill, as specified by the manufacturer/supplier. Cover the pipe with AASHTO #57 stone.
5. For construction sequence of earthen berms, see BMP 6.4.10 Infiltration Berm.

Maintenance

- Catch Basins and Inlets draining to a level spreader should be inspected and cleaned on an annual basis.
- The receiving land area should be immediately restored to design conditions after any disturbance. Vegetate areas should be seeded and blanketed.
- It is critical that even **sheet flow conditions** are sustained throughout the life of the level spreader, as their effectiveness can deteriorate due to lack of maintenance, inadequate design/location, and poor vegetative cover.
  - **Inspection -** The area below a level spreader should be inspected for clogging, density of vegetation, damage by foot or vehicular traffic, excessive accumulations, and channelization. Inspections should be made on a quarterly basis for the first two years following installation, and then on a semiannual basis thereafter. Inspections should also be made after every storm event greater than 1-inch.
  - **Removal -** Sediment and debris should be routinely removed (but never less than semiannually), or upon observation, when buildup occurs in the clean outs. Regrading and reseeding may be necessary in the areas below the level spreader. Regrading may also be required when pools of standing water are observed along the slope. (In no case should standing water be allowed for longer than 72 hours.)
  - **Vegetation -** Maintaining a vigorous vegetative cover on the areas below a level spreader is critical for maximizing pollutant removal efficiency and erosion prevention. If vegetative cover is not fully established within the designated time, it may need to be replaced with an alternative species. Unwanted or invasive growth should be removed on an annual basis. Biweekly inspections are recommended for at least the first growing season, or until the vegetation is permanently established. Once the vegetation is established, inspections of health, diversity, and density should be performed at least twice per year, during both the growing and non-growing season. Vegetative cover should be sustained at 85% and replaced if damage greater than 50% is observed.

Vegetated Swale

Construction Sequence

1. Begin vegetated swale construction only when the upgradient temporary erosion and sediment control measures are in place. Vegetated swales should be constructed and stabilized early in the construction schedule, preferably before mass earthwork and paving increase the rate and volume of runoff. (Erosion and sediment control methods shall adhere to the Pennsylvania Department of Environmental Protection's *Erosion and Sediment Pollution Control Program Manual*, March 2000 or latest edition.)
2. Rough grade the vegetated swale. Equipment shall avoid excessive compaction and/or land disturbance. Excavating equipment should operate from the side of the swale and never on the bottom. If excavation leads to substantial compaction of the subgrade (where an infiltration trench is not proposed), 18 inches shall be removed and replaced with a blend of topsoil and sand to promote infiltration and biological growth. At the very least, topsoil shall be thoroughly deep plowed into the subgrade in order to penetrate the compacted zone and promote aeration and the formation of macropores. Following this, the area should be disked prior to final grading of topsoil.
3. Construct check dams, if required.
4. Fine grade the vegetated swale. Accurate grading is crucial for swales. Even the smallest non-conformities may compromise flow conditions.
5. Seed, vegetate and install protective lining as per approved plans and according to final planting list. Plant the swale at a time of the year when successful establishment without irrigation is most likely. However, temporary irrigation may be needed in periods of little rain or drought. Vegetation should be established as soon as possible to prevent erosion and scour.
6. Once all tributary areas are sufficiently stabilized, remove temporary erosion and sediment controls. It is very important that the swale be stabilized before receiving upland stormwater flow.
7. Follow maintenance guidelines, as discussed below.

   Note: If a vegetated swale is used for runoff conveyance during construction, it should be regraded and reseeded immediately after construction and stabilization has occurred. Any damaged areas should be fully restored to ensure future functionality of the swale.

Maintenance

Maintenance activities to be done annually and within 48 hours after every major storm event (>1 inch rainfall depth):

- Inspect and correct erosion problems, damage to vegetation, and sediment and debris accumulation (address when > 3 inches at any spot or covering vegetation)
- Inspect vegetation on side slopes for erosion and formation of rills or gullies, correct as needed
- Inspect for pools of standing water; dewater and discharge to an approved location and restore to design grade
- Mow and trim vegetation to ensure safety, aesthetics, proper swale operation, or to suppress weeds and invasive vegetation; dispose of cuttings in a local composting facility; mow only when swale is dry to avoid rutting
- Inspect for litter; remove prior to mowing
- Inspect for uniformity in cross-section and longitudinal slope, correct as needed
- Inspect swale inlet (curb cuts, pipes, etc.) and outlet for signs of erosion or blockage, correct as needed

Maintenance activities to be done as needed:

- Plant alternative grass species in the event of unsuccessful establishment.
- Reseed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Rototill and replant swale if draw down time is more than 48 hours
- Inspect and correct check dams when signs of altered water flow (channelization, obstructions, erosion, etc.) are identified
- Water during dry periods, fertilize, and apply pesticide **only when absolutely necessary.**
- Inspect swale immediately after the spring melt, remove residuals (e.g. sand) and replace damaged vegetation without disturbing remaining vegetation.
- If roadside or parking lot runoff is directed to the swale, mulching and/or soil aeration/manipulation may be required in the spring to restore soil structure and moisture capacity and to reduce the impacts of deicing agents.
- Use nontoxic, organic deicing agents, applied either as blended, magnesium chloride-based liquid products or as pretreated salt.
- Use salt-tolerant vegetation in swales

Vegetated Filter Strip

Construction Sequence

1. Begin filter strip construction only when the upgradient site has been sufficiently stabilized and temporary erosion and sediment control measures are in place. (Erosion and sediment control methods shall adhere to the Pennsylvania Department of Environmental Protection's Erosion and Sediment Pollution Control Program Manual, March 2000 or latest edition.) The strip should be installed at a time of the year when successful establishment without irrigation is most likely. However, temporary irrigation may be needed in periods of little rain or drought.
2. For planted (not indigenous Filter Strips) clear and grub site as needed. Care should be taken to disturb as little existing vegetation as possible, whether in the designated filter strip area or in adjacent areas, and to avoid soil compaction. Grading a level slope may require removal of existing vegetation.
3. Rough grade the filter strip area, including the berm at the toe of the slope, if proposed. Use the lightest, least disruptive equipment to avoid excessive compaction and/or land disturbance.
4. Construct level spreader device at the upgradient edge of the strip. For gravel trenches, do not compact subgrade (Follow construction sequence for Infiltration Trench).
5. Fine grade the filter strip area. Accurate grading is crucial for filter strips. Even the smallest irregularities may compromise sheet flow conditions
6. Seed or sod, as desired. Plant more substantial vegetation, such as trees and shrubs, if proposed. If sod is proposed, place tiles tightly enough to avoid gaps and stagger the ends to prevent channelization along the strip. Use a roller on sod to prevent air pockets between the sod and soil from forming.
7. Concurrent with #6 stabilize seed filter strips with appropriate permanent soil stabilization methods, such as erosion control matting or blankets. Erosion control for seeded filter strips should be maintained for at least the first 75 days following the first storm event of the season.
8. Once the filter strip is sufficiently stabilized, remove temporary erosion and sediment controls. It is very important that filter strip vegetation be fully established before receiving upland Stormwater flow. One full growing season is the recommended minimum time for establishment. Some seed mixtures may require a longer time period to become established.
9. Follow maintenance guidelines, as discussed below.

Note: When and if a filter strip is used for temporary sediment control, it might need to be regraded and reseeded immediately after construction and stabilization has occurred.

Maintenance

- Filter strips should be properly maintained to ensure their effectiveness.
- It is critical that sheet flow conditions and infiltration are sustained throughout the life of the filter strip.
- Vegetated filter strip components that receive or trap sediment and debris should be inspected for clogging, density of vegetation, damage by foot or vehicular traffic, excessive accumulations, and channelization. Inspections should be made on a quarterly basis for the first two years following installation, and then on a biannual basis thereafter.
- Inspections should also be made after every storm event greater than 1 inch during the establishment period.
- Sediment and debris should be routinely removed (but never less than biannually), or upon observation, when buildup exceeds 2 inches in depth in either the strip itself or the level spreader.
- If erosion is observed, measures should be taken to improve the level spreader or other dispersion method to address the source of erosion. Rills and gullies observed along the strip may be filled with topsoil, stabilized with erosion control matting, and either seeded or sodded, as desired. For channels less than 12 inches wide, filling with crushed gravel, which allows grass to creep in over time, is acceptable. For wider channels, i.e. greater than 12 inches, regrading and reseeding may be necessary. (Small bare areas may only require overseeding.) Regrading may also be required when pools of standing water are observed along the slope. (In no case should standing water be tolerated for longer than 48-72 hours.)
- Sediment should be removed when the filter strip is thoroughly dry. Trash and debris removed from the site should be deposited only at suitable disposal/recycling sites and must comply with applicable local, state, and federal waste regulations. In the case where a filter strip is used for sediment control, it should be regraded and reseeded immediately after construction has concluded.
- Grass cover should be mowed, with low ground pressure equipment, as needed to maintain a height of 4-6 inches. Mowing should be done only when the soil is dry, in order to prevent tracking damage to vegetation, soil compaction, and flow concentrations. Generally speaking, grasses should be allowed to grow as high as possible, but mowed frequently enough to avoid troublesome insects or noxious weeds. Fall mowing should be controlled to a grass height of 6 inches, to provide adequate wildlife winter habitat. When and where cutting is desired for aesthetic reasons, a high blade setting should be used.
- If vegetative cover is not fully established within the designated time, it should be replaced with an alternative species. Unwanted or invasive growth should be removed on an annual basis. Biweekly inspections are recommended for at least the first growing season, or until the vegetation is permanently established. Once the vegetation is established, inspections of health, diversity, and density should be performed at least twice per year, during both the growing and non-growing season. Vegetative cover should be sustained at 85% and reestablished if damage greater than 50% is observed. Whenever possible, deficiencies in vegetation are to be mollified without the use of fertilizers or pesticides.
- If a filter strip exhibits signs of poor drainage and/or vegetative cover, periodic soil aeration may be needed. In addition, depending on soil characteristics, the strip may need periodic liming. If the 72 hour draw-down maximum time is exceeded, strip characteristics such as soils, vegetation, and groundwater levels should be reevaluated. Measures should be taken to establish, or reestablish as the case may be, the specified drain down time of the system.

Landscape Restoration

Construction Sequence

Meadow installation should proceed as follows:

1. SITE
- Site conditions lend themselves mostly towards meadow as a landscape restoration option

2. PLANT SELECTION
- Native species of grasses will be selected as groundcover. See E&S planting sheet for planting and seeding guidelines.

3. PREPARE SITE
- All weeds or existing vegetation must be eliminated prior to seeding.
- Perennial weeds may require year long smothering, repeated sprayings with herbicides, or repeated tillage with equipment that can uproot and kill perennial weeds.

4. PLANTING
- Planting can take place from spring thaw through June 30 or from September 1 through soil freeze-up ("dormant seeding")
- Planting in July and August is generally not recommend due to the frequency of drought during this time.
- Seeding can be accomplished by a variety of methods: no-till seeder for multi-acre planting; broadcast seeder; hand broadcast for small areas of one acre or less.
- Seed quality is critical and a seed mix should be used with a minimum percentage of non-seed plant parts.

5. SITE MAINTENANCE (additional information below)
- Responsibilities for watering, weeding, mowing, and maintenance fall on the permittee. Upon termination of NPDES permit maintenance will revert to landowner.
- Monitor site regularly for growth and potential problems.

Maintenance

A seasonal mowing or burning may be required, although care must be taken to make sure that any management is coordinated with essential reseeding and other important aspects of meadow reestablishment. In the first year weeds must be carefully controlled and consistently mowed back to 4-6 inches tall when they reach 12 inches in height. In the second year, weeds should continue to monitored and mowed and rhizomatous weeds should be hand treated with herbicide. Weeds should not be sprayed with herbicide as the drift from the spray may kill large patches of desirable plants, allowing weeds to move in to these new open areas. In the beginning of the third season the meadow should be mowed very closely to the ground. The mowed material should be removed from the site to expose the soil to the sun. This helps encourage rapid soil warming which favors the establishment of "warm season" plants over "cool season" weeds.

ANTICIPATED PROJECT CONSTRUCTION WASTES

A. Accumulated sediment and rocks.
B. Portable sanitary facility waste.
C. Trash from onsite workers (food bags and wrappers; beverage containers).
D. Trimmings and cuttings of wood, pipe, and other construction material.
E. Brush, trees and other cleared vegetation.
F. Repaired and removed non-reusable non-biodegradable BMP material.

MEASURES FOR THE RECYCLING OR DISPOSAL OF MATERIALS FOR THE PROJECT SITE.

A. Recycling or reuse of wastes materials where feasible is required.
   - Silt will be disposed of by being mixed with other soils on the site or spread to dry in an area protected with filter sock and then seeded per permanent seeding specifications when dry. Compost from the filter sock can be used as a soil supplement.
   - Brush, trees and other cleared vegetation can be chipped and mulched.
   - Clean masonry and rocks can be used in fill.
   - Metal, plastic, glass and cardboard may be recycled.
   - Excess construction material can be donated to nonprofits.
B. If wastes are to be disposed of off-site, the disposal facility must be a DEP permitted site.
C. During site construction there is to be a portable sanitary facility to be supplied by the contractor. An experienced contractor is to dispose of this waste following appropriate rules and regulations concerning this type of waste.
D. Replaced or removed non-reusable non-biodegradable materials from BMPs are to be disposed of as per manufacturers recommendations in a DEP permitted site.

MEASURES FOR THE REDUCING OTHER POTENTIAL POLLUTION SOURCES FOR THE PROJECT SITE.

A. Thermal impacts are minimized through reduction of rate and volume and by detaining the 2-yr, 24hr storm to evaporate over a period of greater than 24 hours. Detention pond shaded by deciduous trees.
B. There are no naturally occurring geologic formations or soils on site that will cause excessive erosion. No soils have been identified with high erodibility on site. BMPs used to counter erosion are listed in detail below.
C. The following Non-discharge alternatives utilized in the PCSM plan include but are not limited to:
   1) Limiting Disturbed Areas
   2) Limiting extent and duration of the disturbance

Stormwater Facilities
Maintenance & Inspection Plan

The Stormwater Management Plan developed for the Project is supplemented by this Maintenance and Inspection Plan to help ensure continuing operation of all stormwater facilities. The following is a list of items that shall be inspected and corrective action taken by the owner

(Owner): Merrion Oil & Gas

a. Owner refers to individual ultimately responsible for storm facility condition and function.

1. Outlet conditions in Detention/Retention Facility.
2. Storm sewers, swales, concrete gutters and other conveyance devices.
3. Catch Basins, Manholes, and other stormwater catchment/transition structures.
4. Access for maintenance.

The following actions will be taken by the **Owner** to help ensure the facilities shown on the plan and identified above are in working order:

1. Replace or repair facilities so as to function as intended.
2. Remove silt debris, and trash in catch basin/storm sewers.
3. Repair outlet structures, trash racks, displaced riprap & low flow channel.
4. Remove any silt, debris and trash in Detention/Retention Facility.
5. Disposal of collected silt, debris and trash in a manner, which will not adversely affect the environment.
6. Replace eroded material and revegetate eroded areas.
7. Vegetation maintenance (i.e. mowing, brush cutting, debris removal, etc.) shall be performed a minimum of four (4) times per year. Additional vegetation maintenance may be required to maintain pond esthetics and function.
8. Visual inspection of the facility to identify conditions that may cause concern with the integrity of the facility (i.e. animal burrows, embankment subsidence, cracks, etc.).

The corrective actions to be taken are not limited to those listed above.

Stormwater Facilities
Maintenance & Inspection Plan

The inspection shall be undertaken by a minimum of one person at least two (2) times per year on or before March 1st, and October 1st. Additional inspections will be required if it becomes apparent facilities are not functioning properly. Corrective actions will then be taken as required to help ensure continuing operation of stormwater facilities. Any deficiencies noted in items inspected by the **Owner** shall be documented and corrective actions taken by the **Owner**. This recommended Maintenance Plan shall not be considered a guarantee as to the adequacy of the stormwater management facilities in the future.

The Township or governing body (**East Pittsburgh Borough**) may require other items to be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. If the **Borough** does not maintain the Stormwater Facilities, the **Owner** shall maintain all facilities in accordance with the approved maintenance schedule and shall keep all facilities maintained in a safe and attractive manner. The **Owner** shall convey to the **Borough** easements and/or rights_of_way to assure access for periodic inspections by the **Borough** and maintenance if required. ***The Owner shall keep on file with the Borough the name, address, and telephone number of the person or company responsible for maintenance activities.*** In the event of a change, new information will be submitted to the **Borough** within ten (10) days of the change. The **Owner** shall establish any special maintenance funds or other financing sources, in accordance with the approved maintenance plan. If the **Owner** fails to maintain the stormwater control facilities, following due notice by the **Borough** to correct deficiencies, the **Borough** shall perform the necessary maintenance or corrective work. The **Owner** shall reimburse the **Borough** for all costs associated with the required maintenance of the stormwater control facilities.

CRITICAL STAGES OF BMP IMPLEMENTATION:
Installation of retention facility outlet structure, spillway, and berm.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

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I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

scale: AS NOTED
date: 10/22/2018
project no: 180539

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

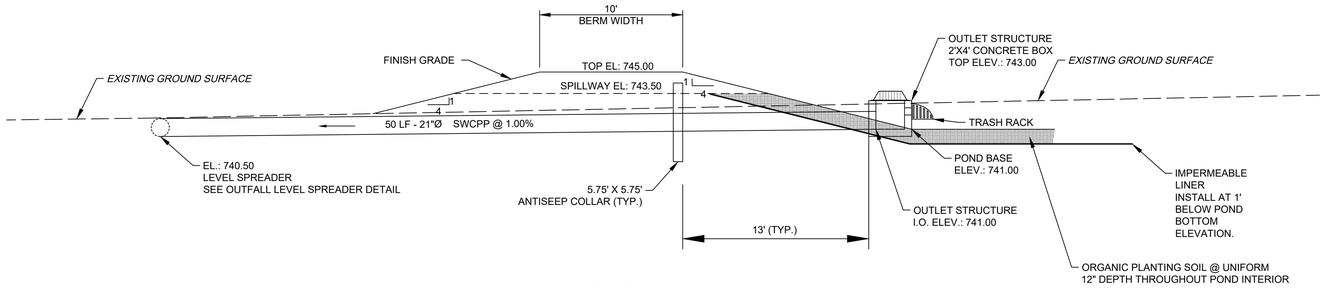
drawing title: PCSM NOTES SR / PCSM PLAN

EAST PITTSBURGH BOROUGH, NORTH BRADDOCK BOROUGH, NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

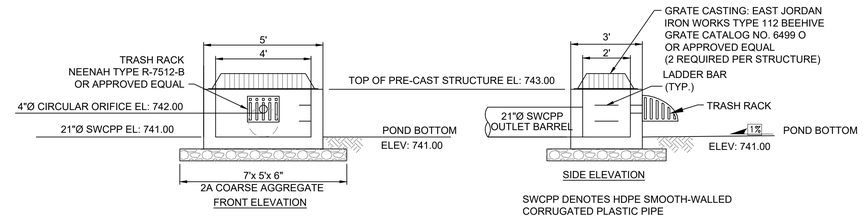
project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

Sheet N-1

Z:\Merrion Oil & Gas\180539-1-ET Braddock 1\Dwg\Production\Renovation\180539-PCSM-N1.dwg Plotted: October 18, 2018

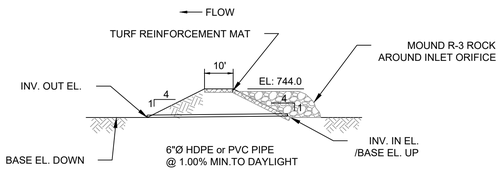


POND 1
SECTION AT OUTLET BOX
SCALE 1"=5'



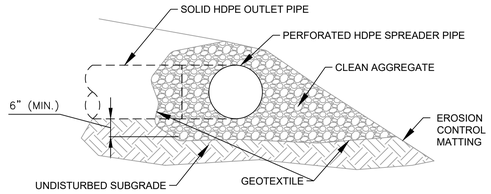
POND 1
EXISTING OUTLET STRUCTURE
SCALE: 1"=3'

FOREBAY					
POND	BASE EL. UP	BASE EL. DOWN	BERM EL.	WIDTH (FT.)	LENGTH (FT.)
1	742.5	742.0	745	2	196



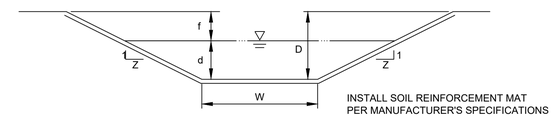
FOREBAY BERM
SCALE 1"=5'

LEVEL SPREADER			
	MATERIAL	LENGTH (FT.)	DIAM. (IN.)
POND 1	CORRUGATED HDPE PIPE	60	15



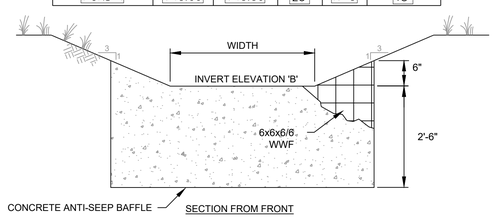
OUTFLOW LEVEL SPREADER DETAIL
NOT TO SCALE

CHANNEL SCHEDULE											
CHANNEL	LINING	PLACEMENT THICKNESS	VEG. RET.	SLOPE (%)	D (ft.)	W (ft.)	Z	DESIGN FLOW (cfs)	VELOCITY (fps)	d (ft.)	f (ft.)
PC-1A	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	4.9	1.87	0.747	0.753
PC-1A	VEGETATED	NA	C	1.0%	1.5	2	2	4.9	1.43	0.898	0.602
PC-1B	CONC. TRENCH DRAIN	NA	NA	2.0%	1.1	1	0	3.4	5.84	0.584	0.516
PC-1C	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	3.4	1.63	0.638	0.862
PC-1C	VEGETATED	NA	C	1.0%	1.5	2	2	3.4	1.43	0.898	0.602
PC-2	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	2.1	1.37	0.510	0.990
PC-2	VEGETATED	NA	C	1.0%	1.5	2	2	2.1	1.43	0.898	0.602
PC-3	SYNTHETIC MAT	NA	NA	1.0%	1.5	2	2	6.1	2.04	0.823	0.677
PC-3	VEGETATED	NA	C	1.0%	1.5	2	2	6.1	1.55	0.989	0.511
DIVERSION BERM	SYNTHETIC MAT	NA	NA	0.2%	2.5	2	2	6.0	1.25	1.125	1.375
DIVERSION BERM	VEGETATED	NA	C	0.2%	2.5	2	2	6.0	0.61	1.777	0.723

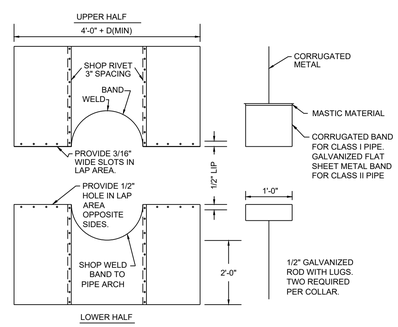


CHANNEL DETAIL

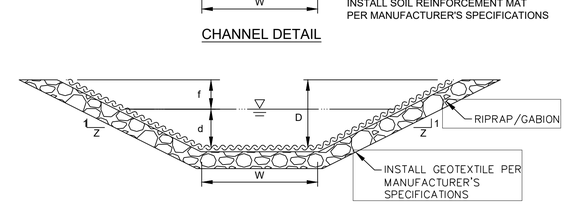
EMERGENCY SPILLWAY SCHEDULE					
	ELEVATION 'A'	ELEVATION 'B'	WIDTH	MATL.	PLACEMENT THICKNESS
POND 1	745.00	743.50	25'	R-5	18"



ANTI-SEEP COLLAR SCHEDULE		
	COLLAR SIZE (FT.)	NUMBER OF COLLARS
POND 1	5.75 x 5.75	1

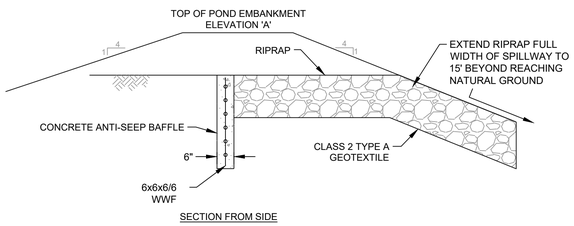


ANTI-SEEPAGE COLLAR DETAIL

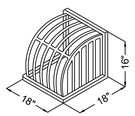


ECM SHALL BE NAG-S150 OR APPROVED EQUIVIALENT

RIPRAPPED/GABION CHANNEL DETAIL

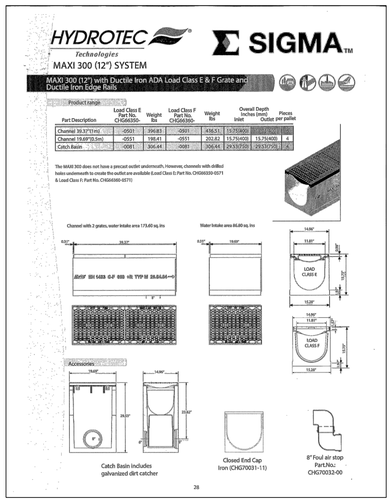


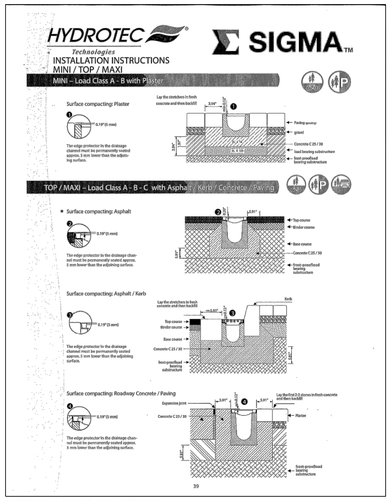
DETENTION POND EMERGENCY SPILLWAY



NOTE: NEENAH-R-7512-A (OR EQUAL)

LOW FLOW TRASH RACK DETAIL





CONCRETE CHANNEL DETAIL/ INSTALLATION

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No.	Revision	Date	By
1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

scale: AS NOTED
date: 10/22/2018
project no.: 180539

designed: KGJ
checked: MDR
drawn: QZ
graphic scale:

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

drawing title: CONSTRUCTION DETAILS
SR / PCSM PLAN

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
TESSA MICHELE ANTOLICK
No. PE077667

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I do hereby certify to the best of my knowledge, information and belief, that the Erosion and Sediment Control and Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

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Sheet C601

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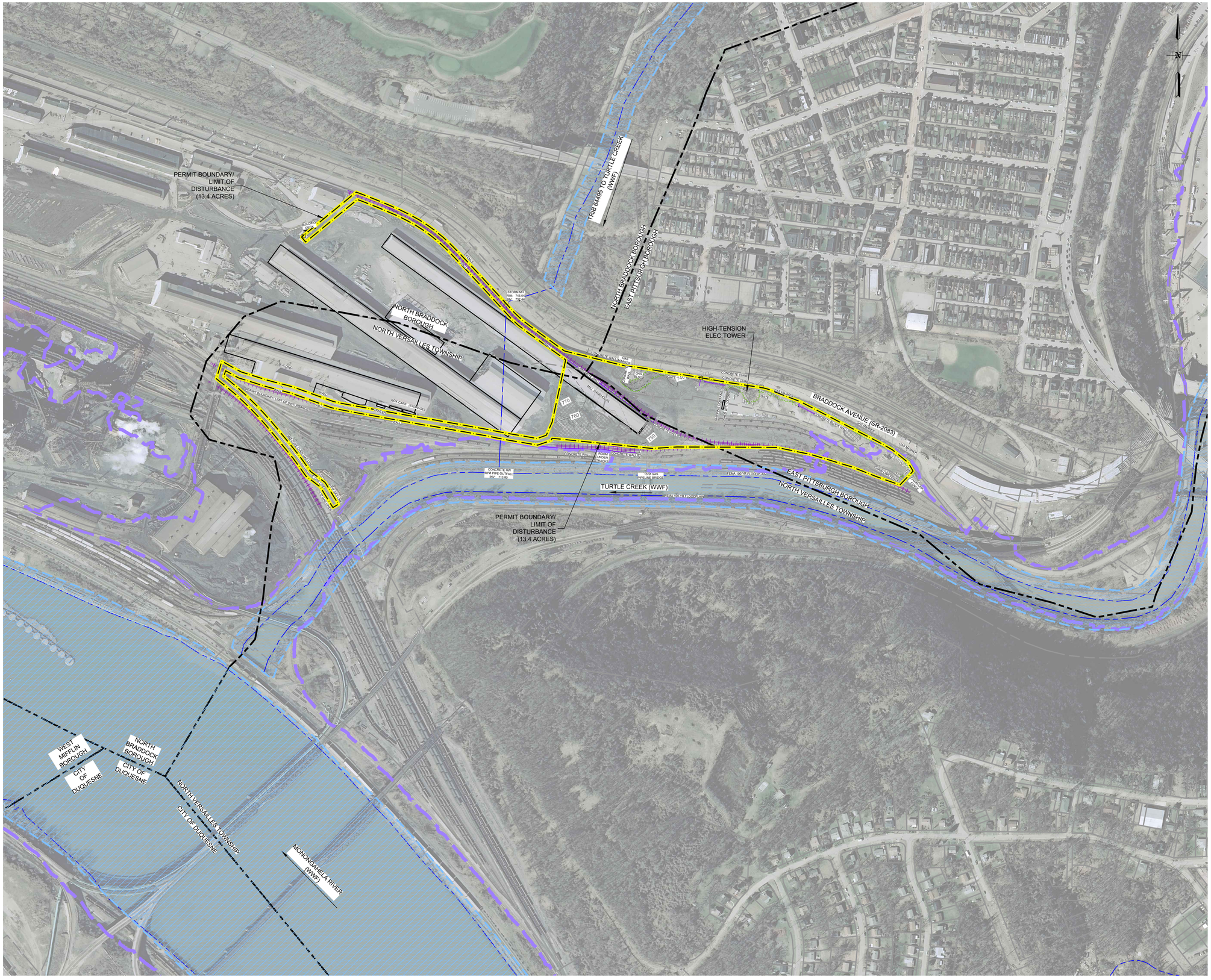

NOTES:

1. THE BASE MAP HAS BEEN CREATED USING SURVEY DATA (WITHIN LIMIT OF DISTURBANCE) PROVIDED BY TRANT CORPORATION, DATED 05/31/2018, SUPPLEMENTED BY AERIAL PHOTOGRAPHY OF PAMAP TILES 40001380PAS PROVIDED BY TRANT CORPORATION. SITE TOPOGRAPHY IS SUBJECT TO CHANGE DUE TO ACTIVE STOCKPILE BY US STEEL.
2. AERIAL IMAGE ON SHEET C701 WAS PROVIDED BY AERIAL PHOTOGRAPHY OF PAMAP TILES 40001380PAS DATED 2010.
3. PROPERTY LINES INFORMATION OF ALLEGHENY COUNTY ARE PROVIDED BY TRANT CORPORATION. THIS BASEMAP IS NOT THE RESULT OF AN ACTUAL FIELD SURVEY OF PROPERTIES SHOWN AND SHOULD NOT BE USED AS SUCH.
4. THIS PLAN IS IN THE PENNSYLVANIA STATE PLANE SOUTH, NORTH AMERICAN DATUM 1983 (NAD 83) COORDINATE SYSTEM.
5. SLOPE AREAS 3:1 OR GREATER BROUGHT TO FINISH GRADE ARE TO BE STABILIZED WITH ROCK OR SEEDED WITH MULCH APPLIED TO SLOPES AS SPECIFIED ON DETAIL SHEETS.
6. EXISTING RAILROAD TRACKS WITHIN WELL PAD PROJECT AREA WILL BE REMOVED.
7. THE TEMPORARY WATER STORAGE TANK DIMENSIONS AND LAYOUT ARE DISPLAYED FOR ILLUSTRATIVE PURPOSES ONLY. THE FINAL TANK DIMENSIONS AND LAYOUT WILL BE DETERMINED PRIOR TO CONSTRUCTION. THE OPEN-TOP TANKS ARE NOT ACCOUNTED FOR IN THE PCSM CALCULATIONS. THE ENTIRE TANK AREA IS MODELED AS A 'GRAVEL' COVER TYPE TO ACCOUNT FOR RUNOFF BEFORE THE TANKS ARE ERECTED.

LEGEND

NOTE: LEGEND IS TYPICAL, NOT ALL OBJECTS IN LEGEND APPEAR IN PLAN.

- 1550 — EXISTING CONTOURS
- EXISTING FEMA FLOODPLAIN
- 50' FLOODWAY
- FEMA FLOODWAY
- EXISTING MAPPED WATERCOURSE
- EXISTING STRUCTURE
- EXISTING VEGETATION
- EXISTING PROPERTY LINE
- EXISTING MUNICIPAL BOUNDARIES
- X — EXISTING FENCE
- OE — OE — EXISTING OVERHEAD ELECTRIC LINE
- EXISTING ELECTRIC POLE
- G — G — G — EXISTING GAS LINE
- W — W — W — EXISTING WATER LINE
- EXISTING CULVERT
- EXISTING WALL
- EXISTING RAILLINE
- EXISTING SLAG PILE
- WeB — EXISTING SOIL BOUNDARY AND DESCRIPTOR
- 1490 — PROPOSED CONTOURS
- PROPOSED LIMIT OF DISTUBANCE
- PROPOSED CHANNEL
- PROPOSED WATER FEATURES
- PROPOSED WELL PAD
- PROPOSED TEMPORARY TANK
- W — W — PROPOSED WATERLINE
- G — G — PROPOSED GASLINE
- PROPOSED SLOPE STABILIZATION
- PROPOSED ROCK CONSTRUCTION ENTRANCE WITH WASH RACK
- PROPOSED ACCESS ROAD
- 12 — 12 — 12 — PROPOSED 12" FILTER SOCK
- 24 — 24 — 24 — PROPOSED 24" FILTER SOCK
- PROPOSED CULVERT
- DIV — DIV — PROPOSED DIVERSION BERM
- PROPOSED GRAVEL
- PROPOSED INLET

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TESSA MICHELE ANTOLICK
ENGINEER
No. PE077667

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1	REVISED PER PADEP COMMENTS	10/22/2018	ARM
0	PADEP SUBMISSION	05/31/2018	TRANT

designed: KGJ
checked: MDR
drawn: QZ
scale: 1" = 200'
date: 10/22/2018
project no: 180539

graphic scale: 0 200 400 800 SCALE IN FEET

drawing title: EXISTING CONDITIONS OVERLAY MAP
SR / PCSM PLAN

project title: ET - BRADDOCK WELL PAD
MERRION OIL & GAS

EAST PITTSBURGH BOROUGH,
NORTH BRADDOCK BOROUGH,
NORTH VERSAILLES TOWNSHIP,
ALLEGHENY COUNTY, PENNSYLVANIA

Sheet C701

Z:\Merrion Oil & Gas\180539-1-ET Braddock 1\Drawing\Production\Renovation\180539-PCSM-C701.dwg, Plotted: October 19, 2018

APPENDIX F

Act 14 Notifications and Municipal Approval

Act 14 Letters

A R M G r o u p I n c .

PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT OF THE RETURN ADDRESS, FOLD AT DOTTED LINE

CERTIFIED MAIL™

7014 1200 0002 1760 8065

7014 1200 0002 1760 8065

Sent To
Allegheny County Economic Development
Street, Apt. No.; or PO Box No. 112 Washington Place
City, State, ZIP+4 Pittsburgh PA 15219

PS Form 3800, August 2005 — See Reverse for Instructions

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PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT OF THE RETURN ADDRESS, FOLD AT DOTTED LINE

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7014 1200 0002 1760 8096

7014 1200 0002 1760 8096

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North Versailles Municipal Building
Street, Apt. No.; or PO Box No. 1401 Greensburg Avenue
City, State, ZIP+4 North Versailles, PA 15137

PS Form 3800, August 2006 — See Reverse for Instructions

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Return Receipt Fee (Endorsement Required)	
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Total Postage & Fees	$

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CERTIFIED MAIL™

7014 1200 0002 1760 8072

7014 1200 0002 1760 8072

Sent To
East Pittsburgh Municipal Building
Street, Apt. No.; or PO Box No. 813 Linden Avenue
City, State, ZIP+4 East Pittsburgh, PA 15112

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Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

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CERTIFIED MAIL™

7014 1200 0002 1760 8089

7014 1200 0002 1760 8089

Sent To
North Braddock Municipal Building
Street, Apt. No.; or PO Box No. 600 Anderson Street
City, State, ZIP+4 North Braddock, PA 15104

PS Form 3800, August 2006 — See Reverse for Instructions

TRANT CORPORATION

Engineering Permits & Approvals

Environmental
Surveying
Site Civil
Traffic

Date: May 21, 2018

Allegheny County Economic Development
One Chatham Center Suite 900
112 Washington Place
Pittsburgh PA 15219
Certified Mail #: 7014 1200 0002 1760 8065
County Notification Letter

Dear Allegheny County Planning Director:

Acts 14, 67, 68 and 127, which amended the Municipalities Planning Code, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities and infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. The Pennsylvania Department of Environmental Protection's Policy for Consideration of Local Comprehensive Plans and Zoning Ordinances in DEP Review of Permits for Facilities and Infrastructure (DEP's Land Use Policy) provides direction and guidance to DEP staff, permit applicants, and local and county governments for the implementation of Acts 67, 68 and 127 of 2000. This policy can be found at www.depweb.state.pa.us; keyword: Land Use.

In accordance with DEP's Land Use Policy, enclosed please find a County Land Use Letter that is to be submitted with our permit application to DEP for an NPDES Permit for Stormwater Discharges Associated with Construction Activities. Please complete the attached form and return within 30 days to:

Name of Applicant: Merrion Oil and Gas

Address of Applicant: 600 Reilly Avenue, Farmington, NM 87401

Project Location: 152 11th Street, Braddock, PA 15104. The property is located in North Braddock Borough, North Versailles Township, and East Pittsburgh Borough, Allegheny County

Project Description: The current plans for the project includes the construction of an unconventional gas well and pad to supply natural gas to the US Steel facility as well as the access roads, utilities, storm water facilities, etc. necessary for the development.

11279 Perry Highway
Suite 206
Wexford, PA 15090

www.trantcorp.com
permits@trantcorp.com

(724) 935-7900 PH
(724) 935-6060 FX

<u>Please do not send this form to DEP</u>, as we must include the County Land Use Letter with our permit application. If we do not receive a response from you **within 30 days**, we shall proceed to submit our permit application to DEP without the County Land Use Letter. If the County Land Use Letter is not submitted with our permit application, and we provide proof to DEP that we attempted to obtain it, DEP will assume there are no substantive land use conflicts and proceed with the normal application review process.

If you have any questions, please do not hesitate to contact me.

Respectfully,

Alexander P. Trant
Trant Corporation
11279 Perry Highway Suite 206
Wexford, PA. 15090
724-935-7900
aptrant@trantcorp.com
File: 25383

Attachment – County Land Use Letter

APPENDIX B
COUNTY LAND USE LETTER

Date: _____

To: _____ (Name of Applicant)

From: _____ County Planning Agency/Commission

Re: _____ (Name of DEP Permittee)

The County of _____ states that it:

_____ has adopted a county or multi-county comprehensive plan.
If yes, please provide date of adoption:

_____ has not adopted a county or multi-county comprehensive plan.

If applicable:

The above referenced project:

___ is consistent with the adopted county or multi-county comprehensive plan.
___ is not consistent with the adopted county or multi-county comprehensive plan.

Additional Comments (attach additional sheets if necessary):

_____

_____

_____

_____

Submitted By:

Name	
Title	
Contact Information (Address & Phone)	
Signature	
Date	

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Expected Delivery on

TUESDAY

22 MAY 2018

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Delivered

May 22, 2018 at 11:43 am
Delivered, Left with Individual
PITTSBURGH, PA 15219

Tracking History

May 22, 2018, 11:43 am
Delivered, Left with Individual
PITTSBURGH, PA 15219
Your item was delivered to an individual at the address at 11:43 am on May 22, 2018 in PITTSBURGH, PA 15219.

May 22, 2018, 8:18 am
Out for Delivery
PITTSBURGH, PA 15219

May 22, 2018, 8:08 am
Sorting Complete
PITTSBURGH, PA 15219

May 22, 2018, 5:27 am
Arrived at Unit
PITTSBURGH, PA 15212

May 21, 2018, 10:41 pm
Departed USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 21, 2018, 7:00 pm
Arrived at USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 21, 2018, 5:58 pm
Departed Post Office
WEXFORD, PA 15090

May 21, 2018, 3:19 pm
USPS in possession of item
WEXFORD, PA 15090

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Environmental
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Site Civil
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Date: May 21, 2018

813 Linden Avenue
East Pittsburgh, PA 15112
Certified Mail #: 7014 1200 0002 1760 8089
Municipal Notification Letter

Dear Municipal Secretary:

Acts 14, 67, 68 and 127, which amended the Municipalities Planning Code, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities and infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. The Pennsylvania Department of Environmental Protection's Policy for Consideration of Local Comprehensive Plans and Zoning Ordinances in DEP Review of Permits for Facilities and Infrastructure (DEP's Land Use Policy) provides direction and guidance to DEP staff, permit applicants, and local and county governments for the implementation of Acts 67, 68 and 127 of 2000. This policy can be found at www.depweb.state.pa.us; keyword: Land Use.

In accordance with DEP's Land Use Policy, enclosed please find a Municipal Land Use Letter that is to be submitted with our permit application to DEP for an NPDES Permit for Stormwater Discharges Associated with Construction Activities. Please complete the attached form and return within 30 days to:

Name of Applicant: Merrion Oil and Gas

Address of Applicant: 600 Reilly Avenue, Farmington, NM 87401

Project Location: 152 11th Street, Braddock, PA 15104. The property is located in North Braddock Borough, North Versailles Township, and East Pittsburgh Borough, Allegheny County

Project Description: The current plans for the project includes the construction of an unconventional gas well and pad to supply natural gas to the US Steel facility as well as the access roads, utilities, storm water facilities, etc. necessary for the development.

11279 Perry Highway
Suite 206
Wexford, PA 15090

www.trantcorp.com
permits@trantcorp.com

(724) 935-7900 PH
(724) 935-6060 FX

<u>Please do not send this form to DEP</u>, as we must include the Municipal Land Use Letter with our permit application. If we do not receive a response from you **within 30 days,** we shall proceed to submit our permit application to DEP without the Municipal Land Use Letter. If the Municipal Land Use Letter is not submitted with our permit application, and we provide proof to DEP that we attempted to obtain it, DEP will assume there are no substantive land use conflicts and proceed with the normal application review process.

If you have any questions, please do not hesitate to contact me.

Respectfully,

Alexander P. Trant
Trant Corporation
11279 Perry Highway Suite 206
Wexford, PA. 15090
724-935-7900
aptrant@trantcorp.com
File: 25283.03

Attachment – Municipal Land Use Letter

APPENDIX C
MUNICIPAL LAND USE LETTER

Date: _____

To: _____ (Name of Applicant)

From: _____ Township/Borough/City

Re: _____ (Name of DEP Permittee)

The municipality of _____ states that it:
_____ has adopted a municipal or multi-municipal comprehensive plan.
If yes, please provide date of adoption:

_____ has not adopted a municipal or multi-municipal comprehensive plan.

The municipality of _____ states that it:
_____ has adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.
_____ has not adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.

If applicable:

The municipality of _____ states that its zoning ordinance is generally consistent with its municipal comprehensive plan and the county comprehensive plan.

The above referenced proposed project
_____ meets the provisions of the local zoning ordinance

If zoning approval is required for the project to proceed, the above referenced project:
_____ has received zoning approval.
_____ has not received zoning approval.

If the proposed project has not received zoning approval:

What is the status of the zoning request for the proposed project? (e.g., Special Exception Approval from the Zoning Hearing Board required, Conditional Use approval from the Governing Body required)

_____

_____

_____

_____

_____

_____

Is there a legal challenge by the applicant with regard to zoning for the proposed project?

_____

_____

Name and Contact Information for Municipal Zoning Officer:

_____

_____

Additional Comments (attach additional sheets if necessary):

_____

_____

_____

Submitted By:

Name	
Title	
Contact Information (Address & Phone)	
Signature	
Date	

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23 MAY 2018

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Delivered

May 23, 2018 at 9:41 am
Delivered, Left with Individual
EAST PITTSBURGH, PA 15112

Tracking History

May 23, 2018, 9:41 am
Delivered, Left with Individual
EAST PITTSBURGH, PA 15112
Your item was delivered to an individual at the address at 9:41 am on May 23, 2018 in EAST PITTSBURGH, PA 15112.

May 23, 2018, 7:16 am
Arrived at Unit
BRADDOCK, PA 15104

May 22, 2018, 4:12 pm
Departed USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 22, 2018
In Transit to Next Facility

May 21, 2018, 7:00 pm
Arrived at USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 21, 2018, 5:58 pm
Departed Post Office
WEXFORD, PA 15090

May 21, 2018, 3:19 pm
USPS in possession of item
WEXFORD, PA 15090

Feedback

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Environmental
Surveying
Site Civil
Traffic

Date: May 21, 2018

600 Anderson Street
North Braddock, PA 15104
Certified Mail #: 7014 1200 0002 1760 8089
Municipal Notification Letter

Dear Municipal Secretary:

Acts 14, 67, 68 and 127, which amended the Municipalities Planning Code, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities and infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. The Pennsylvania Department of Environmental Protection's Policy for Consideration of Local Comprehensive Plans and Zoning Ordinances in DEP Review of Permits for Facilities and Infrastructure (DEP's Land Use Policy) provides direction and guidance to DEP staff, permit applicants, and local and county governments for the implementation of Acts 67, 68 and 127 of 2000. This policy can be found at www.depweb.state.pa.us; keyword: Land Use.

In accordance with DEP's Land Use Policy, enclosed please find a Municipal Land Use Letter that is to be submitted with our permit application to DEP for an NPDES Permit for Stormwater Discharges Associated with Construction Activities. Please complete the attached form and return within 30 days to:

Name of Applicant: Merrion Oil and Gas

Address of Applicant: 600 Reilly Avenue, Farmington, NM 87401

Project Location: 152 11th Street, Braddock, PA 15104. The property is located in North Braddock Borough, North Versailles Township, and East Pittsburgh Borough, Allegheny County

Project Description: The current plans for the project includes the construction of an unconventional gas well and pad to supply natural gas to the US Steel facility as well as the access roads, utilities, storm water facilities, etc. necessary for the development.

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Suite 206
Wexford, PA 15090

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(724) 935-7900 PH
(724) 935-6060 FX

<u>Please do not send this form to DEP</u>, as we must include the Municipal Land Use Letter with our permit application. If we do not receive a response from you **within 30 days**, we shall proceed to submit our permit application to DEP without the Municipal Land Use Letter. If the Municipal Land Use Letter is not submitted with our permit application, and we provide proof to DEP that we attempted to obtain it, DEP will assume there are no substantive land use conflicts and proceed with the normal application review process.

If you have any questions, please do not hesitate to contact me.

Respectfully,

Alexander P. Trant
Trant Corporation
11279 Perry Highway Suite 206
Wexford, PA. 15090
724-935-7900
aptrant@trantcorp.com
File: 25283.03

Attachment – Municipal Land Use Letter

APPENDIX C
MUNICIPAL LAND USE LETTER

Date: _____

To: _____ (Name of Applicant)

From: _____ Township/Borough/City

Re: _____ (Name of DEP Permittee)

The municipality of _____ states that it:
_____ has adopted a municipal or multi-municipal comprehensive plan.
If yes, please provide date of adoption:

_____ has not adopted a municipal or multi-municipal comprehensive plan.

The municipality of _____ states that it:
_____ has adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.
_____ has not adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.

If applicable:

The municipality of _____ states that its zoning ordinance is generally consistent with its municipal comprehensive plan and the county comprehensive plan.

The above referenced proposed project
_____ meets the provisions of the local zoning ordinance

If zoning approval is required for the project to proceed, the above referenced project:
_____ has received zoning approval.
_____ has not received zoning approval.

If the proposed project has not received zoning approval:

What is the status of the zoning request for the proposed project? (e.g., Special Exception Approval from the Zoning Hearing Board required, Conditional Use approval from the Governing Body required)

_____

_____

_____

_____

_____

_____

Is there a legal challenge by the applicant with regard to zoning for the proposed project?

_____

_____

Name and Contact Information for Municipal Zoning Officer:

_____

_____

Additional Comments (attach additional sheets if necessary):

_____

_____

_____

Submitted By:

Name	
Title	
Contact Information (Address & Phone)	
Signature	
Date	

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Your item was delivered to the front desk or reception area at 9:36 am on May 29, 2018 in BRADDOCK, PA 15104.

Delivered

May 29, 2018 at 9:36 am
Delivered, Front Desk/Reception
BRADDOCK, PA 15104

Feedback

Tracking History

May 29, 2018, 9:36 am
Delivered, Front Desk/Reception
BRADDOCK, PA 15104
Your item was delivered to the front desk or reception area at 9:36 am on May 29, 2018 in BRADDOCK, PA 15104.

Reminder to Schedule Redelivery of your item

May 23, 2018, 8:44 am
Notice Left (No Authorized Recipient Available)
BRADDOCK, PA 15104

May 23, 2018, 7:16 am
Arrived at Unit
BRADDOCK, PA 15104

May 22, 2018, 4:48 pm
Departed USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 22, 2018
In Transit to Next Facility

May 21, 2018, 7:00 pm
Arrived at USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 21, 2018, 5:58 pm
Departed Post Office
WEXFORD, PA 15090

May 21, 2018, 3:19 pm
USPS in possession of item
WEXFORD, PA 15090

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TRANT
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Environmental
Surveying
Site Civil
Traffic

Date: May 21, 2018

1401 Greensburg Avenue
North Versailles, PA 15137
Certified Mail #: 7014 1200 0002 1760 8096
Municipal Notification Letter

Dear Municipal Secretary:

Acts 14, 67, 68 and 127, which amended the Municipalities Planning Code, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities and infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. The Pennsylvania Department of Environmental Protection's Policy for Consideration of Local Comprehensive Plans and Zoning Ordinances in DEP Review of Permits for Facilities and Infrastructure (DEP's Land Use Policy) provides direction and guidance to DEP staff, permit applicants, and local and county governments for the implementation of Acts 67, 68 and 127 of 2000. This policy can be found at www.depweb.state.pa.us; keyword: Land Use.

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Address of Applicant: 600 Reilly Avenue, Farmington, NM 87401

Project Location: 152 11th Street, Braddock, PA 15104. The property is located in North Braddock Borough, North Versailles Township, and East Pittsburgh Borough, Allegheny County

Project Description: The current plans for the project includes the construction of an unconventional gas well and pad to supply natural gas to the US Steel facility as well as the access roads, utilities, storm water facilities, etc. necessary for the development.

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Suite 206
Wexford, PA 15090

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(724) 935-7900 PH
(724) 935-6060 FX

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If you have any questions, please do not hesitate to contact me.

Respectfully,

Alexander P. Trant
Trant Corporation
11279 Perry Highway Suite 206
Wexford, PA. 15090
724-935-7900
aptrant@trantcorp.com
File: 25283.03

Attachment – Municipal Land Use Letter

APPENDIX C
MUNICIPAL LAND USE LETTER

Date: _____

To: _____ (Name of Applicant)

From: _____ Township/Borough/City

Re: _____ (Name of DEP Permittee)

The municipality of _____ states that it:
_____ has adopted a municipal or multi-municipal comprehensive plan.
If yes, please provide date of adoption:

_____ has not adopted a municipal or multi-municipal comprehensive plan.

The municipality of _____ states that it:
_____ has adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.
_____ has not adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.

If applicable:

The municipality of _____ states that its zoning ordinance is generally consistent with its municipal comprehensive plan and the county comprehensive plan.

The above referenced proposed project
_____ meets the provisions of the local zoning ordinance

If zoning approval is required for the project to proceed, the above referenced project:
_____ has received zoning approval.
_____ has not received zoning approval.

If the proposed project has not received zoning approval:

What is the status of the zoning request for the proposed project? (e.g., Special Exception Approval from the Zoning Hearing Board required, Conditional Use approval from the Governing Body required)

_____

_____

_____

_____

_____

_____

Is there a legal challenge by the applicant with regard to zoning for the proposed project?

_____

_____

Name and Contact Information for Municipal Zoning Officer:

_____

_____

Additional Comments (attach additional sheets if necessary):

_____

_____

_____

Submitted By:

Name	
Title	
Contact Information (Address & Phone)	
Signature	
Date	

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23 MAY 2018 ⓘ

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Feedback

Delivered

May 23, 2018 at 8:54 am
Delivered, Left with Individual
NORTH VERSAILLES, PA 15137

Tracking History ∧

May 23, 2018, 8:54 am
Delivered, Left with Individual
NORTH VERSAILLES, PA 15137
Your item was delivered to an individual at the address at 8:54 am on May 23, 2018 in NORTH VERSAILLES, PA 15137.

May 23, 2018, 8:20 am
Out for Delivery
NORTH VERSAILLES, PA 15137

May 23, 2018, 8:10 am
Sorting Complete
NORTH VERSAILLES, PA 15137

May 23, 2018, 5:57 am
Arrived at Unit
NORTH VERSAILLES, PA 15137

May 22, 2018, 2:25 pm
Departed USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 22, 2018
In Transit to Next Facility

May 21, 2018, 6:58 pm
Arrived at USPS Regional Facility
PITTSBURGH PA DISTRIBUTION CENTER

May 21, 2018, 5:58 pm
Departed Post Office
WEXFORD, PA 15090

May 21, 2018, 3:19 pm
USPS in possession of item
WEXFORD, PA 15090

Feedback

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- Enter USPS Delivery Instructions™ for your mail carrier.

APPENDIX C
MUNICIPAL LAND USE LETTER

Date: 5/29/18

To: Merrion Oil & Gas (Name of Applicant)

From: N. Versailles Township/Borough/City

Re: _____ (Name of DEP Permittee)

The municipality of North Versailles states that it:
✓ has adopted a municipal or multi-municipal comprehensive plan.
If yes, please provide date of adoption: July, 2007

_____ has not adopted a municipal or multi-municipal comprehensive plan.

The municipality of N. Versailles states that it:
✓ has adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.
_____ has not adopted a county zoning ordinance, or a municipal or joint-municipal zoning ordinance.

If applicable:

The municipality of N. Versailles states that its zoning ordinance is generally consistent with its municipal comprehensive plan and the county comprehensive plan.

The above referenced proposed project
✓ meets the provisions of the local zoning ordinance

If zoning approval is required for the project to proceed, the above referenced project:
_____ has received zoning approval.
_____ has not received zoning approval.

If the proposed project has not received zoning approval:

What is the status of the zoning request for the proposed project? (e.g., Special Exception Approval from the Zoning Hearing Board required, Conditional Use approval from the Governing Body required)

_____

_____

_____

_____

_____

_____

Is there a legal challenge by the applicant with regard to zoning for the proposed project?

No

Name and Contact Information for Municipal Zoning Officer:

DAVID GILLILAND 412-824-5672 x113
daveg@glennengr.com

Additional Comments (attach additional sheets if necessary):

Submitted By:

Name	DAVID GILLILAND
Title	Township Engineer
Contact Information (Address & Phone)	412-824-5672 x113
Signature	
Date	5/29/18

Zoning Approval

A R M G r o u p I n c .

MINUTES OF THE BOARD MEETING HELD NOVEMBER 16, 2017

PLEDGE TO THE FLAG!

The regular meeting was held at 7:00PM at the North Versailles Township Municipal Building. An open caucus meeting, which was duly advertised, was held at 6:30 PM, prior to the regular monthly meeting.

ROLL CALL: *G. Beswick, present; V. Paradine, present; S. Juliano, present; D. Roher, present; D. Mitchell, present; R. Saula, present; F. Bivins, present.*

PUBLIC SPEAK OUT SESSION: *Hugh Kovarik spoke in favor of Al Hussey for Fire Marshall.*

BOARD MEETING SESSION:

Motion made by R. Saula, seconded by D. Roher, to approve the minutes from the Commissioner's meeting held on October 19, 2017 correcting the Ordinance Number passed from 1109 to 1110.

ROLL CALL: *G. Beswick, yes; V. Paradine, yes; S. Juliano, yes; D. Roher, yes; D. Mitchell, yes; R. Saula, yes; F. Bivins, yes.*

PUBLIC HEARING:

PRESIDENT'S REPORT:

Motion made by G. Beswick, seconded by V. Paradine to approve the conditional use for Merion Oil and Gas to drill a gas well at Hamburg Road and Braddock Avenue per the recommendations of the Planning Commission.

ROLL CALL: *G. Beswick, yes; V. Paradine, yes; S. Juliano, yes; D. Roher, yes; D. Mitchell, yes; R. Saula, no; F. Bivins, yes*

BANK REPORT: *Commissioner Paradine*

As of October,2017: General Fund $744,088.17; Refuse Account, $269,098.02; Tentative Escrow Account, $0.00; State Motor Fund, $178,331.05; Health Reimbursement Account, $0.00; Capital Savings Account, $2,024,060.46; PIB Loan Account, $356,658.48; 150th Anniversary Savings, $10,065.55; Certificates of Deposit S & T Bank, $1,007,333.84.

TREASURER'S REPORT: *Commissioner Paradine*

Money turned over to North Versailles Township for the month of October, 2017 by Mary Ann Fetsick, Treasurer; 2017 Township Tax, $9364.33. Fire Department Fund beginning balance October 1, 2017, $124,985.89; + Deposits of $1,115.50 + Interest of $1.01; NVT Fire Department - $9,990.32: Crestas Volunteer Fire Department - $2,422.07; West Wilmerding Volunteer Fire Department - $2,518.54; Exoneration Refunds - $56.22 Ending balance as of 10/31/2017, $111,114.75.

Motion made by V. Paradine, seconded by G Beswick to authorize refunds for 2016 and 2017 to Riley and Maxine Merida, L&B 458-E-193 in the amount of $478.80 and Gary Greaves, L&B 643-G-26 in the amount of $524.74

ROLL CALL: *All in Favor*

FINANCE: *Commissioner Paradine*

Motion made by V. Paradine, seconded by G. Beswick, to approve the list of bills payable and paid in the amount of $239,083.80.

ROLL CALL: *All in Favor*

Motion made by V. Paradine, seconded by G. Beswick to authorize payment of $500.00 for t annual sponsorship program of the Turtle Creek Valley Council of Government Initiatives.
ROLL CALL: *All in favor*

Motion made by V. Paradine, seconded by G. Beswick to accept the quote from Hosack, Spec Muetzel and Wood LLP for preparing the audit for 2017 in the amount of $10,550.00.
ROLL CALL: *All in favor*

Motion made by V. Paradine, seconded by G. Beswick to rescind the motion from last month change the payroll company to Paytime and enter into a new agreement with our current company ADP.
ROLL CALL: *G. Beswick, yes; V. Paradine, yes; S. Juliano, yes; D. Roher, no; D. Mitchell, yes; R. Saula, yes; F. Bivins, yes*

Motion made by V. Paradine, seconded by R. Saula to pay the remainder of the Police Pensi MMO in the amount of $180,818.32 to PNC Bank.
ROLL CALL: *All in Favor*

Motion made by V. Paradine, seconded by G. Beswick to purchase a new floor buffer for the Community Center for a price not to exceed $1,100.00.
ROLL CALL: *All in Favor*

BLDG PERMITS: *Commissioner Roher*

POLICE & PUBLIC SAFETY: *Commissioner Saula*
Month of October 2017:
Total calls in NVT, 883; total arrests in NVT, 26;
Prisoner housing statistics: East McKeesport, 5; East Pittsburgh, 7; Turtle Creek, 4.

Motion made by R. Saula, seconded by G. Beswick to accept the grant from Allegheny Count District Attorney's Office in the amount of $4,803.46 to purchase equipment for the Tactical Team.
ROLL CALL: *All in favor*

FIRE: *Commissioner Saula*
Motion made by R. Saula, seconded by S. Juliano, to authorize payment to West Wilmerding VFC in the amount of $3428.16 from the 2017 Fire Tax Money.
ROLL CALL: *G. Beswick, no; V. Paradine, yes; S. Juliano, yes; D. Roher; yes; D. Mitchell, yes; R. Saula, yes; F. Bivins, yes.*

Motion made by R. Saula, seconded by S. Juliano, to authorize payment to Crestas VFC in th amount of $2,755.97 from the 2017 Fire Tax Money.
ROLL CALL: *All in favor*

Motion made by R. Saula, seconded by V. Paradine, to approve a loan in the amount of $250,000.00 to the 3 VFCs and Association for an SCBA equipment purchase to be repaid ov ten year period, and approve the execution of the loan agreement
ROLL CALL: *All in favor*

CODE ENFORCEMENT:
October 12, 2017 – November 8, 2017
Problem properties reported, 17; Code violations identified, 21; Code violation letters sent, 15; Code violation letter sent via Registered Mail, 2; Court Appearances, 2; Code Violation Issues resolved, 7.

ROAD DEPT: *Commissioner Juliano*
Motion made by S Juliano, seconded by V. Paradine to terminate the contract with Building Inspection Underwriters for fire inspection services.
ROLL CALL: *G. Beswick, no; V. Paradine, yes; S. Juliano, yes; D. Roher; no; D. Mitchell, no; R. Saula, yes; F. Bivins, yes.*

Motion made by S. Juliano, seconded by V. Paradine to make Al Hussey Fire Code Official.
ROLL CALL: *G. Beswick, no; V. Paradine, yes; S. Juliano, yes; D. Roher; no; D. Mitchell, no; R. Saula, yes; F. Bivins, yes.*

PARKS AND RECREATION: *Commissioner Mitchell*

SANITARY AUTHORITY: *Commissioner Paradine*
The 2018 NVTSA Budget was submitted with no increase in rates.
Motion made by V. Paradine, seconded by S. Juliano to approve the NVTSA 2018 Budget in the amount of $3,054,992.00
ROLL CALL: *All in favor*

ENGINEER'S REPORT: *Dave Gilliland*
Motion made by G. Beswick, seconded by V. Paradine to approve the additional quote of $4,590.00 from Jadell Minniefield for the demolition of 225 Versailles Avenue due to the requirements of the ACHD.
ROLL CALL: *All in favor*

Motion made by D. Mitchell, seconded by G. Beswick to cut weeds on property at Inwood and North Broadway.
ROLL CALL: *G. Beswick, yes; V. Paradine, no; S. Juliano, no; D. Roher; no; D. Mitchell, yes; R. Saula, no; F. Bivins, no*

SOLICITOR'S REPORT: *Greg Evashavik*

OLD BUSINESS:

.

NEW BUSINESS:

COMMISSIONER'S REMARKS:

Darryl Roher announced the Veteran of the Month as Mr. Gary Luther, 806 Maple Avenue, who was in the US Marine Corp from 1966-1972. Mr. Schaffer was a Corporal and served in Viet-Nam in various locations. Most notable was Cam-Lo where they took 30-40 artillery rounds from the North Vietnamese per day. He served in an Anti-Tank Platoon with 106 Howitzer Recoiless Rifled Cannons.

After the Marine Corps, Mr. Luther served for 12 years as a Sargent with the Army Reserve where he worked on helicopters.

Motion made by V. Paradine, seconded by G. Beswick to adjourn at 7:25 PM.

ROLL CALL: *All in favor*

TOWNSHIP MANAGER

ADOPTION OF THE TENTATIVE 2018 BUDGET
NOVEMBER 21, 2017

PLEDGE TO THE FLAG!

ROLL CALL OF THE COMMISSIONERS: *G. Beswick, present; V. Paradine, present; S. Juliano, present; D. Roher, present; D. Mitchell, present; R. Saula, absent; F. Bivins, present.*

PRESENTATION OF THE 2018 BUDGET:
Lengthy discussion on the budget being short by $167,306.00 and how we were going to balance it. One suggestion from Darryl Roher was to cut about $90,000.00 from the paving budget. No other suggestions were made to make cuts. It was decided that we would take the money from our savings to balance the budget and not make any cuts to the proposed budget.

Motion made by D Roher, seconded by V. Paradine, to adopt the Tentative Budget for 2018 in the amount of $7,843,646.00 consisting of $7,306,656.00 General Fund; $333,480.00 Liquid Fuels Fund; and $203,510.00 Fire Tax Fund.

ROLL CALL: *G. Beswick, no; V. Paradine, yes; S. Juliano, yes; D. Roher, yes; D. Mitchell, no; F. Bivins, yes.*

Motion made by V. Paradine, seconded by D. Roher to advertise an ordinance appropriating specific sums estimate to be required for the specific purposes of the municipal government hereinafter set forth during the year 2018.

ROLL CALL: *G. Beswick, no; V. Paradine, yes; S. Juliano, yes; D. Roher, yes; D. Mitchell, yes; F. Bivins, yes*

Motion made by V. Paradine, seconded by G Beswick to advertise an ordinance fixing the tax rate for the year 2018 at 7.25 mills, general fund and .5 mills fire tax.

ROLL CALL: *G. Beswick, yes; V. Paradine, yes; S. Juliano, yes; D. Roher, yes; D. Mitchell, yes; F. Bivins, yes*

Motion made by V. Paradine, seconded by G. Beswick, to display the 2018 Budget for a 20 day period in the Manager's Office during regular business hours and set the date for final adoption of the budget at our regular meeting on December 21, 2017 at 7 P.M.

ROLL CALL: *G. Beswick, yes; V. Paradine, yes; S. Juliano, yes; D. Roher, yes; D. Mitchell, yes; F. Bivins, yes*

Motion made by D. Roher , seconded by V. Paradine to adjourn at 7:15 P.M.
ROLL CALL: *All in favor*

TOWNSHIP MANAGER

Borough of East Pittsburgh
Council Meeting Minutes
December 19, 2017

The December 19, 2017 meeting of the East Pittsburgh Borough was called to order by Mr. Simon at 7:00 at the Citizens Center on Grandview Avenue. All recited the Pledge of Allegiance. Mrs. Navish took roll call.

Council Members Present:
Dennis Simon, Council President
Mary Carol Kennedy, Vice President
Paul Borkowski, Council Member
Joe Esposto, Council Member
Renee Pekarcik, Council Member

Others Present:
Greg Evashavik, Solicitor
Lori Fruncek, Police Chief
Dave Gilliland, Engineer
Denise Hartford
Eileen Navish, Office Manager and Tax Collector
Kimberly Weschler

Absent:
Margaret Huffman, Borough Secretary
Louis Payne, Mayor

Public:
Donna Cantania, Resident
Wayne Gregg, Resident
Jonathan Teacoach, MPF Manager
Jake Polochak, Attorney

ENGINEER'S REPORT

1. Alcosan Green Project

   This project has been completed.

   Two trees were destroyed because of a car accident that still need replaced.

2. 511-513 Western Ave Demolition

   We have submitted an application for emergency CD funding to demolish these buildings but have not received a response yet. The asbestos inspections have been completed. Liz at TCVCOG has been pestering the county for a response to no avail so she is sending them a letter stressing the urgency of this project. I have contributed some information for her letter detailing the dangers present.

   Mr. Gilliland stated that the county has given a verbal approval for grant to demolish property. We are waiting for the grant to come in.

3. CD 43 Wood Street Paving

   This project has been completed.

4. Union Railroad Viaduct Repair

   I have requested quotes from both Duquesne Light and Traffic Control Equipment and Supplies Inc., but have not received any quotes yet although Traffic Control did call to say they are working on a quote.

   Mr. Gilliland said that the job wasn't going to be started till 2018 and that it was a large job. There are a lot of wires connected to the Viaduct. Mr. Gilliland will be following up on getting the quotes.

5. Resolution on Unified Source of Reduction Efforts

   Alcosan is requesting Council pass a resolution approving the Source Flow Reduction Plan prepared last month and encouraging a unified approach to the Source Reduction matter. We recommend Council adopt the resolution.

Motion to Pass a Resolution Approving the Source Flow Reduction Plan

Ms. Kennedy made a motion to pass a resolution approving the Source Flow Reduction Plan.
Seconded by Mr. Esposto Motion Carried

Sink Holes at 507 and 509 Ridge Avenue

Ms. Kennedy asked Mr. Gilliland if he had any information on the sink holes and the curbs at 507 and 509 Ridge Avenue. Mr. Gilliland said he contacted the gas company and they are sending someone out from Lindy Paving who is their subcontractor. They were to get back to

Mr. Gilliland. Mr. Gilliland read a letter from Mr. Fitzgerald from Peoples Gas that he received November 22, 2017. It stated he was looking in to it and will check the pictures that they took before. The borough had just resurfaced Ridge Avenue less than a year before all this and it was beautiful. Since Lindy Asphalt is a sub-contractor of the gas company, they should be responsible. The Council understands that with the weather it will not be able to be done until the weather warms up. They would like it in writing that it will be fixed as well as it was before the work was done by Lindy Paving.

SOLICITORS REPORT

Sable Kennel Contract with an Addendum

Mr. Evashavik suggested that council add an addendum to the contract with Sable Kennel before signing.

Motion to Add an Addendum to the Contract with Sable Kennel Before Signing

Mrs. Pekarcik made a motion to have an addendum added to the contract with Sable Kennel before signing. Seconded by Ms. Kennedy. Motion Carried

POLICE REPORT

Chief Fruncek passed out the report for November.

Motion to Accept the Resignation of Officer James Johe

Mrs. Pekarcik made a motion to accept the resignation of Officer James Johe. Seconded by Mr. Borkowski Motion Carried

Motion to Ratify the Phone Vote to Hire Officer Benjamin Azzarello

Ms. Kennedy made a motion to ratify the phone vote to hire Officer Benjamin Azzarello at a rate of $12.00 an hour for a probationary period of up to ninety days. Seconded by Mrs. Pekarcik Motion Carried

Motion to Ratify the Phone Vote to Hire Officer Christopher Thompson

Mr. Esposto made a motion to ratify the phone vote to hire Officer Christopher Thompson at a rate of $12.00 an hour for a probationary period of up to ninety days. Seconded by Mr. Borkowski Motion Carried

Swearing in of Officers Benjamin Azzarello and Christopher Thompson

The Solicitor swore in Officers Benjamin Azzarello and Christopher Thompson because Mayor Payne was absent.

Parking Complaint from Donna Cantania of 813 Main Street and Wayne Gregg

Donna Cantania and Wayne Gregg were there wondering when she can start parking in front of her home. She had been towed because of a yellow line in front of her home nine months ago. Chief Fruncek is going to look into this to see if the yellow line still needs to be there. A concern was raised about children darting out behind parked vehicles.

COMMUNICATION'S REPORT

Resolution of the Borough Recognizing Eileen Navish as the Elected Tax Collector

Ms. Kennedy made a motion to accept the Resolution of the Borough recognizing Eileen Navish as the Elected Tax Collector and accepting the certified results from the Board of Elections in Allegheny County, which is required by the School District. Seconded by Mr. Esposto

Motion Carried

Ordinance of the Borough Setting the Millage Rate at 13.45

Mr. Esposto made a motion to accept the Ordinance of the Borough to set the millage at a rate of 13.45. Seconded by Mrs. Pekarcik Motion Carried

Motion to Accept the Resolution of the Borough Approving the Acquisition of Parcel 375-9-39

Ms. Kennedy made a motion to accept the resolution of the borough approving the acquisition of the empty lot at 107 Center Street. In accordance with the comprehensive plan, conflict of interest and code violation forms must be signed. Seconded by Mr. Esposto
Motion Carried

OLD BUSINESS

None

NEW BUSINESS

Motion to Pay December Bills

Mrs. Pekarcik made a motion to pay December bills. Seconded by Ms. Kennedy

Motion Carried

SWIF AUDIT- Safety Inspection for the Community Center, Borough Garage, Police Station, Tax Office, and Senior Center

SWIF came to Audit the Community Center, Borough Garage, Police Station, Tax office, Borough Office and Senior Center. The garage door at the Community Center is not closing and needs repaired. It is a safety issue. Council will look in to calling around to find a contractor to fix the

door. The SWIF Auditor, Jim Hutchison, told us that if we formed a safety committee and had monthly meetings we would be eligible for a 5% discount on our State Worker's Insurance Fund.

Motion to Start a Safety Committee

Mrs. Pekarcik made a motion to start a safety committee and have safety meetings once a month. Seconded by Ms. Kennedy Motion Carried

Motion to Approve November 21, 2017 Minutes with Corrections

Mr. Esposto made a motion to accept the November 21, 2017 minutes with corrections. Seconded by Mrs. Pekarcik Motion Carried

Motion to Pass the Budget Meeting Minutes with Corrections

Ms. Kennedy made a motion to accept the Budget Meeting Minutes with corrections. Seconded by Mr. Borkowski. Mr. Esposto abstained because he was not at the budget meeting.

Motion Carried

Motion to Approve the Condemnation Hearing Minutes from the November 21, 2017 Council Meeting

Mrs. Pekarcik made a motion to approve the Condemnation Hearing Minutes for 543 Sunnyside Avenue, 523 Center Street, and 517 Bessemer Avenue. Seconded by Mr. Esposto

Motion Carried

Motion to Approve the 2018 Budget

Ms. Kennedy made a motion to pass the budget for 2018 for $1,731,104 Seconded by Mr. Esposto. Motion Carried

Motion to Accept Kimberly Weschler as a Temporary Borough Secretary at a Rate of $11.50 an Hour for a Probationary Period of up to 90 Days.

Mrs. Pekarcik made a motion to accept Kimberly Weschler as a temporary borough secretary at a rate of $11.50 an hour for a probationary period of up to 90 days. Seconded by Ms. Kennedy

Motion Carried

Motion to Hire Adam McVeigh for the Department of Public Works at $14.50 an Hour

Ms. Kennedy made a motion to hire Adam McVeigh for the Department of Public Works at $14.50 an hour. Seconded by Mrs. Pekarcik Motion Carried

Motion to Hire Jacob Borkowski for the Department of Public Works and Snow Removal until January 19, 2018 at a Rate of $13.50 an Hour

Ms. Kennedy made a motion to hire Jacob Borkowski for the Department of Public Works and snow removal until January 19, 2018 at a rate of $13.50 an hour. Seconded by Mrs. Pekarcik Mr. Borkowski abstained. Motion Carried

Ms. Kennedy asked how many DPW employees were even needed. Mr. Simon said that Jake would be used for snow removal after training until he goes back to school. Jayante will continue part-time at $9.75 an hour. Chief Fruncek said that she has an officer with plowing experience and he can help in an emergency.

Motion to Accept the Resolution to Ban the Location of Category Four License Facilities in the Borough

Mrs. Pekarcik made a motion to accept the resolution to ban the location of category four license facilities in the borough. Seconded by Ms. Kennedy Motion Carried

A letter needs to be sent to the Gaming Commission by December 31, 2017.

Results of the Planning and Zoning Meeting

Mr. Simon stated that the results of the Planning and Zoning meeting were both passed 5-0. Mr. Evashavik stated that the Council can approve, deny, or approve with condition, anything that the Planning Commission passes. The Zoning Board is independent. If council doesn't agree with their decision, they can appeal with the Court of Common Pleas.

Motion to Accept the Conditional Use Application Presented by Merrion Oil & Gas

Mr. Esposto made a motion to accept the Conditional Use Application presented by Merrion Oil & Gas. Seconded by Mr. Borkowski Ms. Kennedy voted nay. Motion Carried

Discussion with Mr. Teacoach MPF Manager and Mr. Polochak of Merrion Oil & Gas as to next step in the negotiation process.

Mr. Simon asked Mr. Teacoach and Mr. Polochak what the next step was. Mr Teacoach stated that they provided a draft copy years ago. Mr. Esposto asked if the offer was still the same. Mr. Teacoach said that all offers are up for negotiation. Solicitor fees are also negotiable. We will get a small amount for impact fees when wells are drilled. Their Solicitor is more than willing to work with our Solicitor to draw up a letter for the state to possibly increase the amount of impact fees because the holes are drilled so close to East Pittsburgh. It was decided that there would be another meeting before Council would sign a lease.

Motion to Pass the Budget for 2018

Mrs. Pekarcik made a motion to pass the budget for 2018 for $1,731,104. Seconded by Mr. Esposto

Motion Carried

Broken Window on Old Pick Up Truck

Mr. Borkowski told council that the back window on the old pick up truck was accidently broken picking up trash. A board that was in the back of the truck bounced up and broke the window while throwing trash in. Mr. Simon will check out the options to getting it fixed.

Motion to Adjourn

Mrs. Pekarcik made a motion to adjourn a t 8:45PM

Respectfully submitted,

Denise Hartford
Kimberly Weschler

Denise Hartford
Kimberly Weschler
Borough Secretaries

MS4 Letter

A R M G r o u p I n c .

ARM Group Inc.
Engineers and Scientists

October 11, 2018

Certified Mail Article Number:

Municipal Secretary
North Braddock Borough
600 Anderson Street
North Braddock, PA 15104

Re: NPDES Individual Permit
ET Braddock 1H Well Pad
Merrion Oil & Gas
North Braddock Borough, North Versailles Township, and East Pittsburgh Borough, Allegheny County
ARM Project 180539

Dear Municipal Secretary:

ARM Group Inc. (ARM) is submitting this letter on behalf of Merrion Oil & Gas (Merrion) to notify you of their intent to submit an application for coverage under the Pennsylvania Department of Environmental Protection (DEP) National Pollutant Discharge Elimination System (NPDES) Individual Permit for Stormwater Discharges Associated with construction activities in North Braddock Borough, North Versailles Township, and East Pittsburgh Borough, Allegheny County, Pennsylvania. Merrion is submitting an individual NPDES permit for the proposed ET Braddock 1H Well Pad. As part of this application, Merrion is required to notify North Braddock Borough since the Borough is a Municipal Separate Storm Sewer System permittee.

Name of Applicant: Merrion Oil & Gas

Address of Applicant: 610 Reilly Ave., Farmington, NM., 87401-2634

Project Location: The location of the facility is shown on the attached Figure 1 – Site Location Map.

Site Coordinates: 40° 23' 35" N, 79° 50' 45" W

Pursuant to Act 14, P.L. 384, and Acts 67, 68 and 127, notice is hereby given that the Applicant is submitting the above referenced application. Acts 67, 68 and 127, which amended the Municipalities Planning Code (MPC), direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and

2548 Park Center Boulevard • State College, PA 16801
voice: (814) 272 – 0455 • fax: (814) 272 – 0467 • www.armgroup.net

specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

This permit application is being submitted to the Pennsylvania Department of Environmental Protection (PADEP) Southwest Regional Office. If you wish to submit comments to PADEP to become part of a land use review of this project, you must respond within 30 days to the PADEP Southwest Regional Office, 400 Waterfront Drive, Pittsburg, PA 15222, or by phone at 412-442-4000. If there are no land use comments received by the end of the comment period, PADEP will assume that there are no substantive land use conflicts and proceed with the normal application review process. For more information about the land review process, please visit www.dep.state.pa.us (directLINK: Land Use Reviews).

If you have any additional questions regarding this project, please call me at 814-272-0455, extension 2205.

Respectfully submitted,

ARM Group Inc.

Tessa M. Antolick

Tessa Antolick, P.E.
Senior Engineer/Director of Oil and Gas Services

Attachments:
Figure 1 – Site Location Map
Individual NPDES NOI

cc: Merrion Oil & Gas

7017 0530 0000 7342 0441

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at *www.usps.com®*.

OFFICIAL USE

Certified Mail Fee
$

Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $ _____
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- ☐ Certified Mail Restricted Delivery $ _____
- ☐ Adult Signature Required $ _____
- ☐ Adult Signature Restricted Delivery $ _____

Postage
$

Total Postage and Fees
$

Postmark Here

Sent To
Municipal Secretary
North Braddock Borough

Street and Apt. No., or PO Box No.
600 Anderson Street

City, State, ZIP+4
North Braddock, PA 15104

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

APPENDIX G

Pennsylvania Natural Diversity Inventory (PNDI) Receipt

A R M G r o u p I n c .

1. PROJECT INFORMATION

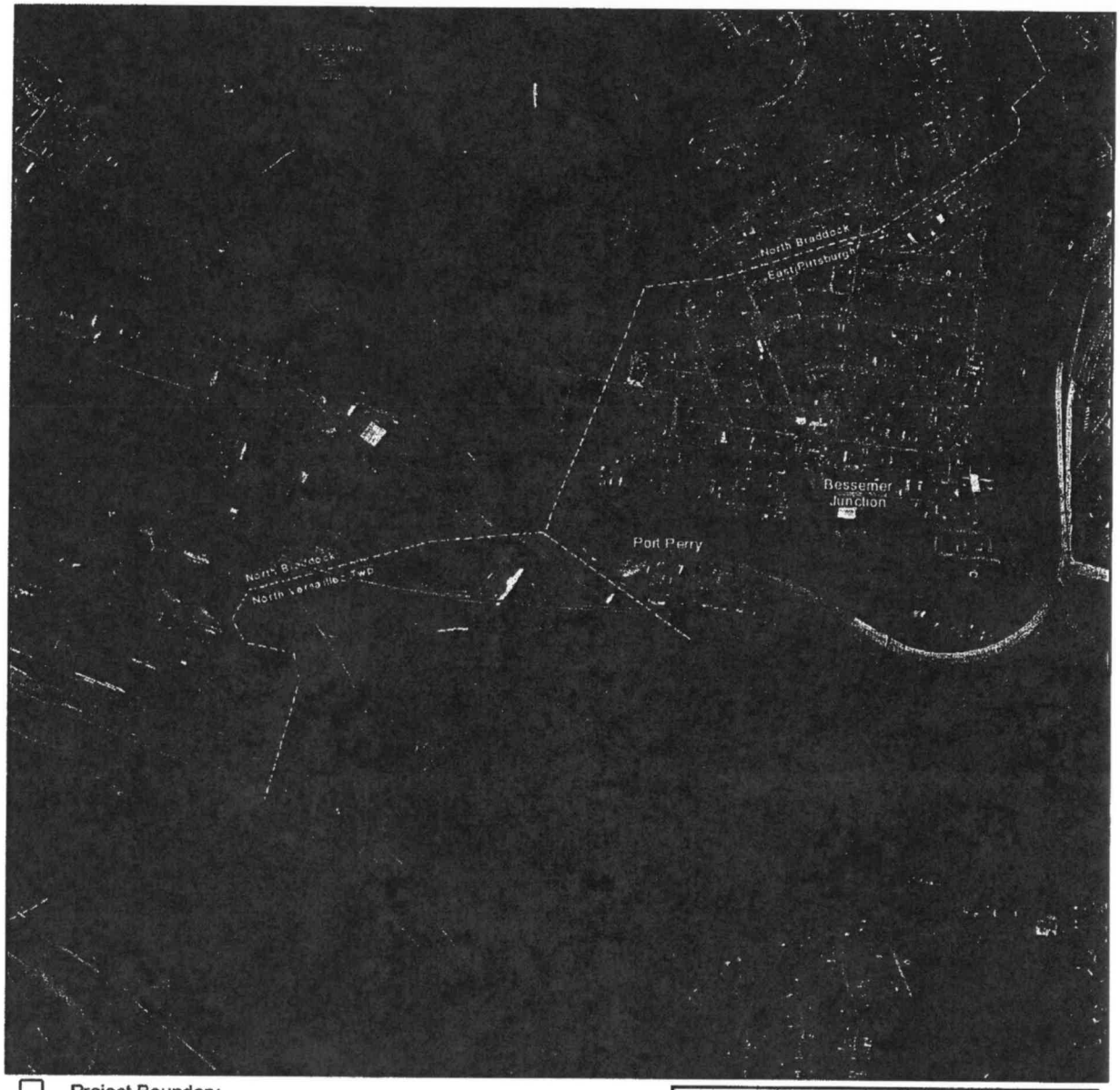
Project Name: **Merrion Oil & Gas ET Braddock 1H**
Date of Review: **5/17/2018 03:26:03 PM**
Project Category: **Mining, Oil or Gas (including roads and pipelines), New Well**
Project Area: **14.89 acres**
County(s): **Allegheny**
Township/Municipality(s): **EAST PITTSBURGH; NORTH BRADDOCK; NORTH VERSAILLES**
ZIP Code: **15104; 15112; 15137**
Quadrangle Name(s): **BRADDOCK**
Watersheds HUC 8: **Lower Monongahela**
Watersheds HUC 12: **Sawmill Run-Turtle Creek**
Decimal Degrees: **40.393331, -79.845723**
Degrees Minutes Seconds: **40° 23' 35.9905" N, 79° 50' 44.6044" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

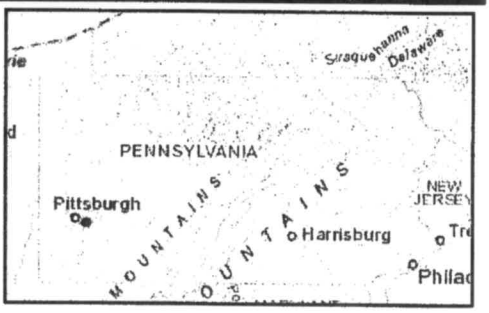
As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Merrion Oil & Gas ET Braddock 1H



☐ Project Boundary

☐ Buffered Project Boundary



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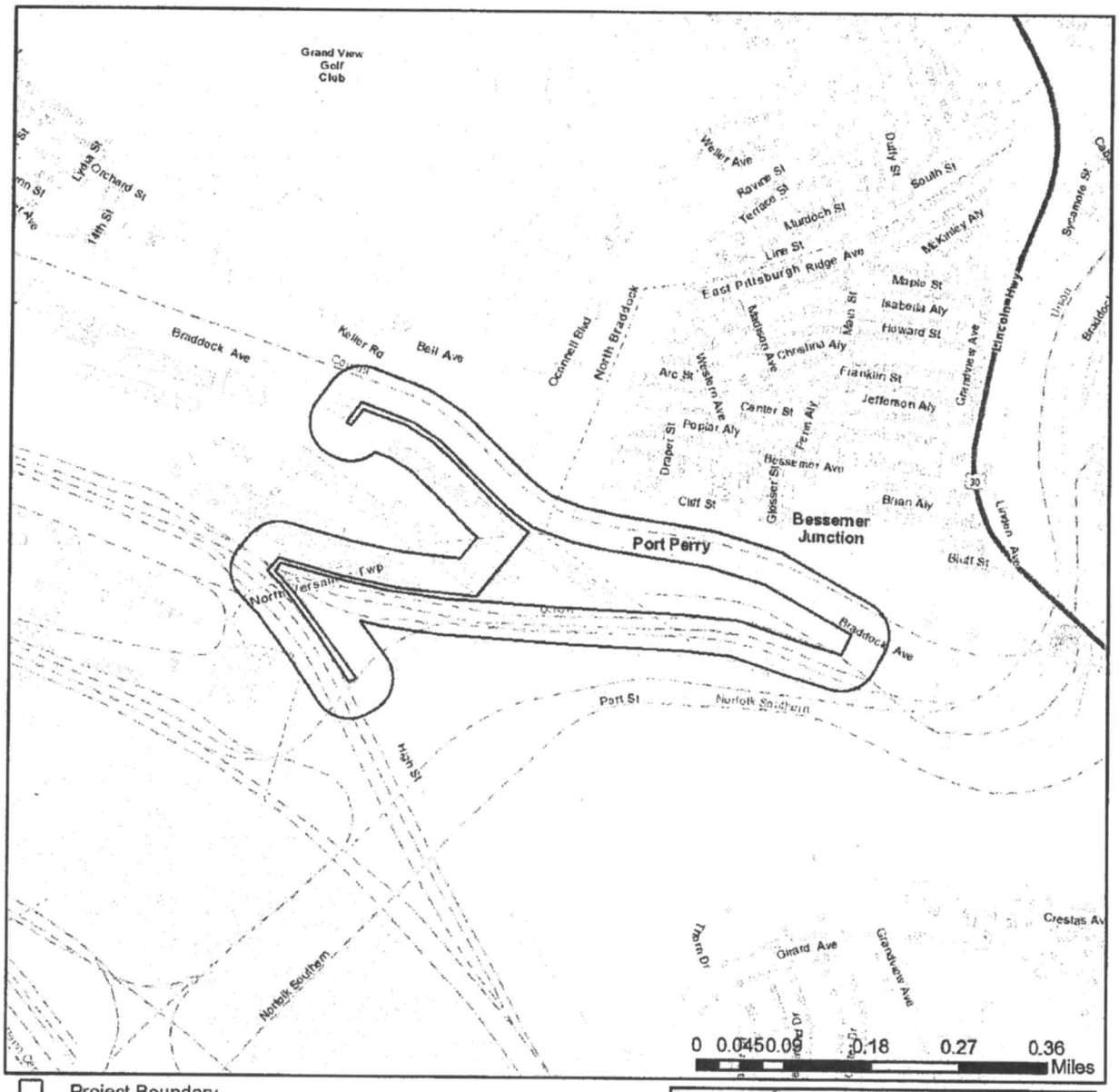
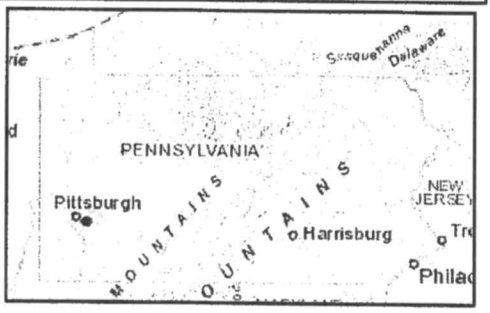
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

Merrion Oil & Gas ET Braddock 1H



☐ Project Boundary

☐ Buffered Project Boundary



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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission
RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources
RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission
RESPONSE:

Further review of this project is necessary to resolve the potential impact(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

Scientific Name	Common Name	Current Status
Lepomis gulosus	Warmouth	Endangered
Notropis buchanani	Ghost Shiner	Endangered
Toxolasma parvum	Lilliput	Special Concern Species*

U.S. Fish and Wildlife Service
RESPONSE:

No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, upload* or email* the following information to the agency(s). Instructions for uploading project materials can be found here. This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies. Alternatively, applicants may email or mail their project materials (see AGENCY CONTACT INFORMATION).
***Note:** U.S.Fish and Wildlife Service requires applicants to mail project materials to the USFWS PA field office (see AGENCY CONTACT INFORMATION). USFWS will not accept project materials submitted electronically (by upload or email).

Check-list of Minimum Materials to be submitted:
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____A map with the project boundary and/or a basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
In addition to the materials listed above, USFWS REQUIRES the following
____**SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552
Harrisburg, PA 17105-8552
Email: RA-HeritageReview@pa.gov

U.S. Fish and Wildlife Service
Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
NO Faxes Please

PA Fish and Boat Commission
Division of Environmental Services
595 E. Rolling Ridge Dr., Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

Name: Alex Trant
Company/Business Name: Trant Corporation
Address: 11279 Perry Hwy, Suite 206
City, State, Zip: Wexford, PA 15090
Phone: (724) - 935 - 7900 Fax: ( )
Email: aptrant@trantcorp.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Alex P. Trant
applicant/project proponent signature

5-18-18
date

Pennsylvania Fish & Boat Commission
Clearance Letter and Coordination Submission

A R M G r o u p I n c .

Pennsylvania Fish & Boat Commission

established 1866

Division of Environmental Services
Natural Gas Section
595 E Rolling Ridge Dr.
Bellefonte, PA 16823

June 11, 2018

IN REPLY REFER TO
SIR# 49603

Trant Corporation
Alexander Trant
11279 Perry Highway
Wexford, Pennsylvania 15090

RE: Species Impact Review (SIR) – Rare, Candidate, Threatened and Endangered Species
PNDI Search No. 657407_1
Merrion Oil & Gas ET Braddock 1H
ALLEGHENY County: East Pittsburgh Borough, North Braddock Borough, North Versailles Township

Dear Alexander Trant:

This responds to your inquiry about a Pennsylvania Natural Diversity Inventory (PNDI) Internet Database search "potential conflict" or a threatened and endangered species impact review. These projects are screened for potential conflicts with rare, candidate, threatened or endangered species under Pennsylvania Fish & Boat Commission jurisdiction (fish, reptiles, amphibians, aquatic invertebrates only) using the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files. These species of special concern are listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, and the Pennsylvania Fish & Boat Code (Chapter 75), or the Wildlife Code.

Freshwater Mussels and Fish

Rare or protected freshwater mussel and fish species are known from the vicinity of the project area. Freshwater mussels are the most imperiled taxonomic group in North America. Nearly 20% of the species historically known to occur in the Commonwealth are now extirpated (locally extinct). Additionally 60% of Pennsylvania's remaining species are of conservation concern. We are concerned about direct and indirect (i.e., runoff) effects that the proposed project may have on the species of concern. Freshwater mussel and fish species are extremely vulnerable to physical (i.e., siltation, dredging, trenching, rip-rap) and chemical (i.e., pH, temperature, dissolved oxygen, organic contaminants, heavy metals) changes to their aquatic environment. Therefore, we recommend construction techniques that eliminate in-stream work, sedimentation and changes to water quality. I recommend that you avoid any in-stream disturbance or water quality degradation during and after the project installation. Storm sewers and retention basins should be designed so as to minimize/remove all silt from the water before it is released into the stream. Strict erosion and sedimentation control measures, as well as best management practices should be employed. Provided that these recommendations are followed, in-stream work is

avoided, strict E&S control measures are maintained, and best management practices are employed, we do not foresee any significant adverse impacts from the proposed activity to the freshwater mussel or fish species of concern.

This response represents the most up-to-date summary of the PNDI data and our files and is valid for two (2) years from the date of this letter. An absence of recorded species information does not necessarily imply species absence. Our data files and the PNDI system are continuously being updated with species occurrence information. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered, and consultation shall be re-initiated.

If you have any questions regarding this review, please contact Gary Smith at 814-279-3080 and refer to the SIR # 49603. Thank you for your cooperation and attention to this important matter of species conservation and habitat protection.

Sincerely,

Gary A. Smith

Gary Smith
Natural Gas Section

GAS/dn

TRANT CORPORATION

Engineering Permits & Approvals

Environmental
Surveying
Site Civil
Traffic

May 21, 2018

PA Fish and Boat Commission
Division of Environmental Services
595 E. Rolling Ridge Drive
Bellefonte, PA 16823

Re: U.S.S. Mon Valley Works – Edgar Thomson Plant
East Pittsburgh Borough, North Versailles Township, Allegheny County

Dear Sir or Madam,

Trant Corporation is pleased to submit the enclosed documents to the PA Fish and Boat Commission, for an area of ground located within the Edgar Thomson Plant in East Pittsburgh Borough, and North Versailles Township Allegheny County, Pennsylvania. When completing a PNDI for the scope of work proposed to be carried out at the U.S.S. Mon Valley Works – Edgar Thompson Plant, the resulting PNDI receipt showed a potential impact within the PA Fish and Boat Commission. Please find the following included below:

- **1 Copy of the Project Narrative**
- **1 Copy of the Site Plan**
- **1 Copy of the signed Final Project Environmental Review Receipt**
- **1 Copy of Wetland Delineation Report**

If you have any questions or need more information, please do not hesitate to call.

Respectfully,

Alexander P. Trant

Cc: File #25383

11279 Perry Highway
Suite 206
Wexford, PA 15090

www.trantcorp.com
permits@trantcorp.com

(724) 935-7900 PH
(724) 935-6060 FX

PROJECT NARRATIVE

The current plans for the project includes the construction of an unconventional gas well and pad to supply natural gas to the US Steel facility as well as the access roads, utilities, storm water facilities, etc. necessary for the development.

Work that will be performed will include the installation of a sediment trap, channels, and all necessary storm water structures on site to manage all storm water runoff created. Erosion control such as rock construction entrances, silt socks, and erosion control matting will be placed in the proposed designated areas to ensure stability while earthmoving/grading is performed. Above ground water and gas utility lines, installation of the proposed gas well, drilling pad, access roads, and equipment contaminant area are all proposed to be constructed. Only after all storm water and erosion control measures proposed are in place, will construction of the gas well be allowed to commence.

The current physical characteristics of the site is gentle slopes with some moderate and steep slopes included. The current use of the proposed area is a gravel parking lot, railroad tracks, areas for various equipment storage, slag piles, staging areas, and an existing building. The current proposed area to be impacted is 13.56 acres.

1. PROJECT INFORMATION

Project Name: **Merrion Oil & Gas ET Braddock 1H**
Date of Review: **5/17/2018 03:26:03 PM**
Project Category: **Mining, Oil or Gas (including roads and pipelines), New Well**
Project Area: **14.89 acres**
County(s): **Allegheny**
Township/Municipality(s): **EAST PITTSBURGH; NORTH BRADDOCK; NORTH VERSAILLES**
ZIP Code: **15104; 15112; 15137**
Quadrangle Name(s): **BRADDOCK**
Watersheds HUC 8: **Lower Monongahela**
Watersheds HUC 12: **Sawmill Run-Turtle Creek**
Decimal Degrees: **40.393331, -79.845723**
Degrees Minutes Seconds: **40° 23' 35.9905" N, 79° 50' 44.6044" W**

2. SEARCH RESULTS

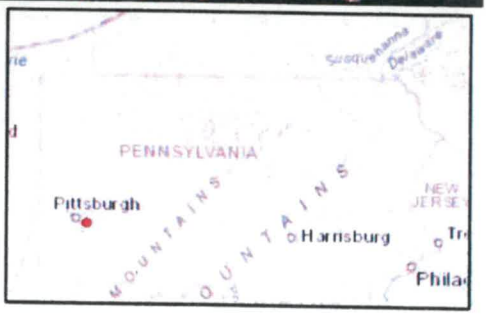
Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

Merrion Oil & Gas ET Braddock 1H

Project Boundary

Buffered Project Boundary

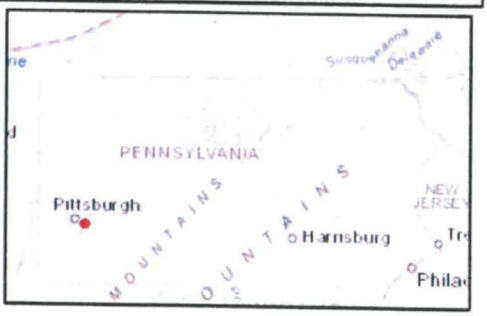


Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

Merrion Oil & Gas ET Braddock 1H

Project Boundary

Buffered Project Boundary



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission
RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources
RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission
RESPONSE:

Further review of this project is necessary to resolve the potential impact(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

Scientific Name	Common Name	Current Status
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***Note:** U.S.Fish and Wildlife Service requires applicants to mail project materials to the USFWS PA field office (see AGENCY CONTACT INFORMATION). USFWS will not accept project materials submitted electronically (by upload or email).

Check-list of Minimum Materials to be submitted:
_X_Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
_X_A map with the project boundary and/or a basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
In addition to the materials listed above, USFWS REQUIRES the following
_X_**SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
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The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552
Harrisburg, PA 17105-8552
Email: RA-HeritageReview@pa.gov

U.S. Fish and Wildlife Service
Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
NO Faxes Please

PA Fish and Boat Commission
Division of Environmental Services
595 E. Rolling Ridge Dr., Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

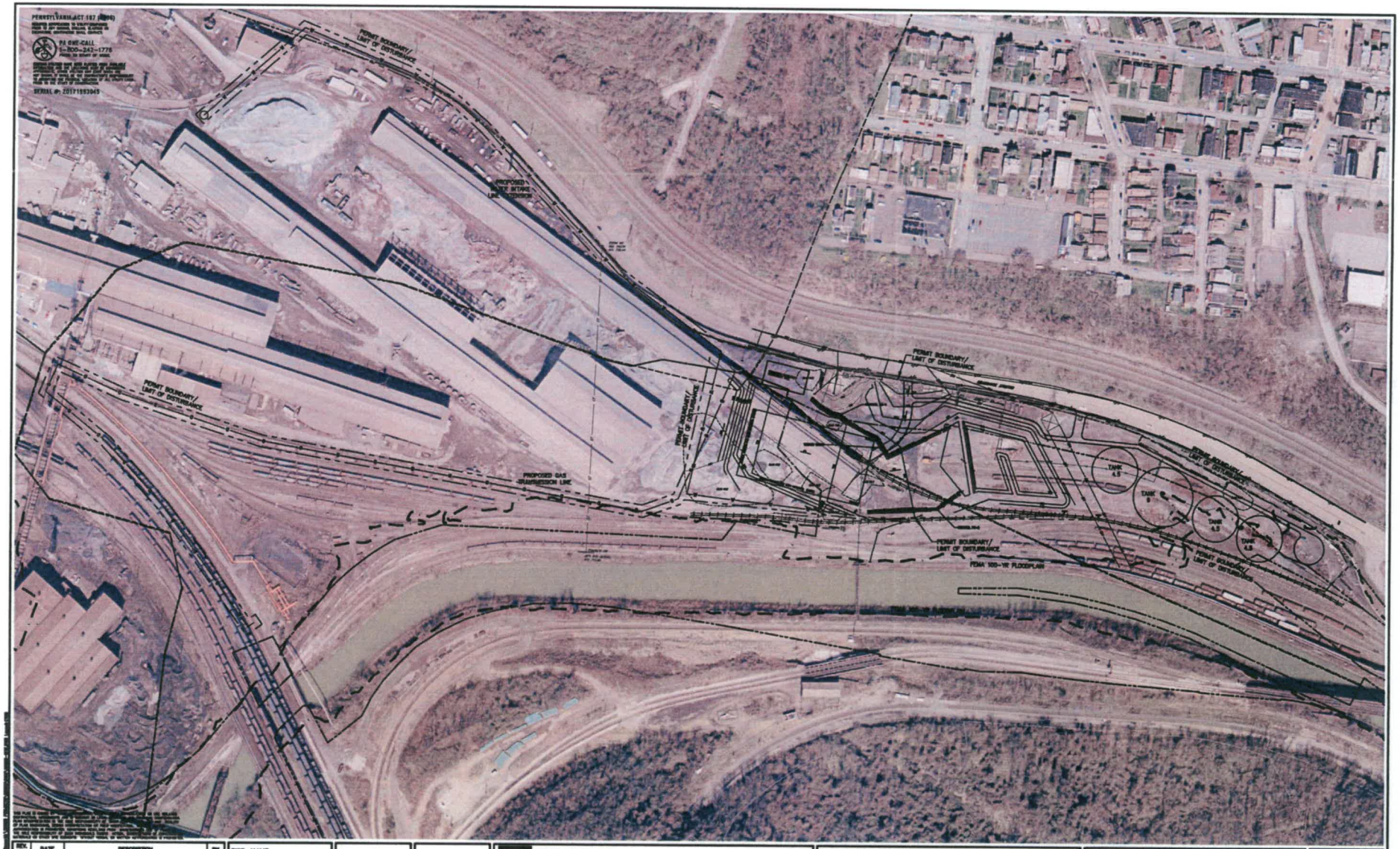
Name: Alex Trant
Company/Business Name: Trant Corporation
Address: 11279 Perry Hwy, Suite 206
City, State, Zip: Wexford, PA 15090
Phone: (724) - 935 - 7900 Fax: ( )
Email: aptrant@trantcorp.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Alex P. Trant
applicant/project proponent signature

5-18-18
date



REV. NO.	DATE	DESCRIPTION	BY

DWG. NAME: 25383-SITE
DRAWN BY: MDK
CHECKED BY: DJB

N
W E
S

TRANT CORPORATION
TRANT Engineering Permits & Approvals
PINE CENTER
11279 PERRY HIGHWAY SUITE 206
WEXFORD, PA 15090
Environmental
Surveying
Site Civil
Traffic
PHONE: (724) 935-7900
FAX: (724) 935-6060
EMAIL: permits@trantcorp.com

MERRION OIL & GAS ET BRADDOCK 1H

BRADDOCK BOROUGH - ALLEGHENY COUNTY - PA

100 0 50 100 200 400
1 inch = 100 feet

OVERALL SITE PLAN OVERLAY

PROJECT NO.: 25383 DATE: 05-21-2018

SHEET NO.
C103

APPENDIX H

Cultural Resources Review Documentation

A R M G r o u p I n c .

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

5 January 2018

Alexander Trant
Trant Corporation
11279 Perry Highway, Suite 206
Wexford, PA 15090

RE: ER 2018-0305-003-B
OTHER: Additional Information, U.S.S. Mon Valley Works Edgar Thomson Plant Gas Well Construction Project, East Pittsburgh Borough and North Versailles Township, Allegheny County

Dear Mr. Trant:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Archaeology

There is a high probability that archaeological resources are located in or near this project area. In our opinion, the activity described in your proposal should have no effect on such resources. Should the scope of the project be amended to include additional ground disturbing activity this office should be contacted immediately and a Phase I Archaeological Survey may be necessary to locate all potentially significant archaeological resources.

Above Ground

The properties listed below, listed in or eligible for the National Register of Historic Places, are located near the project area. In our opinion, the activity described in your proposal will have no effect on such resources. Should the scope and/or nature of the project activities change, the PA SHPO should be contacted immediately.

Resource Name: Edgar Thomson Works (Key # 107760)

If you need further information regarding archaeological resources, please contact Kira Heinrich at kiheinrich@pa.gov or (717) 705-0700. If you need further information on above ground resources please consult Cheryl Nagle at chnagle@pa.gov or (717) 772-4519.

Sincerely,

Douglas C. McLearen, Chief
Division of Archaeology & Protection

TRANT CORPORATION

Engineering Permits & Approvals

Environmental
Surveying
Site Civil
Traffic

December 14, 2017

Douglas C. McLearen
Pennsylvania State Historic Preservation Office
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093

Re: File No: ER 2018-0305-003-A
U.S.S. Mon Valley Works – Edgar Thomson Plant
East Pittsburgh Borough, North Versailles Township, Allegheny County

Dear Mr. McLearen:

Trant Corporation is pleased to resubmit the enclosed Historic Resource Survey Form and supporting documents for an area of ground located within the Edgar Thomson Plant in East Pittsburgh Borough, and North Versailles, Township Allegheny County, Pennsylvania. Please find 1 copy of the Historic Resource Survey Form along with the required information enclosed. Also please find the requested additional information enclosed via review letter dated December 12, 2017

If you have any questions or need more information, please do not hesitate to call.
Respectfully,

Alexander P. Trant

Cc: File #25383

11279 Perry Highway
Suite 206
Wexford, PA 15090

www.trantcorp.com
permits@trantcorp.com

(724) 935-7900 PH
(724) 935-6060 FX

Historic Resource Survey Form

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
Bureau for Historic Preservation

Key #
ER#
Date Prepared

Name, Location and Ownership *(Items 1-6; see Instructions, page 4)*

HISTORIC NAME Braddock's Field

CURRENT/COMMON NAME U.S.S. Mon Valley Works - Edgar Thomson Plant

OWNER NAME/ADDRESS United States Steel Corporation / 600 Grant Street RM 1381, Pittsburgh, PA 15219-2753

TOTAL NUMBER OF RESOURCES ____

COUNTY Allegheny **MUNICIPALITY** Braddock

USGS QUAD Braddock, PA

LOCATION East Pittsburgh Borough, North Braddock Borough, North Versailles Township

STREET ADDRESS 152, 198 11th Street, Braddock, PA **ZIP** 15104

CATEGORY OF PROPERTY ☐ Building ☒ District ☐ Object ☐ Site ☐ Structure

OWNERSHIP ☒ Private ☐ Corporate
☐ Public/Local ☐ Public/County ☐ Public/State ☐ Public/Federal

TAX PARCEL #/YEAR 0302-N-00036-0000-01/1980

Function *(Items 7-8; see Instructions, pages 4-6)*

Historic Function	Subcategory	Particular Type
Industry	Manufacturing Facility	Factory

Current Function	Subcategory	Particular Type
Industry	Manufacturing Facility	Factory

Property Features *(Items 15-17; see Instructions, pages 7-8)*

Setting Industrial/Industrial park

Ancillary Features
N/A

Acreage (round to nearest tenth) 26.01

Key #

ER#

Architectural/Property Information *(Items 9-14; see Instructions, pages 6-7)*

ARCHITECTURAL CLASSIFICATION

Commercial Style

EXTERIOR MATERIALS and STRUCTURAL SYSTEM

Foundation	N/A
Walls	N/A
Roof	Tin
Other	
Structural System	Steel Beams

WIDTH N/A (feet) or N/A (# bays) **DEPTH** N/A (feet) or N/A (# rooms) **STORIES/HEIGHT**

Historical Information *(Items 18-21; see Instructions, page 8)*

Year Construction Began 1873 ☐ Circa **Year Completed** 1875 ☐ Circa

Date of Major Additions, Alterations 1992 ☐ Circa ☐ Circa ☐ Circa

Basis for Dating ☒ Documentary ☐ Physical

Explain

Cultural/Ethnic Affiliation(s)

Associated Individual(s)

Associated Event(s)

Architect(s)

Builder(s)

Submission Information *(Items 22-23; see Instructions, page 8)*

Previous Survey/Determinations ASM International 1994

Threats ☐ None ☐ Neglect ☐ Public Development ☐ Private Development ☐ Other

Explain Gas Well

This submission is related to a ☐ non-profit grant application ☐ business tax incentive ☐ NHPA/PA History Code Project Review ☐ other

Preparer Information *(Items 24-30; see Instructions, page 9)*

Name & Title Alexander Trant - Draftsman

Date Surveyed 07/19/2017 **Project Name** U.S.S. Mon Valley Works - Edgar Thomson Plant

Organization/Company Trant Corporation

Mailing Address 11279 Perry Highway - suite 209, Wexford PA, 15090

Phone 724-935-7900 **Email** aptrant@trantcorp.com

Key #_____

ER#_____

National Register Evaluation *(Item 31; see Instructions, page 9)*

(To be completed by Survey Director, Agency Consultant, or for Project Reviews ONLY.)

☐ Not Eligible (due to ☐ lack of significance and/or ☐ lack of integrity)

☐ Eligible Area(s) of Significance _____

Criteria Considerations ____ Period of Significance _____

☐ Contributes to Potential or Eligible District District Name _____

Bibliography *(Item 32; cite major references consulted. Attach additional page if needed. See Instructions, page 9.)*

http://openbuildings.com/buildings/edgar-thomson-steel-works-profile-35058?_show_desription=1

https://www.asminternational.org/membership/awards/historical-landmarks

Additional Information

The following must be submitted with form. Check the appropriate box as each piece is completed and attach to form with paperclip.

- ☒ Narrative Sheets—Description/Integrity and History/Significance (See Instructions, pages 13-14)
- ☒ Current Photos (See Instructions, page 10)
- ☒ Photo List (See Instructions, page 11)
- ☒ Site Map (sketch site map on 8.5x11 page; include North arrow, approximate scale; label all resources, street names, and geographic features; show exterior photo locations; See Instructions, page 11)
- ☐ Floor Plan (sketch main building plans on 8.5x11 page; include North arrow, scale bar or length/width dimensions; label rooms; show interior photo locations; See Instructions, page 11)
- ☒ USGS Map (submit original, photocopy, or download ; See Instructions, page)

Send Completed Form and Additional Information to:

National Register Program
Bureau for Historic Preservation/PHMC
Keystone Bldg., 2nd Floor
400 North St.
Harrisburg, PA 17120-0093

Key #_____

ER#_____

Photo List (Item 33)

See pages 10-11 of the instructions for more information regarding photos and the photo list. In addition to this photo list, create a photo key for the site plan and floor plans by placing the photo number in the location the photographer was standing on the appropriate plan. Place a small arrow next to the photo number indicating the direction the camera was pointed. Label individual photos on the reverse side or provide a caption underneath digital photos.

Photographer name N/A

Date 10-20-2017

Location Negatives/Electronic Images Stored _____

Photo #	Photo Subject/Description	Camera Facing
1	Image 2102	
2	Image 2103	
3	Image 2104	
4	Image 2105	
5	Image 2106	
6	Image 2107	
7	Image 2108	
8	Image 2109	
9	Image 2110	
10	Image 2111	
11		
12		
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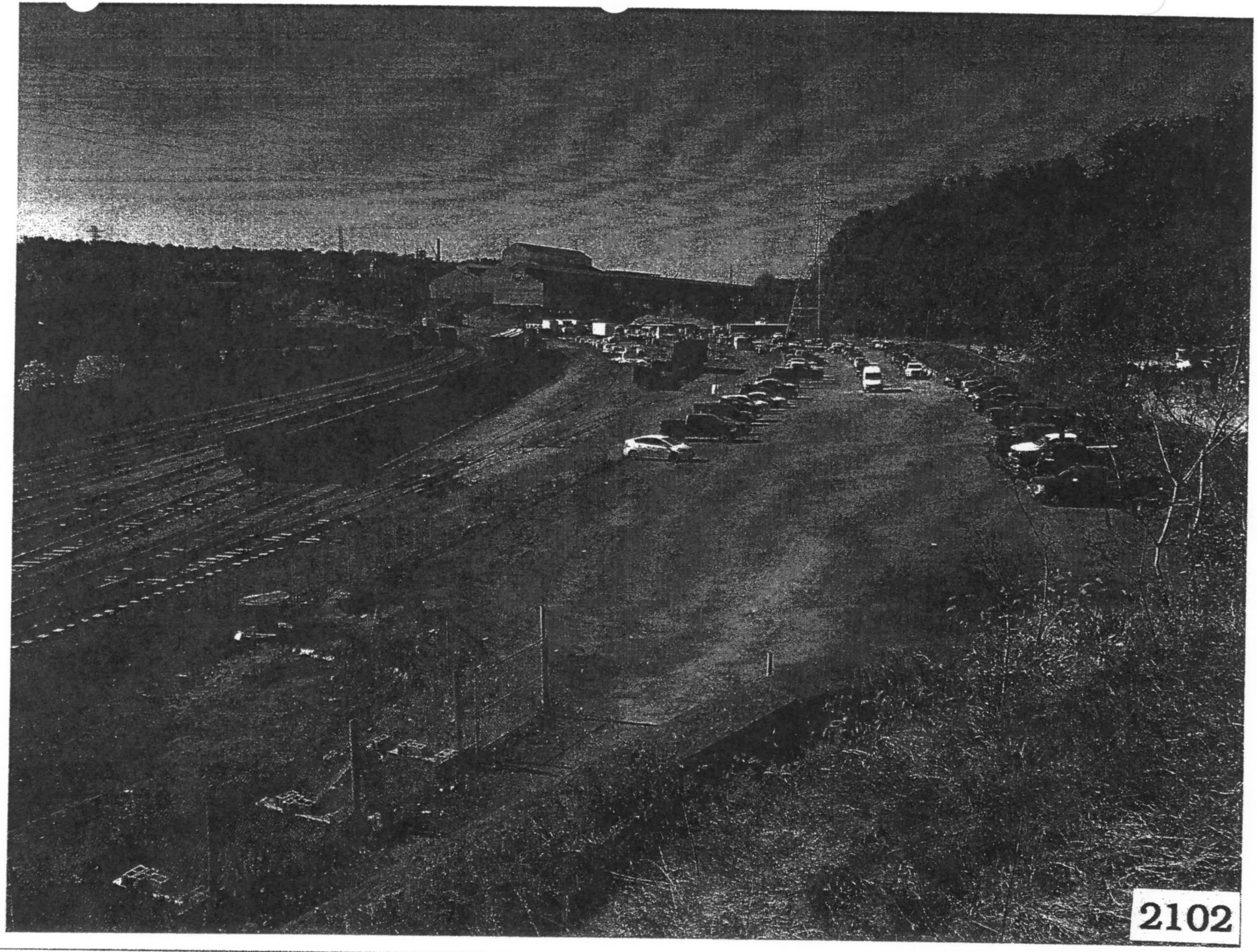

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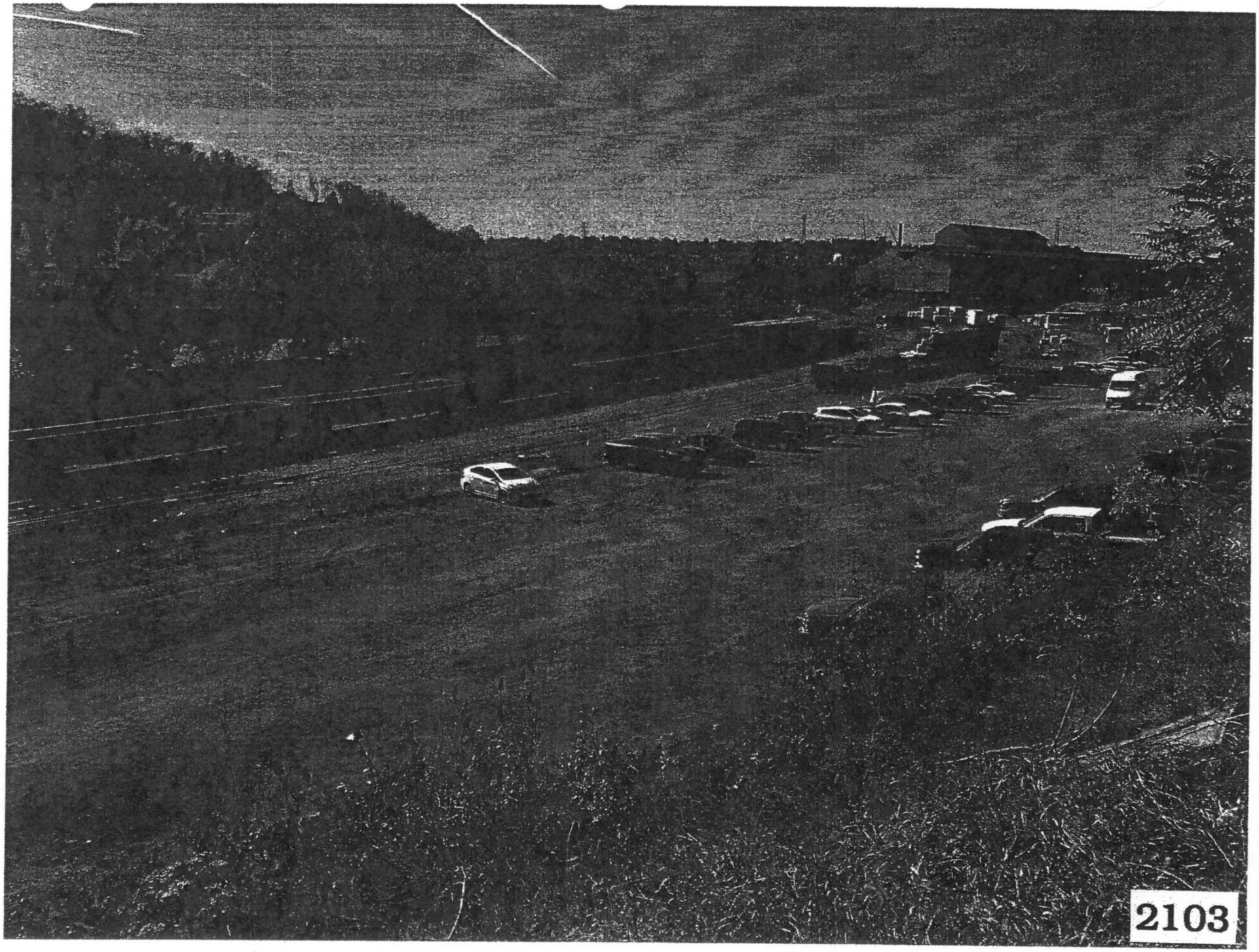
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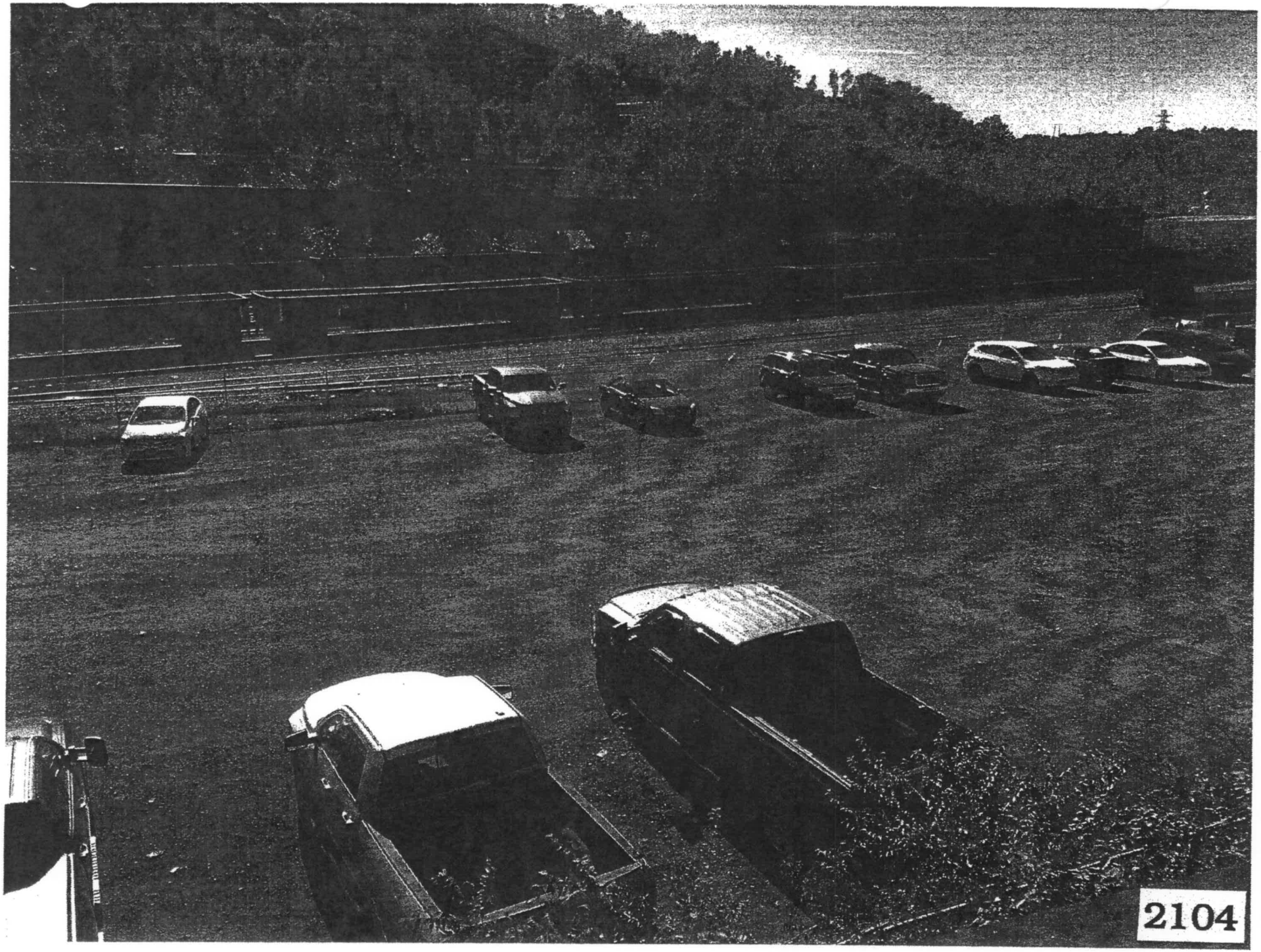
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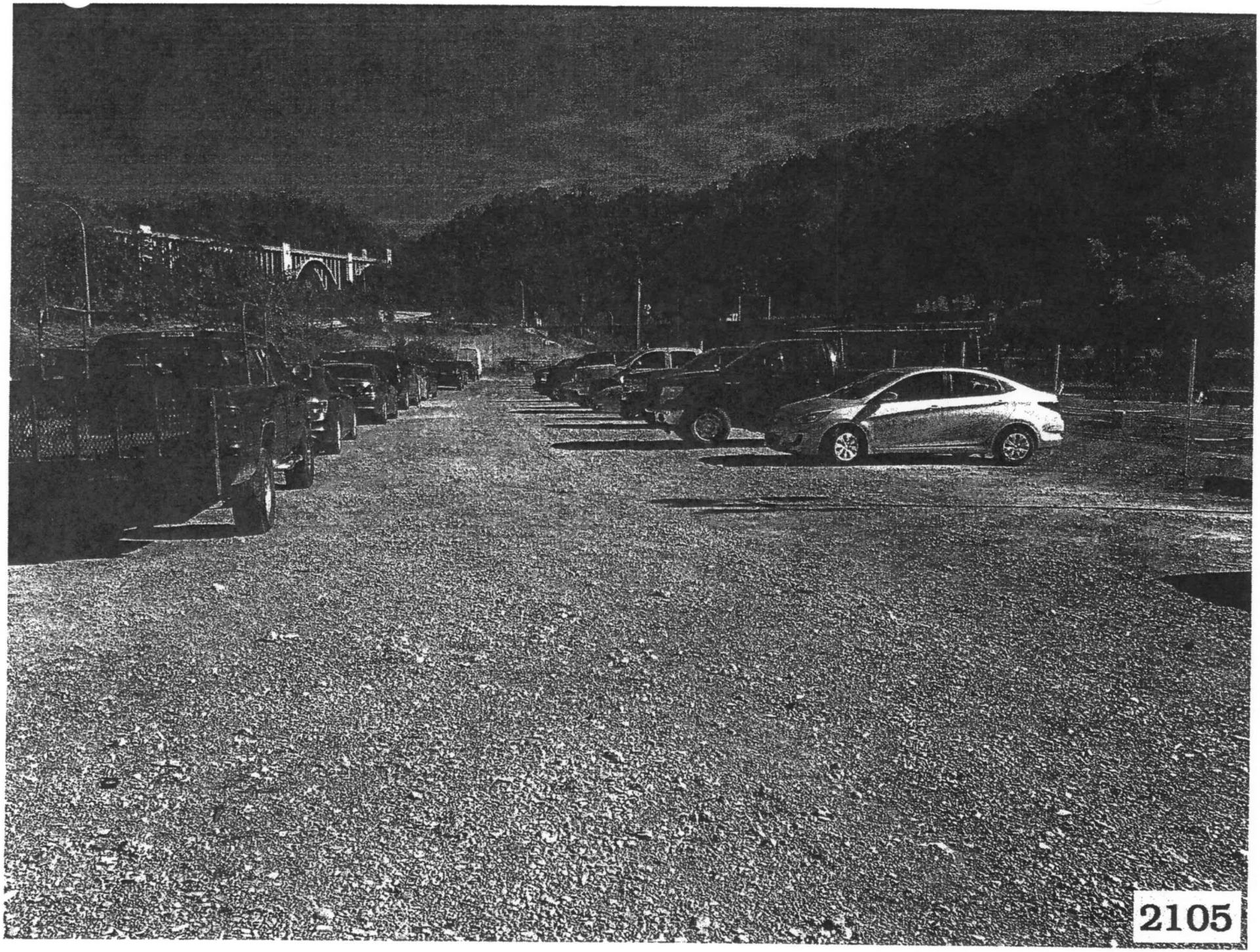

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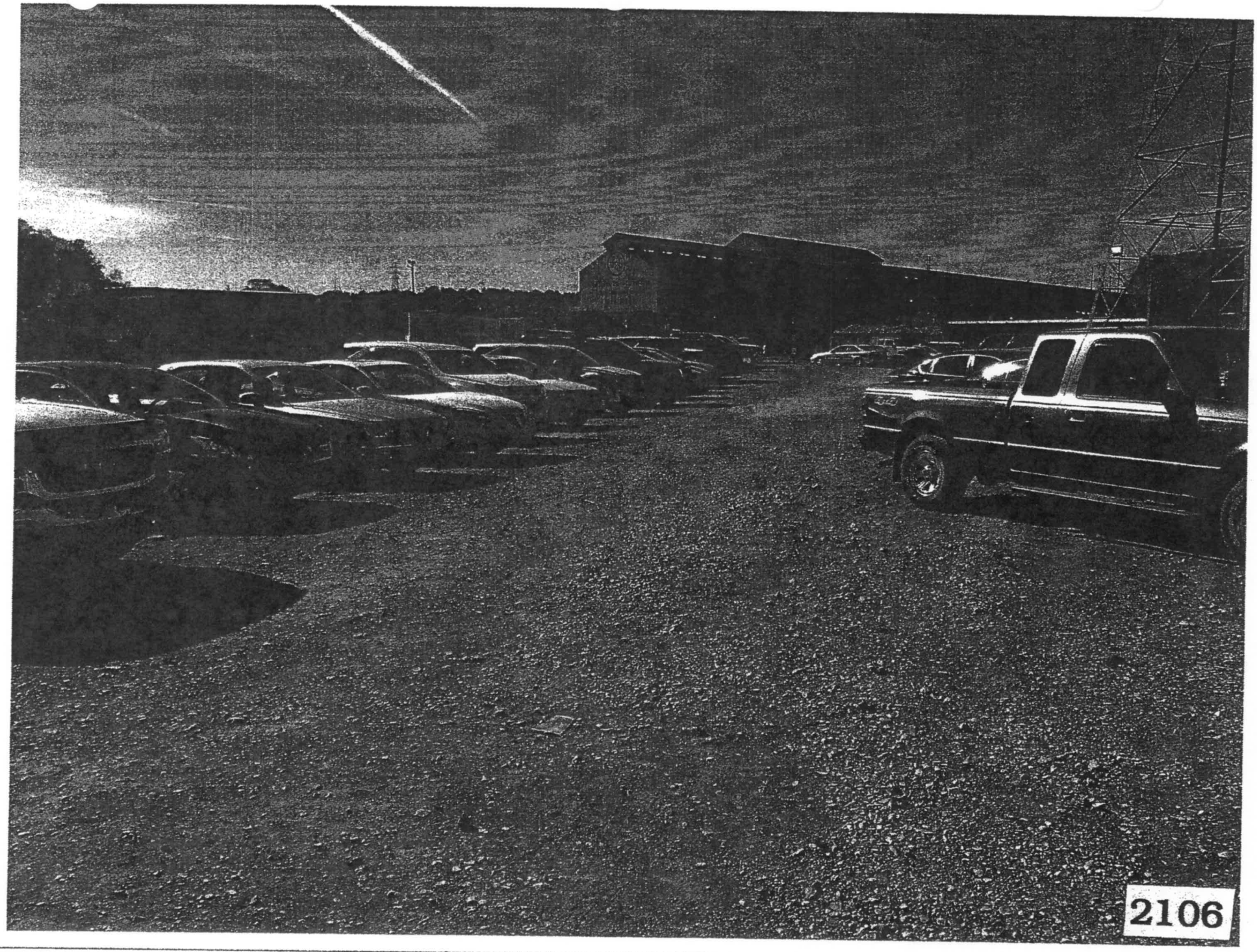

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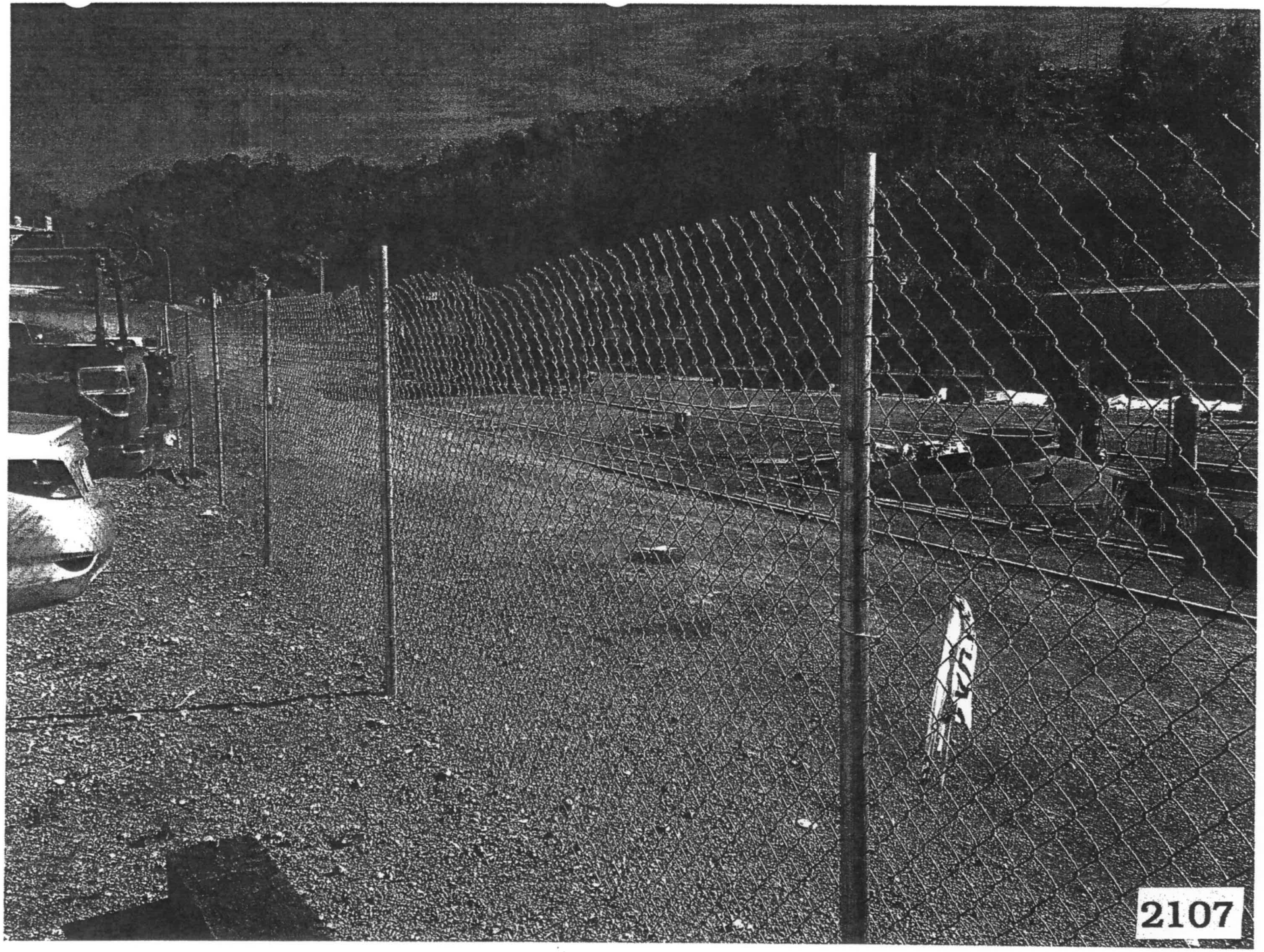

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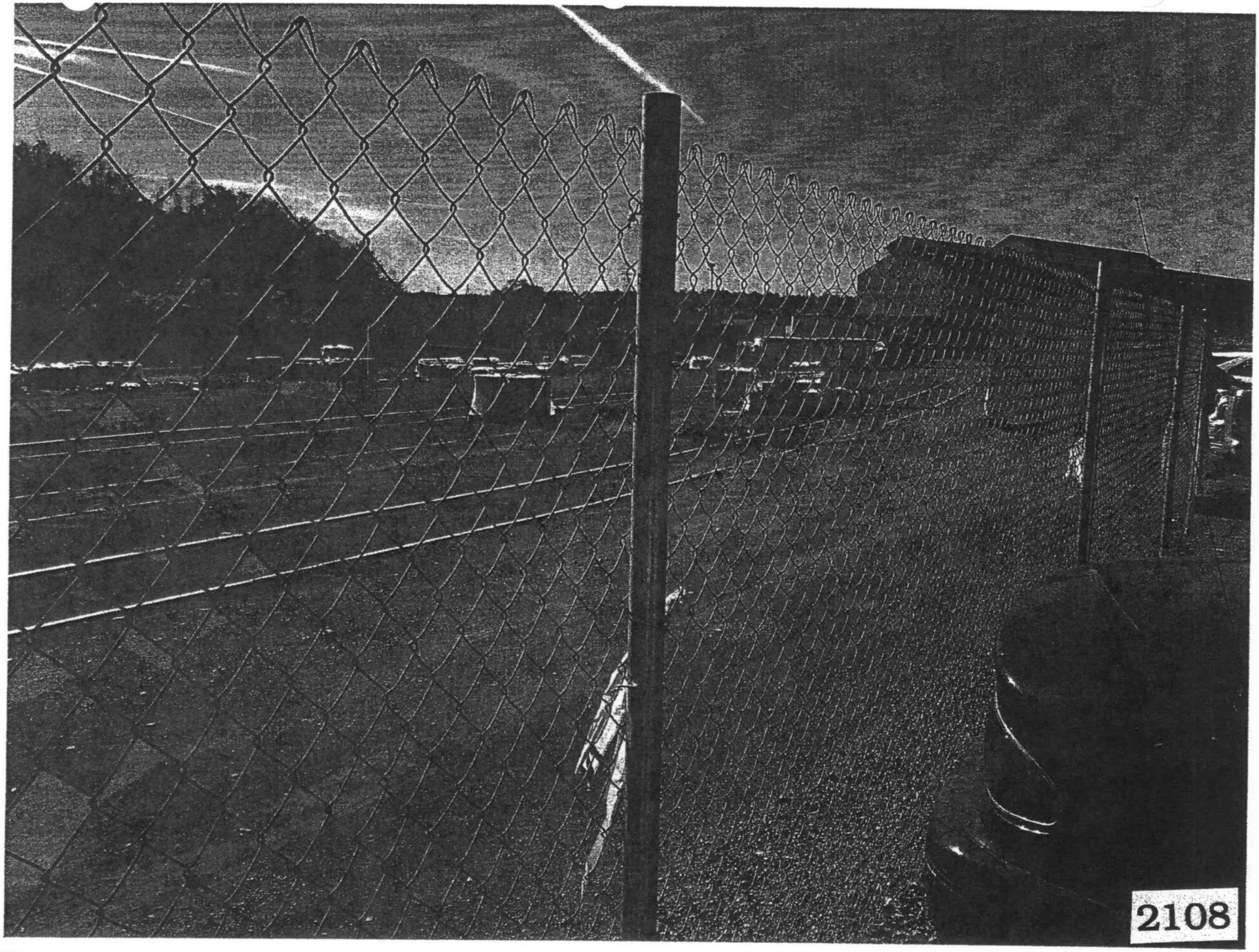
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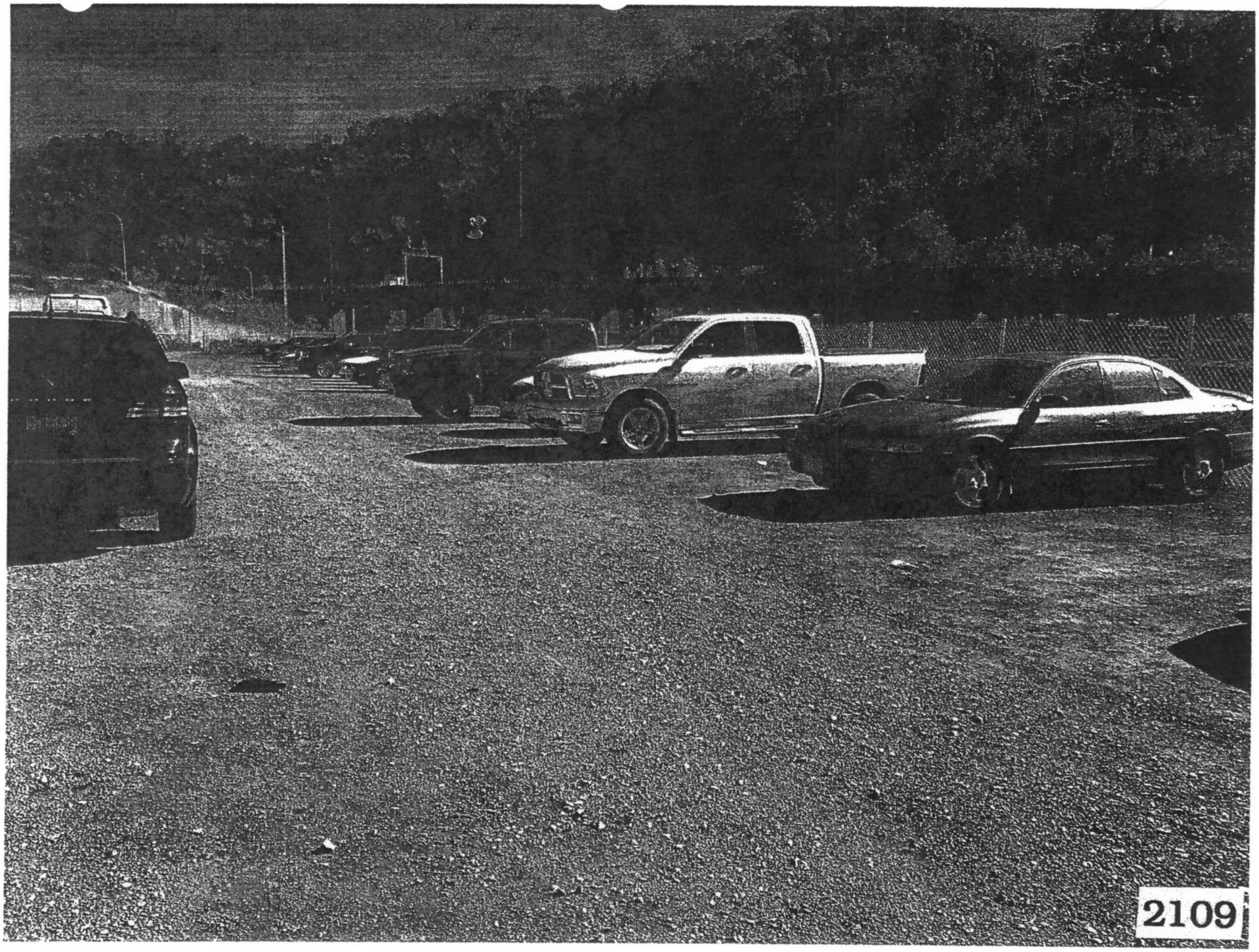

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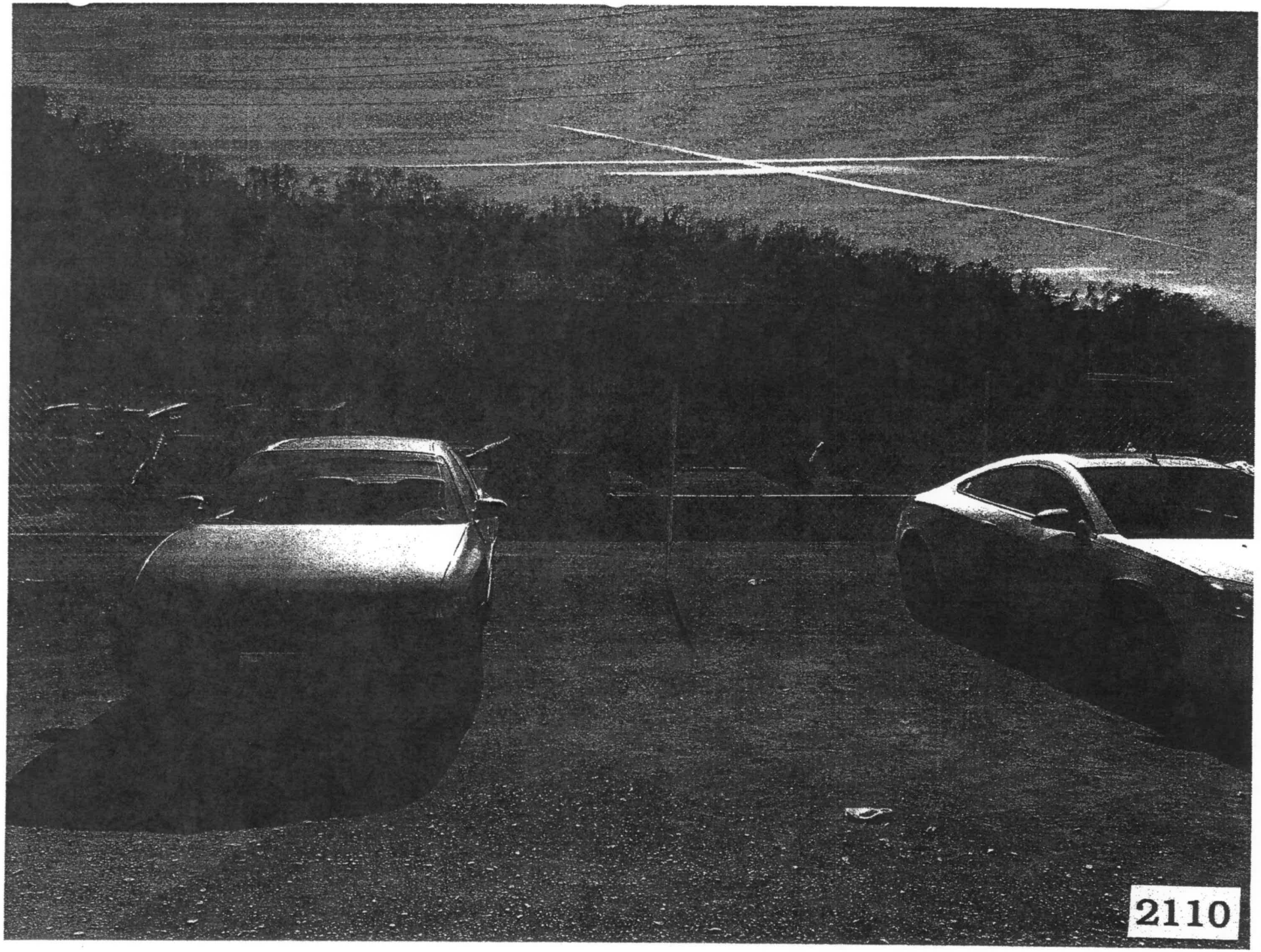
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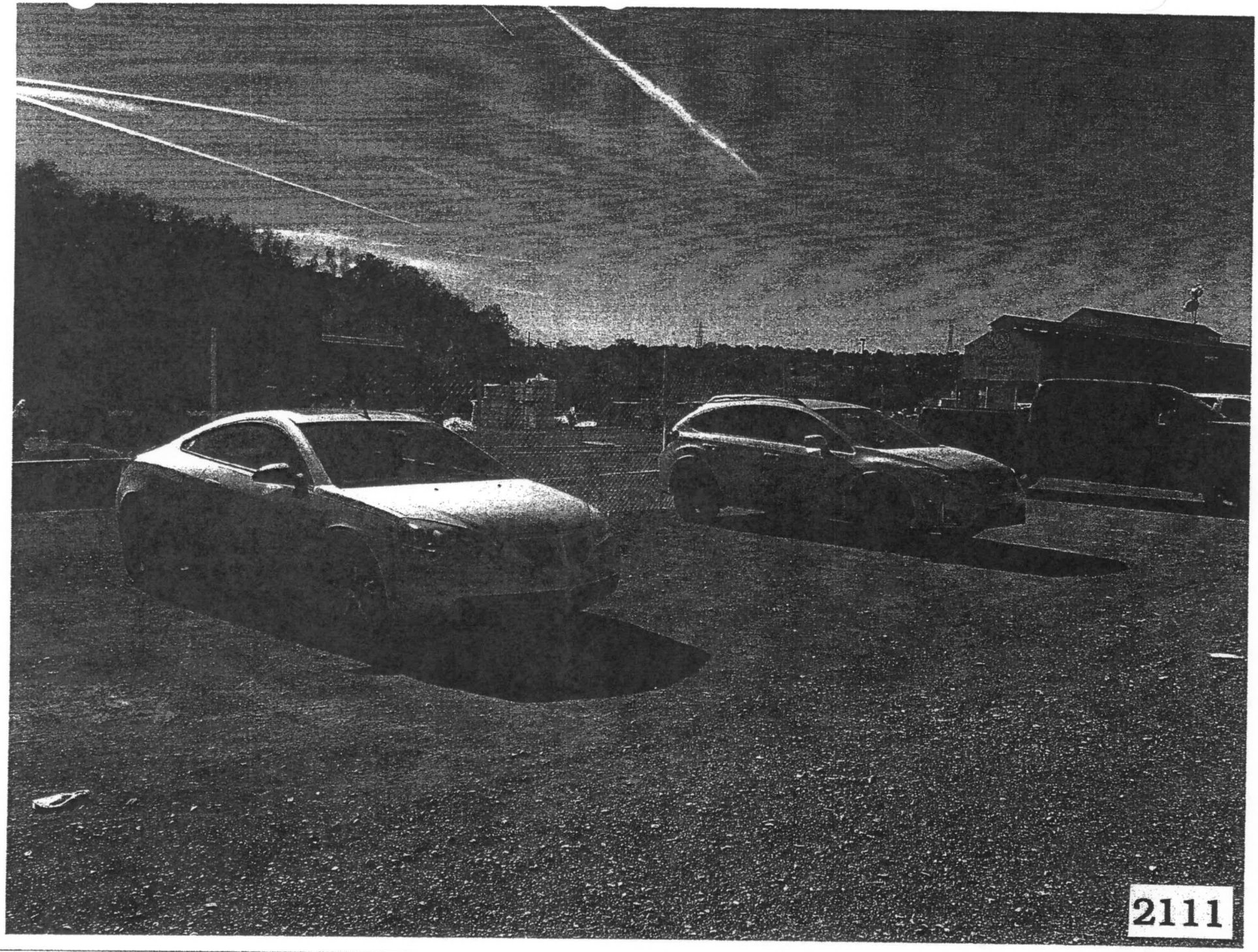

2111

REFERENCE: USGS 7.5' QUADRANGLE OF: BRADDOCK, PA

PROJECT NO.:	25383
DWG. FILE:	SITE LOCATION
DRAWN BY:	RLB
CHECKED BY:	MDK
DATE:	09-15-2017
SCALE:	1"=2000'

TRANT CORPORATION
Engineering Permits & Approvals
11279 PERRY HIGHWAY
SUITE 206
WEXFORD, PA 15090

U.S.S. EDGAR THOMSON WORKS

EAST PITTSBURGH BOROUGH, ALLEGHENY COUNTY, PA
NORTH BRADDOCK BOROUGH, ALLEGHENY COUNTY, PA
NORTH VERSAILLES TOWNSHIP, ALLEGHENY COUNTY, PA

SITE LOCATION MAP

Plot Date: 11/17/2017 1:02 PM File Name: M:\25000 PROJECTS\25383\DWG\25383-SITE-LOCATION.DWG

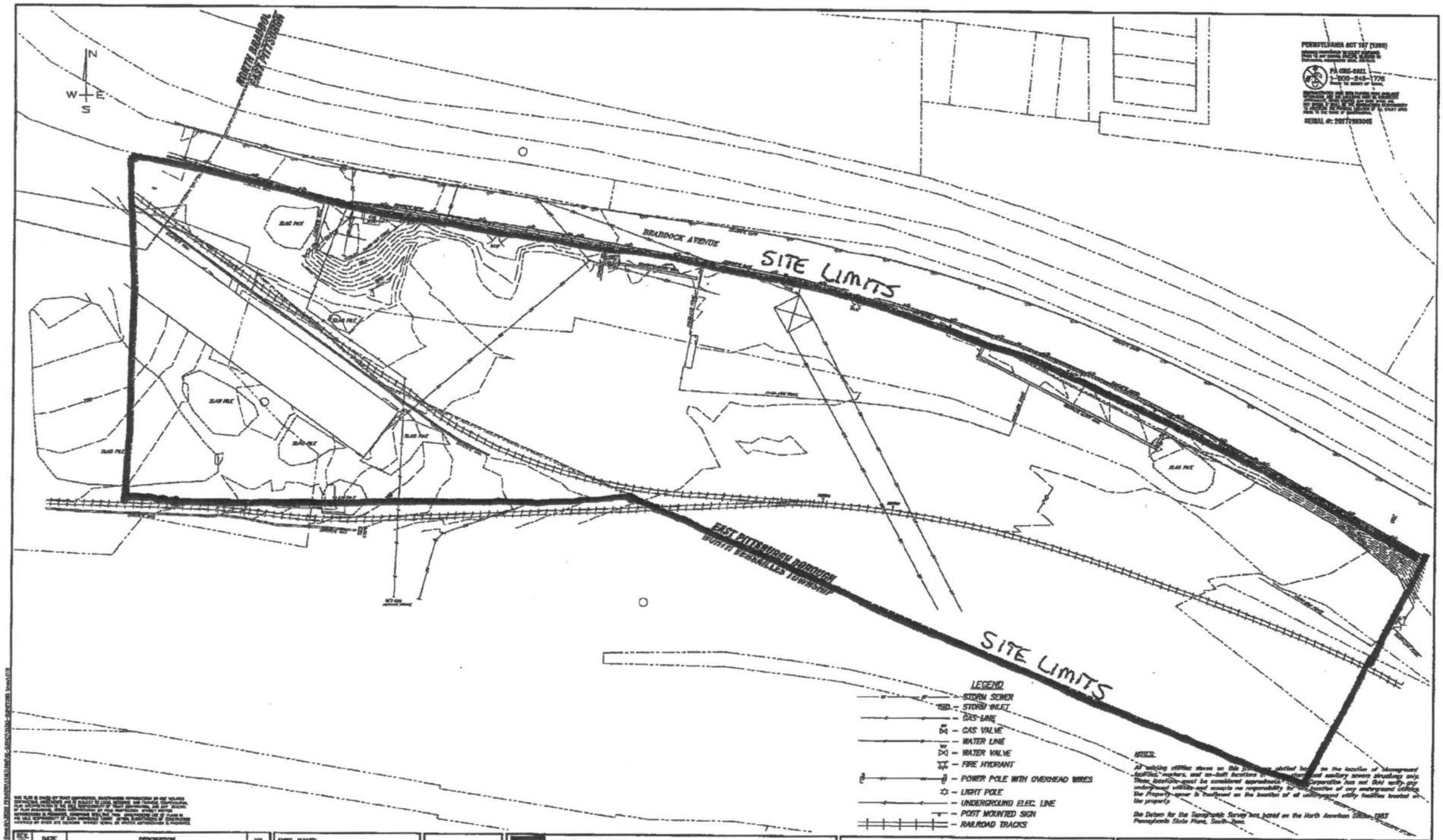
Key #_____

ER#_____

Site Plan (Item 34)

See page 11 of the Instructions for more information regarding the site plan. Create a sketch of the property, showing the footprint of all buildings, structures, landscape features, streets, etc. Label all resources and streets. Include a North arrow and a scale bar (note if scale is approximate). This sheet may be used to sketch a plan or another map/plan may be substituted.

Please see attached sheet.



REV. NO.	DATE	DESCRIPTION	BY

DWG. NAME: 25383-SURVEY
DRAWN BY: RLB
CHECKED BY: DJB

TRANT CORPORATION
Engineering Permits & Approvals
PINE CENTER
11279 PERRY HIGHWAY SUITE 208
WEXFORD, PA 15090

Environmental
Surveying
Site Civil
Traffic

PHONE: (724) 935-7900
FAX: (724) 935-8060
EMAIL: permits@trantcorp.com

USS MON VALLEY WORKS, EDGAR THOMSON PLANT
EAST PITTSBURGH BOROUGH, ALLEGHENY COUNTY, PA

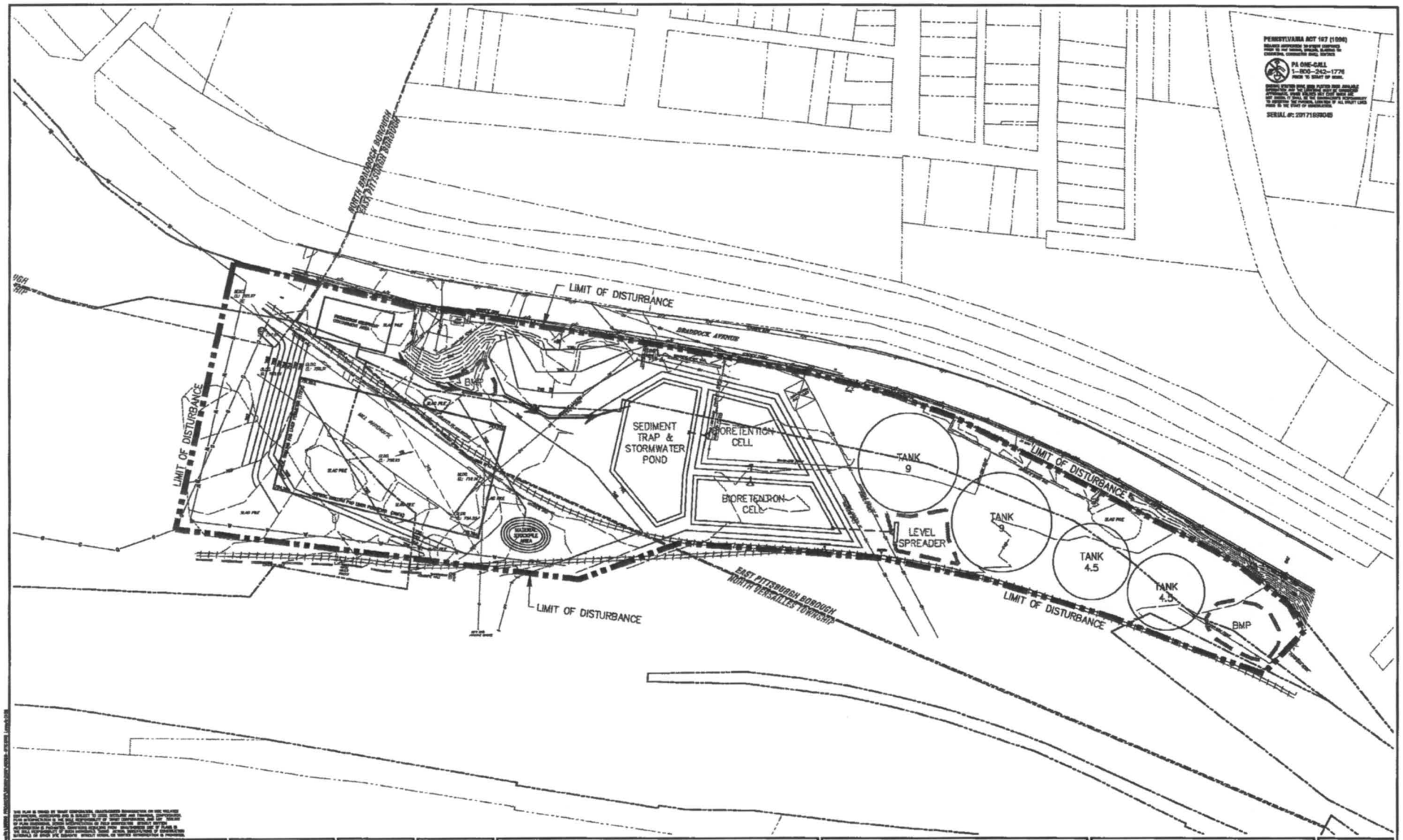
1 inch = 50 ft.

TOPOGRAPHIC SURVEY

PREPARED FOR
MERRION OIL & GAS

PROJECT NO.: 25383
SURVEY DATE: 07-10-2017
DRAWING DATE: 07-25-2017

SHEET NO.
C101



REV. NO.	DATE	DESCRIPTION	BY

DWG. NAME: 25383-SITE
DRAWN BY: RJB
CHECKED BY: DJB

N
W E
S

TRANT CORPORATION
Engineering Permits & Approvals
PINE CENTER
11279 PERRY HIGHWAY SUITE 206
WEXFORD, PA 15090

Environmental
Surveying
Site Civil
Traffic
PHONE: (724) 935-7900
FAX: (724) 935-5080
EMAIL: permits@trantcorp.com

U.S.S. EDGAR THOMSON WORKS
BRADDOCK BOROUGH - ALLEGHENY COUNTY - PA

60 0 30 60 120 240
1 inch = 60 feet

SITE PLAN

PROJECT NO.: 25383.01
DATE: 12/13/2017

SHEET NO.
C102

Key #_____

ER#_____

Floor Plan (Item 35)

See page 11 of the Instructions for more information regarding the floor plan. Provide a floor plan for the primary buildings, showing all additions. Label rooms and note important features. Note the date of additions. Include a North arrow and a scale bar (note if scale is approximate) or indicate width/depth dimensions. This sheet may be used to sketch a floor plan or another map/plan may be substituted.

N/A

Key #_____

ER#_____

Physical Description and Integrity (Item 36)

Provide a current description of the overall setting, landscape, and resources of the property. See page 13 of the Instructions for detailed directions. Continue on additional sheets as needed. Suggested outline for organizing this section:

- Introduction [summarize the property, stating type(s) of resource(s) and function(s)]
- Setting [describe geographic location, streetscapes, natural/man-made landscape features, signage, etc.]
- Exterior materials, style, and features [describe the exterior of main buildings/resources]
- Interior materials, style, and features [describe the interior of main buildings/resources]
- Outbuildings/Landscape [describe briefly additional outbuildings/landscape features found on property, substitute Building Complex Form if preferred; See Instructions, page 18]
- Boundaries [explain how/why boundaries chosen, such as historic legal parcel, visual natural features such as tree lines, alley separating modern construction, etc.]
- Integrity [summarize changes to the property and assess how the changes impact its ability to convey significance

(Text entered directly into form fields will not permit formatting adjustments, such as spell checking or italicizing. Instead, you may wish to cut-and-paste text from another document into the field below; "unprotect" the document for this section; or prepare the "Physical Description and Integrity" narrative as a separate document.)

Please see attached sheet.

Physical Description and Integrity

The U.S.S Mon Valley Works – Edgar Thomson Plant is located in East Pittsburgh Borough, North Braddock Borough, and North Versailles Township, Allegheny County, Pennsylvania. The site area is located in the eastern end of the property. This area is a laydown area for the steel mill. The Edgar Thomson Plant has been in operation since the 1800s and is currently still operating. The site area is boarded to the north by borough or township residents and to the south by the Monongahela River. The site is owned and maintained by United States Steel.

The proposed site is currently used as a graded gravel parking lot, laydown area, slag stockpile area, and box car storage area. All proposed work is located on an existing developed area. The proposed work is the construction of a gas well and will include grading of a drilling pad, production equipment containment area, material stockpile, a sediment trap, storm water detention system, stormwater pipes & structures, and four water tanks to be constructed within the limit of disturbance of the proposed site area.

Key #_____

ER#_____

History and Significance (Item 39)

Provide an overview of the history of the property and its various resources. Do not substitute deeds, chapters from local history books, or newspaper articles. See page 14 of the instructions for detailed directions. Continue on additional sheets as needed. Suggested outline for organizing this section:

- History [Summarize the evolution of the property from origin to present]
- Significance [Explain why the property is important]
- Context and Comparisons [Describe briefly similar properties in the area, and explain how this property compares]

(Text entered directly into form fields will not permit formatting adjustments, such as spell checking or italicizing. Instead, you may wish to cut-and-paste text from another document into the field below; "unprotect" the document for this section; or prepare the "History and Significance" narrative as a separate document.)

Please see attached sheet.

History and Significance

Based on our research the mill occupies the historic site of Braddock's Field, on the banks of the Monongahela River east of Pittsburgh, Pennsylvania. On July 9, 1755, in the Battle of the Monongahela, French and Indian forces from Fort Duquesne defeated the expedition of British General Edward Braddock, who himself was mortally wounded. Braddock's Field also was the site of a rally of rebellious militiamen and farmers during the Whiskey Rebellion, prior to a massive march on the city of Pittsburgh on August 1, 1794. The site is on the banks of the Monongahela, which provides cost-effective, riverine transportation of coke, iron and finished steel products. The Edgar Thomson Plant was designed and built because of the Bessemer process, the first inexpensive industrial process for the mass production of steel.

On January 1, 1873, ground work broke on the Edgar Thomson Plant. On August 22, 1875, the Edgar Thomson Plant's Bessemer converter produced its first heat of liquid steel. The mill was capable of producing 225 tons of steel rails per day. In 1892, the workers of the plant took part in the one of the most serious strikes in U.S. history, The Homestead Strike. In 1901, Carnegie sold the Carnegie Steel Company, including the Edgar Thomson Plant, to J. P. Morgan, Elbert H. Gary and other investors, as part of the foundation of U.S. Steel.

Today, two blast furnaces (Furnaces No.1 and No. 3) continue in operation at the Edgar Thomson Plant, which remains part of U.S. Steel. In 2005, the mill produced 2.8 million tons of steel, equal to 28% of U.S. Steel's domestic production. Among improvements to its physical plant is a $250 million continuous caster installed in 1992.

In April 1995, the mill was designated a historic landmark by ASM International, a society that honors works of structural engineering. Other structures honored by the society are the Statue of Liberty and the Eiffel Tower.

http://openbuildings.com/buildings/edgar-thomson-steel-works-profile-35058?_show_description=1

APPENDIX I

Wetland and Waterbody Delineation Report

A R M G r o u p I n c .

Ecotune
ENVIRONMENTAL CONSULTANTS

215 EXECUTIVE DRIVE, SUITE 204
CRANBERRY TOWNSHIP, PA 16066
VOICE (724) 779-9010
FAX (724) 779-9011

Wetland Delineation and Watercourse Identification Report
ET-Braddock Well Pad Project Area
North Braddock & East Pittsburgh Boroughs / North Versailles Township, Allegheny County, PA

Prepared For:
Marion Oil & Gas Corporation
610 Reilly Avenue
Farmington, NM

September 2017
Revised April 2018

1.0 PROJECT LOCATION AND DESCRIPTION

Ecotune Environmental Consultants was retained by Marion Oil & Gas Corporation to conduct a wetland and watercourse investigation of a portion of the Edgar Thomson Works (the Site), located along the south side of Braddock Avenue in North Braddock and East Pittsburgh Boroughs and North Versailles Township, Allegheny County, PA. The Site consists of the eastern end of the overall Edgar Thomson Works plant. And is the potential future site of a gas well development area.

The vast majority of the Site consists of developed land inclusive of warehouse space, access ways, railroad tracks, stockpile areas and a very small extent of old field habitat.

According to the Braddock, PA USGS Map, no "blue-line" streams are located on the Site. However, it is likely that a stream enclosure is located through the central portion of the Site (flowing from north to south).

The Site is depicted in Figure 1 (Location Map, Braddock, PA, USGS Map), Figure 2 (2016 Google Aerial Image), Figures 3 & 3A (Proposed Conditions Plans), Figures 4 and 4A (USDA Soils Map and Legend), and Figure 5 (National Wetland Inventory Map).

This Report identifies and delineates all jurisdictional watercourses and wetlands within the limits of the Site.

2.0 WETLAND DELINEATION METHODOLOGY

The methodology used to determine the existence and extent of jurisdictional wetlands is set forth in the 1987 Corps of Engineers Wetland Delineation Manual. This manual has been supplemented by a number of regional supplements to more accurately delineate wetland in the United States. Because of its location, the Site was delineated using the *U. S. Army Corps of Engineers. 2012 Regional Supplement to the Corps of Engineers Wetland delineation Manual: Eastern Mountain and Piedmont Region.*

No recent development or earthmoving has occurred within the Site. Therefore, the Routine Onsite Determination Method was invoked due to the undisturbed nature of the Site (the soils, hydrology and/or vegetation have not been recently or significantly disturbed).

entified wetlands were classified using the Cowardin Classification system and were delineated using the three parameter approach, inclusive of vegetation, hydrology and soil evaluation. According to the three parameter approach, all three criteria must be evaluated and must meet specific standards in order for an area to be considered a wetland. These three criteria are as follows:

1. Hydrophytic Vegetation Indicators: Hydrophytic vegetation in the Region is now identified by using one of four indicators. The indicators are as follows:

- **Indicator 1 – Rapid Test for Hydrophytic Vegetation** – all dominant species across all strata are rated OBL or FACW, or a combination of these two categories based on a visual estimation,
- **Indicator 2 – Dominance Test** – More than 50% of the dominant plant species (using the 50/20 rule) across all strata are rated OBL, FACW, or FAC,
- **Indicator 3 – Prevalence Test** – the Prevalence Index is 3.0 or less, or
- **Indicator 4 – Morphological Adaptations** – the plant community passes either the Dominance Test or the Prevalence Test after reconsideration of the indicator status of certain plant species that exhibit morphological adaptations for life in wetlands.

If the plant community passes any one of the four hydrophytic vegetation indicator tests, the vegetation is considered to be hydrophytic.

2. Hydric Soil Indicators: Hydric soil indicators are formed predominantly by the accumulation or loss of iron, manganese, sulfur or carbon compounds in a saturated, anaerobic environment. Hydric soil indicators are presented in three groups:

- **All Soils** - used in any soil regardless of texture,
- **Sandy Soils** - used in soil layers with USDA textures of loamy fine sand or courser, and
- **Loamy or Clayey Soils** - used with soil layers of very fine sand or finer.

one or more of the hydric soil indicators is present, then the soil is hydric.

3. Wetland Hydrology Indicators

Wetland hydrology indicators are used in conjunction with indicators of hydric soil and hydrophytic vegetation to determine if an area is wetland under the Corps Manual. Hydrology indicators are often the most transitory of the wetland indicators.

'etland hydrology indicators are presented in four groups:

- **Group A** - based on direct observation of surface water or groundwater during a visit.
- **Group B** - consists of evidence that the site is subject to flooding or ponding, although it may not be inundated currently.
- **Group C** - consists of other evidence that the soil is saturated or was saturated recently.
- **Group D** - consists of landscape, vegetation and soil features that indicate contemporary rather than historical wet conditions.

Within each group, indicators are categorized into one of two groups – primary and secondary indicators, based on their reliability within the region.

3.0 WETLAND DELINEATION RESULTS

Wetland Determination Data Forms were completed for each habitat type located within the Site and can be seen in Appendix A of this report. Data Forms sampling locations are indicated on Figure 3.

At no point within the limits of the Site were all three required wetland parameters met, therefore, no wetlands exist within the limits of the Site.

4.0 WATERCOURSE DETERMINATION

No defined bed or bank areas exist on the Site. Therefore, no open or natural watercourses are located within the Site boundaries.

However, there appears to be a stream enclosure that bisects the site. The stream enclosure appears to originate north of the Site on the north side of Braddock Avenue near the terminus of O'Connell Boulevard. The stream enclosure proceeds south through the Site and terminates at an end wall along Turtle Creek south of the Site (refer to Figure 3A). appears that both the proposed water and gas lines to be installed to the west of the pad area will cross the stream enclosure.

Relevant photographs of the Site are contained in Appendix B and are keyed to Figure 3.

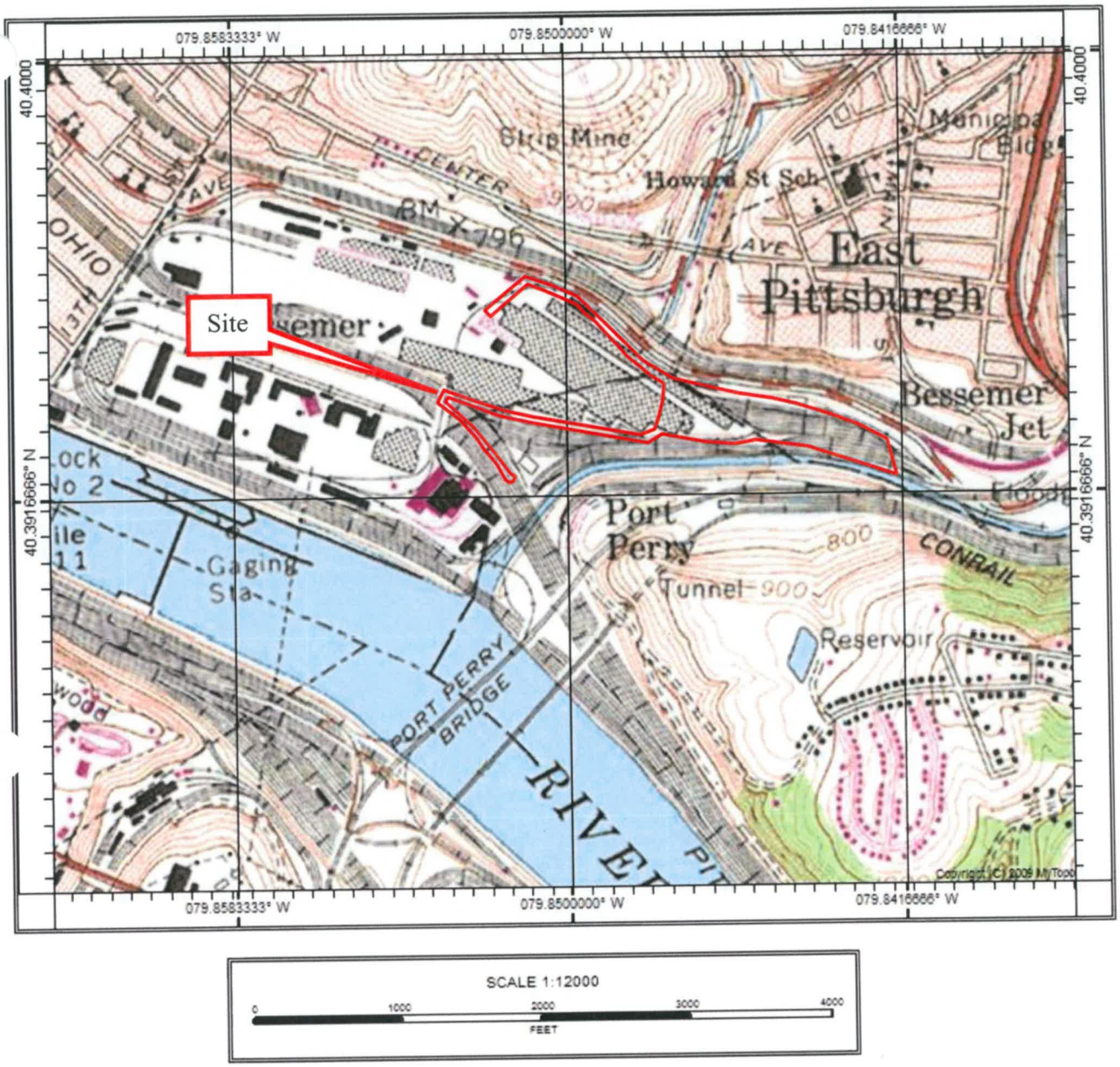


Figure 1 – Location Map (Braddock, PA USGS Map)

Ecotune
ENVIRONMENTAL CONSULTANTS
215 EXECUTIVE DRIVE, SUITE 204
CRANBERRY TOWNSHIP, PA 16066
VOICE (724) 779-9010
FAX (724) 779-9011

Figure 2 – Location Map (2016 Google Earth)

Ecotune
ENVIRONMENTAL CONSULTANTS
215 EXECUTIVE DRIVE, SUITE 204
CRANBERRY TOWNSHIP, PA 16066
VOICE (724) 779-9010
FAX (724) 779-9011

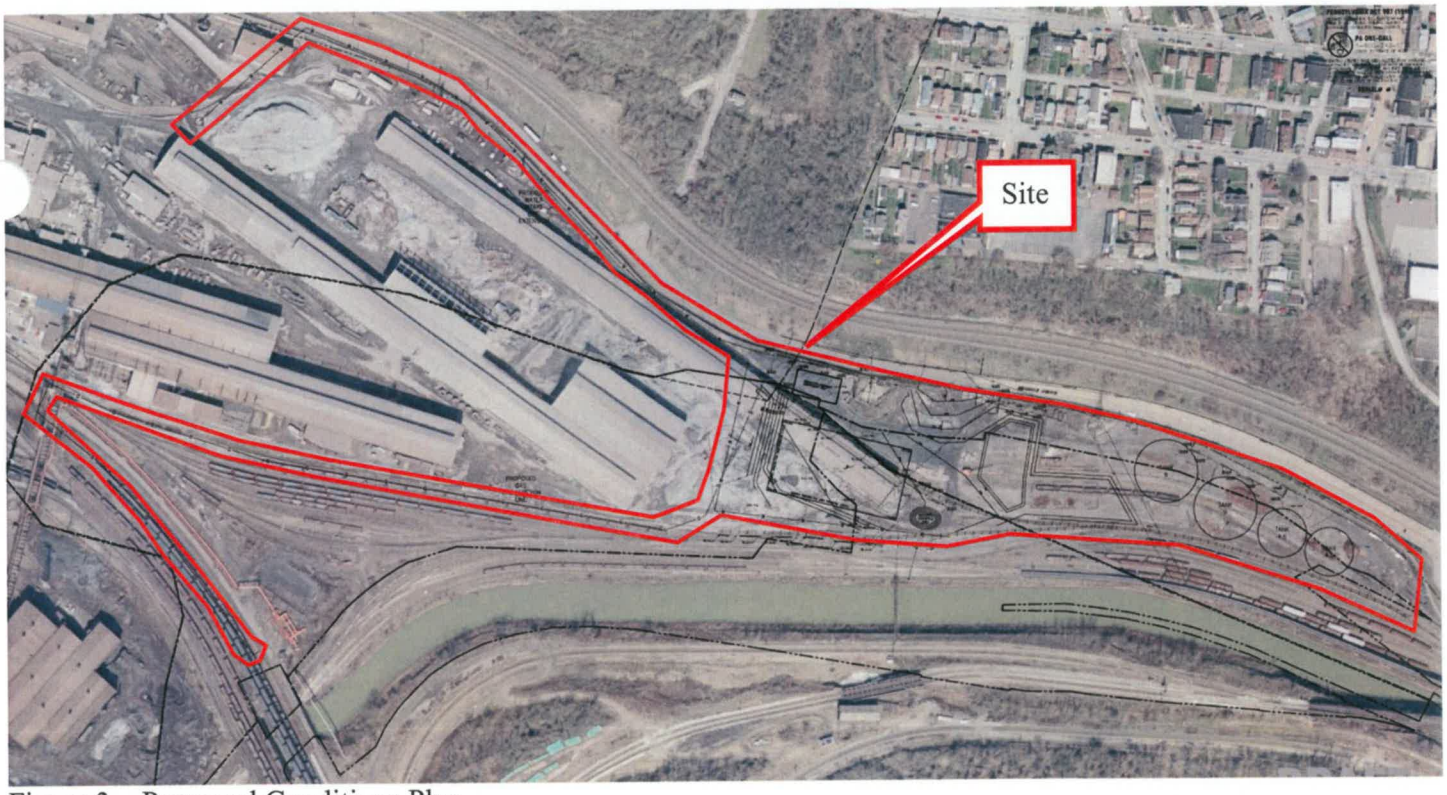


Figure 3 – Proposed Conditions Plan

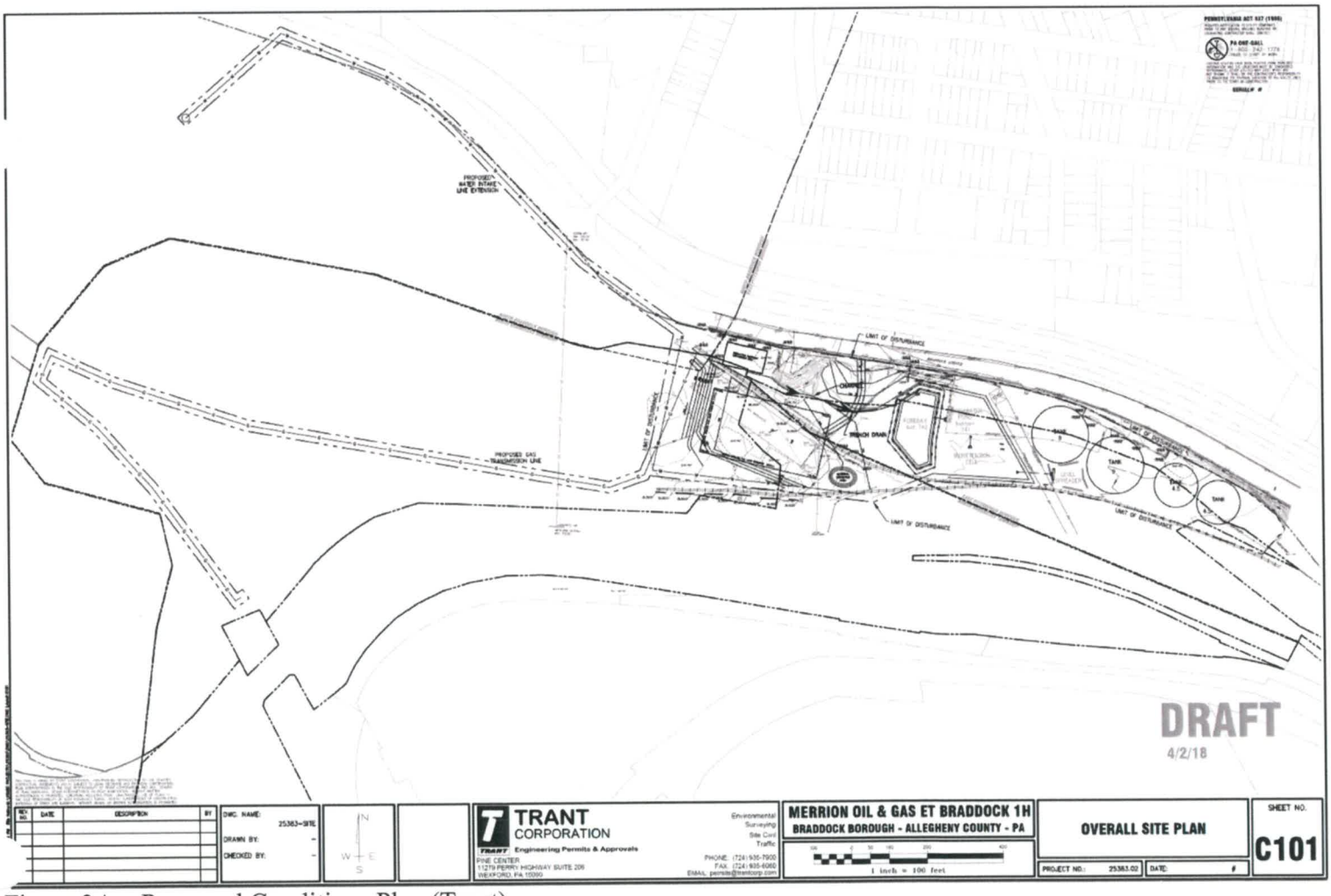


Figure 3A – Proposed Conditions Plan (Trant)

Ecotune
ENVIRONMENTAL CONSULTANTS
215 EXECUTIVE DRIVE, SUITE 204
CRANBERRY TOWNSHIP, PA 16066
VOICE (724) 779-9010
FAX (724) 779-9011

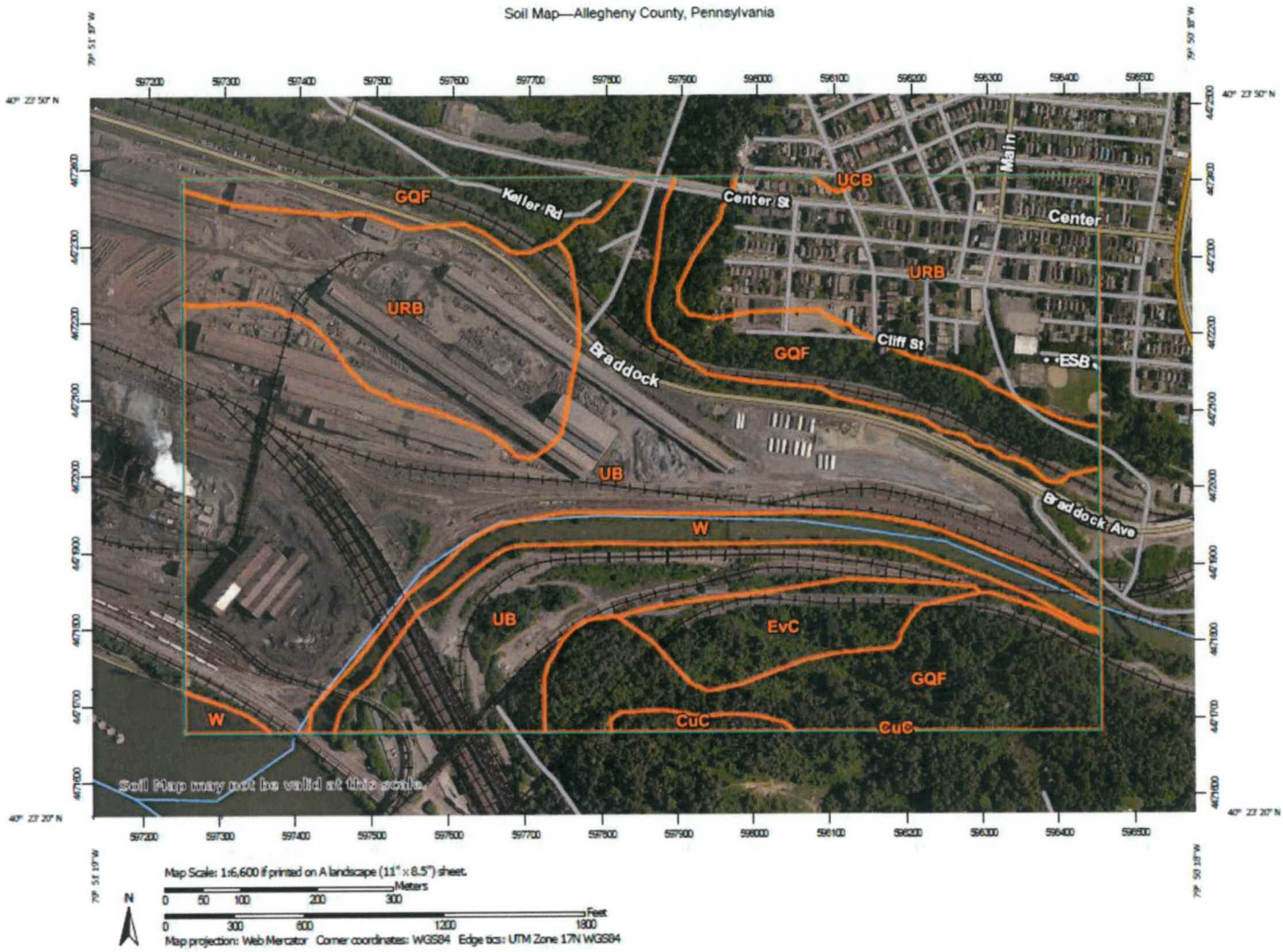


Figure 4 – Site Soils Map
USDA Soil Survey

Ecotune
ENVIRONMENTAL CONSULTANTS
'5 EXECUTIVE DRIVE, SUITE 204
:ANBERRY TOWNSHIP, PA 16066
VOICE (724) 779-9010
FAX (724) 779-9011

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CuC	Culleoka channery silt loam, 8 to 15 percent slopes	1.4	0.6%
EvC	Ernest-Vandergrift silt loams, 8 to 15 percent slopes	8.9	4.1%
GQF	Gilpin-Upshur complex, very steep	42.9	19.9%
UB	Urban land	95.8	44.4%
UCB	Urban land-Culleoka complex, gently sloping	0.2	0.1%
URB	Urban land-Rainsboro complex, gently sloping	55.4	25.7%
W	Water	11.0	5.1%
Totals for Area of Interest		**215.6**	**100.0%**

Figure 4A – Site Soils Legend
USDA Soil Survey

Ecotune
ENVIRONMENTAL CONSULTANTS
215 EXECUTIVE DRIVE, SUITE 204
CRANBERRY TOWNSHIP, PA 16066
OICE (724) 779-9010
.X (724) 779-9011

U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetlands

January 1, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Figure 5 – NWI Map

Ecotune
ENVIRONMENTAL CONSULTANTS
215 EXECUTIVE DRIVE, SUITE 204
CRANBERRY TOWNSHIP, PA 16066
VOICE (724) 779-9010
FAX (724) 779-9011

APPENDIX A
WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: ET-braddock Well Pad City/County: Allegheny Sampling Date: 12-04-2017

Applicant/Owner: Marion Oil & Gas State: PA Sampling Point: DF-1

Investigator(s): ECOTUNE- PG Section, Township, Range: Braddock Boro

Landform (hillslope, terrace, etc.) Flat Local relief (concave, convex, none): None

Slope (%): 3 Lat: 40.3936° Long: -79.8460 ° Datum:

Soil Map Unit Name: UB NWI Classification: Not Mapped

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ____
Water Table Present?	Yes ___	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point DF-1 _____

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50/20=		= Total Cover	

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
50/20= 12.5/5	25	= Total Cover	

Herb Stratum (Plot size: 5')			
1. Verbesina alternifolia	5	X	FAC
Dipsacus fullonum	5	X	FACU
3. Solidago altissima	3	X	FACU
4. Alliaria petiolata	2		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50/20 = 7.5 / 3	15	= Total Cover	

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
6.			
50/20 = 22.5/9		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		X 2 =	
FAC species		X 3 =	
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is > 50%

___ 3 - Prevalence Test is ≤ 3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DF-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	NA							Coal Spoil
3-16	10YR5/5	100					Mineral	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10) **(LRR N)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ____ Sandy Gleyed Matrix (s4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7)
- ____ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ____ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Iron Manganese Masses (F12) **(LRR N, MLRA 136)**
- ____ Umbric Surface (F13) **(MLRA 136, 122)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(MLRA 147)**
- ____ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ____ Red Parent Material (TF2)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: ET-braddock Well Pad City/County: Allegheny Sampling Date: 12-04-2017

Applicant/Owner: Marion Oil & Gas State: PA Sampling Point: DF-2

estigator(s): ECOTUNE- PG Section, Township, Range: Braddock Boro

Landform (hillslope, terrace, etc.) Flat Local relief (concave, convex, none): None

Slope (%): 3 Lat: 40.3937° Long: -79.8461 ° Datum: ____

Soil Map Unit Name: UB NWI Classification: Not Mapped

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?**	Yes ____	No X
Hydric Soil Present?	Yes ____	No X			
Wetland Hydrology Present?	Yes ____	No X			

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ____
Water Table Present?	Yes ___	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point DF-2 _____

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50/20=		= Total Cover	

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
50/20=		= Total Cover	

Herb Stratum (Plot size: 5')			
1. Polygonatum biflorum	2		FACU
Polystichum acrostichoides	3	X	FACU
3. Datylis glomerata	5	X	FACU
4. Solidago altissima	5	X	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50/20 = 7.5 / 3	15	= Total Cover	

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
6.			
50/20 =5/2		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		X 2 =	
FAC species		X 3 =	
FACU species		X 4 =	
UPL species		X 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is > 50%

___ 3 - Prevalence Test is ≤ 3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

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Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DF-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2								Coal Spoil
2-16	10YR5/6	98	10YR4/4	2			Mineral	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10) **(LRR N)**
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ____ Sandy Gleyed Matrix (s4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Dark Surface (S7)
- ____ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ____ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)
- ____ Iron Manganese Masses (F12) **(LRR N, MLRA 136)**
- ____ Umbric Surface (F13) **(MLRA 136, 122)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ____ 2 cm Muck (A10) **(MLRA 147)**
- ____ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ____ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ____ Red Parent Material (TF2)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

APPENDIX B
SITE PHOTOGRAPHS

All Photographs Taken On December 4, 2017

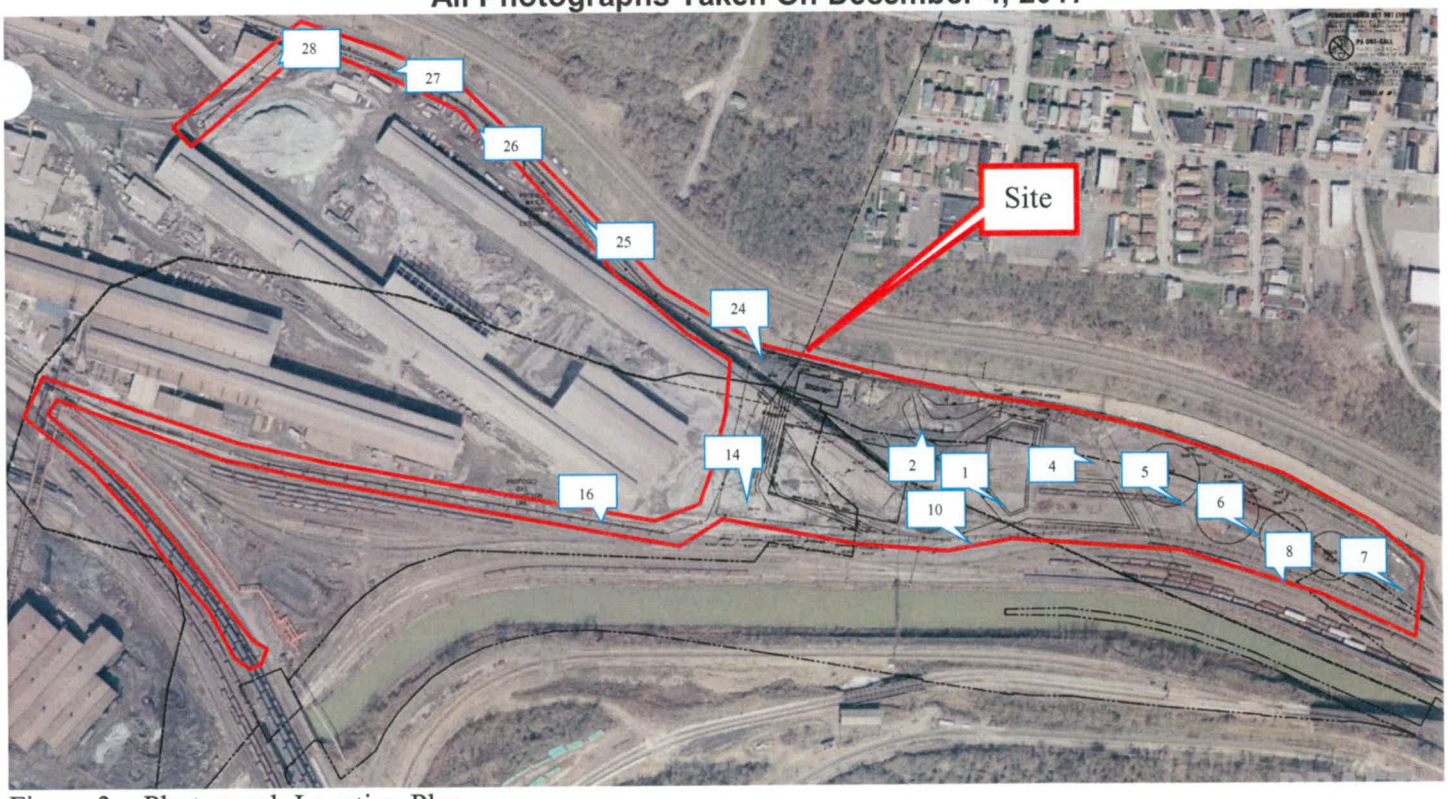
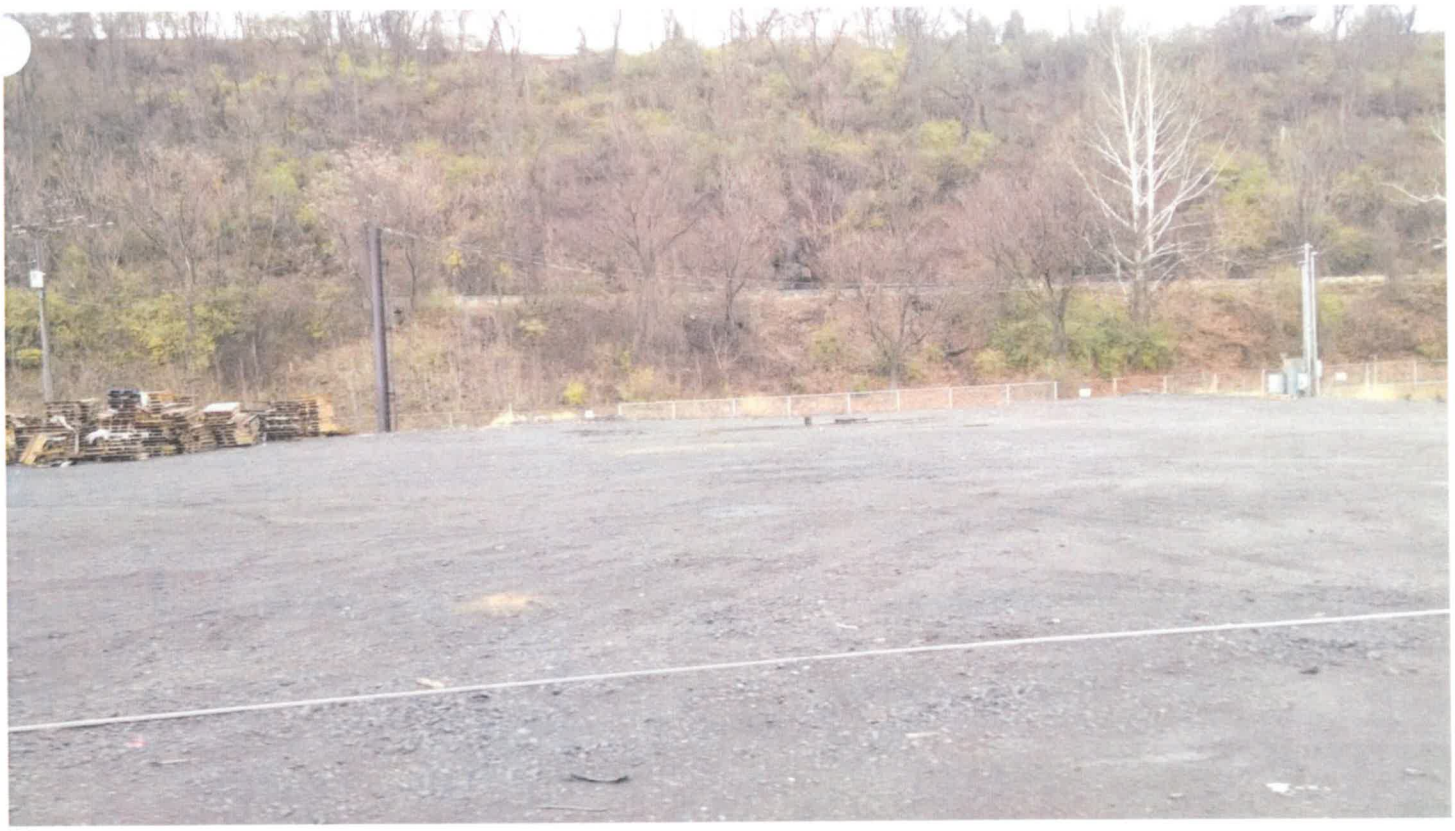


Figure 3 – Photograph Location Plan

P1



P2

P4

P5

P6

P7

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10

P14

6

APPENDIX J

Geotechnical Report

A R M G r o u p I n c .

GEOTECHNICAL INVESTIGATION

ET – BRADDOCK WELL PAD
BRADDOCK, PENNSYLVANIA

Prepared For:

Mr. Ryan Davis
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Prepared by:

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FAX: 412-761-1998

ACA Project #P17385x10
April 11, 2018

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APPENDIX E Test Boring Logs & Soil Classification Charts
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APPENDIX G Keyway/Bench Detail

1.0 INTRODUCTION

1.1 Authority

This report has been prepared in accordance with the objective and scope of investigation outlined by ACA Engineering, Inc. in its technical proposal dated November 16, 2017, which was presented to Merrion Oil & Gas for review and approval.

1.2 Project Objective

The overall objective of the project is the construction of a well site that will include a well pad, AST area, and extensions to the existing water intake line and gas transmission line at the Edgar Thomson Works facility in Braddock, Allegheny County, PA.

1.3 Scope of Geotechnical Investigation

In order to achieve the above objective, the investigation program consisted of the following tasks:

- Conduct field reconnaissance.
- Prepare and perform an exploration program to delineate and characterize the subsurface materials by drilling test borings.
- Provide engineering involvement during all phases of the investigation and analysis of all data acquired.
- Provide inspection during the drilling of test borings to supervise the drilling operation and to log the test borings.
- Formulate and perform a laboratory testing program on soils and rock and to determine material parameters needed for subsequent analyses.
- Prepare a geotechnical engineering report that documents the data and analyses performed as well as presents the discussions and evaluation of the subsurface conditions, the conclusions regarding the geotechnical engineering behavior of the subsurface materials under the anticipated stresses, and a set of recommendations for the following design aspects:

    - Slope Construction
    - Site Preparation (cut/fill)
    - Foundation Recommendations

2.0 SUBSURFACE EXPLORATION PROGRAM

Sixteen (16) soil borings with sampling were conducted at the site between January 10 and 16, 2018, by Shallenberger Construction, Inc., under the general supervision

of ACA Engineering, Inc., to determine the subsurface conditions. Test boring locations were selected by ACA Engineering, Inc., and field located by Trant Corporation. The approximate locations are shown on the Boring Location Plan in Appendix D.

2.1 Soil Sampling

The soil sampling program consisted of obtaining split spoon samples. The spoon samples were obtained by conducting Standard Penetration Test (SPT) by driving a two (2) inch O.D. Split Spoon Sampler (ASTM D-1586). The sampler was driven eighteen inches into the soil with blows from a 140-pound hammer falling a distance of thirty (30) inches, and the number of blows required to drive the sampler for each six (6) inch interval was recorded. The cumulative number of blows for the last two six (6)-inch intervals (blows/foot) is termed as Standard Penetration Resistance, which can be correlated with relative density of granular soils or consistency of fine-grained soils and, in turn, their shear strength and compressibility characteristics. The description of the soil samples, based on visual identification which was modified in the light of laboratory test results, and the SPT values at various depths are recorded on the boring logs.

2.2 Groundwater Readings

Groundwater was encountered in test borings B-7 and B-10 through B-16, at depths ranging from approximately eleven and one-half (11.5) to thirty-six and one-half (36.5) feet below the existing ground surface at the completion of drilling operations. It should be noted that the groundwater level at the site may fluctuate in response to precipitation, run-off volumes and the close proximity to the Monongahela River.

3.0 LABORATORY TESTING PROGRAM

In order to determine the soil parameters, ACA performed laboratory testing to evaluate the on-site soil condition. The test results are in Appendix F. A brief description of testing methodology and test results is presented below.

3.1 Water Content Tests (ASTM D2216)

These tests were performed on selected representative soil samples to determine the water content of in-place soils at the time of drilling. In general, the soil samples were dry to moist, based on an empirical scale of dry, moist, and wet. These conditions, however, would vary depending upon the seasonal and local precipitation.

3.2 Gradation Tests (ASTM D422)

Gradation tests consisting of sieve analysis tests were conducted on selected representative soil samples on which moisture content tests have been conducted. The data from these tests are included in Appendix F.

3.3 Atterberg Limits Tests (ASTM D4318)

Liquid and plastic limit tests were performed on a sample that a gradation test had been conducted. In general, the sample tested exhibited low plasticity. The data from these tests are included in Appendix F.

3.4 Environmental Sampling

Environmental soil samples were collected from borings B-2, B-7, B-10, B-13, and B-16 and groundwater samples were collected from borings B-7, B-10, and B-16 to obtain background soil and groundwater data. The sampling locations were chosen to provide a representation across the entire proposed work area. The soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and target analyte compound metals. Groundwater samples were analyzed for Oil & Grease, Fluoride, Total Cyanide, Ammonia Nitrogen, Chemical Oxygen Demand (COD), Total Phenolics, and pH. The groundwater samples were analyzed for these parameters in anticipation of obtaining a NPDES permit for storm water runoff.

Soil analytical results were compared to the Pennsylvania Land Recycling Program (Act 2) Medium Specific Concentrations (MSCs) for organic regulated substances in soil, direct contact numeric values and soil to groundwater numeric values. Metal concentrations were compared to the MSCs for inorganic regulated substances in soil, non-residential direct contact numeric values. Concentrations of VOCs were not detected above their respective MSCs in any of the soil samples collected. Concentrations of SVOCs were not detected above their respective MSCs for direct contact numeric values in any of the soil samples collected. The naphthalene concentration in the soil sample from boring B-13 was the only constituent above its respective MSC for the soil to groundwater numeric values.

No metal concentrations were above their respective direct contact MSCs in any of the soil samples collected. The manganese concentration exceeded the soil to groundwater MSC in the soil sample collected from each of the five soil borings.

Concentrations of Oil & Grease were not detected in any of the groundwater samples collected. Fluoride concentrations ranged from 0.13 milligrams per liter (mg/L) in boring B-10 to 1.2 mg/L in boring B-16. Total Cyanide concentrations ranged from not detected in borings B-7 and B-16 to 0.027 mg/L in boring B-10. Ammonia nitrogen concentrations ranged from 3.3 mg/L in borings B-7 and B-10 to 5.7 mg/L in boring B-16. Chemical Oxygen Demand concentrations ranged from 68 mg/L in boring B-7 to 203 mg/L in boring B-16. Total Phenol concentrations were not detected in any of the groundwater samples collected. The groundwater pH ranged from 9.1 standard units in boring B-16 to 11.6 standard units in borings B-7 and B-10. A copy of the laboratory analytical report for the samples collected during the geotechnical investigation are included in Appendix F. See tables 1 and 2 below for a summary of analytic results.

Table 1
ET-Braddock Pad
Braddock, Pennsylvania

VOC and SVOC Concentrations Above The PQL

	B-2 (1.5-3') 1/16/2018	B-7 (10.5-12') 1/15/2018	B-10 (19.5-21') 1/15/2018	B-13 (1.5-3') 1/10/2018	B-16 (3-4.5') 1/10/2018	MSC 1 Direct Contact	MSC 2 Soil to Groundwater
SVOCS							
Acenaphthene	NA	NA	NA	32.00	NA	190,000	4700
Anthracene	NA	NA	NA	21.60	NA	190,000	350
Benzo(a)anthracene	0.474	NA	NA	13.40	NA	130	430
Benzo(a)pyrene	NA	NA	NA	5.95	NA	12	46
Benzo(b)fluoranthene	0.452	NA	NA	6.34	NA	76	170
Benzo(g,h,i)perylene	NA	NA	NA	1.10	NA	190,000	180
Benzo(k)fluoranthene	0.45	NA	NA	5.28	NA	76	610
Chrysene	0.78	NA	NA	11.90	NA	760	230
Dibenz(a,h)anthracene	NA	NA	NA	0.78	NA	22	270
Dibenzofuran	NA	NA	NA	29.80	NA	3,200	310
Fluoranthene	1.36	NA	NA	52.00	0.438	130,000	3,200
Fluorene	NA	NA	NA	35.10	NA	130,000	3,800
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.56	NA	76	22,000
2-Methylnaphthalene	NA	0.439	NA	41.90	0.766	13,000	1,900
Naphthalene	NA	NA	NA	159.00	0.539	760	25
Phenanthrene	0.567	NA	NA	114.00	0.499	190,000	10,000
Pyrene	1.37	NA	NA	35.40	0.396	96,000	2,200
VOCS							
Acetone	NA	0.0507	0.0177	NA	0.0399	10,000	1,200
2-Butanone	NA	0.0132	NA	NA	NA	10,000	76
o-Xylene	NA	NA	NA	0.37	NA	8,000	990

Notes:
All results in milligrams per kilogram (mg/kg)
VOC - Volatile Organic Compound
SVOC - Semi-Volatile Organic Compound
MSC 1 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Direct Contact Numeric Values)
MSC 2 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Soil to Groundwater Numeric Values)
NA - Not Applicable

Table 2
ET-Braddock Pad
Braddock, Pennsylvania

Metals

	B-2 (1.5-3') 1/16/2018	B-7 (10.5-12') 1/15/2018	B-10 (19.5-21') 1/15/2018	B-13 (1.5-3') 1/10/2018	B-16 (3-4.5') 1/10/2018	MSC 1 Direct Contact	MSC 2 Soil to Groundwater
Metals							
Aluminum	11,200	9,360	7,650	5,890	6,020	190,000	NA
Antimony	ND	1.5	0.82	1	0.77	1,300	27
Arsenic	9.1	15.2	18.2	17.3	13.6	61	29
Barium	105	212	55.9	77.4	76.1	190,000	8,200
Beryllium	1.4	1	0.47	0.66	0.86	11	320
Boron	23.5	15.2	7.8	15.9	11.2	190,000	1,900
Cadmium	2.9	0.44	0.75	1.5	0.42	6	38
Calcium	132,000	30,900	1,400	66,800	17,200	NA	NA
Chromium	202	19	17.2	267	36.2	NA	NA
Cobalt	5.6	7.2	13	6.6	7	960	160
Copper	34.5	49.4	427	77.9	74	120,000	43,000
Iron	148,000	104,000	98,500	107,000	90,500	190,000	NA
Lead	330	72.9	44.8	180	127	1,000	450
Magnesium	15,700	2,300	653	21,900	1,940	NA	NA
Manganese	3,770	6,190	2,160	6,000	2,080	150,000	2,000
Mercury	ND	ND	ND	0.41	ND	510	10
Molybdenum	8	ND	ND	9.7	ND	16,000	650
Nickel	24.7	15	24.5	25.3	16.1	64,000	650
Potassium	652	661	1,210	513	552	NA	NA
Selenium	1.4	ND	ND	ND	1.1	16,000	26
Silver	ND	ND	ND	ND	ND	16,000	84
Sodium	773	891	ND	ND	ND	NA	NA
Thallium	ND	ND	ND	ND	ND	32	14
Vanadium	87.5	26.9	29.9	103	27.8	220	820
Zinc	1,710	65.4	101	215	84.2	190,000	12,000

Notes:
All results in milligrams per kilogram (mg/kg)
MSC 1 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Direct Contact Numeric Values)
MSC 2 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Soil to Groundwater Numeric Values)
NA - Not Applicable

4.0 GENERAL SITE CONDITIONS

4.1 Project Location

The site of the proposed development is located along Braddock Avenue in Braddock, Allegheny County, Pennsylvania. For site location, see the U.S.G.S. Topographic Map in Appendix A. The site is bordered by Braddock Avenue to the north, State Route 2183 to the east, Turtle Creek to the south, and the existing Edgar Thomson Works facility to the west.

4.2 Soil Conditions

According to the soil survey of Allegheny County, Pennsylvania (see map in Appendix B), the soils in the project area have been classified as Urban land (map symbol UB); and Urban land-Rainsboro complex, gently sloping (map symbol URB).

The Urban land map unit consists of land so altered by earth moving or so obscured by buildings or other structures that the original soils cannot be identified. In some places, cuts have removed all or nearly all the natural soil horizons. In other places, fills have buried the original soils.

4.3 General Geology

The project area lies within the Pittsburgh Low Plateau Section of the Appalachian Plateaus physiographic province. A review of the Greater Pittsburgh Region Geologic Map, Map 42, dated 1975, prepared by the Commonwealth of Pennsylvania Department of Environmental Resources, indicates the bedrock across the project area is Pennsylvanian system in age belonging to the Casselman Formation of the Conemaugh Group. The Casselman Formation consists of repeated sequences of sandstone, siltstone, shale, claystone (including red beds), limestone, and coal. Structurally, the site lies west of the Duquesne Syncline.

4.4 Mining Conditions

According to the publication "Coal Resources of Allegheny County, PA, the Coal Crop Lines, Mined-out Areas, and Structure Contours" provided by the Commonwealth of Pennsylvania Department of Environmental Resources, deep mining has not occurred beneath the project site. The elevation of the base of the Pittsburgh coal seam at the site is approximately 1,000 feet. According to the U.S.G.S. topographic map, the elevation of the site ranges from approximately 740 to 760 feet. The site is located below the Pittsburgh coal seam.

4.5 Landslide Conditions

According to the U.S.G.S. Map of Susceptibility to Landsliding, Allegheny County, Pennsylvania (see map in Appendix D), the site is generally classified as having slopes with little susceptibility to landsliding.

5.0 DISCUSSION AND EVALUATION OF SITE CONDITIONS

This section of the report presents general surface and subsurface conditions as well as design and construction considerations of the proposed site and the interaction of these conditions with the construction of the new slopes.

5.1 Surface Conditions

The proposed site currently consists of the existing U.S. Steel Edgar Thomson Works facility. Several buildings and railroad tracks are present along the western half of the site. The topography of the site is generally level to gently sloped down to the east.

5.2 Subsurface Conditions

A total of sixteen (16) test borings, B-1 through B-16, were drilled at the site to determine and characterize the subsurface materials (see Test Boring Logs in Appendix D).

Fill material was encountered at the ground surface in each test boring. The fill material consisted of greenish gray, dark brown, yellow, light brown, tan, white, bluish black, gray, bluish gray, black, and brown slag with varying amounts of sand, silt, and brick fragments; black and brown, silty sand with varying amounts of gravel, slag, wood fragments, and coal fragments; reddish brown, brown, light brown, dark brown, black, and dark gray sand with varying amounts of gravel, slag, wood fragments, silt, wire, coal fragments, brick fragments, and glass; black and gray gravel with varying amounts of sand, silt, slag, and concrete fragments; gray, rock fragments and slag; red, brick fragments with varying amounts of slag; reddish brown, black, and brown, sandy silt with varying amounts of gravel, slag, coal fragments, brick fragments, and wood fragments; olive, black, and brown clay with varying amounts of gray mottling, coal fragments, sand, gravel, and silt; brown and gray, silty clay with varying amounts of sand, gravel, coal fragments, and slag; black silt with varying amounts of san and organics; and brown and black, clayey silt with varying amounts of sand, slag, and coal fragments.

Alluvial soils were encountered beneath the fill material in test borings B-11, B-12, and B-14 through B-16. The residual soils consisted of very loose to medium, brown sand with varying amounts of gravel, silt, and rock fragments; soft to stiff, brown and olive, silty clay with varying amounts of gravel and sand; soft to very stiff, brown and gray clay with varying amounts of sand, organics, and silt; and firm, brown and gray, sandy clay with varying amounts of rock fragments.

Groundwater was encountered in test borings B-7 and B-10 through B-16, at depths ranging from approximately eleven and one-half (11.5) to thirty-six and one-half (36.5) feet below the existing ground surface at the completion of drilling operations. It should be noted that the groundwater level at the site may fluctuate in response to precipitation, run-off volumes and the close proximity to the Monongahela River.

5.3 Seismic Classification

The site is located in an area anticipated to have a 0.2 second spectral response acceleration of 0.109g and 1.0 second spectral response acceleration of 0.053g according to the 2012 International Building Code prepared by the International Code council. Site class definition for stiff soil is Class D, and the corresponding site coefficients of Fa and Fv are 1.6 and 2.4 respectively. Therefore, the adjusted 0.2 second spectral response acceleration is 0.116g and the adjusted 1.0 second spectral response acceleration is 0.084g for this site.

5.4 Infiltration Testing

In order to determine an infiltration rate for the proposed storm water management system, six (6) percolation tests were performed. The tests were performed in accordance with the Pennsylvania Department of Environmental Protection, Pennsylvania Stormwater Best Management Practices Manual, Appendix C – Site Evaluation and Soil Testing procedures. Due to the initial water level drop during the presoaking period, water level readings were generally taken every ten (10) to thirty (30) minutes for a two (2) hour time period or until a stabilized rate of drop was observed. The infiltration rate is the final reading. The results are summarized below:

INFILTRATION TESTING			
Test Boring Number	Ground Surface Elevation (ft)	Proposed Test Elevation (ft)	Infiltration Rate (in/hr)
I-1	747.45	2.0	0.57
I-2	742.16	2.0	2.62
I-3	741.94	2.0	5.64
I-4	741.22	2.0	13.57
I-5	737.53	2.0	1.42
B-13	738.17	2.0	2.33

6.0 RECOMMENDATIONS

The analysis and recommendations presented in this report are based on the subsurface conditions disclosed by the site reconnaissance, field exploration, laboratory testing, and office research programs. With this in mind, the following

engineering recommendations are presented concerning site preparation, general fill construction, and slope construction.

6.1 Site Preparation

6.1.1 Strip the entire proposed construction area of all concrete, asphalt, subbase, vegetation, topsoil, carbonaceous shale, coal, soils, and any unsuitable soils or materials. Also, remove or relocate all of the utilities, if any, as necessary to accommodate the proposed construction. Due to potential variability of the material across the site, it is recommended that during site preparation continuous monitoring of the suitability of material for construction be observed by a qualified geotechnical testing agency, so that no unsuitable materials are present.

6.1.2 Remove remaining soils, where necessary, to proposed subgrade elevations.

6.1.3 All areas which will receive backfill should be filled in with suitable materials.

6.1.4 Prior to structure support or backfilling operations, all areas should be proofrolled to detect any soft yielding zones. Proofrolling is performed by driving a loaded tri-axle truck over an area to see if it meets non-movement criteria. Soil meets non-movement criteria when there is no rutting, pumping, or excessive settlement. Two (2) passes, one (1) north to south and one (1) east to west, should be made over the entire area or area of fill placement. Any yielding zones discovered should be removed or stabilized as per Part 6.1.5 of this section.

6.1.5 Depending on the conditions encountered during construction, stabilization of isolated unstable subsurface materials may be possible using crushed stone which is "bridged" or "choked" into the yielding materials. An alternate method of subgrade stabilization for the case of soft, moist soils would be to scarify, dry out, and then recompact the moist areas.

6.1.6 All proofrolled areas should be inspected by a qualified geotechnical engineer to evaluate that all unsuitable materials have been removed.

6.1.7 Upon subgrade approval, fill the site to grade where necessary as per the "GENERAL FILL CONSTRUCTION" section of this report.

6.2 General Fill Construction

6.2.1 The soil used for fill construction should be uncontaminated and clean. The soil shall be free of organic matter, peat, rock or gravel larger than 6 inches in any dimension, and other deleterious materials and shall include the following ASTM D-2487 soil classification groups: GW, GP, GM, GC, SW, SM, SC, ML and CL or a combination of these group symbols. In general, the fill material stockpiled onsite is suitable for use as backfill.

6.2.2 In the areas which are to receive fill either as part of an undercut and replacement process or for grade raising, the subgrade should first be properly prepared. The subgrade should be scarified.

6.2.3 The first lift of material should be only approximately four (4) inches thick in the loose state. Each lift of soil thereafter should be placed in maximum eight (8) inch loose thickness and should be within plus or minus two (2) percent of optimum moisture content as determined by the Modified Proctor Test (ASTM D-1557).

6.2.4 All fill should be compacted to a minimum density of 95 percent of maximum dry density as determined by the Modified Proctor Test (ASTM D1557).

6.2.5 During fill construction and/or subgrade preparation, the contractor should maintain good site drainage. Exposed surfaces should be positively sloped to cause runoff to flow away from the site. If water does pond in any sectors, those areas should be drained and all mud zones or softened soils should be aerated and recompacted before further construction takes place.

6.2.6 Clayey and silty soils were encountered on site and are susceptible to breakdown by pumping under traffic loads. When clay or silt pockets are encountered during construction and if pumping is initiated, construction traffic should be rerouted and the area should then be restabilized either by drying and recompacting, or by adding drainage and then drying and recompacting. Areas allowed to break down will gradually worsen and spread.

6.2.7 All fill densities should be evaluated by a qualified geotechnical testing agency using nuclear densometers or other approved methods. At least one (1) test per every 2,500 square feet on each lift should be conducted.

6.2.8 The above recommendations encompass essential aspects of fill construction. They are not, however, intended to be a complete set of earthwork specifications.

6.3 Foundation Recommendations

Well Pad

It is assumed that potential structures will coincide with a pad elevation of approximately 750'. Based on the test borings performed and the standard penetration testing (SPT) results, the proposed structures can generally be supported by a standard foundation system (shallow spread and continuous wall footings). Foundations located within the new engineered or existing fill or can be designed for a net, maximum allowable bearing pressure of 2,000 pounds per square foot. Any soft or unsuitable material encountered at the bottom of foundation elevations should be overexcavated to suitable material and replaced with lean concrete/flowable fill or PennDOT No. 2A stone to the bottom of foundation elevation. Any coal or carbonaceous material encountered should be completely removed as directed by a qualified geotechnical engineer and backfilled as recommended above.

Above Ground Storage Tanks

It is assumed that above ground storage tanks will coincide with the existing ground surface. Based on the test borings performed and the standard penetration testing (SPT) results, the proposed structures can generally be supported by a standard foundation system (shallow spread and continuous wall footings). Foundations located within the new engineered or existing fill or can be designed for a net, maximum allowable bearing pressure of 1,500 pounds per square foot. Any soft or unsuitable material encountered at the bottom of foundation elevations should be overexcavated to suitable material and replaced with lean concrete/flowable fill or PennDOT No. 2A stone to the bottom of foundation elevation. Any black sand/slag, coal or carbonaceous material encountered should be completely removed as directed by a qualified geotechnical engineer and backfilled as recommended above.

The following are general recommendations for the shallow foundations:

6.3.1 The exterior footings and footings exposed to freezing conditions must be a minimum of three and one-half (3.5) feet below the adjacent finished exterior grade to assure proper frost protection.

6.3.2 If any foundations are to be stepped, they should be stepped no steeper than one (1) foot vertically to two (2) feet horizontally.

6.3.3 All foundation bearing surfaces should be compacted following excavation and prior to concrete placement. Foundations should be poured as soon after excavation as possible. Furthermore, concrete should not be placed on frozen soil.

6.3.4 All foundation bearing surfaces should be inspected by a qualified geotechnical testing agency to evaluate the suitability of the bearing materials for support of the proposed loads and to observe that no unsuitable materials are present.

6.3.5 All foundations should be designed to withstand 0.5-8inch differential settlement.

6.4 Slab on Grade

Any on grade slabs will be supported by new engineered or existing fill. Any soft or unsuitable material encountered should be overexcavated two (2) feet and replaced with suitable material, placed and compacted as per the "GENERAL FILL CONSTRUCTION" of this report. After the overexcavation is completed, any soft areas that may still exist should be stabilized using a minimum of six (6) inches of AASHTO No. 1 stone (maximum size 4"). It may be possible to reuse some of the on-site material provided it is suitable material and properly dried prior to backfill placement.

The following are general recommendations for the slab on grade:

6.4.1 The slab may then be designed with a modulus of subgrade reaction (k) of 120 pounds per cubic inch. Slabs should be mesh reinforced and should have ample construction joints to help control the locations of shrinkage and settlement cracking. In addition, slabs should not be structurally connected to walls or columns.

6.4.2All bearing surfaces should be free of water, contamination, and carbonaceous material prior to concrete placement. Furthermore, concrete should not be placed on frozen soil.

6.4.3 Prior to concrete placement, a qualified geotechnical testing technician should evaluate the suitability of the bearing materials for support of the proposed loads and observe that no unsuitable materials are present.

6.4.4 The use of a polyethylene moisture barrier beneath the floor slab is recommended to break capillary moisture rise. The slab should be placed on a minimum of six (6) inches of granular subbase materials, such as

PennDOT 2A stone, compacted as per the "GENERAL FILL CONSTRUCTION" section of this report.

6.5 Slope Construction

Fill Slopes

To provide for long term stability, all fill slopes should be constructed with a grade no steeper than 2:1 (horizontal:vertical). All fill slopes should be constructed using proper toe benching, drainage and intermediate benching. To achieve a stable slope and prior to placing any fill, the following should be implemented.

6.5.1 Strip the entire construction area of all existing vegetation, topsoil, any organic soil encountered, and any other unsuitable materials.

6.5.2 Construct the embankment toe bench as shown in Appendix G. The keyway should be excavated to suitable material as directed by a qualified geotechnical engineer. The keyways should be a minimum of ten (10) feet wide.

6.5.3 The slope construction should then start using the on-site suitable soil/weathered rock. It is recommended that rocky fill be placed in the initial stages of the fill placement. These materials should be placed as per the "General Fill Construction" section of this report. The fill should be benched into the existing materials. The suitability of the fill material should be evaluated by a qualified geotechnical engineer prior to use.

6.5.4 The final slope should be properly landscaped to prevent surface erosion.

6.6 Excavated Soils/Materials

The suitability and usage of the excavated materials should be made on site by a qualified geotechnical engineer during construction operations due to the variable nature of the existing materials. In general, the materials on the site are suitable to use within the engineered fill, except for any black or organics material encountered.

We anticipate that excavations into the on-site soils and weathered rock that was encountered can be performed using conventional excavation equipment.

7.0 GENERAL CONSIDERATIONS

This report has been prepared to present our recommendations with regard to geotechnical aspects of the proposed construction to the owner and the designer of the ET – Braddock Well Pad project located in Braddock, Allegheny County, Pennsylvania. The scope of our services is limited to the specific project and location described herein and the description of the project represents ACA's understanding of the significant aspects relevant to soil and groundwater characteristics. Since no final grading plan was available at the time of our report, ACA should review the final grading plan so that the conclusions of this report can be modified as necessary in writing.

We also request that we be authorized to review the project plans and specifications to confirm that the recommendations contained in this report have been interpreted and implemented in accordance with our intent.

It is recommended that all construction operations dealing with earthworks construction be reviewed by an experienced geotechnical engineer who can evaluate the conditions encountered and make decisions regarding whether the intent of the recommendations is fulfilled in the actual construction. If requested, ACA would welcome the opportunity to provide field monitoring services during construction.

The analyses and recommendations presented herein are based upon data obtained from borings at the locations indicated on the plan and from any other information discussed in the report. Information presented regarding subsurface conditions between borings is based on the engineering judgment of ACA and could be interpreted differently by others. In the performance of subsurface explorations, specific information is obtained at specific locations at specific times. However, it should be recognized that variations may exist between boring locations and, also, that such situations as groundwater levels vary from time to time. The nature and extent of variations may not become evident until construction is initiated or even completed. If variations become evident during construction, it will be necessary to reevaluate the recommendations presented herein after performing on site observations during the construction period.

In preparing this report, the professional services of ACA have been performed, findings obtained, and recommendations prepared in accordance with generally accepted engineering principles and practices. This statement is in lieu of all warranties, either expressed or implied.

If you require additional information or clarification of the foundation recommendations, please contact our office.

ACA ENGINEERING, INC.

Michael Z. McLain, P.E.
Project Engineer

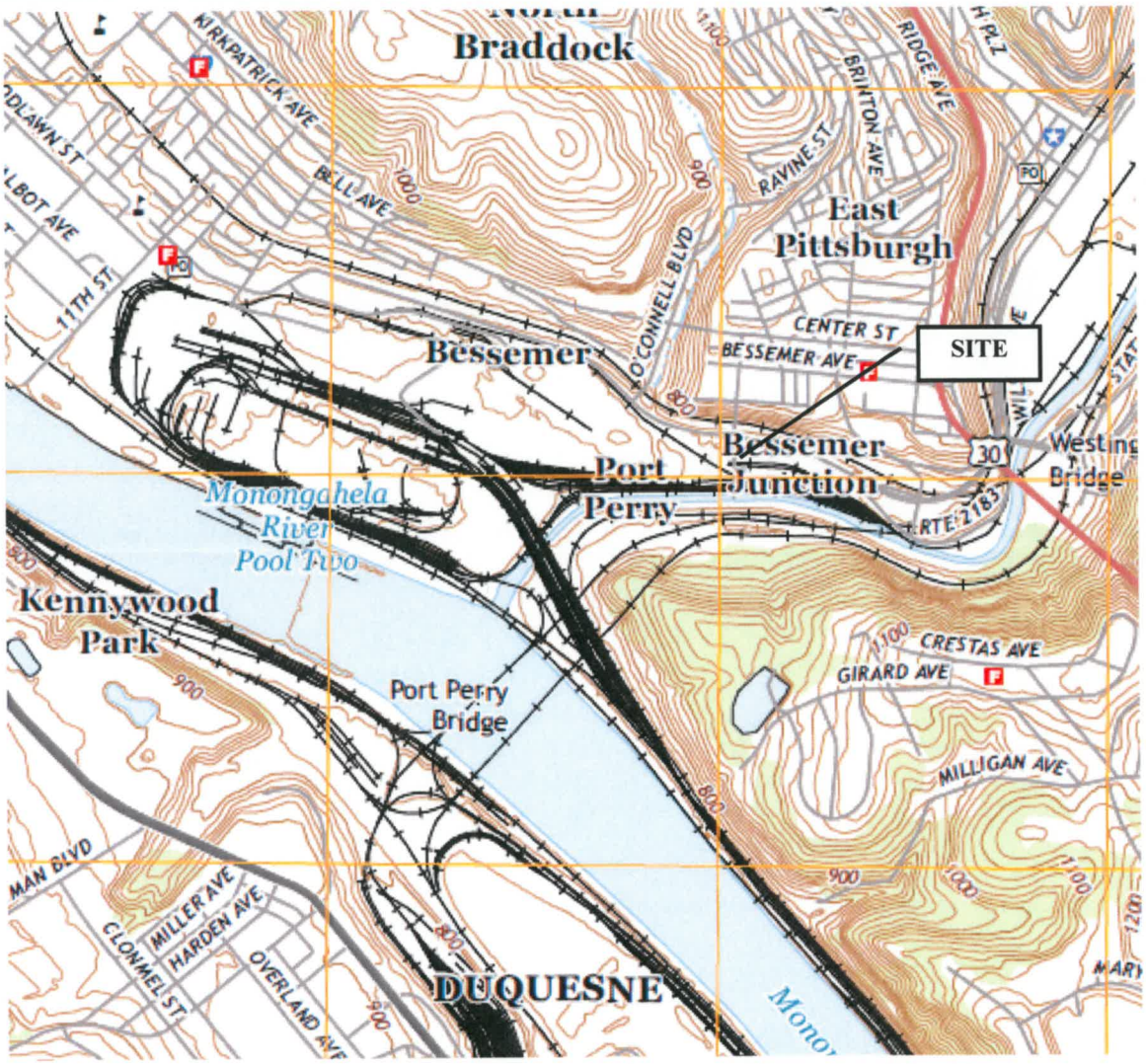
Thomas R. Beatty, P.G.
President

MGS:ms

APPENDICES

APPENDIX A

U.S.G.S. Map



SITE LOCATION MAP

Source: U.S.G.S. Braddock Quad
Allegheny County, Pennsylvania
7.5 Minute Series (Topographic)
Scale: 1:24,000

Project: Geotechnical Investigation
ET-Braddock Well Pad
Braddock., Pennsylvania

ACA ENGINEERING, INC.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

APPENDIX B

Soil Survey Map

SOIL SURVEY MAP

Source: U.S.D.A. Soil Conservation Service
Allegheny County, Pennsylvania
Web Soil Survey

Project: Geotechnical Investigation
ET-Braddock Well Pad
Braddock, Pennsylvania

ACA ENGINEERING, INC.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

APPENDIX C

Mining Maps

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BRADDOCK QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

EXPLANATION

Extent of known deep mining

MAP RELIABILITY

Limits of known deep mining – approximate

SOURCE

Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U.S. Route — State Route

QUADRANGLE LOCATION

BRADDOCK

MINED-OUT AREA OF THE
UPPER FREEPORT COAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

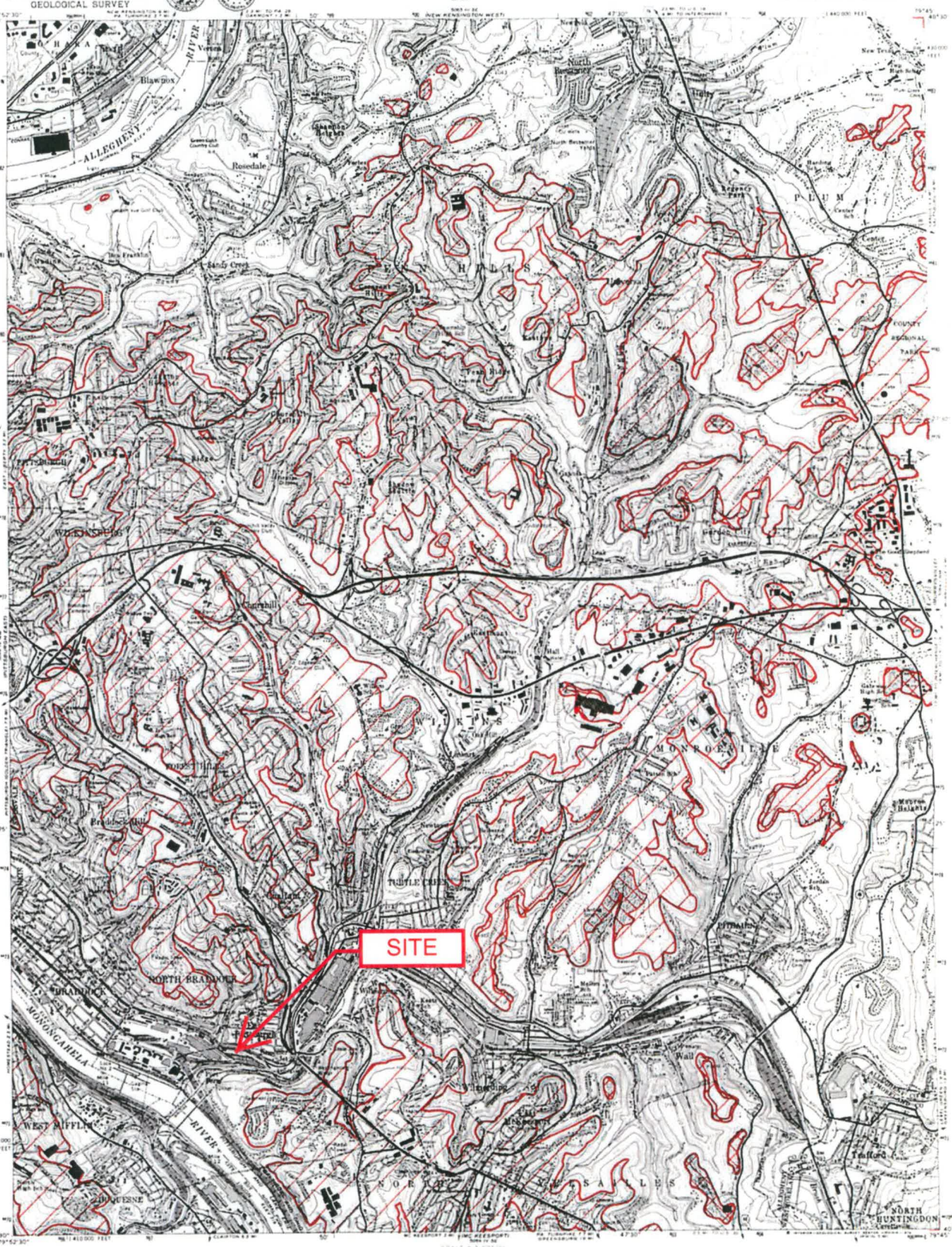
BRADDOCK QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

EXPLANATION

Crop line of the Pittsburgh coal

Extent of known strip mining

Extent of known deep mining



MAP RELIABILITY

Coal crop line – very good

Limits of known strip mining – approximate

Limits of known deep mining – approximate

SOURCES

Crop line modified by C. H. Dodge from Johnson, M. E. (1929). *Pittsburgh quadrangle – Geology and mineral resources*, Pennsylvania Geological Survey, 4th ser., Atlas 27, 236 p.

Limits of strip mining based on interpretation of topographic map and on field checking.

Limits of deep mining from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1978), unpublished map.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

QUADRANGLE LOCATION

BRADDOCK

CROP LINE AND MINED-OUT AREAS OF THE

PITTSBURGH COAL

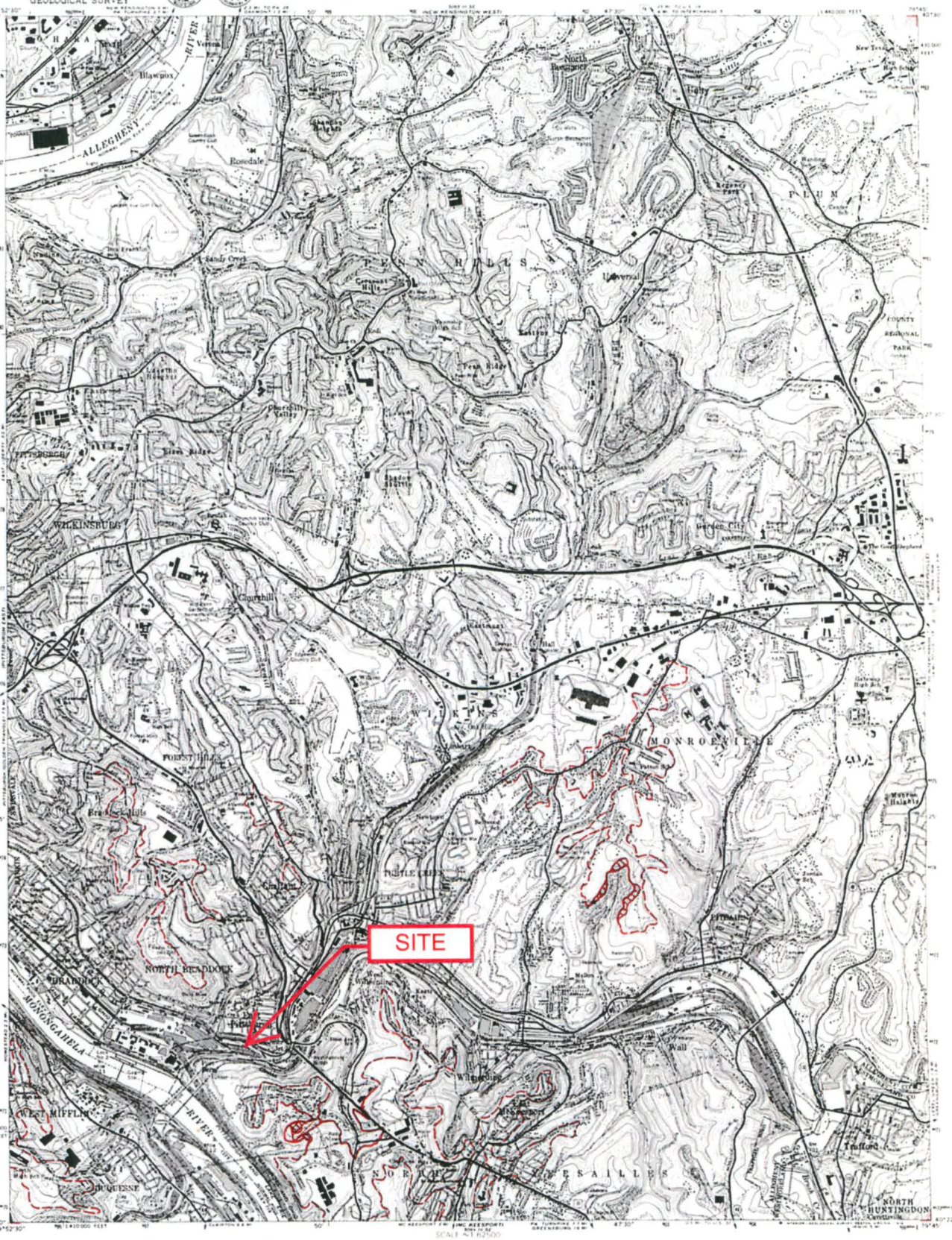
EXPLANATION

Crop line of the Redstone coal

Horizon of the Redstone coal

Extent of known strip mining

Extent of known deep mining



MAP RELIABILITY

Coal crop line and horizon – good to very good

Limits of known strip mining – approximate

Limits of known deep mining – approximate

SOURCES

Crop line modified by C. H. Dodge from Johnson, M. E. (1929), *Pittsburgh quadrangle – Geology and mineral resources*, Pennsylvania Geological Survey, 4th ser., Atlas 27, 236 p.

Limits of strip mining based on interpretation of topographic map and on field checking.

Limits of deep mining from unpublished mine maps.

SCALE 1:24 000

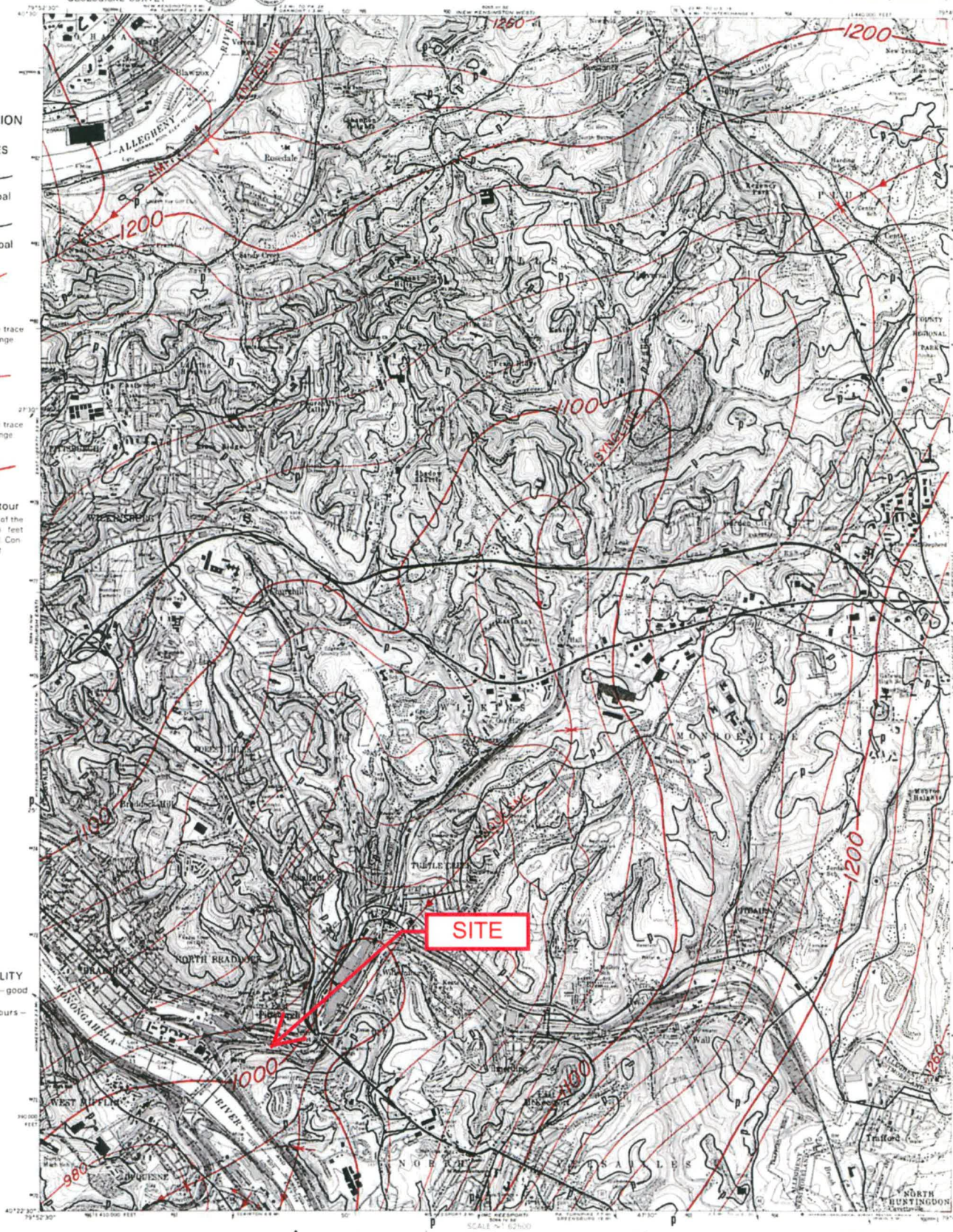
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

BRADDOCK

CROP LINE, HORIZON, AND MINED-OUT AREAS OF THE REDSTONE COAL



EXPLANATION

CROP LINES

Redstone coal

Pittsburgh coal

Anticline
Showing axial-plane trace and direction of plunge

Syncline
Showing axial-plane trace and direction of plunge

1100

Structure contour
Altitude of the base of the Pittsburgh coal, in feet above mean sea level. Contour interval 20 feet

MAP RELIABILITY
Coal crop lines – good to very good
Structure contours – very good

SOURCE

Crop lines and structure contours modified by C. H. Dodge from Johnson, M. E. (1929), *Pittsburgh quadrangle – Geology and mineral resources*. Pennsylvania Geological Survey, 4th ser., Atlas 27, 236 p.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

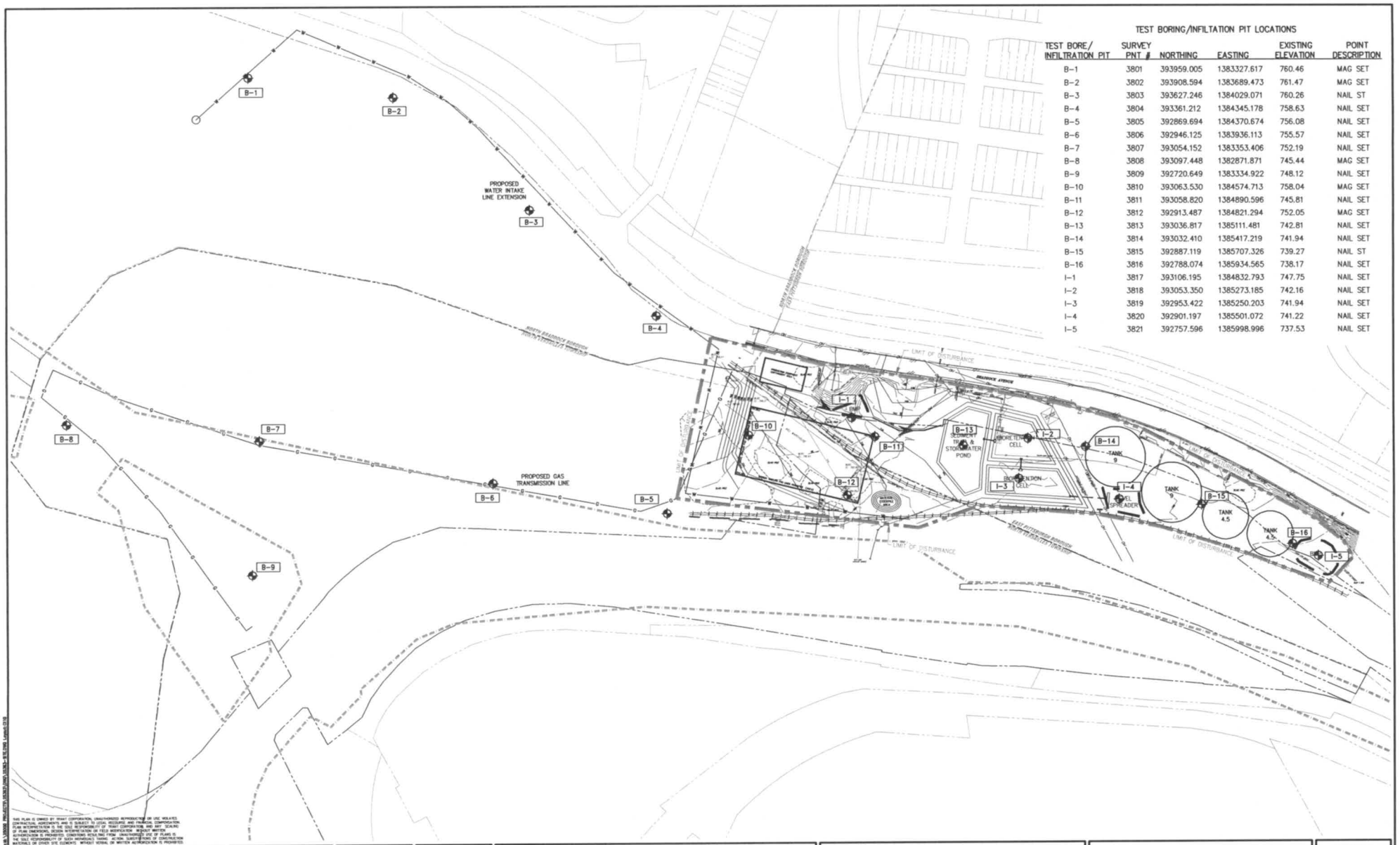
ROAD CLASSIFICATION

BRADDOCK

COAL CROP LINES AND STRUCTURE CONTOURS

APPENDIX D

Boring Location Plan



TEST BORING/INFILTATION PIT LOCATIONS

TEST BORE/ INFILTRATION PIT	SURVEY PNT #	NORTHING	EASTING	EXISTING ELEVATION	POINT DESCRIPTION
B-1	3801	393959.005	1383327.617	760.46	MAG SET
B-2	3802	393908.594	1383689.473	761.47	MAG SET
B-3	3803	393627.246	1384029.071	760.26	NAIL ST
B-4	3804	393361.212	1384345.178	758.63	NAIL SET
B-5	3805	392869.694	1384370.674	756.08	NAIL SET
B-6	3806	392946.125	1383936.113	755.57	NAIL SET
B-7	3807	393054.152	1383353.406	752.19	NAIL SET
B-8	3808	393097.448	1382871.871	745.44	MAG SET
B-9	3809	392720.649	1383334.922	748.12	NAIL SET
B-10	3810	393063.530	1384574.713	758.04	MAG SET
B-11	3811	393058.820	1384890.596	745.81	NAIL SET
B-12	3812	392913.487	1384821.294	752.05	MAG SET
B-13	3813	393036.817	1385111.481	742.81	NAIL SET
B-14	3814	393032.410	1385417.219	741.94	NAIL SET
B-15	3815	392887.119	1385707.326	739.27	NAIL ST
B-16	3816	392788.074	1385934.565	738.17	NAIL SET
I-1	3817	393106.195	1384832.793	747.75	NAIL SET
I-2	3818	393053.350	1385273.185	742.16	NAIL SET
I-3	3819	392953.422	1385250.203	741.94	NAIL SET
I-4	3820	392901.197	1385501.072	741.22	NAIL SET
I-5	3821	392757.596	1385998.996	737.53	NAIL SET

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REV. NO.	DATE	DESCRIPTION	BY

DWG. NAME: 25383-SITE
DRAWN BY: RLB
CHECKED BY: DUB

N W E S

TRANT CORPORATION
Engineering Permits & Approvals
PINE CENTER
11279 PERRY HIGHWAY SUITE 206
WEXFORD, PA 15090

Environmental
Surveying
Site Civil
Traffic
PHONE: (724) 935-7900
FAX: (724) 935-6060
EMAIL: permits@trantcorp.com

ET-BRADDOCK WELL PAD

BRADDOCK BOROUGH - ALLEGHENY COUNTY -

100 0 50 100 PA 200 400
1 inch = 100 feet

OVERALL SITE TEST BORE LOCATION PLAN

PROJECT NO.: 25383.03
DATE: 12-28-2017

SHEET NO.
C110

APPENDIX E

Test Boring Logs and Soil Classification Charts

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 760.46'

Borehole #: B-1

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft 10 30 50	Water Level	Remarks
		Ground Surface	760.5 0.0								
0–3		Gray SLAG with trace sand (FILL)		S-1	SS	0.0 - 1.5	22 25 33	1.5			Moist
3–6		Gray SLAG (FILL)	757.5 3.0	S-2	SS	3.0 - 4.5	15 21 26	1.5			Moist
6			754.3 6.2	S-3	SS	6.0 - 6.2	50-3"	0.1			Wet 0 HR.-Dry
7–20		End of Test Boring									

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/16/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 761.47'

Borehole #: B-2

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
		Ground Surface	761.5 / 0.0								
0–1		Black, silty SAND with some gravel and little slag (FILL)	760.0 / 1.5	S-1	SS	0.0 - 1.5	40 27 29	1.5			Moist
2–3		Brown SAND with little gravel, trace slag, and trace wood fragments (FILL)	758.5 / 3.0	S-2	SS	1.5 - 3.0	21 18 16	1.5			Moist
4				S-3	SS	3.0 - 4.5	14 11 13	1.1			Moist
5–6		Brown SAND with little slag, trace silt, and trace wire (FILL)		S-4	SS	4.5 - 6.0	10 12 11	0.3			Moist
7			754.0 / 7.5	S-5	SS	6.0 - 7.5	5 11 14	1.0			Moist
8		End of Test Boring									0 HR.-Dry
9–20											

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/16/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 760.26'

Borehole #: B-3

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft 10 30 50	Water Level	Remarks
		Ground Surface	760.3 0.0								
0–3		Black GRAVEL with some sand and trace silt (FILL)		S-1	SS	0.0 - 1.5	6 13 9	1.0			Moist
3–6		Gray ROCK FRAGMENTS and SLAG (FILL)	757.3 3.0	S-2	SS	3.0 - 3.2	50-3"	0.2			Dry
6–7		Gray GRAVEL with slag and concrete fragments (FILL)	754.3 6.0	S-3	SS	6.0 - 6.1	50-1"	0.1			Dry 0 HR.-Dry
7–20		End of Test Boring									

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/16/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 759.63'

Borehole #: B-4

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
		Ground Surface	759.6 / 0.0								
0–3		Black, silty SAND with some gravel (FILL)		S-1	SS	0.0 - 1.5	50-4"	0.2			Moist
3–6		Light brown SAND with some slag (FILL)	756.6 / 3.0	S-2	SS	3.0 - 4.5	14 9 6	1.5			Wet
6		Bluish gray SLAG (FILL)	753.6 / 6.0	S-3	SS	6.0 - 6.3	50-4"	0.3			Moist 0 HR.-Dry
		End of Test Boring	753.3 / 6.3								

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 756.08'

Borehole #: B-5

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
		Ground Surface	756.1 / 0.0								
0–3		Black, silty SAND with some gravel and some wood fragments (FILL)		S-1	SS	0.0 - 1.5	6 12 11	0.9			Moist
3–6		Blue, black, and gray SLAG with trace silt and trace sand (FILL)	753.1 / 3.0	S-2	SS	3.0 - 4.5	32 22 12	1.5			Moist
6–7.5		Blue, black, and gray SLAG with some silt and some sand (FILL)	750.1 / 6.0	S-3	SS	6.0 - 7.5	9 11 8	1.2			Moist
		End of Test Boring	748.6 / 7.5								0 HR.-Dry

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 755.17'

Borehole #: B-6

Engineer/Geologist: M. Burke

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SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
		Ground Surface	755.2 / 0.0								
0–3		Brown, silty SAND with some gravel and little slag (FILL)		S-1	SS	0.0 - 1.5	3 3 5	1.5			Moist
3–6		Light brown SAND with some silt and little gravel (FILL)	752.2 / 3.0	S-2	SS	3.0 - 4.5	8 6 7	1.5			Moist
6–7.5		Bluish black SLAG with some silt and some sand (FILL)	749.2 / 6.0	S-3	SS	6.0 - 7.5	6 6 4	1.5			Moist
		End of Test Boring	747.7 / 7.5								0 HR.-Dry

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 752.19'

Borehole #: B-7

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
0		Ground Surface	752.2 0.0								
1		Brown, silty SAND with some gravel and some slag (FILL)	750.7 1.5	S-1	SS	0.0 - 1.5	3 5 9	0.9			Moist
2				S-2	SS	1.5 - 3.0	7 12 11	1.3			Moist
3		Red BRICK FRAGMENTS with some slag (FILL)					11				
4				S-3	SS	3.0 - 4.5	9 15	0.8			Moist
5				S-4	SS	4.5 - 5.4	34 50-5"	0.9			Moist
6			746.2 6.0								
7		Reddish brown, sandy SILT with some gravel and little slag (FILL)		S-4	SS	6.0 - 6.4	50-5"	0.4			Moist
8				S-6	SS	7.5 - 9.0	22 11 8	1.5			Moist
9			743.2 9.0								
10		White, brown, and bluish gray SLAG with trace silt and trace sand (FILL)	741.7 10.5	S-7	SS	9.0 - 10.5	11 8 5	0.8			Moist
11		Black and brown, silty SAND with little coal fragments and little gravel (FILL)		S-8	SS	10.5 - 12.0	6 4 5	1.5			Moist
12			740.2 12.0								
13				S-9	SS	12.0 - 13.5	15 11 18	0.7			Moist
14		Brown, black, and bluish gray SLAG with some silt and some sand (FILL)									
15			737.2 15.0								
16				S-10	SS	15.0 - 16.5	28 15 10	1.1			Moist
17											
18											
19				S-11	SS	18.0 - 18.8	38 50-4"	0.8			Moist
20											

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 20's

Sheet: 1 of 2

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 752.19'

Borehole #: B-7
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
21											
22				S-12	SS	21.0 - 21.4	50-5"	0.4			Moist
23											
24											
25				S-13	SS	24.0 - 25.5	43 20 40	1.5			Moist
26											
27											
28		Bluish gray and tan SLAG with some sand (FILL)		S-14	SS	27.0 - 27.1	50-1"	0.1			Moist
29										▼	0 HR.-29.3'
30											
31				S-15	SS	30.0 - 31.5	30 18 10	0.5			Wet
32											
33											
34				S-16	SS	33.0 - 34.5	36 15 9	1.5			Wet
35											
36											
37			714.7 37.5	S-17	SS	36.0 - 37.5	30 23 26	1.5			Wet
38		End of Test Boring									
39											
40											

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 20's
Sheet: 2 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 745.44'

Borehole #: B-8

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
0		Ground Surface	745.4 0.0								
		Gray GRAVEL (FILL)	744.9 0.5	S-1	SS	0.0 - 1.5	21 24 13	1.0			Moist
1–3		Brown GRAVEL with little sand, little silt, and trace slag (FILL)		S-2	SS	3.0 - 4.5	9 10 8	1.1			Moist
6		Brown SAND with little silt, little coal fragments, and little gravel (FILL)	739.4 6.0	S-3	SS	6.0 - 7.1	4 16 50-1"	1.1			Moist
7		End of Test Boring	738.3 7.1								0 HR.-Dry

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/16/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 748.12'

Borehole #: B-9

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft 10 30 50	Water Level	Remarks
		Ground Surface	748.1 0.0								
0–3		Brown SAND with some gravel and little silt (FILL)		S-1	SS	0.0 - 1.5	9 8 7	1.5			Moist
3–6		Gray SLAG (FILL)	745.1 3.0	S-2	SS	3.0 - 4.3	21 42 50-4"	1.3			Moist
			741.7 6.4	S-3	SS	6.0 - 6.4	50-5"	0.4			Moist 0 HR.-Dry
7		End of Test Boring									

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/16/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 758.04'

Borehole #: B-10

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
0		Ground Surface	758.0 / 0.0								
1		Black, silty SAND with some slag (FILL)		S-1	SS	0.0 - 0.4	50-5"	0.4			Moist
2				S-2	SS	1.5 - 3.0	43 32 18	1.5			Moist
3							24				
4				S-3	SS	3.0 - 4.5	22 17	1.5			Moist
5		Black, silty SAND with some slag and little coal fragments (FILL)	753.5 / 4.5	S-4	SS	4.5 - 5.4	10 9 12	1.5			Moist
6			752.0 / 6.0								
7		Bluish gray SLAG (FILL)		S-4	SS	6.0 - 6.9	10 50-5"	0.9			Moist
8				S-6	SS	7.5 - 8.4	43 50-5"	0.9			Moist
9											
10				S-7	SS	9.0 - 9.2	50-3"	0.2			Moist
11		Bluish gray, black, and brown SLAG with sand and silt (FILL)	747.5 / 10.5	S-8	SS	10.5 - 12.0	33 47 47	1.5			Moist
12			746.0 / 12.0								
13		Black and brown, sandy SILT with some slag (FILL)		S-9	SS	12.0 - 12.9	39 50-5"	0.9			Moist
14				S-10	SS	13.5 - 15.0	47 9 7	1.1			Moist
15		Bluish gray SLAG (FILL)	743.0 / 15.0								
16				S-11	SS	15.0 - 15.8	12 50-4"	0.8			Moist
17				S-12	SS	16.5 - 16.9	50-5"	0.4			Moist
18		Black and brown, sandy SILT with little coal fragments and little brick (FILL)	740.0 / 18.0								
19				S-13	SS	18.0 - 19.5	20 14 8	0.8			Moist
20				S-14			10 6				

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 20's

Sheet: 1 of 2

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 758.04'

Borehole #: B-10
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
				S-14	SS	19.5 - 21.0	6 5 6	1.5			Moist
21			737.0 21.0								
22		Light brown SAND with some slag (FILL)		S-15	SS	21.0 - 22.5	6 10 17	0.8			Moist
23				S-16	SS	22.5 - 24.0	15 16 4	0.8			Moist
24			734.0 24.0								
25				S-17	SS	24.0 - 25.5	28 31 11	1.0			Moist
26				S-18	SS	25.5 - 27.0	7 4	0.8			Moist
27											
28											
29		Bluish gray SLAG (FILL)									
30											0 HR.-29.4'
31				S-19	SS	30.0 - 30.4	50-5"	0.4			Wet
32											
33				S-20	SS	33.0 - 33.8	48 50-4"	0.8			Wet
34		End of Test Boring	724.2 33.8								
35											
36											
37											
38											
39											
40											

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/15/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 20's
Sheet: 2 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

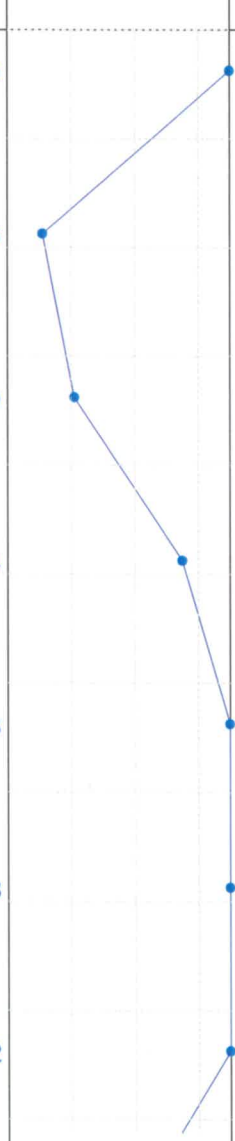
Elevation: 745.81'

Borehole #: B-11

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft 10 30 50	Water Level	Remarks
		Ground Surface	745.8 0.0								
0–3		Dark brown SAND with some gravel, little slag, and trace silt (FILL)	742.8 3.0	S-1	SS	0.0 - 0.9	42 50-5"	0.9			Moist
3–6		Black SAND with some gravel, trace silt, trace slag, and trace brick fragments (FILL)	739.8 6.0	S-2	SS	3.0 - 4.5	8 6 5	1.5			Moist
6–9		Bluish gray and brown SLAG with some sand (FILL)	736.8 9.0	S-3	SS	6.0 - 7.5	8 8 13	1.0			Moist
9–12		Yellow SLAG with some sand (FILL)	733.8 12.0	S-4	SS	9.0 - 10.5	11 10 45	0.4			Moist
12–15		Gray SLAG (FILL)	730.8 15.0	S-4	SS	12.0 - 12.4	50-5"	0.3			Dry
15–18		Gray and bluish gray SLAG (FILL)	727.8 18.0	S-6	SS	15.0 - 15.8	10 50-4"	0.8			Dry
18–20		Gray SLAG (FILL)		S-7	SS	18.0 - 18.2	50-3"	0.2		▼	Dry 0 HR.-19.5'



Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/11/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 40's

Sheet: 1 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

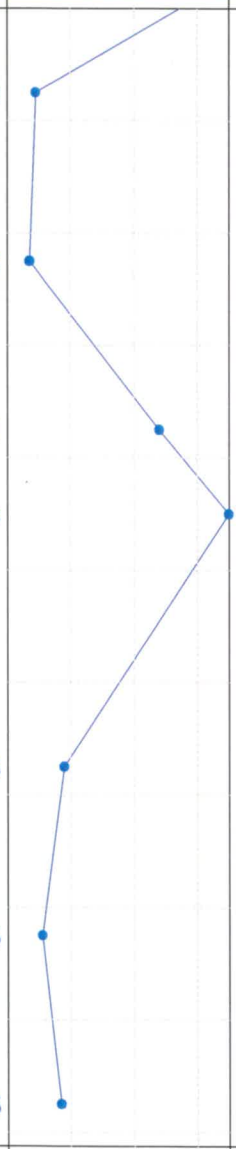
Elevation: 745.81'

Borehole #: B-11

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
21			724.8 / 21.0								
22		Light brown SLAG (FILL)		S-8	SS	21.0 - 22.5	26 5 4	0.9			Wet
23											
24			721.8 / 24.0								
25		Olive and black CLAY (FILL)		S-9	SS	24.0 - 25.5	6 3 4	1.5			Wet
26											
27			718.8 / 27.0								
28		Bluish gray SLAG (FILL)		S-10	SS	27.0 - 28.5	13 25 23	1.1			Wet
29			717.3 / 28.5	S-11	SS	28.5 - 28.9	50-4"	0.3			Wet
30											
31											Wet
32		Black SLAG (FILL)									
33											
34				S-12	SS	33.0 - 34.5	29 12 6	1.5			Wet
35											
36			709.8 / 36.0								
37		Medium, brown SAND with little to some gravel and little silt (ALLUVIAL - SP)		S-13	SS	36.0 - 37.5	WOR 6 5	1.5			Wet
38											
39											
40				S-14	SS	39.0 - 40.5	4 7 10	1.5			Wet
			705.3 / 40.5								



Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/11/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 40's

Sheet: 2 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 752.05'

Borehole #: B-12

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft 10 30 50	Water Level	Remarks
		Ground Surface	752.1 0.0								
0											
1		Brown SAND with little gravel, little slag, trace silt, and trace brick fragments (FILL)		S-1	SS	0.0 - 0.8	33 50-4"	0.8			Moist
2											
3											
4		Auger refusal at 5'. Offset 10' west.		S-2	SS	3.0 - 3.7	30 50-3"	0.7			Moist
5											
6			746.1 6.0								
7		Brown SAND with little gravel (FILL)		S-3	SS	6.0 - 7.5	3 4 5	1.0			Moist
8											
9			743.1 9.0								
10		Brown SAND with little gravel, trace silt, and trace slag (FILL)		S-4	SS	9.0 - 10.5	4 4 6	1.3			Moist
11											
12			740.1 12.0								
13		Gray and bluish gray SLAG (FILL)		S-4	SS	12.0 - 13.5	15 9 7	1.5			Moist
14											
15			737.1 15.0								
16				S-6	SS	15.0 - 16.5	10 12 10	1.5			Moist
17											
18		Brown SAND with little gravel, trace silt, and trace slag (FILL)									
19				S-7	SS	18.0 - 19.5	11 13 9	1.5			Moist
20											

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/11/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 60's

Sheet: 1 of 2

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 752.05'

Borehole #: B-12
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
21			731.1 / 21.0								
22		Brown and gray, silty CLAY with little sand, trace gravel, and trace coal fragments (FILL)		S-8	SS	21.0 - 22.5	1 2 4	1.5			Moist
23											
24			728.1 / 24.0								
25		Bluish gray SLAG (FILL)		S-9	SS	24.0 - 25.5	3 4 7	0.2			Dry
26											
27			725.1 / 27.0								
28				S-10	SS	27.0 - 27.7	10 50-3"	0.7			Moist
29											
30											
31		Gray SLAG (FILL)		S-11	SS	30.0 - 30.4	50-5"	0.4			Wet
32											
33											
34				S-12	SS	33.0 - 33.6	39 50-1"	0.6			Wet
35											
36			716.1 / 36.0								0 HR.-36.4'
37		Very loose to loose, brown SAND with little gravel and little silt (ALLUVIAL - SP)		S-13	SS	36.0 - 37.5	1 1 2	1.0			Wet
38											
39											
40				S-14	SS	39.0 - 40.5	WOR 3 4	1.5			Wet
			711.6 / 40.5								

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/11/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 60's
Sheet: 2 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 742.81'

Borehole #: B-13

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
		Ground Surface	742.8 / 0.0								
0–1		Black, sandy SILT with some gravel, little slag, and little wood fragments (FILL)		S-1	SS	0.0 - 0.8	31 50-4"	0.8			Wet
1–2			741.3 / 1.5								
2–3		Black and brown, silty SAND with trace gravel, trace coal fragments, and trace slag (FILL)		S-2	SS	1.5 - 3.0	32 11 12	1.5			Wet
3–4			739.8 / 3.0								
4–5				S-3	SS	3.0 - 4.5	13 18 26	1.0			Moist
5–6		Black SILT with little sand and trace organics (FILL)	738.3 / 4.5	S-4	SS	4.5 - 6.0	22 21 8	1.5			Moist
6–7			736.8 / 6.0								
7–8		Gray SLAG with brick fragments, trace sand, and trace silt (FILL)		S-5	SS	6.0 - 7.4	8 18 50-5"	1.4			Wet
8–9		Gray SLAG (FILL)		S-6	SS	7.5 - 7.8	50-4"	0.1			Wet
9			733.6 / 9.2	S-7	SS	9.0 - 9.2	50-3"	0.2			Wet
10–20		End of Test Boring									0 HR.-Dry

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/10/16

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Snow 20's

Sheet: 1 of 1

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 741.94'

Borehole #: B-14
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft 10 30 50	Water Level	Remarks
0		Ground Surface	741.9 0.0								
1, 2		Brown SAND with some slag adn some brick fragments (FILL)		S-1	SS	0.0 - 0.4	50-5"	0.4			Wet
3, 4, 5		Brown, SAND with slag (FILL)	738.9 3.0	S-2	SS	3.0 - 4.5	20 10 9	1.5			Moist
6, 7, 8		Gray SLAG with some sand (FILL)	735.9 6.0	S-3	SS	6.0 - 7.5	25 12 16	1.5			Moist
9, 10, 11		Gray SLAG (FILL)	732.9 9.0	S-4	SS	9.0 - 9.1	50-1"	0.1		▼	Dry 0 HR.-11.4'
12, 13, 14		Brown, silty CLAY with little slag and little sand (FILL)	729.9 12.0	S-4	SS	12.0 - 13.5	WOR WOH 2	0.6			Wet
15, 16, 17		Brown CLAY with gray mottling (FILL)	726.9 15.0	S-6	SS	15.0 - 16.5	2 1 2	1.5			Wet
18, 19, 20			723.9 18.0	S-7	SS	18.0 - 19.5	3 2 1	0.9			Wet

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/10/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 20's
Sheet: 1 of 2

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 741.94'

Borehole #: B-14
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
21		Black CLAY with trace sand with coal fragments and gravel (FILL)					3				
22				S-8	SS	21.0 - 22.5	2	0.3			Wet
23							2				
24			717.9 / 24.0								
							8				
25				S-9	SS	24.0 - 25.5	2	1.0			Wet
26		Soft to stiff, brown, silty CLAY with gravel and trace sand (ALLUVIAL - CL)					2				
27							3				
28				S-10	SS	27.0 - 28.5	4	1.5			Wet
							4				
29							3				
				S-11	SS	28.5 - 30.0	4	1.5			Wet
30			711.9 / 30.0				4				
31		End of Test Boring									
32											
33											
34											
35											
36											
37											
38											
39											
40											

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/10/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 20's
Sheet: 2 of 2

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 739.27'

Borehole #: B-15
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
		Ground Surface	741.9 / 0.0								
0–6		Dark brown SAND with little silt, little gravel, and little slag (FILL)		S-1	SS	0.0 - 0.4	8 12 29	1.0			Moist
				S-2	SS	3.0 - 4.5	20 9 4	1.5			Moist
6–9		Brown and black SAND with little silt, little gravel, trace slag, and trace glass (FILL)	735.9 / 6.0	S-3	SS	6.0 - 7.5	2 1 2	13			Moist
9–12		Greenish gray to blue SLAG (FILL)	732.9 / 9.0	S-4	SS	9.0 - 9.1	5 42 26	1.1			Dry
12–15		Reddish brown SAND with little silt, little gravel, trace coal fragments, and trace slag (FILL)	729.9 / 12.0	S-4	SS	12.0 - 13.5	WOR 2 1	1.1			Moist
15–18		Dark brown SLAG (FILL)	726.9 / 15.0	S-6	SS	15.0 - 16.5	3 3 37	1.5		▼	Moist 0 HR.-17.2'
18–19.8		White SLAG (FILL)	723.9 / 18.0	S-7	SS	18.0 - 19.5	23 14 8	1.5			Wet
			723.1 / 18.8								

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/11/18

ACA Engineering, Inc.
410 N Balph Avenue
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Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 20's
Sheet: 1 of 2

Project No: P17385x10
Project: ET-Braddock Well Pad
Client: Merrion Oil & Gas
Location: Braddock, PA
Elevation: 739.27'

Borehole #: B-15
Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
21		Bluish gray SLAG (FILL)									
22				S-8	SS	21.0 - 22.5	2 2 3	0.0			Wet
23											
24											
25			716.8 25.1	S-9	SS	24.0 - 25.5	5 6 6	1.5			Wet
26		Stiff, olive, silty CLAY (ALLUVIAL - CL)									
27			714.9 27.0								
28		Firm to stiff, brown, silty CLAY with some to trace sand (ALLUVIAL - CL)		S-10	SS	27.0 - 28.5	4 4 4	1.5			Wet
29				S-11	SS	28.5 - 30.0	WOR 2 4	1.5			Wet
30		End of Test Boring	711.9 30.0								
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											

Drilled By: Shallenberger Construction, Inc.
Drill Method: Hollow Stem Auger
Drill Date: 1/11/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"
Weather: Cloudy 20's
Sheet: 2 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 738.17'

Borehole #: B-16

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
0		Ground Surface	738.2 0.0								
1		Dark gray SAND with little slag and trace silt (FILL)	736.7 1.5	S-1	SS	0.0 - 1.5	25 30 45	1.5			Wet
2		Dark gray, silty SAND with trace rock fragments (FILL)	735.2 3.0	S-2	SS	1.5 - 1.9	50-5"	0.4			Moist
3		Dark gray SAND with little silt, trace brick fragments, trace slag, and trace coal fragments (FILL)	733.7 4.5	S-3	SS	3.0 - 4.5	12 11 12	1.5			Moist
4				S-4	SS	4.5 - 6.0	8 7 5	1.5			Moist
5											
6		Brown, clayey SILT with trace sand and trace slag (FILL)	732.2 6.0	S-4	SS	6.0 - 7.5	2 2 1	0.8			Moist
7		Brown and black, clayey SILT with trace sand and trace slag (FILL)	730.7 7.5	S-6	SS	7.5 - 9.0	2 2 3	1.5			Moist
8											
9		Brown, clayey SILT with trace sand, trace coal fragments, and trace slag (FILL)	729.2 9.0	S-7	SS	9.0 - 10.5	4 3 4	0.5			Moist
10											
11		Brown CLAY with trace silt and trace rock fragments (FILL)	727.7 10.5	S-8	SS	10.5 - 12.0	3 2 2	1.1			Wet
12			726.2 12.0								
13		Very loose to loose, brown SAND with some rock fragments and trace silt (ALLUVIAL - SP)		S-9	SS	12.0 - 13.5	5 6 2	1.0		▼	Wet 0 HR.-13.2'
14				S-10	SS	13.5 - 15.0	2 2 2	1.5			Wet
15		Soft to stiff, brown and gray CLAY with little sand and trace organics (ALLUVIAL - CL)	723.2 15.0	S-11	SS	15.0 - 16.5	3 3 4	1.0			Wet
16			721.7 16.5	S-12	SS	16.5 - 18.0	3 3 5	1.5			Moist
17											
18			720.2 18.0	S-13	SS	18.0 - 19.5	3 4 4	1.5			Moist
19				S-14			4 15				
20											

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/10/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 20's

Sheet: 1 of 2

Project No: P17385x10

Project: ET-Braddock Well Pad

Client: Merrion Oil & Gas

Location: Braddock, PA

Elevation: 738.17'

Borehole #: B-16

Engineer/Geologist: M. Burke

ACA ENGINEERING

SUBSURFACE PROFILE				SAMPLE							
Depth	Symbol	Description	Depth	Number	Type	Sample Depth	Blows/ft	Recovery	N-Value blows/ft (10 30 50)	Water Level	Remarks
21		Firm, brown and gray, sandy CLAY with trace rock fragments (ALLUVIAL - CL)	717.2 / 21.0	S-14	SS	19.5 - 21.0	15 9 5	1.5			Moist
22				S-15	SS	21.0 - 22.5	7 8 6	1.5			Moist
23		Stiff, gray CLAY (ALLUVIAL - CL)	715.7 / 22.5	S-16	SS	22.5 - 24.0	5 4 4	1.5			Moist
24		Stiff to very stiff, gray CLAY with trace sand and trace silt (ALLUVIAL - CL)		S-17	SS	24.0 - 25.5	3 4	1.5			Moist
25			712.7 / 25.5								
26		Very stiff, brown and gray CLAY with trace silt (ALLUVIAL - CL)									
27											
28		Firm to stiff, brown CLAY with little to trace sand and trace silt (ALLUVIAL - CL)									
29											
30		End of Test Boring									
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											

Drilled By: Shallenberger Construction, Inc.

Drill Method: Hollow Stem Auger

Drill Date: 1/10/18

ACA Engineering, Inc.
410 N Balph Avenue
Pittsburgh, PA 15202
Phone: (412) 761-1990
Fax: (412) 761-1998

Hole Size: 7"

Weather: Cloudy 20's

Sheet: 2 of 2

APPENDIX F

Laboratory Test Results

ACA ENGINEERING

WATER CONTENT REPORT

PROJECT: ET-Braddock Well Pad
CLIENT: Merrion Oil & Gas

FILE NO.: P17385x10
DATE: 1/23/2018

BORING NO.	SAMPLE DEPTH (ft.)	MOISTURE CONTENT (%)
B-1	0.0 - 1.5	6.1
B-1	3.0 - 4.5	13.3
B-2	0.0 - 1.5	10.2
B-2	1.5 - 3.0	19.5
B-3	0.0 - 1.5	10.6
B-3	3.0 - 3.2	7.0
B-4	0.0 - 1.5	4.6
B-4	3.0 - 4.5	18.0
B-5	0.0 - 1.5	12.6
B-5	3.0 - 4.5	5.5
B-6	0.0 - 1.5	18.5
B-6	3.0 - 4.5	24.1
B-7	0.0 - 1.5	9.2
B-7	1.5 - 3.0	12.2
B-8	0.0 - 1.5	18.3
B-8	3.0 - 4.5	5.6
B-9	0.0 - 1.5	16.9
B-9	3.0 - 4.3	9.7
B-10	0.0 - 0.4	9.8
B-10	1.5 - 3.0	8.9
B-11	3.0 - 4.5	12.3
B-11	6.0 - 7.5	15.3
B-12	3.0 - 3.7	10.7
B-12	6.0 - 7.5	32.0
B-13	1.5 - 3.0	15.4
B-13	3.0 - 4.5	26.3
B-14	3.0 - 4.5	29.8
B-14	6.0 - 7.5	8.3

412-761-1990 Phone
412-761-1998 Fax

ACA ENGINEERING

WATER CONTENT REPORT

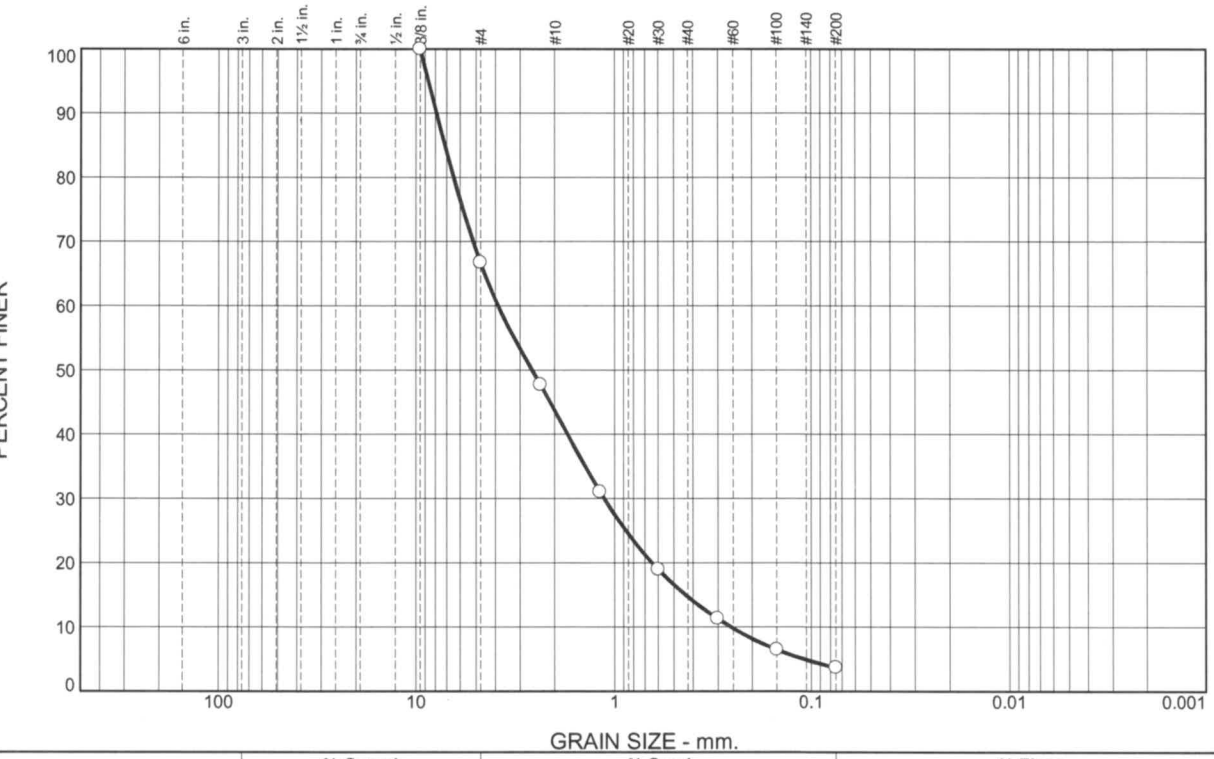
PROJECT: ET-Braddock Well Pad
CLIENT: Merrion Oil & Gas

FILE NO.: P17385x10
DATE: 1/23/2018

BORING NO.	SAMPLE DEPTH (ft.)	MOISTURE CONTENT (%)
B-15	3.0 - 4.5	8.3
B-15	6.0 - 7.5	22.3
B-16	1.5 - 1.9	7.6
B-16	3.0 - 4.5	26.8

412-761-1990 Phone
412-761-1998 Fax

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	33	23	29	11	4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100		
#4	67		
#8	48		
#16	31		
#30	19		
#50	11		
#100	6		
#200	3.7		

* (no specification provided)

Material Description

Gray SLAG

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 7.8807 D_{85}= 7.1482 D_{60}= 3.8696
D_{50}= 2.6040 D_{30}= 1.1255 D_{15}= 0.4367
D_{10}= 0.2566 C_u= 15.08 C_c= 1.28

Classification

USCS= SW AASHTO= A-1-a

Remarks

Location: B-1
Sample Number: S-1 **Depth:** 0.0 - 1.5 **Date:**

ACA Engineering

Pittsburgh, PA

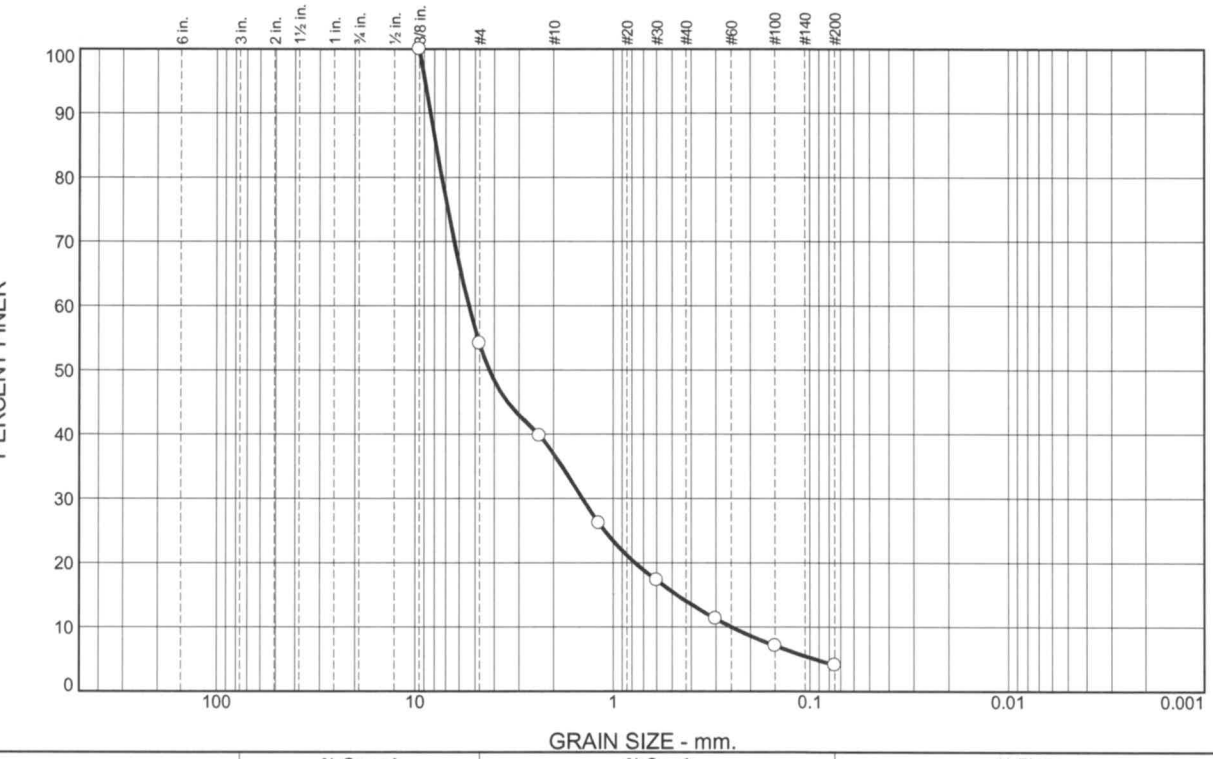
Client: Merrion Oil & Gas
Project: ET-Braddock Well Pad
Project No: P17385x10 **Figure**

Tested By: E.B. **Checked By:** M.M.

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical sample

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical sample

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	46	17	23	10	4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100		
#4	54		
#8	40		
#16	26		
#30	17		
#50	11		
#100	7		
#200	4.1		

* (no specification provided)

Material Description

Black SAND

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 8.3736 D_{85}= 7.8407 D_{60}= 5.3693
D_{50}= 4.2298 D_{30}= 1.4300 D_{15}= 0.4725
D_{10}= 0.2495 C_u= 21.52 C_c= 1.53

Classification

USCS= SW AASHTO= A-1-a

Remarks

Location: B-5
Sample Number: S-2 **Depth:** 1.5 - 3.0 **Date:**

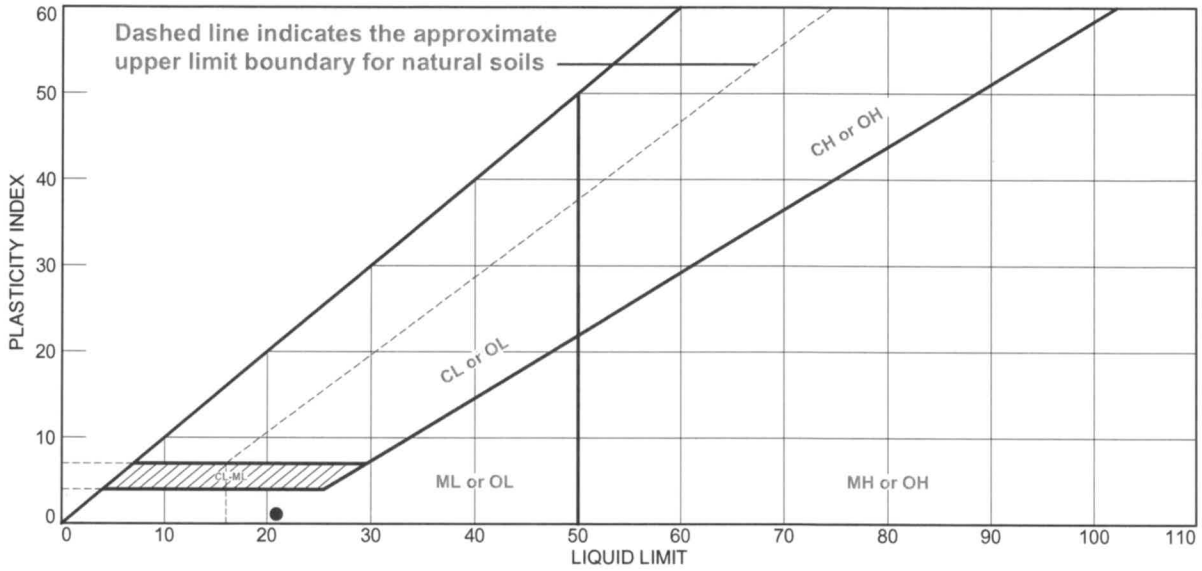
ACA Engineering

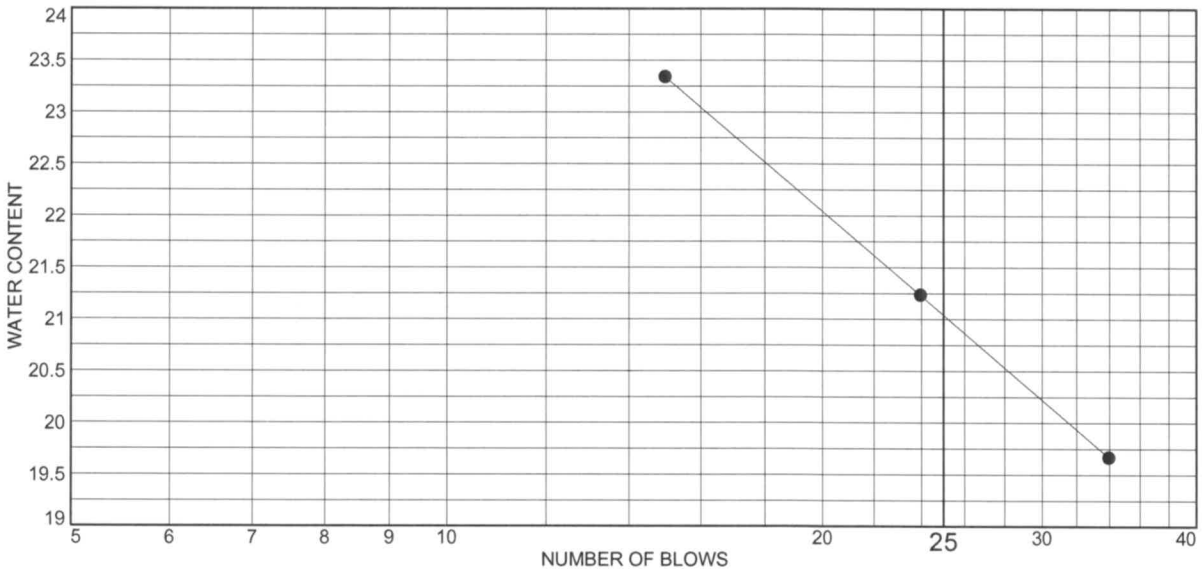
Pittsburgh, PA

Client: Merrion Oil & Gas
Project: ET-Braddock Well Pad
Project No: P17385x10 **Figure**

Tested By: E.B. **Checked By:** M.M.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Black, silty SAND	21	20	1	57	29	SM

Project No. P17385x10 **Client:** Merrion Oil & Gas

Project: ET-Braddock Well Pad

Location: B-13

Sample Number: S-3 **Depth:** 3.0 - 4.5

ACA Engineering

Pittsburgh, PA

Remarks:

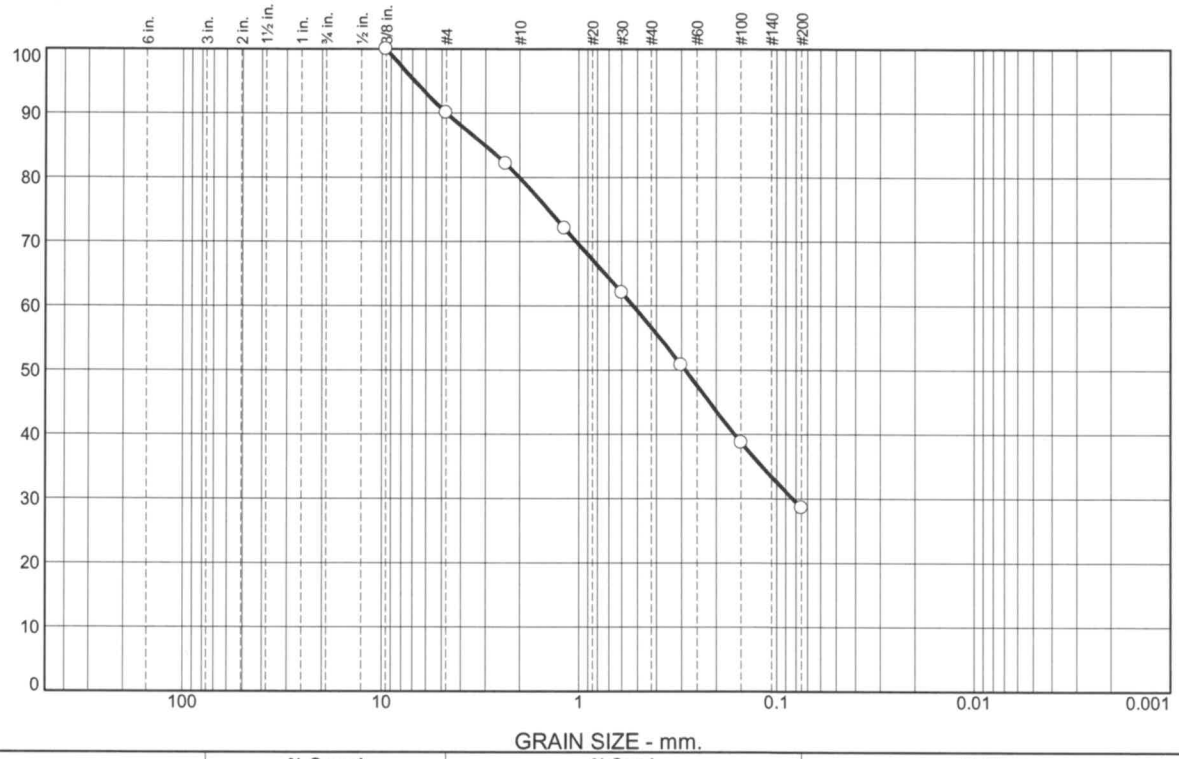
Figure

Tested By: E.B. **Checked By:** M.M.

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical sample

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical sample

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	10	10	23	28	29	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100		
#4	90		
#8	82		
#16	72		
#30	62		
#50	51		
#100	39		
#200	29		

* (no specification provided)

Material Description

Black, silty SAND

Atterberg Limits

PL= 20 LL= 21 PI= 1

Coefficients

D_{90}= 4.7157 D_{85}= 3.0134 D_{60}= 0.5247
D_{50}= 0.2864 D_{30}= 0.0829 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Location: B-13
Sample Number: S-3 **Depth:** 3.0 - 4.5 **Date:**

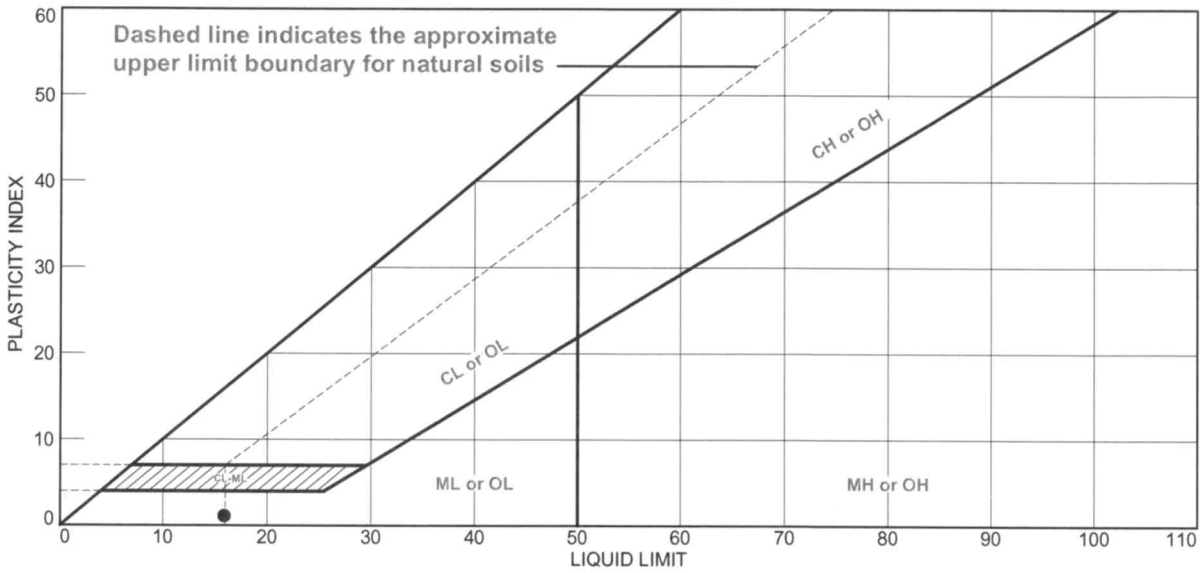
ACA Engineering

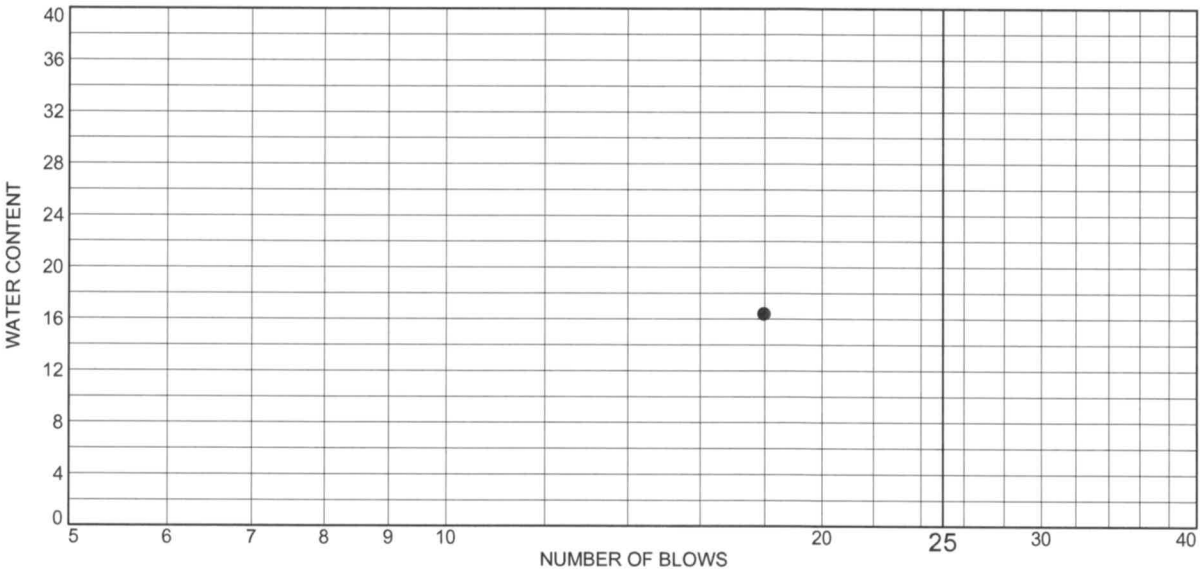
Pittsburgh, PA

Client: Merrion Oil & Gas
Project: ET-Braddock Well Pad
Project No: P17385x10 **Figure**

Tested By: E.B. **Checked By:** M.M.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark gray, silty SAND with gravel	16	15	1	31	13	SM

Project No. P17385x10 **Client:** Merrion Oil & Gas

Project: ET-Braddock Well Pad

Location: B-16

Sample Number: S-2 **Depth:** 1.5 - 1.9

ACA Engineering

Pittsburgh, PA

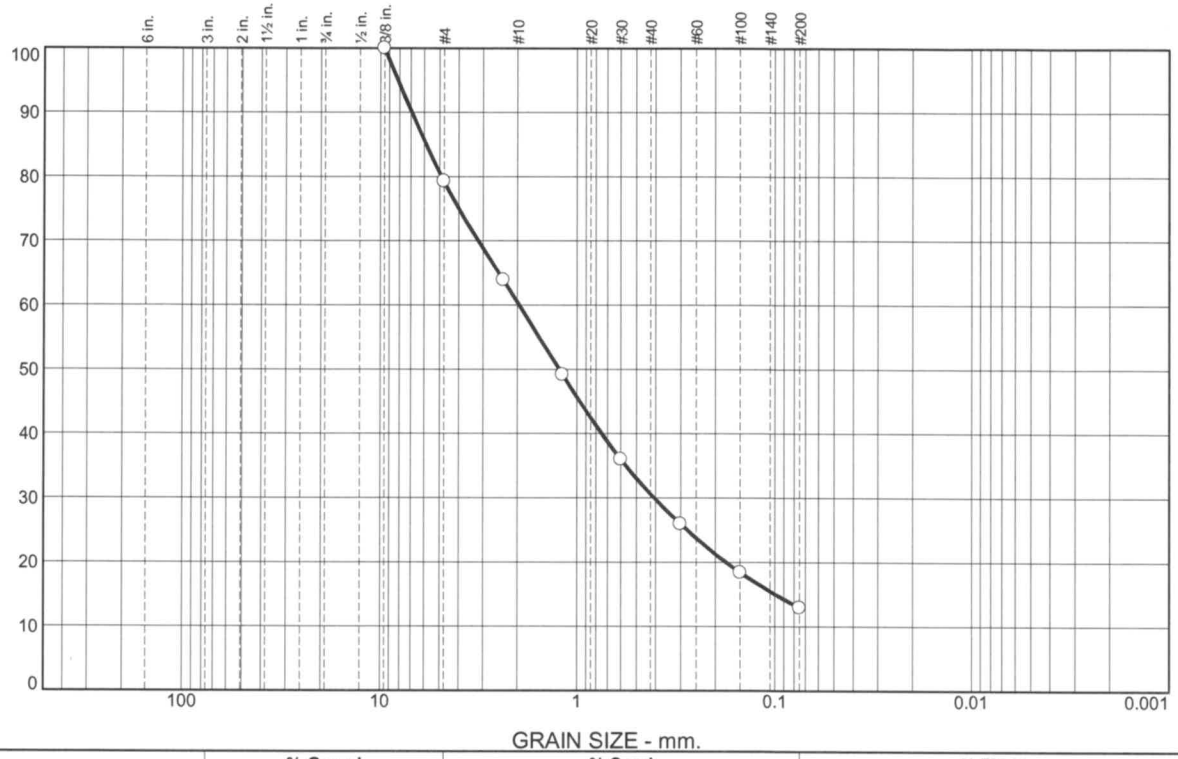
Remarks:

Figure

Tested By: E.B. **Checked By:** M.M.

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical sample

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	21	19	29	18	13	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100		
#4	79		
#8	64		
#16	49		
#30	36		
#50	26		
#100	18		
#200	13		

* (no specification provided)

Material Description

Dark gray, silty SAND with gravel

Atterberg Limits

PL= 15 LL= 16 PI= 1

Coefficients

D_{90}= 6.9265 D_{85}= 5.8547 D_{60}= 1.9605
D_{50}= 1.2269 D_{30}= 0.4073 D_{15}= 0.0993
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Location: B-16
Sample Number: S-2 **Depth:** 1.5 - 1.9 **Date:**

ACA Engineering

Pittsburgh, PA

Client: Merrion Oil & Gas
Project: ET-Braddock Well Pad
Project No: P17385x10 **Figure**

Tested By: E.B. **Checked By:** M.M.

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical sample

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

January 30, 2018

Mike Burke
ACA Engineering
410 North Balph Avenue
Pittsburgh, PA 15202

RE: Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Dear Mike Burke:
Enclosed are the analytical results for sample(s) received by the laboratory on January 17, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Laura Pirilla

Laura M. Pirilla
laura.pirilla@pacelabs.com
(724)850-5616
Project Manager

Enclosures

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CERTIFICATIONS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
L-A-B DOD-ELAP Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH-0694
Delaware Certification
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana DHH/TNI Certification #: LA140008
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: PA00091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nebraska Certification #: NE-05-29-14
Nevada Certification #: PA014572015-1
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188-14-8
Utah/TNI Certification #: PA014572015-5
USDA Soil Permit #: P330-14-00213
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Certification
Wyoming Certification #: 8TMS-L

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-13 (1.5-3') **Lab ID: 30241083001** Collected: 01/10/18 13:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010B Preparation Method: EPA 3050B							
Aluminum	**5890**	mg/kg	10.8	1	01/24/18 08:44	01/25/18 10:59	7429-90-5	
Antimony	**1.0**	mg/kg	0.65	1	01/24/18 08:44	01/25/18 10:59	7440-36-0	
Arsenic	**17.3**	mg/kg	0.54	1	01/24/18 08:44	01/25/18 10:59	7440-38-2	
Barium	**77.4**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 10:59	7440-39-3	
Beryllium	**0.66**	mg/kg	0.22	1	01/24/18 08:44	01/25/18 10:59	7440-41-7	
Boron	**15.9**	mg/kg	5.4	1	01/24/18 08:44	01/25/18 10:59	7440-42-8	
Cadmium	**1.5**	mg/kg	0.32	1	01/24/18 08:44	01/25/18 10:59	7440-43-9	
Calcium	**66800**	mg/kg	215	1	01/24/18 08:44	01/25/18 10:59	7440-70-2	
Chromium	**267**	mg/kg	0.54	1	01/24/18 08:44	01/25/18 10:59	7440-47-3	
Cobalt	**6.6**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 10:59	7440-48-4	
Copper	**77.9**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 10:59	7440-50-8	
Iron	**107000**	mg/kg	10.8	1	01/24/18 08:44	01/25/18 10:59	7439-89-6	
Lead	**180**	mg/kg	0.54	1	01/24/18 08:44	01/25/18 10:59	7439-92-1	
Magnesium	**21900**	mg/kg	53.8	1	01/24/18 08:44	01/25/18 10:59	7439-95-4	
Manganese	**6000**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 10:59	7439-96-5	
Molybdenum	**9.7**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 10:59	7439-98-7	
Nickel	**25.3**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 10:59	7440-02-0	
Potassium	**513**	mg/kg	53.8	1	01/24/18 08:44	01/25/18 10:59	7440-09-7	
Selenium	ND	mg/kg	0.86	1	01/24/18 08:44	01/25/18 10:59	7782-49-2	
Silver	ND	mg/kg	0.65	1	01/24/18 08:44	01/25/18 10:59	7440-22-4	
Sodium	ND	mg/kg	538	1	01/24/18 08:44	01/25/18 10:59	7440-23-5	
Thallium	ND	mg/kg	2.2	1	01/24/18 08:44	01/25/18 10:59	7440-28-0	
Vanadium	**103**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 10:59	7440-62-2	
Zinc	**215**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 10:59	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471A Preparation Method: EPA 7471A							
Mercury	**0.41**	mg/kg	0.12	1	01/24/18 09:35	01/24/18 14:00	7439-97-6	
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C Preparation Method: EPA 3546							
Acenaphthene	**32000**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	83-32-9	
Acenaphthylene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	208-96-8	
Anthracene	**21600**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	120-12-7	
Benzo(a)anthracene	**13400**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	56-55-3	
Benzo(a)pyrene	**5950**	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	50-32-8	
Benzo(b)fluoranthene	**6340**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	205-99-2	
Benzo(g,h,i)perylene	**1100**	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	191-24-2	
Benzo(k)fluoranthene	**5280**	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	207-08-9	
Benzyl alcohol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	101-55-3	
Butylbenzylphthalate	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	59-50-7	IS,L1
4-Chloroaniline	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	106-47-8	IS
bis(2-Chloroethoxy)methane	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	111-91-1	IS
bis(2-Chloroethyl) ether	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	108-60-1	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-13 (1.5-3') **Lab ID: 30241083001** Collected: 01/10/18 13:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2-Chloronaphthalene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	91-58-7	
2-Chlorophenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	7005-72-3	
Chrysene	**11900**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	218-01-9	
Dibenz(a,h)anthracene	**779**	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	53-70-3	
Dibenzofuran	**29800**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	132-64-9	
1,2-Dichlorobenzene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	120-83-2	IS
Diethylphthalate	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	105-67-9	
Dimethylphthalate	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	131-11-3	
Di-n-butylphthalate	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	606-20-2	
Di-n-octylphthalate	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	117-81-7	
Fluoranthene	**52000**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	206-44-0	
Fluorene	**35100**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	87-68-3	IS
Hexachlorobenzene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	77-47-4	
Hexachloroethane	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	67-72-1	
Indeno(1,2,3-cd)pyrene	**1560**	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	193-39-5	
Isophorone	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	78-59-1	
2-Methylnaphthalene	**41900**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	91-57-6	L1
2-Methylphenol(o-Cresol)	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	761	1	01/19/18 19:46	01/23/18 17:02		
Naphthalene	**159000**	ug/kg	19000	50	01/19/18 19:46	01/24/18 14:57	91-20-3	
2-Nitroaniline	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	88-74-4	
3-Nitroaniline	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	99-09-2	
4-Nitroaniline	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	100-01-6	
Nitrobenzene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	98-95-3	
2-Nitrophenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	88-75-5	L1
4-Nitrophenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	86-30-6	
Pentachlorophenol	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	87-86-5	
Phenanthrene	**114000**	ug/kg	19000	50	01/19/18 19:46	01/24/18 14:57	85-01-8	
Phenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	108-95-2	
Pyrene	**35400**	ug/kg	3800	10	01/19/18 19:46	01/24/18 14:35	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	120-82-1	IS,L1

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(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-13 (1.5-3') **Lab ID: 30241083001** Collected: 01/10/18 13:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2,4,5-Trichlorophenol	ND	ug/kg	951	1	01/19/18 19:46	01/23/18 17:02	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	380	1	01/19/18 19:46	01/23/18 17:02	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	131	%	10-175	1	01/19/18 19:46	01/23/18 17:02	4165-60-0	IS
2-Fluorobiphenyl (S)	63	%	10-151	1	01/19/18 19:46	01/23/18 17:02	321-60-8	
Terphenyl-d14 (S)	70	%	10-172	1	01/19/18 19:46	01/23/18 17:02	1718-51-0	
Phenol-d6 (S)	69	%	10-142	1	01/19/18 19:46	01/23/18 17:02	13127-88-3	
2-Fluorophenol (S)	75	%	10-138	1	01/19/18 19:46	01/23/18 17:02	367-12-4	
2,4,6-Tribromophenol (S)	68	%	10-144	1	01/19/18 19:46	01/23/18 17:02	118-79-6	
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B	Preparation Method: EPA 5035A						
Acetone	ND	ug/kg	697	50	01/19/18 13:02	01/19/18 19:35	67-64-1	1c
Benzene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	71-43-2	1c
Bromodichloromethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-27-4	1c
Bromoform	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-25-2	1c
Bromomethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	74-83-9	1c
TOTAL BTEX	ND	ug/kg	2090	50	01/19/18 13:02	01/19/18 19:35		
2-Butanone (MEK)	ND	ug/kg	697	50	01/19/18 13:02	01/19/18 19:35	78-93-3	1c
Carbon disulfide	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-15-0	1c
Carbon tetrachloride	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	56-23-5	1c
Chlorobenzene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	108-90-7	1c
Chloroethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-00-3	1c
Chloroform	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	67-66-3	1c
Chloromethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	74-87-3	1c
Dibromochloromethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	124-48-1	1c
1,2-Dichlorobenzene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	95-50-1	1c
1,3-Dichlorobenzene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	541-73-1	1c
1,4-Dichlorobenzene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	106-46-7	1c
1,1-Dichloroethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-34-3	1c
1,2-Dichloroethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	107-06-2	1c
1,2-Dichloroethene (Total)	ND	ug/kg	697	50	01/19/18 13:02	01/19/18 19:35	540-59-0	
1,1-Dichloroethene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-35-4	1c
cis-1,2-Dichloroethene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	156-59-2	1c
trans-1,2-Dichloroethene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	156-60-5	1c
1,2-Dichloropropane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	78-87-5	1c
cis-1,3-Dichloropropene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	10061-01-5	1c
trans-1,3-Dichloropropene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	10061-02-6	1c
Ethylbenzene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	100-41-4	1c
2-Hexanone	ND	ug/kg	697	50	01/19/18 13:02	01/19/18 19:35	591-78-6	1c
Methylene Chloride	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-09-2	1c
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	697	50	01/19/18 13:02	01/19/18 19:35	108-10-1	1c
Methyl-tert-butyl ether	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	1634-04-4	1c
Styrene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	100-42-5	1c
1,1,2,2-Tetrachloroethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	79-34-5	1c
Tetrachloroethene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	127-18-4	1c
Toluene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	108-88-3	1c

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-13 (1.5-3') **Lab ID: 30241083001** Collected: 01/10/18 13:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035A							
1,1,1-Trichloroethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	71-55-6	1c
1,1,2-Trichloroethane	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	79-00-5	1c
Trichloroethene	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	79-01-6	1c
Vinyl chloride	ND	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	75-01-4	1c
Xylene (Total)	ND	ug/kg	1040	50	01/19/18 13:02	01/19/18 19:35	1330-20-7	
m&p-Xylene	ND	ug/kg	697	50	01/19/18 13:02	01/19/18 19:35	179601-23-1	1c
o-Xylene	**366**	ug/kg	348	50	01/19/18 13:02	01/19/18 19:35	95-47-6	1c
Surrogates								
Toluene-d8 (S)	101	%	76-124	50	01/19/18 13:02	01/19/18 19:35	2037-26-5	
4-Bromofluorobenzene (S)	105	%	70-133	50	01/19/18 13:02	01/19/18 19:35	460-00-4	
1,2-Dichloroethane-d4 (S)	98	%	74-131	50	01/19/18 13:02	01/19/18 19:35	17060-07-0	
Dibromofluoromethane (S)	92	%	71-130	50	01/19/18 13:02	01/19/18 19:35	1868-53-7	
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**13.9**	%	0.10	1		01/21/18 10:51		

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-16 (3-4.5') **Lab ID: 30241083002** Collected: 01/10/18 18:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010B Preparation Method: EPA 3050B							
Aluminum	**6020**	mg/kg	11.0	1	01/24/18 08:44	01/25/18 11:01	7429-90-5	
Antimony	**0.77**	mg/kg	0.66	1	01/24/18 08:44	01/25/18 11:01	7440-36-0	
Arsenic	**13.6**	mg/kg	0.55	1	01/24/18 08:44	01/25/18 11:01	7440-38-2	
Barium	**76.1**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:01	7440-39-3	
Beryllium	**0.86**	mg/kg	0.22	1	01/24/18 08:44	01/25/18 11:01	7440-41-7	
Boron	**11.2**	mg/kg	5.5	1	01/24/18 08:44	01/25/18 11:01	7440-42-8	
Cadmium	**0.42**	mg/kg	0.33	1	01/24/18 08:44	01/25/18 11:01	7440-43-9	
Calcium	**17200**	mg/kg	219	1	01/24/18 08:44	01/25/18 11:01	7440-70-2	
Chromium	**36.2**	mg/kg	0.55	1	01/24/18 08:44	01/25/18 11:01	7440-47-3	
Cobalt	**7.0**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:01	7440-48-4	
Copper	**74.0**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:01	7440-50-8	
Iron	**90500**	mg/kg	11.0	1	01/24/18 08:44	01/25/18 11:01	7439-89-6	
Lead	**127**	mg/kg	0.55	1	01/24/18 08:44	01/25/18 11:01	7439-92-1	
Magnesium	**1940**	mg/kg	54.8	1	01/24/18 08:44	01/25/18 11:01	7439-95-4	
Manganese	**2080**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:01	7439-96-5	
Molybdenum	ND	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:01	7439-98-7	
Nickel	**16.1**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:01	7440-02-0	
Potassium	**552**	mg/kg	54.8	1	01/24/18 08:44	01/25/18 11:01	7440-09-7	
Selenium	**1.1**	mg/kg	0.88	1	01/24/18 08:44	01/25/18 11:01	7782-49-2	
Silver	ND	mg/kg	0.66	1	01/24/18 08:44	01/25/18 11:01	7440-22-4	
Sodium	ND	mg/kg	548	1	01/24/18 08:44	01/25/18 11:01	7440-23-5	
Thallium	ND	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:01	7440-28-0	
Vanadium	**27.8**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:01	7440-62-2	
Zinc	**84.2**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:01	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471A Preparation Method: EPA 7471A							
Mercury	ND	mg/kg	0.12	1	01/24/18 09:35	01/24/18 14:01	7439-97-6	
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C Preparation Method: EPA 3546							
Acenaphthene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	83-32-9	
Acenaphthylene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	208-96-8	
Anthracene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	120-12-7	
Benzo(a)anthracene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	56-55-3	
Benzo(a)pyrene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	207-08-9	
Benzyl alcohol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	101-55-3	
Butylbenzylphthalate	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	59-50-7	L1
4-Chloroaniline	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	108-60-1	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-16 (3-4.5') **Lab ID: 30241083002** Collected: 01/10/18 18:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C Preparation Method: EPA 3546							
2-Chloronaphthalene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	91-58-7	
2-Chlorophenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	7005-72-3	
Chrysene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	53-70-3	
Dibenzofuran	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	132-64-9	
1,2-Dichlorobenzene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	120-83-2	
Diethylphthalate	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	105-67-9	
Dimethylphthalate	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	131-11-3	
Di-n-butylphthalate	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	606-20-2	
Di-n-octylphthalate	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	117-81-7	
Fluoranthene	**438**	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	206-44-0	
Fluorene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	87-68-3	
Hexachlorobenzene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	77-47-4	
Hexachloroethane	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	193-39-5	
Isophorone	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	78-59-1	
2-Methylnaphthalene	**766**	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	91-57-6	L1
2-Methylphenol(o-Cresol)	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	769	1	01/19/18 19:46	01/23/18 15:58		
Naphthalene	**539**	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	91-20-3	
2-Nitroaniline	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	88-74-4	
3-Nitroaniline	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	99-09-2	
4-Nitroaniline	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	100-01-6	
Nitrobenzene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	98-95-3	
2-Nitrophenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	88-75-5	L1
4-Nitrophenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	86-30-6	
Pentachlorophenol	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	87-86-5	
Phenanthrene	**499**	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	85-01-8	
Phenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	108-95-2	
Pyrene	**396**	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	120-82-1	L1

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-16 (3-4.5') **Lab ID: 30241083002** Collected: 01/10/18 18:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2,4,5-Trichlorophenol	ND	ug/kg	961	1	01/19/18 19:46	01/23/18 15:58	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	384	1	01/19/18 19:46	01/23/18 15:58	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	76	%	10-175	1	01/19/18 19:46	01/23/18 15:58	4165-60-0	
2-Fluorobiphenyl (S)	77	%	10-151	1	01/19/18 19:46	01/23/18 15:58	321-60-8	
Terphenyl-d14 (S)	76	%	10-172	1	01/19/18 19:46	01/23/18 15:58	1718-51-0	
Phenol-d6 (S)	76	%	10-142	1	01/19/18 19:46	01/23/18 15:58	13127-88-3	
2-Fluorophenol (S)	82	%	10-138	1	01/19/18 19:46	01/23/18 15:58	367-12-4	
2,4,6-Tribromophenol (S)	67	%	10-144	1	01/19/18 19:46	01/23/18 15:58	118-79-6	
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B	Preparation Method: EPA 5035A						
Acetone	**39.9**	ug/kg	13.9	1	01/19/18 13:01	01/19/18 14:44	67-64-1	1c
Benzene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	71-43-2	1c
Bromodichloromethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-27-4	1c
Bromoform	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-25-2	1c
Bromomethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	74-83-9	1c
TOTAL BTEX	ND	ug/kg	41.7	1	01/19/18 13:01	01/19/18 14:44		
2-Butanone (MEK)	ND	ug/kg	13.9	1	01/19/18 13:01	01/19/18 14:44	78-93-3	1c
Carbon disulfide	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-15-0	1c
Carbon tetrachloride	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	56-23-5	1c
Chlorobenzene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	108-90-7	1c
Chloroethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-00-3	1c
Chloroform	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	67-66-3	1c
Chloromethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	74-87-3	1c
Dibromochloromethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	124-48-1	1c
1,2-Dichlorobenzene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	95-50-1	1c
1,3-Dichlorobenzene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	541-73-1	1c
1,4-Dichlorobenzene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	106-46-7	1c
1,1-Dichloroethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-34-3	1c
1,2-Dichloroethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	107-06-2	1c
1,2-Dichloroethene (Total)	ND	ug/kg	13.9	1	01/19/18 13:01	01/19/18 14:44	540-59-0	
1,1-Dichloroethene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-35-4	1c
cis-1,2-Dichloroethene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	156-59-2	1c
trans-1,2-Dichloroethene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	156-60-5	1c
1,2-Dichloropropane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	78-87-5	1c
cis-1,3-Dichloropropene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	10061-01-5	1c
trans-1,3-Dichloropropene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	10061-02-6	1c
Ethylbenzene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	100-41-4	1c
2-Hexanone	ND	ug/kg	13.9	1	01/19/18 13:01	01/19/18 14:44	591-78-6	1c
Methylene Chloride	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-09-2	1c
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	13.9	1	01/19/18 13:01	01/19/18 14:44	108-10-1	1c
Methyl-tert-butyl ether	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	1634-04-4	1c
Styrene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	100-42-5	1c
1,1,2,2-Tetrachloroethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	79-34-5	1c
Tetrachloroethene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	127-18-4	1c
Toluene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	108-88-3	1c

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-16 (3-4.5') **Lab ID: 30241083002** Collected: 01/10/18 18:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035A							
1,1,1-Trichloroethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	71-55-6	1c
1,1,2-Trichloroethane	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	79-00-5	1c
Trichloroethene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	79-01-6	1c
Vinyl chloride	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	75-01-4	1c
Xylene (Total)	ND	ug/kg	20.9	1	01/19/18 13:01	01/19/18 14:44	1330-20-7	
m&p-Xylene	ND	ug/kg	13.9	1	01/19/18 13:01	01/19/18 14:44	179601-23-1	1c
o-Xylene	ND	ug/kg	7.0	1	01/19/18 13:01	01/19/18 14:44	95-47-6	1c
Surrogates								
Toluene-d8 (S)	101	%	76-124	1	01/19/18 13:01	01/19/18 14:44	2037-26-5	
4-Bromofluorobenzene (S)	103	%	70-133	1	01/19/18 13:01	01/19/18 14:44	460-00-4	
1,2-Dichloroethane-d4 (S)	104	%	74-131	1	01/19/18 13:01	01/19/18 14:44	17060-07-0	
Dibromofluoromethane (S)	98	%	71-130	1	01/19/18 13:01	01/19/18 14:44	1868-53-7	
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**14.0**	%	0.10	1		01/21/18 10:51		

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-10 (19.5-21') **Lab ID: 30241083003** Collected: 01/15/18 14:10 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010B Preparation Method: EPA 3050B							
Aluminum	**7650**	mg/kg	10.0	1	01/24/18 08:44	01/25/18 11:04	7429-90-5	
Antimony	**0.82**	mg/kg	0.60	1	01/24/18 08:44	01/25/18 11:04	7440-36-0	
Arsenic	**18.2**	mg/kg	0.50	1	01/24/18 08:44	01/25/18 11:04	7440-38-2	
Barium	**55.9**	mg/kg	2.0	1	01/24/18 08:44	01/25/18 11:04	7440-39-3	
Beryllium	**0.47**	mg/kg	0.20	1	01/24/18 08:44	01/25/18 11:04	7440-41-7	
Boron	**7.8**	mg/kg	5.0	1	01/24/18 08:44	01/25/18 11:04	7440-42-8	
Cadmium	**0.75**	mg/kg	0.30	1	01/24/18 08:44	01/25/18 11:04	7440-43-9	
Calcium	**1400**	mg/kg	200	1	01/24/18 08:44	01/25/18 11:04	7440-70-2	
Chromium	**17.2**	mg/kg	0.50	1	01/24/18 08:44	01/25/18 11:04	7440-47-3	
Cobalt	**13.0**	mg/kg	1.0	1	01/24/18 08:44	01/25/18 11:04	7440-48-4	
Copper	**427**	mg/kg	1.0	1	01/24/18 08:44	01/25/18 11:04	7440-50-8	
Iron	**98500**	mg/kg	10.0	1	01/24/18 08:44	01/25/18 11:04	7439-89-6	
Lead	**44.8**	mg/kg	0.50	1	01/24/18 08:44	01/25/18 11:04	7439-92-1	
Magnesium	**653**	mg/kg	50.0	1	01/24/18 08:44	01/25/18 11:04	7439-95-4	
Manganese	**2160**	mg/kg	1.0	1	01/24/18 08:44	01/25/18 11:04	7439-96-5	
Molybdenum	ND	mg/kg	2.0	1	01/24/18 08:44	01/25/18 11:04	7439-98-7	
Nickel	**24.5**	mg/kg	2.0	1	01/24/18 08:44	01/25/18 11:04	7440-02-0	
Potassium	**1210**	mg/kg	50.0	1	01/24/18 08:44	01/25/18 11:04	7440-09-7	
Selenium	ND	mg/kg	0.80	1	01/24/18 08:44	01/25/18 11:04	7782-49-2	
Silver	ND	mg/kg	0.60	1	01/24/18 08:44	01/25/18 11:04	7440-22-4	
Sodium	ND	mg/kg	500	1	01/24/18 08:44	01/25/18 11:04	7440-23-5	
Thallium	ND	mg/kg	2.0	1	01/24/18 08:44	01/25/18 11:04	7440-28-0	
Vanadium	**29.9**	mg/kg	1.0	1	01/24/18 08:44	01/25/18 11:04	7440-62-2	
Zinc	**101**	mg/kg	1.0	1	01/24/18 08:44	01/25/18 11:04	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471A Preparation Method: EPA 7471A							
Mercury	ND	mg/kg	0.11	1	01/24/18 09:35	01/24/18 14:03	7439-97-6	
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C Preparation Method: EPA 3546							
Acenaphthene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	83-32-9	
Acenaphthylene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	208-96-8	
Anthracene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	120-12-7	
Benzo(a)anthracene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	56-55-3	
Benzo(a)pyrene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	207-08-9	
Benzyl alcohol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	101-55-3	
Butylbenzylphthalate	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	59-50-7	L1
4-Chloroaniline	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	108-60-1	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-10 (19.5-21') **Lab ID: 30241083003** Collected: 01/15/18 14:10 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2-Chloronaphthalene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	91-58-7	
2-Chlorophenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	7005-72-3	
Chrysene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	53-70-3	
Dibenzofuran	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	132-64-9	
1,2-Dichlorobenzene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	120-83-2	
Diethylphthalate	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	105-67-9	
Dimethylphthalate	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	131-11-3	
Di-n-butylphthalate	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	606-20-2	
Di-n-octylphthalate	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	117-81-7	
Fluoranthene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	206-44-0	
Fluorene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	87-68-3	
Hexachlorobenzene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	77-47-4	
Hexachloroethane	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	193-39-5	
Isophorone	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	78-59-1	
2-Methylnaphthalene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	91-57-6	L1
2-Methylphenol(o-Cresol)	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	743	1	01/19/18 19:46	01/23/18 15:36		
Naphthalene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	91-20-3	
2-Nitroaniline	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	88-74-4	
3-Nitroaniline	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	99-09-2	
4-Nitroaniline	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	100-01-6	
Nitrobenzene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	98-95-3	
2-Nitrophenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	88-75-5	L1
4-Nitrophenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	86-30-6	
Pentachlorophenol	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	87-86-5	
Phenanthrene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	85-01-8	
Phenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	108-95-2	
Pyrene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	120-82-1	L1

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-10 (19.5-21') **Lab ID: 30241083003** Collected: 01/15/18 14:10 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2,4,5-Trichlorophenol	ND	ug/kg	930	1	01/19/18 19:46	01/23/18 15:36	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	372	1	01/19/18 19:46	01/23/18 15:36	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	69	%	10-175	1	01/19/18 19:46	01/23/18 15:36	4165-60-0	
2-Fluorobiphenyl (S)	77	%	10-151	1	01/19/18 19:46	01/23/18 15:36	321-60-8	
Terphenyl-d14 (S)	72	%	10-172	1	01/19/18 19:46	01/23/18 15:36	1718-51-0	
Phenol-d6 (S)	73	%	10-142	1	01/19/18 19:46	01/23/18 15:36	13127-88-3	
2-Fluorophenol (S)	87	%	10-138	1	01/19/18 19:46	01/23/18 15:36	367-12-4	
2,4,6-Tribromophenol (S)	67	%	10-144	1	01/19/18 19:46	01/23/18 15:36	118-79-6	
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B	Preparation Method: EPA 5035A						
Acetone	**17.7**	ug/kg	9.7	1	01/19/18 13:01	01/19/18 15:10	67-64-1	1c
Benzene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	71-43-2	1c
Bromodichloromethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-27-4	1c
Bromoform	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-25-2	1c
Bromomethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	74-83-9	1c
TOTAL BTEX	ND	ug/kg	29.1	1	01/19/18 13:01	01/19/18 15:10		
2-Butanone (MEK)	ND	ug/kg	9.7	1	01/19/18 13:01	01/19/18 15:10	78-93-3	1c
Carbon disulfide	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-15-0	1c
Carbon tetrachloride	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	56-23-5	1c
Chlorobenzene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	108-90-7	1c
Chloroethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-00-3	1c
Chloroform	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	67-66-3	1c
Chloromethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	74-87-3	1c
Dibromochloromethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	124-48-1	1c
1,2-Dichlorobenzene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	95-50-1	1c
1,3-Dichlorobenzene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	541-73-1	1c
1,4-Dichlorobenzene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	106-46-7	1c
1,1-Dichloroethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-34-3	1c
1,2-Dichloroethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	107-06-2	1c
1,2-Dichloroethene (Total)	ND	ug/kg	9.7	1	01/19/18 13:01	01/19/18 15:10	540-59-0	
1,1-Dichloroethene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-35-4	1c
cis-1,2-Dichloroethene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	156-59-2	1c
trans-1,2-Dichloroethene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	156-60-5	1c
1,2-Dichloropropane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	78-87-5	1c
cis-1,3-Dichloropropene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	10061-01-5	1c
trans-1,3-Dichloropropene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	10061-02-6	1c
Ethylbenzene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	100-41-4	1c
2-Hexanone	ND	ug/kg	9.7	1	01/19/18 13:01	01/19/18 15:10	591-78-6	1c
Methylene Chloride	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-09-2	1c
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	9.7	1	01/19/18 13:01	01/19/18 15:10	108-10-1	1c
Methyl-tert-butyl ether	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	1634-04-4	1c
Styrene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	100-42-5	1c
1,1,2,2-Tetrachloroethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	79-34-5	1c
Tetrachloroethene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	127-18-4	1c
Toluene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	108-88-3	1c

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-10 (19.5-21') **Lab ID: 30241083003** Collected: 01/15/18 14:10 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035A							
1,1,1-Trichloroethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	71-55-6	1c
1,1,2-Trichloroethane	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	79-00-5	1c
Trichloroethene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	79-01-6	1c
Vinyl chloride	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	75-01-4	1c
Xylene (Total)	ND	ug/kg	14.5	1	01/19/18 13:01	01/19/18 15:10	1330-20-7	
m&p-Xylene	ND	ug/kg	9.7	1	01/19/18 13:01	01/19/18 15:10	179601-23-1	1c
o-Xylene	ND	ug/kg	4.8	1	01/19/18 13:01	01/19/18 15:10	95-47-6	1c
Surrogates								
Toluene-d8 (S)	100	%	76-124	1	01/19/18 13:01	01/19/18 15:10	2037-26-5	
4-Bromofluorobenzene (S)	95	%	70-133	1	01/19/18 13:01	01/19/18 15:10	460-00-4	
1,2-Dichloroethane-d4 (S)	109	%	74-131	1	01/19/18 13:01	01/19/18 15:10	17060-07-0	
Dibromofluoromethane (S)	98	%	71-130	1	01/19/18 13:01	01/19/18 15:10	1868-53-7	
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**12.3**	%	0.10	1		01/21/18 10:51		

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1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-7 (10.5-12') **Lab ID: 30241083004** Collected: 01/15/18 18:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010B Preparation Method: EPA 3050B							
Aluminum	**9360**	mg/kg	10.6	1	01/24/18 08:44	01/25/18 11:06	7429-90-5	
Antimony	**1.5**	mg/kg	0.64	1	01/24/18 08:44	01/25/18 11:06	7440-36-0	
Arsenic	**15.2**	mg/kg	0.53	1	01/24/18 08:44	01/25/18 11:06	7440-38-2	
Barium	**212**	mg/kg	2.1	1	01/24/18 08:44	01/25/18 11:06	7440-39-3	
Beryllium	**1.0**	mg/kg	0.21	1	01/24/18 08:44	01/25/18 11:06	7440-41-7	
Boron	**15.2**	mg/kg	5.3	1	01/24/18 08:44	01/25/18 11:06	7440-42-8	
Cadmium	**0.44**	mg/kg	0.32	1	01/24/18 08:44	01/25/18 11:06	7440-43-9	
Calcium	**30900**	mg/kg	212	1	01/24/18 08:44	01/25/18 11:06	7440-70-2	
Chromium	**19.0**	mg/kg	0.53	1	01/24/18 08:44	01/25/18 11:06	7440-47-3	
Cobalt	**7.2**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:06	7440-48-4	
Copper	**49.4**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:06	7440-50-8	
Iron	**104000**	mg/kg	10.6	1	01/24/18 08:44	01/25/18 11:06	7439-89-6	
Lead	**72.9**	mg/kg	0.53	1	01/24/18 08:44	01/25/18 11:06	7439-92-1	
Magnesium	**2300**	mg/kg	53.0	1	01/24/18 08:44	01/25/18 11:06	7439-95-4	
Manganese	**6190**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:06	7439-96-5	
Molybdenum	ND	mg/kg	2.1	1	01/24/18 08:44	01/25/18 11:06	7439-98-7	
Nickel	**15.0**	mg/kg	2.1	1	01/24/18 08:44	01/25/18 11:06	7440-02-0	
Potassium	**661**	mg/kg	53.0	1	01/24/18 08:44	01/25/18 11:06	7440-09-7	
Selenium	ND	mg/kg	0.85	1	01/24/18 08:44	01/25/18 11:06	7782-49-2	
Silver	ND	mg/kg	0.64	1	01/24/18 08:44	01/25/18 11:06	7440-22-4	
Sodium	**891**	mg/kg	530	1	01/24/18 08:44	01/25/18 11:06	7440-23-5	
Thallium	ND	mg/kg	2.1	1	01/24/18 08:44	01/25/18 11:06	7440-28-0	
Vanadium	**26.9**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:06	7440-62-2	
Zinc	**65.4**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:06	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471A Preparation Method: EPA 7471A							
Mercury	ND	mg/kg	0.12	1	01/24/18 09:35	01/24/18 14:05	7439-97-6	
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C Preparation Method: EPA 3546							
Acenaphthene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	83-32-9	
Acenaphthylene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	208-96-8	
Anthracene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	120-12-7	
Benzo(a)anthracene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	56-55-3	
Benzo(a)pyrene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	50-32-8	
Benzo(b)fluoranthene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	191-24-2	
Benzo(k)fluoranthene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	207-08-9	
Benzyl alcohol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	101-55-3	
Butylbenzylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	59-50-7	L1
4-Chloroaniline	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	108-60-1	

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(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-7 (10.5-12') **Lab ID: 30241083004** Collected: 01/15/18 18:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2-Chloronaphthalene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	91-58-7	
2-Chlorophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	7005-72-3	
Chrysene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	53-70-3	
Dibenzofuran	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	132-64-9	
1,2-Dichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	120-83-2	
Diethylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	105-67-9	
Dimethylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	131-11-3	
Di-n-butylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	606-20-2	
Di-n-octylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	117-81-7	
Fluoranthene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	206-44-0	
Fluorene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	87-68-3	
Hexachlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	77-47-4	
Hexachloroethane	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	193-39-5	
Isophorone	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	78-59-1	
2-Methylnaphthalene	**439**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	91-57-6	L1
2-Methylphenol(o-Cresol)	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	790	1	01/19/18 19:46	01/23/18 16:19		
Naphthalene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	91-20-3	
2-Nitroaniline	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	88-74-4	
3-Nitroaniline	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	99-09-2	
4-Nitroaniline	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	100-01-6	
Nitrobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	98-95-3	
2-Nitrophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	88-75-5	L1
4-Nitrophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	86-30-6	
Pentachlorophenol	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	87-86-5	
Phenanthrene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	85-01-8	
Phenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	108-95-2	
Pyrene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	120-82-1	L1

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(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-7 (10.5-12') **Lab ID: 30241083004** Collected: 01/15/18 18:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2,4,5-Trichlorophenol	ND	ug/kg	988	1	01/19/18 19:46	01/23/18 16:19	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:19	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	73	%	10-175	1	01/19/18 19:46	01/23/18 16:19	4165-60-0	
2-Fluorobiphenyl (S)	74	%	10-151	1	01/19/18 19:46	01/23/18 16:19	321-60-8	
Terphenyl-d14 (S)	74	%	10-172	1	01/19/18 19:46	01/23/18 16:19	1718-51-0	
Phenol-d6 (S)	73	%	10-142	1	01/19/18 19:46	01/23/18 16:19	13127-88-3	
2-Fluorophenol (S)	79	%	10-138	1	01/19/18 19:46	01/23/18 16:19	367-12-4	
2,4,6-Tribromophenol (S)	54	%	10-144	1	01/19/18 19:46	01/23/18 16:19	118-79-6	
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B	Preparation Method: EPA 5035A						
Acetone	**50.7**	ug/kg	10.4	1	01/19/18 13:01	01/19/18 15:37	67-64-1	1c
Benzene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	71-43-2	1c
Bromodichloromethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-27-4	1c
Bromoform	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-25-2	1c
Bromomethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	74-83-9	1c
TOTAL BTEX	ND	ug/kg	31.2	1	01/19/18 13:01	01/19/18 15:37		
2-Butanone (MEK)	**13.2**	ug/kg	10.4	1	01/19/18 13:01	01/19/18 15:37	78-93-3	1c
Carbon disulfide	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-15-0	1c
Carbon tetrachloride	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	56-23-5	1c
Chlorobenzene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	108-90-7	1c
Chloroethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-00-3	1c
Chloroform	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	67-66-3	1c
Chloromethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	74-87-3	1c
Dibromochloromethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	124-48-1	1c
1,2-Dichlorobenzene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	95-50-1	1c
1,3-Dichlorobenzene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	541-73-1	1c
1,4-Dichlorobenzene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	106-46-7	1c
1,1-Dichloroethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-34-3	1c
1,2-Dichloroethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	107-06-2	1c
1,2-Dichloroethene (Total)	ND	ug/kg	10.4	1	01/19/18 13:01	01/19/18 15:37	540-59-0	
1,1-Dichloroethene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-35-4	1c
cis-1,2-Dichloroethene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	156-59-2	1c
trans-1,2-Dichloroethene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	156-60-5	1c
1,2-Dichloropropane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	78-87-5	1c
cis-1,3-Dichloropropene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	10061-01-5	1c
trans-1,3-Dichloropropene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	10061-02-6	1c
Ethylbenzene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	100-41-4	1c
2-Hexanone	ND	ug/kg	10.4	1	01/19/18 13:01	01/19/18 15:37	591-78-6	1c
Methylene Chloride	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-09-2	1c
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	10.4	1	01/19/18 13:01	01/19/18 15:37	108-10-1	1c
Methyl-tert-butyl ether	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	1634-04-4	1c
Styrene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	100-42-5	1c
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	79-34-5	1c
Tetrachloroethene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	127-18-4	1c
Toluene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	108-88-3	1c

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-7 (10.5-12') **Lab ID: 30241083004** Collected: 01/15/18 18:45 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035A							
1,1,1-Trichloroethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	71-55-6	1c
1,1,2-Trichloroethane	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	79-00-5	1c
Trichloroethene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	79-01-6	1c
Vinyl chloride	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	75-01-4	1c
Xylene (Total)	ND	ug/kg	15.6	1	01/19/18 13:01	01/19/18 15:37	1330-20-7	
m&p-Xylene	ND	ug/kg	10.4	1	01/19/18 13:01	01/19/18 15:37	179601-23-1	1c
o-Xylene	ND	ug/kg	5.2	1	01/19/18 13:01	01/19/18 15:37	95-47-6	1c
Surrogates								
Toluene-d8 (S)	101	%	76-124	1	01/19/18 13:01	01/19/18 15:37	2037-26-5	
4-Bromofluorobenzene (S)	105	%	70-133	1	01/19/18 13:01	01/19/18 15:37	460-00-4	
1,2-Dichloroethane-d4 (S)	104	%	74-131	1	01/19/18 13:01	01/19/18 15:37	17060-07-0	
Dibromofluoromethane (S)	99	%	71-130	1	01/19/18 13:01	01/19/18 15:37	1868-53-7	
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**17.2**	%	0.10	1		01/21/18 10:51		

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1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-2 (1.5-3') **Lab ID: 30241083005** Collected: 01/16/18 14:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010B Preparation Method: EPA 3050B							
Aluminum	**11200**	mg/kg	11.0	1	01/24/18 08:44	01/25/18 11:08	7429-90-5	
Antimony	ND	mg/kg	0.66	1	01/24/18 08:44	01/25/18 11:08	7440-36-0	
Arsenic	**9.1**	mg/kg	0.55	1	01/24/18 08:44	01/25/18 11:08	7440-38-2	
Barium	**105**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:08	7440-39-3	
Beryllium	**1.4**	mg/kg	0.22	1	01/24/18 08:44	01/25/18 11:08	7440-41-7	
Boron	**23.5**	mg/kg	5.5	1	01/24/18 08:44	01/25/18 11:08	7440-42-8	
Cadmium	**2.9**	mg/kg	0.33	1	01/24/18 08:44	01/25/18 11:08	7440-43-9	
Calcium	**132000**	mg/kg	2210	10	01/24/18 08:44	01/25/18 11:13	7440-70-2	
Chromium	**202**	mg/kg	0.55	1	01/24/18 08:44	01/25/18 11:08	7440-47-3	
Cobalt	**5.6**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:08	7440-48-4	
Copper	**34.5**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:08	7440-50-8	
Iron	**148000**	mg/kg	110	10	01/24/18 08:44	01/25/18 11:13	7439-89-6	
Lead	**330**	mg/kg	0.55	1	01/24/18 08:44	01/25/18 11:08	7439-92-1	
Magnesium	**15700**	mg/kg	55.2	1	01/24/18 08:44	01/25/18 11:08	7439-95-4	
Manganese	**3770**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:08	7439-96-5	
Molybdenum	**8.0**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:08	7439-98-7	
Nickel	**24.7**	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:08	7440-02-0	
Potassium	**652**	mg/kg	55.2	1	01/24/18 08:44	01/25/18 11:08	7440-09-7	
Selenium	**1.4**	mg/kg	0.88	1	01/24/18 08:44	01/25/18 11:08	7782-49-2	
Silver	ND	mg/kg	0.66	1	01/24/18 08:44	01/25/18 11:08	7440-22-4	
Sodium	**773**	mg/kg	552	1	01/24/18 08:44	01/25/18 11:08	7440-23-5	
Thallium	ND	mg/kg	2.2	1	01/24/18 08:44	01/25/18 11:08	7440-28-0	
Vanadium	**87.5**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:08	7440-62-2	
Zinc	**1710**	mg/kg	1.1	1	01/24/18 08:44	01/25/18 11:08	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471A Preparation Method: EPA 7471A							
Mercury	ND	mg/kg	0.11	1	01/24/18 09:35	01/24/18 14:06	7439-97-6	
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C Preparation Method: EPA 3546							
Acenaphthene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	83-32-9	
Acenaphthylene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	208-96-8	
Anthracene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	120-12-7	
Benzo(a)anthracene	**474**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	56-55-3	
Benzo(a)pyrene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	50-32-8	
Benzo(b)fluoranthene	**452**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	205-99-2	
Benzo(g,h,i)perylene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	191-24-2	
Benzo(k)fluoranthene	**450**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	207-08-9	
Benzyl alcohol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	100-51-6	
4-Bromophenylphenyl ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	101-55-3	
Butylbenzylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	85-68-7	
4-Chloro-3-methylphenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	59-50-7	L1
4-Chloroaniline	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	106-47-8	
bis(2-Chloroethoxy)methane	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	108-60-1	

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(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-2 (1.5-3') **Lab ID: 30241083005** Collected: 01/16/18 14:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2-Chloronaphthalene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	91-58-7	
2-Chlorophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	7005-72-3	
Chrysene	**780**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	53-70-3	
Dibenzofuran	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	132-64-9	
1,2-Dichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	91-94-1	
2,4-Dichlorophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	120-83-2	
Diethylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	105-67-9	
Dimethylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	131-11-3	
Di-n-butylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	534-52-1	
2,4-Dinitrophenol	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	51-28-5	
2,4-Dinitrotoluene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	121-14-2	
2,6-Dinitrotoluene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	606-20-2	
Di-n-octylphthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	117-84-0	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	117-81-7	
Fluoranthene	**1360**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	206-44-0	
Fluorene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	86-73-7	
Hexachloro-1,3-butadiene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	87-68-3	
Hexachlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	118-74-1	
Hexachlorocyclopentadiene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	77-47-4	
Hexachloroethane	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	67-72-1	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	193-39-5	
Isophorone	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	78-59-1	
2-Methylnaphthalene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	91-57-6	L1
2-Methylphenol(o-Cresol)	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/kg	791	1	01/19/18 19:46	01/23/18 16:41		
Naphthalene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	91-20-3	
2-Nitroaniline	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	88-74-4	
3-Nitroaniline	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	99-09-2	
4-Nitroaniline	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	100-01-6	
Nitrobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	98-95-3	
2-Nitrophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	88-75-5	L1
4-Nitrophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	100-02-7	
N-Nitroso-di-n-propylamine	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	621-64-7	
N-Nitrosodiphenylamine	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	86-30-6	
Pentachlorophenol	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	87-86-5	
Phenanthrene	**567**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	85-01-8	
Phenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	108-95-2	
Pyrene	**1370**	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	129-00-0	
1,2,4-Trichlorobenzene	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	120-82-1	L1

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-2 (1.5-3') **Lab ID: 30241083005** Collected: 01/16/18 14:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV FULL LIST MICROWAVE	Analytical Method: EPA 8270C	Preparation Method: EPA 3546						
2,4,5-Trichlorophenol	ND	ug/kg	989	1	01/19/18 19:46	01/23/18 16:41	95-95-4	
2,4,6-Trichlorophenol	ND	ug/kg	395	1	01/19/18 19:46	01/23/18 16:41	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	78	%	10-175	1	01/19/18 19:46	01/23/18 16:41	4165-60-0	
2-Fluorobiphenyl (S)	76	%	10-151	1	01/19/18 19:46	01/23/18 16:41	321-60-8	
Terphenyl-d14 (S)	65	%	10-172	1	01/19/18 19:46	01/23/18 16:41	1718-51-0	
Phenol-d6 (S)	71	%	10-142	1	01/19/18 19:46	01/23/18 16:41	13127-88-3	
2-Fluorophenol (S)	47	%	10-138	1	01/19/18 19:46	01/23/18 16:41	367-12-4	
2,4,6-Tribromophenol (S)	15	%	10-144	1	01/19/18 19:46	01/23/18 16:41	118-79-6	
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B	Preparation Method: EPA 5035A						
Acetone	ND	ug/kg	604	50	01/19/18 13:02	01/19/18 20:01	67-64-1	1c
Benzene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	71-43-2	1c
Bromodichloromethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-27-4	1c
Bromoform	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-25-2	1c
Bromomethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	74-83-9	1c
TOTAL BTEX	ND	ug/kg	1810	50	01/19/18 13:02	01/19/18 20:01		
2-Butanone (MEK)	ND	ug/kg	604	50	01/19/18 13:02	01/19/18 20:01	78-93-3	1c
Carbon disulfide	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-15-0	1c
Carbon tetrachloride	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	56-23-5	1c
Chlorobenzene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	108-90-7	1c
Chloroethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-00-3	1c
Chloroform	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	67-66-3	1c
Chloromethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	74-87-3	1c
Dibromochloromethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	124-48-1	1c
1,2-Dichlorobenzene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	95-50-1	1c
1,3-Dichlorobenzene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	541-73-1	1c
1,4-Dichlorobenzene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	106-46-7	1c
1,1-Dichloroethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-34-3	1c
1,2-Dichloroethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	107-06-2	1c
1,2-Dichloroethene (Total)	ND	ug/kg	604	50	01/19/18 13:02	01/19/18 20:01	540-59-0	
1,1-Dichloroethene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-35-4	1c
cis-1,2-Dichloroethene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	156-59-2	1c
trans-1,2-Dichloroethene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	156-60-5	1c
1,2-Dichloropropane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	78-87-5	1c
cis-1,3-Dichloropropene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	10061-01-5	1c
trans-1,3-Dichloropropene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	10061-02-6	1c
Ethylbenzene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	100-41-4	1c
2-Hexanone	ND	ug/kg	604	50	01/19/18 13:02	01/19/18 20:01	591-78-6	1c
Methylene Chloride	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-09-2	1c
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	604	50	01/19/18 13:02	01/19/18 20:01	108-10-1	1c
Methyl-tert-butyl ether	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	1634-04-4	1c
Styrene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	100-42-5	1c
1,1,2,2-Tetrachloroethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	79-34-5	1c
Tetrachloroethene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	127-18-4	1c
Toluene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	108-88-3	1c

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(724)850-5600

ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-2 (1.5-3') **Lab ID: 30241083005** Collected: 01/16/18 14:30 Received: 01/17/18 12:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV 5035 Low Level	Analytical Method: EPA 8260B Preparation Method: EPA 5035A							
1,1,1-Trichloroethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	71-55-6	1c
1,1,2-Trichloroethane	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	79-00-5	1c
Trichloroethene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	79-01-6	1c
Vinyl chloride	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	75-01-4	1c
Xylene (Total)	ND	ug/kg	905	50	01/19/18 13:02	01/19/18 20:01	1330-20-7	
m&p-Xylene	ND	ug/kg	604	50	01/19/18 13:02	01/19/18 20:01	179601-23-1	1c
o-Xylene	ND	ug/kg	302	50	01/19/18 13:02	01/19/18 20:01	95-47-6	1c
Surrogates								
Toluene-d8 (S)	100	%	76-124	50	01/19/18 13:02	01/19/18 20:01	2037-26-5	
4-Bromofluorobenzene (S)	98	%	70-133	50	01/19/18 13:02	01/19/18 20:01	460-00-4	
1,2-Dichloroethane-d4 (S)	98	%	74-131	50	01/19/18 13:02	01/19/18 20:01	17060-07-0	
Dibromofluoromethane (S)	95	%	71-130	50	01/19/18 13:02	01/19/18 20:01	1868-53-7	
Percent Moisture	Analytical Method: ASTM D2974-87							
Percent Moisture	**17.7**	%	0.10	1		01/21/18 10:51		

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-16 **Lab ID: 30241083006** Collected: 01/11/18 07:50 Received: 01/17/18 12:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
HEM, Oil and Grease	Analytical Method: EPA 1664A							
Oil and Grease	ND	mg/L	4.8	1		01/29/18 13:40		
4500FC Fluoride - Undistilled	Analytical Method: SM4500FC-97							
Fluoride	**1.2**	mg/L	0.10	1		01/19/18 14:28	16984-48-8	
4500H+ pH, Electrometric	Analytical Method: SM4500H+B-00							
pH at 25 Degrees C	**9.1**	Std. Units	2.0	1		01/17/18 20:45		H3,H6
335.4 Cyanide, Total	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	01/24/18 11:49	01/24/18 16:10	57-12-5	
350.1 Ammonia, Undistilled	Analytical Method: EPA 350.1							
Nitrogen, Ammonia	**5.7**	mg/L	0.20	2		01/23/18 10:57	7664-41-7	
410.4 COD	Analytical Method: EPA 410.4 Preparation Method: EPA 410.4							
Chemical Oxygen Demand	**203**	mg/L	25.0	1	01/23/18 11:11	01/23/18 14:01		
Phenolics, Total	Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	ug/L	50.0	1	01/19/18 17:31	01/19/18 21:11	64743-03-9	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-10 **Lab ID: 30241083007** Collected: 01/15/18 12:45 Received: 01/17/18 12:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
HEM, Oil and Grease	Analytical Method: EPA 1664A							
Oil and Grease	ND	mg/L	4.8	1		01/29/18 13:40		
4500FC Fluoride - Undistilled	Analytical Method: SM4500FC-97							
Fluoride	**0.13**	mg/L	0.10	1		01/19/18 14:30	16984-48-8	
4500H+ pH, Electrometric	Analytical Method: SM4500H+B-00							
pH at 25 Degrees C	**11.6**	Std. Units	2.0	1		01/17/18 20:49		H3,H6
335.4 Cyanide, Total	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	**0.027**	mg/L	0.010	1	01/24/18 11:49	01/24/18 16:13	57-12-5	
350.1 Ammonia, Undistilled	Analytical Method: EPA 350.1							
Nitrogen, Ammonia	**3.3**	mg/L	0.20	2		01/23/18 10:57	7664-41-7	
410.4 COD	Analytical Method: EPA 410.4 Preparation Method: EPA 410.4							
Chemical Oxygen Demand	**107**	mg/L	25.0	1	01/23/18 11:11	01/23/18 14:02		
Phenolics, Total	Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	ug/L	50.0	1	01/19/18 17:31	01/19/18 21:11	64743-03-9	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: B-7 **Lab ID: 30241083008** Collected: 01/16/18 08:20 Received: 01/17/18 12:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
HEM, Oil and Grease	Analytical Method: EPA 1664A							
Oil and Grease	ND	mg/L	4.8	1		01/29/18 13:40		
4500FC Fluoride - Undistilled	Analytical Method: SM4500FC-97							
Fluoride	**0.24**	mg/L	0.10	1		01/19/18 14:31	16984-48-8	
4500H+ pH, Electrometric	Analytical Method: SM4500H+B-00							
pH at 25 Degrees C	**11.6**	Std. Units	2.0	1		01/17/18 20:50		H3,H6
335.4 Cyanide, Total	Analytical Method: EPA 335.4 Preparation Method: EPA 335.4							
Cyanide	ND	mg/L	0.010	1	01/24/18 11:49	01/24/18 16:14	57-12-5	
350.1 Ammonia, Undistilled	Analytical Method: EPA 350.1							
Nitrogen, Ammonia	**3.3**	mg/L	0.20	2		01/23/18 10:58	7664-41-7	
410.4 COD	Analytical Method: EPA 410.4 Preparation Method: EPA 410.4							
Chemical Oxygen Demand	**68.0**	mg/L	25.0	1	01/23/18 11:11	01/23/18 14:02		
Phenolics, Total	Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	ug/L	50.0	1	01/19/18 17:31	01/19/18 21:11	64743-03-9	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: Trip Blank **Lab ID: 30241083009** Collected: 01/16/18 00:01 Received: 01/17/18 12:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B							
Acetone	ND	ug/L	10.0	1		01/21/18 15:42	67-64-1	
Benzene	ND	ug/L	1.0	1		01/21/18 15:42	71-43-2	
Bromochloromethane	ND	ug/L	1.0	1		01/21/18 15:42	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		01/21/18 15:42	75-27-4	
Bromoform	ND	ug/L	1.0	1		01/21/18 15:42	75-25-2	
Bromomethane	ND	ug/L	1.0	1		01/21/18 15:42	74-83-9	
2-Butanone (MEK)	ND	ug/L	10.0	1		01/21/18 15:42	78-93-3	
Carbon disulfide	ND	ug/L	1.0	1		01/21/18 15:42	75-15-0	
Carbon tetrachloride	ND	ug/L	1.0	1		01/21/18 15:42	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		01/21/18 15:42	108-90-7	
Chloroethane	ND	ug/L	1.0	1		01/21/18 15:42	75-00-3	
Chloroform	ND	ug/L	1.0	1		01/21/18 15:42	67-66-3	
Chloromethane	ND	ug/L	1.0	1		01/21/18 15:42	74-87-3	
Dibromochloromethane	ND	ug/L	1.0	1		01/21/18 15:42	124-48-1	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		01/21/18 15:42	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		01/21/18 15:42	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		01/21/18 15:42	106-46-7	
1,1-Dichloroethane	ND	ug/L	1.0	1		01/21/18 15:42	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		01/21/18 15:42	107-06-2	
1,2-Dichloroethene (Total)	ND	ug/L	2.0	1		01/21/18 15:42	540-59-0	
1,1-Dichloroethene	ND	ug/L	1.0	1		01/21/18 15:42	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		01/21/18 15:42	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		01/21/18 15:42	156-60-5	
1,2-Dichloropropane	ND	ug/L	1.0	1		01/21/18 15:42	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	1.0	1		01/21/18 15:42	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	1.0	1		01/21/18 15:42	10061-02-6	
Ethylbenzene	ND	ug/L	1.0	1		01/21/18 15:42	100-41-4	
2-Hexanone	ND	ug/L	10.0	1		01/21/18 15:42	591-78-6	
Methylene Chloride	ND	ug/L	1.0	1		01/21/18 15:42	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10.0	1		01/21/18 15:42	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		01/21/18 15:42	1634-04-4	
Styrene	ND	ug/L	1.0	1		01/21/18 15:42	100-42-5	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		01/21/18 15:42	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		01/21/18 15:42	127-18-4	
Toluene	ND	ug/L	1.0	1		01/21/18 15:42	108-88-3	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		01/21/18 15:42	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		01/21/18 15:42	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		01/21/18 15:42	79-00-5	
Trichloroethene	ND	ug/L	1.0	1		01/21/18 15:42	79-01-6	
Vinyl chloride	ND	ug/L	1.0	1		01/21/18 15:42	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		01/21/18 15:42	1330-20-7	
m&p-Xylene	ND	ug/L	2.0	1		01/21/18 15:42	179601-23-1	
o-Xylene	ND	ug/L	1.0	1		01/21/18 15:42	95-47-6	
Surrogates								
4-Bromofluorobenzene (S)	102	%	79-129	1		01/21/18 15:42	460-00-4	
1,2-Dichloroethane-d4 (S)	115	%	80-120	1		01/21/18 15:42	17060-07-0	
Toluene-d8 (S)	101	%	80-120	1		01/21/18 15:42	2037-26-5	

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ANALYTICAL RESULTS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Sample: Trip Blank **Lab ID: 30241083009** Collected: 01/16/18 00:01 Received: 01/17/18 12:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B							
Surrogates								
Dibromofluoromethane (S)	105	%	80-120	1		01/21/18 15:42	1868-53-7	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285818 | Analysis Method: EPA 7471A
QC Batch Method: EPA 7471A | Analysis Description: 7471 Mercury
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

METHOD BLANK: 1402071 | Matrix: Solid
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.10	01/24/18 13:52	

LABORATORY CONTROL SAMPLE: 1402072

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.2	0.20	102	80-120	

MATRIX SPIKE SAMPLE: 1402074

Parameter	Units	30241428001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	ND	.57	0.65	103	80-120	

SAMPLE DUPLICATE: 1402073

Parameter	Units	30241428001 Result	Dup Result	RPD	Qualifiers
Mercury	mg/kg	ND	.066J		

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285813 | Analysis Method: EPA 6010B
QC Batch Method: EPA 3050B | Analysis Description: 6010 MET
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

METHOD BLANK: 1402048 | Matrix: Solid
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	mg/kg	ND	9.8	01/25/18 10:25	
Antimony	mg/kg	ND	0.59	01/25/18 10:25	
Arsenic	mg/kg	ND	0.49	01/25/18 10:25	
Barium	mg/kg	ND	2.0	01/25/18 10:25	
Beryllium	mg/kg	ND	0.20	01/25/18 10:25	
Boron	mg/kg	ND	4.9	01/25/18 10:25	
Cadmium	mg/kg	ND	0.29	01/25/18 10:25	
Calcium	mg/kg	ND	196	01/25/18 10:25	
Chromium	mg/kg	ND	0.49	01/25/18 10:25	
Cobalt	mg/kg	ND	0.98	01/25/18 10:25	
Copper	mg/kg	ND	0.98	01/25/18 10:25	
Iron	mg/kg	ND	9.8	01/25/18 10:25	
Lead	mg/kg	ND	0.49	01/25/18 10:25	
Magnesium	mg/kg	ND	49.0	01/25/18 10:25	
Manganese	mg/kg	ND	0.98	01/25/18 10:25	
Molybdenum	mg/kg	ND	2.0	01/25/18 10:25	
Nickel	mg/kg	ND	2.0	01/25/18 10:25	
Potassium	mg/kg	ND	49.0	01/25/18 10:25	
Selenium	mg/kg	ND	0.78	01/25/18 10:25	
Silver	mg/kg	ND	0.59	01/25/18 10:25	
Sodium	mg/kg	ND	490	01/25/18 10:25	
Thallium	mg/kg	ND	2.0	01/25/18 10:25	
Vanadium	mg/kg	ND	0.98	01/25/18 10:25	
Zinc	mg/kg	ND	0.98	01/25/18 10:25	

LABORATORY CONTROL SAMPLE: 1402049

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/kg	490	483	99	80-120	
Antimony	mg/kg	49	48.9	100	80-120	
Arsenic	mg/kg	49	48.5	99	80-120	
Barium	mg/kg	49	50.8	104	80-120	
Beryllium	mg/kg	49	50.4	103	80-120	
Boron	mg/kg	49	46.1	94	80-120	
Cadmium	mg/kg	49	49.0	100	80-120	
Calcium	mg/kg	490	498	102	80-120	
Chromium	mg/kg	49	51.2	104	80-120	
Cobalt	mg/kg	49	47.4	97	80-120	
Copper	mg/kg	49	49.5	101	80-120	
Iron	mg/kg	490	485	99	80-120	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

LABORATORY CONTROL SAMPLE: 1402049

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Lead	mg/kg	49	46.7	95	80-120	
Magnesium	mg/kg	490	493	101	80-120	
Manganese	mg/kg	49	49.2	100	80-120	
Molybdenum	mg/kg	49	48.6	99	80-120	
Nickel	mg/kg	49	50.7	103	80-120	
Potassium	mg/kg	490	493	100	80-120	
Selenium	mg/kg	49	47.7	97	80-120	
Silver	mg/kg	24.5	24.3	99	80-120	
Sodium	mg/kg	490	483J	98	80-120	
Thallium	mg/kg	49	45.9	94	80-120	
Vanadium	mg/kg	49	51.2	104	80-120	
Zinc	mg/kg	49	50.7	103	80-120	

MATRIX SPIKE SAMPLE: 1402051

Parameter	Units	30241351001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/kg	7880	492	17500	1950	75-125	MH
Antimony	mg/kg	0.59 U	49.2	16.0	32	75-125	ML
Arsenic	mg/kg	13.2	49.2	67.6	110	75-125	
Barium	mg/kg	73.5	49.2	183	223	75-125	MH
Beryllium	mg/kg	0.58	49.2	46.2	93	75-125	
Boron	mg/kg	6.0	49.2	43.0	75	75-125	
Cadmium	mg/kg	0.18J	49.2	45.4	92	75-125	
Calcium	mg/kg	2190	492	4910	551	75-125	MH
Chromium	mg/kg	13.7	49.2	71.4	117	75-125	
Cobalt	mg/kg	5.7	49.2	54.2	98	75-125	
Copper	mg/kg	36.5	49.2	76.2	81	75-125	
Iron	mg/kg	13700	492	18800	1050	75-125	MH
Lead	mg/kg	18.7	49.2	80.0	125	75-125	
Magnesium	mg/kg	1920	492	3100	240	75-125	MH
Manganese	mg/kg	59.5	49.2	233	352	75-125	MH
Molybdenum	mg/kg	0.70J	49.2	47.7	95	75-125	
Nickel	mg/kg	13.8	49.2	62.3	99	75-125	
Potassium	mg/kg	1560	492	2670	226	75-125	MH
Selenium	mg/kg	2.2	49.2	44.1	85	75-125	
Silver	mg/kg	0.59 U	24.6	22.6	92	75-125	
Sodium	mg/kg	374J	492	952	118	75-125	
Thallium	mg/kg	2.0 U	49.2	42.2	85	75-125	
Vanadium	mg/kg	12.9	49.2	73.5	123	75-125	
Zinc	mg/kg	57.0	49.2	101	89	75-125	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

SAMPLE DUPLICATE: 1402050

Parameter	Units	30241351001 Result	Dup Result	RPD	Qualifiers
Aluminum	mg/kg	7880	6550	18	
Antimony	mg/kg	0.59 U	ND		
Arsenic	mg/kg	13.2	13.1	1	
Barium	mg/kg	73.5	104	34	D6
Beryllium	mg/kg	0.58	0.75	25	D6
Boron	mg/kg	6.0	8.3	32	D6
Cadmium	mg/kg	0.18J	.23J		
Calcium	mg/kg	2190	3530	47	D6
Chromium	mg/kg	13.7	11.5	18	
Cobalt	mg/kg	5.7	3.2	55	D6
Copper	mg/kg	36.5	35.1	4	
Iron	mg/kg	13700	8520	46	D6
Lead	mg/kg	18.7	25.9	32	D6
Magnesium	mg/kg	1920	968	66	D6
Manganese	mg/kg	59.5	34.0	55	D6
Molybdenum	mg/kg	0.70J	1J		
Nickel	mg/kg	13.8	8.9	43	D6
Potassium	mg/kg	1560	1660	7	
Selenium	mg/kg	2.2	2.2	2	
Silver	mg/kg	0.59 U	ND		
Sodium	mg/kg	374J	453J		
Thallium	mg/kg	2.0 U	ND		
Vanadium	mg/kg	12.9	11.3	14	
Zinc	mg/kg	57.0	38.2	40	D6

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285462 | Analysis Method: EPA 8260B
QC Batch Method: EPA 5035A | Analysis Description: 8260B MSV 5035 Low
Associated Lab Samples: 30241083002, 30241083003, 30241083004

METHOD BLANK: 1400042 | Matrix: Solid
Associated Lab Samples: 30241083002, 30241083003, 30241083004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1-Trichloroethane	ug/kg	ND	5.0	01/19/18 13:51	
1,1,2,2-Tetrachloroethane	ug/kg	ND	5.0	01/19/18 13:51	
1,1,2-Trichloroethane	ug/kg	ND	5.0	01/19/18 13:51	
1,1-Dichloroethane	ug/kg	ND	5.0	01/19/18 13:51	
1,1-Dichloroethene	ug/kg	ND	5.0	01/19/18 13:51	
1,2-Dichlorobenzene	ug/kg	ND	5.0	01/19/18 13:51	
1,2-Dichloroethane	ug/kg	ND	5.0	01/19/18 13:51	
1,2-Dichloroethene (Total)	ug/kg	ND	10.0	01/19/18 13:51	
1,2-Dichloropropane	ug/kg	ND	5.0	01/19/18 13:51	
1,3-Dichlorobenzene	ug/kg	ND	5.0	01/19/18 13:51	
1,4-Dichlorobenzene	ug/kg	ND	5.0	01/19/18 13:51	
2-Butanone (MEK)	ug/kg	ND	10.0	01/19/18 13:51	
2-Hexanone	ug/kg	ND	10.0	01/19/18 13:51	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	10.0	01/19/18 13:51	
Acetone	ug/kg	ND	10.0	01/19/18 13:51	
Benzene	ug/kg	ND	5.0	01/19/18 13:51	
Bromodichloromethane	ug/kg	ND	5.0	01/19/18 13:51	
Bromoform	ug/kg	ND	5.0	01/19/18 13:51	
Bromomethane	ug/kg	ND	5.0	01/19/18 13:51	
Carbon disulfide	ug/kg	ND	5.0	01/19/18 13:51	
Carbon tetrachloride	ug/kg	ND	5.0	01/19/18 13:51	
Chlorobenzene	ug/kg	ND	5.0	01/19/18 13:51	
Chloroethane	ug/kg	ND	5.0	01/19/18 13:51	
Chloroform	ug/kg	ND	5.0	01/19/18 13:51	
Chloromethane	ug/kg	ND	5.0	01/19/18 13:51	
cis-1,2-Dichloroethene	ug/kg	ND	5.0	01/19/18 13:51	
cis-1,3-Dichloropropene	ug/kg	ND	5.0	01/19/18 13:51	
Dibromochloromethane	ug/kg	ND	5.0	01/19/18 13:51	
Ethylbenzene	ug/kg	ND	5.0	01/19/18 13:51	
m&p-Xylene	ug/kg	ND	10.0	01/19/18 13:51	
Methyl-tert-butyl ether	ug/kg	ND	5.0	01/19/18 13:51	
Methylene Chloride	ug/kg	ND	5.0	01/19/18 13:51	
o-Xylene	ug/kg	ND	5.0	01/19/18 13:51	
Styrene	ug/kg	ND	5.0	01/19/18 13:51	
Tetrachloroethene	ug/kg	ND	5.0	01/19/18 13:51	
Toluene	ug/kg	ND	5.0	01/19/18 13:51	
TOTAL BTEX	ug/kg	ND	30.0	01/19/18 13:51	
trans-1,2-Dichloroethene	ug/kg	ND	5.0	01/19/18 13:51	
trans-1,3-Dichloropropene	ug/kg	ND	5.0	01/19/18 13:51	
Trichloroethene	ug/kg	ND	5.0	01/19/18 13:51	
Vinyl chloride	ug/kg	ND	5.0	01/19/18 13:51	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

METHOD BLANK: 1400042 Matrix: Solid
Associated Lab Samples: 30241083002, 30241083003, 30241083004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Xylene (Total)	ug/kg	ND	15.0	01/19/18 13:51	
1,2-Dichloroethane-d4 (S)	%	104	74-131	01/19/18 13:51	
4-Bromofluorobenzene (S)	%	99	70-133	01/19/18 13:51	
Dibromofluoromethane (S)	%	97	71-130	01/19/18 13:51	
Toluene-d8 (S)	%	98	76-124	01/19/18 13:51	

LABORATORY CONTROL SAMPLE: 1400043

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/kg	20	17.3	86	70-130	
1,1,2,2-Tetrachloroethane	ug/kg	20	16.1	80	70-130	
1,1,2-Trichloroethane	ug/kg	20	17.0	85	70-130	
1,1-Dichloroethane	ug/kg	20	18.8	94	70-130	
1,1-Dichloroethene	ug/kg	20	19.0	95	70-130	
1,2-Dichlorobenzene	ug/kg	20	17.3	87	70-130	
1,2-Dichloroethane	ug/kg	20	17.6	88	70-130	
1,2-Dichloroethene (Total)	ug/kg	40	36.3	91	70-130	
1,2-Dichloropropane	ug/kg	20	17.1	86	70-130	
1,3-Dichlorobenzene	ug/kg	20	17.6	88	70-130	
1,4-Dichlorobenzene	ug/kg	20	17.3	87	70-130	
2-Butanone (MEK)	ug/kg	20	23.0	115	65-137	
2-Hexanone	ug/kg	20	19.5	97	70-130	
4-Methyl-2-pentanone (MIBK)	ug/kg	20	22.3	112	70-130	
Acetone	ug/kg	20	23.8	119	49-158	
Benzene	ug/kg	20	17.8	89	70-130	
Bromodichloromethane	ug/kg	20	17.8	89	70-130	
Bromoform	ug/kg	20	14.5	73	70-130	
Bromomethane	ug/kg	20	17.3	86	44-154	
Carbon disulfide	ug/kg	20	14.2	71	33-127	
Carbon tetrachloride	ug/kg	20	16.5	83	70-130	
Chlorobenzene	ug/kg	20	17.3	87	70-130	
Chloroethane	ug/kg	20	19.8	99	70-130	
Chloroform	ug/kg	20	17.3	87	70-130	
Chloromethane	ug/kg	20	24.7	123	70-130	
cis-1,2-Dichloroethene	ug/kg	20	18.1	91	70-130	
cis-1,3-Dichloropropene	ug/kg	20	16.2	81	70-130	
Dibromochloromethane	ug/kg	20	16.2	81	70-130	
Ethylbenzene	ug/kg	20	18.1	90	70-130	
m&p-Xylene	ug/kg	40	35.3	88	70-130	
Methyl-tert-butyl ether	ug/kg	20	18.3	91	70-130	
Methylene Chloride	ug/kg	20	20.5	103	70-130	
o-Xylene	ug/kg	20	17.7	88	70-130	
Styrene	ug/kg	20	17.4	87	70-130	
Tetrachloroethene	ug/kg	20	17.6	88	70-130	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

LABORATORY CONTROL SAMPLE: 1400043

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Toluene	ug/kg	20	16.4	82	70-130	
TOTAL BTEX	ug/kg		105			
trans-1,2-Dichloroethene	ug/kg	20	18.2	91	70-130	
trans-1,3-Dichloropropene	ug/kg	20	15.0	75	70-130	
Trichloroethene	ug/kg	20	15.6	78	70-130	
Vinyl chloride	ug/kg	20	21.8	109	70-130	
Xylene (Total)	ug/kg	60	52.9	88	70-130	
1,2-Dichloroethane-d4 (S)	%			101	74-131	
4-Bromofluorobenzene (S)	%			96	70-133	
Dibromofluoromethane (S)	%			100	71-130	
Toluene-d8 (S)	%			92	76-124	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285463 | Analysis Method: EPA 8260B
QC Batch Method: EPA 5035A | Analysis Description: 8260B MSV 5035 Low
Associated Lab Samples: 30241083001, 30241083005

METHOD BLANK: 1400044 | Matrix: Solid
Associated Lab Samples: 30241083001, 30241083005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1-Trichloroethane	ug/kg	ND	250	01/19/18 13:25	
1,1,2,2-Tetrachloroethane	ug/kg	ND	250	01/19/18 13:25	
1,1,2-Trichloroethane	ug/kg	ND	250	01/19/18 13:25	
1,1-Dichloroethane	ug/kg	ND	250	01/19/18 13:25	
1,1-Dichloroethene	ug/kg	ND	250	01/19/18 13:25	
1,2-Dichlorobenzene	ug/kg	ND	250	01/19/18 13:25	
1,2-Dichloroethane	ug/kg	ND	250	01/19/18 13:25	
1,2-Dichloroethene (Total)	ug/kg	ND	500	01/19/18 13:25	
1,2-Dichloropropane	ug/kg	ND	250	01/19/18 13:25	
1,3-Dichlorobenzene	ug/kg	ND	250	01/19/18 13:25	
1,4-Dichlorobenzene	ug/kg	ND	250	01/19/18 13:25	
2-Butanone (MEK)	ug/kg	ND	500	01/19/18 13:25	
2-Hexanone	ug/kg	ND	500	01/19/18 13:25	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	500	01/19/18 13:25	
Acetone	ug/kg	ND	500	01/19/18 13:25	
Benzene	ug/kg	ND	250	01/19/18 13:25	
Bromodichloromethane	ug/kg	ND	250	01/19/18 13:25	
Bromoform	ug/kg	ND	250	01/19/18 13:25	
Bromomethane	ug/kg	ND	250	01/19/18 13:25	
Carbon disulfide	ug/kg	ND	250	01/19/18 13:25	
Carbon tetrachloride	ug/kg	ND	250	01/19/18 13:25	
Chlorobenzene	ug/kg	ND	250	01/19/18 13:25	
Chloroethane	ug/kg	ND	250	01/19/18 13:25	
Chloroform	ug/kg	ND	250	01/19/18 13:25	
Chloromethane	ug/kg	ND	250	01/19/18 13:25	
cis-1,2-Dichloroethene	ug/kg	ND	250	01/19/18 13:25	
cis-1,3-Dichloropropene	ug/kg	ND	250	01/19/18 13:25	
Dibromochloromethane	ug/kg	ND	250	01/19/18 13:25	
Ethylbenzene	ug/kg	ND	250	01/19/18 13:25	
m&p-Xylene	ug/kg	ND	500	01/19/18 13:25	
Methyl-tert-butyl ether	ug/kg	ND	250	01/19/18 13:25	
Methylene Chloride	ug/kg	ND	250	01/19/18 13:25	
o-Xylene	ug/kg	ND	250	01/19/18 13:25	
Styrene	ug/kg	ND	250	01/19/18 13:25	
Tetrachloroethene	ug/kg	ND	250	01/19/18 13:25	
Toluene	ug/kg	ND	250	01/19/18 13:25	
TOTAL BTEX	ug/kg	ND	1500	01/19/18 13:25	
trans-1,2-Dichloroethene	ug/kg	ND	250	01/19/18 13:25	
trans-1,3-Dichloropropene	ug/kg	ND	250	01/19/18 13:25	
Trichloroethene	ug/kg	ND	250	01/19/18 13:25	
Vinyl chloride	ug/kg	ND	250	01/19/18 13:25	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

METHOD BLANK: 1400044 Matrix: Solid
Associated Lab Samples: 30241083001, 30241083005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Xylene (Total)	ug/kg	ND	750	01/19/18 13:25	
1,2-Dichloroethane-d4 (S)	%	102	74-131	01/19/18 13:25	
4-Bromofluorobenzene (S)	%	97	70-133	01/19/18 13:25	
Dibromofluoromethane (S)	%	95	71-130	01/19/18 13:25	
Toluene-d8 (S)	%	100	76-124	01/19/18 13:25	

LABORATORY CONTROL SAMPLE: 1400045

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/kg	20	17.3	86	70-130	
1,1,2,2-Tetrachloroethane	ug/kg	20	16.1	80	70-130	
1,1,2-Trichloroethane	ug/kg	20	17.0	85	70-130	
1,1-Dichloroethane	ug/kg	20	18.8	94	70-130	
1,1-Dichloroethene	ug/kg	20	19.0	95	70-130	
1,2-Dichlorobenzene	ug/kg	20	17.3	87	70-130	
1,2-Dichloroethane	ug/kg	20	17.6	88	70-130	
1,2-Dichloroethene (Total)	ug/kg	40	36.3	91	70-130	
1,2-Dichloropropane	ug/kg	20	17.1	86	70-130	
1,3-Dichlorobenzene	ug/kg	20	17.6	88	70-130	
1,4-Dichlorobenzene	ug/kg	20	17.3	87	70-130	
2-Butanone (MEK)	ug/kg	20	23.0	115	65-137	
2-Hexanone	ug/kg	20	19.5	97	70-130	
4-Methyl-2-pentanone (MIBK)	ug/kg	20	22.3	112	70-130	
Acetone	ug/kg	20	23.8	119	49-158	
Benzene	ug/kg	20	17.8	89	70-130	
Bromodichloromethane	ug/kg	20	17.8	89	70-130	
Bromoform	ug/kg	20	14.5	73	70-130	
Bromomethane	ug/kg	20	17.3	86	44-154	
Carbon disulfide	ug/kg	20	14.2	71	33-127	
Carbon tetrachloride	ug/kg	20	16.5	83	70-130	
Chlorobenzene	ug/kg	20	17.3	87	70-130	
Chloroethane	ug/kg	20	19.8	99	70-130	
Chloroform	ug/kg	20	17.3	87	70-130	
Chloromethane	ug/kg	20	24.7	123	70-130	
cis-1,2-Dichloroethene	ug/kg	20	18.1	91	70-130	
cis-1,3-Dichloropropene	ug/kg	20	16.2	81	70-130	
Dibromochloromethane	ug/kg	20	16.2	81	70-130	
Ethylbenzene	ug/kg	20	18.1	90	70-130	
m&p-Xylene	ug/kg	40	35.3	88	70-130	
Methyl-tert-butyl ether	ug/kg	20	18.3	91	70-130	
Methylene Chloride	ug/kg	20	20.5	103	70-130	
o-Xylene	ug/kg	20	17.7	88	70-130	
Styrene	ug/kg	20	17.4	87	70-130	
Tetrachloroethene	ug/kg	20	17.6	88	70-130	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

LABORATORY CONTROL SAMPLE: 1400045

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Toluene	ug/kg	20	16.4	82	70-130	
TOTAL BTEX	ug/kg		105			
trans-1,2-Dichloroethene	ug/kg	20	18.2	91	70-130	
trans-1,3-Dichloropropene	ug/kg	20	15.0	75	70-130	
Trichloroethene	ug/kg	20	15.6	78	70-130	
Vinyl chloride	ug/kg	20	21.8	109	70-130	
Xylene (Total)	ug/kg	60	52.9	88	70-130	
1,2-Dichloroethane-d4 (S)	%			101	74-131	
4-Bromofluorobenzene (S)	%			96	70-133	
Dibromofluoromethane (S)	%			100	71-130	
Toluene-d8 (S)	%			92	76-124	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285531
QC Batch Method: EPA 8260B
Analysis Method: EPA 8260B
Analysis Description: 8260B MSV
Associated Lab Samples: 30241083009

METHOD BLANK: 1400494
Matrix: Water
Associated Lab Samples: 30241083009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1-Trichloroethane	ug/L	ND	1.0	01/21/18 11:49	
1,1,2,2-Tetrachloroethane	ug/L	ND	1.0	01/21/18 11:49	
1,1,2-Trichloroethane	ug/L	ND	1.0	01/21/18 11:49	
1,1-Dichloroethane	ug/L	ND	1.0	01/21/18 11:49	
1,1-Dichloroethene	ug/L	ND	1.0	01/21/18 11:49	
1,2,4-Trichlorobenzene	ug/L	ND	1.0	01/21/18 11:49	
1,2-Dichlorobenzene	ug/L	ND	1.0	01/21/18 11:49	
1,2-Dichloroethane	ug/L	ND	1.0	01/21/18 11:49	
1,2-Dichloroethene (Total)	ug/L	ND	2.0	01/21/18 11:49	
1,2-Dichloropropane	ug/L	ND	1.0	01/21/18 11:49	
1,3-Dichlorobenzene	ug/L	ND	1.0	01/21/18 11:49	
1,4-Dichlorobenzene	ug/L	ND	1.0	01/21/18 11:49	
2-Butanone (MEK)	ug/L	ND	10.0	01/21/18 11:49	
2-Hexanone	ug/L	ND	10.0	01/21/18 11:49	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	10.0	01/21/18 11:49	
Acetone	ug/L	ND	10.0	01/21/18 11:49	
Benzene	ug/L	ND	1.0	01/21/18 11:49	
Bromochloromethane	ug/L	ND	1.0	01/21/18 11:49	
Bromodichloromethane	ug/L	ND	1.0	01/21/18 11:49	
Bromoform	ug/L	ND	1.0	01/21/18 11:49	
Bromomethane	ug/L	ND	1.0	01/21/18 11:49	
Carbon disulfide	ug/L	ND	1.0	01/21/18 11:49	
Carbon tetrachloride	ug/L	ND	1.0	01/21/18 11:49	
Chlorobenzene	ug/L	ND	1.0	01/21/18 11:49	
Chloroethane	ug/L	ND	1.0	01/21/18 11:49	
Chloroform	ug/L	ND	1.0	01/21/18 11:49	
Chloromethane	ug/L	ND	1.0	01/21/18 11:49	
cis-1,2-Dichloroethene	ug/L	ND	1.0	01/21/18 11:49	
cis-1,3-Dichloropropene	ug/L	ND	1.0	01/21/18 11:49	
Dibromochloromethane	ug/L	ND	1.0	01/21/18 11:49	
Ethylbenzene	ug/L	ND	1.0	01/21/18 11:49	
m&p-Xylene	ug/L	ND	2.0	01/21/18 11:49	
Methyl-tert-butyl ether	ug/L	ND	1.0	01/21/18 11:49	
Methylene Chloride	ug/L	ND	1.0	01/21/18 11:49	
o-Xylene	ug/L	ND	1.0	01/21/18 11:49	
Styrene	ug/L	ND	1.0	01/21/18 11:49	
Tetrachloroethene	ug/L	ND	1.0	01/21/18 11:49	
Toluene	ug/L	ND	1.0	01/21/18 11:49	
trans-1,2-Dichloroethene	ug/L	ND	1.0	01/21/18 11:49	
trans-1,3-Dichloropropene	ug/L	ND	1.0	01/21/18 11:49	
Trichloroethene	ug/L	ND	1.0	01/21/18 11:49	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

METHOD BLANK: 1400494 Matrix: Water
Associated Lab Samples: 30241083009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Vinyl chloride	ug/L	ND	1.0	01/21/18 11:49	
Xylene (Total)	ug/L	ND	3.0	01/21/18 11:49	
1,2-Dichloroethane-d4 (S)	%	106	80-120	01/21/18 11:49	
4-Bromofluorobenzene (S)	%	101	79-129	01/21/18 11:49	
Dibromofluoromethane (S)	%	107	80-120	01/21/18 11:49	
Toluene-d8 (S)	%	98	80-120	01/21/18 11:49	

LABORATORY CONTROL SAMPLE: 1400495

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1-Trichloroethane	ug/L	20	19.7	99	70-130	
1,1,2,2-Tetrachloroethane	ug/L	20	20.2	101	65-127	
1,1,2-Trichloroethane	ug/L	20	18.5	93	70-130	
1,1-Dichloroethane	ug/L	20	19.7	98	70-130	
1,1-Dichloroethene	ug/L	20	19.0	95	70-130	
1,2,4-Trichlorobenzene	ug/L	20	23.5	117	70-130	
1,2-Dichlorobenzene	ug/L	20	21.2	106	70-130	
1,2-Dichloroethane	ug/L	20	19.7	99	70-130	
1,2-Dichloroethene (Total)	ug/L	40	38.1	95	70-130	
1,2-Dichloropropane	ug/L	20	19.9	99	70-130	
1,3-Dichlorobenzene	ug/L	20	20.5	102	70-130	
1,4-Dichlorobenzene	ug/L	20	20.6	103	70-130	
2-Butanone (MEK)	ug/L	20	15.3	76	72-170	
2-Hexanone	ug/L	20	16.6	83	65-151	
4-Methyl-2-pentanone (MIBK)	ug/L	20	17.7	88	66-150	
Acetone	ug/L	20	17.3	87	30-179	
Benzene	ug/L	20	19.9	99	70-130	
Bromochloromethane	ug/L	20	18.8	94	70-130	
Bromodichloromethane	ug/L	20	20.9	105	70-130	
Bromoform	ug/L	20	21.3	106	70-130	
Bromomethane	ug/L	20	15.1	76	47-174	
Carbon disulfide	ug/L	20	20.8	104	43-133	
Carbon tetrachloride	ug/L	20	21.5	107	56-143	
Chlorobenzene	ug/L	20	20.5	102	70-130	
Chloroethane	ug/L	20	17.5	88	67-139	
Chloroform	ug/L	20	19.7	98	70-130	
Chloromethane	ug/L	20	12.3	61	57-138	
cis-1,2-Dichloroethene	ug/L	20	19.1	95	70-130	
cis-1,3-Dichloropropene	ug/L	20	21.2	106	70-130	
Dibromochloromethane	ug/L	20	21.5	108	70-130	
Ethylbenzene	ug/L	20	21.6	108	70-130	
m&p-Xylene	ug/L	40	42.2	106	70-130	
Methyl-tert-butyl ether	ug/L	20	19.8	99	70-130	
Methylene Chloride	ug/L	20	15.1	76	55-144	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

LABORATORY CONTROL SAMPLE: 1400495

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
o-Xylene	ug/L	20	20.9	105	70-130	
Styrene	ug/L	20	21.8	109	70-130	
Tetrachloroethene	ug/L	20	20.5	103	70-130	
Toluene	ug/L	20	19.2	96	70-130	
trans-1,2-Dichloroethene	ug/L	20	19.0	95	70-130	
trans-1,3-Dichloropropene	ug/L	20	21.1	106	70-130	
Trichloroethene	ug/L	20	19.9	100	70-130	
Vinyl chloride	ug/L	20	15.0	75	70-130	
Xylene (Total)	ug/L	60	63.1	105	70-130	
1,2-Dichloroethane-d4 (S)	%			101	80-120	
4-Bromofluorobenzene (S)	%			106	79-129	
Dibromofluoromethane (S)	%			106	80-120	
Toluene-d8 (S)	%			103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1400496 1400497

Parameter	Units	30241382001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
1,1,1-Trichloroethane	ug/L	ND	20	20	19.8	19.9	99	100	79-129	1	
1,1,2,2-Tetrachloroethane	ug/L	ND	20	20	17.5	18.2	88	91	57-118	4	
1,1,2-Trichloroethane	ug/L	ND	20	20	17.6	17.3	88	86	68-117	2	
1,1-Dichloroethane	ug/L	ND	20	20	19.1	19.1	96	95	74-119	0	
1,1-Dichloroethene	ug/L	ND	20	20	19.1	18.2	96	91	63-126	5	
1,2,4-Trichlorobenzene	ug/L	ND	20	20	20.4	20.2	102	101	60-117	1	
1,2-Dichlorobenzene	ug/L	ND	20	20	18.2	18.3	91	91	72-119	0	
1,2-Dichloroethane	ug/L	ND	20	20	18.8	18.8	94	94	69-116	0	
1,2-Dichloroethene (Total)	ug/L	ND	40	40	37.0	36.4	93	91	70-119	2	
1,2-Dichloropropane	ug/L	ND	20	20	19.2	18.1	96	91	63-118	6	
1,3-Dichlorobenzene	ug/L	ND	20	20	18.5	19.2	93	96	81-119	4	
1,4-Dichlorobenzene	ug/L	ND	20	20	18.6	18.6	93	93	72-118	0	
2-Butanone (MEK)	ug/L	ND	20	20	18.5	18.0	93	90	72-168	3	
2-Hexanone	ug/L	ND	20	20	16.4	16.4	82	82	66-143	0	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	20	20	18.3	18.4	92	92	67-145	1	
Acetone	ug/L	ND	20	20	19.7	19.7	82	82	15-175	0	
Benzene	ug/L	ND	20	20	19.3	19.6	96	98	67-121	1	
Bromochloromethane	ug/L	ND	20	20	19.6	19.3	98	97	62-128	2	
Bromodichloromethane	ug/L	ND	20	20	21.9	21.1	110	105	66-127	4	
Bromoform	ug/L	ND	20	20	18.3	17.9	92	90	71-127	2	
Bromomethane	ug/L	ND	20	20	18.3	18.4	92	92	10-156	1	
Carbon disulfide	ug/L	ND	20	20	17.1	18.4	86	92	45-131	7	
Carbon tetrachloride	ug/L	ND	20	20	22.0	20.4	110	102	69-134	7	
Chlorobenzene	ug/L	ND	20	20	18.7	19.1	94	96	69-119	2	
Chloroethane	ug/L	ND	20	20	23.0	24.5	115	123	60-156	7	
Chloroform	ug/L	ND	20	20	19.3	18.7	96	93	69-115	3	
Chloromethane	ug/L	ND	20	20	21.2	20.1	106	101	52-145	5	

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(724)850-5600

QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1400496 1400497

Parameter	Units	30241382001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
cis-1,2-Dichloroethene	ug/L	ND	20	20	18.6	18.3	93	92	65-120	1	
cis-1,3-Dichloropropene	ug/L	ND	20	20	19.6	20.4	98	102	57-125	4	
Dibromochloromethane	ug/L	ND	20	20	19.4	19.8	97	99	64-131	2	
Ethylbenzene	ug/L	ND	20	20	20.7	20.5	103	103	70-127	1	
m&p-Xylene	ug/L	ND	40	40	39.9	41.6	100	104	71-128	4	
Methyl-tert-butyl ether	ug/L	ND	20	20	20.3	19.6	102	98	79-135	4	
Methylene Chloride	ug/L	ND	20	20	14.5	12.8	73	64	54-133	12	
o-Xylene	ug/L	ND	20	20	20.3	20.1	101	100	68-125	1	
Styrene	ug/L	ND	20	20	20.3	20.5	101	102	65-121	1	
Tetrachloroethene	ug/L	ND	20	20	20.7	20.8	103	104	77-125	0	
Toluene	ug/L	ND	20	20	18.2	18.4	91	92	77-125	1	
trans-1,2-Dichloroethene	ug/L	ND	20	20	18.4	18.1	92	91	70-119	2	
trans-1,3-Dichloropropene	ug/L	ND	20	20	17.8	18.4	89	92	52-125	3	
Trichloroethene	ug/L	ND	20	20	19.1	19.4	96	97	74-128	1	
Vinyl chloride	ug/L	ND	20	20	25.8	24.2	129	121	60-131	6	
Xylene (Total)	ug/L	ND	60	60	60.2	61.7	100	103	69-128	2	
1,2-Dichloroethane-d4 (S)	%						108	104	80-120		
4-Bromofluorobenzene (S)	%						102	103	79-129		
Dibromofluoromethane (S)	%						105	107	80-120		
Toluene-d8 (S)	%						102	102	80-120		

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285493 | Analysis Method: EPA 8270C
QC Batch Method: EPA 3546 | Analysis Description: 8270 Solid MSSV Microwave
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

METHOD BLANK: 1400146 | Matrix: Solid
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	ND	333	01/22/18 13:39	
1,2-Dichlorobenzene	ug/kg	ND	333	01/22/18 13:39	
1,3-Dichlorobenzene	ug/kg	ND	333	01/22/18 13:39	
1,4-Dichlorobenzene	ug/kg	ND	333	01/22/18 13:39	
2,4,5-Trichlorophenol	ug/kg	ND	833	01/22/18 13:39	
2,4,6-Trichlorophenol	ug/kg	ND	333	01/22/18 13:39	
2,4-Dichlorophenol	ug/kg	ND	333	01/22/18 13:39	
2,4-Dimethylphenol	ug/kg	ND	333	01/22/18 13:39	
2,4-Dinitrophenol	ug/kg	ND	833	01/22/18 13:39	
2,4-Dinitrotoluene	ug/kg	ND	333	01/22/18 13:39	
2,6-Dinitrotoluene	ug/kg	ND	333	01/22/18 13:39	
2-Chloronaphthalene	ug/kg	ND	333	01/22/18 13:39	
2-Chlorophenol	ug/kg	ND	333	01/22/18 13:39	
2-Methylnaphthalene	ug/kg	ND	333	01/22/18 13:39	
2-Methylphenol(o-Cresol)	ug/kg	ND	333	01/22/18 13:39	
2-Nitroaniline	ug/kg	ND	833	01/22/18 13:39	
2-Nitrophenol	ug/kg	ND	333	01/22/18 13:39	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	666	01/22/18 13:39	
3,3'-Dichlorobenzidine	ug/kg	ND	333	01/22/18 13:39	
3-Nitroaniline	ug/kg	ND	833	01/22/18 13:39	
4,6-Dinitro-2-methylphenol	ug/kg	ND	833	01/22/18 13:39	
4-Bromophenylphenyl ether	ug/kg	ND	333	01/22/18 13:39	
4-Chloro-3-methylphenol	ug/kg	ND	333	01/22/18 13:39	
4-Chloroaniline	ug/kg	ND	333	01/22/18 13:39	
4-Chlorophenylphenyl ether	ug/kg	ND	333	01/22/18 13:39	
4-Nitroaniline	ug/kg	ND	833	01/22/18 13:39	CH
4-Nitrophenol	ug/kg	ND	333	01/22/18 13:39	
Acenaphthene	ug/kg	ND	333	01/22/18 13:39	
Acenaphthylene	ug/kg	ND	333	01/22/18 13:39	
Anthracene	ug/kg	ND	333	01/22/18 13:39	
Benzo(a)anthracene	ug/kg	ND	333	01/22/18 13:39	
Benzo(a)pyrene	ug/kg	ND	333	01/22/18 13:39	
Benzo(b)fluoranthene	ug/kg	ND	333	01/22/18 13:39	
Benzo(g,h,i)perylene	ug/kg	ND	333	01/22/18 13:39	
Benzo(k)fluoranthene	ug/kg	ND	333	01/22/18 13:39	
Benzyl alcohol	ug/kg	ND	333	01/22/18 13:39	
bis(2-Chloroethoxy)methane	ug/kg	ND	333	01/22/18 13:39	
bis(2-Chloroethyl) ether	ug/kg	ND	333	01/22/18 13:39	
bis(2-Chloroisopropyl) ether	ug/kg	ND	333	01/22/18 13:39	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	333	01/22/18 13:39	
Butylbenzylphthalate	ug/kg	ND	333	01/22/18 13:39	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

METHOD BLANK: 1400146 Matrix: Solid
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chrysene	ug/kg	ND	333	01/22/18 13:39	
Di-n-butylphthalate	ug/kg	ND	333	01/22/18 13:39	
Di-n-octylphthalate	ug/kg	ND	333	01/22/18 13:39	
Dibenz(a,h)anthracene	ug/kg	ND	333	01/22/18 13:39	
Dibenzofuran	ug/kg	ND	333	01/22/18 13:39	
Diethylphthalate	ug/kg	ND	333	01/22/18 13:39	
Dimethylphthalate	ug/kg	ND	333	01/22/18 13:39	
Fluoranthene	ug/kg	ND	333	01/22/18 13:39	
Fluorene	ug/kg	ND	333	01/22/18 13:39	
Hexachloro-1,3-butadiene	ug/kg	ND	333	01/22/18 13:39	
Hexachlorobenzene	ug/kg	ND	333	01/22/18 13:39	
Hexachlorocyclopentadiene	ug/kg	ND	333	01/22/18 13:39	
Hexachloroethane	ug/kg	ND	333	01/22/18 13:39	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	333	01/22/18 13:39	
Isophorone	ug/kg	ND	333	01/22/18 13:39	
N-Nitroso-di-n-propylamine	ug/kg	ND	333	01/22/18 13:39	
N-Nitrosodiphenylamine	ug/kg	ND	333	01/22/18 13:39	
Naphthalene	ug/kg	ND	333	01/22/18 13:39	
Nitrobenzene	ug/kg	ND	333	01/22/18 13:39	
Pentachlorophenol	ug/kg	ND	833	01/22/18 13:39	
Phenanthrene	ug/kg	ND	333	01/22/18 13:39	
Phenol	ug/kg	ND	333	01/22/18 13:39	
Pyrene	ug/kg	ND	333	01/22/18 13:39	
2,4,6-Tribromophenol (S)	%	81	10-144	01/22/18 13:39	
2-Fluorobiphenyl (S)	%	86	10-151	01/22/18 13:39	
2-Fluorophenol (S)	%	86	10-138	01/22/18 13:39	
Nitrobenzene-d5 (S)	%	91	10-175	01/22/18 13:39	
Phenol-d6 (S)	%	80	10-142	01/22/18 13:39	
Terphenyl-d14 (S)	%	95	10-172	01/22/18 13:39	

LABORATORY CONTROL SAMPLE: 1400147

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	3330	2820	85	55-84	L1
1,2-Dichlorobenzene	ug/kg	3330	3110	93	64-102	
1,3-Dichlorobenzene	ug/kg	3330	3150	94	63-99	
1,4-Dichlorobenzene	ug/kg	3330	2610	78	64-100	
2,4,5-Trichlorophenol	ug/kg	3330	3060	92	54-119	
2,4,6-Trichlorophenol	ug/kg	3330	4150	125	53-128	
2,4-Dichlorophenol	ug/kg	3330	2940	88	49-92	
2,4-Dimethylphenol	ug/kg	3330	2470	74	46-88	
2,4-Dinitrophenol	ug/kg	3330	2820	85	10-121	
2,4-Dinitrotoluene	ug/kg	3330	3380	101	61-120	
2,6-Dinitrotoluene	ug/kg	3330	3030	91	60-118	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

LABORATORY CONTROL SAMPLE: 1400147

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Chloronaphthalene	ug/kg	3330	3220	97	55-110	
2-Chlorophenol	ug/kg	3330	3030	91	54-111	
2-Methylnaphthalene	ug/kg	3330	2860	86	47-84	L1
2-Methylphenol(o-Cresol)	ug/kg	3330	2720	81	49-121	
2-Nitroaniline	ug/kg	3330	3530	106	61-122	
2-Nitrophenol	ug/kg	3330	2990	90	52-88	L1
3&4-Methylphenol(m&p Cresol)	ug/kg	3330	2640	79	55-116	
3,3'-Dichlorobenzidine	ug/kg	3330	2350	71	42-122	
3-Nitroaniline	ug/kg	3330	2970	89	59-129	
4,6-Dinitro-2-methylphenol	ug/kg	3330	3650	109	42-132	
4-Bromophenylphenyl ether	ug/kg	3330	3380	101	65-112	
4-Chloro-3-methylphenol	ug/kg	3330	3060	92	57-91	L1
4-Chloroaniline	ug/kg	3330	1440	43	32-76	
4-Chlorophenylphenyl ether	ug/kg	3330	3280	98	65-113	
4-Nitroaniline	ug/kg	3330	3340	100	53-168	CH
4-Nitrophenol	ug/kg	3330	3500	105	55-132	
Acenaphthene	ug/kg	3330	3500	105	59-113	
Acenaphthylene	ug/kg	3330	3340	100	56-114	
Anthracene	ug/kg	3330	2980	89	60-104	
Benzo(a)anthracene	ug/kg	3330	3290	99	64-114	
Benzo(a)pyrene	ug/kg	3330	3100	93	62-111	
Benzo(b)fluoranthene	ug/kg	3330	3410	102	61-122	
Benzo(g,h,i)perylene	ug/kg	3330	3120	94	54-127	
Benzo(k)fluoranthene	ug/kg	3330	3350	100	63-117	
Benzyl alcohol	ug/kg	3330	1900	57	34-127	
bis(2-Chloroethoxy)methane	ug/kg	3330	2710	81	46-89	
bis(2-Chloroethyl) ether	ug/kg	3330	2870	86	45-108	
bis(2-Chloroisopropyl) ether	ug/kg	3330	2360	71	47-113	
bis(2-Ethylhexyl)phthalate	ug/kg	3330	3560	107	60-127	
Butylbenzylphthalate	ug/kg	3330	3500	105	65-124	
Chrysene	ug/kg	3330	3320	100	64-112	
Di-n-butylphthalate	ug/kg	3330	3270	98	66-118	
Di-n-octylphthalate	ug/kg	3330	3400	102	57-133	
Dibenz(a,h)anthracene	ug/kg	3330	3230	97	53-125	
Dibenzofuran	ug/kg	3330	3280	99	65-109	
Diethylphthalate	ug/kg	3330	3170	95	65-113	
Dimethylphthalate	ug/kg	3330	2600	78	64-115	
Fluoranthene	ug/kg	3330	3300	99	64-114	
Fluorene	ug/kg	3330	3420	103	62-113	
Hexachloro-1,3-butadiene	ug/kg	3330	3030	91	45-91	
Hexachlorobenzene	ug/kg	3330	3330	100	63-113	
Hexachlorocyclopentadiene	ug/kg	3330	2740	82	31-105	
Hexachloroethane	ug/kg	3330	2860	86	50-110	
Indeno(1,2,3-cd)pyrene	ug/kg	3330	3190	96	57-119	
Isophorone	ug/kg	3330	2520	76	46-87	
N-Nitroso-di-n-propylamine	ug/kg	3330	2570	77	54-116	
N-Nitrosodiphenylamine	ug/kg	3330	2390	72	46-90	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

LABORATORY CONTROL SAMPLE: 1400147

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Naphthalene	ug/kg	3330	2810	84	47-85	
Nitrobenzene	ug/kg	3330	2260	68	43-93	
Pentachlorophenol	ug/kg	3330	3760	113	41-143	
Phenanthrene	ug/kg	3330	3790	114	63-114	
Phenol	ug/kg	3330	2500	75	56-114	
Pyrene	ug/kg	3330	3450	104	62-120	
2,4,6-Tribromophenol (S)	%			91	10-144	
2-Fluorobiphenyl (S)	%			91	10-151	
2-Fluorophenol (S)	%			98	10-138	
Nitrobenzene-d5 (S)	%			79	10-175	
Phenol-d6 (S)	%			86	10-142	
Terphenyl-d14 (S)	%			95	10-172	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1400148 1400149

Parameter	Units	30240931001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
1,2,4-Trichlorobenzene	ug/kg	ND	3990	4030	3490	3200	87	80	51-82	9	MH
1,2-Dichlorobenzene	ug/kg	ND	3990	4030	3040	3360	76	84	58-98	10	
1,3-Dichlorobenzene	ug/kg	ND	3990	4030	3200	3380	80	84	56-94	5	
1,4-Dichlorobenzene	ug/kg	ND	3990	4030	2660	3200	67	79	56-97	18	
2,4,5-Trichlorophenol	ug/kg	ND	3990	4030	2810	3250	70	81	14-139	15	
2,4,6-Trichlorophenol	ug/kg	ND	3990	4030	3950	4490	99	112	10-152	13	
2,4-Dichlorophenol	ug/kg	ND	3990	4030	3000	3260	75	81	46-87	8	
2,4-Dimethylphenol	ug/kg	ND	3990	4030	2600	2570	65	64	26-94	1	
2,4-Dinitrophenol	ug/kg	ND	3990	4030	1680	1390	42	35	10-120	19	
2,4-Dinitrotoluene	ug/kg	ND	3990	4030	2460	3140	62	78	44-117	24	
2,6-Dinitrotoluene	ug/kg	ND	3990	4030	2590	2810	65	70	48-112	8	
2-Chloronaphthalene	ug/kg	ND	3990	4030	3120	3360	78	84	52-104	7	
2-Chlorophenol	ug/kg	ND	3990	4030	3000	3900	75	97	48-105	26	R1
2-Methylnaphthalene	ug/kg	ND	3990	4030	3120	3180	73	74	41-84	2	
2-Methylphenol(o-Cresol)	ug/kg	ND	3990	4030	2830	3490	71	87	24-137	21	
2-Nitroaniline	ug/kg	ND	3990	4030	3070	3670	77	91	52-117	18	
2-Nitrophenol	ug/kg	ND	3990	4030	2880	2910	72	72	18-103	1	
3&4-Methylphenol(m&p Cresol)	ug/kg	ND	3990	4030	2680	3280	67	81	29-126	20	
3,3'-Dichlorobenzidine	ug/kg	ND	3990	4030	2130	2650	53	66	10-137	22	
3-Nitroaniline	ug/kg	ND	3990	4030	2830	3300	71	82	30-131	15	
4,6-Dinitro-2-methylphenol	ug/kg	ND	3990	4030	2360	2230	59	55	10-139	6	
4-Bromophenylphenyl ether	ug/kg	ND	3990	4030	3240	3500	81	87	58-108	8	
4-Chloro-3-methylphenol	ug/kg	ND	3990	4030	3230	3370	81	84	48-90	4	
4-Chloroaniline	ug/kg	ND	3990	4030	1580	1820	40	45	10-82	14	
4-Chlorophenylphenyl ether	ug/kg	ND	3990	4030	3130	3400	78	84	57-107	8	
4-Nitroaniline	ug/kg	ND	3990	4030	2790	3590	70	89	32-143	25	CH
4-Nitrophenol	ug/kg	ND	3990	4030	2550	2990	64	74	15-136	16	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1400148 1400149

Parameter	Units	30240931001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Acenaphthene	ug/kg	ND	3990	4030	3290	3690	83	92	57-104	11	
Acenaphthylene	ug/kg	ND	3990	4030	3210	3470	80	86	55-103	8	
Anthracene	ug/kg	ND	3990	4030	2810	3150	70	78	51-100	12	
Benzo(a)anthracene	ug/kg	ND	3990	4030	3170	3480	79	86	35-124	9	
Benzo(a)pyrene	ug/kg	ND	3990	4030	2890	3290	72	81	45-112	13	
Benzo(b)fluoranthene	ug/kg	ND	3990	4030	3220	3170	80	78	17-160	2	
Benzo(g,h,i)perylene	ug/kg	ND	3990	4030	3160	3050	78	75	10-127	4	
Benzo(k)fluoranthene	ug/kg	ND	3990	4030	3010	4080	75	101	27-150	30	R1
Benzyl alcohol	ug/kg	ND	3990	4030	1690	1950	42	48	10-125	14	
bis(2-Chloroethoxy)methane	ug/kg	ND	3990	4030	2680	2970	67	74	40-84	10	
bis(2-Chloroethyl) ether	ug/kg	ND	3990	4030	2990	3000	75	75	41-95	0	
bis(2-Chloroisopropyl) ether	ug/kg	ND	3990	4030	2870	3410	72	85	30-106	17	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	3990	4030	3270	3540	81	87	32-144	8	
Butylbenzylphthalate	ug/kg	ND	3990	4030	3210	3570	80	89	33-144	11	
Chrysene	ug/kg	ND	3990	4030	3140	3520	78	87	48-111	11	
Di-n-butylphthalate	ug/kg	ND	3990	4030	2940	3490	74	87	58-108	17	
Di-n-octylphthalate	ug/kg	ND	3990	4030	3140	3590	79	89	11-175	13	
Dibenz(a,h)anthracene	ug/kg	ND	3990	4030	3190	3240	80	80	10-125	2	
Dibenzofuran	ug/kg	ND	3990	4030	2920	3400	73	84	56-105	15	
Diethylphthalate	ug/kg	ND	3990	4030	2740	2730	69	68	56-104	0	
Dimethylphthalate	ug/kg	ND	3990	4030	2310	2660	58	66	53-108	14	
Fluoranthene	ug/kg	ND	3990	4030	3240	3770	80	92	24-131	15	
Fluorene	ug/kg	ND	3990	4030	3070	3600	76	88	60-106	16	
Hexachloro-1,3-butadiene	ug/kg	ND	3990	4030	3780	3800	95	95	44-86	1	MH
Hexachlorobenzene	ug/kg	ND	3990	4030	3240	3890	81	97	61-105	18	
Hexachlorocyclopentadiene	ug/kg	ND	3990	4030	1860	1830	47	46	10-99	2	
Hexachloroethane	ug/kg	ND	3990	4030	2880	3790	72	94	41-104	27	R1
Indeno(1,2,3-cd)pyrene	ug/kg	ND	3990	4030	3180	3180	79	78	10-122	0	
Isophorone	ug/kg	ND	3990	4030	2360	2430	53	55	42-82	3	
N-Nitroso-di-n-propylamine	ug/kg	ND	3990	4030	2300	2710	58	67	44-110	17	
N-Nitrosodiphenylamine	ug/kg	ND	3990	4030	2140	2180	54	54	40-84	2	
Naphthalene	ug/kg	ND	3990	4030	3240	3200	78	77	40-86	1	
Nitrobenzene	ug/kg	ND	3990	4030	2460	2600	62	65	39-85	6	
Pentachlorophenol	ug/kg	ND	3990	4030	3690	4390	93	109	10-162	17	
Phenanthrene	ug/kg	ND	3990	4030	3550	3920	87	96	51-117	10	
Phenol	ug/kg	ND	3990	4030	3150	3800	79	95	36-113	19	
Pyrene	ug/kg	ND	3990	4030	3410	3560	83	86	15-154	4	
2,4,6-Tribromophenol (S)	%						71	84	10-144		
2-Fluorobiphenyl (S)	%						71	79	10-151		
2-Fluorophenol (S)	%						82	99	10-138		
Nitrobenzene-d5 (S)	%						71	69	10-175		
Phenol-d6 (S)	%						73	90	10-142		
Terphenyl-d14 (S)	%						73	81	10-172		

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(724)850-5600

QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285538 | Analysis Method: ASTM D2974-87
QC Batch Method: ASTM D2974-87 | Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 30241083001, 30241083002, 30241083003, 30241083004, 30241083005

SAMPLE DUPLICATE: 1400506

Parameter	Units	30241102001 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	88.8	88.7	0	

SAMPLE DUPLICATE: 1400507

Parameter	Units	30241103001 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	11.8	11.7	1	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 286405 | Analysis Method: EPA 1664A
QC Batch Method: EPA 1664A | Analysis Description: 1664 HEM, Oil and Grease
Associated Lab Samples: 30241083006, 30241083007, 30241083008

METHOD BLANK: 1404643 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Oil and Grease	mg/L	ND	4.8	01/29/18 11:38	

LABORATORY CONTROL SAMPLE: 1404644

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Oil and Grease	mg/L	40	41.9	105	78-114	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1404645 1404646

Parameter	Units	30241445002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Oil and Grease	mg/L	4770 U ug/L	40.2	40.2	40.7	39.5	101	98	78-114	3	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285414 | Analysis Method: SM4500FC-97
QC Batch Method: SM4500FC-97 | Analysis Description: SM4500FC Fluoride Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

METHOD BLANK: 1399892 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fluoride	mg/L	ND	0.10	01/19/18 13:37	

METHOD BLANK: 1399894 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fluoride	mg/L	ND	0.10	01/19/18 13:42	

LABORATORY CONTROL SAMPLE: 1399893

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	2	2.0	101	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1399897 | 1399898

Parameter	Units	30241078001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Fluoride	mg/L	0.48	4	4	4.5	4.4	100	99	85-115	1	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1400062 | 1400063

Parameter	Units	30240863003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Fluoride	mg/L	0.14	4	4	4.3	4.3	104	105	85-115	0	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285211 | Analysis Method: SM4500H+B-00
QC Batch Method: SM4500H+B-00 | Analysis Description: 4500H+B pH
Associated Lab Samples: 30241083006, 30241083007, 30241083008

SAMPLE DUPLICATE: 1399065

Parameter	Units	30240964001 Result	Dup Result	RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.2	7.3	1	H1,H6

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285835 | Analysis Method: EPA 335.4
QC Batch Method: EPA 335.4 | Analysis Description: 335.4 Cyanide, Total
Associated Lab Samples: 30241083006, 30241083007, 30241083008

METHOD BLANK: 1402119 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	01/24/18 16:06	

METHOD BLANK: 1402162 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	01/24/18 16:07	

LABORATORY CONTROL SAMPLE: 1402120

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.2	0.19	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1402121 1402122

Parameter	Units	30241083006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Cyanide	mg/L	ND	.1	.1	0.095	0.099	92	96	90-110	4	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285671 | Analysis Method: EPA 350.1
QC Batch Method: EPA 350.1 | Analysis Description: 350.1 Ammonia, Undistilled
Associated Lab Samples: 30241083006, 30241083007, 30241083008

METHOD BLANK: 1401130 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	ND	0.10	01/23/18 10:47	

LABORATORY CONTROL SAMPLE: 1401131

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	4	4.0	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1401132 1401133

Parameter	Units	30241124019 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Nitrogen, Ammonia	mg/L	13.8	4	4	16.8	16.5	74	68	90-110	1	ML

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285723 | Analysis Method: EPA 410.4
QC Batch Method: EPA 410.4 | Analysis Description: 410.4 COD
Associated Lab Samples: 30241083006, 30241083007, 30241083008

METHOD BLANK: 1401349 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chemical Oxygen Demand	mg/L	ND	25.0	01/23/18 14:00	

LABORATORY CONTROL SAMPLE: 1401350

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chemical Oxygen Demand	mg/L	300	308	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1401351 1401352

Parameter	Units	30241060001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Chemical Oxygen Demand	mg/L	373	150	150	523	534	100	107	90-110	2	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1401353 1401354

Parameter	Units	30241085006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Chemical Oxygen Demand	mg/L	289	150	150	433	433	96	96	90-110	0	

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QUALITY CONTROL DATA

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

QC Batch: 285504 | Analysis Method: EPA 9065
QC Batch Method: EPA 9065 | Analysis Description: 9065 Phenolics, Total
Associated Lab Samples: 30241083006, 30241083007, 30241083008

METHOD BLANK: 1400221 | Matrix: Water
Associated Lab Samples: 30241083006, 30241083007, 30241083008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phenolics, Total Recoverable	ug/L	ND	50.0	01/19/18 21:09	

LABORATORY CONTROL SAMPLE: 1400222

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenolics, Total Recoverable	ug/L	250	260	104	85-115	

MATRIX SPIKE SAMPLE: 1400224

Parameter	Units	30241083008 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phenolics, Total Recoverable	ug/L	ND	250	241	92	85-115	

SAMPLE DUPLICATE: 1400223

Parameter	Units	30241083008 Result	Dup Result	RPD	Qualifiers
Phenolics, Total Recoverable	ug/L	ND	15.6J		

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QUALIFIERS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

BATCH QUALIFIERS

Batch: 285462

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

Batch: 285463

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

1c	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.
CH	The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.
D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
H1	Analysis conducted outside the EPA method holding time.
H3	Sample was received or analysis requested beyond the recognized method holding time.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
IS	The internal standard response is below criteria. Results may be biased high.
L1	Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.
MH	Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.
ML	Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.
R1	RPD value was outside control limits.

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QUALIFIERS

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

ANALYTE QUALIFIERS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30241083001	B-13 (1.5-3')	EPA 3050B	285813	EPA 6010B	285905
30241083002	B-16 (3-4.5')	EPA 3050B	285813	EPA 6010B	285905
30241083003	B-10 (19.5-21')	EPA 3050B	285813	EPA 6010B	285905
30241083004	B-7 (10.5-12')	EPA 3050B	285813	EPA 6010B	285905
30241083005	B-2 (1.5-3')	EPA 3050B	285813	EPA 6010B	285905
30241083001	B-13 (1.5-3')	EPA 7471A	285818	EPA 7471A	285856
30241083002	B-16 (3-4.5')	EPA 7471A	285818	EPA 7471A	285856
30241083003	B-10 (19.5-21')	EPA 7471A	285818	EPA 7471A	285856
30241083004	B-7 (10.5-12')	EPA 7471A	285818	EPA 7471A	285856
30241083005	B-2 (1.5-3')	EPA 7471A	285818	EPA 7471A	285856
30241083001	B-13 (1.5-3')	EPA 3546	285493	EPA 8270C	285586
30241083002	B-16 (3-4.5')	EPA 3546	285493	EPA 8270C	285586
30241083003	B-10 (19.5-21')	EPA 3546	285493	EPA 8270C	285586
30241083004	B-7 (10.5-12')	EPA 3546	285493	EPA 8270C	285586
30241083005	B-2 (1.5-3')	EPA 3546	285493	EPA 8270C	285586
30241083001	B-13 (1.5-3')	EPA 5035A	285463	EPA 8260B	285466
30241083002	B-16 (3-4.5')	EPA 5035A	285462	EPA 8260B	285465
30241083003	B-10 (19.5-21')	EPA 5035A	285462	EPA 8260B	285465
30241083004	B-7 (10.5-12')	EPA 5035A	285462	EPA 8260B	285465
30241083005	B-2 (1.5-3')	EPA 5035A	285463	EPA 8260B	285466
30241083009	Trip Blank	EPA 8260B	285531		
30241083001	B-13 (1.5-3')	ASTM D2974-87	285538		
30241083002	B-16 (3-4.5')	ASTM D2974-87	285538		
30241083003	B-10 (19.5-21')	ASTM D2974-87	285538		
30241083004	B-7 (10.5-12')	ASTM D2974-87	285538		
30241083005	B-2 (1.5-3')	ASTM D2974-87	285538		
30241083006	B-16	EPA 1664A	286405		
30241083007	B-10	EPA 1664A	286405		
30241083008	B-7	EPA 1664A	286405		
30241083006	B-16	SM4500FC-97	285414		
30241083007	B-10	SM4500FC-97	285414		
30241083008	B-7	SM4500FC-97	285414		
30241083006	B-16	SM4500H+B-00	285211		
30241083007	B-10	SM4500H+B-00	285211		
30241083008	B-7	SM4500H+B-00	285211		
30241083006	B-16	EPA 335.4	285835	EPA 335.4	285888
30241083007	B-10	EPA 335.4	285835	EPA 335.4	285888
30241083008	B-7	EPA 335.4	285835	EPA 335.4	285888
30241083006	B-16	EPA 350.1	285671		
30241083007	B-10	EPA 350.1	285671		
30241083008	B-7	EPA 350.1	285671		
30241083006	B-16	EPA 410.4	285723	EPA 410.4	285748

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: USS Edgar Thomson Works
Pace Project No.: 30241083

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30241083007	**B-10**	EPA 410.4	285723	EPA 410.4	285748
30241083008	**B-7**	EPA 410.4	285723	EPA 410.4	285748
30241083006	**B-16**	EPA 9065	285504	EPA 9065	285521
30241083007	**B-10**	EPA 9065	285504	EPA 9065	285521
30241083008	**B-7**	EPA 9065	285504	EPA 9065	285521

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WO# : 30241083

30241083

Request Document

Ids must be completed accurately.

Page: 1 of 1

2212242

Section A Required Client Information:

Company: ACA Engineering
Address: 410 N. Balph Ave
Pittsburgh, PA 15202
Email To: Mburke@acaengineering.com
Phone: 412-761-1990 Fax: 412-761-1998
Requested Due Date/TAT: Standard

Section B Required Project Information:

Report To: Mike Burke
Copy To:
Purchase Order No.:
Project Name: USS Edgar Thomson Works
Project Number: P17385

Attention: Mike Burke
Company Name: Same
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY: ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☒ OTHER

Site Location STATE: PA

Section D Required Client Information

Matrix Codes (MATRIX / CODE): Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED Composite Start Date	Composite Start Time	Composite End/Grab Date	Composite End/Grab Time	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	VOCs	SVOCs	COD	Ammonia-Nitrogen	Total Cyanide	Phenols (4AAP)	O&G Grease	Fluoride	pH	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	B-13 (1.5-3')	SL	G			1/10/18	1345		5	X					X	X		X	X									001
2	B-16 (3-4.5')	SL	G			1/10/18	1830		5	X					X	X		X	X									002
3	B-10 (19.5-21')	SL	G			1/15/18	1410		5	X					X	X		X	X									003
4	B-7 (10.5-12')	SL	G			1/15/18	1845		5	X					X	X		X	X									004
5	B-2 (1.5-3')	SL	G			1/16/18	1430		5	X					X	X		X	X									005
6	B-16	WT	G			1/11/18	0730		5	X	X			X						X	X	X	X	X	X	X			006
7	B-10	WT	G			1/15/18	1245		5	X	X			X						X	X	X	X	X	X	X			007
8	B-7	WT	G			1/16/18	0530		5	X	X			X						X	X	X	X	X	X	X			008
9																												
10																												
11																												
12																												

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Mike Burke ACA	1/10-16/18	various	ACA Fridge	1/10-16/18	various				
	ACA Fridge	1/17/18			1/17/18	1025				
		1/17/18	1220		1-17-18	1220	5.7	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Mike Burke

SIGNATURE of SAMPLER: Mike Burke DATE Signed (MM/DD/YY): 1/17/18

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pittsburgh Lab Sample Condition Upon Receipt

30241083

Pace Analytical

Client Name: ACA Engin Project # _____

Label	ML
LIMS Login	7H

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☒ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Thermometer Used 7 Type of Ice: (Wet) Blue None

Cooler Temperature Observed Temp 5.8 °C Correction Factor: -0.1 °C Final Temp: 5.7 °C

Temp should be above freezing to 6°C

Date and Initials of person examining contents: MC 1-17-18

Comments:	Yes	No	N/A	
Chain of Custody Present:	X			1.
Chain of Custody Filled Out:	X			2.
Chain of Custody Relinquished:	X			3.
Sampler Name & Signature on COC:	X			4.
Sample Labels match COC: -Includes date/time/ID Matrix: SL / WT	X			5.
Samples Arrived within Hold Time:	X			6.
Short Hold Time Analysis (<72hr remaining):	X			7.
Rush Turn Around Time Requested:		X		8.
Sufficient Volume:	X			9.
Correct Containers Used: -Pace Containers Used:	X			10.
Containers Intact:	X			11.
Orthophosphate field filtered			X	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			X	13.
Organic Samples checked for dechlorination:			X	14.
Filtered volume received for Dissolved tests			X	15.
All containers have been checked for preservation. All containers needing preservation are found to be in compliance with EPA recommendation. exceptions: VOA, coliform, TOC, O&G, Phenolics	X			16. Initial when completed MC Date/time of preservation Lot # of added preservative
Headspace in VOA Vials (>6mm):		X	X	17. MC 1-17-18
Trip Blank Present:	X			18.
Trip Blank Custody Seals Present	X			
Rad Aqueous Samples Screened > 0.5 mrem/hr			X	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

☐ **A check in this box indicates that additional information has been stored in ereports.**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

***PM review** is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

Table 2
ET-Braddock Pad
Braddock, Pennsylvania

Metals

	B-2 (1.5-3') 1/16/2018	B-7 (10.5-12') 1/15/2018	B-10 (19.5-21') 1/15/2018	B-13 (1.5-3') 1/10/2018	B-16 (3-4.5') 1/10/2018	MSC 1 Direct Contact	MSC 2 Soil to Groundwater
Metals							
Aluminum	11,200	9,360	7,650	5,890	6,020	190,000	NA
Antimony	ND	1.5	0.82	1	0.77	1,300	27
Arsenic	9.1	15.2	18.2	17.3	13.6	61	29
Barium	105	212	55.9	77.4	76.1	190,000	8,200
Beryllium	1.4	1	0.47	0.66	0.86	11	320
Boron	23.5	15.2	7.8	15.9	11.2	190,000	1,900
Cadmium	2.9	0.44	0.75	1.5	0.42	6	38
Calcium	132,000	30,900	1,400	66,800	17,200	NA	NA
Chromium	202	19	17.2	267	36.2	NA	NA
Cobalt	5.6	7.2	13	6.6	7	960	160
Copper	34.5	49.4	427	77.9	74	120,000	43,000
Iron	148,000	104,000	98,500	107,000	90,500	190,000	NA
Lead	330	72.9	44.8	180	127	1,000	450
Magnesium	15,700	2,300	653	21,900	1,940	NA	NA
Manganese	3,770	6,190	2,160	6,000	2,080	150,000	2,000
Mercury	ND	ND	ND	0.41	ND	510	10
Molybdenum	8	ND	ND	9.7	ND	16,000	650
Nickel	24.7	15	24.5	25.3	16.1	64,000	650
Potassium	652	661	1,210	513	552	NA	NA
Selenium	1.4	ND	ND	ND	1.1	16,000	26
Silver	ND	ND	ND	ND	ND	16,000	84
Sodium	773	891	ND	ND	ND	NA	NA
Thallium	ND	ND	ND	ND	ND	32	14
Vanadium	87.5	26.9	29.9	103	27.8	220	820
Zinc	1,710	65.4	101	215	84.2	190,000	12,000

Notes:
All results in milligrams per kilogram (mg/kg)
MSC 1 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Direct Contact Numeric Values)
MSC 2 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Soil to Groundwater Numeric Values)
NA - Not Applicable

Table 1
ET-Braddock Pad
Braddock, Pennsylvania

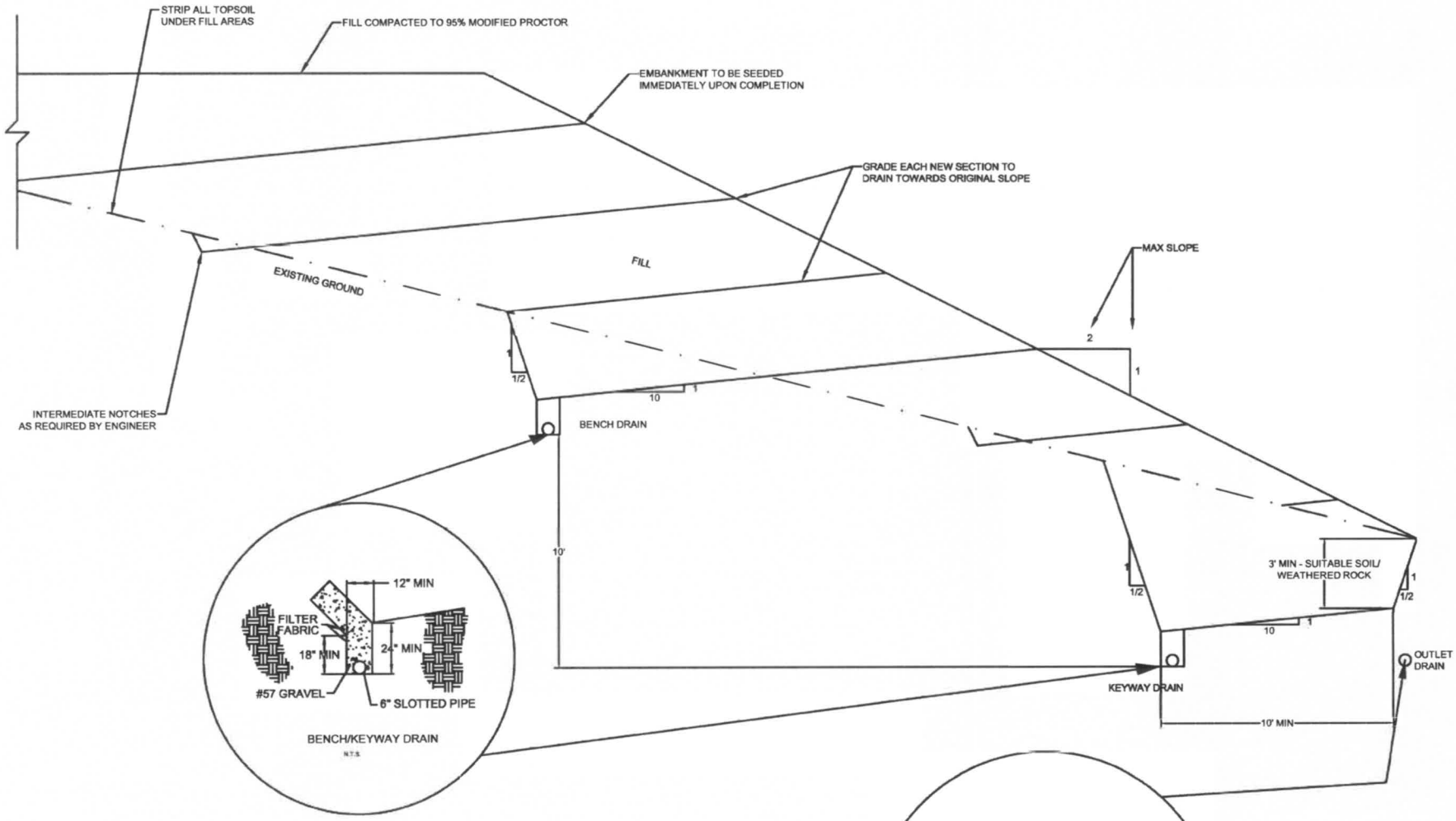
VOC and SVOC Concentrations Above The PQL

	B-2 (1.5-3') 1/16/2018	B-7 (10.5-12') 1/15/2018	B-10 (19.5-21') 1/15/2018	B-13 (1.5-3') 1/10/2018	B-16 (3-4.5') 1/10/2018	MSC 1 Direct Contact	MSC 2 Soil to Groundwater
SVOCS							
Acenaphthene	NA	NA	NA	32.00	NA	190,000	4700
Anthracene	NA	NA	NA	21.60	NA	190,000	350
Benzo(a)anthracene	0.474	NA	NA	13.40	NA	130	430
Benzo(a)pyrene	NA	NA	NA	5.95	NA	12	46
Benzo(b)fluoranthene	0.452	NA	NA	6.34	NA	76	170
Benzo(g,h,i)perylene	NA	NA	NA	1.10	NA	190,000	180
Benzo(k)fluoranthene	0.45	NA	NA	5.28	NA	76	610
Chrysene	0.78	NA	NA	11.90	NA	760	230
Dibenz(a,h)anthracene	NA	NA	NA	0.78	NA	22	270
Dibenzofuran	NA	NA	NA	29.80	NA	3,200	310
Fluoranthene	1.36	NA	NA	52.00	0.438	130,000	3,200
Fluorene	NA	NA	NA	35.10	NA	130,000	3,800
Indeno(1,2,3-cd)pyrene	NA	NA	NA	1.56	NA	76	22,000
2-Methylnaphthalene	NA	0.439	NA	41.90	0.766	13,000	1,900
Naphthalene	NA	NA	NA	159.00	0.539	760	25
Phenanthrene	0.567	NA	NA	114.00	0.499	190,000	10,000
Pyrene	1.37	NA	NA	35.40	0.396	96,000	2,200
VOCS							
Acetone	NA	0.0507	0.0177	NA	0.0399	10,000	1,200
2-Butanone	NA	0.0132	NA	NA	NA	10,000	76
o-Xylene	NA	NA	NA	0.37	NA	8,000	990

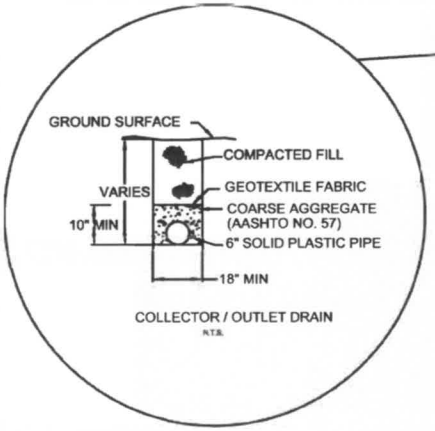
Notes:
All results in milligrams per kilogram (mg/kg)
VOC - Volatile Organic Compound
SVOC - Semi-Volatile Organic Compound
MSC 1 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Direct Contact Numeric Values)
MSC 2 - Medium Specific Concentrations For Organic Regulated Substances In Soil (Soil to Groundwater Numeric Values)
NA - Not Applicable

APPENDIX G

Keyway/Bench Detail



INSTALL BENCH DRAINS @ 10' VERTICALS



KEYWAY/BENCH DETAIL
ACA ENGINEERING, INC. 410 N BALPH AVENUE PITTSBURGH, PA 15202
PROJECT: ET-BRADDOCK WELL PAD BRADDOCK, PA

APPENDIX K

Act 167 Consistency Letter

GLENN ENGINEERING

Date: October 19, 2018

Merrion Oil & Gas
610 Reilly Avenue
Farmington New Mexico 87401

Subject: N.P.D.E.S. Permit – Merrion NPDES Permit File No. PAD0200114

SWM Consistency Letter

Attn: Ryan Davis

The purpose of this correspondence is to inform you that as Engineers for North Versailles Township, our office has reviewed the Storm Water Management Design for consistency with the applicable Ordinances of the Municipality.

The design appears to be consistent with the ordinance

If there are any questions concerning this matter, please do not hesitate to contact my office.

Cordially

Robert A. DeZorzi
Consultant

14920 Route 30 • North Huntingdon, PA 15642
412-824-5672 • Fax 412-824-9587
www.glennengr.com

GLENN ENGINEERING

Date: October 19, 2018

Merrion Oil & Gas
610 Reilly Avenue
Farmington New Mexico 87401

Subject: N.P.D.E.S. Permit – Merrion NPDES Permit File No. PAD0200114

SWM Consistency Letter

Attn: Ryan Davis

The purpose of this correspondence is to inform you that as Engineers for East Pittsburgh Borough, our office has reviewed the Storm Water Management Design for consistency with the applicable Ordinances of the Municipality.

The design appears to be consistent with the ordinance

If there are any questions concerning this matter, please do not hesitate to contact my office.

Cordially

Robert A. DeZorzi
Consultant

14920 Route 30 • North Huntingdon, PA 15642
412-824-5672 • Fax 412-824-9587
www.glennengr.com

GLENN ENGINEERING

Date: October 19, 2018

Merrion Oil & Gas
610 Reilly Avenue
Farmington New Mexico 87401

Subject: N.P.D.E.S. Permit – Merrion NPDES Permit File No. PAD0200114

SWM Consistency Letter

Attn: Ryan Davis

The purpose of this correspondence is to inform you that as Engineers for North Braddock Borough, our office has reviewed the Storm Water Management Design for consistency with the applicable Ordinances of the Municipality.

The design appears to be consistent with the ordinance

If there are any questions concerning this matter, please do not hesitate to contact my office.

Cordially

Robert A. DeZorzi
Consultant

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