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1.0 **INTRODUCTION**

This Run-on/Run-off Control System Plan (Plan) was prepared for an existing coal combustion residuals (CCR) disposal facility located at the DTE Energy (DTE) Range Road Landfill Ash Disposal Facility (RRLF) in China Township, St. Clair County, Michigan. The CCR disposal facility consists of a 402 acre landfill located on 514 acres of property approximately one mile west of the St. Clair River. The disposal facility currently accepts bottom ash and fly ash generated by plant operations at St. Clair Power Plant, Belle River Power Plant, and Harbor Beach Power Plant.

The plan was prepared in accordance with 40 CFR Part 257 and specifically addresses the requirements under Subpart D, §257.81(c) of the U.S. Environmental Protection Agency (EPA) CCR Final Rule. It is noted that the disposal facility is an existing landfill currently operating under a permit approved by the Michigan Department of Environment and Quality (MDEQ) on June 26, 2014, which is in accordance with regulatory standards generally equivalent to those included in the CCR Final Rule. Accordingly, run-on and run-off control system requirements for the disposal facility must meet or exceed those of the CCR Final Rule.

1.1 **SITE LOCATION AND DESCRIPTION**

The CCR disposal facility is located on land currently owned by DTE at the RRLF. The landfill was originally operated by DTE, but operations have since been contracted to Headwater, Inc. The CCR disposal facility site consists of the landfill with perimeter ditches that drain to a Michigan National Pollutant Discharge Elimination System (NPDES) sedimentation pond and a pump house at the southeast corner of the site. The site is approximately a half mile southwest of St. Clair, MI, and is bounded by Range Rd. on the east, King Road and multiple residential properties on the west, residential properties on the north, and Puttygut Rd. on the south. The landfill has been permitted since 1966.

1.2 **DESCRIPTION OF CCR LANDFILL OPERATIONS**

Sheet 3 of the Landfill Development Plan design drawings (Appendix A) shows the extent of each work area within the landfill. The landfill is designed to cover approximately 402 acres and be constructed in multiple phases. To date, nine work areas within the landfill have been certified closed. Waste is currently being placed in three work areas, including F3, D3, and G2, while three additional work areas are unconstructed.

Stormwater and leachate drains from the landfill into a network of perimeter ditches from which it ultimately collects in the NPDES Sedimentation Pond at the southeast corner of the site. This water is collected in a pump house and discharged to the Belle River Power Plant under a Michigan NPDES permit number MI0038172 issued by MDEQ.
1.3 **CCR FINAL RULE REQUIREMENTS**

(40 CFR) 257.81(a) The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must maintain:

(1) A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and

(2) A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

(b) Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

The RRLF disposal facility is an existing landfill that was designed to incorporate run-on and run-off controls systems, which prevent flow from and onto the active portion of the unit during a 24-hour, 25-year storm.

1.4 **PLAN CONTENT**

(40 CFR) 257.81(c) Run-on and run-off control system plan—

(1) Content of the plan. The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility’s operating record as required by § 257.105(g)(3).

This Plan describes how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of the CCR Final Rule. A certification statement from a qualified professional engineer verifying that this initial Plan meets the requirements of this section § 257.81 is provided in Appendix A. In accordance with § 257.81(c)(1), this Plan will be amended each time there is a change in conditions that substantially affect the written plan in effect.

1.5 **DOCUMENTS REVIEWED**

Background information, design basis information, and other data used in preparing this plan have been provided to AECOM by DTE. AECOM is not responsible for the accuracy of the documents reviewed, and has prepared this plan by practicing good engineering judgement.
based upon the best available information. The following documents and design drawings were reviewed in the preparation of this plan:


Additional information on the references utilized for this plan can be found in **Section 4.0**.
2.0 OVERVIEW OF RUN-ON/RUN-OFF CONTROL SYSTEMS

The run-on and run-off control systems share multiple common control measures and are both required to control the peak flows resulting from a 25-year/24-hour storm. Due to these similarities, one hydrologic and hydraulic (H&H) model was constructed in HydroCAD (version 10.0) to analyze both systems in order to evaluate the run-on and run-off control systems’ abilities to control the design storm. The NPDES sedimentation pond and stormwater ditches were found to adequately contain the 25-year/24-hour storm event without overtopping. The resulting output from this model can be found in Appendix B. The components that make up the run-on and run-off control systems are described in detail below.

2.1 RUN-ON CONTROLS

Run-on controls consist of diversion berms which divert stormwater away from active disposal areas and also direct surface water to receiving flumes or drainage ditches. In addition, the proposed cap system is graded at a minimum of 1% to drain stormwater flows away from active portions of the landfill. The active area of any phase will be minimized to reduce contact water and the potential for fugitive dust emissions. Furthermore, the areas immediately outside of the landfill’s perimeter slope away from the perimeter ditch system, preventing run-on from adjacent land from entering the facility.

2.2 PERMANENT RUN-OFF MANAGEMENT FEATURES

Permanent run-off management features and associated details are provided on Sheets 10 and 11 of the Landfill Development Plan design drawings (Appendix A). The cap system’s grade ranges from a minimum slope of 1.3% at the top to a maximum grade of 3 horizontal feet to 1 vertical foot (3H:1V) along the perimeter. V-shaped perimeter ditches are sloped at approximately 0.1% and 3H:1V side slopes. These perimeter ditches direct stormwater flows into the NPDES sedimentation pond at the southeast corner of the site.

All permanent run-off measures are designed to collect and control the peak flow resulting from a 25-year/24-hour storm under final design conditions. Supporting calculations for the surface water control structures are provided in Appendix B.

2.3 EROSION CONTROL

The cap system of the landfill is constructed with a 6-inch thick layer of topsoil in order to promote vegetative growth. This vegetative cover is sufficient to minimize potential erosion on all areas of the cap system where run-off is limited to sheet flow or shallow concentrated flow. Stormwater channels and swales at the facility are lined with permanent erosion matting or riprap as necessary in order to limit stormwater velocities and reduce erosion. Erosion matting is used as a more robust form of erosion control for any area of the cap system that is designed to convey concentrated flows.
2.4 COLLECTION AND HOLDING FACILITIES

All stormwater flows are conveyed from the perimeter swales into the existing NPDES sedimentation pond. Stormwater runoff settles within the NPDES sedimentation pond and ultimately discharges through a permitted NPDES outfall at its eastern end (permit number MI0038172 issued by MDEQ). The existing water surface elevation (WSE) of the sedimentation pond is approximately 577.7 feet. A starting WSE of 579.3 feet, corresponding to the pump station “off” elevation, was used to model the tailwater conditions for the perimeter ditch system.
3.0 FREQUENCY FOR REVISING THE PLAN

(40 CFR) 257.81(c)(4). The owner or operator of the CCR unit must prepare periodic run-on and runoff control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility’s operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed a periodic run-on and run-off control system plan when the plan has been placed in the facility’s operating record as required by § 257.105(g)(3).

DTE will update periodic run-on and runoff control system plans every five years and will place the plan in the facility’s operating record. DTE will obtain a certification from a qualified professional engineer stating that the periodic run-on and run-off control system plans meet the requirements of this section.
4.0 REFERENCES


APPENDIX A1
FINAL CCR RULE ENGINEER’S CERTIFICATION
Certification Statement 40 CFR § 257.81(c)(5) – Initial Run-on and Run-Off Control System Plan for an Existing CCR Landfill

CCR Unit: DTE Energy Range Road Landfill

I, Scott G. Hutsele, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the information contained in the initial run-on and run-off control system plan dated October 17, 2016 meets the requirements of 40 CFR § 257.81.

Scott G. Hutsele
Printed Name

10/17/16
Date
APPENDIX A2
HISTORIC DESIGN DRAWINGS
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY
CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN
LANDFILL DEVELOPMENT PLAN

PREPARED FOR: DTE ELECTRIC COMPANY

PREPARED BY: TRC ENVIRONMENTAL CORPORATION
ANN ARBOR, MICHIGAN

DATE: NOVEMBER 2013

INDEX

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<th>SHEET NUMBER</th>
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<tr>
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<td>STANDARD LEGEND/GENERAL NOTES</td>
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<tr>
<td>3</td>
<td>EXISTING SITE CONDITIONS</td>
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<td>PHASING PLAN - AREA F</td>
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<tr>
<td>5</td>
<td>PHASING PLAN - AREA G PHASE 2</td>
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<td>6</td>
<td>PHASING PLAN - AREA G PHASE 3</td>
</tr>
<tr>
<td>7</td>
<td>PROPOSED FINAL GRADES - NORTHERN HALF</td>
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<tr>
<td>8</td>
<td>PROPOSED FINAL GRADES - SOUTHERN HALF</td>
</tr>
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<td>9</td>
<td>ENGINEERING CROSS SECTIONS</td>
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SHEET 10

RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

DETAILED DESIGN OF LANDFILL COVER SYSTEM

- **FINAL COVER**
- **FINAL COVER TIE-IN**
- **FINAL COVER SPlice**
- **FINAL COVER TERMINATION**
- **SLOPE GRADING AND STABILIZATION**
- **SURFACE WATER DIVERSION BERM**

Scale: 2\(\text{in.}=1\text{ft.}\)
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN

LANDFILL DEVELOPMENT PLAN

DTE ELECTRIC COMPANY
### NF tabular

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<th>Average recurrence interval (years)</th>
<th>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)</th>
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<tr>
<td>5</td>
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### NF graphical

[Graphical representation of precipitation frequency]

---

1 Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.
Maps & aerals
Created (GMT): Wed Sep 7 19:11:17 2016

Small scale terrain
APPENDIX B2
HYDROCAD 25-YEAR/24 HOUR OUTPUT
## Area Listing (all nodes)

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<tr>
<th>Area</th>
<th>CN</th>
<th>Description</th>
<th>(subcatchment-numbers)</th>
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<tr>
<td>104.700</td>
<td>78</td>
<td>(2S, 3S, 4S, 6S, 12S)</td>
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<tr>
<td>99.100</td>
<td>72</td>
<td>(2S, 3S, 9S, 10AS, 10S)</td>
<td></td>
</tr>
<tr>
<td>3.800</td>
<td>83</td>
<td>(9S)</td>
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</tr>
<tr>
<td>64.300</td>
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<td>Meadow- cont. grass (non-grazed) (1S, 5S)</td>
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<tr>
<td>81.700</td>
<td>94</td>
<td>Newly graded area (pervious only) (8S)</td>
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</tr>
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<td>Pasture, grassland, or range - fair (7S, 11AS, 11BS)</td>
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</tr>
<tr>
<td>20.300</td>
<td>77</td>
<td>Woods - good (7S)</td>
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</tr>
<tr>
<td>12.500</td>
<td>82</td>
<td>Woods - grass combination (poor) (1S)</td>
<td></td>
</tr>
<tr>
<td><strong>486.500</strong></td>
<td><strong>81</strong></td>
<td><strong>TOTAL AREA</strong></td>
<td><strong>TOTAL AREA</strong></td>
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</table>
Summary for Subcatchment 1S: Subarea 1

Runoff = 48.73 cfs @ 12.47 hrs, Volume = 6.626 af, Depth = 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 0.00-72.00 hrs, dt = 0.01 hrs
Type II 24-hr  25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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<tbody>
<tr>
<td>* 29.200</td>
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<td>Meadow- cont. grass (non-grazed)</td>
</tr>
<tr>
<td>* 12.500</td>
<td>82</td>
<td>Woods - grass combination (poor)</td>
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<tr>
<td>41.700</td>
<td>79</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>41.700</td>
<td>100.00% Pervious Area</td>
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<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
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<th>Capacity (cfs)</th>
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<td>Shallow Concentrated Flow, (640-596)/1400</td>
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<td>Short Grass Pasture  Kv= 7.0 fps</td>
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<td>30.2</td>
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<td></td>
<td>Area= 5.0 sf  Perim= 5.0’  r = 1.00’</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n= 0.035  Earth, dense weeds</td>
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</table>

| 49.0     | 4,660         | Total         |                  |                |                                                  |

Subcatchment 1S: Subarea 1

Hydrograph

Type II 24-hr  25-year Rainfall=3.93"
Runoff Area=41.700 ac
Runoff Volume=6.626 af
Runoff Depth=1.91"
Flow Length=4,660'
Tc=49.0 min
CN=79
Summary for Subcatchment 2S: Subarea 2

Runoff = 27.83 cfs @ 12.58 hrs, Volume= 4.100 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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<td>* 20.400</td>
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</tr>
<tr>
<td>* 8.800</td>
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<td>29.200</td>
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<td>29.200</td>
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<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
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<td>Short Grass Pasture Kv= 7.0 fps</td>
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<td>3.1</td>
<td>390</td>
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<td>2.13</td>
<td>40.27</td>
<td>Channel Flow,</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Area= 18.9 sf Perim= 15.9’ r= 1.19’</td>
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<td>n= 0.035 Earth, dense weeds</td>
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53.2 3,200 Total

Subcatchment 2S: Subarea 2

Hydrograph

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=29.200 ac
Runoff Volume=4.100 af
Runoff Depth=1.69"
Flow Length=3,200'
Tc=53.2 min
CN=76
Summary for Subcatchment 3S: Subarea 3

Runoff = 33.61 cfs @ 12.57 hrs, Volume = 4.929 af, Depth = 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 0.00-72.00 hrs, dt = 0.01 hrs

Type II 24-hr 25-year Rainfall = 3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
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<td>10.500</td>
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<td>24.600</td>
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<td>Weighted Average</td>
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<tr>
<td>35.100</td>
<td>100.00% Pervious Area</td>
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</tbody>
</table>

Tc Length Slope Velocity Capacity Description
(min) (feet) (ft/ft) (ft/sec) (cfs)
53.1 3,090 0.0192 0.97 Shallow Concentrated Flow, (647.5-582)/3090
Short Grass Pasture Kv = 7.0 fps

Subcatchment 3S: Subarea 3

Type II 24-hr
25-year Rainfall = 3.93"
Runoff Area = 35.100 ac
Runoff Volume = 4.929 af
Runoff Depth = 1.69"
Flow Length = 3,090'
Slope = 0.0192 '/'
Tc = 53.1 min
CN = 76
Summary for Subcatchment 4S: Subarea 4

Runoff = 38.70 cfs @ 12.08 hrs, Volume = 2.503 af, Depth = 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

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<th>CN</th>
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<td>100.00% Pervious Area</td>
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<table>
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<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
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<th>Capacity (cfs)</th>
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<td>14.9</td>
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<td>Shallow Concentrated Flow, (647.5-582)/1370 Short Grass Pasture Kv= 7.0 fps</td>
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<td>0.2</td>
<td>40</td>
<td>0.0025</td>
<td>3.10</td>
<td>128.71</td>
<td>Channel Flow, Area= 41.5 sf Perim= 23.5’ r= 1.77’ n= 0.035</td>
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Type II 24-hr 25-year Rainfall=3.93"

Runoff Area=16.400 ac
Runoff Volume=2.503 af
Runoff Depth=1.83"
Flow Length=1,410'
Tc=15.1 min
CN=78
Summary for Subcatchment 5S: Subarea 5

Runoff = 46.31 cfs @ 12.37 hrs, Volume= 5.357 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

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<td>Meadow- cont. grass (non-grazed)</td>
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<td>100.00% Pervious Area</td>
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<th>Tc (min)</th>
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<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
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<td>0.0226</td>
<td>1.05</td>
<td></td>
<td>Shallow Concentrated Flow, (647.5-592)/2450</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture Kv= 7.0 fps</td>
</tr>
</tbody>
</table>

Subcatchment 5S: Subarea 5

Hydrograph

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=35.100 ac
Runoff Volume=5.357 af
Runoff Depth=1.83"
Flow Length=2,450'
Slope=0.0226 '/'
Tc=38.8 min
CN=78
Summary for Subcatchment 6S: Subarea 6

Runoff = 19.83 cfs @ 12.90 hrs, Volume = 3.861 af, Depth = 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 25.300</td>
<td>78</td>
<td>100.00% Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.5</td>
<td>1,320</td>
<td>0.0122</td>
<td>0.77</td>
<td></td>
<td>Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps</td>
</tr>
<tr>
<td>50.5</td>
<td>1,286</td>
<td>0.0008</td>
<td>0.42</td>
<td></td>
<td>Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps</td>
</tr>
</tbody>
</table>

79.0  2,606  Total

Subcatchment 6S: Subarea 6

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=25.300 ac
Runoff Volume=3.861 af
Runoff Depth=1.83"
Flow Length=2,606'
Tc=79.0 min
CN=78
Summary for Subcatchment 7S: Subarea 7

Runoff = 77.24 cfs @ 12.27 hrs, Volume= 7.753 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.800</td>
<td>84</td>
<td>Pasture, grassland, or range - fair</td>
</tr>
<tr>
<td>20.300</td>
<td>77</td>
<td>Woods - good</td>
</tr>
<tr>
<td>45.100</td>
<td>81</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>45.100</td>
<td>100.00%</td>
<td>Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>614</td>
<td>0.0700</td>
<td>1.85</td>
<td></td>
<td>Shallow Concentrated Flow, (542-599)/614 Short Grass Pasture Kv= 7.0 fps</td>
</tr>
<tr>
<td>26.5</td>
<td>3,635</td>
<td>0.0030</td>
<td>2.29</td>
<td>17.60</td>
<td>Channel Flow, (599-588)/3635 Area= 7.7 sf Perim= 7.9' r= 0.97' n= 0.035 Earth, dense weeds</td>
</tr>
</tbody>
</table>

32.0 4,249 Total

Subcatchment 7S: Subarea 7

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=45.100 ac
Runoff Volume=7.753 af
Runoff Depth=2.06"
Flow Length=4,249'
Tc=32.0 min
CN=81
Summary for Subcatchment 8S: Subarea 8

Runoff = 154.96 cfs @ 12.46 hrs, Volume= 22.167 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>81.700</td>
<td>94</td>
<td>Newly graded area (pervious only)</td>
</tr>
<tr>
<td>81.700</td>
<td>100.00%</td>
<td>Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.1</td>
<td>3,320</td>
<td>0.0138</td>
<td>1.17</td>
<td></td>
<td>Shallow Concentrated Flow, Nearly Bare &amp; Untilled</td>
</tr>
<tr>
<td>4.1</td>
<td>700</td>
<td>0.0029</td>
<td>2.86</td>
<td>44.96</td>
<td>Channel Flow, Area= 15.7 sf, Perim= 11.2', r= 1.40', n= 0.035, Earth, dense weeds</td>
</tr>
</tbody>
</table>

51.2 4,020 Total

Subcatchment 8S: Subarea 8

Hydrograph

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=81.700 ac
Runoff Volume=22.167 af
Runoff Depth=3.26"
Flow Length=4,020'
Tc=51.2 min
CN=94
Summary for Subcatchment 9S: Subarea 9

Runoff = 23.59 cfs @ 12.03 hrs, Volume = 1.334 af, Depth = 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 0.00-72.00 hrs, dt = 0.01 hrs
Type II 24-hr 25-year Rainfall = 3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 5.700</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>* 3.800</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>9.500</td>
<td>76</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>9.500</td>
<td>100</td>
<td>100.00% Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7</td>
<td>303</td>
<td>0.1815</td>
<td>2.98</td>
<td></td>
<td>Shallow Concentrated Flow, Short Grass Pasture Kv = 7.0 fps</td>
</tr>
<tr>
<td>9.5</td>
<td>1,450</td>
<td>0.0041</td>
<td>2.54</td>
<td>20.80</td>
<td>Channel Flow, Area = 8.2 sf Perim = 9.1' r = 0.90' n = 0.035</td>
</tr>
</tbody>
</table>

11.2 1,753 Total

Subcatchment 9S: Subarea 9

Type II 24-hr 25-year Rainfall = 3.93"
Runoff Area = 9.500 ac
Runoff Volume = 1.334 af
Runoff Depth = 1.69"
Flow Length = 1,753'
Tc = 11.2 min
CN = 76
Summary for Subcatchment 10AS: Subarea 10A

Runoff = 42.58 cfs @ 12.23 hrs, Volume = 4.081 af, Depth = 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 0.00-72.00 hrs, dt = 0.01 hrs
Type II 24-hr 25-year Rainfall = 3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>34.700</td>
<td>72</td>
<td>100.00% Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.8</td>
<td>1,010</td>
<td>0.0075</td>
<td>0.61</td>
<td></td>
<td>Shallow Concentrated Flow, (595.5-588)/1010 Short Grass Pasture Kv = 7.0 fps</td>
</tr>
</tbody>
</table>

Subcatchment 10AS: Subarea 10A

Hydrograph

Type II 24-hr 25-year Rainfall = 3.93"
Runoff Area = 34.700 ac
Runoff Volume = 4.081 af
Runoff Depth = 1.41"
Flow Length = 1,010'
Slope = 0.0075 '/'
Tc = 27.8 min
CN = 72
Summary for Subcatchment 10S: Subarea 10

Runoff = 46.11 cfs @ 12.26 hrs, Volume= 4.633 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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<tbody>
<tr>
<td>39.400</td>
<td>72</td>
<td>100.00% Pervious Area</td>
</tr>
</tbody>
</table>

Tc  | Length      | Slope  | Velocity  | Capacity  | Description                   |
---|-------------|--------|-----------|-----------|------------------------------|
24.8| 1,250       | 0.0144 | 0.84      | 166.06    | Shallow Concentrated Flow, (604-586)/1250 |
|   | 5.1         | 940    | 0.0021    | 3.09      | Short Grass Pasture  Kv= 7.0 fps |
|   | 29.9        | 2,190  | 0.0075    | 166.06    | Channel Flow,                |
|   |             |        |           | 3.09      | Area= 53.7 sf  Perim= 26.8' r= 2.00' n= 0.035 |

Subcatchment 10S: Subarea 10

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=39.400 ac
Runoff Volume=4.633 af
Runoff Depth=1.41"
Flow Length=2,190'
Tc=29.9 min
CN=72
Summary for Subcatchment 11AS: Subarea 11A

Runoff = 86.13 cfs @ 12.28 hrs, Volume= 8.969 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr  25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 46.600</td>
<td>84</td>
<td>Pasture, grassland, or range - fair</td>
</tr>
<tr>
<td>46.600</td>
<td>100.00% Pervious Area</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
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<tbody>
<tr>
<td>27.1</td>
<td>1,650</td>
<td>0.0210</td>
<td>1.01</td>
<td></td>
<td>Shallow Concentrated Flow, (618-584)/1650</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture   Kv= 7.0 fps</td>
</tr>
<tr>
<td>6.9</td>
<td>840</td>
<td>0.0023</td>
<td>2.04</td>
<td>16.29</td>
<td>Channel Flow,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Area= 8.0 sf  Perim= 8.0’  r= 1.00’</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n= 0.035  Earth, dense weeds</td>
</tr>
</tbody>
</table>

34.0 2,490 Total

Subcatchment 11AS: Subarea 11A

Hydrograph

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=46.600 ac
Runoff Volume=8.969 af
Runoff Depth=2.31"
Flow Length=2,490'
Tc=34.0 min
CN=84
Summary for Subcatchment 11BS: Subarea 11B

Runoff = 104.40 cfs @ 12.01 hrs, Volume= 5.524 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 28.700</td>
<td>84</td>
<td>Pasture, grassland, or range - fair</td>
</tr>
<tr>
<td>28.700</td>
<td>100.00%</td>
<td>Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.2</td>
<td>490</td>
<td>0.0160</td>
<td>0.89</td>
<td></td>
<td>Shallow Concentrated Flow, (593.8-586)/485</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture   Kv= 7.0 fps</td>
</tr>
</tbody>
</table>

Subcatchment 11BS: Subarea 11B

Hydrograph

Type II 24-hr 25-year Rainfall=3.93"
Runoff Area=28.700 ac
Runoff Volume=5.524 af
Runoff Depth=2.31"
Flow Length=490'
Slope=0.0160 '/'
Tc=9.2 min
CN=84
Summary for Subcatchment 12S: Subarea 12

Runoff = 25.95 cfs @ 12.31 hrs, Volume = 2.747 af, Depth = 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 0.00-72.00 hrs, dt = 0.01 hrs
Type II 24-hr 25-year Rainfall = 3.93"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 18.000</td>
<td>78</td>
<td>100.00% Pervious Area</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2</td>
<td>614</td>
<td>0.0560</td>
<td>1.66</td>
<td></td>
<td>Shallow Concentrated Flow, Short Grass Pasture  Kv= 7.0 fps</td>
</tr>
<tr>
<td>27.9</td>
<td>1,818</td>
<td>0.0020</td>
<td>1.09</td>
<td>13.37</td>
<td>Channel Flow, Area= 12.3 sf  Perim= 28.4’  r= 0.43’  n= 0.035</td>
</tr>
</tbody>
</table>

34.1 2,432 Total

Subcatchment 12S: Subarea 12

Hydrograph

Type II 24-hr
25-year Rainfall = 3.93"
Runoff Area = 18.000 ac
Runoff Volume = 2.747 af
Runoff Depth = 1.83"
Flow Length = 2,432'
Tc = 34.1 min
CN = 78
Summary for Reach 1R: Reach 1

Inflow Area = 120.100 ac, 0.00% Impervious, Inflow Depth = 1.86" for 25-year event
Inflow = 127.33 cfs @ 12.41 hrs, Volume= 18.591 af
Outflow = 96.05 cfs @ 12.72 hrs, Volume= 18.591 af, Atten= 25%, Lag= 18.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.59 fps, Min. Travel Time= 24.9 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 140.2 min

Peak Storage= 143,652 cf @ 12.72 hrs
Average Depth at Peak Storage= 2.22'
Bank-Full Depth= 3.00' Flow Area= 57.0 sf, Capacity= 174.14 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 28.00'
Length= 3,880.0' Slope= 0.0021 '/'
Inlet Invert= 598.00', Outlet Invert= 589.85'

‡
Summary for Reach 2R: Reach 2

Inflow Area = 149.300 ac, 0.00% Impervious, Inflow Depth = 1.82" for 25-year event
Inflow = 122.05 cfs @ 12.68 hrs, Volume= 22.691 af
Outflow = 121.87 cfs @ 12.70 hrs, Volume= 22.691 af, Atten= 0%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.15 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 11.2 min

Peak Storage= 15,079 cf @ 12.70 hrs
Average Depth at Peak Storage= 2.98'
Bank-Full Depth= 6.00' Flow Area= 96.0 sf, Capacity= 430.35 cfs

10.00' x 6.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 1.0 '/' Top Width= 22.00'
Length= 390.0' Slope= 0.0021 '/'
Inlet Invert= 584.00', Outlet Invert= 583.20'

Reach 2R: Reach 2

Hydrograph

Inflow Area=149.300 ac
Avg. Flow Depth=2.98'
Max Vel=3.15 fps
n=0.035
L=390.0'
S=0.0021 '/'
Capacity=430.35 cfs
Summary for Reach 3R: Reach 3

Inflow Area = 184.400 ac, 0.00% Impervious, Inflow Depth = 1.80" for 25-year event
Inflow = 153.52 cfs @ 12.67 hrs, Volume= 27.620 af
Outflow = 153.22 cfs @ 12.69 hrs, Volume= 27.620 af, Atten= 0%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.04 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 10.2 min

Peak Storage= 19,177 cf @ 12.69 hrs
Average Depth at Peak Storage= 4.10'
Bank-Full Depth= 6.00' Flow Area= 108.0 sf, Capacity= 422.53 cfs

0.00' x 6.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 36.00'
Length= 380.0' Slope= 0.0021 '/'
Inlet Invert= 583.20', Outlet Invert= 582.40'

Reach 3R: Reach 3

Inflow Area=184.400 ac
Avg. Flow Depth=4.10'
Max Vel=3.04 fps
n=0.035
L=380.0'
S=0.0021 '/'
Capacity=422.53 cfs
Summary for Reach 4R: Reach 4

Inflow Area = 210.300 ac, 0.00% Impervious, Inflow Depth = 1.79" for 25-year event
Inflow = 160.14 cfs @ 12.68 hrs, Volume= 31.457 af
Outflow = 160.04 cfs @ 12.70 hrs, Volume= 31.457 af, Atten= 0%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.27 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 5.8 min

Peak Storage= 11,733 cf @ 12.70 hrs
Average Depth at Peak Storage= 4.04'
Bank-Full Depth= 6.00' Flow Area= 108.0 sf, Capacity= 460.44 cfs

0.00' x 6.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 36.00'
Length= 240.0' Slope= 0.0025 '/'
Inlet Invert= 582.40', Outlet Invert= 581.80'

Reach 4R: Reach 4

Hydrograph

Inflow Area=210.300 ac
Avg. Flow Depth=4.04'
Max Vel=3.27 fps
n=0.035
L=240.0'
S=0.0025 '/'
Capacity=460.44 cfs
Summary for Reach 7R: Reach 7

Inflow Area = 45.100 ac, 0.00% Impervious, Inflow Depth = 2.06" for 25-year event
Inflow = 77.24 cfs @ 12.27 hrs, Volume= 7.753 af
Outflow = 52.57 cfs @ 12.50 hrs, Volume= 7.753 af, Atten= 32%, Lag= 13.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.66 fps, Min. Travel Time= 22.8 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 96.6 min

Peak Storage= 71,770 cf @ 12.50 hrs
Average Depth at Peak Storage= 2.57'
Bank-Full Depth= 6.00' Flow Area= 108.0 sf, Capacity= 506.58 cfs

0.00’ x 6.00’ deep channel, n= 0.035  Earth, dense weeds
Side Slope Z-value= 3.0 '/'  Top Width= 36.00'
Length= 3,635.0'  Slope= 0.0030 '/'
Inlet Invert= 599.00', Outlet Invert= 588.00'

Reach 7R: Reach 7

Hydrograph

Inflow Area=45.100 ac
Avg. Flow Depth=2.57'
Max Vel=2.66 fps
n=0.035
L=3,635.0'
S=0.0030 '/'
Capacity=506.58 cfs
Summary for Reach 8R: Reach 8

Inflow Area = 81.700 ac, 0.00% Impervious, Inflow Depth = 3.26" for 25-year event
Inflow = 154.96 cfs @ 12.46 hrs, Volume = 22.167 af
Outflow = 153.44 cfs @ 12.53 hrs, Volume = 22.167 af, Atten = 1%, Lag = 3.9 min

Routing by Dyn-Stor-Ind method, Time Span = 0.00-72.00 hrs, dt = 0.01 hrs / 2
Max. Velocity = 3.41 fps, Min. Travel Time = 3.4 min
Avg. Velocity = 1.17 fps, Avg. Travel Time = 10.0 min

Peak Storage = 31,538 cf @ 12.53 hrs
Average Depth at Peak Storage = 3.88'
Bank-Full Depth = 4.00' Flow Area = 48.0 sf, Capacity = 166.95 cfs

0.00' x 4.00' deep channel, n = 0.035 Earth, dense weeds
Side Slope Z-value = 3.0 '/' Top Width = 24.00'
Length = 700.0' Slope = 0.0029 '/'
Inlet Invert = 586.00', Outlet Invert = 584.00'

Reach 8R: Reach 8

Hydrograph

Inflow Area = 81.700 ac
Avg. Flow Depth = 3.88'
Max Vel = 3.41 fps
n = 0.035
L = 700.0'
S = 0.0029 '/'
Capacity = 166.95 cfs
Summary for Reach 10R: Reach 10

Inflow Area = 249.700 ac, 0.00% Impervious, Inflow Depth = 1.73" for 25-year event
Inflow = 178.77 cfs @ 12.65 hrs, Volume= 36.090 af
Outflow = 169.57 cfs @ 12.80 hrs, Volume= 36.090 af, Atten= 5%, Lag= 9.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.78 fps, Min. Travel Time= 12.7 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 59.3 min

Peak Storage= 129,283 cf @ 12.80 hrs
Average Depth at Peak Storage= 4.51'
Bank-Full Depth= 6.00' Flow Area= 108.0 sf, Capacity= 363.32 cfs

0.00' x 6.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 36.00'
Length= 2,120.0' Slope= 0.0016 '/'
Inlet Invert= 581.80', Outlet Invert= 578.50'

Reach 10R: Reach 10
Hydrograph

Inflow Area=249.700 ac
Avg. Flow Depth=4.51'
Max Vel=2.78 fps
n=0.035
L=2,120.0'
S=0.0016 '/'
Capacity=363.32 cfs
Summary for Reach 11AR: Reach 11A

Inflow Area = 91.700 ac, 0.00% Impervious, Inflow Depth = 2.19" for 25-year event
Inflow = 129.77 cfs @ 12.35 hrs, Volume= 16.721 af
Outflow = 107.83 cfs @ 12.54 hrs, Volume= 16.721 af, Atten= 17%, Lag= 11.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.87 fps, Min. Travel Time= 15.2 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 72.1 min

Peak Storage= 98,442 cf @ 12.54 hrs
Average Depth at Peak Storage= 3.54'
Bank-Full Depth= 6.00' Flow Area= 108.0 sf, Capacity= 440.68 cfs

0.00' x 6.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 36.00'
Length= 2,620.0' Slope= 0.0023 '/'
Inlet Invert= 588.00', Outlet Invert= 582.00'

Inflow Area= 91.700 ac
Avg. Flow Depth= 3.54'
Max Vel= 2.87 fps
n=0.035
L=2,620.0'
S=0.0023 '/'
Capacity= 440.68 cfs
### Summary for Reach 11BR: Reach 11B

<table>
<thead>
<tr>
<th>Inflow Area</th>
<th>202.100 ac, 0.00% Impervious, Inflow Depth = 2.64&quot; for 25-year event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflow</td>
<td>271.53 cfs @ 12.53 hrs, Volume= 44.411 af</td>
</tr>
<tr>
<td>Outflow</td>
<td>264.37 cfs @ 12.61 hrs, Volume= 44.411 af, Attenuation= 3%, Lag= 5.2 min</td>
</tr>
</tbody>
</table>

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.83 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 30.9 min

Peak Storage= 101,441 cf @ 12.61 hrs
Average Depth at Peak Storage= 4.80'
Bank-Full Depth= 6.00' Flow Area= 108.0 sf, Capacity= 480.37 cfs

0.00' x 6.00' deep channel, n= 0.035  Earth, dense weeds
Side Slope Z-value= 3.0 '/'  Top Width= 36.00'
Length= 1,470.0'  Slope= 0.0027 '/'
Inlet Invert= 582.00', Outlet Invert= 578.00'

### Reach 11BR: Reach 11B

**Hydrograph**

Inflow Area=202.100 ac
Avg. Flow Depth=4.80'
Max Vel=3.83 fps
n=0.035
L=1,470.0'
S=0.0027 '/'
Capacity=480.37 cfs
Summary for Pond 9P: NPDES Sedimentation Basin

The pumps at the pump house are three National Pump Company J11MC five stage pumps.

Starting WSE of 579.3 was selected from the pump off switch.

starting WSE of 579.3 was selected from the pump off switch.

<table>
<thead>
<tr>
<th>Inflow Area</th>
<th>486.500 ac</th>
<th>0.00% Impervious</th>
<th>Inflow Depth = 2.09&quot; for 25-year event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflow</td>
<td>440.20 cfs @ 12.65 hrs</td>
<td>Volume = 84.583 af</td>
<td></td>
</tr>
<tr>
<td>Outflow</td>
<td>5.69 cfs @ 25.60 hrs, Volume = 27.979 af, Atten = 99%, Lag = 776.6 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>5.69 cfs @ 25.60 hrs, Volume = 27.979 af</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>0.00 cfs @ 0.00 hrs, Volume = 0.000 af</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Starting Elev= 579.30' Surf.Area= 8.539 ac Storage= 10.935 af
Peak Elev= 587.25' @ 25.60 hrs Surf.Area= 12.663 ac Storage= 88.625 af (77.691 af above start)

Plug-Flow detention time= 2,520.0 min calculated for 17.045 af (20% of inflow)
Center-of-Mass det. time= 1,642.2 min (2,526.3 - 884.1)

<table>
<thead>
<tr>
<th>Volume</th>
<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>578.00'</td>
<td>98.676 af</td>
<td>Custom Stage Data (Irregular) Listed below (Recalc)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>578.00</td>
<td>8.284</td>
<td>3,734.0</td>
<td>0.000</td>
<td>0.000</td>
<td>8.284</td>
</tr>
<tr>
<td>580.00</td>
<td>8.678</td>
<td>3,762.0</td>
<td>16.960</td>
<td>16.960</td>
<td>8.704</td>
</tr>
<tr>
<td>582.00</td>
<td>9.167</td>
<td>5,177.0</td>
<td>17.843</td>
<td>34.803</td>
<td>31.812</td>
</tr>
<tr>
<td>584.00</td>
<td>9.860</td>
<td>5,810.0</td>
<td>19.023</td>
<td>53.826</td>
<td>44.520</td>
</tr>
<tr>
<td>586.00</td>
<td>10.510</td>
<td>6,225.0</td>
<td>20.367</td>
<td>74.193</td>
<td>53.649</td>
</tr>
<tr>
<td>588.00</td>
<td>14.059</td>
<td>11,378.0</td>
<td>24.483</td>
<td>98.676</td>
<td>219.359</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Routing</th>
<th>Invert</th>
<th>Outlet Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Primary</td>
<td>580.30'</td>
<td>Pump (National Pump J11MC x 3) X 3.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Discharges@929.30' Turns Off@579.30'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flow (gpm)= 600.0 720.0 735.0 840.0 1,008.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Head (feet)= 390.00 375.00 350.00 345.00 300.00</td>
</tr>
<tr>
<td>#2</td>
<td>Device 1</td>
<td>578.07'</td>
<td>96.0&quot; W x 48.0&quot; H Box Culvert</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L= 49.2' RCP, end-section conforming to fill, Ke= 0.500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inlet / Outlet Invert= 578.07' / 577.09' S= 0.0199 '/'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>n= 0.013, Flow Area= 32.00 sf</td>
</tr>
<tr>
<td>#3</td>
<td>Secondary</td>
<td>590.00'</td>
<td>1,000.0' long x 12.0' breadth Broad-Crested Rectangular Weir</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Coef. (English) 2.57 2.62 2.67 2.66 2.67 2.66 2.66 2.64</td>
</tr>
</tbody>
</table>

Primary OutFlow Max=5.69 cfs @ 25.60 hrs HW=587.25' (Free Discharge)
1=Pump (National Pump J11MC x 3) (Pump Controls 5.69 cfs)
2=Culvert (Passes 5.69 cfs of 394.14 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=579.30' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
Pond 9P: NPDES Sedimentation Basin

Hydrograph

Inflow Area = 486.500 ac
Peak Elev = 587.25'
Storage = 88.625 af

Flow (cfs)

Time (hours)