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May 19, 2016

Via Electronic Filing

Ms. Barcy McNeal
Administration/Docketing
Public Utilities Commission of Ohio
180 East Broad Street, 11th Floor
Columbus, OH 43215-3793

Re: Clean Energy Future-Lordstown, LLC,
OPSB Case No. 14-2322-EL-BGN

Dear Ms. McNeal:

The September 17, 2015, Opinion, Order, and Certificate ("Certificate") approving Clean Energy Future-Lordstown, LLC ("CEFL") Certificate of Environmental Compatibility and Public Need to Construct the Lordstown Energy Center established a set of conditions as part of the Certificate.

Within this set of conditions, **Condition No. 10** requires that:

Prior to the commencement of construction activities that require permits or authorizations by federal or state laws and regulations, the Applicant shall obtain and comply with such permits or authorizations. The Applicant shall provide copies of permits and authorizations, including all supporting documentation, to Staff within seven days of issuance or receipt by the Applicant. The Applicant shall provide a schedule of construction activities and acquisition of corresponding permits for each activity at the preconstruction conference.

In compliance with **Condition No. 10**, attached is a copy of the Stormwater Pollution Prevention Plan and Checklist of construction activities for the switchyard.

If you have any questions please call at the number listed above.

Sincerely,

Sally W. Bloomfield

Attachments

cc: Jon Whitis (w/Attachments)
Grant Zeto (w/Attachments)

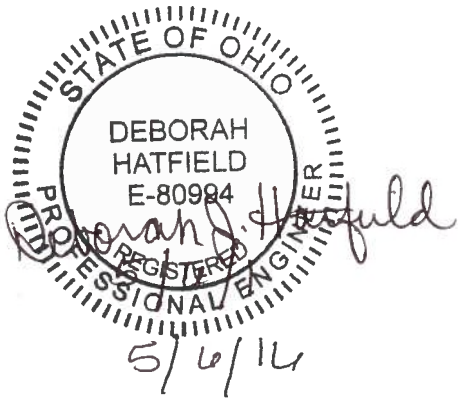
STORMWATER POLLUTION PREVENTION PLAN

FOR THE

LORDSTOWN SWITCHYARD
VILLAGE OF LORDSTOWN
TRUMBULL COUNTY
OHIO

MAY, 2016

PREPARED FOR:
REALTIME UTILITY ENGINEERS, INC.



PREPARED BY:

Montgomery Associates
Resource Solutions, LLC

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

SECTION 1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Clean Energy Future Lordstown, LLC (CEFL) is proposing to build a new gas-fired power plant in the Village of Lordstown, Trumbull County Ohio. Once built, the power generated will be distributed to proposed transmission lines and to a nearby proposed switchyard in the vicinity of the proposed generating facility. This report documents the erosion control and stormwater management practices that are associated with the construction of gravel access drives that will serve the maintenance needs of the transmission lines and the construction of the gravel switchyard.

The project is located in the Village of Lordstown, Trumbull County, Ohio (***Figure A1***). The generating facility will be located south of Henn Parkway just off of State Highway 45. The proposed switchyard will be constructed roughly 0.75 miles east of the generating facility north of Goldner Lane. A transmission line connecting the generating facility to the switchyard will be constructed crossing a tributary to Mud Creek. Three sections of a 12-foot wide gravel access drive will run along the transmission lines serving access needs of the lines. (***See Drawings***). The access drives will result in the addition of 0.99 acres of gravel area and the switchyard will result in the addition of 4.42 of gravel area. The project is anticipated to result in a total of 5.42 acres of gravel area and will likely cause approximately 13.8 acres of land disturbance. Construction is planned to occur between May 23, 2016 and January 2017.

1.2 APPLICABLE DESIGN AND PERFORMANCE CRITERIA

Permit Applicability

Construction of the proposed switchyard and access drives will result in greater than 1-acre of land disturbance, which is the threshold for requiring an Ohio Environmental Protection Agency (OEPA) Construction General Permit. The State of Ohio outlines construction-time erosion control and post construction stormwater management requirements in the OEPA's General Permit #OHC00004. The General Permit is included in ***Appendix*** D of this report. The requirements specified in the General Permit are designed so that water quality standards defined in Ohio Administrative Code (OAC) 3745 are met.

Because the project involves greater than 1-acres of land disturbance and 5.42 acres of new impervious, gravel area, the project is subject to erosion control and post-construction stormwater requirements outlined in the OEPA permit. Additionally, the project must meet stormwater and erosion control guidelines outlined in Sections 1106.06 and 1107.03 of the Village of Lordstown codified ordinances as well as requirements described in the Trumbull County Drainage and Erosion Sediment Control Manual. Per state stormwater and erosion control requirements, the project is considered to be a large construction activity because the anticipated disturbance is greater than 5 acres and is required to meet the corresponding performance standards.

State Stormwater Criteria for Large Construction Activities

- Post-construction best management practices (BMPs) shall be able to detain stormwater runoff for protection of the stream channels, stream erosion control, and improved water quality;
- The BMPs chosen must be compatible with the site and soil conditions;

- Structural post-construction stormwater treatment practices shall be incorporated into the permanent drainage system for the site; and
- The BMPs chosen must be sized to treat the water quality volume (WQ_v) and ensure compliance with Ohio's Water Quality Standards in OAC Chapter 3745-1.

Village/County Stormwater Criteria

- The design and construction of Storm Water Management Facilities shall require the review and approval of the Village Road Commissioner and shall be in accordance with the Trumbull County Standard Drainage Criteria Manual;
- For construction activities that will disturb one or more acres of land or will disturb less than one acres but are part of a larger common plan of development or sale which will disturb one or more acres of land, the post-construction storm water control methods chosen shall meet the following criteria:
    1. The peak discharge rate of runoff from the critical storm and all more frequent storms occurring under post-development conditions does not exceed the peak discharge rate of runoff from a 2-year, 24-hour storm occurring on the same development drainage area under pre-development conditions. The peak discharge rate of runoff from the 1-year storm post-developed conditions shall not exceed the 1-year storm pre-developed conditions.
    2. Storms of less frequent occurrence (longer return periods) than the critical storm up to the 100-year storm have peak runoff discharge rates no greater than the peak runoff rates of the pre-developed 10 year storm.
    3. The critical storm for a specific development drainage area is determined as follows:
        a. Use SCS TR-55 or other appropriate and approved hydrologic simulation model to determine the total volume (acre-feet) of runoff from a 2-year, 24-hour storm occurring on the development drainage area before and after development. Include clearly in your calculations the lot coverage assumptions used for full build out of the proposed condition. Curve numbers for pre-developed or improvements or expansion to a developed condition must reflect the average type of land use over the past 10 years and not only the current land use.
        b. From the volumes determined in (a) above, determine the percent increase in volume of runoff due to development. Using this percentage, select the critical storm from ***Table 1-1***:

Table 1-1: Critical Storm Determination Criteria

If Percentage of Increase in Volume of Runoff Is:		The Critical Storm Will Be:
Equal to or Greater Than:	**Less Than:**	
0	10	1-year
10	20	2-year
20	50	5-year
50	100	10-year
100	250	25-year
250	500	50-year
500		100-year

State Erosion Control Criteria

Erosion and sediment control requirements are specified Part II.A of the OEPA General Permit and must be designed, installed and maintained to:

- Control stormwater volume and velocity within the site to minimize soil erosion;
- Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and streambank erosion;
- Minimize the amount of soil exposed during construction activity;
- Minimize the disturbance of steep slopes;
- Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls shall address factors such as the amount, frequency, intensity, and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;
- If feasible, provide and maintain a 50-foot undisturbed natural buffer around surface waters of the state, direct storm water to vegetated areas to increase sediment removal and maximize storm water infiltration. If it is infeasible to provide and maintain an undisturbed 50-foot natural buffer, the project shall comply with the stabilization requirements found in Part II.B for areas within 50 feet of a surface water; and
- Minimize soil compaction and, unless infeasible, preserve topsoil.

Village Erosion Control Criteria

- As part of submitting Improvement Plans, the developer shall prepare an Erosion and Sediment Control Plan according to the format and principles described in the Ohio Environmental Protection Agency's general permit for storm water discharges associated with construction activity under the National Pollutant Discharge Elimination System (NPDES);
- When a proposed development area consists of one or more acres of earth disturbing activity, the owner of record shall prepare and submit an Erosion and Sediment Control Plan. When a proposed development area involves less than one acre, it is not necessary to submit an Erosion and Sediment Control Plan. However, the developer shall comply with the standards and specifications in "Rainwater and Land Development" (ODNR, NRCS, OEPA).

1.3 SUMMARY OF PLAN

Switchyard Pad

The project involves constructing an approximately 4.42-acre gravel pad for the switchyard designed to slope at a 1% grade. To the south and east of the pad, stormwater swales are designed to convey runoff to a wet detention pond located to the southeast of the switchyard area. The pond is designed to handle and treat runoff from the gravel switchyard area and a 250-foot long gravel access road that is to be located west of the switchyard pad. Offsite runoff will be conveyed through swales located to the north and west of the pad. Additionally, the offsite swale will lead to a series of 30-inch RCP pipes that will run under the access drive and convey offsite runoff to the south toward Mud Creek (***See Drawings***).

Access Drive
Gravel access drives will be constructed in a 100-foot easement that is centered on the proposed transmission line. The gravel drives will be constructed in three segments: one segment west of the creek with an entrance on Henn Parkway, and two segments on the east side of the creek. The eastern segments extend from an existing gravel drive extending from Goldner Lane.

All the access drives are designed with a 12-foot width with a 2% cross slope will drain to the south to stormwater swales designed as vegetated biofilters to meet water quality requirements. The stormwater swales lead to five small stormwater detention ponds that are designed to meet peak discharge rate control requirements (**S*ee Drawings and Appendices B and C***).

Wet Detention Pond
The wet detention pond is sized to treat the calculated WQ_v (***See Appendix C***) per state requirements. The dry extended detention portion of the pond above the permanent pool is designed such that peak discharge rate control meets requirements outlined by the Village and Trumbull County. The discharge structures on the pond are a 32-foot long, 8-inch PVC pipe that is installed in a 48-inch RCP standpipe with a 2-inch and 4-inch orifice cutouts to handle smaller events, and a 12-foot long, 1-foot high broad-crested weir to serve as an emergency spillway. Both outlet structures exit to an area near Mud Creek (***See Drawings***).

The erosion control plan utilizes perimeter sediment controls, a stone tracking pad, check dams, erosion matting, seed, and mulch to reduce soil loss from the site during construction. (***See Drawings***).

1.4 SCOPE AND PROCEDURE

Montgomery Associates: Resource Solutions, LLC (MARS) was contracted by Realtime Utility Engineers, Inc. (RUE) to prepare the erosion control plan, stormwater management plan, and associated grading plan for the Lordstown Switchyard and associated gravel access drives.

1.5 DATA SOURCES

Data utilized to perform these analyses were obtained from the following sources:

- Parital survey data provided by RUE;
- LiDAR topographic data from the State of Ohio Office of Information Technology, Ohio Geographically Referenced Information Program;
- Orthophotography from Bing Maps;
- Soils data obtained online from the Natural Resource Conservation Service's (NRCS) Geospatial Data Gateway;
- Proposed general arrangement provided by RUE; and
- Soils and geotechnical information from January 2015 provided by The Mannik and Smith Group, Inc.

SECTION 2 STORMWATER MANAGEMENT PLAN

2.1 METHODOLOGY

The performance of the stormwater management plan was analyzed in HydroCAD. Water quality calculations were performed under guidance detailed in the Ohio Department of Natural Resources (ODNR) Rainwater and Land Development Manual and the Ohio Department of Transportation (ODOT) Location and Design Manual Volume 2: Drainage Design.

PEAK DISCHARGE

For ease of regulatory review, and also for conformance with ordinance criteria, rainfall-runoff and hydraulic routing were analyzed in HydroCAD. HydroCAD uses Soil Conservation Service (SCS) TR-20 runoff hydrograph and curve number (CN) procedures, and TR-55 Time of Concentration (T_c) calculations.

Soil Conservation Service (SCS, now NRCS), 24-hour, Type II rainfall distribution was used in the analysis. Rainfall depths were taken from SCS Technical Paper 40 (TP-40), which are summarized for Trumbull County, Ohio in ***Table 2-1*** below.

Table 2-1: Summary of Rainfall Depths Used in Analysis

	Recurrence Interval and Rainfall Depth (inches)						
Storm Duration	**1-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
24 Hours	2.1	2.4	3.1	3.6	4.1	4.6	4.7

WATER QUALITY

Water quality was analyzed using guidelines specified by the OEPA and by analyzing existing and proposed site conditions. The ODNR Rainwater and Land Development Manual and The Ohio Department of Transportation Location and Design Manual Volume 2: Drainage Design were used to determine the appropriate specifications of stormwater treatment features with regard to water quality standards.

SITE DESCRIPTION

Existing land use for the area of the proposed development is agricultural fields and undeveloped areas consisting of a mix of wooded and grassed vegetation. Soils on the site are mapped as Holly silt loam (Ho), Mahoning silt loam (MgA), Mahoning silt loam (MgB), Sebring silt loam (Sc), and Wadsworth silt loam (WbA). The soil types on the site have a Hydrologic Soil Group (HSG) classification of "B/D", "C/D", or "D" according to the NRCS Web Soil Survey and as shown in ***Figure A2***. To model the hydrologic and soil interaction conservatively, it is assumed that all soils have an HSG of "D". Runoff from the site drains to Mud Creek. Mud Creek eventually flows to the Meander Creek Reservoir located approximately 2 miles east of the site.

2.2 CRITICAL STORM DETERMINATION

To meet the peak discharge requirements outlined in the Trumbull County Drainage and Erosion Sediment Control Manual, it was necessary to determine a critical storm (***See Section 1.2***). The critical storm for the project was calculated using the peak discharge calculation methods mentioned above and by evaluating the percent increase in runoff volume that would

occur due to the development. Four watersheds were evaluated in existing and post-development conditions and are shown in ***Figure A3***. Watersheds in the transmission line easement area were modeled using only the easement area and the minimum time of concentration of 6 minutes, as stipulated by TR-55. The watershed of the switchyard pad was delineated based on the regional drainage pattern. Parameters used in the critical storm determination, exiting and post-development models are shown below in ***Table 2-2*** and ***Table 2-3***.

Table 2-2: Summary of Critical Storm Determination Existing Model SCS Parameters

Watershed Name	Impervious Area (SF)	Pervious Area (SF)	Impervious Curve Number	Pervious Curve Number	Time of Concentration (min)
WS 1	0	16,470	NA	79	6.0
WS 2	0	53,830	NA	79	6.0
WS 3	0	156,000	NA	79	6.0
WS 4 & 5	0	109,000	NA	79	6.0
WS SS	11,300	1,023,000	96	79	58.4

Table 2-3: Summary of Critical Storm Determination Post-Development Model SCS Parameters

Watershed Name	Impervious Area (SF)	Pervious Area (SF)	Impervious Curve Number	Pervious Curve Number	Time of Concentration (min)
WS 1	2,270	14,200	96	80	6.0
WS 2	6,430	47,400	96	80	6.0
WS 3	19,000	137,000	96	80	6.0
WS 4 & 5	12,872	96,270	96	80	6.0
WS SS	212,200	822,100	96	79	61.3

Conversations between the consulting engineer at MARS and Jeff Smith, an engineer with CT Consulting, who serves as the Village Engineer for the Village of Lordstown indicated that treating the watersheds in this manner would be an appropriate approach to determining the critical storm for use in the peak discharge rate modeling. HydroCAD input and output detail the increase in the volume of runoff and are shown in the ***Appendix B*** and are summarized in ***Table 2-4*** below.

Table 2-4: Existing and Post-Development Volumes and Percent Increase

Runoff Volumes: 2-year, 24-hour Storm Event			
Watershed Name	Existing (acre-feet)	Post-Development (acre-feet)	Percent Increase (%)
WS 1	0.024	0.031	29.2
WS 2	0.079	0.098	24.1
WS 3	0.230	0.286	23.9
WS 4 & 5	0.161	0.199	23.6
WS SS	1.552	2.009	29.4

Since all the increases in runoff volume from the watersheds shown above fall within the 20-50% range seen in ***Table 1-1***, the 5-year, 24-hour storm event is used in the peak discharge rate modeling for this project.

2.3 EXISTING CONDITIONS

HYDROLOGIC PARAMETERS

The existing runoff conditions from the site were analyzed in a similar way as the critical storm determination modeling in ***Section 2.***2. The main difference is that the watersheds areas for both

the existing and post-development models are identical and correlate with the total contributing drainage areas in post-developments. This approach to the modeling was selected because of the difficulty in finding a consistent way to evaluate peak discharge rates for existing and the post-development scenarios as the watersheds areas are not equivalent. The watersheds include areas where the proposed stormwater ponds and associated drainage swales are to be installed and can be seen in ***Figure A4***. The SCS parameters for the subwatershed are summarized below in ***Table 2-5***.

Table 2-5: Summary of Existing SCS Parameters

Watershed Name	Impervious Area (SF)	Pervious Area (SF)	Impervious Curve Number	Pervious Curve Number	Time of Concentration (min)
WS 1	0	4,040	NA	79	6.0
WS 2	0	16,610	NA	79	6.0
WS 3	0	46,340	NA	79	109.2
WS 4	0	17,470	NA	78	6.0
WS 5	0	11,910	NA	78	6.0
WS SS	0	234,870	NA	78	39.5

PEAK DISCHARGE ANALYSIS

Peak discharge rates for existing conditions are summarized in ***Table 2-6*** below for the various design recurrence intervals. Existing conditions HydroCAD input and output are included in ***Appendix B***.

Table 2-6: Summary of Existing Peak Runoff Rates for Site

	Recurrence Interval and Peak Runoff Rates (cfs) for 24-hour Storm Events						
Watershed	**1-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
WS 1	0.09	0.12	0.20	0.26	0.33	0.39	0.40
WS 2	0.38	0.51	0.84	1.08	1.34	1.61	1.66
WS 3	0.18	0.25	0.44	0.58	0.73	0.88	0.91
WS 4	0.36	0.50	0.84	1.10	1.36	1.64	1.69
WS 5	0.25	0.34	0.57	0.75	0.93	1.12	1.16
WS SS	1.81	2.54	4.46	5.97	7.54	9.17	9.50

2.3 PROPOSED CONDITIONS

Switchyard Pad

Site drainage to the wet detention pond is conveyed from the switchyard pad to grassed stormwater swales to the north and east as shown in ***Drawings.*** The pond's outlet structure is a 48-inch diameter RCP standpipe. The standpipe has a 2-inch and a 4-inch orifice drilled in the side to handle smaller storm events. An 8-inch diameter PVC pipe connected to the standpipe discharges to an area adjacent to Mud Creek southeast of the property boundary. To convey offsite runoff originating from the northwest of the pad, two swales will be constructed bordering the north and the west of the pad. The west offsite swale leads to two 30-inch RCP culverts that are joined by a 60-inch diameter RCP manhole structure that conveys runoff to an area north of Mud Creek. The 30-inch culverts lie under the gravel access drive to the switchyard pad.

Access Drives

Runoff from the gravel access drives serving the transmission lines is conveyed via grassed stormwater swales that are designed as vegetated biofilters to meet water quality requirements

(***See Drawings***). The stormwater swales lead to five different small detention ponds to meet peak discharge requirements. The ponds are labeled in the models as ponds 1 through 5 from west to east. Ponds 1 through 3 rely on stone weepers and broad-crested weirs as outlet structures. Pond 4 has a 6-inch diameter PVC pipe that leads to the offsite swale to the west of the switchyard. Pond 5 has a 4-inch PVC pipe that conveys water to the offsite swale to the west of the switchyard. Both ponds 4 and 5 have broad-crested weirs to safely covey overflow volumes from larger storm event.

Additionally, to ensure offsite conveyance of runoff originating from the north of the transmission line access drives to the east of Mud Creek, a stormwater swale will lead to two 18-inch diameter PVC pipes that will convey runoff to the offsite stormwater swale located to the west of the switchyard (***See Drawings***).

The access drive on the west of Mud Creek starts from Henn Parkway and crosses an existing stormwater swale that serves a property to the west. Conversations between the consulting engineer with MARS and Jeff Smith with CT Consulting determined that a culvert to maintain flow in the swale should be sized to handle the 50-year, 24-hour storm event. An 18-inch diameter RCP pipe with apron end-sections will placed in the swale to ensure continuity of flow. Documentation of culvert capacity can be provided upon request.

PEAK DISCHARGE

The analysis boundaries for the watershed used in the post-development model were based on the proposed new transmission gravel access drives and switchyard pad and areas of the proposed layout that are to be drained to the stormwater treatment areas based on the proposed grading plan. The analysis area was divided into five watersheds to perform overall hydrologic modeling for the site (***See Figure A5***). Impervious areas (gravel) were characterized as impervious area with depression storage. The depression depth was set to 0.08 inches, consistent with an initial abstraction for a CN=96. Time of concentration was set to the minimum of 6 minutes for the smaller watersheds areas per TR-55 guidance. Watershed areas, CNs, and Tc's are listed below in ***Table 2-7***.

Table 2-7: Summary of Proposed SCS Parameters

Watershed Name	Impervious Area (SF)	Pervious Area (SF)	Impervious Curve Number	Pervious Curve Number	Time of Concentration (min)
WS 1	1,750	2,290	96	80	6.0
WS 2	6,400	10,210	96	80	6.0
WS 3	18,580	27,760	96	80	14.0
WS 4	7,490	9,980	96	80	6.0
WS 5	5,390	6,520	96	80	6.0
WS SS	193,903	30,290	96	80	6.2

The proposed conditions HydroCAD schematic is shown in ***Appendix B***. Runoff is detained using the various stormwater features and proposed conditions peak runoff rates before and after detention from the watersheds and the site as a whole are summarized in ***Table 2-8*** below for the design recurrence intervals. Proposed conditions HydroCAD output is included in ***Appendix B*** for the various storm events.

Table 2-8: Summary of Proposed Peak Runoff Rates for Site

		Recurrence Interval and Peak Runoff Rates (cfs) for 24-hour Storm Events						
Watershed		**1-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
WS 1	w/o Detention	0.16	0.20	0.28	0.35	0.41	0.48	0.49
	w/ Detention	0.06	0.08	0.12	0.16	0.20	0.23	0.24
WS 2	w/o Detention	0.64	0.78	1.14	1.40	1.67	1.94	1.99
	w/ Detention	0.06	0.08	0.14	0.19	0.24	0.29	0.30
WS 3	w/o Detention	1.40	1.72	2.50	3.08	3.67	4.27	4.39
	w/ Detention	0.10	0.13	0.23	0.30	0.39	0.49	0.51
WS 4	w/o Detention	0.70	0.85	1.23	1.51	1.79	2.07	2.13
	w/ Detention	0.28	0.36	0.50	0.58	0.65	0.67	0.68
WS 5	w/o Detention	0.49	0.59	0.85	1.04	1.23	1.43	1.46
	w/ Detention	0.17	0.19	0.25	0.28	0.30	0.33	0.33
WS SS	w/o Detention	13.22	15.49	20.79	24.59	28.38	32.18	32.93
	w/ Detention	1.47	1.61	1.90	2.08	2.77	5.27	5.95

WATER QUALITY

Water quality performance standards are defined by the OEPA and design specifications are described in the ODNR Rainwater and Land Development Manual. Runoff from the portion of the site draining to the wet detention pond meet water quality standards required by the OEPA and calculations can be seen in ***Appendix C***.

Runoff from the access drives serving the transmission lines will be treated to comply with water quality requirements using vegetated biofilters. The ODOT Location and Design Manual Volume 2: Drainage Design, Section 1117.2.2 was used to appropriately design and implement the vegetated biofilters as a means of treatment to satisfy water quality requirements for the project. Calculations can be seen in ***Appendix C***.

An area west of the proposed switchyard pad and south of the access drives to the west of Mud Creek will be designated to handle solid, sanitary and recyclable waste related to construction activities (See ***Drawings***). These areas are situated away from any stormwater conveyance features and regulated surface waters and will also be designated for use for concrete truck washout, mixing of construction chemical compounds, and vehicle fueling and maintenance. No toxic substances or contaminated soils of construction debris are allowed on site. Any containers for waste disposal will be covered and leak-proof and disposal of construction and demolition debris shall follow guidelines specified by Ohio Revised Code (ORC) 3714.

SECTION 3 EROSION CONTROL

Site preparation and construction of the switchyard pad is scheduled to begin in May 23, 2016, pending all permit approvals. Final seeding and restoration of graded and disturbed areas will be completed in August 2016, pending adequate soil and weather conditions. Switchyard pad grading and site work is expected to be completed by January 2017. Erosion control measures will be installed and maintained as shown in on the Grading, Erosion Control, and Restoration plan in the ***Drawings***. If dewatering is required, dewatering shall adhere to guidelines described in the OEPA General Permit OHC000004. Efforts have been made to phase in construction activities to minimize land disturbance. Final structure foundation work and gravel placement will be completed by January 2017.

Inspection sheets and a modification log has been included with this report in ***Appendix E*** so that the contractor can meet the inspection requirements of the OEPA General Permit and so that any deviations to the SWPPP can be documented.

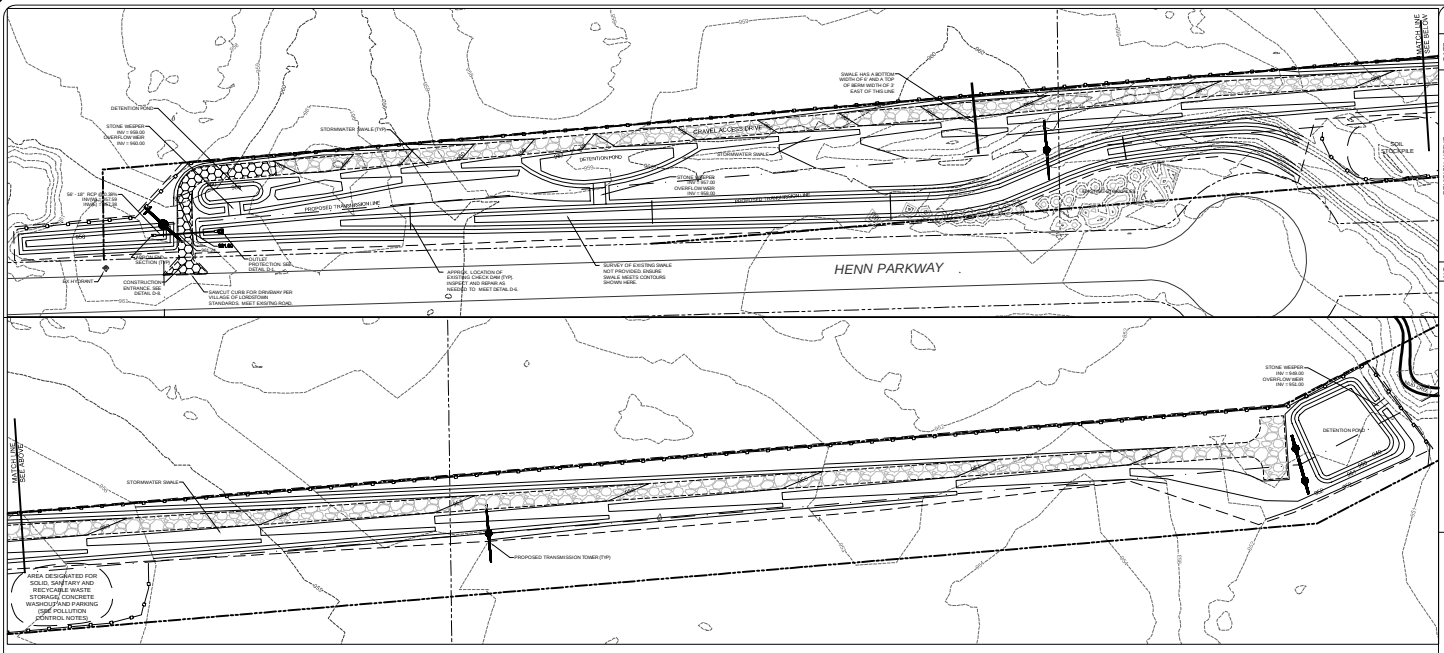
SECTION 4 LONG-TERM MAINTENANCE PLAN

Clean Energy Future Lordstown, LLC will provide maintenance of the stormwater facilities for the switchyard and access drive as outlined in the maintenance agreement in ***Appendix F***. All drainage and stormwater features at this site will be inspected at a minimum of once per year. Repairs will be performed to permanent stormwater features as needed.

SECTION 5 CONCLUSIONS

The site meets or exceeds all of the State performance objectives outlined in ***Section 1*** of this report.

DRAWINGS



CONSTRUCTION SEQUENCE

1. INSTALL CONSTRUCTION ENTRANCES AND SILT FENCE.
2. STRIP AND STOCKPILE TOPSOIL.
3. CONSTRUCT WET DETENTION BASIN AND DRY DETENTION BASINS WITH CONTROL STRUCTURES, OUTLET PROTECTION, AND TEMPORARY SURFACE SKIMMER TO ACT AS CONSTRUCTION TIME SEDIMENT SETTLING BASIN.
4. COMPLETE ALL SITE GRADING AND RESTORATION WITH THE EXCEPTION OF THE SWITCHYARD PAD WHICH SHOULD BE GRADED TO THE SUBBASE ONLY.
5. COMPLETE BELOW GRADE WORK INTERIOR TO THE SWITCHYARD FENCE
6. INSTALL SWITCHYARD CRUSHED STONE
7. REMOVE TEMPORARY EROSION CONTROL MEASURES AND TEMPORARY SURFACE SKIMMER IN THE WET DETENTION BASIN.

GRADING NOTES

1. ALL WORK SHALL BE IN CONFORMANCE WITH FIRST ENERGY SPECIFICATIONS FE-EROSIONCTRL-1 AND FE-CONST-1.
2. ALL SLOPES ADJACENT TO THE ACCESS DRIVES AND SUBSTATION PAD ARE 3H:1V.
3. PARTIAL SURVEY PROVIDED TO MONTGOMERY ASSOCIATES RESOURCE SOLUTIONS (MARS) BY REALTIME UTILITY ENGINEERS (RUE) ON APRIL 8, 2016. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS.

RESTORATION NOTES

1. THE ACCESS DRIVE AND SUBSTATION PAD SHALL BE CONSTRUCTED PER FIRST ENERGY SPECIFICATION FE-CONST-1.
2. ALL DISTURBED PERVIOUS AREAS (AREAS WHICH DO NOT INCLUDE HARD SURFACES SUCH GRAVEL) SHALL BE RESTORED BY PLACING TOPSOIL, SEED, MULCH AND FERTILIZER.
3. AREAS TO BE SEEDED SHALL BE COVERED WITH 4 INCHES OF TOPSOIL (6 INCHES WITH PUBLIC RIGHT-OF-WAY'S). TOPSOIL SHALL COMPLY WITH FIRST ENERGY SPECIFICATION FE-ERODECTRL-1.
4. AREAS TO BE SEEDED SHALL USE FIRST ENERGY SEED MIX CONSISTING OF 40% CREEPING RED FESCUE, 20% ANNUAL RYEGRASS, AND 40% KENTUCKY BLUEGRASS.
5. AREAS TO BE SEEDED SHALL HAVE LIME AND COMMERCIAL FERTILIZER APPLIED PER FIRST ENERGY SPECIFICATION FE-ERODECTRL-1.
6. EROSION CONTROL MAT SHALL BE USED ON SUBSTATION PAD AND ACCESS DRIVE SIDE SLOPES AND DITCHES PER MANUFACTURER RECOMMENDATIONS FOR SLOPES AND SLOPE LENGTHS ON THIS SITE (SEE DETAILS D-11, RSED-13).
7. SEED SHALL BE APPLIED AT A RATE OF 350 POUNDS PER ACRE BY SEED DRILL BETWEEN THE DATES OF MAY 1ST THROUGH JUNE 1 AND OCTOBER 15 OR MARCH 1 AND MAY 15 AS DESCRIBED IN FIRST ENERGY SPECIFICATION FE-EROSIONCTRL-1.
8. TURF REINFORCEMENT MAT (TRM) SUCH AS ENKAMAT 7210 OR APPROVED EQUIVALENT SHALL BE USED ON THE DETENTION POND OVERFLOW, EXCEPT IN THE CASES WHERE STONE WEEPER ARE USED AS AN OUTLET STRUCTURE. INSTALLATION OF TRM SHALL BE FOLLOWED BY SEEDING AND EROSION CONTROL MAT.

EROSION CONTROL NOTES

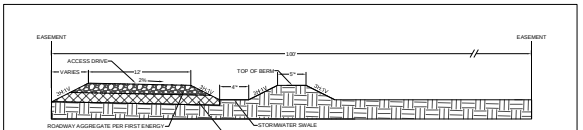
1. INSTALL CONSTRUCTION ENTRANCE PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES.
2. NO CONSTRUCTION EQUIPMENT SHALL BE ALLOWED OUTSIDE THE LIMITS OF DISTURBANCE.
3. DISTURBED AREAS WITHIN 50 FEET OF THE STREAMS WHICH WILL REMAIN DORMANT FOR OVER 14 DAYS SHALL BE TEMPORARILY STABILIZED WITHIN 2 DAYS OF DISTURBANCE.
4. DISTURBED AREAS FURTHER THAN 50 FEET FROM THE STREAMS WHICH WILL REMAIN DORMANT FOR OVER 14 DAYS SHALL BE TEMPORARILY STABILIZED WITHIN 7 DAYS OF DISTURBANCE.
5. SEDIMENT CONTROL DEVICES SHALL BE IMPLEMENTED FOR ALL AREAS REMAINING DISTURBED FOR OVER 14 DAYS OR WITHIN 7 DAYS OF GRUBBING ACTIVITIES.
6. SEDIMENT TRACKED ONTO GOLDNER LANE OR HENN PARKWAY SHALL BE REMOVED AT THE END OF EACH WORKING DAY.
7. WET DETENTION BASIN SHALL BE USED AS A TEMPORARY SEDIMENT SETTLING BASIN DURING CONSTRUCTION BY ATTACHING A SURFACE DEWATERING SKIMMER MEETING DACP-ALSM TO THE 20' RCP STANDPIPE STRUCTURE. DEWATERING THROUGH THE SURFACE SKIMMER SHALL BE NO LESS THAN 60 HOURS.
8. SEDIMENT SHALL BE REMOVED FROM THE TEMPORARY SEDIMENT SETTLING BASIN WHEN SEDIMENT OCCUPIES 85% OF THE SEDIMENT STORAGE VOLUME.
9. ADDITIONAL MEASURES SHOWN (CHECK DAMS, OUTLET PROTECTION AND SILT FENCE) SHALL BE INSTALLED IN A TIMELY MANNER AS CONSTRUCTION PROCEEDS.
10. EROSION CONTROL MEASURES SHOWN ON THE PLAN SHALL BE CONSIDERED MINIMUMS. ADDITIONAL EROSION CONTROL MEASURES REQUESTED BY STATE INSPECTORS, LOCAL INSPECTORS AND/OR ENGINEER SHALL BE INSTALLED WITHIN 24 HOURS OF REQUEST.
11. BMPS SHALL BE INSPECTED BY A QUALIFIED INSPECTION PERSONNEL WEEKLY WITHIN 24 HOURS AFTER EVERY RAIN EVENT OF 0.5 INCHES WITHIN A 24 HOUR PERIOD. AN INSPECTION CHECKLIST SHALL BE COMPLETED AND SIGNED BY THE INSPECTOR AFTER EVERY INSPECTION. INSPECTION RECORDS SHALL BE KEPT FOR 3 YEARS AFTER TERMINATION OF CONSTRUCTION ACTIVITIES.
12. NON-SEDIMENT POND BMPS THAT REQUIRE REPAIR OR MAINTENANCE SHALL BE REPAIRED OR MAINTAINED WITHIN 2 DAYS OF INSPECTION. IF DURING THE INSPECTION THE SEDIMENT POND REQUIRES REPAIR OR MAINTENANCE, THE REPAIR SHALL BE COMPLETED WITHIN 7 DAYS OF INSPECTION. DURING THE INSPECTION, BMPS THAT ARE, AND NOTED AS MISSING OR NOT MEETING THE INTENDED FUNCTION SHALL BE REPLACED OR INSTALLED WITHIN 10 DAYS OF INSPECTION.
13. EROSION CONTROL FEATURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS SUFFICIENTLY ESTABLISHED, AS DETERMINED BY THE ENVIRONMENTAL MONITOR.
14. PERMANENT EROSION CONTROLS SHALL BE APPLIED TO DISTURBED AREAS WITHIN 50 FEET OF STREAMS WITHIN 2 DAYS OF REACHING FINAL GRADE.

POLLUTION CONTROL NOTES

1. A COVERED, LEAK PROOF DUMPSTER SHALL BE MADE AVAILABLE FOR THE PROPER DISPOSAL OF GARBAGE, AND OTHER WASTE MATERIALS. ALL WASTE MATERIAL INCLUDING TOXIC OR HAZARDOUS WASTE SHALL BE DISPOSED OF AT FACILITIES APPROVED FOR THE PERTINENT MATERIAL.
2. ALL CONSTRUCTION & DEMOLITION DEBRIS (C&DD) WASTE WILL BE DISPOSED OF IN AN OHIOEPA APPROVED C&DD LANDFILL AS REQUIRED BY OHIO REVISED CODE (ORC) 3714. MATERIALS WHICH CONTAIN ASBESTOS MUST COMPLY WITH AIR POLLUTION REGULATIONS (NESHAP) ADMINISTRATIVE CODE (OAC) 3745-20.
3. BRICKS, HARDENING CONCRETE, AND SOIL WASTE SHALL BE FREE FROM CONTAMINATION WHICH WOULD RENDER THEM UNFIT TO RETURN TO NATURAL RESOURCES. CLEAN CONSTRUCTION WASTES THAT WILL BE DISPOSED OF INTO THE PROPERTY SHALL BE SUBJECT TO ANY LOCAL PROHIBITIONS FROM THIS TYPE OF DISPOSAL.
4. AN AREA ON EITHER SIDE OF MUD CREEK HAS BEEN DESIGNATED FOR THE MIXING OR STORAGE OF COMPOUNDS SUCH AS FERTILIZERS, LIME, ASPHALT, OR CONCRETE FOR CONSTRUCTION OF THE ACCESS DRIVES AND SWITCH YARD. PERIMETER CONTROLS SHALL BE PLACED SO THAT THE PROBABILITY OF RUNOFF AND SPILLS FROM THESE DESIGNATED AREAS ENTERING WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER WATER/DRAINAGE AREAS IS MINIMIZED.
5. ALL FUEL/LIQUID TANKS AND DRUMS SHALL BE STORED IN A BERMED STORAGE AREAS. SECONDARY CONTAINMENT SHALL BE PROVIDED FOR ALL FUEL OIL STORAGE TANKS. WHEELS BLOCKED AND MAINTENANCE SHALL OCCUR IN DESIGNATED AREAS. THESE AREAS SHALL BE LOCATED AWAY FROM WATER COURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORMWATER DRAINAGE AREAS.
6. CONCRETE CHUTE OR OTHER CONCRETE WASH WATERS SHALL BE DISCHARGED INTO DESIGNATED AREAS ONLY. DESIGNATED AREAS SHALL BE IDENTIFIED WITH SIGNAGE AND LOCATED AWAY FROM WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORM WATER DRAINAGE AREAS.
7. ALL CONTAMINATED SOILS MUST BE TREATED AND/OR DISPOSED OF IN OHIO EPA APPROVED SOLID WASTE MANAGEMENT FACILITIES OR HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITIES (TSDF'S). RUNOFF FROM CONTAMINATED SOILS SHALL NOT BE DISCHARGED FROM THE SITE.
8. IN THE EVENT OF A SMALL RELEASE (LESS THAN 25 GALLONS) OF PETROLEUM WASTE, THE LOCAL FIRE DEPARTMENT SHALL BE CONTACTED.
9. IN THE CASE OF A LARGE SPILL (25 GALLONS OR MORE) OF PETROLEUM, CONTACT THE OHIOEPA (AT 1-800-282-9378), THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE (LEPC) WITHIN 30 MINUTES OF THE SPILL.
10. OPEN BURNING IS NOT PERMITTED.
11. USED OIL SHALL NOT BE USED AS A DUST SUPPRESSANT. DUST CONTROLS MAY INCLUDE THE USE OF WATER TRUCKS TO WET DISTURBED AREAS, TARPING STOCKPILES, TEMPORARY STABILIZATION OF DISTURBED AREAS, AND REGULATION OF THE SPEED OF VEHICLES ON THE SITE.

LEGEND

- EASEMENT
- EXISTING MINOR CONTOURS
- 950 EXISTING MAJOR CONTOURS
- 987 PROPOSED MINOR CONTOURS
- 985 PROPOSED MAJOR CONTOURS
- PROPOSED GRAVEL EXTENTS
- PROPOSED FENCELINE
- SILT FENCE
- LIMITS OF DISTURBANCE
- PARCEL BOUNDARIES



*EXCEPT WHERE DENOTED ON PLANS

TYPICAL SECTION THRU ACCESS DRIVE

DRAWN BY	CHECKED BY
CNB	DJH

NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS, LLC
136 SOUTH MAIN STREET
SUITE A
NORTH CANTON, OHIO 44720
WWW.MARS-OH.COM

GRADING, EROSION CONTROL, & RESTORATION PLAN

LORDSTOWN SWITCHYARD

LORDSTOWN, OH

REALTIME UTILITY ENGINEERS

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

0 1/2 1

SCALE	
1" = 80'	
PROJECT NO.	DATE
1704	5/5/16

FIGURE

1/4

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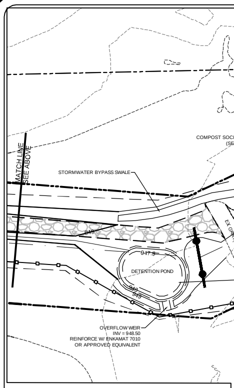


CONSTRUCTION SEQUENCE

1. INSTALL CONSTRUCTION ENTRANCES AND SILT FENCE.
2. STRIP AND STOCKPILE TOPSOIL.
3. CONSTRUCT WET DETENTION BASIN AND DRY DETENTION BASINS WITH CONTROL STRUCTURES, OUTLET PROTECTION, AND TEMPORARY SURFACE SKIMMER TO ACT AS CONSTRUCTION-TIME SEDIMENT SETTLING BASIN.
4. COMPLETE ALL SITE GRADING AND RESTORATION WITH THE EXCEPTION OF THE SWITHCYARD PAD WHICH SHOULD BE GRADED TO THE SUBBASE ONLY.
5. COMPLETE BELOW GRADE WORK INTERIOR TO THE SWITHCYARD FENCE
6. INSTALL SWITHCYARD CRUSHED STONE
7. REMOVE TEMPORARY EROSION CONTROL MEASURES AND TEMPORARY SURFACE SKIMMER IN THE WET DETENTION BASIN.

GENERAL NOTES

1. ALL WORK SHALL BE IN CONFORMANCE WITH FIRST ENERGY SPECIFICATIONS FE-EROSIONCTRL-1 AND FE CONST-1.
2. ALL SLOPES ADJACENT TO THE ACCESS DRIVES AND SUBSTATION PAD ARE 3H:1V.
3. PARTIAL SURVEY PROVIDED TO MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS (MARS) BY REALTIME UTILITY ENGINEERS (RUE) ON APRIL 6, 2016. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS.

RESTORATION NOTES:

1. THE ACCESS DRIVE AND SUBSTATION PAD SHALL BE CONSTRUCTED PER FIRST ENERGY SPECIFICATION FE-CONST-1.
2. ALL DISTURBED PERVIOUS AREAS (AREAS WHICH DO NOT INCLUDE HARD SURFACES SUCH GRAVEL) SHALL BE RESTORED BY PLACING TOPSOIL, SEED, MULCH AND FERTILIZER.
3. AREAS TO BE SEEDED SHALL BE COVERED WITH 4 INCHES OF TOPSOIL (6 INCHES WITHIN PUBLIC RIGHT-OF-WAYS). TOPSOIL SHALL COMPLY WITH FIRST ENERGY SPECIFICATION FE-EROSIONCTRL-1.
4. AREAS TO BE SEEDED SHALL USE FIRST ENERGY SEED MIX CONSISTING OF 40% CREEPING RED FESCUE, 20% ANNUAL RYEGRASS, AND 40% KENTUCKY BLUEGRASS.
5. AREAS TO BE SEEDED SHALL HAVE LIME AND COMMERCIAL FERTILIZER APPLIED PER FIRST ENERGY SPECIFICATION FE-EROSIONCTRL-1.
6. EROSION CONTROL MAT SHALL BE USED ON SUBSTATION PAD AND ACCESS DRIVE SIDE SLOPES AND DITCHES PER MANUFACTURER RECOMMENDATIONS FOR SLOPES AND SLOPE LENGTHS ON THIS SITE (SEE DETAILS D-11 AND D-12).
7. SEED SHALL BE APPLIED AT A RATE OF 150 POUNDS PER ACRE BY SEED DRILL BETWEEN THE DATES OF SEPTEMBER 1 AND OCTOBER 15 OR MARCH 1 AND MAY 15 AS DESCRIBED IN FIRST ENERGY SPECIFICATION FE-EROSIONCTRL-1.
8. TURF REINFORCEMENT MAT (TRM) SUCH AS ENKAMAT 7010 OR APPROVED EQUIVALENT SHALL BE USED ON THE DETENTION POND OVERFLOW, EXCEPT IN THE CASES WHERE STONE WEEPER ARE USED AS AN OUTLET STRUCTURE. INSTALLATION OF TRM SHALL BE FOLLOWED BY SEEDING AND EROSION CONTROL MAT.

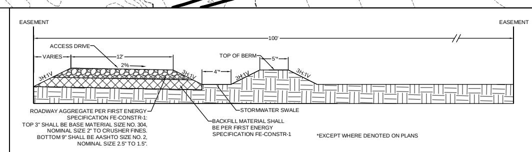
EROSION CONTROL NOTES

1. INSTALL CONSTRUCTION ENTRANCE PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES.
2. NO CONSTRUCTION EQUIPMENT SHALL BE ALLOWED OUTSIDE THE LIMITS OF DISTURBANCE.
3. DISTURBED AREAS WITHIN 50 FEET OF THE STREAMS WHICH WILL REMAIN DORMANT FOR OVER 14 DAYS SHALL BE TEMPORARILY STABILIZED WITHIN 2 DAYS OF DISTURBANCE.
4. DISTURBED AREAS FURTHER THAN 50 FEET FROM THE STREAMS WHICH WILL REMAIN DORMANT FOR OVER 14 DAYS SHALL BE TEMPORARILY STABILIZED WITHIN 7 DAYS OF DISTURBANCE.
5. SEDIMENT CONTROL DEVICES SHALL BE IMPLEMENTED FOR ALL AREAS REMAINING DISTURBED FOR OVER 14 DAYS OR WITHIN 7 DAYS OF GRUBBING ACTIVITIES.
6. SEDIMENT TRACKED ONTO GOLDNER LANE OR HENN PARKWAY SHALL BE REMOVED AT THE END OF EACH WORKING DAY.
7. WET DETENTION BASIN SHALL BE USED AS A TEMPORARY SEDIMENT SETTLING BASIN DURING CONSTRUCTION BY ATTACHING A SURFACE DEWATERING SKIMMER MEETING OHIO RLDM TO THE 48" RCP STANDPIPE STRUCTURE. DEWATERING THROUGH THE SURFACE SKIMMER SHALL BE NO LESS THAN 48 HOURS.
8. SEDIMENT SHALL BE REMOVED FROM THE TEMPORARY SEDIMENT SETTLING BASIN WHEN SEDIMENT OCCUPIES 40% OF THE SEDIMENT STORAGE VOLUME.
9. ADDITIONAL MEASURES SHOWN (CHECK DAMS, OUTLET PROTECTION AND SILT FENCE) SHALL BE INSTALLED IN A TIMELY MANNER AS CONSTRUCTION PROGRESSES.
10. EROSION CONTROL MEASURES SHOWN ON THE PLAN SHALL BE CONSIDERED MINIMUMS. ADDITIONAL EROSION CONTROL MEASURES REQUESTED BY STATE INSPECTORS, LOCAL INSPECTORS AND/OR ENGINEER SHALL BE INSTALLED WITHIN 24 HOURS OF REQUEST.
11. BMPS SHALL BE INSPECTED BY A QUALIFIED INSPECTION PERSONNEL WEEKLY WITHIN 24 HOURS AFTER EVERY RAIN EVENT OF 0.5 INCHES WITHIN A 24 HOUR PERIOD. AN INSPECTION CHECKLIST SHALL BE COMPLETED AND SIGNED BY THE INSPECTOR AFTER EVERY INSPECTION. INSPECTION RECORDS SHALL BE KEPT FOR 3 YEARS AFTER TERMINATION OF CONSTRUCTION ACTIVITIES.
12. NON-SEDIMENT POND BMPS THAT REQUIRE REPAIR OR MAINTENANCE SHALL BE REPAIRED OR MAINTAINED WITHIN 3 DAYS OF INSPECTION. IF DURING THE INSPECTION THE SEDIMENT POND REQUIRES REPAIR OR CLEANOUT, REPAIR OR CLEANED OUT SHALL OCCUR WITHIN 10 DAYS OF INSPECTION. DURING THE INSPECTION, BMPS THAT ARE ARE NOTED AS MISSING OR NOT MEETING THE INTENDED FUNCTION SHALL BE REPLACED OR INSTALLED WITHIN 10 DAYS OF INSPECTION.
13. EROSION CONTROL FEATURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS SUFFICIENTLY ESTABLISHED, AS DETERMINED BY THE ENVIRONMENTAL MONITOR.
14. PERMANENT EROSION CONTROLS SHALL BE APPLIED TO DISTURBED AREAS WITHIN 50 FEET OF STREAMS WITHIN 2 DAYS OF REACHING FINAL GRADE .

POLLUTION CONTROL NOTES

1. A COVERED, LEAK-PROOF DUMPSTER SHALL BE MADE AVAILABLE FOR THE PROPER DISPOSAL OF GARBAGE, AND OTHER WASTE MATERIALS. ALL WASTE MATERIAL INCLUDING TOXIC OR HAZARDOUS WASTE SHALL BE DISPOSED OF AT FACILITIES APPROVED FOR THE PERTINENT MATERIAL.
2. ALL CONSTRUCTION & DEMOLITION DEBRIS (C&DD) WASTE WILL BE DISPOSED OF IN AN OHIO EPA APPROVED C&DD LANDFILL AS REQUIRED BY OHIO REVISED CODE (ORC) 3714. MATERIALS WHICH CONTAIN ASBESTOS MUST COMPLY WITH AIR POLLUTION REGULATIONS (SEE OHIO ADMINISTRATIVE CODE (OAC) 3745-02.
3. BRICKS, HARDENING CONCRETE, AND SOIL WASTE SHALL BE FREE FROM CONTAMINATION WHICH MAY LEACH CONSTITUENTS TO WATER RESOURCES. CLEAN CONSTRUCTION WASTES THAT WILL BE DISPOSED OF INTO THE PROPERTY SHALL BE SUBJECT TO ANY LOCAL PROHIBITIONS FROM THIS TYPE OF DISPOSAL.
4. AN AREA ON EITHER SIDE OF MUD CREEK HAS BEEN DESIGNATED FOR THE MIXING OR STORAGE OF COMPOUNDS SUCH AS FERTILIZERS, LIME, ASPHALT, OR CONCRETE FOR CONSTRUCTION OF THE ACCESS DRIVES AND SWITCHYARD. PERIMETER CONTROLS SHALL BE PLACES SO THAT THE PROBABILITY OF RUNOFF AND SPILLS FROM THESE DESIGNATED AREAS ENTERING WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER WATER DRAINAGE AREAS IS MINIMIZED.
5. ALL FUEL/LIQUID TANKS AND DRUMS SHALL BE STORED IN A MARKED STORAGE AREAS. SECONDARY CONTAINMENT SHALL BE PROVIDED FOR ALL FUEL OIL STORAGE TANKS. VEHICLE FUELING AND MAINTENANCE SHALL OCCUR IN DESIGNATED AREAS. THESE AREAS SHALL BE LOCATED AWAY FROM WATER COURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORMWATER DRAINAGE AREAS.
6. CONCRETE CHUTE OR OTHER CONCRETE WASH WATERS SHALL BE DISCHARGED INTO DESIGNATED AREAS ONLY. DESIGNATED AREAS SHALL BE IDENTIFIED WITH SIGNAGE AND LOCATED AWAY FROM WATERCOURSES, DRAINAGE DITCHES, FIELD DRAINS, OR OTHER STORM WATER DRAINAGE AREAS.
7. ALL CONTAMINATED SOILS MUST BE TREATED AND/OR DISPOSED OF IN OHIO EPA APPROVED SOLID WASTE MANAGEMENT FACILITIES OR HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITIES (TSDFs). RUNOFF FROM CONTAMINATED SOILS SHALL NOT BE DISCHARGED FROM THE SITE.
8. IN THE EVENT OF A SMALL RELEASE (LESS THAN 25 GALLONS) OF PETROLEUM WASTE, THE LOCAL FIRE DEPARTMENT SHALL BE CONTACTED.
9. IN THE CASE OF A LARGE SPILL (25 GALLONS OR MORE) OF PETROLEUM, CONTACT THE OHIO EPA (AT 1-800-282-9378), THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE (LEPC) WITHIN 30 MINUTES OF THE SPILL.
10. OPEN BURNING IS NOT PERMITTED.
11. USED OIL SHALL NOT BE USED AS A DUST SUPPRESSANT. DUST CONTROLS MAY INCLUDE THE USE OF WATER TRUCKS TO WET DISTURBED AREAS, TARPING STOCKPILES, TEMPORARY STABILIZATION OF DISTURBED AREAS, AND REGULATION OF THE SPEED OF VEHICLES ON THE SITE.

"THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. IF ADDITIONAL UTILITIES ARE KNOWN TO EXIST IN THE PROPERTY, THE OWNER WILL PROVIDE EXISTING PLANS OF OTHER UTILITIES SERVING THE SITE AND THE BUILDING THAT OTHERWISE CANNOT BE LOCATED BY A VISUAL INSPECTION OF THE PROPERTY OR OF WHICH THE SURVEYOR WOULD HAVE NO KNOWLEDGE".



TYPICAL SECTION THRU ACCESS DRIVE (N.T.S.)

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NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS, LLC
119 SOUTH MAIN STREET
SUITE A
COTTAGE GROVE, WI 53527
www.ma-rs.org

GRADING, EROSION CONTROL, & RESTORATION PLAN

LORDSTOWN SWITCHYARD

LORDSTOWN, OH

REALTIME UTILITY ENGINEERS

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
0 ½ 1

SCALE
1" = 80'

PROJECT NO.	DATE
1704	5/5/16

FIGURE
2/4

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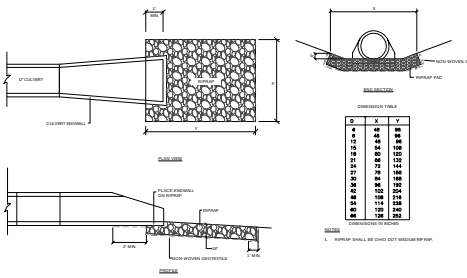
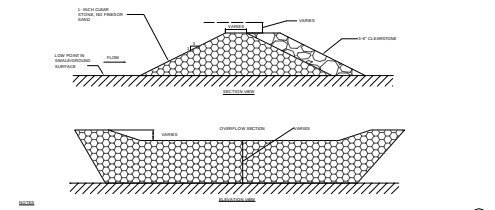


D	X	Y
4	48	96
5	48	96
12	48	96
15	54	108
18	60	120
21	66	132
24	72	144
27	78	156
30	84	168
36	96	192
42	102	204
48	108	216
54	114	228
60	120	240
66	126	252

DIMENSIONS IN INCHES

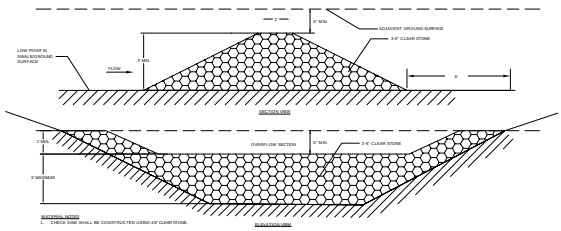
NOTES
1. RIPRAP SHALL BE OHIO DOT MEDIUM RIP RAP.

D-1 OUTLET PROTECTION
N.T.S



NOTES
1. ACCUMULATED SEDIMENT SHOULD BE REMOVED AS NECESSARY.
2. CENTER OVERFLOW SECTION SHOULD BE APPROXIMATELY 6 INCHES BELOW THE ADJACENT GROUND SURFACE.
3. STONE WEEPERS SHALL REMAIN IN PLACE IN ORDER TO MAXIMIZE INFILTRATION.

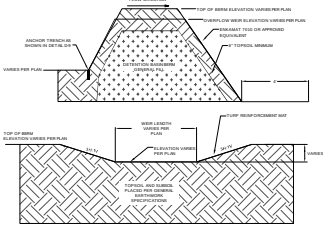
D-2 STONE WEEPER
N.T.S



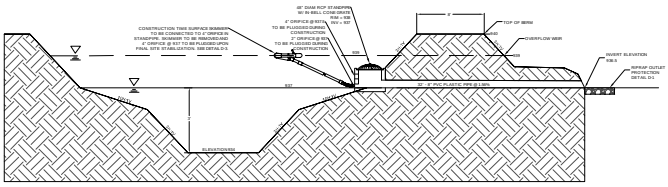
MATERIAL NOTES
1. CHECK DAM SHALL BE CONSTRUCTED USING 4/4" CLEAR STONE.

INSTALLATION NOTES
1. CHECK DAM SHALL BE INSTALLED SUCH THAT ENDS ARE HIGHER THAN THE CENTER CREATING A STABLE OVERFLOW POINT. ENDS SHOULD BE A MINIMUM OF 6" HIGHER THAN THE EXPECTED DESIGN WATER LEVEL.

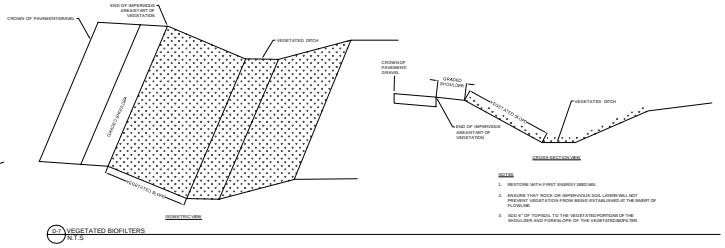
D-6 CHECK DAM
N.T.S



D-3 DETENTION BASIN OVERFLOW WEIR
N.T.S

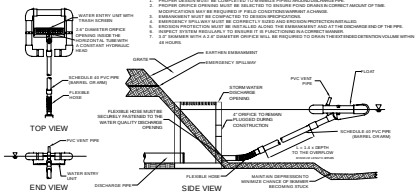


D-4 DETENTION BASIN PRIMARY OUTLET STRUCTURE
N.T.S



NOTES
1. RESTORE WITH FIRST ENERGY SEED MIX.
2. ENSURE THAT ROCK OR IMPERVIOUS SOIL LAYERS WILL NOT PREVENT VEGETATION FROM BEING ESTABLISHED AT THE INVERT OF FLOWLINE.
3. ADD 6" OF TOPSOIL TO THE VEGETATED PORTIONS OF THE SHOULDER AND FORESLOPE OF THE VEGETATED SWALE.

D-7 VEGETATED BIOFILTERS
N.T.S



FAIRCLOTH SKIMMER DISCHARGE SYSTEM WITH EMBANKMENT
(OR APPROVED EQUIVALENT)

D-5 SURFACE SKIMMER
N.T.S

GENERAL NOTES:
1. CONSTRUCTION MUST BE COMPLETED TO MINIMIZE PIPING AROUND DISCHARGE PIPE.
2. PROPER ORIFICE DRAINAGE MUST BE SELECTED TO ENSURE POND DRAINS IN CORRECT AMOUNT OF TIME. MODIFICATIONS MAY BE REQUIRED IF FIELD CONDITIONS WARRANT A CHANGE.
3. SKIMMER MUST BE SECURELY FASTENED TO THE WATER QUALITY DISCHARGE.
4. EMERGENCY SPILLWAY MUST BE CORRECTLY SIZED AND EROSION PROTECTION INSTALLED.
5. EROSION PROTECTION MUST BE INSTALLED ALONG THE EMBANKMENT AND AT THE DISCHARGE END OF THE PIPE.
6. INSPECT SYSTEM REGULARLY TO ENSURE IT IS FUNCTIONING IN A CORRECT MANNER.
7. 3.4" SKIMMER WITH A 2.4" DIAMETER ORIFICE WILL BE REQUIRED TO DRAIN THE EXTENDED DETENTION VOLUME WITHIN 48 HOURS.

MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS, LLC
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www.ma-rs.com

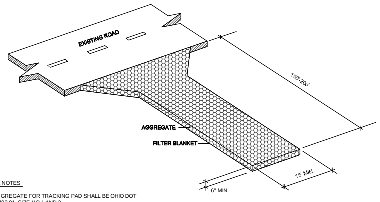
STORMWATER & EROSION CONTROL DETAILS 1
LORDSTOWN SWITCHYARD
LORDSTOWN, OH
REAL TIME UTILITY ENGINEERS

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
0 1/2 1

SCALE: N.T.S.
PROJECT NO.: 1704
DATE: 5/5/16
SHEET NO.: 3/4

DRAWN BY: CNB
CHECKED BY: DJH
DATE
REVISION / ISSUE
NO.

P:\1704 - Realtime - Lordstown Substation\Drawings\details1 - 11x17.dwg



MATERIAL NOTES

1. THE AGGREGATE FOR TRACKING PAD SHALL BE OHIO DOT C&MS 703.01, SIZE NO 1 AND 2.
2. THE TRACKING PAD SHALL BE UNDERLAIN WITH OHIO DOT C&MS 712.09 TYPE B FILTER BLANKET

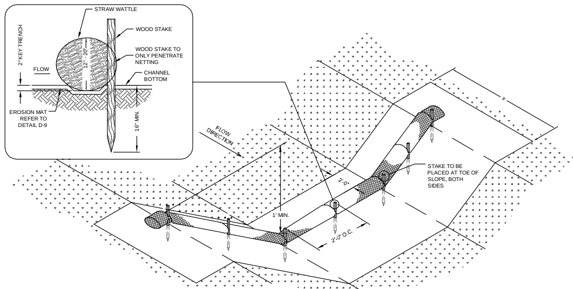
INSTALLATION NOTES

1. INSTALLATION SHALL CONFORM WITH THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATION 832: TEMPORARY SEDIMENT AND EROSION CONTROL.
2. THE CONSTRUCTION ENTRANCE SHALL BE INSTALLED PRIOR TO ANY TRAFFIC LEAVING THE SITE. CONSTRUCTION ENTRANCES SHALL BE USED AT ALL POINTS OF CONSTRUCTION EGRESS.
3. DIMENSIONS OF THE TRACKING PAD SHALL BE MINIMUM AS NOTED ON THE FIGURE ABOVE.
4. SURFACE WATER SHALL BE PREVENTED FROM PASSING THROUGH THE TRACKING PAD. FLOWS SHALL BE DIVERTED AWAY FROM TRACKING PADS OR CONVEYED UNDER AND AROUND THEM USING CULVERTS OR OTHER PRACTICES.
5. TRACKING PAD SHALL BE REMOVED OR INCORPORATED INTO GRAVEL DRIVEWAY ONLY AFTER CONSTRUCTION IS COMPLETE AND THE SITE HAS BEEN STABILIZED.

INSPECTION & MAINTENANCE NOTES

1. STONE TRACKING PADS SHALL BE INSPECTED WEEKLY AND WITHIN 24 HOURS AFTER EVERY PRECIPITATION EVENT THAT PRODUCES 0.5 INCHES OF RAIN OR MORE DURING A 24 HOUR PERIOD.
2. ADDITIONAL AGGREGATE SHALL BE PLACED IF THE TRACKING PAD BECOMES BURIED OR IF SEDIMENT IS NOT BEING REMOVED EFFECTIVELY FROM THE VEHICLE TIRES.
3. A MINIMUM 10-FEET WIDE BY 150-FEET LONG BY 6-INCH THICK PAD SHALL BE MAINTAINED AT ALL TIMES.
4. THE TRACKING PAD PERFORMANCE SHALL BE MAINTAINED BY SCRAPING OR TOP-DRESSING WITH ADDITIONAL AGGREGATE.
5. ANY SEDIMENT TRACKED ONTO A PUBLIC OR PRIVATE ROAD SHOULD BE REMOVED BY STREET CLEANING AT THE END OF EACH WORKING DAY.
6. MAINTENANCE SHALL BE COMPLETED AS SOON AS POSSIBLE WITH CONSIDERATION FOR SITE CONDITIONS.

D-8 CONSTRUCTION ENTRANCE
N.T.S



MATERIAL NOTES

1. COMPOST SOCK CHECK DAM SHALL BE CONSTRUCTED OF APPROVED MATERIALS LISTED IN STATE OF OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATION 832: TEMPORARY SEDIMENT AND EROSION CONTROL.
2. EROSION MAT SHALL BE SELECTED AND INSTALLED PER THE REQUIREMENTS LISTED IN DETAIL D-11.
3. WOOD STAKES SHALL MEET THE FOLLOWING REQUIREMENTS:
   FOR 12" SEDIMENT LOGS: 1⅛" X 1⅛" X 30" AIR OR KILN DRIED HICKORY OR OAK STAKES
   FOR 20" SEDIMENT LOGS: 1⅛" X 1⅛" X 48" AIR OR KILN DRIED HICKORY OR OAK STAKES

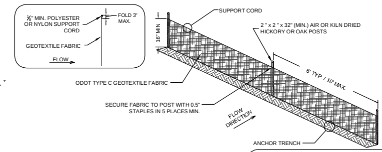
INSTALLATION NOTES

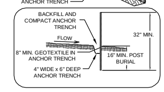
1. INSTALLATION SHALL CONFORM WITH THE REQUIREMENTS OF THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATION 832: TEMPORARY SEDIMENT AND EROSION CONTROL.
2. PROPRIETARY CHECK DAMS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
3. COMPOST SOCK CHECK DAM SHALL BE INSTALLED SUCH THAT ENDS ARE HIGHER THAN THE CENTER CREATING A STABLE OVERFLOW POINT. ENDS SHOULD BE A MINIMUM OF 6" HIGHER THAN THE EXPECTED DESIGN WATER LEVEL.
4. COMPOST SOCK CHECK DAM SHOULD BE INSTALLED SUCH THAT ADJOINING PROPERTY IS NOT NEGATIVELY IMPACTED.
5. COMPOST SOCK CHECK DAM SHOULD BE USED IN CONJUNCTION WITH OTHER PERMANENT RESTORATION PRACTICES.

INSPECTION & MAINTENANCE NOTES

1. COMPOST SOCK CHECK DAM SHALL BE INSPECTED WEEKLY AND WITHIN 24 HOURS AFTER EVERY PRECIPITATION EVENT THAT PRODUCES 0.5 INCHES OF RAIN OR MORE DURING A 24 HOUR PERIOD.
2. WHEN OBSERVING CONDITIONS OF CHECK DAMS, PAY SPECIAL CONSIDERATION TO THE PRESENCE OF INDICATORS THAT WATER IS ERODING AROUND THE ENDS, UNDERCUTTING THE CHECK DAMS, OR SIGNIFICANT EROSION IS OCCURRING DOWNSTREAM OF THE CHECK DAM. THESE ITEMS MAY INDICATE THE NEED FOR CLOSER SPACING ON CHECK DAMS OR USE OF A DIFFERENT EROSION MAT.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND THE CHECK DAM WHEN IT REACHES ½ THE HEIGHT OF THE LOWEST ELEVATION OF THE DITCH CHECK.
4. CHECK DAMS SHALL BE REMOVED ONCE CHANNEL IS STABILIZED WITH VEGETATION UNLESS PART OF A PERMANENT STORMWATER MANAGEMENT PLAN.
5. MAINTENANCE SHALL BE COMPLETED AS SOON AS POSSIBLE WITH CONSIDERATION FOR SITE CONDITIONS.

D-9 COMPOST SOCK CHECK DAM
N.T.S





MATERIAL NOTES

SILT FENCE FABRIC SHALL BE ODOT TYPE C GEOTEXTILE FABRIC

INSTALLATION NOTES

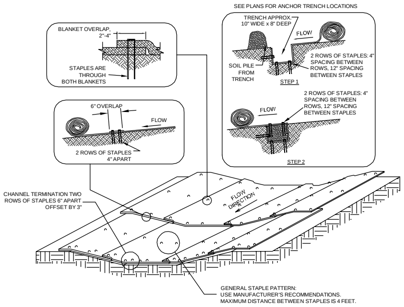
1. INSTALLATION SHALL CONFORM TO THE REQUIREMENTS OF THE VILLAGE OF LORDSTOWN.
2. CONSTRUCT THE SILT FENCE IN AN ARC WITH THE ENDS POINTING UPSLOPE TO AVOID EROSION AROUND THE ENDS OF THE FENCE.
3. FAILURE TO PROPERLY ANCHOR SILT FENCE COULD RESULT IN WATER AND SEDIMENT RELEASE BENEATH THE SILT FENCE. PROPERLY SECURE THE SILT FENCE INTO THE ANCHOR TRENCH.
4. CONSTRUCT THE FENCE FROM A CONTINUOUS ROLL OF GEOTEXTILE TO AVOID JOINTS. WHERE JOINTS ARE NECESSARY, OVERLAP TO THE NEXT POST OR WRAP ADJOINING FABRICS TOGETHER AROUND THE JOINT POST AND TIGHTLY FASTEN.
5. SILT FENCE SHALL NOT BE USED IN AREAS OF CONCENTRATED FLOW.

INSPECTION & MAINTENANCE NOTES

1. AT A MINIMUM, PERFORM INSPECTIONS WEEKLY AND WITHIN 24 HOURS OF PRECIPITATION EVENTS PRODUCING 0.5 INCHES OR MORE OF RAINFALL.
2. INSPECT FENCES FOR DAMAGE TO STAKES AND FABRIC, UNDERCUTTING, EXCESSIVE SEDIMENT ACCUMULATION (GREATER THAN ½ OF THE FENCE HEIGHT), AND INDICATIONS OF SCOUR AROUND THE EDGES.
3. REPAIR OR REPLACE SILT FENCE WITHIN 24 HOURS OF IDENTIFYING AND DEFICIENCIES.

D-10 SILT FENCE
N.T.S

ANCHOR TRENCH DETAIL
SEE PLANS FOR ANCHOR TRENCH LOCATIONS



MATERIAL NOTES

1. ONLY PRODUCTS LISTED IN THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATION 836 ARE ACCEPTABLE FOR USE.
2. STAPLES SHALL BE 1-2 INCH WIDE, U-SHAPED, MADE OF NO.11 (3.05mm) OR LARGER DIAMETER STEEL WIRE, AND NOT LESS THAN 6 INCHES LONG FOR FIRM SOILS AND 12 INCHES LONG FOR LOOSE SOILS.

INSTALLATION NOTES

1. EROSION CONTROL MATS SHALL BE INSTALLED AFTER TOPSOIL AND SEED HAVE BEEN PLACED.
2. INSTALLATION OF EROSION CONTROL MAT SHOULD BE COORDINATED WITH PERMANENT RESTORATION PRACTICES.
3. INSTALLATION SHALL CONFORM TO ODOT SUPPLEMENTAL SPECIFICATION 836.
4. ALL PRODUCTS SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS. THIS STANDARD DETAIL IS AN EXAMPLE OF TYPICAL INSTALLATION GUIDANCE.
5. MATS SHALL BE IN FIRM AND CONTINUOUS CONTACT WITH THE SOIL.
6. IF SECTIONS OF ECRM NEED TO BE OVERLAPPED, ENSURE THAT THE OVERLAP IS FACING DOWNSTREAM TO PREVENT WATER FROM FLOWING BENEATH THE ECRM.

INSPECTION & MAINTENANCE NOTES

1. INSTALL ADDITIONAL ANCHORING IN AREAS OF OBSERVED RILLING AND CONCENTRATED FLOW BENEATH THE EROSION MAT. IF RILLING IS SEVERE ENOUGH TO PREVENT VEGETATION ESTABLISHMENT, REMOVE EROSION MAT, REGRADE, COMPACT, RE-SEED, AND REPLACE THE SECTION OF MAT.
2. IF PRODUCTS WITH PLASTIC NETTING ARE USED, REMOVE NETTING OR REPLACE MAT IF SEPARATION OF THE NETTING FROM THE MAT IS OBSERVED.
3. ALL MAINTENANCE ACTIVITIES SHOULD OCCUR AS SOON AS POSSIBLE WITH CONSIDERATION OF SITE CONDITIONS.

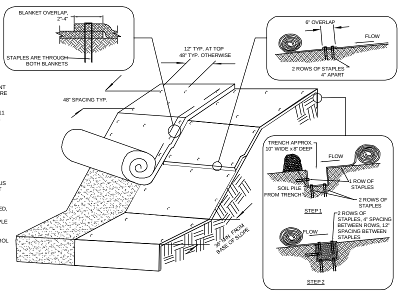
D-11 EROSION CONTROL MAT (CHANNELS)
N.T.S

MATERIAL NOTES

1. ONLY PRODUCTS LISTED IN THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATION 836 ARE ACCEPTABLE FOR USE.
2. STAPLES SHALL BE 1-2 INCH WIDE, U-SHAPED, MADE OF NO.11 (3.05mm) OR LARGER DIAMETER STEEL WIRE, AND NOT LESS THAN 6 INCHES LONG FOR FIRM SOILS AND 12 INCHES LONG FOR LOOSE SOILS.

INSTALLATION NOTES

1. INSTALLATION SHALL CONFORM TO ODOT SUPPLEMENTAL SPECIFICATION 836
2. EROSION CONTROL MAT SHALL BE IN FIRM AND CONTINUOUS CONTACT WITH THE SOIL AND EXTEND UPSLOPE ONE-FOOT FROM LAND DISTURBANCE.
3. EROSION CONTROL MAT SHALL BE ANCHORED, OVERLAPPED, STAKED AND ENTRENCHED PER THE MANUFACTURER'S RECOMMENDATIONS. THIS STANDARD DETAIL IS AN EXAMPLE OF TYPICAL INSTALLATION GUIDANCE.
4. WHERE POSSIBLE, USE A SINGLE ROLL OF EROSION CONTROL MAT TO SPAN THE DISTURBED AREA.



D-12 EROSION CONTROL MAT (SLOPES)
N.T.S

DRAWN BY	CHECKED BY
CNB	DJH

NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS, LLC
119 SOUTH MAIN STREET
SUITE A
COTTAGE GROVE, WI 53527
www.ma-rs.org

STORMWATER & EROSION CONTROL DETAILS 2
LORDSTOWN SWITCHYARD
LORDSTOWN, OH
REAL TIME UTILITY ENGINEERS

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
0 ½ 1

SCALE
N.T.S.

PROJECT NO.	DATE
1704	5/5/16

SHEET NO.
4/4

APPENDIX A
FIGURES

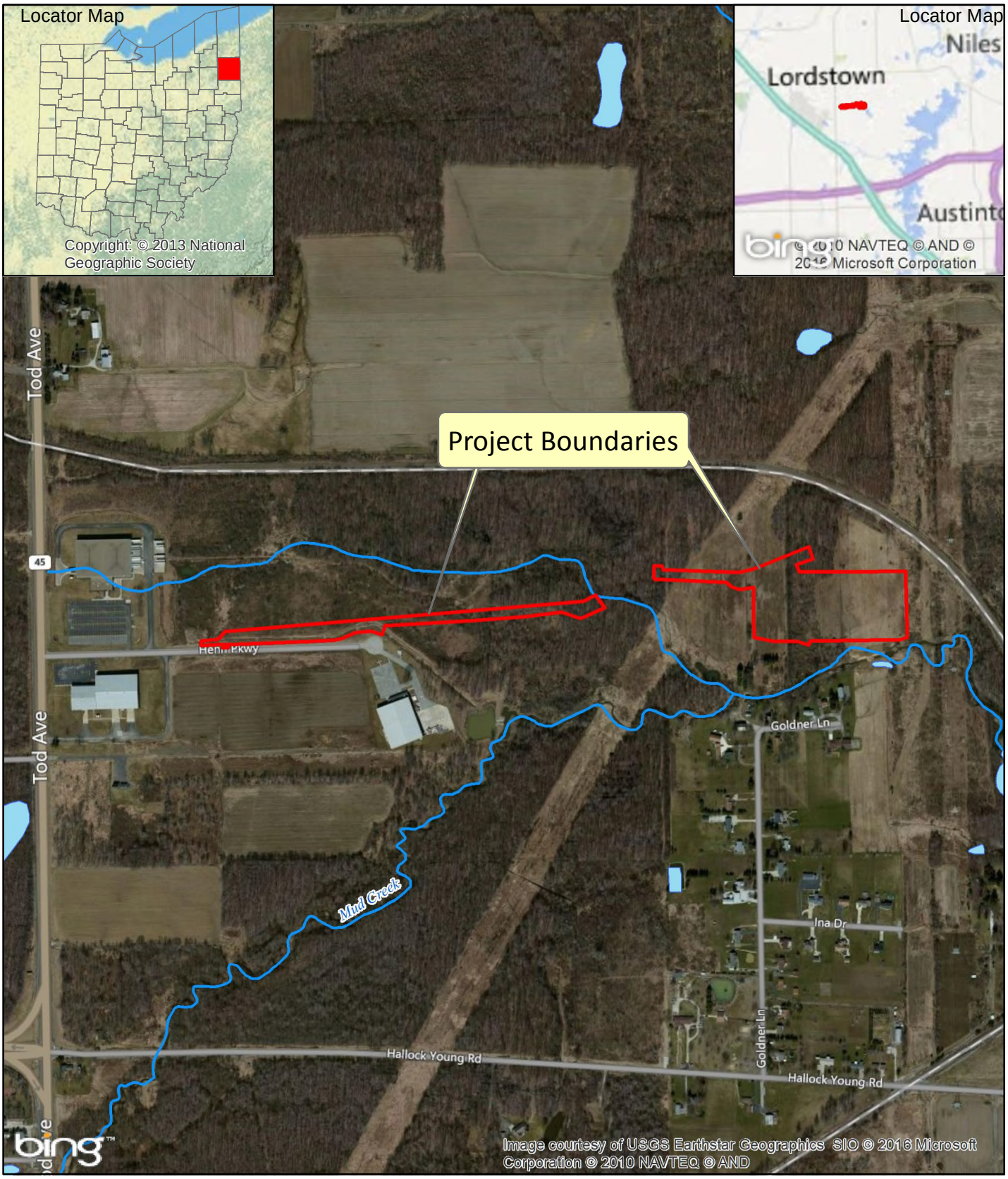


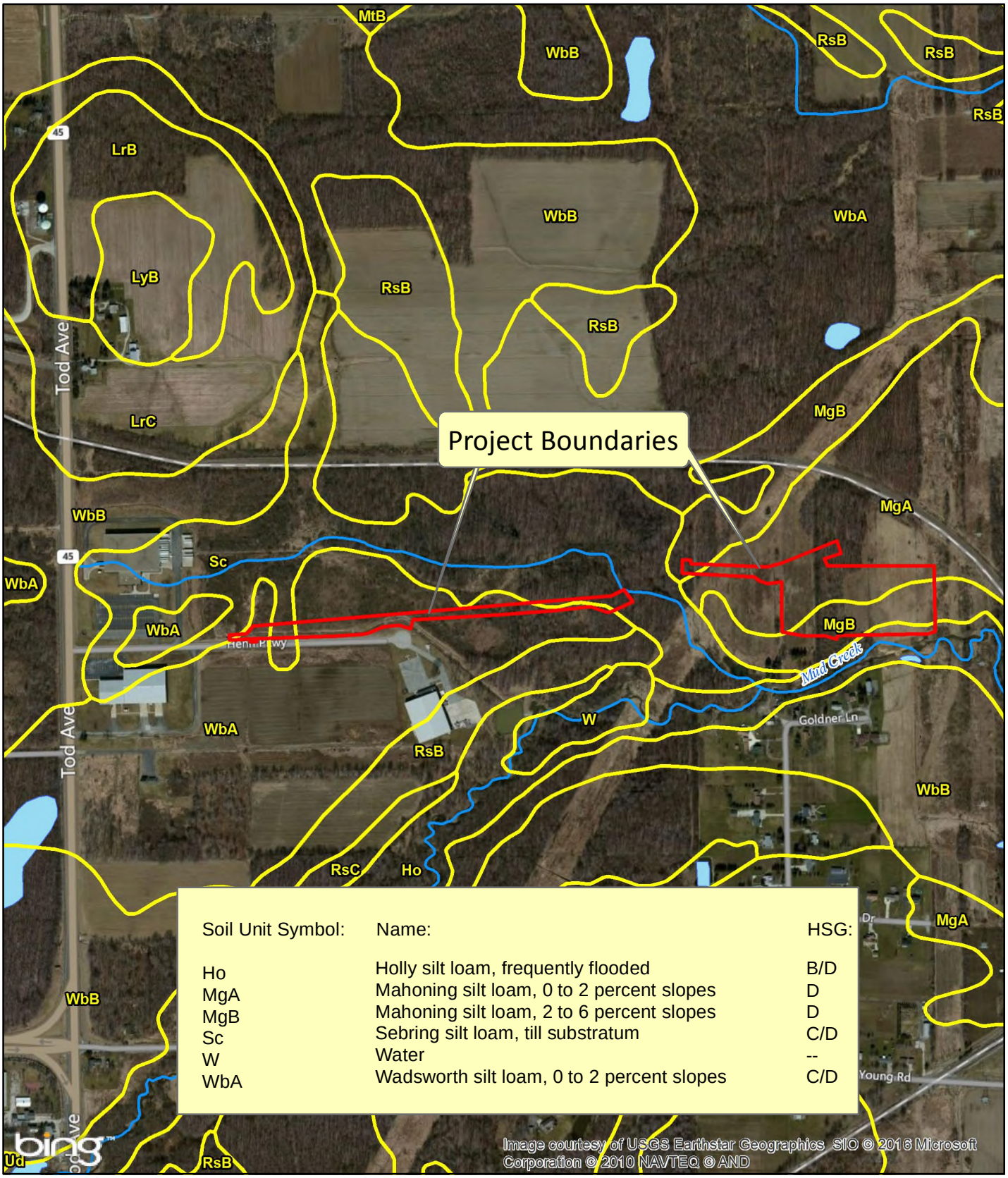
Figure A1: Location Map

Lordstown Clean Energy Switchyard and Access Drives
Lordstown, OH

May, 2015
Developed by: CNB

0 200 400 800
Feet

Montgomery Associates: Resource Solutions, LLC
119 South Main St.
Cottage Grove, WI 53527



Soil Unit Symbol:	Name:	HSG:
Ho	Holly silt loam, frequently flooded	B/D
MgA	Mahoning silt loam, 0 to 2 percent slopes	D
MgB	Mahoning silt loam, 2 to 6 percent slopes	D
Sc	Sebring silt loam, till substratum	C/D
W	Water	--
WbA	Wadsworth silt loam, 0 to 2 percent slopes	C/D

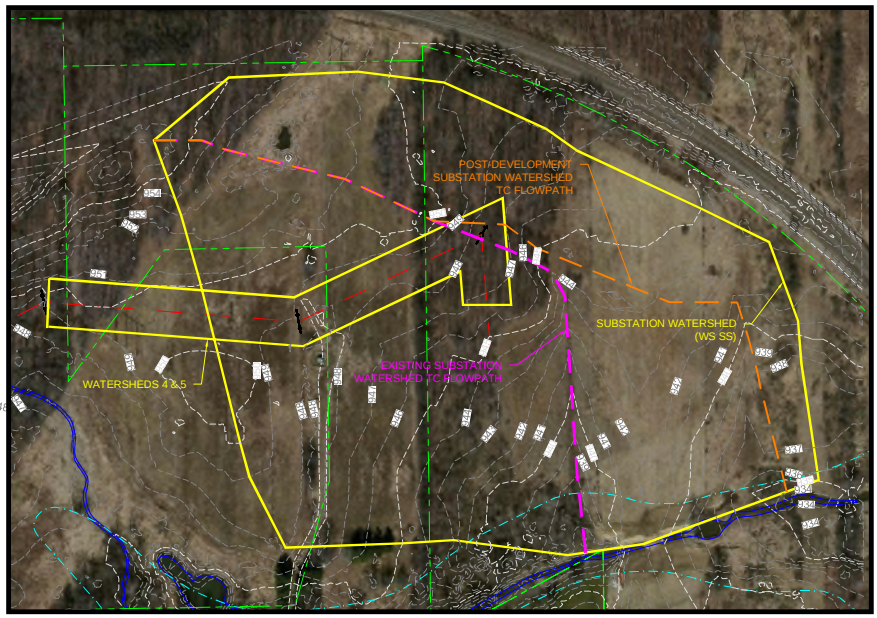
Figure A2: Soils Map

Lordstown Clean Energy
Switchyard and Access Drives
Lordstown, OH

May, 2015
Developed by: CNB

0 200 400 800
Feet

Montgomery Associates:
Resource Solutions, LLC
119 South Main St.
Cottage Grove, WI 53527



LEGEND

- EXISTING MINOR CONTOURS
- EXISTING MAJOR CONTOURS
- CRITICAL STORM WATERSHEDS
- PROPOSED TRANSMISSION LINE ALIGNMENT
- PARCEL BOUNDARIES
- 100-YEAR FLOODPLAIN
- WATER FEATURES

DRAWN BY	CHECKED BY
CNB	DJH

NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES:
RESOURCE SOLUTIONS, LLC
518 SOUTH MAIN STREET
SUITE A
COTTAGE GROVE, WI 53527
(608) 839-5004

CRITICAL STORM DETERMINATION WATERSHEDS AND TC FLOWPATH

LORDSTOWN SWITCHYARD

LORDSTOWN, OH

REALTIME UTILITY ENGINEERS, INC.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

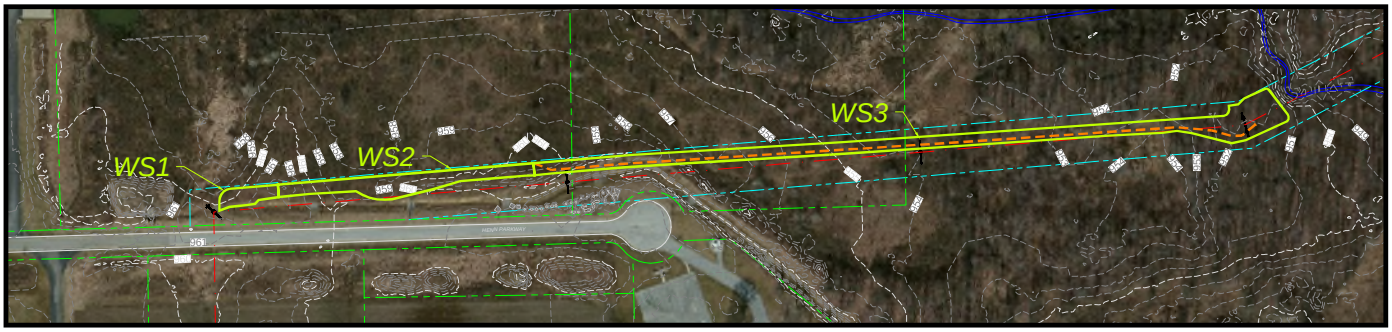
0 1

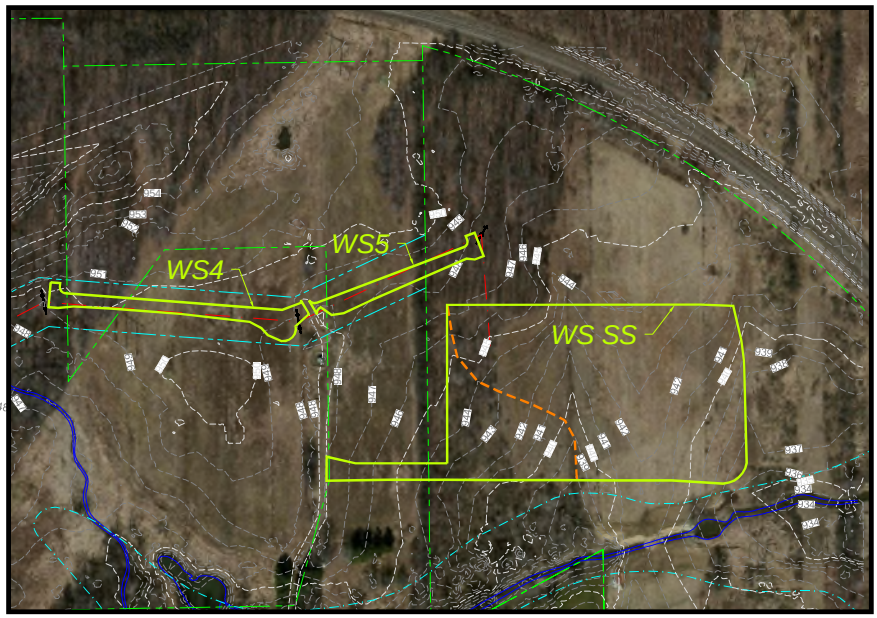
SCALE: 1" = 200'

PROJECT NO.: 1704

DATE: 4/28/16

FIGURE: A3





LEGEND

- 951 EXISTING MINOR CONTOURS
- 950 EXISTING MAJOR CONTOURS
- EXISTING WATERSHEDS
- EXISTING TC FLOWPATHS
- PROPOSED TRANSMISSION LINE ALIGNMENT
- PARCEL BOUNDARIES
- 100-YEAR FLOODPLAIN
- WATER FEATURES

DRAWN BY	CHECKED BY
CNB	DJH

NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES:
RESOURCE SOLUTIONS, LLC
537 SOUTH MAIN STREET
SUITE A
COTTAGE GROVE, WI 53527
(608) 839-5004

EXISTING WATERSHEDS AND TC FLOWPATHS

LORDSTOWN SWITCHYARD

LORDSTOWN, OH

REALTIME UTILITY ENGINEERS, INC.

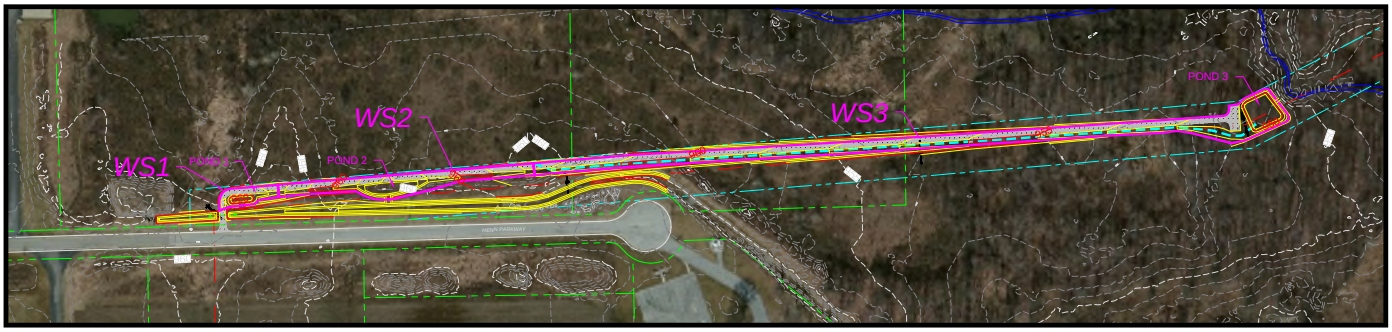
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

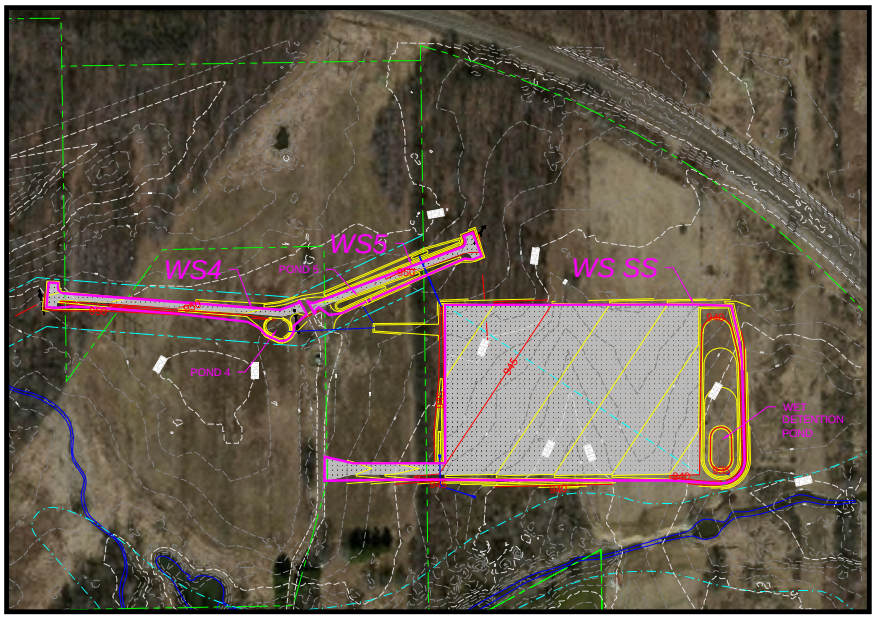
0 1

SCALE	
1" = 200'	
PROJECT NO.	DATE
1704	4/29/16

FIGURE

A4





LEGEND

- EXISTING MINOR CONTOURS
- EXISTING MAJOR CONTOURS
- PROPOSED MINOR CONTOURS
- PROPOSED MAJOR CONTOURS
- POST-DEVELOPMENT WATERSHEDS
- POST-DEVELOPMENT TC FLOWPATHS
- PROPOSED TRANSMISSION LINE ALIGNMENT
- PARCEL BOUNDARIES
- 100-YEAR FLOODPLAIN
- WATER FEATURES
- PROPOSED GRAVEL AREAS

DRAWN BY: CNB | CHECKED BY: DJH

DATE | NO. | REVISION / ISSUE

MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS, LLC
137 SOUTH MAIN STREET
SUITE A
COTTAGE GROVE, WI 53527
(608) 839-5388

POST-DEVELOPMENT WATERSHEDS & TC FLOWPATHS

LORDSTOWN SWITCHYARD

LORDSTOWN, OH

REALTIME UTILITY ENGINEERS, INC.

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

0 1

SCALE: 1" = 200'

PROJECT NO.: 1704

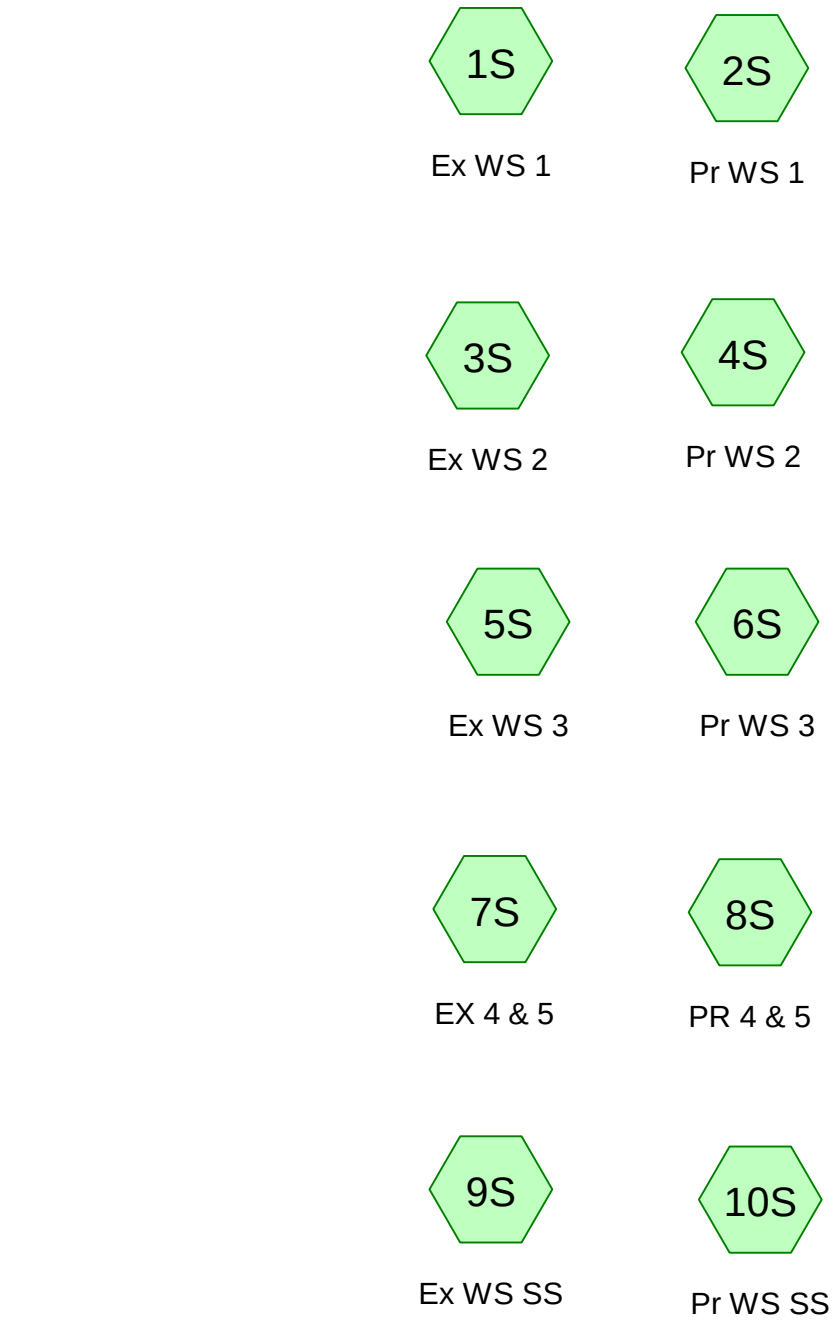
DATE: 4/29/16

FIGURE

A5

APPENDIX B
HYDROCAD INPUT/OUTPUT

Critical Storm
Determination



Subcat Reach Pond Link

Routing Diagram for Lordstown - Critical Storm Determination
Prepared by Montgomery Associates, Printed 5/3/2016

Summary for Subcatchment 1S: Ex WS 1

Runoff = 0.50 cfs @ 11.98 hrs, Volume= 0.024 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
16,470	79	Woods/grass comb., Good, HSG D
16,470	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.62 cfs @ 11.98 hrs, Volume= 0.031 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
*	2,270	96	Gravel
	14,200	80	>75% Grass cover, Good, HSG D
	16,470		Weighted Average
	16,470	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 1.64 cfs @ 11.98 hrs, Volume= 0.079 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
53,830	79	Woods/grass comb., Good, HSG D
53,830	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 2.00 cfs @ 11.98 hrs, Volume= 0.098 af, Depth> 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
*	6,430	96	Gravel
	47,400	80	>75% Grass cover, Good, HSG D
	53,830		Weighted Average
	53,830	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 4.76 cfs @ 11.98 hrs, Volume= 0.230 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
156,000	79	Woods/grass comb., Good, HSG D
156,000	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 6S: Pr WS 3

Runoff = 5.81 cfs @ 11.98 hrs, Volume= 0.286 af, Depth> 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	137,000	80	>75% Grass cover, Good, HSG D
*	19,000	96	Gravel
	156,000		Weighted Average
	156,000	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 7S: EX 4 & 5

Runoff = 3.32 cfs @ 11.98 hrs, Volume= 0.161 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
109,000	79	Woods/grass comb., Good, HSG D
109,000	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: PR 4 & 5

Runoff = 4.04 cfs @ 11.98 hrs, Volume= 0.199 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	96,130	80	>75% Grass cover, Good, HSG D
*	12,870	96	Gravel
	109,000		Weighted Average
	109,000	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS SS

Runoff = 9.29 cfs @ 12.65 hrs, Volume= 1.552 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	1,023,000	79	Woods/grass comb., Good, HSG D
*	11,300	96	Gravel
	1,034,300		Weighted Average
	1,034,300	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
2.7	119	0.0210	0.72		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	430	0.0105	0.72		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.4	270	0.0148	0.61		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.7	430	0.0139	0.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	160	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
58.4	1,509	Total			

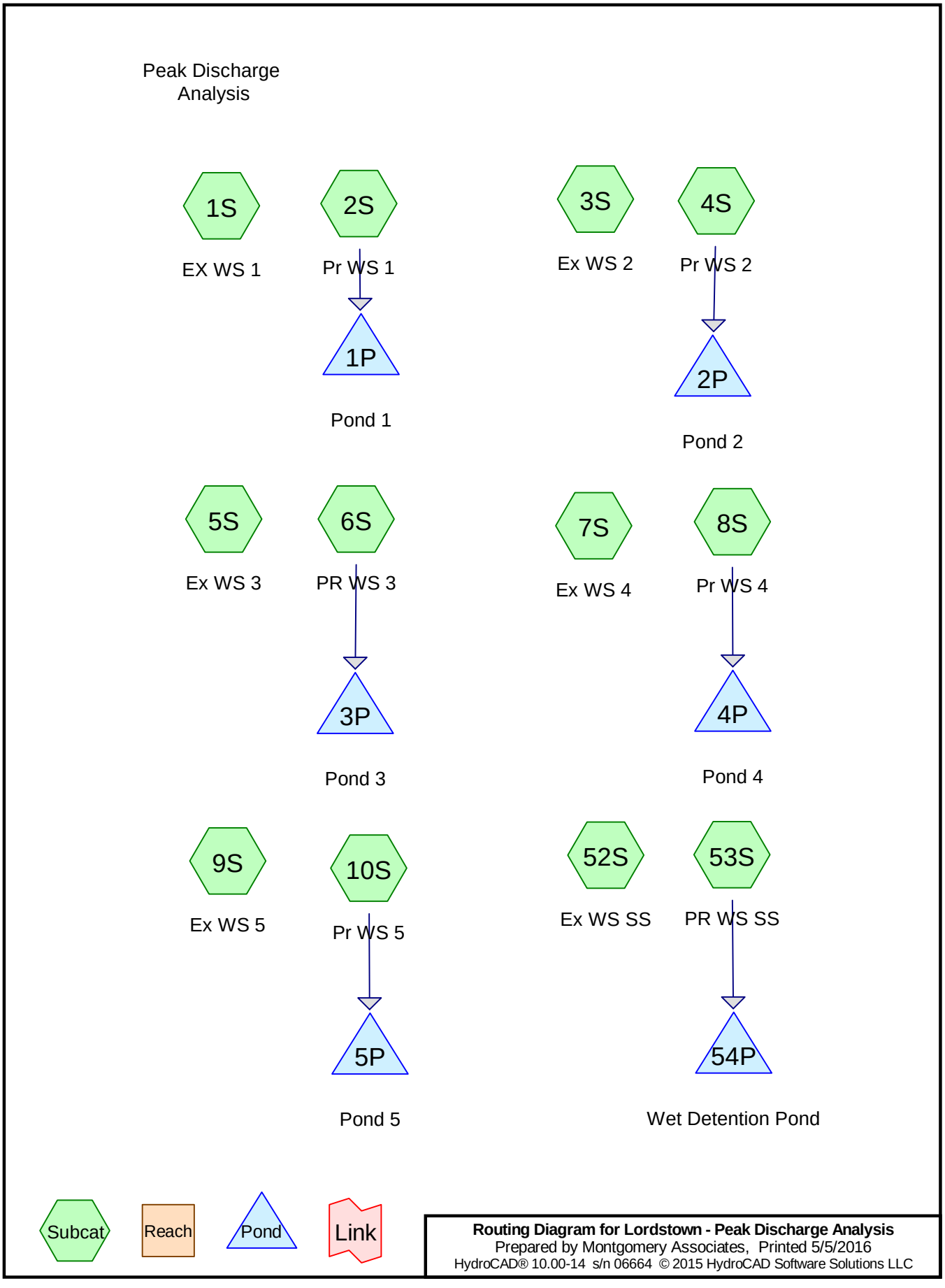
Summary for Subcatchment 10S: Pr WS SS

Runoff = 11.84 cfs @ 12.66 hrs, Volume= 2.009 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	822,100	79	Woods/grass comb., Good, HSG D
*	212,200	96	Gravel
	1,034,300		Weighted Average
	1,034,300	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	100	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
2.7	119	0.0210	0.72		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	430	0.0105	0.72		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.2	230	0.0217	0.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	296	0.0101	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.6	550	0.0127	0.79		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
61.3	1,725	Total			


Peak Discharge Analysis
1S
EX WS 1
2S
Pr WS 1
1P
Pond 1
3S
Ex WS 2
4S
Pr WS 2
2P
Pond 2
5S
Ex WS 3
6S
PR WS 3
3P
Pond 3
7S
Ex WS 4
8S
Pr WS 4
4P
Pond 4
9S
Ex WS 5
10S
Pr WS 5
5P
Pond 5
52S
Ex WS SS
53S
PR WS SS
54P
Wet Detention Pond
Subcat
Reach
Pond
Link
Routing Diagram for Lordstown - Peak Discharge Analysis
Prepared by Montgomery Associates, Printed 5/5/2016
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Summary for Subcatchment 1S: EX WS 1

Runoff = 0.09 cfs @ 11.98 hrs, Volume= 0.004 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.16 cfs @ 11.97 hrs, Volume= 0.008 af, Depth> 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 0.38 cfs @ 11.98 hrs, Volume= 0.018 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 0.64 cfs @ 11.97 hrs, Volume= 0.033 af, Depth> 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.18 cfs @ 13.43 hrs, Volume= 0.052 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (sf)	CN	Description
46,340	79	Woods/grass comb., Good, HSG D
46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 1.40 cfs @ 12.06 hrs, Volume= 0.092 af, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 0.36 cfs @ 11.98 hrs, Volume= 0.018 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 0.70 cfs @ 11.97 hrs, Volume= 0.036 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 0.25 cfs @ 11.98 hrs, Volume= 0.012 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 0.49 cfs @ 11.97 hrs, Volume= 0.025 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 1.81 cfs @ 12.41 hrs, Volume= 0.243 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 13.22 cfs @ 11.97 hrs, Volume= 0.693 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 1.08" for 1-Year event
Inflow = 0.16 cfs @ 11.97 hrs, Volume= 0.008 af
Outflow = 0.06 cfs @ 12.10 hrs, Volume= 0.008 af, Atten= 63%, Lag= 7.7 min
Primary = 0.06 cfs @ 12.10 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.24' @ 12.10 hrs Surf.Area= 492 sf Storage= 109 cf

Plug-Flow detention time= 32.7 min calculated for 0.008 af (100% of inflow)
Center-of-Mass det. time= 32.6 min (843.7 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.06 cfs @ 12.10 hrs HW=959.24' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Stoner Weeper** (Custom Controls 0.06 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 1.03" for 1-Year event
Inflow = 0.64 cfs @ 11.97 hrs, Volume= 0.033 af
Outflow = 0.06 cfs @ 12.45 hrs, Volume= 0.033 af, Atten= 90%, Lag= 28.8 min
Primary = 0.06 cfs @ 12.45 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.30' @ 12.45 hrs Surf.Area= 2,400 sf Storage= 662 cf

Plug-Flow detention time= 201.5 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 200.8 min (1,015.3 - 814.6)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.06 cfs @ 12.45 hrs HW=957.30' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Stone Weeper** (Custom Controls 0.06 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 1.04" for 1-Year event
Inflow = 1.40 cfs @ 12.06 hrs, Volume= 0.092 af
Outflow = 0.10 cfs @ 13.20 hrs, Volume= 0.092 af, Atten= 93%, Lag= 68.4 min
Primary = 0.10 cfs @ 13.20 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 949.63' @ 13.20 hrs Surf.Area= 3,754 sf Storage= 2,218 cf

Plug-Flow detention time= 478.0 min calculated for 0.092 af (100% of inflow)
Center-of-Mass det. time= 479.1 min (1,299.8 - 820.7)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.10 cfs @ 13.20 hrs HW=949.63' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.10 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 1.07" for 1-Year event
Inflow = 0.70 cfs @ 11.97 hrs, Volume= 0.036 af
Outflow = 0.28 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 60%, Lag= 7.2 min
Primary = 0.28 cfs @ 12.09 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.84' @ 12.09 hrs Surf.Area= 1,709 sf Storage= 526 cf

Plug-Flow detention time= 88.2 min calculated for 0.036 af (100% of inflow)
Center-of-Mass det. time= 87.9 min (899.3 - 811.3)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.28 cfs @ 12.09 hrs HW=947.84' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.28 cfs @ 1.97 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 1.10" for 1-Year event
Inflow = 0.49 cfs @ 11.97 hrs, Volume= 0.025 af
Outflow = 0.17 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 66%, Lag= 8.1 min
Primary = 0.17 cfs @ 12.10 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.32' @ 12.10 hrs Surf.Area= 1,397 sf Storage= 379 cf

Plug-Flow detention time= 79.0 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 79.9 min (889.5 - 809.7)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.16 cfs @ 12.10 hrs HW=947.32' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.16 cfs @ 1.92 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 1.54" for 1-Year event
Inflow = 13.22 cfs @ 11.97 hrs, Volume= 0.693 af
Outflow = 1.47 cfs @ 12.34 hrs, Volume= 0.677 af, Atten= 89%, Lag= 22.5 min
Primary = 1.47 cfs @ 12.34 hrs, Volume= 0.677 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 938.10' @ 12.34 hrs Surf.Area= 19,064 sf Storage= 17,015 cf

Plug-Flow detention time= 624.2 min calculated for 0.677 af (98% of inflow)
Center-of-Mass det. time= 610.1 min (1,398.5 - 788.4)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=1.47 cfs @ 12.34 hrs HW=938.10' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 1.47 cfs @ 4.21 fps)
  - **3=Orifice/Grate** (Passes < 1.26 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.11 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 0.55 cfs potential flow)

Summary for Subcatchment 1S: EX WS 1

Runoff = 0.12 cfs @ 11.98 hrs, Volume= 0.006 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.20 cfs @ 11.97 hrs, Volume= 0.010 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 0.51 cfs @ 11.98 hrs, Volume= 0.025 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 0.78 cfs @ 11.97 hrs, Volume= 0.040 af, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.25 cfs @ 13.36 hrs, Volume= 0.068 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	46,340	79	Woods/grass comb., Good, HSG D
	46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 1.72 cfs @ 12.06 hrs, Volume= 0.113 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 0.50 cfs @ 11.98 hrs, Volume= 0.024 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 0.85 cfs @ 11.97 hrs, Volume= 0.044 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 0.34 cfs @ 11.98 hrs, Volume= 0.016 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 0.59 cfs @ 11.97 hrs, Volume= 0.030 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 2.54 cfs @ 12.40 hrs, Volume= 0.325 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 15.49 cfs @ 11.97 hrs, Volume= 0.817 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.40"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 1.31" for 2-Year event
Inflow = 0.20 cfs @ 11.97 hrs, Volume= 0.010 af
Outflow = 0.08 cfs @ 12.09 hrs, Volume= 0.010 af, Atten= 60%, Lag= 7.3 min
Primary = 0.08 cfs @ 12.09 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.29' @ 12.09 hrs Surf.Area= 507 sf Storage= 131 cf

Plug-Flow detention time= 32.3 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 32.0 min (839.8 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.08 cfs @ 12.09 hrs HW=959.28' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Stoner Weeper** (Custom Controls 0.08 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 1.26" for 2-Year event
Inflow = 0.78 cfs @ 11.97 hrs, Volume= 0.040 af
Outflow = 0.08 cfs @ 12.41 hrs, Volume= 0.040 af, Atten= 89%, Lag= 26.2 min
Primary = 0.08 cfs @ 12.41 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.36' @ 12.41 hrs Surf.Area= 2,474 sf Storage= 813 cf

Plug-Flow detention time= 194.2 min calculated for 0.040 af (100% of inflow)
Center-of-Mass det. time= 193.4 min (1,004.6 - 811.2)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.08 cfs @ 12.41 hrs HW=957.36' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Stone Weeper** (Custom Controls 0.08 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 1.28" for 2-Year event
Inflow = 1.72 cfs @ 12.06 hrs, Volume= 0.113 af
Outflow = 0.13 cfs @ 13.05 hrs, Volume= 0.113 af, Atten= 92%, Lag= 59.4 min
Primary = 0.13 cfs @ 13.05 hrs, Volume= 0.113 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 949.75' @ 13.05 hrs Surf.Area= 3,843 sf Storage= 2,700 cf

Plug-Flow detention time= 447.9 min calculated for 0.113 af (100% of inflow)
Center-of-Mass det. time= 449.0 min (1,266.3 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.13 cfs @ 13.05 hrs HW=949.75' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.13 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 1.31" for 2-Year event
Inflow = 0.85 cfs @ 11.97 hrs, Volume= 0.044 af
Outflow = 0.36 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 58%, Lag= 7.0 min
Primary = 0.36 cfs @ 12.09 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.89' @ 12.09 hrs Surf.Area= 1,759 sf Storage= 625 cf

Plug-Flow detention time= 78.2 min calculated for 0.044 af (100% of inflow)
Center-of-Mass det. time= 79.6 min (887.7 - 808.0)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.35 cfs @ 12.09 hrs HW=947.89' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.35 cfs @ 2.13 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 1.33" for 2-Year event
Inflow = 0.59 cfs @ 11.97 hrs, Volume= 0.030 af
Outflow = 0.19 cfs @ 12.11 hrs, Volume= 0.030 af, Atten= 68%, Lag= 8.3 min
Primary = 0.19 cfs @ 12.11 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.38' @ 12.11 hrs Surf.Area= 1,472 sf Storage= 459 cf

Plug-Flow detention time= 74.8 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 74.2 min (880.6 - 806.4)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.19 cfs @ 12.11 hrs HW=947.37' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.19 cfs @ 2.19 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 1.82" for 2-Year event
Inflow = 15.49 cfs @ 11.97 hrs, Volume= 0.817 af
Outflow = 1.61 cfs @ 12.38 hrs, Volume= 0.801 af, Atten= 90%, Lag= 24.7 min
Primary = 1.61 cfs @ 12.38 hrs, Volume= 0.801 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 938.25' @ 12.38 hrs Surf.Area= 19,926 sf Storage= 20,037 cf

Plug-Flow detention time= 553.1 min calculated for 0.800 af (98% of inflow)
Center-of-Mass det. time= 542.7 min (1,327.9 - 785.2)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=1.61 cfs @ 12.38 hrs HW=938.25' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 1.61 cfs @ 4.62 fps)
  - **3=Orifice/Grate** (Passes < 5.22 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.11 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 0.64 cfs potential flow)

Summary for Subcatchment 1S: EX WS 1

Runoff = 0.20 cfs @ 11.98 hrs, Volume= 0.010 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.28 cfs @ 11.97 hrs, Volume= 0.015 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 0.84 cfs @ 11.98 hrs, Volume= 0.040 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 1.14 cfs @ 11.97 hrs, Volume= 0.058 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.44 cfs @ 13.32 hrs, Volume= 0.112 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
	46,340	79	Woods/grass comb., Good, HSG D
	46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 2.50 cfs @ 12.06 hrs, Volume= 0.164 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 0.84 cfs @ 11.98 hrs, Volume= 0.040 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 1.23 cfs @ 11.97 hrs, Volume= 0.063 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 0.57 cfs @ 11.98 hrs, Volume= 0.027 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 0.85 cfs @ 11.97 hrs, Volume= 0.044 af, Depth> 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 4.46 cfs @ 12.38 hrs, Volume= 0.539 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 20.79 cfs @ 11.97 hrs, Volume= 1.110 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 1.89" for 5-Year event
Inflow = 0.28 cfs @ 11.97 hrs, Volume= 0.015 af
Outflow = 0.12 cfs @ 12.08 hrs, Volume= 0.015 af, Atten= 57%, Lag= 6.8 min
Primary = 0.12 cfs @ 12.08 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.39' @ 12.08 hrs Surf.Area= 541 sf Storage= 185 cf

Plug-Flow detention time= 31.1 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 30.8 min (832.5 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.12 cfs @ 12.08 hrs HW=959.39' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stoner Weeper** (Custom Controls 0.12 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 1.83" for 5-Year event
Inflow = 1.14 cfs @ 11.97 hrs, Volume= 0.058 af
Outflow = 0.14 cfs @ 12.30 hrs, Volume= 0.058 af, Atten= 88%, Lag= 20.0 min
Primary = 0.14 cfs @ 12.30 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.50' @ 12.30 hrs Surf.Area= 2,647 sf Storage= 1,182 cf

Plug-Flow detention time= 178.7 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 179.2 min (984.1 - 804.9)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.14 cfs @ 12.30 hrs HW=957.50' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.14 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 1.85" for 5-Year event
Inflow = 2.50 cfs @ 12.06 hrs, Volume= 0.164 af
Outflow = 0.23 cfs @ 12.80 hrs, Volume= 0.164 af, Atten= 91%, Lag= 44.3 min
Primary = 0.23 cfs @ 12.80 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 950.05' @ 12.80 hrs Surf.Area= 4,056 sf Storage= 3,882 cf

Plug-Flow detention time= 394.8 min calculated for 0.164 af (100% of inflow)
Center-of-Mass det. time= 396.1 min (1,207.1 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.23 cfs @ 12.80 hrs HW=950.05' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.23 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 1.88" for 5-Year event
Inflow = 1.23 cfs @ 11.97 hrs, Volume= 0.063 af
Outflow = 0.50 cfs @ 12.09 hrs, Volume= 0.063 af, Atten= 59%, Lag= 7.1 min
Primary = 0.50 cfs @ 12.09 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 948.03' @ 12.09 hrs Surf.Area= 1,909 sf Storage= 872 cf

Plug-Flow detention time= 65.7 min calculated for 0.063 af (100% of inflow)
Center-of-Mass det. time= 67.1 min (869.1 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.50 cfs @ 12.09 hrs HW=948.03' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Inlet Controls 0.50 cfs @ 2.54 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 1.92" for 5-Year event
Inflow = 0.85 cfs @ 11.97 hrs, Volume= 0.044 af
Outflow = 0.25 cfs @ 12.12 hrs, Volume= 0.044 af, Atten= 71%, Lag= 8.8 min
Primary = 0.25 cfs @ 12.12 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.51' @ 12.12 hrs Surf.Area= 1,647 sf Storage= 666 cf

Plug-Flow detention time= 65.7 min calculated for 0.044 af (100% of inflow)
Center-of-Mass det. time= 66.4 min (866.9 - 800.5)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.24 cfs @ 12.12 hrs HW=947.51' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Inlet Controls 0.24 cfs @ 2.80 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 2.47" for 5-Year event
Inflow = 20.79 cfs @ 11.97 hrs, Volume= 1.110 af
Outflow = 1.90 cfs @ 12.45 hrs, Volume= 1.094 af, Atten= 91%, Lag= 28.8 min
Primary = 1.90 cfs @ 12.45 hrs, Volume= 1.094 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 938.62' @ 12.45 hrs Surf.Area= 21,943 sf Storage= 27,630 cf

Plug-Flow detention time= 463.5 min calculated for 1.093 af (98% of inflow)
Center-of-Mass det. time= 455.9 min (1,235.7 - 779.8)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=1.90 cfs @ 12.45 hrs HW=938.62' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 1.90 cfs @ 5.45 fps)
  - **3=Orifice/Grate** (Passes < 19.85 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.13 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 0.82 cfs potential flow)

Summary for Subcatchment 1S: EX WS 1

Runoff = 0.26 cfs @ 11.97 hrs, Volume= 0.013 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.35 cfs @ 11.97 hrs, Volume= 0.018 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 1.08 cfs @ 11.97 hrs, Volume= 0.052 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 1.40 cfs @ 11.97 hrs, Volume= 0.072 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.58 cfs @ 13.27 hrs, Volume= 0.146 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (sf)	CN	Description
46,340	79	Woods/grass comb., Good, HSG D
46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 3.08 cfs @ 12.06 hrs, Volume= 0.202 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 1.10 cfs @ 11.98 hrs, Volume= 0.053 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 1.51 cfs @ 11.97 hrs, Volume= 0.077 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 0.75 cfs @ 11.98 hrs, Volume= 0.036 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 1.04 cfs @ 11.97 hrs, Volume= 0.053 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 5.97 cfs @ 12.37 hrs, Volume= 0.707 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 24.59 cfs @ 11.97 hrs, Volume= 1.321 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 2.32" for 10-Year event
Inflow = 0.35 cfs @ 11.97 hrs, Volume= 0.018 af
Outflow = 0.16 cfs @ 12.07 hrs, Volume= 0.018 af, Atten= 54%, Lag= 6.4 min
Primary = 0.16 cfs @ 12.07 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.46' @ 12.07 hrs Surf.Area= 565 sf Storage= 225 cf

Plug-Flow detention time= 30.4 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 30.1 min (828.4 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.16 cfs @ 12.07 hrs HW=959.46' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stoner Weeper** (Custom Controls 0.16 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 2.25" for 10-Year event
Inflow = 1.40 cfs @ 11.97 hrs, Volume= 0.072 af
Outflow = 0.19 cfs @ 12.26 hrs, Volume= 0.072 af, Atten= 87%, Lag= 17.5 min
Primary = 0.19 cfs @ 12.26 hrs, Volume= 0.072 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.61' @ 12.26 hrs Surf.Area= 2,770 sf Storage= 1,459 cf

Plug-Flow detention time= 172.0 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 171.2 min (972.5 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.19 cfs @ 12.26 hrs HW=957.61' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.19 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 2.28" for 10-Year event
Inflow = 3.08 cfs @ 12.06 hrs, Volume= 0.202 af
Outflow = 0.30 cfs @ 12.71 hrs, Volume= 0.202 af, Atten= 90%, Lag= 39.1 min
Primary = 0.30 cfs @ 12.71 hrs, Volume= 0.202 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 950.27' @ 12.71 hrs Surf.Area= 4,221 sf Storage= 4,759 cf

Plug-Flow detention time= 369.0 min calculated for 0.202 af (100% of inflow)
Center-of-Mass det. time= 368.4 min (1,175.9 - 807.5)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.30 cfs @ 12.71 hrs HW=950.27' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.30 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 2.31" for 10-Year event
Inflow = 1.51 cfs @ 11.97 hrs, Volume= 0.077 af
Outflow = 0.58 cfs @ 12.09 hrs, Volume= 0.077 af, Atten= 61%, Lag= 7.4 min
Primary = 0.58 cfs @ 12.09 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 948.13' @ 12.09 hrs Surf.Area= 2,088 sf Storage= 1,066 cf

Plug-Flow detention time= 62.0 min calculated for 0.077 af (100% of inflow)
Center-of-Mass det. time= 61.6 min (860.2 - 798.6)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.58 cfs @ 12.09 hrs HW=948.13' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Inlet Controls 0.58 cfs @ 2.95 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 2.35" for 10-Year event
Inflow = 1.04 cfs @ 11.97 hrs, Volume= 0.053 af
Outflow = 0.28 cfs @ 12.12 hrs, Volume= 0.053 af, Atten= 73%, Lag= 9.2 min
Primary = 0.28 cfs @ 12.12 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.60' @ 12.12 hrs Surf.Area= 1,770 sf Storage= 825 cf

Plug-Flow detention time= 64.2 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 63.4 min (860.6 - 797.2)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.28 cfs @ 12.12 hrs HW=947.60' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Culvert** (Inlet Controls 0.28 cfs @ 3.16 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 2.94" for 10-Year event
Inflow = 24.59 cfs @ 11.97 hrs, Volume= 1.321 af
Outflow = 2.08 cfs @ 12.49 hrs, Volume= 1.304 af, Atten= 92%, Lag= 31.2 min
Primary = 2.08 cfs @ 12.49 hrs, Volume= 1.304 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 938.86' @ 12.49 hrs Surf.Area= 23,292 sf Storage= 33,116 cf

Plug-Flow detention time= 431.9 min calculated for 1.304 af (99% of inflow)
Center-of-Mass det. time= 423.6 min (1,200.7 - 777.1)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=2.08 cfs @ 12.49 hrs HW=938.86' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 2.08 cfs @ 5.95 fps)
  - **3=Orifice/Grate** (Passes < 32.66 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.14 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 0.92 cfs potential flow)

Summary for Subcatchment 1S: EX WS 1

Runoff = 0.33 cfs @ 11.97 hrs, Volume= 0.016 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.41 cfs @ 11.97 hrs, Volume= 0.021 af, Depth> 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 1.34 cfs @ 11.97 hrs, Volume= 0.065 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 1.67 cfs @ 11.97 hrs, Volume= 0.085 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.73 cfs @ 13.26 hrs, Volume= 0.181 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

Area (sf)	CN	Description
46,340	79	Woods/grass comb., Good, HSG D
46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 3.67 cfs @ 12.06 hrs, Volume= 0.241 af, Depth> 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 1.36 cfs @ 11.97 hrs, Volume= 0.066 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 1.79 cfs @ 11.97 hrs, Volume= 0.092 af, Depth> 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 0.93 cfs @ 11.97 hrs, Volume= 0.045 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 1.23 cfs @ 11.97 hrs, Volume= 0.064 af, Depth> 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 7.54 cfs @ 12.37 hrs, Volume= 0.884 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 28.38 cfs @ 11.97 hrs, Volume= 1.532 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.10"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 2.76" for 25-Year event
Inflow = 0.41 cfs @ 11.97 hrs, Volume= 0.021 af
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 0.021 af, Atten= 52%, Lag= 6.3 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.53' @ 12.07 hrs Surf.Area= 587 sf Storage= 263 cf

Plug-Flow detention time= 29.5 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 29.4 min (824.9 - 795.5)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=959.52' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stoner Weeper** (Custom Controls 0.20 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 2.69" for 25-Year event
Inflow = 1.67 cfs @ 11.97 hrs, Volume= 0.085 af
Outflow = 0.24 cfs @ 12.22 hrs, Volume= 0.085 af, Atten= 86%, Lag= 15.3 min
Primary = 0.24 cfs @ 12.22 hrs, Volume= 0.085 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.71' @ 12.22 hrs Surf.Area= 2,889 sf Storage= 1,740 cf

Plug-Flow detention time= 163.7 min calculated for 0.085 af (100% of inflow)
Center-of-Mass det. time= 164.2 min (962.5 - 798.3)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.24 cfs @ 12.22 hrs HW=957.71' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.24 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 2.71" for 25-Year event
Inflow = 3.67 cfs @ 12.06 hrs, Volume= 0.241 af
Outflow = 0.39 cfs @ 12.66 hrs, Volume= 0.240 af, Atten= 89%, Lag= 35.9 min
Primary = 0.39 cfs @ 12.66 hrs, Volume= 0.240 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 950.47' @ 12.66 hrs Surf.Area= 4,382 sf Storage= 5,650 cf

Plug-Flow detention time= 346.8 min calculated for 0.240 af (100% of inflow)
Center-of-Mass det. time= 346.2 min (1,150.7 - 804.5)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.39 cfs @ 12.66 hrs HW=950.47' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.39 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 2.75" for 25-Year event
Inflow = 1.79 cfs @ 11.97 hrs, Volume= 0.092 af
Outflow = 0.65 cfs @ 12.10 hrs, Volume= 0.092 af, Atten= 64%, Lag= 7.8 min
Primary = 0.65 cfs @ 12.10 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 948.22' @ 12.10 hrs Surf.Area= 2,263 sf Storage= 1,273 cf

Plug-Flow detention time= 56.6 min calculated for 0.092 af (100% of inflow)
Center-of-Mass det. time= 57.8 min (853.5 - 795.7)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.65 cfs @ 12.10 hrs HW=948.22' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.65 cfs @ 3.31 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 2.79" for 25-Year event
Inflow = 1.23 cfs @ 11.97 hrs, Volume= 0.064 af
Outflow = 0.30 cfs @ 12.12 hrs, Volume= 0.064 af, Atten= 75%, Lag= 9.5 min
Primary = 0.30 cfs @ 12.12 hrs, Volume= 0.064 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.69' @ 12.12 hrs Surf.Area= 1,890 sf Storage= 992 cf

Plug-Flow detention time= 61.1 min calculated for 0.063 af (100% of inflow)
Center-of-Mass det. time= 61.7 min (856.1 - 794.4)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.30 cfs @ 12.12 hrs HW=947.69' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.30 cfs @ 3.48 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 3.41" for 25-Year event
Inflow = 28.38 cfs @ 11.97 hrs, Volume= 1.532 af
Outflow = 2.77 cfs @ 12.41 hrs, Volume= 1.516 af, Atten= 90%, Lag= 26.5 min
Primary = 2.77 cfs @ 12.41 hrs, Volume= 1.516 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 939.07' @ 12.41 hrs Surf.Area= 24,295 sf Storage= 38,083 cf

Plug-Flow detention time= 406.6 min calculated for 1.515 af (99% of inflow)
Center-of-Mass det. time= 399.2 min (1,174.2 - 775.0)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=2.76 cfs @ 12.41 hrs HW=939.07' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.69 fps)
- **2=Culvert** (Inlet Controls 2.21 cfs @ 6.34 fps)
  - **3=Orifice/Grate** (Passes < 45.25 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.15 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 0.99 cfs potential flow)

Summary for Subcatchment 1S: EX WS 1

Runoff = 0.39 cfs @ 11.97 hrs, Volume= 0.019 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.48 cfs @ 11.97 hrs, Volume= 0.025 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 1.61 cfs @ 11.97 hrs, Volume= 0.078 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 1.94 cfs @ 11.97 hrs, Volume= 0.100 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.88 cfs @ 13.26 hrs, Volume= 0.218 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

Area (sf)	CN	Description
46,340	79	Woods/grass comb., Good, HSG D
46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 4.27 cfs @ 12.06 hrs, Volume= 0.280 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 1.64 cfs @ 11.97 hrs, Volume= 0.079 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 2.07 cfs @ 11.97 hrs, Volume= 0.107 af, Depth> 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 1.12 cfs @ 11.97 hrs, Volume= 0.054 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 1.43 cfs @ 11.97 hrs, Volume= 0.074 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 9.17 cfs @ 12.37 hrs, Volume= 1.067 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 32.18 cfs @ 11.97 hrs, Volume= 1.745 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.60"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 3.21" for 50-Year event
Inflow = 0.48 cfs @ 11.97 hrs, Volume= 0.025 af
Outflow = 0.23 cfs @ 12.07 hrs, Volume= 0.025 af, Atten= 51%, Lag= 6.2 min
Primary = 0.23 cfs @ 12.07 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.59' @ 12.07 hrs Surf.Area= 609 sf Storage= 301 cf

Plug-Flow detention time= 29.0 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 28.9 min (821.9 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.23 cfs @ 12.07 hrs HW=959.58' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stoner Weeper** (Custom Controls 0.23 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 3.13" for 50-Year event
Inflow = 1.94 cfs @ 11.97 hrs, Volume= 0.100 af
Outflow = 0.29 cfs @ 12.21 hrs, Volume= 0.100 af, Atten= 85%, Lag= 14.6 min
Primary = 0.29 cfs @ 12.21 hrs, Volume= 0.100 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.80' @ 12.21 hrs Surf.Area= 3,006 sf Storage= 2,027 cf

Plug-Flow detention time= 159.3 min calculated for 0.100 af (100% of inflow)
Center-of-Mass det. time= 158.5 min (954.1 - 795.6)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.29 cfs @ 12.21 hrs HW=957.80' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.29 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 3.16" for 50-Year event
Inflow = 4.27 cfs @ 12.06 hrs, Volume= 0.280 af
Outflow = 0.49 cfs @ 12.62 hrs, Volume= 0.280 af, Atten= 89%, Lag= 33.7 min
Primary = 0.49 cfs @ 12.62 hrs, Volume= 0.280 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 950.67' @ 12.62 hrs Surf.Area= 4,538 sf Storage= 6,547 cf

Plug-Flow detention time= 328.4 min calculated for 0.280 af (100% of inflow)
Center-of-Mass det. time= 327.9 min (1,129.7 - 801.9)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.49 cfs @ 12.62 hrs HW=950.67' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.49 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 3.20" for 50-Year event
Inflow = 2.07 cfs @ 11.97 hrs, Volume= 0.107 af
Outflow = 0.67 cfs @ 12.10 hrs, Volume= 0.107 af, Atten= 67%, Lag= 8.3 min
Primary = 0.67 cfs @ 12.10 hrs, Volume= 0.107 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 948.32' @ 12.10 hrs Surf.Area= 2,440 sf Storage= 1,498 cf

Plug-Flow detention time= 54.1 min calculated for 0.107 af (100% of inflow)
Center-of-Mass det. time= 55.2 min (848.4 - 793.2)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.67 cfs @ 12.10 hrs HW=948.32' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 0.67 cfs @ 3.43 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 3.24" for 50-Year event
Inflow = 1.43 cfs @ 11.97 hrs, Volume= 0.074 af
Outflow = 0.33 cfs @ 12.13 hrs, Volume= 0.074 af, Atten= 77%, Lag= 10.0 min
Primary = 0.33 cfs @ 12.13 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.78' @ 12.13 hrs Surf.Area= 2,005 sf Storage= 1,161 cf

Plug-Flow detention time= 60.3 min calculated for 0.074 af (100% of inflow)
Center-of-Mass det. time= 60.9 min (852.9 - 791.9)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.33 cfs @ 12.13 hrs HW=947.78' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.33 cfs @ 3.76 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 3.88" for 50-Year event
Inflow = 32.18 cfs @ 11.97 hrs, Volume= 1.745 af
Outflow = 5.27 cfs @ 12.18 hrs, Volume= 1.728 af, Atten= 84%, Lag= 13.0 min
Primary = 5.27 cfs @ 12.18 hrs, Volume= 1.728 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 939.20' @ 12.18 hrs Surf.Area= 24,741 sf Storage= 41,455 cf

Plug-Flow detention time= 371.4 min calculated for 1.726 af (99% of inflow)
Center-of-Mass det. time= 366.7 min (1,140.0 - 773.2)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=5.25 cfs @ 12.18 hrs HW=939.20' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 2.95 cfs @ 1.21 fps)
- **2=Culvert** (Inlet Controls 2.30 cfs @ 6.58 fps)
  - **3=Orifice/Grate** (Passes < 54.24 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.15 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 1.04 cfs potential flow)

Summary for Subcatchment 1S: EX WS 1

Runoff = 0.40 cfs @ 11.97 hrs, Volume= 0.020 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

Area (sf)	CN	Description
4,040	79	Woods/grass comb., Good, HSG D
4,040	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2S: Pr WS 1

Runoff = 0.49 cfs @ 11.97 hrs, Volume= 0.025 af, Depth> 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	1,750	96	Gravel
	2,290	80	>75% Grass cover, Good, HSG D
	4,040		Weighted Average
	4,040	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3S: Ex WS 2

Runoff = 1.66 cfs @ 11.97 hrs, Volume= 0.081 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

Area (sf)	CN	Description
16,610	79	Woods/grass comb., Good, HSG D
16,610	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4S: Pr WS 2

Runoff = 1.99 cfs @ 11.97 hrs, Volume= 0.102 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	6,400	96	Gravel
	10,210	80	>75% Grass cover, Good, HSG D
	16,610		Weighted Average
	16,610	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5S: Ex WS 3

Runoff = 0.91 cfs @ 13.26 hrs, Volume= 0.226 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
	46,340	79	Woods/grass comb., Good, HSG D
	46,340	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.2	100	0.0050	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
66.0	1,400	0.0050	0.35		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
109.2	1,500	Total			

Summary for Subcatchment 6S: PR WS 3

Runoff = 4.39 cfs @ 12.06 hrs, Volume= 0.288 af, Depth> 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	18,580	96	Gravel
	27,760	80	>75% Grass cover, Good, HSG D
	46,340		Weighted Average
	46,340	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	12	0.0020	0.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
13.4	1,490	0.0050	1.85	5.09	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=0.50' Z= 3.0 '/' Top.W=7.00' n= 0.030 Earth, clean & winding
14.0	1,502	Total			

Summary for Subcatchment 7S: Ex WS 4

Runoff = 1.69 cfs @ 11.97 hrs, Volume= 0.082 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

Area (sf)	CN	Description
17,470	78	Meadow, non-grazed, HSG D
17,470	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 8S: Pr WS 4

Runoff = 2.13 cfs @ 11.97 hrs, Volume= 0.110 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
	9,980	80	>75% Grass cover, Good, HSG D
*	7,490	96	Gravel
	17,470		Weighted Average
	17,470	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 9S: Ex WS 5

Runoff = 1.16 cfs @ 11.97 hrs, Volume= 0.056 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

Area (sf)	CN	Description
11,910	78	Meadow, non-grazed, HSG D
11,910	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 10S: Pr WS 5

Runoff = 1.46 cfs @ 11.97 hrs, Volume= 0.076 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
	6,520	80	>75% Grass cover, Good, HSG D
*	5,390	96	Gravel
	11,910		Weighted Average
	11,910	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 52S: Ex WS SS

Runoff = 9.50 cfs @ 12.36 hrs, Volume= 1.105 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

Area (sf)	CN	Description
234,870	78	Meadow, non-grazed, HSG D
234,870	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.7	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40"
6.8	386	0.0182	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	486	Total			

Summary for Subcatchment 53S: PR WS SS

Runoff = 32.93 cfs @ 11.97 hrs, Volume= 1.787 af, Depth> 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.70"

	Area (sf)	CN	Description
	30,290	80	>75% Grass cover, Good, HSG D
*	192,750	96	Gravel
*	11,830	98	Permanent Pool
	234,870		Weighted Average
	223,040	94	94.96% Pervious Area
	11,830	98	5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.90		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40"
4.4	534	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.2	634	Total			

Summary for Pond 1P: Pond 1

Inflow Area = 0.093 ac, 0.00% Impervious, Inflow Depth > 3.30" for 100-Year event
Inflow = 0.49 cfs @ 11.97 hrs, Volume= 0.025 af
Outflow = 0.24 cfs @ 12.07 hrs, Volume= 0.025 af, Atten= 51%, Lag= 6.2 min
Primary = 0.24 cfs @ 12.07 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 959.60' @ 12.07 hrs Surf.Area= 613 sf Storage= 309 cf

Plug-Flow detention time= 28.9 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 28.8 min (821.3 - 792.5)

Volume	Invert	Avail.Storage	Storage Description
#1	959.00'	1,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
959.00	412	0	0
960.00	745	579	579
961.00	1,248	997	1,575

Device	Routing	Invert	Outlet Devices
#1	Primary	960.00'	**10.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	959.00'	**Stoner Weeper**

Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
Disch. (cfs) 0.000 0.043 0.127 0.240 0.382 0.553

Primary OutFlow Max=0.24 cfs @ 12.07 hrs HW=959.60' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Stoner Weeper** (Custom Controls 0.24 cfs)

Summary for Pond 2P: Pond 2

Inflow Area = 0.381 ac, 0.00% Impervious, Inflow Depth > 3.22" for 100-Year event
Inflow = 1.99 cfs @ 11.97 hrs, Volume= 0.102 af
Outflow = 0.30 cfs @ 12.21 hrs, Volume= 0.102 af, Atten= 85%, Lag= 14.4 min
Primary = 0.30 cfs @ 12.21 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 957.82' @ 12.21 hrs Surf.Area= 3,028 sf Storage= 2,084 cf

Plug-Flow detention time= 158.3 min calculated for 0.102 af (100% of inflow)
Center-of-Mass det. time= 157.4 min (952.6 - 795.1)

Volume	Invert	Avail.Storage	Storage Description
#1	957.00'	6,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
957.00	2,043	0	0
958.00	3,242	2,643	2,643
959.00	4,000	3,621	6,264

Device	Routing	Invert	Outlet Devices
#1	Primary	958.00'	**10.0' long x 17.0' 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
#2	Primary	957.00'	**Stone Weeper**
			Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00
			Disch. (cfs) 0.000 0.033 0.097 0.182 0.287 0.411

Primary OutFlow Max=0.30 cfs @ 12.21 hrs HW=957.82' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Stone Weeper** (Custom Controls 0.30 cfs)

Summary for Pond 3P: Pond 3

Inflow Area = 1.064 ac, 0.00% Impervious, Inflow Depth > 3.25" for 100-Year event
Inflow = 4.39 cfs @ 12.06 hrs, Volume= 0.288 af
Outflow = 0.51 cfs @ 12.61 hrs, Volume= 0.288 af, Atten= 88%, Lag= 33.3 min
Primary = 0.51 cfs @ 12.61 hrs, Volume= 0.288 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs

Peak Elev= 950.71' @ 12.61 hrs Surf.Area= 4,569 sf Storage= 6,726 cf

Plug-Flow detention time= 325.1 min calculated for 0.288 af (100% of inflow)
Center-of-Mass det. time= 324.6 min (1,125.9 - 801.4)

Volume	Invert	Avail.Storage	Storage Description
#1	949.00'	14,652 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
949.00	3,317	0	0
950.00	4,014	3,666	3,666
951.00	4,792	4,403	8,069
952.00	8,374	6,583	14,652

Device	Routing	Invert	Outlet Devices
#1	Primary	951.00'	**5.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	949.00'	**Stone Weeper** Head (feet) 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 Disch. (cfs) 0.000 0.017 0.048 0.091 0.143 0.206 0.277 0.359 0.450 0.553 0.666

Primary OutFlow Max=0.51 cfs @ 12.61 hrs HW=950.71' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Stone Weeper** (Custom Controls 0.51 cfs)

Summary for Pond 4P: Pond 4

Inflow Area = 0.401 ac, 0.00% Impervious, Inflow Depth > 3.29" for 100-Year event
Inflow = 2.13 cfs @ 11.97 hrs, Volume= 0.110 af
Outflow = 0.68 cfs @ 12.11 hrs, Volume= 0.110 af, Atten= 68%, Lag= 8.4 min
Primary = 0.68 cfs @ 12.11 hrs, Volume= 0.110 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 948.34' @ 12.11 hrs Surf.Area= 2,476 sf Storage= 1,546 cf

Plug-Flow detention time= 55.3 min calculated for 0.110 af (100% of inflow)
Center-of-Mass det. time= 54.8 min (847.6 - 792.8)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	3,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	1,409	0	0
948.00	1,853	816	816
949.00	3,700	2,777	3,592

Device	Routing	Invert	Outlet Devices
#1	Primary	948.50'	**6.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	947.50'	**6.0" Round Culvert** L= 180.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.50' / 946.00' S= 0.0083 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.68 cfs @ 12.11 hrs HW=948.34' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 0.68 cfs @ 3.45 fps)

Summary for Pond 5P: Pond 5

Inflow Area = 0.273 ac, 0.00% Impervious, Inflow Depth > 3.33" for 100-Year event
Inflow = 1.46 cfs @ 11.97 hrs, Volume= 0.076 af
Outflow = 0.33 cfs @ 12.13 hrs, Volume= 0.076 af, Atten= 77%, Lag= 10.1 min
Primary = 0.33 cfs @ 12.13 hrs, Volume= 0.076 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 947.80' @ 12.13 hrs Surf.Area= 2,028 sf Storage= 1,196 cf

Plug-Flow detention time= 61.6 min calculated for 0.076 af (100% of inflow)
Center-of-Mass det. time= 60.8 min (852.3 - 791.5)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	5,085 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	976	0	0
948.00	2,297	1,637	1,637
949.00	4,600	3,449	5,085

Device	Routing	Invert	Outlet Devices
#1	Primary	948.00'	**10.0' long x 11.0' 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) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64
#2	Primary	947.00'	**4.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 947.00' / 946.00' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.33 cfs @ 12.13 hrs HW=947.80' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.33 cfs @ 3.82 fps)

Summary for Pond 54P: Wet Detention Pond

Inflow Area = 5.392 ac, 5.04% Impervious, Inflow Depth > 3.98" for 100-Year event
Inflow = 32.93 cfs @ 11.97 hrs, Volume= 1.787 af
Outflow = 5.95 cfs @ 12.17 hrs, Volume= 1.770 af, Atten= 82%, Lag= 12.1 min
Primary = 5.95 cfs @ 12.17 hrs, Volume= 1.770 af

Routing by Stor-Ind method, Time Span= 5.00-84.00 hrs, dt= 0.05 hrs
Peak Elev= 939.23' @ 12.17 hrs Surf.Area= 24,836 sf Storage= 42,185 cf

Plug-Flow detention time= 365.3 min calculated for 1.769 af (99% of inflow)
Center-of-Mass det. time= 360.8 min (1,133.7 - 772.9)

Volume	Invert	Avail.Storage	Storage Description
#1	937.00'	62,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
937.00	11,830	0	0
938.00	18,520	15,175	15,175
939.00	24,080	21,300	36,475
940.00	27,320	25,700	62,175

Device	Routing	Invert	Outlet Devices
#1	Primary	939.00'	**12.0' long x 16.0' 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
#2	Primary	937.00'	**8.0" Round Culvert** L= 32.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 937.00' / 936.50' S= 0.0156 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	938.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	937.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#5	Device 2	937.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600

Primary OutFlow Max=5.89 cfs @ 12.17 hrs HW=939.23' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 3.58 cfs @ 1.29 fps)
- **2=Culvert** (Inlet Controls 2.32 cfs @ 6.63 fps)
  - **3=Orifice/Grate** (Passes < 56.13 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.15 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 1.05 cfs potential flow)

APPENDIX C
WATER QUALITY CALCULATIONS

Water Quality Calcuations:
Wet Detention Pond
5/4/2016
Prepared by CNB

Water Quality Equations From ODNR Rainwater and Land Development Manual (Chapter 2 & Appendix 1):
WQv = C*0.75*A/12
Where,
A = Drainage Area (acres)
WQv = Water Quality Area (acre-feet)
$C = 0.858i^3-0.78i^2+0.774i+0.04$
I = watershed imperviousness ratio, percent imperviousness divided by 100

EDv = 0.75*WQv EDv = Extended Detention Volume (acre-feet)
PPv ≥ (0.75+0.2)*WQv PPv = Permanent Pool Volume (acre-feet)

	A (acres)	A (SF)
Gravel	4.425	192750
Swale and pond (Grass)	0.695	30290
Permanent Pool*	0.272	11830
Total Area to pond (A)	5.392	234870

Pre-Development Conditions

Percent Impervious (i) =	0.0	0%
Runoff Coefficient (C) =	0.0400	

Post-Development Conditions

Percent Impervious (i) =	0.8710	87.10%
Runoff Coefficient (C) =	0.6894	

Design volumes must be equivalent or exceed required volumes listed below

	acre-feet	cubic feet
WQv	0.232	10120
EDv	0.174	7590
PPv	0.221	9614

Stage-Storage Relationship for Wet Detention Pond - Design Volumes

			Incremental	Cumulative		
Elevation	Area (SF)	Area (ac)	Volume (CF)	Volume (CF)	Volume (ac-ft)	Notes:
934	2900	0.067	0	0	0.000	
935	3560	0.082	3230	3230	0.074	
936	4280	0.098	3920	7150	0.164	
937	11830	0.272	8055	15205	0.349	Top of Permanent Pool
938	18520	0.425	15175	30380	0.697	
939	24080	0.553	21300	51680	1.186	
940	27320	0.627	25700	77380	1.776	Top of Berm

*Permanent pool of the pond was considered to be impervious
Design EDv is defined to be the difference of the cumulative volumes at the top of the pond and top of the permanent pool (1.776 - 0.349 = 1.741 acre-feet)
Design PPv is defined to be the cumulative storage volume at the top of the permanent pool in the pond (0.349 acre-feet)

In conclusion, design parameters and water quality requirements are met by this design.

Vegetated Biofilter Calculations
5/4/2016
Prepared by CNB

Design guidance for vegetated biofilters can be found in the Ohio Department of Transportation Location and Design Manual Vol II - Drainage Design.

To appropriately size a vegetated biofilter according to the guidance, and Enhanced Bankful Width (EBW) must be determined where the width in a trapezoidal ditch meets the following criteria:

- The minimum EBW is 4 feet
- The depth of flow for the water quality flow rate (WQ_f) is less than or equal to 4"
- The velocity of flow for the WQ_f is less than or equal to 1 ft/sec

Velocity and flow are determined by using Manning's Equation

The WQ_f is determined according to the guidance by using the rational method with a rainfall intensity of 0.65 in//hr where,

$WQ_f = CiA$ (cfs)
C= Coefficient of runoff
i = Rainfall intensity (in/hr)
A = Drainage area (acres)

Below are the calculated results showing that the ditches serving the gravel access drives along the transmission all meet the criteria of the EBW and can be considered functional vegetated biofilters to meet water quality requirements. All ditches were designed to have a bottom width of 4 feet, with exception to WS3's ditch, which has a bottom width of 6 feet.

Watershed 1

A = 0.09 acres, C = 0.67, i = 0.65 in/hr
WQ_f = 0.04 cfs
Depth of flow = 0.24"
Velocity of flow = 0.68 ft/s
Ditch in **Watershed 1** meets vegetated biofilter design criteria.

Watershed 2

A = 0.38 acres, C = 0.66, i = 0.65 in/hr
WQ_f = 0.16 cfs
Depth of flow = 0.48"
Velocity of flow = 0.96 ft/s
Ditch in **Watershed 2** meets vegetated biofilter design criteria.

Montgomery Associates
Resource Solutions, LLC

Vegetated Biofilter Calculations
5/4/2016
Prepared by CNB

Watershed 3
A = 1.06 acres, C = 0.74, i = 0.65 in/hr
WQ_f = 0.52 cfs
Depth of flow = 0.96"
Velocity of flow = 0.89 ft/s
Ditch in **Watershed 3** meets vegetated biofilter design criteria.

Watershed 4
A = 0.40 acres, C = 0.67, i = 0.65 in/hr
WQ_f = 0.17 cfs
Depth of flow = 0.72"
Velocity of flow = 0.63 ft/s
Ditch in **Watershed 4** meets vegetated biofilter design criteria.

Watershed 5
A = 0.27 acres, C = 0.68, i = 0.65 in/hr
WQ_f = 0.12 cfs
Depth of flow = 0.48"
Velocity of flow = 0.66 ft/s
Ditch in **Watershed 5** meets vegetated biofilter design criteria.

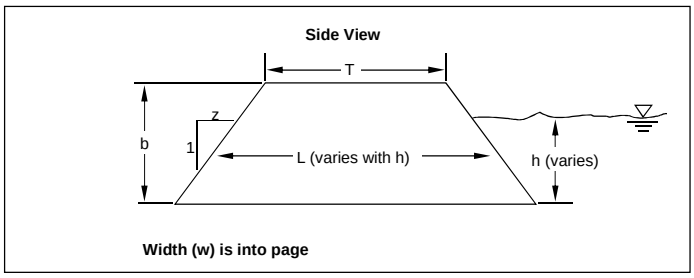
Montgomery Associates
Resource Solutions, LLC

Project: Lordstown Switchyard
Design Purpose: Watershed 1 Pond

Weeper Flow Calculations
Date: 5/4/2016

User Specified Values:			
Berm Height	b=	1	ft
Width	w=	10	ft
Top Width	T=	10	ft
Side Slope (z:1)	z=	3	ft
Stone Diameter	d_{50}=	1	inches

Calc and Print to .csv file



Calculated Values:		
Water Surface (h)	L (ft)*	Flow (cfs)
0.0	16.0	**0.000**
0.2	15.4	**0.043**
0.4	14.8	**0.127**
0.6	14.2	**0.240**
0.8	13.6	**0.382**
1.0	13.0	**0.553**

*L is the AVERAGE flow path length through the weeper based on the depth of the water (h)

$$Q = \frac{h^{3/2} W}{\left[L/D + 2.5 + L^2 \right]^{1/2}}$$

Q = Total flow through dam (cfs)
h = Ponding depth in basin (ft)
W = Total length of dam(ft)
L = Horizontal flow path length (ft)
D = Average rock diameter (ft)

Notes:

This spreadsheet calculates flow using a equation for calculating flow through a stone weeper. It accounts for the variable length (for a trapezoidal weeper) with varying water depths.

The figure above illustrates the individual variables.

Documentation can be found at the following sources:
1. Illinois Urban Manual. A Technical Manual Designed for Urban Ecosystem Protection and Enhancement. United States Department of Agriculture, Natural Resources Conservation Service. Washington, D.C. 1995.
2. Minnesota Urban Small Sites BMP Manual. Metropolitan Council. Minneapolis. 2000.
3. NAHB/NRC Designated Housing Research Center at Penn State University. 2003.
4. Stormwater Management. Massachusetts Dept. of Environmental Protection. Volume Two: Stormwater Technical Handbook. Boston. March 1997.

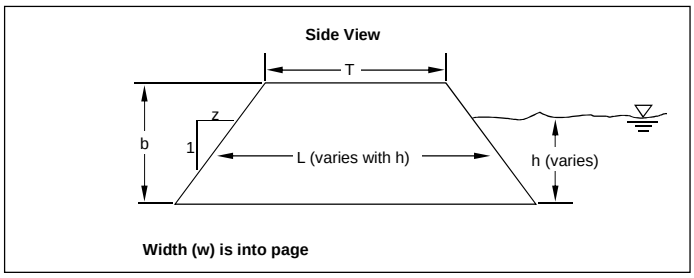
Montgomery Associates
Resource Solutions, LLC

Project: Lordstown Switchyard
Design Purpose: Watershed 2 Pond

Weeper Flow Calculations
Date: 5/4/2016

User Specified Values:			
Berm Height	b=	1	ft
Width	w=	10	ft
Top Width	T=	16	ft
Side Slope (z:1)	z=	3	ft
Stone Diameter	d_{50}=	1	inches

Calc and Print to .csv file



Calculated Values:		
Water Surface (h)	L (ft)*	Flow (cfs)
0.0	22.0	**0.000**
0.2	21.4	**0.033**
0.4	20.8	**0.097**
0.6	20.2	**0.182**
0.8	19.6	**0.287**
1.0	19.0	**0.411**

*L is the AVERAGE flow path length through the weeper based on the depth of the water (h)

$$Q = \frac{h^{3/2} W}{\left[L/D + 2.5 + L^2 \right]^{1/2}}$$

Q = Total flow through dam (cfs)
h = Ponding depth in basin (ft)
W = Total length of dam(ft)
L = Horizontal flow path length (ft)
D = Average rock diameter (ft)

Notes:

This spreadsheet calculates flow using a equation for calculating flow through a stone weeper. It accounts for the variable length (for a trapezoidal weeper) with varying water depths.

The figure above illustrates the individual variables.

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2. Minnesota Urban Small Sites BMP Manual. Metropolitan Council. Minneapolis. 2000.
3. NAHB/NRC Designated Housing Research Center at Penn State University. 2003.
4. Stormwater Management. Massachusetts Dept. of Environmental Protection. Volume Two: Stormwater Technical Handbook. Boston. March 1997.

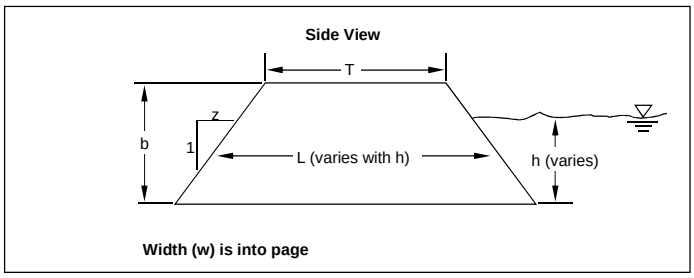
Montgomery Associates
Resource Solutions, LLC

Project: Lordstown Switchyard
Design Purpose: Watershed 3 Pond

Weeper Flow Calculations
Date: 5/4/2016

User Specified Values:			
Berm Height	b=	2	ft
Width	w=	5	ft
Top Width	T=	10	ft
Side Slope (z:1)	z=	3	ft
Stone Diameter	d_{50}=	1	inches

Calc and Print to .csv file



Calculated Values:

Water Surface (h)	L (ft)*	Flow (cfs)
0.0	22.0	**0.000**
0.2	21.4	**0.017**
0.4	20.8	**0.048**
0.6	20.2	**0.091**
0.8	19.6	**0.143**
1.0	19.0	**0.206**
1.2	18.4	**0.277**
1.4	17.8	**0.359**
1.6	17.2	**0.450**
1.8	16.6	**0.553**
2	16	**0.666**

*L is the AVERAGE flow path length through the weeper based on the depth of the water (h)

$$Q = \frac{h^{3/2} W}{\left[L/D + 2.5 + L^2 \right]^{1/2}}$$

Q = Total flow through dam (cfs)
h = Ponding depth in basin (ft)
W = Total length of dam(ft)
L = Horizontal flow path length (ft)
D = Average rock diameter (ft)

Notes:

This spreadsheet calculates flow using a equation for calculating flow through a stone weeper. It accounts for the variable length (for a trapezoidal weeper) with varying water depths.

The figure above illustrates the individual variables.

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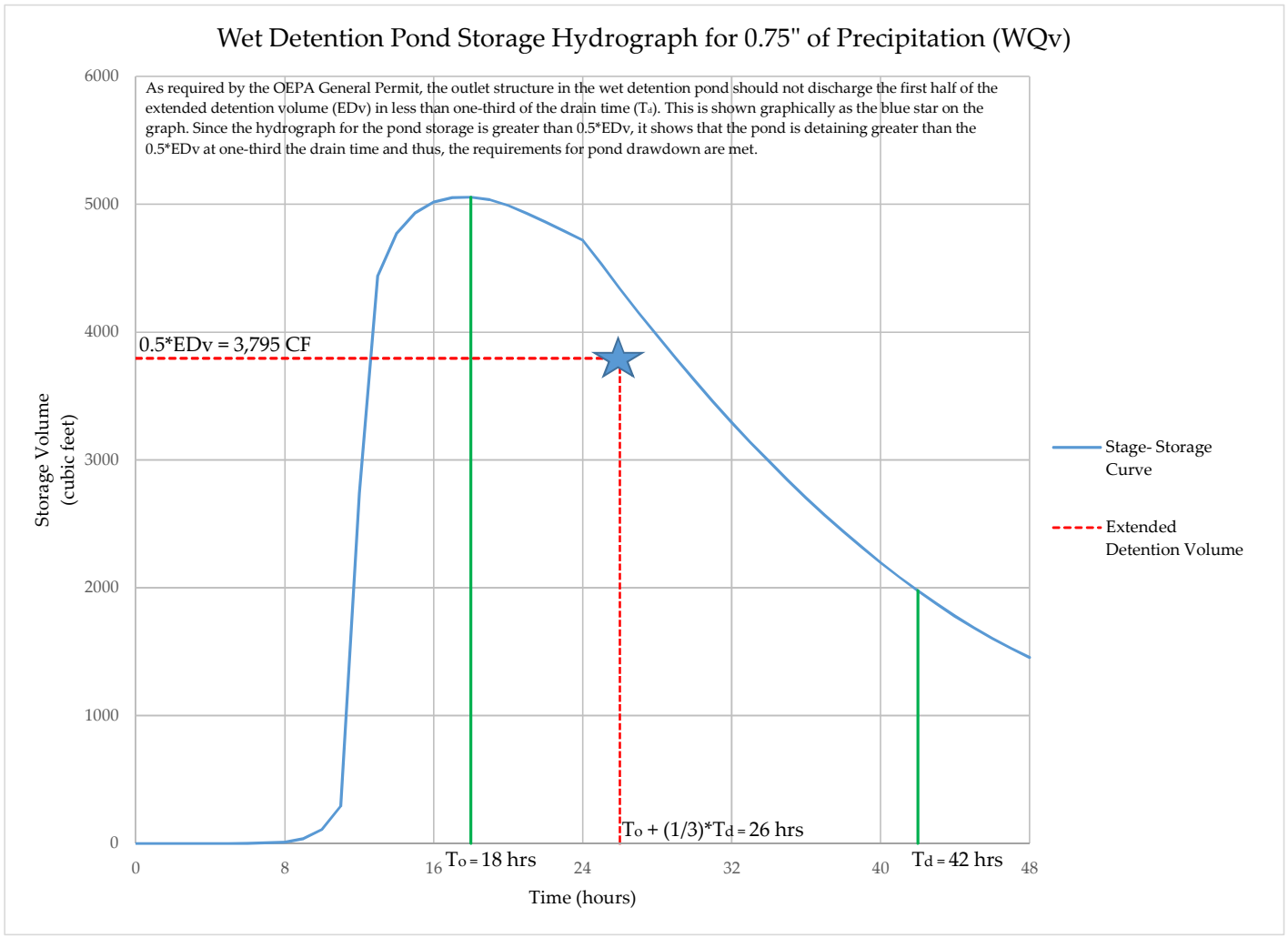
4. Stormwater Management. Massachusetts Dept. of Environmental Protection. Volume Two: Stormwater Technical Handbook. Boston. March 1997.


Wet Detention Pond Storage Hydrograph for 0.75" of Precipitation (WQv)
As required by the OEPA General Permit, the outlet structure in the wet detention pond should not discharge the first half of the extended detention volume (EDv) in less than one-third of the drain time (Td). This is shown graphically as the blue star on the graph. Since the hydrograph for the pond storage is greater than 0.5*EDv, it shows that the pond is detaining greater than the 0.5*EDv at one-third the drain time and thus, the requirements for pond drawdown are met.
0.5*EDv = 3,795 CF
To + (1/3)*Td = 26 hrs
To = 18 hrs
Td = 42 hrs
Storage Volume (cubic feet)
Time (hours)
Stage- Storage Curve
Extended Detention Volume
6000
5000
4000
3000
2000
1000
0
0
8
16
24
32
40
48

APPENDIX D

OHIO EPA PERMIT NO. OHC000004

Issuance Date: April 11, 2013
Effective Date: April 21, 2013
Expiration Date: April 20, 2018

OHIO ENVIRONMENTAL PROTECTION AGENCY

GENERAL PERMIT AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et. seq. hereafter referred to as "the Act") and the Ohio Water Pollution Control Act [Ohio Revised Code ("ORC") Chapter 6111], dischargers of storm water from sites where construction activity is being conducted, as defined in Part I.B of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA," to discharge from the outfalls at the sites and to the receiving surface waters of the state identified in their Notice of Intent ("NOI") application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

It has been determined that a lowering of water quality of various waters of the state associated with granting coverage under this permit is necessary to accommodate important social and economic development in the state of Ohio. In accordance with OAC 3745-1-05, this decision was reached only after examining a series of technical alternatives, reviewing social and economic issues related to the degradation, and considering all public and intergovernmental comments received concerning the proposal.

This permit is conditioned upon payment of applicable fees, submittal of a complete NOI application form and written approval of coverage from the director of Ohio EPA in accordance with Ohio Administrative Code ("OAC") Rule 3745-38-02.

Scott J. Nally
Director

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: Jodi Lassiter Date: 4-11-13

TABLE OF CONTENTS

PART I. COVERAGE UNDER THIS PERMIT

A. Permit Area.

This permit covers the entire State of Ohio.

B. Eligibility.

1. Construction activities covered. Except for storm water discharges identified under Part I.B.2, this permit may cover all new and existing discharges composed entirely of storm water discharges associated with construction activity that enter surface waters of the state or a storm drain leading to surface waters of the state.

   For the purposes of this permit, construction activities include any clearing, grading, excavating, grubbing and/or filling activities that disturb the threshold acreage described in the next paragraph. Discharges from trench dewatering are also covered by this permit as long as the dewatering activity is carried out in accordance with the practices outlined in Part III.G.2.g.iv of this permit.

   Construction activities disturbing one or more acres of total land, or will disturb less than one acre of land but are part of a larger common plan of development or sale that will ultimately disturb one or more acres of land will be eligible for coverage under this permit. The threshold acreage includes the entire area disturbed in the larger common plan of development or sale.

   This permit also authorizes storm water discharges from support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided:

   a. The support activity is directly related to a construction site that is required to have NPDES permit coverage for discharges of storm water associated with construction activity;

   b. The support activity is not a commercial operation serving multiple unrelated construction projects and does not operate beyond the completion of the construction activity at the site it supports;

   c. Appropriate controls and measures are identified in a storm water pollution prevention plan (SWP3) covering the discharges from the support activity; and

   d. The support activity is on or contiguous with the property defined in the NOI (offsite borrow pits and soil disposal areas, which serve only one project, do not have to be contiguous with the construction site).

2. Limitations on coverage. The following storm water discharges associated with construction activity are not covered by this permit:

   a. Storm water discharges that originate from the site after construction activities have been completed, including any temporary support activity, and the site has achieved

final stabilization. Industrial post-construction storm water discharges may need to be covered by an NPDES permit;

b. Storm water discharges associated with construction activity that the director has shown to be or may reasonably expect to be contributing to a violation of a water quality standard; and

c. Storm water discharges authorized by an individual NPDES permit or another NPDES general permit;

3. Waivers. After March 10, 2003, sites whose larger common plan of development or sale have at least one, but less than five acres of land disturbance, which would otherwise require permit coverage for storm water discharges associated with construction activities, may request that the director waive their permit requirement. Entities wishing to request such a waiver must certify in writing that the construction activity meets one of the two waiver conditions:

a. Rainfall Erosivity Waiver. For a construction site to qualify for the rainfall erosivity waiver, the cumulative rainfall erosivity over the project duration must be five or less and the site must be stabilized with a least a 70 percent vegetative cover or other permanent, non-erosive cover. The rainfall erosivity must be calculated according to the method in U.S. EPA Fact Sheet 3.1 Construction Rainfall Erosivity Waiver dated January 2001 and be found at: http://epa.ohio.gov/portals/35/permits/USEPAfact3-1_s.pdf. If it is determined that a construction activity will take place during a time period where the rainfall erosivity factor is less than five, a written waiver certification must be submitted to Ohio EPA at least 21 days before construction activity is scheduled to begin. If the construction activity will extend beyond the dates specified in the waiver certification, the operator must either: (a) recalculate the waiver using the original start date with the new ending date (if the R factor is still less than five, a new waiver certification must be submitted) or (b) submit an NOI application form and fee for coverage under this general permit at least seven days prior to the end of the waiver period; or

b. TMDL (Total Maximum Daily Load) Waiver. Storm water controls are not needed based on a TMDL approved or established by U.S. EPA that addresses the pollutant(s) of concern or, for non-impaired waters that do not require TMDLs, and equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The pollutant(s) of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the director of Ohio EPA that the construction activity will take place, and storm water discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis. A written waiver certification must be submitted to Ohio EPA at least 21 days before the construction activity is scheduled to begin.

4. Prohibition on non-storm water discharges. All discharges covered by this permit must be composed entirely of storm water with the exception of the following: discharges from firefighting activities; fire hydrant flushings; potable water sources including waterline flushings; irrigation drainage; lawn watering; routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; springs; uncontaminated ground water from trench or well point dewatering and foundation or footing drains where flows are not contaminated with process materials such as solvents. Dewatering activities must be done in compliance with Part II.C and Part III.G.2.g.iv of this permit. Discharges of material other than storm water or the authorized non-storm water discharges listed above must comply with an individual NPDES permit or an alternative NPDES general permit issued for the discharge.

   Except for flows from firefighting activities, sources of non-storm water listed above that are combined with storm water discharges associated with construction activity must be identified in the SWP3. The SWP3 must identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

5. Spills and unintended releases (Releases in excess of Reportable Quantities). This permit does not relieve the permittee of the reporting requirements of Title 40 of the Code of Federal Regulations ("CFR") Part 117 and 40 CFR Part 302. In the event of a spill or other unintended release, the discharge of hazardous substances in the storm water discharge(s) from a construction site must be minimized in accordance with the applicable storm water pollution prevention plan for the construction activity and in no case, during any 24-hour period, may the discharge(s) contain a hazardous substance equal to or in excess of reportable quantities.

   40 CFR Part 117 sets forth a determination of the reportable quantity for each substance designated as hazardous in 40 CFR Part 116. The regulation applies to quantities of designated substances equal to or greater than the reportable quantities, when discharged to surface waters of the state. 40 CFR Part 302 designates under section 102(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, those substances in the statutes referred to in section 101(14), identifies reportable quantities for these substances and sets forth the notification requirements for releases of these substances. This regulation also sets forth reportable quantities for hazardous substances designated under section 311(b)(2)(A) of the Clean Water Act (CWA).

C. Requiring an individual NPDES permit or an alternative NPDES general permit.

1. The director may require an alternative permit. The director may require any operator eligible for this permit to apply for and obtain either an individual NPDES permit or coverage under an alternative NPDES general permit in accordance with OAC Rule 3745-38-04. Any interested person may petition the director to take action under this paragraph.

   The director will send written notification that an alternative NPDES permit is required. This notice shall include a brief statement of the reasons for this decision, an application

form and a statement setting a deadline for the operator to file the application. If an operator fails to submit an application in a timely manner as required by the director under this paragraph, then coverage, if in effect, under this permit is automatically terminated at the end of the day specified for application submittal.

2. Operators may request an individual NPDES permit. Any owner or operator eligible for this permit may request to be excluded from the coverage of this permit by applying for an individual permit. The owner or operator shall submit an individual application with reasons supporting the request to the director in accordance with the requirements of 40 CFR 122.26. If the reasons adequately support the request, the director shall grant it by issuing an individual NPDES permit.

3. When an individual NPDES permit is issued to an owner or operator otherwise subject to this permit or the owner or operator is approved for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the effective date of the individual permit or the date of approval for coverage under the alternative general permit, whichever the case may be.

D. Permit requirements when portions of a site are sold

If an operator obtains a permit for a development, and then the operator (permittee) sells off lots or parcels within that development, permit coverage must be continued on those lots until a Notice of Termination (NOT) in accordance with Part IV.B is submitted. For developments which require the use of centralized sediment and erosion controls (i.e., controls that address storm water runoff from one or more lots) for which the current permittee intends to terminate responsibilities under this permit for a lot after sale of the lot to a new owner and such termination will either prevent or impair the implementation of the controls and therefore jeopardize compliance with the terms and conditions of this permit, the permittee will be required to maintain responsibility for the implementation of those controls. For developments where this is not the case, it is the permittee's responsibility to temporarily stabilize all lots sold to individual lot owners unless an exception is approved in accordance with Part III.G.4. In cases where permit responsibilities for individual lot(s) will be terminated after sale of the lot, the permittee shall inform the individual lot owner of the obligations under this permit and ensure that the Individual Lot NOI application is submitted to Ohio EPA.

E. Authorization

1. Obtaining authorization to discharge. Operators that discharge storm water associated with construction activity must submit an NOI application form in accordance with the requirements of Part I.F of this permit to obtain authorization to discharge under this general permit. As required under OAC Rule 3745-38-06(E), the director, in response to the NOI submission, will notify the applicant in writing that he/she has or has not been granted general permit coverage to discharge storm water associated with construction activity under the terms and conditions of this permit or that the applicant must apply for an individual NPDES permit or coverage under an alternate general NPDES permit as described in Part I.C.1.

2. No release from other requirements. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations. Other permit requirements commonly associated with construction activities

include, but are not limited to, section 401 water quality certifications, isolated wetland permits, permits to install sanitary sewers or other devices that discharge or convey polluted water, permits to install drinking water lines, single lot sanitary system permits and disturbance of land which was used to operate a solid or hazardous waste facility (i.e., coverage under this NPDES general permit does not satisfy the requirements of OAC Rule 3745-27-13 or ORC Section 3734.02(H)). The issuance of this permit is subject to resolution of an antidegradation review. This permit does not relieve the permittee of other responsibilities associated with construction activities such as contacting the Ohio Department of Natural Resources, Division of Water, to ensure proper well installation and abandonment of wells.

F. Notice of Intent Requirements

1. Deadlines for notification.

   a. Initial coverage: Operators who intend to obtain initial coverage for a storm water discharge associated with construction activity under this general permit must submit a complete and accurate NOI application form and appropriate fee at least 21 days prior to the commencement of construction activity. If more than one operator, as defined in Part VII of this general permit, will be engaged at a site, each operator shall seek coverage under this general permit. Coverage under this permit is not effective until an approval letter granting coverage from the director of Ohio EPA is received by the applicant. Where one operator has already submitted an NOI prior to other operator(s) being identified, the additional operator shall request modification of coverage to become a co-permittee. In such instances, the co-permittees shall be covered under the same facility permit number. No additional permit fee is required.

   b. Individual lot transfer of coverage: Operators must each submit an individual lot notice of intent (Individual Lot NOI) application form (no fee required) to Ohio EPA at least seven days prior to the date that they intend to accept responsibility for permit requirements for their portion of the original permitted development from the previous permittee. The original permittee may submit an Individual Lot NOT at the time the Individual Lot NOI is submitted. Transfer of permit coverage is not granted until an approval letter from the director of Ohio EPA is received by the applicant.

2. Failure to notify. Operators who fail to notify the director of their intent to be covered and who discharge pollutants to surface waters of the state without an NPDES permit are in violation of ORC Chapter 6111. In such instances, Ohio EPA may bring an enforcement action for any discharges of storm water associated with construction activity.

3. Where to submit an NOI. Operators seeking coverage under this permit must submit a signed NOI form, provided by Ohio EPA, to the address found in the associated instructions.

4. Additional notification. NOIs and SWP3s are considered public documents and shall be made available to the public in accordance with Part III.C.2. The permittee shall make NOIs and SWP3s available upon request of the director of Ohio EPA, local agencies approving sediment and erosion control plans, grading plans or storm water management plans, local governmental officials, or operators of municipal separate storm sewer systems (MS4s) receiving drainage from the permitted site. Each operator

that discharges to an NPDES permitted MS4 shall provide a copy of its Ohio EPA NOI submission to the MS4 in accordance with the MS4's requirements, if applicable.

5. Re-notification. Existing permittees having coverage under the previous generations of this general permit (OHC000003, OHC000002 and OHR100000) shall have continuing coverage under OHC000004 with the submittal of a timely renewal application. Existing permittees will receive a renewal application and instructions for how to continue coverage under OHC000004. Within 90 days of receiving a renewal application from Ohio EPA, existing permittees shall submit the completed renewal application expressing their intent for continued coverage. In accordance with Ohio Administrative Code (OAC) 3745-38-02(E)(2)(a)(i), a renewal application fee will only apply to existing permittees having general permit coverage for 5 or more years as of the effective date of this general permit. Permit coverage will be terminated if Ohio EPA does not receive the renewal application within this 90 day period.

Part II. NON-NUMERIC EFFLUENT LIMITATIONS

You shall comply with the following non-numeric effluent limitations for discharges from your site and/or from construction support activities. Part III of this permit contains the specific design criteria to meet the objectives of the following non-numeric effluent limitations.

A. Erosion and Sediment Controls. You shall design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, such controls shall be designed, installed and maintained to:

1. Control storm water volume and velocity within the site to minimize soil erosion;

2. Control storm water discharges, including both peak flowrates and total storm water volume, to minimize erosion at outlets and to minimize downstream channel and streambank erosion;

3. Minimize the amount of soil exposed during construction activity;

4. Minimize the disturbance of steep slopes;

5. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls shall address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting storm water runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;

6. If feasible, provide and maintain a 50-foot undisturbed natural buffer around surface waters of the state, direct storm water to vegetated areas to increase sediment removal and maximize storm water infiltration. If it is infeasible to provide and maintain an undisturbed 50-foot natural buffer, you shall comply with the stabilization requirements found in Part II.B for areas within 50 feet of a surface water; and

7. Minimize soil compaction and, unless infeasible, preserve topsoil.

B. **Soil Stabilization**. Stabilization of disturbed areas shall, at a minimum, be initiated in accordance with the time frames specified in the following tables.

Table 1: Permanent Stabilization

Area requiring permanent stabilization	Time frame to apply erosion controls
Any areas that will lie dormant for one year or more	Within seven days of the most recent disturbance
Any areas within 50 feet of a surface water of the state and at final grade	Within two days of reaching final grade
Any other areas at final grade	Within seven days of reaching final grade within that area

Table 2: Temporary Stabilization

Area requiring temporary stabilization	Time frame to apply erosion controls
Any disturbed areas within 50 feet of a surface water of the state and not at final grade	Within two days of the most recent disturbance if the area will remain idle for more than 14 days
For all construction activities, any disturbed areas that will be dormant for more than 14 days but less than one year, and not within 50 feet of a surface water of the state	Within seven days of the most recent disturbance within the area For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of permit coverage for the individual lot(s).
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed. Permanent and temporary stabilization are defined in Part VII.

C. **Dewatering.** Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls.

D. **Pollution Prevention Measures.** Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, such measures must be designed, installed, implemented and maintained to:

1. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters shall be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;

2. Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to storm water; and

3. Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.

E. Prohibited Discharges. The following discharges are prohibited:

1. Wastewater from washout of concrete, unless managed by an appropriate control;

2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

3. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance; and

4. Soaps or solvents used in vehicle and equipment washing.

F. Surface Outlets. When discharging from sediment basins utilize outlet structures that withdraw water from the surface, unless infeasible. (Note: Ohio EPA believes that the circumstances in which it is infeasible to design outlet structures in this manner are rare. Exceptions may include time periods with extended cold weather during winter months. If you have determined that it is infeasible to meet this requirement, you shall provide documentation in your SWP3 to support your determination.)

PART III. STORM WATER POLLUTION PREVENTION PLAN (SWP3)

A. Storm Water Pollution Prevention Plans.

A SWP3 shall be developed for each site covered by this permit. For a multi-phase construction project, a separate NOI shall be submitted when a separate SWP3 will be prepared for subsequent phases. SWP3s shall be prepared in accordance with sound engineering and/or conservation practices by a professional experienced in the design and implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction. The SWP3 shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with construction activities. The SWP3 shall be a comprehensive, stand-alone document, which is not complete unless it contains the information required by Part III.G of this permit. In addition, the SWP3 shall describe and ensure the implementation of best management practices (BMPs) that reduce the pollutants in storm water discharges during construction and pollutants associated with post-construction activities to ensure compliance with ORC Section 6111.04, OAC Chapter 3745-1 and the terms and conditions of this permit.

B. Timing

A SWP3 shall be completed prior to the timely submittal of an NOI and updated in accordance with Part III.D. Upon request and good cause shown, the director may waive the requirement to have a SWP3 completed at the time of NOI submission. If a waiver has been granted, the

SWP3 must be completed prior to the initiation of construction activities. The SWP3 must be implemented upon initiation of construction activities.

If you wish to continue coverage from the previous generations of this permit (OHR100000, OHC000002 and OHC000003) you shall review and update your SWP3 to ensure that this permit's requirements are addressed within 180 days after the effective date of this permit. If it is infeasible for you to comply with a specific requirement in this permit because (1) the provision was not part of the permit you were previously covered under (OHR100000, OHC000002 and OHC000003), and (2) because you are prevented from compliance due to the nature or location of earth disturbances that commenced prior to the effective date of this permit, you shall include documentation within your SWP3 of the reasons why it is infeasible for you to meet the specific requirement. (Note: Ohio EPA believes examples of OHC000004 permit conditions that would be infeasible for permittees renewing coverage to comply with include: (1) Post-Construction Storm Water Management requirements, if general permit coverage was obtained prior to April 21, 2003, and (2) Sediment settling pond design requirements, if the general permit coverage was obtained prior to the effective date of this permit and the sediment settling pond has been installed.)

C. SWP3 Signature and Review.

1. Plan Signature and Retention On-Site. The SWP3 shall include the certification in Part V.H, be signed in accordance with Part V.G., and be retained on site during working hours.

2. Plan Availability

   a. On-site: The plan shall be made available immediately upon request of the director or his authorized representative and MS4 operators or their authorized representative during working hours. A copy of the NOI and letter granting permit coverage under this general permit also shall be made available at the site.

   b. By written request: The permittee must provide the most recent copy of the SWP3 within 10 days upon written request by any of the following:

      i. The director or the director's authorized representative;

      ii. A local agency approving sediment and erosion plans, grading plans or storm water management plans; or

      iii. In the case of a storm water discharge associated with construction activity which discharges through a municipal separate storm sewer system with an NPDES permit, to the operator of the system.

   c. To the public: All NOIs, general permit approval for coverage letters, and SWP3s are considered reports that shall be available to the public in accordance with the Ohio Public Records law. The permittee shall make documents available to the public upon request or provide a copy at public expense, at cost, in a timely manner. However, the permittee may claim to Ohio EPA any portion of an SWP3 as confidential in accordance with Ohio law.

3. Plan Revision. The director or authorized representative may notify the permittee at any time that the SWP3 does not meet one or more of the minimum requirements of this part. Within 10 days after such notification from the director or authorized representative (or as otherwise provided in the notification), the permittee shall make the required changes to the SWP3 and, if requested, shall submit to Ohio EPA the revised SWP3 or a written certification that the requested changes have been made.

D. Amendments

The permittee shall amend the SWP3 whenever there is a change in design, construction, operation or maintenance, which has a significant effect on the potential for the discharge of pollutants to surface waters of the state or if the SWP3 proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity. Amendments to the SWP3 may be reviewed by Ohio EPA in the same manner as Part III.C.

E. Duty to inform contractors and subcontractors

The permittee shall inform all contractors and subcontractors not otherwise defined as "operators" in Part VII of this general permit who will be involved in the implementation of the SWP3 of the terms and conditions of this general permit. The permittee shall maintain a written document containing the signatures of all contractors and subcontractors involved in the implementation of the SWP3 as proof acknowledging that they reviewed and understand the conditions and responsibilities of the SWP3. The written document shall be created and signatures shall be obtained prior to commencement of work on the construction site.

F. Total Maximum Daily Load (TMDL) allocations

If a TMDL is approved for any waterbody into which the permittee's site discharges and requires specific BMPs for construction sites, the director may require the permittee to revise his/her SWP3.

G. SWP3 Requirements

Operations that discharge storm water from construction activities are subject to the following requirements and the SWP3 shall include the following items:

1. Site description. Each SWP3 shall provide:

    a. A description of the nature and type of the construction activity (e.g., low density residential, shopping mall, highway, etc.);

    b. Total area of the site and the area of the site that is expected to be disturbed (i.e., grubbing, clearing, excavation, filling or grading, including off-site borrow areas);

    c. An estimate of the impervious area and percent imperviousness created by the construction activity;

d. A calculation of the runoff coefficients for both the pre-construction and post-construction site conditions;

e. Existing data describing the soil and, if available, the quality of any discharge from the site;

f. A description of prior land uses at the site;

g. An implementation schedule which describes the sequence of major construction operations (i.e., designation of vegetative preservation areas, grubbing, excavating, grading, utilities and infrastructure installation) and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence;

h. The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water(s) and the areal extent and description of wetlands or other special aquatic sites at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project. For discharges to an MS4, the point of discharge to the MS4 and the location where the MS4 ultimately discharges to a stream or surface water of the state shall be indicated;

i. For subdivided developments where the SWP3 does not call for a centralized sediment control capable of controlling multiple individual lots, a detail drawing of a typical individual lot showing standard individual lot erosion and sediment control practices.

   This does not remove the responsibility to designate specific erosion and sediment control practices in the SWP3 for critical areas such as steep slopes, stream banks, drainage ways and riparian zones;

j. Location and description of any storm water discharges associated with dedicated asphalt and dedicated concrete plants covered by this permit and the best management practices to address pollutants in these storm water discharges;

k. A copy of the permit requirements (attaching a copy of this permit is acceptable);

l. A cover page or title identifying the name and location of the site, the name and contact information of all construction site operators, the name and contact information for the person responsible for authorizing and amending the SWP3, preparation date, and the estimated dates that construction will start and be complete;

m. A log documenting grading and stabilization activities as well as amendments to the SWP3, which occur after construction activities commence; and

n. Site map showing:

i. Limits of earth-disturbing activity of the site including associated off-site borrow or spoil areas that are not addressed by a separate NOI and associated SWP3;

ii. Soils types for all areas of the site, including locations of unstable or highly erodible soils;

iii. Existing and proposed contours. A delineation of drainage watersheds expected during and after major grading activities as well as the size of each drainage watershed, in acres;

iv. Surface water locations including springs, wetlands, streams, lakes, water wells, etc., on or within 200 feet of the site, including the boundaries of wetlands or stream channels and first subsequent named receiving water(s) the permittee intends to fill or relocate for which the permittee is seeking approval from the Army Corps of Engineers and/or Ohio EPA;

v. Existing and planned locations of buildings, roads, parking facilities and utilities;

vi. The location of all erosion and sediment control practices, including the location of areas likely to require temporary stabilization during the course of site development;

vii. Sediment and storm water management basins noting their sediment settling volume and contributing drainage area. Ohio EPA recommends the use of data sheets (see ODNR's Rainwater and Land Development manual for examples) to provide data for all sediment traps, sediment basins and storm water management treatment practices noting important inputs to design and resulting parameters such as their contributing drainage area, disturbed area, water quality volume, sedimentation volume, practice surface area, facility discharge and dewatering time, outlet type and dimensions;

viii. The location of permanent storm water management practices to be used to control pollutants in storm water after construction operations have been completed;

ix. Areas designated for the storage or disposal of solid, sanitary and toxic wastes, including dumpster areas, areas designated for cement truck washout, and vehicle fueling;

x. The location of designated construction entrances where the vehicles will access the construction site; and

xi. The location of any in-stream activities including stream crossings.

2. Controls. In accordance with Part II.A, the SWP3 shall contain a description of the controls appropriate for each construction operation covered by this permit and the operator(s) shall implement such controls. The SWP3 shall clearly describe for each

major construction activity identified in Part III.G.1.g: (a) appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented; and (b) which contractor is responsible for implementation (e.g., contractor A will clear land and install perimeter controls and contractor B will maintain perimeter controls until final stabilization). The SWP3 shall identify the subcontractors engaged in activities that could impact storm water runoff. The SWP3 shall contain signatures from all of the identified subcontractors indicating that they have been informed and understand their roles and responsibilities in complying with the SWP3. Ohio EPA recommends that the primary site operator review the SWP3 with the primary contractor prior to commencement of construction activities and keep a SWP3 training log to demonstrate that this review has occurred.

Ohio EPA recommends that the erosion, sediment, and storm water management practices used to satisfy the conditions of this permit should meet the standards and specifications in the most current edition of Ohio's Rainwater and Land Development (see definitions) manual or other standards acceptable to Ohio EPA. The controls shall include the following minimum components:

a. Non-Structural Preservation Methods. The SWP3 shall make use of practices which preserve the existing natural condition as much as feasible. Such practices may include: preserving existing vegetation and vegetative buffer strips, phasing of construction operations in order to minimize the amount of disturbed land at any one time and designation of tree preservation areas or other protective clearing or grubbing practices. For all construction activities immediately adjacent to surface waters of the state, the permittee shall comply with the buffer non-numeric effluent limitation in Part II.A.6, as measured from the ordinary high water mark of the surface water.

b. Erosion Control Practices. The SWP3 shall make use of erosion controls that are capable of providing cover over disturbed soils unless an exception is approved in accordance with Part III.G.4. A description of control practices designed to restabilize disturbed areas after grading or construction shall be included in the SWP3. The SWP3 shall provide specifications for stabilization of all disturbed areas of the site and provide guidance as to which method of stabilization will be employed for any time of the year. Such practices may include: temporary seeding, permanent seeding, mulching, matting, sod stabilization, vegetative buffer strips, phasing of construction operations, use of construction entrances and the use of alternative ground cover.

    i. **Stabilization.** Disturbed areas shall be stabilized in accordance with Table 1 (Permanent Stabilization) and Table 2 (Temporary Stabilization) in Part II.B of this permit.

    ii. **Permanent stabilization of conveyance channels**. Operators shall undertake special measures to stabilize channels and outfalls and prevent erosive flows. Measures may include seeding, dormant seeding (as defined in the most current edition of the Rainwater and Land Development manual), mulching, erosion control matting, sodding, riprap, natural channel design with bioengineering techniques or rock check dams.

c. Runoff Control Practices. The SWP3 shall incorporate measures which control the flow of runoff from disturbed areas so as to prevent erosion from occurring. Such practices may include rock check dams, pipe slope drains, diversions to direct flow away from exposed soils and protective grading practices. These practices shall divert runoff away from disturbed areas and steep slopes where practicable. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.

d. Sediment Control Practices. The plan shall include a description of structural practices that shall store runoff allowing sediments to settle and/or divert flows away from exposed soils or otherwise limit runoff from exposed areas. Structural practices shall be used to control erosion and trap sediment from a site remaining disturbed for more than 14 days. Such practices may include, among others: sediment settling ponds, silt fences, earth diversion dikes or channels which direct runoff to a sediment settling pond and storm drain inlet protection. All sediment control practices must be capable of ponding runoff in order to be considered functional. Earth diversion dikes or channels alone are not considered a sediment control practice unless those are used in conjunction with a sediment settling pond.

The SWP3 shall contain detail drawings for all structural practices.

i. **Timing.** Sediment control structures shall be functional throughout the course of earth disturbing activity. Sediment basins and perimeter sediment barriers shall be implemented prior to grading and within seven days from the start of grubbing. They shall continue to function until the up slope development area is restabilized. As construction progresses and the topography is altered, appropriate controls shall be constructed or existing controls altered to address the changing drainage patterns.

ii. **Sediment settling ponds.** A sediment settling pond is required for any one of the following conditions:

- Concentrated storm water runoff (e.g., storm sewer or ditch);
- Runoff from drainage areas, which exceed the design capacity of silt fence or other sediment barriers;
- Runoff from drainage areas that exceed the design capacity of inlet protection; or
- Runoff from common drainage locations with 10 or more acres of disturbed land.

The permittee may request approval from Ohio EPA to use alternative controls if the permittee can demonstrate the alternative controls are equivalent in effectiveness to a sediment settling pond.

In accordance with Part II.F, if feasible, sediment settling ponds shall be dewatered at the pond surface using a skimmer or equivalent device. The sediment settling pond volume consists of both a dewatering zone and a sediment storage zone. The volume of the dewatering zone shall

be a minimum of 1800 cubic feet (ft^3) per acre of drainage (67 yd^3/acre) with a minimum 48-hour drain time for sediment basins serving a drainage area over 5 acres. The volume of the sediment storage zone shall be calculated by one of the following methods:

Method 1: The volume of the sediment storage zone shall be 1000 ft^3 per disturbed acre within the watershed of the basin. OR

Method 2: The volume of the sediment storage zone shall be the volume necessary to store the sediment as calculated with RUSLE or a similar generally accepted erosion prediction model.

The accumulated sediment shall be removed from the sediment storage zone once it's full. When determining the total contributing drainage area, off-site areas and areas which remain undisturbed by construction activity shall be included unless runoff from these areas is diverted away from the sediment settling pond and is not co-mingled with sediment-laden runoff. The depth of the dewatering zone shall be less than or equal to five feet. The configuration between inlets and the outlet of the basin shall provide at least two units of length for each one unit of width (> 2:1 length:width ratio); however, a length to width ratio of 4:1 is recommended. When designing sediment settling ponds, the permittee shall consider public safety, especially as it relates to children, as a design factor for the sediment basin and alternative sediment controls shall be used where site limitations would preclude a safe design. The use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal is encouraged.

iii. **Silt Fence and Diversions.** Sheet flow runoff from denuded areas shall be intercepted by silt fence or diversions to protect adjacent properties and water resources from sediment transported via sheet flow. Where intended to provide sediment control, silt fence shall be placed on a level contour downslope of the disturbed area. This permit does not preclude the use of other sediment barriers designed to control sheet flow runoff. The relationship between the maximum drainage area to silt fence for a particular slope range is shown in the following table:

Silt Fence Maximum Drainage Area Based on Slope

Maximum drainage area (in acres) to 100 linear feet of silt fence	**Range of slope for a particular drainage area (in percent)**
0.5	< 2%
0.25	≥ 2% but < 20%
0.125	≥ 20% but < 50%

Placing silt fence in a parallel series does not extend the size of the drainage area. Storm water diversion practices shall be used to keep runoff away from disturbed areas and steep slopes where practicable. Such devices, which include swales, dikes or berms, may receive storm water runoff from areas up to 10 acres.

iv. **Inlet Protection.** Other erosion and sediment control practices shall minimize sediment laden water entering active storm drain systems, unless the storm drain system drains to a sediment settling pond. All inlets receiving runoff from drainage areas of one or more acres will require a sediment settling pond.

v. **Surface Waters of the State Protection.** If construction activities disturb areas adjacent to surface waters of the state, structural practices shall be designed and implemented on site to protect all adjacent surface waters of the state from the impacts of sediment runoff. No structural sediment controls (e.g., the installation of silt fence or a sediment settling pond) shall be used in a surface water of the state. For all construction activities immediately adjacent to surface waters of the state, the permittee shall comply with the buffer non-numeric effluent limitation in Part II.A.6, as measured from the ordinary high water mark of the surface water. Where impacts within this buffer area are unavoidable, due to the nature of the construction (e.g., stream crossings for roads or utilities), the project shall be designed such that the number of stream crossings and the width of the disturbance within the buffer area are minimized.

vi. **Modifying Controls**. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee shall replace or modify the control for site conditions.

e. Post-Construction Storm Water Management Requirements. So that receiving stream's physical, chemical and biological characteristics are protected and stream functions are maintained, post-construction storm water practices shall provide perpetual management of runoff quality and quantity. To meet the post-construction requirements of this permit, the SWP3 shall contain a description of the post-construction BMPs that will be installed during construction for the site and the rationale for their selection. The rationale shall address the anticipated impacts on the channel and floodplain morphology, hydrology, and water quality. Post-construction BMPs cannot be installed within a surface water of the state (e.g., wetland or stream) unless it's authorized by a CWA 401 water quality certification, CWA 404 permit, or Ohio EPA non-jurisdictional wetland/stream program approval. Note: localities may have more stringent post-construction requirements.

Detail drawings and maintenance plans shall be provided for all post-construction BMPs. Maintenance plans shall be provided by the permittee to the post-construction operator of the site (including homeowner associations) upon completion of construction activities (prior to termination of permit coverage). For sites located within a community with a regulated municipal separate storm sewer system (MS4), the permittee, land owner, or other entity with legal control of the property may be required to develop and implement a maintenance plan to comply with the requirements of the MS4. Maintenance plans shall ensure that pollutants collected within structural post-construction practices, be disposed of in accordance with local, state, and federal regulations. To ensure that storm water management systems function as they were designed and constructed, the post-construction operation and maintenance plan shall be a stand-alone

document, which contains: (1) a designated entity for storm water inspection and maintenance responsibilities; (2) the routine and non-routine maintenance tasks to be undertaken; (3) a schedule for inspection and maintenance; (4) any necessary legally binding maintenance easements and agreements; and (5) a map showing all access and maintenance easements. Permittees are not responsible under this permit for operation and maintenance of post-construction practices once coverage under this permit is terminated.

Post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves, need authorization under a separate NPDES permit (one example is storm water discharges from regulated industrial sites).

Construction activities that do not include the installation of any impervious surface (e.g., soccer fields), abandoned mine land reclamation activities regulated by the Ohio Department of Natural Resources, stream and wetland restoration activities, and wetland mitigation activities are not required to comply with the conditions of Part III.G.2.e of this permit. Linear construction projects, (e.g., pipeline or utility line installation), which do not result in the installation of additional impervious surface, are not required to comply with the conditions of Part III.G.2.e of this permit. However, linear construction projects shall be designed to minimize the number of stream crossings and the width of disturbance and achieve final stabilization of the disturbed area as defined in Part VII.J.1.

Large Construction Activities. For all large construction activities (involving the disturbance of five or more acres of land or will disturb less than five acres, but is a part of a larger common plan of development or sale which will disturb five or more acres of land), the post construction BMP(s) chosen shall be able to detain storm water runoff for protection of the stream channels, stream erosion control, and improved water quality. The BMP(s) chosen must be compatible with site and soil conditions. Structural post-construction storm water treatment practices shall be incorporated into the permanent drainage system for the site. The BMP(s) chosen must be sized to treat the water quality volume (WQ_v) and ensure compliance with Ohio's Water Quality Standards in OAC Chapter 3745-1. The WQ_v shall be equivalent to the volume of runoff from a 0.75-inch rainfall and shall be determined according to the following equation:

$WQ_v = C * P * A / 12$

where:

WQ_v = water quality volume in acre-feet

C = runoff coefficient appropriate for storms less than 1 inch

(Either use the following formula: $C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$, where i = fraction of post-construction impervious surface or use Table 1)

P = 0.75 inch precipitation depth

A = area draining into the BMP in acres

Table 1
Runoff Coefficients Based on the Type of Land Use

Land Use	Runoff Coefficient
Industrial & Commercial	0.8
High Density Residential (>8 dwellings/acre)	0.5
Medium Density Residential (4 to 8 dwellings/acre)	0.4
Low Density Residential (<4 dwellings/acre)	0.3
Open Space and Recreational Areas	0.2

Where the land use will be mixed, the runoff coefficient should be calculated using a weighted average. For example, if 60% of the contributing drainage area to the storm water treatment structure is Low Density Residential, 30% is High Density Residential, and 10% is Open Space, the runoff coefficient is calculated as follows (0.6)(0.3) + (0.3)(0.5) + (0.1)(0.2) = 0.35.

An additional volume equal to 20 percent of the WQ_v shall be incorporated into the BMP for sediment storage. Ohio EPA recommends that BMPs be designed according to the methodology included in the most current edition of the Rainwater and Land Development manual or in another design manual acceptable for use by Ohio EPA.

The BMPs listed in Table 2 below shall be considered standard BMPs approved for general use. However communities with a regulated MS4 may limit the use of some of these BMPs. BMPs shall be designed such that the drain time is long enough to provide treatment, but short enough to provide storage for successive rainfall events and avoid the creation of nuisance conditions. The outlet structure for the post-construction BMP shall not discharge more than the first half of the WQv or extended detention volume (EDv) in less than one-third of the drain time. The EDv is the volume of storm water runoff that must be detained by a structural post-construction BMP. The EDv is equal to 75 percent of the WQv for wet extended detention basins, but is equal to the WQv for all other BMPs listed in Table 2.

Table 2
Structural Post-Construction BMPs & Associated Drain (Drawdown) Times

Best Management Practice	Drain Time of WQv
Infiltration Basin or Trench[1]	48 hours
Permeable Pavement – Infiltration[1]	48 hours
Permeable Pavement – Extended Detention	24 hours
Dry Extended Detention Basin[2]	48 hours
Wet Extended Detention Basin[3]	24 hours
Constructed Wetland (above permanent pool)[4]	24 hours
Sand & Other Media Filtration[5]	24 hours
Bioretention Area/Cell[5,6]	24 hours
Pocket Wetland[7]	24 hours

[1] Practices that are designed to fully infiltrate the WQv (basin, trench, permeable pavement) shall empty within 48 hours to provide storage for the subsequent storm events.
[2] Dry basins must include forebay and micropool each sized at 10% of the WQv.
[3] Provide both a permanent pool and an EDv above the permanent pool, each sized at 0.75 WQv.
[4] Extended detention shall be provided for the WQv above the permanent water pool.
[5] The surface ponding area (WQv) shall completely empty within 24 hours so that there is no standing water. Shorter drawdown times are acceptable as long as design criteria in Ohio's Rainwater and Land Development manual have been met.
[6] This would include Grassed Linear Bioretention which was previously called Enhanced Water Quality Swale.
[7] Pocket wetlands must have a wet pool equal to the WQv, with 25% of the WQv in a pool and 75% in marshes. The EDv above the permanent pool must be equal to the WQv.

The permittee may request approval from Ohio EPA to use alternative structural post-construction BMPs if the permittee can demonstrate that the alternative BMPs are equivalent in effectiveness to those listed in Table 2 above. Construction activities shall be exempt from this condition if it can be demonstrated that the WQ_v is provided within an existing structural post-construction BMP that is part of a larger common plan of development or if structural post-construction BMPs are addressed in a regional or local storm water management plan. A municipally operated regional storm water BMP can be used as a post-construction BMP provided that the BMP can detain the WQv from its entire drainage area and release it over a 24 hour period.

Transportation Projects. The construction of new roads and roadway improvement projects by public entities (i.e., the state, counties, townships, cities, or villages) may implement post-construction BMPs in compliance with the current version (as of the effective date of this permit) of the Ohio Department of Transportation's "Location and Design Manual, Volume Two Drainage Design" that has been accepted by Ohio EPA as an alternative to the conditions of this permit.

Offsite Mitigation of Post-Construction. Ohio EPA may authorize the offsite mitigation of the post-construction requirements of Part III.G.2.e of this permit on a case by case basis provided the permittee clearly demonstrates the BMPs listed in Table 2 are not feasible and the following criteria is met: (1) a maintenance agreement or policy is established to ensure operations and treatment in perpetuity; (2) the offsite location discharges to the same HUC-14 watershed unit; and (3) the mitigation ratio of the WQv is 1.5 to 1 or the WQv at the point of retrofit, whichever is greater. Requests for offsite mitigation must be received prior to receipt of the NOI applications.

Redevelopment Projects Sites that have been previously developed where no post-construction BMPs were installed shall either ensure a 20 percent net reduction of the site impervious area, provide for treatment of at least 20 percent of the WQv, or a combination of the two. A one-for-one credit towards the 20 percent net reduction of impervious area can be obtained through the use of green roofs. Where projects are a combination of new development and redevelopment, the total WQv that must be treated shall be calculated by a weighted average based on acreage, with the new development at 100 percent WQv and redevelopment at 20 percent WQv.

Non-Structural Post-Construction BMPs The size of the structural post-construction can be reduced by incorporating non-structural post-construction BMPs into the design. Practices such as preserving open space will reduce the runoff coefficient and, thus, the WQv. Ohio EPA encourages the implementation of riparian and wetland setbacks. Practices which reduce storm water runoff include green roofs, rain barrels, conservation development, smart growth, low-impact development, and other site design techniques. For examples, see the Ohio Lake Erie Commission's Balanced Growth Program at http://balancedgrowth.ohio.gov/.

In order to promote the implementation of such practices, the Director may consider the use of non-structural practices to demonstrate compliance with Part III.G.2.e of this permit for areas of the site not draining into a common drainage system of the site, i.e., sheet flow from perimeter areas such as the rear yards of residential lots, for low density development scenarios, or where the permittee can demonstrate that the intent of pollutant removal and stream protection, as required in Part III.G.2.e of this permit is being addressed through non-structural post-construction BMPs based upon review and approval by Ohio EPA.

Use of Alternative Post-Construction BMPs This permit does not preclude the use of innovative or experimental post-construction storm water management technologies. However, the Director may require these practices to be tested using the protocol outlined in the Technology Acceptance Reciprocity Partnership's (TARP) Protocol for Stormwater Best Management Practice Demonstrations or other approvable protocol. For guidance, see the following:

- http://www.njstormwater.org
- http://www.mastep.net/

The Director may require discharges from such structures to be monitored to ensure compliance with Part III.G.2.e of this permit. Permittees shall request

approval from Ohio EPA to use alternative post-construction BMPs if the permittee can demonstrate that the alternative BMPs are equivalent in effectiveness to those listed in Table 2 above. To demonstrate this equivalency, the permittee shall show that the alternative BMP has a minimum total suspended solids (TSS) removal efficiency of 80 percent under both laboratory and field conditions. Tests shall be conducted by an independent, third party tester. Also, the WQv discharge rate from the practice shall be reduced to prevent stream bed erosion and protect the physical and biological stream integrity unless there will be negligible hydrological impact to the receiving surface water of the state. The discharges will have a negligible impact if the permittee can demonstrate that one of the following four conditions exist:

i. The entire WQv is recharged to groundwater;
ii. The larger common plan of development or sale will create less than one acre of impervious surface;
iii. The project is a redevelopment project within an ultra-urban setting (i.e., a downtown area or on a site where 100 percent of the project area is already impervious surface and the storm water discharge is directed into an existing storm sewer system); or
iv. The storm water drainage system of the development discharges directly into a large river (fourth order or greater) or to a lake and where the development area is less than 5 percent of the watershed area upstream of the development site, unless a TMDL identified water quality problems into the receiving surface waters of the state.

The Director shall only consider the use of alternative BMPs on projects where the permittee can demonstrate that the implementation of the BMPs listed in Table 2 is infeasible due to physical site constraints that prevent the ability to provide functional BMP design. Alternative practices may include, but are not limited to, underground detention structures, vegetated swales and vegetated filter strips designed using water quality flow, natural depressions, rain barrels, green roofs, rain gardens, catch basin inserts, and hydrodynamics separators. The Director may also consider non-structural post-construction approaches where no local requirements for such practices exist.

Small Construction Activities For all small land disturbance activities (which disturb one or more, but less than five acres of land and is not a part of a larger common plan of development or sale which will disturb five or more acres of land), a description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed must be included in the SWP3. Structural measures should be placed on upland soils to the degree attainable. Such practices may include, but are not limited to: storm water detention structures (including wet basins); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (which combine several practices). The SWP3 shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed pre-development levels.

f. Surface Water Protection. If the project site contains any streams, rivers, lakes, wetlands or other surface waters, certain construction activities at the site may be regulated under the CWA and/or state isolated wetland permit requirements. Sections 404 and 401 of the Act regulate the discharge of dredged or fill material into surface waters and the impacts of such activities on water quality, respectively. Construction activities in surface waters which may be subject to CWA regulation and/or state isolated wetland permit requirements include, but are not limited to: sewer line crossings, grading, backfilling or culverting streams, filling wetlands, road and utility line construction, bridge installation and installation of flow control structures. If the project contains streams, rivers, lakes or wetlands or possible wetlands, the permittee shall contact the appropriate U.S. Army Corps of Engineers District Office. (CAUTION: Any area of seasonally wet hydric soil is a potential wetland - please consult the Soil Survey and list of hydric soils for your County, available at your county's Soil and Water Conservation District. If you have any questions about Section 401 water quality certification, please contact the Ohio Environmental Protection Agency, Section 401 Coordinator.)

U.S. Army Corps of Engineers (Section 404 regulation):

- Huntington, WV District (304) 399-5210 (Muskingum River, Hocking River, Scioto River, Little Miami River, and Great Miami River Basins)
- Buffalo, NY District (716) 879-4330 (Lake Erie Basin)
- Pittsburgh, PA District (412) 395-7155 (Mahoning River Basin)
- Louisville, KY District (502) 315-6686 (Ohio River)

Ohio EPA 401/404 and non-jurisdictional stream/wetland coordinator can be contacted at (614) 644-2001 (all of Ohio)

Concentrated storm water runoff from BMPs to natural wetlands shall be converted to diffuse flow before the runoff enters the wetlands. The flow should be released such that no erosion occurs downslope. Level spreaders may need to be placed in series, particularly on steep sloped sites, to ensure non-erosive velocities. Other structural BMPs may be used between storm water features and natural wetlands, in order to protect the natural hydrology, hydroperiod, and wetland flora. If the applicant proposes to discharge to natural wetlands, a hydrologic analysis shall be performed. The applicant shall attempt to match the pre-development hydroperiods and hydrodynamics that support the wetland. The applicant shall assess whether their construction activity will adversely impact the hydrologic flora and fauna of the wetland. Practices such as vegetative buffers, infiltration basins, conservation of forest cover, and the preservation of intermittent streams, depressions, and drainage corridors may be used to maintain wetland hydrology.

g. Other controls.

i. **Non-Sediment Pollutant Controls.** In accordance with Part II.E, no solid (other than sediment) or liquid waste, including building materials, shall be discharged in storm water runoff. The permittee must implement all necessary BMPs to prevent the discharge of non-sediment pollutants to the drainage system of the site or surface waters of the state. Under

no circumstance shall wastewater from the washout of concrete trucks, stucco, paint, form release oils, curing compounds, and other construction materials be discharged directly into a drainage channel, storm sewer or surface waters of the state. Also, no pollutants from vehicle fuel, oils, or other vehicle fluids can be discharged to surface waters of the state. No exposure of storm water to waste materials is recommended. The SWP3 must include methods to minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, and sanitary waste to precipitation, storm water runoff, and snow melt. In accordance with Part II.D.3, the SWP3 shall include measures to prevent and respond to chemical spills and leaks. You may also reference the existence of other plans (i.e., Spill Prevention Control and Countermeasure (SPCC) plans, spill control programs, Safety Response Plans, etc.) provided that such plan addresses conditions of this permit condition and a copy of such plan is maintained on site.

ii. **Off-site traffic.** Off-site vehicle tracking of sediments and dust generation shall be minimized. In accordance with Part II.D.1, the SWP3 shall include methods to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. No detergents may be used to wash vehicles. Wash waters shall be treated in a sediment basin or alternative control that provides equivalent treatment prior to discharge.

iii. **Compliance with other requirements.** The SWP3 shall be consistent with applicable State and/or local waste disposal, sanitary sewer or septic system regulations, including provisions prohibiting waste disposal by open burning and shall provide for the proper disposal of contaminated soils to the extent these are located within the permitted area.

iv. **Trench and ground water control**. In accordance with Part II.C, there shall be no turbid discharges to surface waters of the state resulting from dewatering activities. If trench or ground water contains sediment, it shall pass through a sediment settling pond or other equally effective sediment control device, prior to being discharged from the construction site. Alternatively, sediment may be removed by settling in place or by dewatering into a sump pit, filter bag or comparable practice. Ground water which does not contain sediment or other pollutants is not required to be treated prior to discharge. However, care must be taken when discharging ground water to ensure that it does not become pollutant-laden by traversing over disturbed soils or other pollutant sources.

v. **Contaminated Sediment.** Where construction activities are to occur on sites with contamination from previous activities, operators shall be aware that concentrations of materials that meet other criteria (is not considered a Hazardous Waste, meeting VAP standards, etc.) may still result in storm water discharges in excess of Ohio Water Quality Standards. Such discharges are not authorized by this permit. Appropriate BMPs include, but are not limited to:

- The use of berms, trenches, and pits to collect contaminated runoff and prevent discharges;
- Pumping runoff into a sanitary sewer (with prior approval of the sanitary sewer operator) or into a container for transport to an appropriate treatment/disposal facility; and
- Covering areas of contamination with tarps or other methods that prevent storm water from coming into contact with the material.

Operators should consult with Ohio EPA Division of Surface Water prior to seeking permit coverage.

h. Maintenance. All temporary and permanent control practices shall be maintained and repaired as needed to ensure continued performance of their intended function. All sediment control practices must be maintained in a functional condition until all up slope areas they control are permanently stabilized. The SWP3 shall be designed to minimize maintenance requirements. The applicant shall provide a description of maintenance procedures needed to ensure the continued performance of control practices.

i. Inspections. At a minimum, procedures in an SWP3 shall provide that all controls on the site are inspected at least once every seven calendar days and within 24 hours after any storm event greater than one-half inch of rain per 24 hour period. The inspection frequency may be reduced to at least once every month if the entire site is temporarily stabilized or runoff is unlikely due to weather conditions (e.g., site is covered with snow, ice, or the ground is frozen). A waiver of inspection requirements is available until one month before thawing conditions are expected to result in a discharge if all of the following conditions are met: the project is located in an area where frozen conditions are anticipated to continue for extended periods of time (i.e., more than one month); land disturbance activities have been suspended; and the beginning and ending dates of the waiver period are documented in the SWP3. Once a definable area is finally stabilized, the area may be marked on the SWP3 and no further inspection requirements apply to that portion of the site. The permittee shall assign "qualified inspection personnel" to conduct these inspections to ensure that the control practices are functional and to evaluate whether the SWP3 is adequate and properly implemented in accordance with the schedule proposed in Part III.G.1.g of this permit or whether additional control measures are required.

Following each inspection, a checklist must be completed and signed by the qualified inspection personnel representative. At a minimum, the inspection report shall include:

i. the inspection date;
ii. names, titles, and qualifications of personnel making the inspection;
iii. weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
iv. weather information and a description of any discharges occurring at the time of the inspection;

v. location(s) of discharges of sediment or other pollutants from the site;
vi. location(s) of BMPs that need to be maintained;
vii. location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
viii. location(s) where additional BMPs are needed that did not exist at the time of inspection; and
ix. corrective action required including any changes to the SWP3 necessary and implementation dates.

Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of or the potential for pollutants entering the drainage system. Erosion and sediment control measures identified in the SWP3 shall be observed to ensure that those are operating correctly. Discharge locations shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to the receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site vehicle tracking.

The permittee shall maintain for three years following the submittal of a notice of termination form, a record summarizing the results of the inspection, names(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWP3 and a certification as to whether the facility is in compliance with the SWP3 and the permit and identify any incidents of non-compliance. The record and certification shall be signed in accordance with Part V.G. of this permit.

i. **When practices require repair or maintenance.** If the inspection reveals that a control practice is in need of repair or maintenance, with the exception of a sediment settling pond, it shall be repaired or maintained within 3 days of the inspection. Sediment settling ponds shall be repaired or maintained within 10 days of the inspection.

ii. **When practices fail to provide their intended function.** If the inspection reveals that a control practice fails to perform its intended function and that another, more appropriate control practice is required, the SWP3 shall be amended and the new control practice shall be installed within 10 days of the inspection.

iii. **When practices depicted on the SWP3 are not installed.** If the inspection reveals that a control practice has not been implemented in accordance with the schedule contained in Part III.G.1.g of this permit, the control practice shall be implemented within 10 days from the date of the inspection. If the inspection reveals that the planned control practice is not needed, the record shall contain a statement of explanation as to why the control practice is not needed.

3. Approved State or local plans. All dischargers regulated under this general permit must comply, except those exempted under state law, with the lawful requirements of municipalities, counties and other local agencies regarding discharges of storm water from construction activities. All erosion and sediment control plans and storm water

management plans approved by local officials shall be retained with the SWP3 prepared in accordance with this permit. Applicable requirements for erosion and sediment control and storm water management approved by local officials are, upon submittal of a NOI form, incorporated by reference and enforceable under this permit even if they are not specifically included in an SWP3 required under this permit. When the project is located within the jurisdiction of a regulated municipal separate storm sewer system (MS4), the permittee shall certify that the SWP3 complies with the requirements of the storm water management program of the MS4 operator.

4. Exceptions. If specific site conditions prohibit the implementation of any of the erosion and sediment control practices contained in this permit or site specific conditions are such that implementation of any erosion and sediment control practices contained in this permit will result in no environmental benefit, then the permittee shall provide justification for rejecting each practice based on site conditions. Exceptions from implementing the erosion and sediment control standards contained in this permit will be approved or denied on a case-by-case basis.

   The permittee may request approval from Ohio EPA to use alternative methods to satisfy conditions in this permit if the permittee can demonstrate that the alternative methods are sufficient to protect the overall integrity of receiving streams and the watershed. Alternative methods will be approved or denied on a case-by-case basis.

PART IV. NOTICE OF TERMINATION REQUIREMENTS

A. Failure to notify.

The terms and conditions of this permit shall remain in effect until a signed Notice of Termination (NOT) form is submitted. Failure to submit an NOT constitutes a violation of this permit and may affect the ability of the permittee to obtain general permit coverage in the future.

B. When to submit an NOT.

1. Permittees wishing to terminate coverage under this permit shall submit an NOT form in accordance with Part V.G. of this permit. Compliance with this permit is required until an NOT form is submitted. The permittee's authorization to discharge under this permit terminates at midnight of the day the NOT form is submitted. Prior to submitting the NOT form, the permittee shall conduct a site inspection in accordance with Part III.G.2.i of this permit and have a maintenance agreement in place to ensure all post-construction BMPs will be maintained in perpetuity.

2. All permittees shall submit an NOT form within 45 days of completing all permit requirements. Enforcement actions may be taken if a permittee submits an NOT form without meeting one or more of the following conditions:

   a. Final stabilization (see definition in Part VII) has been achieved on all portions of the site for which the permittee is responsible (including, if applicable, returning agricultural land to its pre-construction agricultural use);

   b. Another operator(s) has assumed control over all areas of the site that have not been finally stabilized;

c. For residential construction only, temporary stabilization has been completed and the lot, which includes a home, has been transferred to the homeowner. (Note: For individual lots without housing, which are sold by the developer, the individual lot permittee shall implement final stabilization prior to the individual lot permittee terminating permit coverage.); or

d. An exception has been granted under Part III.G.4.

C. How to submit an NOT.

Permittees shall use Ohio EPA's approved NOT form. The form shall be completed and mailed according to the instructions and signed in accordance with Part V.G of this permit.

PART V. STANDARD PERMIT CONDITIONS.

A. Duty to comply.

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of ORC Chapter 6111 and is grounds for enforcement action.

Ohio law imposes penalties and fines for persons who knowingly make false statements or knowingly swear or affirm the truth of a false statement previously made.

B. Continuation of an expired general permit.

An expired general permit continues in force and effect until a new general permit is issued.

C. Need to halt or reduce activity not a defense.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to mitigate.

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Duty to provide information.

The permittee shall furnish to the director, within 10 days of written request, any information which the director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the director upon request copies of records required to be kept by this permit.

F. Other information.

When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the NOI, SWP3, NOT or in any other report to the director, he or she shall promptly submit such facts or information.

G. Signatory requirements.

All NOIs, NOTs, SWP3s, reports, certifications or information either submitted to the director or that this permit requires to be maintained by the permittee, shall be signed.

1. These items shall be signed as follows:

    a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

        i. A president, secretary, treasurer or vice-president of the corporation in charge of a principal business function or any other person who performs similar policy or decision-making functions for the corporation; or

        ii. The manager of one or more manufacturing, production or operating facilities, provided, the manager is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

    b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

    c. For a municipality, State, Federal or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).

2. All reports required by the permits and other information requested by the director shall be signed by a person described in Part V.G.1 of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

    a. The authorization is made in writing by a person described in Part V.G.1 of this permit and submitted to the director;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator of a well or well field, superintendent, position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

c. The written authorization is submitted to the director.

3. Changes to authorization. If an authorization under Part V.G.2 of this permit is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part V.G.2 of this permit must be submitted to the director prior to or together with any reports, information or applications to be signed by an authorized representative.

H. Certification.

Any person signing documents under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I. Oil and hazardous substance liability.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject under section 311 of the CWA or 40 CFR Part 112. 40 CFR Part 112 establishes procedures, methods and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable surface waters of the state or adjoining shorelines.

J. Property rights.

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

K. Severability.

The provisions of this permit are severable and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

L. Transfers.

Ohio NPDES general permit coverage is transferable. Ohio EPA must be notified in writing sixty days prior to any proposed transfer of coverage under an Ohio NPDES general permit. The transferee must inform Ohio EPA it will assume the responsibilities of the original permittee transferor.

M. Environmental laws.

No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

N. Proper operation and maintenance.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of SWP3s. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

O. Inspection and entry.

The permittee shall allow the director or an authorized representative of Ohio EPA, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment); and

4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

P. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

Q. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

R. Bypass

The provisions of 40 CFR Section 122.41(m), relating to "Bypass," are specifically incorporated herein by reference in their entirety. For definition of "Bypass," see Part VII.C.

S. Upset

The provisions of 40 CFR Section 122.41(n), relating to "Upset," are specifically incorporated herein by reference in their entirety. For definition of "Upset," see Part VII.GG.

T. Monitoring and Records

The provisions of 40 CFR Section 122.41(j), relating to "Monitoring and Records," are specifically incorporated herein by reference in their entirety.

U. Reporting Requirements

The provisions of 40 CFR Section 122.41(l), relating to "Reporting Requirements," are specifically incorporated herein by reference in their entirety.

PART VI. REOPENER CLAUSE

If there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with construction activity covered by this permit, the permittee of such discharge may be required to obtain coverage under an individual permit or an alternative general permit in accordance with Part I.C of this permit or the permit may be modified to include different limitations and/or requirements.

Permit modification or revocation will be conducted according to ORC Chapter 6111.

PART VII. DEFINITIONS

A. "Act" means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117 and Pub. L. 100-4, 33 U.S.C. 1251 et. seq.

B. "Best management practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures and other management practices (both structural and non-structural) to prevent or reduce the pollution of surface waters of the state. BMP's also include treatment requirements, operating procedures and practices to control plant and/or construction site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage.

C. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

D. "Commencement of construction" means the initial disturbance of soils associated with clearing, grubbing, grading, placement of fill, or excavating activities or other construction activities.

E. "Concentrated storm water runoff" means any storm water runoff which flows through a drainage pipe, ditch, diversion or other discrete conveyance channel.

F. "Director" means the director of the Ohio Environmental Protection Agency.

G. "Discharge" means the addition of any pollutant to the surface waters of the state from a point source.

H. "Disturbance" means any clearing, grading, excavating, filling, or other alteration of land surface where natural or man-made cover is destroyed in a manner that exposes the underlying soils.

I. "Drainage watershed" means for purposes of this permit the total contributing drainage area to a BMP, i.e., the "watershed" directed to the practice. This would also include any off-site drainage.

J. "Final stabilization" means that either:

1. All soil disturbing activities at the site are complete and a uniform perennial vegetative cover (e.g., evenly distributed, without large bare areas) with a density of at least 70 percent cover for the area has been established on all unpaved areas and areas not covered by permanent structures or equivalent stabilization measures (such as the use of mulches, rip-rap, gabions or geotextiles) have been employed. In addition, all temporary erosion and sediment control practices are removed and disposed of and all trapped sediment is permanently stabilized to prevent further erosion; or

2. For individual lots in residential construction by either:

    a. The homebuilder completing final stabilization as specified above or

    b. The homebuilder establishing temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for and benefits of, final stabilization. (Homeowners typically have an incentive to put in the landscaping functionally equivalent to final stabilization as quick as possible to keep mud out of their homes and off sidewalks and driveways.); or

3. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its pre-construction agricultural use. Areas disturbed that were previously used for agricultural activities, such as buffer strips immediately adjacent to surface waters of the state and which are not being returned to their pre-construction agricultural use, must meet the final stabilization criteria in (1) or (2) above.

K. "Individual Lot NOI" means a Notice of Intent for an individual lot to be covered by this permit (see Part I of this permit).

L. "Larger common plan of development or sale"- means a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

M. "MS4" means municipal separate storm sewer system which means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) that are:

1. Owned or operated by the federal government, state, municipality, township, county, district(s) or other public body (created by or pursuant to state or federal law) including special district under state law such as a sewer district, flood control district or drainage districts or similar entity or a designated and approved management agency under section 208 of the act that discharges into surface waters of the state; and
2. Designed or used for collecting or conveying solely storm water,
3. Which is not a combined sewer and
4. Which is not a part of a publicly owned treatment works.

N. "National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and enforcing pretreatment requirements, under sections 307, 402, 318 and 405 of the CWA. The term includes an "approved program."

O. "NOI" means notice of intent to be covered by this permit.

P. "NOT" means notice of termination.

Q. "Operator" means any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

2. The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with an SWP3 for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).

As set forth in Part I.F.1, there can be more than one operator at a site and under these circumstances, the operators shall be co-permittees.

R. "Ordinary high water mark" means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

S. "Owner or operator" means the owner or operator of any "facility or activity" subject to regulation under the NPDES program.

T. "Permanent stabilization" means the establishment of permanent vegetation, decorative landscape mulching, matting, sod, rip rap and landscaping techniques to provide permanent erosion control on areas where construction operations are complete or where no further disturbance is expected for at least one year.

U. "Percent imperviousness" means the impervious area created divided by the total area of the project site.

V. "Point source" means any discernible, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or the floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

W. "Qualified inspection personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls, who possesses the skills to assess all conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity.

X. "Rainwater and Land Development" is a manual describing construction and post-construction best management practices and associated specifications. A copy of the manual may be obtained by contacting the Ohio Department of Natural Resources, Division of Soil & Water Conservation.

Y. "Riparian area" means the transition area between flowing water and terrestrial (land) ecosystems composed of trees, shrubs and surrounding vegetation which serve to stabilize erodible soil, improve both surface and ground water quality, increase stream shading and enhance wildlife habitat.

Z. "Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

AA. "Sediment settling pond" means a sediment trap, sediment basin or permanent basin that has been temporarily modified for sediment control, as described in the latest edition of the Rainwater and Land Development manual.

BB. "State isolated wetland permit requirements" means the requirements set forth in Sections 6111.02 through 6111.029 of the ORC.

CC. "Storm water" means storm water runoff, snow melt and surface runoff and drainage.

DD. "Steep slopes" means slopes that are 15 percent or greater in grade. Where a local government or industry technical manual has defined what is to be considered a "steep slope," this permit's definition automatically adopts that definition.

EE. "Surface waters of the state" or "water bodies" means all streams, lakes, reservoirs, ponds, marshes, wetlands or other waterways which are situated wholly or partially within the boundaries of the state, except those private waters which do not combine or effect a junction with natural surface or underground waters. Waters defined as

sewerage systems, treatment works or disposal systems in Section 6111.01 of the ORC are not included.

FF. "SWP3" means storm water pollution prevention plan.

GG. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

HH. "Temporary stabilization" means the establishment of temporary vegetation, mulching, geotextiles, sod, preservation of existing vegetation and other techniques capable of quickly establishing cover over disturbed areas to provide erosion control between construction operations.

II. "Water Quality Volume (WQ_v)" means the volume of storm water runoff which must be captured and treated prior to discharge from the developed site after construction is complete. WQ_v is based on the expected runoff generated by the mean storm precipitation volume from post-construction site conditions at which rapidly diminishing returns in the number of runoff events captured begins to occur.

APPENDIX E
INSPECTION SHEETS AND MODIFICATION LOGS

Construction Site Inspection Checklist for OHC000004

By making use of some simple Best Management Practices (BMPs) a construction site operator can do his or her share to protect Ohio's water resources from the harmful effects of sediment. The topography of the site and the extent of the construction activities will determine which of these practices are applicable to any given site, but the BMPs listed here are applicable to most construction sites. For details on the installation and maintenance of these BMPs, please refer to the current ***Rainwater and Land Development****, Ohio's Standards for Storm Water Management Land Development and Urban Stream Protection* by the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation. The manual is available at http://ohiodnr.com/soilandwater/water/rainwater/default/tabid/9186/Default.aspx or by contacting your county Soil and Water Conservation District.

Temporary Stabilization

This is the most effective BMP. All disturbed areas that will lie dormant for over 14 days must be stabilized within 7 days of the date the area becomes inactive. The goal of temporary stabilization is to provide cover, quickly. Areas within 50 feet of a stream must be stabilized within 2 days of inactivity. This is accomplished by seeding with fast-growing grasses then covering with straw mulch. Apply only mulch between November 1 and March 31. To minimize your costs of temporary stabilization, leave natural cover in place for as long as possible. Only disturb areas you intend to work within the next 14 days.

Construction Entrances

Construction entrances are installed to minimize off-site tracking of sediments. A stone access drive should be installed at every point where vehicles enter or exit the site. Every individual lot should also have its own drive once construction on the lot begins.

Sediment Ponds

Sediment ponds are required for construction areas with concentrated runoff, when the design capacity of silt fence or inlet protection is exceeded, or for drainage areas with 10 or more disturbed areas. There are two types of sediment ponds: sediment basins and sediment traps. A sediment trap is appropriate where the contributing drainage area is 10 acres or less. The outlet is an earthen embankment with a simple stone spillway. A sediment basin is appropriate for drainage areas larger than 10 acres. The outlet is an engineered riser pipe with a skimmer or similar device used to dewater the pond at the surface. Often a permanent storm water management pond, such as a retention or detention basin, can be modified to act as a sediment basin during construction. All sediment ponds must be installed within 7 days of first grubbing the area they control, provide a minimum dewatering zone of 67 cubic yards per acre of total contributing drainage area and a sediment settling zone of 34 cubic yards per disturbed acre below the level of the outlet. Sediment basins must be designed to drain the dewatering zone over a 48-hour period.

Silt Fence

This is typically used at the perimeter of a disturbed area. It's only for small drainage areas on relatively flat slopes or around small soil storage piles. Not suitable where runoff is concentrated in a ditch, pipe or through streams. For large drainage areas where flow is concentrated, collect runoff in diversion berms or channels and pass it through a sediment pond prior to discharging it from the site. Combination barriers constructed of silt fence supported by straw bales or silt fence embedded within rock check dams may be effective within small channels. As with all sediment controls, silt fence must be capable of pooling runoff so that sediment can settle out of suspension. Silt fence must be installed within 7 days of first grubbing the area it controls.

Inlet Protection

This must be installed on all yard drains and curb drains when these inlets do not drain to a sediment trap or basin. Even if there is a sediment trap or basin, inlet protection is still recommended, as it will increase the overall sediment removal efficiency. These are best used on roads with little or no traffic. If working properly, inlet protection will cause water to pond. If used on curb inlets, streets will flood temporarily during heavy storms. Check with your municipality before installing curb inlet protection. They may prefer an alternate means of sediment control such as silt fence or ponds.

Permanent Stabilization

All areas at final grade must be permanently stabilized within 7 days of reaching final grade. This is usually accomplished by using seed and mulch, but special measures are sometimes required. This is particularly true in drainage ditches or on steep slopes. These measures include the addition of topsoil, erosion control matting, rock rip-rap or retaining walls. Permanent seeding should be done March 1 to May 31 and August 1 to September 30. Dormant seeding can be done from November 20 to March 15. At all other times of the year, the area should be temporarily stabilized until a permanent seeding can be applied.

Non-Sediment Pollution Control

Although sediment is the pollutant of greatest concern on most construction sites, there are other sources of pollution. Most of these BMPs are easy to implement with a little bit of planning and go a long way toward keeping your site clean and organized. Please be sure to inform all contractors how these BMPs affect their operations on the site, particularly those that will be working near a stream.

Inspection Sheet

INSPECTIONS MUST BE CONDUCTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF A 0.5" OR GREATER RAINFALL. ALL SEDIMENT CONTROLS MUST BE INSTALLED PRIOR TO GRADING AND WITHIN 7 DAYS OF FIRST GRUBBING

GENERAL INSPECTION INFORMATION

Construction Site Inspection Date: _____ Inspector Name: _____

Inspector Title: _____ Qualifications/Certifications: _____

Storm Events of the Last 7 Days

Storm Event Date	Storm Event Time	Storm Event Duration	Total Rainfall Amount	Discharge Occur? (Y/N)
_____	_____	_____	_____(inches)	_____
_____	_____	_____	_____(inches)	_____
_____	_____	_____	_____(inches)	_____
_____	_____	_____	_____(inches)	_____

Weather Information at the Time of Inspection

Temperature _____ Climate (Sunny, Cloudy, Rain)? _____ Is Storm Water Being Discharged? _____

Sketch or Small Site Map

Along with a narrative inspection log, Ohio EPA recommends the inspector use a sketch or a reduced photocopy of the site plan showing the location of storm water outfalls and storm drain inlets as well as the location and types of control measures. Problems observed at these locations, or at other locations on the construction site, should be highlighted and any corrective measures undertaken should be drawn in and noted in detail on the front side of the sketch. This method will also be helpful as the permittee is required to update the SWP3 to reflect current site conditions.

CONSTRUCTION ENTRANCES

Key things to look for ...

	Yes	No
1. Has the drive been constructed by placing geotextile fabric under the stone?	☐	☐
2. Is the stone 2-inch diameter?	☐	☐
3. Has the stone been placed to a depth of 6 inches, with a width of 10 feet and a length of at least 50 feet (30 feet for entrances onto individual sublots)?	☐	☐
4. If the drive is placed on a slope, has a diversion berm been constructed across the drive to divert runoff away from the street or water resource?	☐	☐
5. If drive is placed across a ditch, was a culvert pipe used to allow runoff to flow across the drive?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

SEDIMENT PONDS

Key things to look for ...

		Yes	No
1.	Are concentrated flows of runoff directed to a sediment pond?	☐	☐
2.	Is sheet-flow runoff from drainage areas that exceed the design capacity of silt fence (generally 0.25 acre or larger) directed to a sediment pond?	☐	☐
3.	Is runoff being collected and directed to the sediment pond via the storm sewer system or via a network of diversion berms and channels?	☐	☐
4.	Is the sediment pond dewatering zone appropriately sized (67 cubic yards per acre of total drainage area)?	☐	☐
5.	Is the sediment pond sediment settling zone appropriately sized (34 cubic yards per acre of disturbed area)?	☐	☐
6.	Is the sediment basin designed to be dewatered at the surface through the use of a skimmer or another similar surface water dewatering device?	☐	☐
7.	Is the sediment basin designed so that the dewatering zone will drain in no less time than 48 hours?	☐	☐
8.	Have the embankments of the sediment pond and the areas that lie downstream of the pond been stabilized?	☐	☐
9.	For sediment basins that dewater 100% between storms, is the riser pipe wrapped with chicken wire and double wrapped with geotextile fabric?	☐	☐
10.	Does the riser have 1-inch diameter holes spaced 4 inches apart, both horizontally and vertically?	☐	☐
11.	For sediment basins, which dewater 60% between storms, is the diameter of the dewatering hole per plan (see Chapter 6 of ***Rainwater*** manual)?	☐	☐
12.	For sediment traps, is there geotextile under the stone spillway and is the spillway saddle-shaped?	☐	☐
13.	For sediment traps, which dewater 100% between storms, is the dewatering pipe end-capped, no larger than 6 inches in diameter, perforated and double-wrapped in geotextile?	☐	☐
14.	Is the length-to-width ratio between inlet(s) and outlet at least 2:1? **NOTE**: If not, a baffle should be added to lengthen the distance.	☐	☐
15.	Is the depth from the bottom of the basin to the top of the primary spillway no more than 3 to 5 feet?	☐	☐
16.	For a modified storm water pond being used as a sediment pond, is the connection between the riser pipe and the permanent outlet water-tight?	☐	☐
17.	Was the basin installed prior to grading the site?	☐	☐
18.	Is it time to clean-out the sediment pond to restore its original capacity? Generally, sediment should be removed from the sediment settling zone once it's half-full. Stabilize the dredged sediments with seed and mulch.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

SILT FENCE

Key things to look for ...

	Yes	No
1. Is the fence at least 4" to 6" into the ground?	☐	☐
2. Is the trench backfilled to prevent runoff from cutting underneath the fence?	☐	☐
3. Is the fence pulled tight so it won't sag when water builds up behind it?	☐	☐
4. Are the ends brought upslope of the rest of the fence so as to prevent runoff from going around the ends?	☐	☐
5. Is the fence placed on a level contour? If not, the fence will only act as a diversion.	☐	☐
6. Have all the gaps and tears in the fence been eliminated.	☐	☐
7. Is the fence controlling an appropriate drainage area? Refer to Chapter 6 of ***Rainwater*** manual. **RULE OF THUMB**: Design capacity for 100 linear feet of silt fence is 0.5 acres for slopes < 2%, 0.25 acres for slopes 2% to 20%, & 0.125 acres for slopes 20% or more. Generally, no more than 0.25 acres should lie behind 100 feet of fence at 2% to 10% slope, i.e., the distance between the fence and the top of the slope behind it should be no more than 125 feet. The allowable distance increases on flatter slopes and decreases for steeper slopes.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

INLET PROTECTION

Key things to look for ...

	Yes	No
1. Does water pond around the inlet when it rains?	☐	☐
2. Has the fabric been replaced when it develops tears or sags?	☐	☐
3. For curb inlet protection, does the fabric cover the entire grate, including the curb window?	☐	☐
4. For yard inlet protection, does the structure encircle the entire grate?	☐	☐
5. Is the fabric properly entrenched or anchored so that water passes through it and not under it?	☐	☐
6. For yard inlet protection, is the fabric properly supported to withstand the weight of water and prevent sagging? The fabric should be supported by a wood frame with cross braces, or straw bales.	☐	☐
7. Is sediment that has accumulated around the inlet removed on a regular basis?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

TEMPORARY STABILIZATION

Key things to look for ...

	Yes	No
1. Are there any areas of the site that are disturbed, but will likely lie dormant for over 14 days?	☐	☐
2. Have all dormant, disturbed areas been temporarily stabilized in their entireties?	☐	☐
3. Have disturbed areas outside the silt fence been seeded or mulched?	☐	☐
4. Have soil stockpiles that will sit for over 14 days been stabilized?	☐	☐
5. Has seed and mulch been applied at the proper rate? In general, seed is applied at 3 to 5 lbs per 1000 sq ft and straw mulch is applied at 2-3 bales per 1000 sq ft.	☐	☐
6. Has seed or mulch blown away? If so, repair.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

PERMANENT STABILIZATION

Key things to look for ...

	Yes	No
1. Are any areas at final grade?	☐	☐
2. Has the soil been properly prepared to accept permanent seeding?	☐	☐
3. Has seed and mulch been applied at the appropriate rate (see Chapter 7 of the ***Rainwater*** manual)?	☐	☐
4. If rainfall has been inadequate, are seeded areas being watered?	☐	☐
5. For drainage ditches where flow velocity exceeds 3.5 ft/s from a 10-year, 24-hour storm has matting been applied to the ditch bottom?	☐	☐
6. If the flow velocity exceeds 5.0 ft/s, has the ditch bottom been stabilized with rock rip-rap? **NOTE**: Rock check dams may be needed to slow the flow of runoff.	☐	☐
7. Has rock rip-rap been placed under all storm water outfall pipes to prevent scouring in the receiving stream or erosion of the receiving channel?	☐	☐
8. For sites with steep slopes or fill areas, is runoff from the top of the site conveyed to the bottom of the slope or fill area in a controlled manner so as not to cause erosion?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

NON-SEDIMENT POLLUTION CONTROL

Key things to look for ...

	Yes	No
1. Has an area been designated for washing out concrete trucks? Washings must be contained on site within a bermed area until they harden. The washings should never be directed toward a watercourse, ditch or storm drain.	☐	☐
2. Is waste and packaging disposed of in a dumpster? Do not burn them on site.	☐	☐
3. Are fuel tanks and drums of toxic and hazardous materials stored within a diked area or trailer and away from any watercourse, ditch or storm drain?	☐	☐
4. Are streets swept as often as necessary to keep them clean and free from sediment? NOTE: Sediment should be swept back onto the lot - not down the storm sewers.	☐	☐
5. Are stockpiles of soil or other materials stored away from any watercourse, ditch or storm drain?	☐	☐
6. Have stream crossings been constructed entirely of non-erodible material?	☐	☐
7. If an area of the site is being dewatered, is it being pumped from a sump pit or is the discharge directed to a sediment pond? **NOTE**: if you must lower ground water, the water may be discharged to the receiving stream as long as the water remains clean. Be sure not to co-mingle the clean ground water with sediment-laden water or to discharge it off-site by passing it over disturbed ground.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

Appendix E –Stormwater Pollution Prevention Plan Modification Log

Project Name:
SWPPP Contact: **Phone:**

Modification No.	Description of the Modification	Date of Amendment	Modification Prepared by [Name(s) and Title]

APPENDIX F
LONG-TERM MAINTENANCE AGREEMENT

May 4, 2016

INSPECTION AND MAINTENANCE AGREEMENT FOR STORM WATER BEST MANAGEMENT PRACTICES

This Inspection and Maintenance Agreement made this _____ day of _____, 2016, by and between Clean Energy Future Lordstown, LLC (hereafter referred to as the ***Owner***) and the Village of Lordstown hereafter referred to as the ***Community***, provides as follows:

WHEREAS, the ***Owner*** is responsible for certain real estate properties shown as Tax Parcels No. 45-190801, 45-904025, 45,141120, 45-016701, and 45-033360 that is to be developed as ***Lordstown Switchyard and Associated Transmission Line Easement*** hereafter referred to as the ***Property*****;** and,

WHEREAS the Owner is providing a storm water management system consisting of the following storm water management practices: stormwater dry detention ponds, wet detention ponds, and vegetated biofilters shown and described on the attached Stormwater Pollution Prevention Plan; and,

WHEREAS, to comply with Section **1106.06** of the Codified Ordinances of the ***Owner*** pertaining to this project, the ***Owner*** has agreed to maintain the storm water management practices in accordance with the terms and conditions hereinafter set forth.

NOW, THEREFORE, for and in consideration of the mutual covenants and undertaking of the parties, the parties hereby agree as follows:

A. FINAL INSPECTION REPORTS AND AS BUILT CERTIFICATION

The Owner shall certify in writing to the ***Community*** within 30 days of completion of the storm water management practices that the storm water management practices are constructed in accordance with the approved plans and specifications. The Owner shall further provide As-built Certifications of the locations of all access and maintenance easements and each stormwater management practice, including those practices permitted to be located in, or within 50 feet of, water resources, and the drainage areas served by each storm water management practice.

B. MAINTENANCE PLANS FOR THE STORMWATER MANAGEMENT PRACTICES

1. The Owner agrees to maintain in perpetuity the stormwater management practices in accordance with approved Maintenance Plans listed in #2 below and in a manner that will permit the storm water management practices to perform the purposes for which they were designed and constructed, and in accordance with the standards by which they were designed and constructed, all as shown and described in the approved Stormwater Pollution Prevention Plan. This includes all pipes and channels built to convey storm water to the storm water management practices, as well as structures, improvements, and vegetation provided to control the quantity and quality of the storm water.

2. The Owner shall provide a Maintenance Plan for each storm water management practice. The Maintenance Plans shall include a schedule for monthly and annual maintenance. The Owner shall maintain, update, and store the maintenance records for the storm water management practices. The specific Maintenance Plans for each storm water management practice are as follows:

(a) Stormwater Pond Maintenance. To be completed MONTHLY.
   (1) Remove floating debris.
   (2) Remove woody vegetative growth from pond area including embankments.
   (3) Remove trash and/or accumulated sediment.
   (4) Remove obstructions in outlets.

(b) Stormwater Pond Maintenance. To be completed ANNUALLY.
   (1) Repair erosion to outfall or spillway.
   (2) Repair and/or replace damaged structures, such as catch basins, risers, pipes, and headwalls.
   (3) Repair animal burrows and/or other leaks in the dam structures.
   (4) Remove debris from overflow spillway.
   (5) Mow embankments and remove woody vegetation on embankments.
   (6) Inspect and remove invasive plants.
   (7) Dredge pond on a 3-7 year cycle or as necessary to retain design capacity.

(c) Vegetated Biofilters. To be completed MONTHLY.
   (1) Remove accumulated sediment.
   (2) Fix bare spots and non-vegetated areas.
   (3) Follow a regular mowing cycle to maintain healthy vegetation.
   (4) Pick up trash in the vicinity of the gravel access drives.

(d) Vegetated Biofilters. To be completed ANNUALLY.
   (1) Maintain ditch bottom to original width.
   (2) Level out ruts or anything that causes flow to concentrate and form eroding channels. Re-establish vegetation.

3. The Owner shall perform all maintenance in accordance with the above Maintenance Plans and shall complete all repairs identified through regular inspections, and any additional repairs as requested in writing by the ***Community.***

C. INSPECTION AND REPAIRS OF STORM WATER MANAGEMENT PRACTICES

1. The Owner shall inspect all storm water management practices listed in Section B above, every three (3) months and after major storm events for the first year of operation.

2. The Owner shall inspect all storm water management practices listed in Section B above at the frequency noted thereafter.

3. The Owner shall submit Inspection Reports in writing to the ***Community*** engineer within 30 days after each inspection. The reports shall include the following:

   The date of inspection; _____
   Name of inspector; _____
   The condition and/or presence of:
   (i) _____
   (ii) _____
   (iii)_____
   (iv)_____
   (v) _____
   (vi)_____
   (vii)_____
   (viii) Any other item that could affect the proper function of the Facility.

4. The Owner grants permission to the ***Community*** to enter the Property and to inspect all aspects of the storm water management practices and related drainage whenever the ***Community*** deems necessary. The ***Community*** shall provide the Owner copies of the inspection findings and a directive to commence with the repairs if necessary.

5. The Owner shall make all repairs within ten (10) days of their discovery through Owner inspections or through a request from the ***Community.*** If repairs will not occur within this ten (10) day period, the Owner must receive written approval from the ***Community*** engineer for a repair schedule.

6. In the event of any default or failure by the Owner in the performance of any of the covenants and warranties pertaining to the maintenance of the storm water management practices, or the Owner fails to maintain the storm water management practices in accordance with the approved design standards and Maintenance Plans, or, in the event of an emergency as determine by the ***Community,*** it is the sole discretion the ***Community***, after providing reasonable notice to the Owner, to enter the property and take whatever steps necessary to correct deficiencies and to charge the cost of such repairs to the Owner. The Owner shall reimburse the ***Community*** upon demand, within thirty (30) days of receipt thereof for all actual cost incurred by the ***Community***. All costs expended by the ***Community*** in performing such necessary maintenance or repairs shall constitute a lien against the properties of the Owner. Nothing herein shall obligate the ***Community*** to maintain the storm water management practices.

D. FUNDING

The Owner shall specify the method of funding for the perpetual inspection, operation, and maintenance of the storm water management practices listed in this Inspection and Maintenance Agreement. This funding mechanism shall be approved by the ***Community.***

E. INDEMNIFICATION

1. The Owner hereby agrees that it shall save, hold harmless, and indemnify the ***Community*** and its employees and officers from and against all liability, losses, claims, demands, costs and expenses arising from, or out of, default or failure by the Owner to maintain the storm water management practices, in accordance with the terms and conditions set forth herein, or from acts of the Owner arising from, or out of, the construction, operation, repair or maintenance of the storm water management practices.

2. The parties hereto expressly do not intend by execution of this Inspection and Maintenance Agreement to create in the public, or any member thereof, any rights as a third party beneficiary or to authorize anyone not a party hereof to maintain a suit for any damages pursuant to the terms of this Inspection and Maintenance Agreement.

3. This Inspection and Maintenance Agreement shall be a covenant that runs with the land and shall inure to the benefit of and shall be binding upon the parties hereto, their respective successors and assigns, and all subsequent owners of the property.

4. The current Owner shall promptly notify the ***Community*** when the Owner legally transfers any of the Owners responsibilities for the storm water management practices. The Owner shall supply the ***Community*** with a copy of any document of transfer, executed by both parties.

5. Upon execution of this Inspection and Maintenance Agreement, it shall be recorded in the Clerk's Office of the Circuit Court of ***Trumbull County,*** Ohio, at the Owner's expense.

IN WITNESS WHERE OF, the Owner has caused this Inspection and Maintenance Agreement to be signed in its names by a duly authorized person.

_____

(Sign) Individual Owner

_____

(Please type)

By: _____

Appropriate Community official

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

Storm Water Pollution Prevention Plan (SWP3) Checklist for Construction Activities (OHC000004)

Facility Name: Lordstown Switchyard	**Date SWP3 Received:**
SWP3 Reviewer:	**Date SWP3 Reviewed:**

Part III.G.1 - Site Description				
Does the SWP3…..	**Y**	**N**	**N/A**	**Comments**
(a) describe the nature and type of construction activity (e.g., low density residential, shopping mall, highway, etc.)?	X			Section 1.1 of Report
(b) describe the total area of the site that is expected to be disturbed (i.e., the area of grubbing, clearing, excavating, filling, or grading including off-site borrow areas)?	X			Section 1.1 and 1.2 of Report
(c) include a calculation of the runoff coefficients for both the pre-construction and post-construction site conditions?	X			Appendix C of Report
(d) include an estimation of the impervious area and percent imperviousness as a result of the construction activity?	X			Table 2-7 of Report and Appendix C
(e) include any existing data describing the soil? *NOTE: If this data is not available, it does not need to be included.*	X			Section 2.1 of Report and Figure A2
provide any information on the quality of the storm water discharge from the construction site? *NOTE: If this data is not available, it does not need to be included.*			X	Data not available
(f) include any information about prior land uses at the site (e.g., was the property used to manage solid or hazardous waste)?	X			Section 2.1 of Report
(g) include an implementation schedule which describes the sequence of major construction operations (i.e., grubbing, excavating, grading, utilities and infrastructure installation) and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence?	X			Drawings - Sheets 1 & 2 and Section 3 of Report
(h) include the name(s) or location(s) of the initial and subsequent surface water bodies receiving the storm water discharge?	X			Sections 1.3, 2.2, and 2.3 of Report
include the areal extent and description of the wetland or other special aquatic sites which will be disturbed and/or will receive the storm water discharges?			X	No wetlands on site
(i) include a detail drawing of a typical individual lot with shown sediment and erosion controls for construction sites with no centralized sediment controls (e.g., a sediment settling pond or inlet protection), which receives drainage from multiple lots?			X	Not a residential/commercial developments. Typical lots not applicable.
(j) include the location and description of storm water discharges associated with dedicated asphalt and/or concrete batch plants covered by the NPDES construction storm water general permit?	X			No associated asphalt or concrete batch plants
(k) include a copy of the NPDES construction storm water general permit?	X			Appendix D
(l) include a cover page identifying the name and location of the site, the name and contact information for site operators and SWP3 authorization agents as well as preparation date, start date, and completion date?			X	Planning still in progress. Operators and authorization agents to be identified in the coming weeks.

(m) include a modification log to be updated in the field?	X			Appendix E

Part III.G.1.n - Site Map Requirements				
Does the SWP3 site map…..	**Y**	**N**	**N/A**	**Comments**
(i) describe the limits of earth-disturbing activity of the site including associated off-site borrow or spoil areas that are not addressed by a separate NOI and associated SWP3?	X			Drawings Sheets 1 & 2
(ii) describe the soils types depicted for all areas of the site, including locations of unstable or highly erodible soils?	X			Figure A2
(iii) show existing and proposed contours to delineate drainage watersheds expected during and after major grading activities as well as the size of each drainage watershed, in acres?	X			Figure A4, A5, & Section 2 of Report
(iv) show surface water locations including springs, wetlands, streams, lakes, water wells, etc., on or within 200 feet of the site, including the boundaries of wetlands or stream channels and first subsequent named receiving water(s) the permittee intends to fill or relocate for which the permittee is seeking approval from the Army Corps of Engineers and/or Ohio EPA?	X			Report, & Figures A1 & A2
(v) include the location of existing and planned buildings, roads, parking facilities, and utilities?	X			Drawings - Sheets 1 & 2
(vi) include the location of all erosion and sediment control practices, including the location of areas likely to require temporary stabilization during the course of site development?	X			Drawings - Sheets 1 & 2
(vii) include the location of sediment and storm water management basins noting their sediment settling volume and contributing drainage area?	X			Drawings - Sheets 1 & 2 and Appendix C
(viii) include the location of permanent storm water management practices to be used to control pollutants in storm water after construction operations have been completed?	X			Drawings - Sheets 1 & 2
(ix) include areas designated for the storage or disposal of solid, sanitary, and toxic wastes (including dumpster areas), areas designated for cement truck washout, and areas for vehicle fueling?	X			Drawings - Sheets 1 & 2
(x) include the location of designated construction entrances where the vehicles will access the construction site?	X			Drawings - Sheets 1 & 2
(xi) include the location of any in-stream activities including stream crossings?			X	No in-stream activities

Part III.G.2 - Sediment & Erosion Controls				
(a) Non-Structural Preservation Methods	**Y**	**N**	**N/A**	**Comments**
(1) Has every effort been made to preserve the natural riparian setback adjacent to streams or other surface water bodies?	X			Drawings - Sheets 1 & 2
(2) Have efforts been made to phase in construction activities in order to minimize the amount of land disturbance at one time?	X			Drawings - Sheets 1 & 2
(3) Will any portions of the site be left undisturbed (e.g., tree preservation areas)?	X			Drawings - Sheets 1 & 2
(b) Erosion Controls	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 describe the control practices used to restabilize areas after grubbing or construction?	X			Drawings - Sheets 1 & 2

(2) Does the SWP3 specify the types of stabilization measures to be employed for any time of the year?			X	Drawings - Sheets 1 & 2 & Sec. 3 of Report
(b)(2)(i) Temporary Stabilization	**Y**	**N**	**N/A**	**Comments**
For disturbed areas within 50 feet of a stream remaining dormant for over 14 days, will temporary erosion controls be applied within 2 days?	X			Drawings - Sheets 1 & 2, EC Note 3
For disturbed areas over 50 feet away from a stream remaining dormant for over 14 days, will temporary erosion controls be applied within 7 days?	X			Drawings - Sheets 1 & 2, EC Note 4
For disturbed areas that will be left idle over winter, will temporary erosion controls be applied prior to onset of winter weather?			X	No disturbed areas to be left idle over winter
(b)(2)(i) Permanent Stabilization	**Y**	**N**	**N/A**	**Comments**
For disturbed areas within 50 feet of a stream at final grade, will permanent erosion controls be applied within 2 days of reaching final grade?	X			Drawings - Sheets 1 & 2, EC Note 14
For disturbed areas remaining dormant for over 1 year or at final grade, will permanent erosion controls be applied within 7 days?	X			No disturbed areas to be left dormant >1 year
(c) Runoff Control Practices	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 incorporate measures to reduce flow rates (e.g., riprap, ditch check dams)?	X			Drawings
(2) Does the SWP3 incorporate measures to divert concentrated flow (e.g., pipe slope drains)?	X			No concentrated flows to impact disturbance
(d) Sediment Control Practices	**Y**	**N**	**N/A**	**Comments**
(1) Will sediment control devices be implemented for all areas remaining disturbed for over 14 days?	X			Drawings - Sheets 1 & 2 , EC Notes
(2) Are detail drawings of the sediment controls to be used included in the SWP3?	X			Drawings - Sheets 3 & 4
(d)(i) Timing of Installing Sediment Controls	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 specify that sediment controls will be installed/implemented within 7 days of grubbing activities?	X			Drawings - Sheets 1 & 2, EC Notes 5
Does the SWP3 propose alternate sediment controls for the changing slopes and topography?			X	Sed. controls placed according to topography
(d)(ii) Sediment Settling Ponds	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 include the installation and use of a sediment settling pond? *NOTE: Sediment settling ponds are required for all drainage areas of 10 or more acres of land disturbed at one time, when there is concentrated runoff (storm sewer or ditch), or when the design capacity of silt fence or inlet protection has been exceeded.*	X			Wet detention basin will be constructed prior to substation and will serve as a sediment trap during construction. Ponds installed near access drive include with vegetated biofilters and stone weepers for sed. control.
For construction activities that require sediment settling pond(s), does the SWP3 propose to implement alternative controls to sediment settling ponds? *NOTE: Alternative controls must be equivalent in effectiveness to a sediment settling pond.*			X	No alternate controls to sediment settling ponds proposed
Is the dewatering volume of the sediment settling pond sized to receive at least 67 cubic yards (1800 cubic feet) of storm water per acre of total drainage area?				Vol = 15,175 CF. Drainage Area = 5.15 acres

Is the depth of the dewatering volume for each sediment settling pond less than or equal to 5 feet? *NOTE: The base of the dewatering volume is where the skimmer is connected to the outlet.*	X			Drawings - Sheets 1 & 2
Will the dewatering volume drain down time in between 48 hours and 72 hours?	X			See Drawings and HydroCAD output App. B
Does the dewatering device (e.g., a skimmer) meet the design standards of Ohio's Rainwater and Land Development Manual?	X			
Is the sediment storage zone volume of the pond at least 1000 cubic feet per disturbed acre (Method 1)?	X			Sediment Storage Volume = 15,205 CF
If not, was RUSLE method (Method 2) used to calculate the sediment storage zone volume?			X	
Is the length to width ratio of the sediment settling pond at least two units of length for every one unit of width (> 2:1 length to width)? *NOTE: The greater the distance from the storm water inlet into the pond to the storm water outlet, the greater likelihood of sediment settlement. This prevents short-circuiting of the pond.*	X			Drawings - Sheets 1 & 2, EC note 8
Will the sediment storage zone of the pond be cleaned out when the silt occupies 40 percent of the sediment storage zone (approximately one-half of the sediment storage zone depth)?	X			Drawings - Sheets 1 & 2, EC note 8
Is the sediment settling pond designed to consider public (i.e., child) safety where site limitations preclude a safe design?	X			Basin design includes 10' wide safety shelf
(d)(iii) Silt Fence & Other Diversions	**Y**	**N**	**N/A**	**Comments**
Will silt fence or other diversions be used to control sheet flow?	X			Drawings - Sheets 1 & 2
Will silt fence be used in areas of steep slopes or concentrated flow? *NOTE: Silt fence is not permitted to be used for controlling high velocity storm water flow (only sheet flow).*			X	No steep slopes, not used for conc. flow

Design Capacity of Silt Fence

Maximum drainage area (in acres) to 100 linear feet of silt fence	Range of slope for a particular drainage area (in percent)
0.5	< 2%
0.25	≥ 2% but < 20%
0.125	≥ 20% but < 50%

(d)(iv) Inlet Protection	**Y**	**N**	**N/A**	**Comments**
Will the field drain inlets and/or the street curb inlets drain into a sediment settling pond or directly to surface waters of the state? *NOTE: Inlet protection is mandatory where sediment settling ponds will not be implemented.*			X	No inlets
Do any inlets not connected to a sediment settling pond receive runoff from one or more acres?			X	No inlets
Does the inlet protection meet the standards of Ohio's Rainwater and Land Development Manual?			X	No inlets

(d)(v) Stream Protection	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 propose to use any structural sediment controls in a stream? *NOTE: Use of structural sediment controls in-stream is prohibited in accordance with Part III.G.2.d.v.*		X		No structural sediment controls in streams
For construction activities that are on the stream bank or will involve stream crossing, does the SWP3 include measures to minimize the number of stream crossings and/or the width of disturbance? *NOTE: If work along a stream bank is necessary, a non-erodible pad or non-erodible stream diversion dams (sand bags) must be installed. If stream crossings are necessary, a non-erodible stream crossing must be installed.*			X	No stream crossing. Project is situated away from stream banks to greatest extent possible.

Part III.G.2.e – Post-Construction Storm Water Management				
	Y	**N**	**N/A**	**Comments**
Does the SWP3 include the installation of a structural post-construction best management practice (BMP) to manage storm water runoff once construction activities have been completed?	X			Wet detention basin and veg. biofilters
Will the construction activity result in the installation of any impervious surface? *NOTE: Projects that do not result in the installation of impervious surface do not require the installation of post-construction BMPs.*	X			Switchyard pad and access drives. See Drawings - Sheets 1 & 2.
Has a long-term maintenance plan been developed or included in the SWP3 for maintenance of the structural post-construction BMP? *NOTE: The long-term maintenance plan must be developed and provided to the post-construction site operator, but does not need to be implemented as required by this permit. Local municipalities may require maintenance plan implementation.*	X			See Section 4 of Report and Appendix F
Is the construction activity a linear project (e.g., pipeline or utility line installation) that does not result in the installation of impervious surface? *NOTE: Linear projects that don't result in the installation of impervious surface do not need the installation of structural post-construction BMPs.*		X		
Large Construction Activities (≥ 5 Acres)	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 include a structural post-construction BMP with a specified volume and drain time?	X			See Section 2 and Appendix C of Report
If so, was one of the two methods proposed in the NPDES construction storm water general permit (CGP) used to determine the water quality volume (WQv) and drain time?	X			See Appendix C (WQv)
If the formula described in the CGP was used to calculate the WQv, were the correct values used for:				See Appendix C
(a) runoff coefficient (C)?	X			C = 0.6894
(b) precipitation depth (P = 0.75-inches)?	X			
(c) and the drainage area (A) to the BMP?	X			A = 5.392
If the structural post-construction BMP will be used for sediment storage and/or has a reduced infiltration capacity, was the WQv increased by an additional 20 percent ("fudge factor")?	X			See Appendix C: PPv >= (0.75+0.2)*WQv

Does the drain time in the SWP3 for the proposed structural post-construction BMP match the drain time for the selected BMP in the table below?	X			See Appendix C
Does the outlet structure of the post-construction BMP allow the discharge of half or more of the WQv or EDv in less than 1/3rd of the drain time?	X			See Appendix C

Target Drain Times for Structural Post-Construction BMPs

Best Management Practice	Drain Time of WQv
Infiltration Basin or Trench[1]	48 hours
Permeable Pavement - Infiltration[1]	48 hours
Permeable Pavement – Extended Detention	24 hours
Dry Extended Detention Basin[2]	48 hours
Wet Extended Detention Basin[3]	24 hours
Constructed Wetland (above permanent pool)[4]	24 hours
Sand & Other Media Filtration[5]	24 hours
Bioretention Cell[5,6]	24 hours
Pocket Wetland[7]	24 hours

1 Practices that are designed to fully infiltrate the WQv (basin, trench, permeable pavement) shall empty within 48 hours to provide storage for the subsequent storm events.
2 Dry basins must include forebay and micropool each sized at 10% of the WQv.
3 Provide both a permanent pool and an EDv above the permanent pool, each sized at 0.75 WQv.
4 Extended detention shall be provided for the WQv above the permanent water pool.
5 The surface ponding area (WQv) shall completely empty within 24 hours so that there is no standing water. Shorter drawdown times are acceptable as long as design criteria in Ohio's Rainwater and Land Development manual have been met.
6 This would include Grassed Linear Bioretention which was previously called Enhanced Water Quality Swale.
7 Pocket wetlands must have a wet pool equal to the WQv, with 25% of the WQv in a pool and 75% in marshes. The EDv above the permanent pool must be equal to the WQv.

Large Construction Activities (Continued)	**Y**	**N**	**N/A**	**Comments**
If the SWP3 proposes to use an alternative BMP instead of one of the BMPs listed in the table above, is the alternative BMP equivalent in effectiveness to the BMPs listed above?		X		No alternative BMPs proposed
Is there a pre-existing drainage basin or other BMP that will receive the storm water drainage from the construction site, is it sized appropriately to treat the WQv?		X		No pre-existing basin
For public road construction activities, are the post-construction BMPs designed consistent with the Ohio Department of Transportation's "Location and Design Manual, Volume Two?"			X	No public road construction activities
For construction activities where a post-construction BMP cannot be placed onsite and will require an offsite post-construction BMP, has the offsite mitigation proposal been authorized by Ohio EPA? *NOTE: Offsite BMPs must have a long-term maintenance agreement, be within the same HUC, and be at least 1.5 times the size of an onsite BMP.*			X	

For redevelopment projects which disturb 5 or more acres of land, was one of the following options used to as a post-construction practice:			X	Project not a redevelopment
(a) 20% reduction in impervious area?			X	
(b) a BMP sized to treat 20% of the WQv?			X	
(c) or a combination of (a) and (b) above?			X	
For construction activities where non-structural post-construction BMPs are proposed, has the substitution of structural BMPs with non-structural BMPs been authorized?			X	No non-structural post-construction BMPs
For construction activities where alternative post-construction BMPs are proposed, has the alternative BMP been authorized by Ohio EPA? *NOTE: Alternative BMPs must have TARP Tier II acceptance, be able to remove 80% of total suspended solids (TSS) in the runoff, and be able to treat the WQv unless hydrologic impacts are not necessary.*			X	No alternative post-construction BMPs proposed
Has the local municipality authorized the use of an alternative post-construction BMP?			X	
Small Construction Activities (≥ 1 Acre, but < 5 Acres)	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 include a structural post-construction BMP? *NOTE: A structural post-construction BMP is required for small construction activities, but the design standards have not been specified in the CGP.*			X	Project is considered a large construction activity
(i) If so, does the SWP3 explain the technical basis used to select the BMPs chosen where flows exceed pre-development levels?			X	
(ii) Does the SWP3 include the installation of velocity dissipation devices at discharge locations and outfall channels?			X	

Part III.G.2.f - Surface Water Protection				
	Y	**N**	**N/A**	**Comments**
Does the construction site contain any streams, rivers, lakes, or wetlands?	X			See Figure A2 and Sec. 1 of Report
If so, has the U.S. Army Corps of Engineers been contacted for a determination of impacts requiring Clean Water Act 401 or 404 permitting?			X	
For storm water discharges from BMPs into wetlands, have BMPs (e.g., level spreaders, buffers, or infiltration basins) been proposed to diffuse the concentrated flow into non-erosive flow?			X	

Part III.G.2.g - Non-Sediment Pollutant Controls				
Handling of Toxic or Hazardous Materials	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 provide directions on how to dispose toxic or hazardous wastes properly?	X			Drawings - Sheets 1 & 2, PC Note 1
(2) Does the SWP3 provide areas for recycling of used or unused hazardous materials? *NOTE: No toxic or hazardous wastes shall be disposed into storm drains, septic tanks, or by burying, burning, or mixing the wastes.*	X			Drawings - Sheets 1 & 2, Pollution Controls (PC) Notes

Waste Disposal	**Y**	**N**	**N/A**	**Comments**
Will containers (e.g., dumpsters, drums) be available for disposal of debris, trash, hazardous or petroleum wastes? *NOTE: All containers must be covered and leak-proof.*	X			Drawings - Sheets 1 & 2, PC Note 1
Clean Hard Fill	**Y**	**N**	**N/A**	**Comments**
(1) Are bricks, hardened concrete, and soil waste free from contamination which may leach constituents to waters of the state?	X			Drawings - Sheets 1 & 2, PC Note 3
(2) If clean construction wastes will be disposed into the property, are there any local prohibitions from this type of disposal?		X		
Construction & Demolition Debris	**Y**	**N**	**N/A**	**Comments**
Does the SWP3 state that all construction & demolition debris (C&DD) waste will be disposed of in an Ohio EPA approved C&DD landfill as required by Ohio Revised Code (ORC) 3714? *NOTE: Construction debris may be disposed of on-site, but demolition debris must be disposed in an Ohio EPA approved landfill. Materials which contain asbestos must comply with air pollution regulations (see Ohio Administrative Code 3745-20).*	X			Drawings - Sheets 1 & 2, PC Note 2
Construction Chemical Compounds	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 designate areas used for mixing or storage of compounds such as fertilizers, lime, asphalt, or concrete?	X			Drawings - Sheets 1 & 2, PC Note 4
(2) If so, are these areas located away from watercourses, drainage ditches, field drains, or other storm water drainage areas?	X			Drawings - Sheets 1 & 2, PC Note 4
Equipment Fueling & Maintenance	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 designate areas used for fueling or performing vehicle maintenance?	X			Drawings - Sheets 1 & 2, PC Note 5
(2) If so, are these areas located away from watercourses, drainage ditches, field drains, or other storm water drainage areas?	X			Drawings - Sheets 1 & 2
(3) Has a spill prevention control and countermeasures (SPCC) plan been developed? *NOTE: A SPCC plan must be developed for sites with one above ground storage tank (AST) of 660 gallons or more, total above ground tank storage of 1330 gallons, or below ground storage of 42,000 gallons of fuel.*			X	
Concrete Wash Waters	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 designate areas used for receiving concrete chute or other concrete wash waters?	X			Drawings - Sheets 1 & 2, PC Note 6
(2) If so, are these areas located away from watercourses, drainage ditches, field drains, or other drainage areas?	X			Drawings - Sheets 1 & 2
Trench & Ground Water Control	**Y**	**N**	**N/A**	**Comments**
Does the construction site have an onsite trench or pond that must be dewatered?		X		
If so, does the SWP3 call for the discharge of potentially turbid water through a filter bag, sump pit, or other sediment removal device?			X	
Contaminated Soils	**Y**	**N**	**N/A**	**Comments**

Does the SWP3 address proper handling and disposal of soils contaminated by petroleum or other chemical spills? *NOTE: All contaminated soils must be treated and/or disposed in Ohio EPA approved solid waste management facilities or hazardous waste treatment, storage or disposal facilities (TSDFs).*	X			Drawings - Sheets 1 & 2, PC Note 7
If the facility contains contaminated soil, which of the following practices will be used to prevent contamination from being released?			X	No contaminated soils anticipated
(1) The use of berms, trenches, and pits to collect contaminated runoff and prevent discharges			X	
(2) Pumping runoff into a sanitary sewer (with prior approval of the sanitary sewer operator) or into a container for transport to an appropriate treatment/disposal facility			X	
(3) Covering areas of contamination with tarps or other methods that prevent storm water from coming into contact with the material			X	
Spill Reporting Requirements	**Y**	**N**	**N/A**	**Comments**
(1) Does the SWP3 describe what to do in the event of a small release (less than 25 gallons) of petroleum waste? *NOTE: Petroleum based and concrete curing compounds must have special handling procedures.*	X			Drawings - Sheets 1 & 2, PC Note 8
(2) Does the SWP3 describe what to do in the event of a larger release (25 or more gallons) of petroleum waste? *NOTE: You must contact, Ohio EPA (at 1-800-282-9378), the local fire department, and the local emergency planning committee (LEPC) within 30 minutes of a spill of 25 or more gallons.*	X			Drawings - Sheets 1 & 2, PC Note 9
Open Burning	**Y**	**N**	**N/A**	**Comments**
(1) Is open burning performed in a restricted area (as defined in OAC 3745-19)? *NOTE: Open burning is permitted in restricted areas for barbeques, heating, and certain occupational purposes.*			X	Open burning not permitted
(2) Is open burning performed in a non-restricted area, but within 1,000 feet of an inhabited building away from the property? *NOTE: Open burning in an unrestricted area is limited to scrap lumber, wooden fence posts, agricultural, land-clearing, or landscape wastes.*			X	Open burning not permitted
Dust Controls/Suppressants	**Y**	**N**	**N/A**	**Comments**
(1) Are dust suppressants proposed to be used in the SWP3?	X			Drawings - Sheets 1 & 2, PC Note 11
(2) If so, are the areas which the dust suppressant will be applied located near catch basins for storm sewers or other drainage ways? *NOTE: Used oil may not be used as a dust suppressant.*			X	Water is proposed as dust suppresant
Air Permitting Requirements	**Y**	**N**	**N/A**	**Comments**
(1) Have appropriate measures been taken to ensure that all air pollution permits have been obtained? *NOTE: Air pollution permits may be required for activities including, but not limited to, mobile concrete batch plants, mobile asphalt plants, concrete crushers, and large generators.*			X	
(2) For restoration or demolition projects, will a notification be submitted to Ohio EPA, Division of Air Pollution Control to determine if asbestos corrective actions are required?			X	No demolition associated with project

Process Wastewater/Leachate Management	**Y**	**N**	**N/A**	**Comments**
Will all process wastewaters (e.g., equipment washing, leachate associated with on-site waste disposal, and concrete wash-outs) be collected and disposed of properly (e.g., to a publicly-owned treatment works)? *NOTE: The NPDES construction storm water general permit only authorizes the discharge of storm water and certain uncontaminated non-storm waters. The discharge of non-storm waters to waters of the state may be in violation of local, state, and federal laws or regulations.*	X			Drawings - Sheets 1 & 2, PC Note 6
Additional Concerns	**Y**	**N**	**N/A**	**Comments**
For construction activities involving the installation and/or replacement of a centralized sanitary system, (including sewer extensions) or a sewerage system (except those serving one, two, and three family dwellings) and potable water lines, was a PTI application submitted to Ohio EPA? *NOTE: Coverage under the NPDES construction storm water general permit does not alone authorize the installation of such sanitary sewerage systems or potable water lines.*			X	No sanitary sewer work associated with project
Does the SWP3 include measures for implementing good housekeeping practices?	X			Drawings - Sheets 1 & 2, PC Notes
Does the SWP3 promote the use of protected storage areas for industrial or construction materials to minimize exposure of such materials to storm water?	X			Drawings - Sheets 1 & 2, PC Notes

Part III.G.2.i - Inspections				
	Y	**N**	**N/A**	**Comments**
Does the SWP3 require weekly inspections of BMPs and an inspection within 24 hours after every rain event of 0.5 inches within a 24 hour period?	X			Drawings - Sheets 1 & 2, EC Note 11
If the site will be dormant for a long period, it's stabilized, and less frequent inspections are desired, does the SWP3 call for a waiver request to be submitted to OEPA for a reduction to monthly inspections?			X	Stabilization to occur promptly after site brought to final grade
Does the SWP3 state that only "qualified inspection personnel" will perform the inspections?	X			Drawings - Sheets 1 & 2, EC Note 11
Does the SWP3 state that an inspection checklist will be completed and signed by the inspector after every inspection?	X			Drawings - Sheets 1 & 2, EC Note 11
Does the SWP3 state that inspection records will be kept for 3 years after termination of construction activities?	X			Drawings - Sheets 1 & 2, EC Note 11
For BMPS that require repair or maintenance, does the SWP3 specify non-sediment pond BMPs to be repaired within 3 days of inspection and sediment ponds to be repaired or cleaned out within 10 days of inspection?	X			Drawings - Sheets 1 & 2, EC Note 12
For BMPs not meeting the intended function, does the SWP3 state that a new BMP will be installed within 10 days of the inspection?	X			Drawings - Sheets 1 & 2, EC Note 12
For missing BMPs required for installation by the SWP3, does the SWP3 state that the missing BMPs will be installed within 10 days of the inspection?	X			Drawings - Sheets 1 & 2, EC Note 12

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Summary: Correspondence of Clean Energy Future-Lordstown, LLC in Compliance with Condition No. 10 electronically filed by Teresa Orahood on behalf of Sally Bloomfield