

PRELIMINARY STORMWATER MANAGEMENT PLAN
FOR
CANTERBURY 7TH ADDITION
SHAKOPEE, MN

PREPARED BY:
GEORGE ABERNATHY, PE
FEBRUARY 27, 2018

PROJECT INTRODUCTION

The project includes a residential and commercial oriented development adjacent to Canterbury Park, along with public street and utility improvements, proposed by Canterbury Development, LLC., in the City of Shakopee located on the north side of Eagle Creek Boulevard, west of County Highway 83.

The Preliminary Plat proposes the Canterbury 7th Addition plat that will create public right-of-way for the new alignment of Shenandoah Drive, a lot for Phase I of Canterbury Residential development, Outlot 'C' for a regional stormwater management pond, and several Outlots for future development. The PUD application consists of the Canterbury Residential project which will provide approximately 600 luxury apartments, private clubhouse and amenities, parking ramps and related surface parking.

The City of Shakopee is the LGU having permitting authority in the area. On Wednesday, April 19, 2017, Sambatek met with City Staff / Representatives as a Pre-application Meeting to discuss the existing site and drainage conditions, the proposed project and stormwater management plan. Attendees included: Bruce Loney (Dir. of Public Works); Ryan Halverson (Assistant City Engineer); Mark Noble (City Planner); Jeff Sandberg (WSB); Erik Miller (Sambatek); George Abernathy (Sambatek).

As part of this meeting, City Staff / Representatives confirmed the acceptance of Minimal Impact Design Standards (MIDS) best management practices and related MIDS Calculator as part of the design process of the proposed stormwater management plan. Upon completion of this meeting, it was agreed upon by those present that due to site restrictions, including shallow bedrock, project location within a wellhead protection area, and potential for karst conditions, that infiltration practices are discouraged and the project shall be designed to meet Minimal Impact Design Standards (MIDS) Flexible Treatment Option #2 (FTO #2) for water quality and volume reduction. Flexible Treatment Option #2 includes volume control to the maximum extent practical and the removal of 60% of the annual total phosphorus load. Please refer to Appendix B for copy of the completed design sequence flow chart and recommended FTO#2.

The proposed regional stormwater pond will provide water quality treatment, and rate control, in compliance with the City's Comprehensive Water Resource Management Plan (CWRMP), for the Canterbury Residential development, a portion of Shenandoah Drive, and for the future townhome project site within Outlot 'D'.

All other development components would be completed as part of future phases and will be required to provide an onsite stormwater management system in compliance with the rules and regulations of the governing authority.

EXISTING CONDITIONS

The majority of the project site is vacant with a vegetative land cover that is utilized annually for Sever's Fall Festival and Corn Maze. The northern portion of the site contains gravel parking and drive areas that

are used occasionally during concerts and other events at Canterbury Park. The southeast portion of the site has been used as a staging area for the adjacent power plant construction.

The project site is gently sloping, does not contain hydric soils, steep slopes, or highly erodible soils. Soils are generally classified as clayey sand, or silty sand, lying atop shallow limestone found at depths ranging from 2' to 8' down from the surface. The existing soils have been conservatively classified as HSG type B soils as part of the design process. Infiltration is not recommended due shallow bedrock and high potential for karst conditions.

A Geotechnical Evaluation Report has been prepared by Braun Intertec, dated February 16, 20017, and is available for review.

The proposed project site is tributary to the Minnesota River and lies within two sub-watersheds, Mill Pond and Blue Lake, of the City of Shakopee's Sub-watershed Delineation Map (Figure III-4) of the Comprehensive Water Resource Management Plan (January 2012).

The majority of existing site runoff would be from the current farmstead and previously farmed areas with the exception of a small northerly portion of the site which is currently a paved and/or gravel parking lot, and the southeast portion of the project site which has most recently been used a gravel lay down area for staging purposes related to the offsite construction of the new power plant to the west.

The type of run-off generated by the existing farmstead, and previous agricultural area, is typical pasture and previously farmed land (i.e. residual fertilizer, herbicide, pesticide, sediment from tilling and planting, etc). The stormwater run-off generated by this area is directed to a large, shallow, centrally located depression where it remains until it is evaporated. After larger rainfall events, this depression drains to the offsite stormwater management system on Canterbury Park via overland flow within the roadside ditch and wetland adjacent to the existing Canterbury Park drive / 12th Avenue.

The existing parking areas to the north, portion of the existing farmstead, and portion of existing entrance to Canterbury Park, drain to a subsurface storm sewer system which leads to an existing stormwater management system located on the adjacent Canterbury Park property where it is treated prior to discharge via an existing 42" storm sewer pipe to the Upper Valley Drainage Way System which drains northwest to the Minnesota River approximately 1.0-miles away. This existing 42" storm sewer pipe bisects the northerly half of the proposed Lot 1 – Canterbury Residences site and is to be rerouted to the north regional pond via the Shenandoah Drive Public Improvements, and then returned to its existing outfall location of the Upper Valley Drainageway.

The southeast portion of the project site drains to the existing storm sewer system within Vierling Drive and 12th Avenue which directs runoff through a public storm sewer system to offsite regional treatment facility prior to its final outfall location of Blue Lake approximately 3.0 miles to the northeast. These conditions will remain unchanged as part of this proposed project.

PROPOSED CONDITIONS

The proposed project will include the extension of Shenandoah Drive and Canterbury Residences, including two 3-story apartment building complexes, attached clubhouse, amenities, concrete sidewalks and bituminous trails, internalized parking ramp structures, surface parking, and related landscaping, site lighting, and utilities.

A regional stormwater management pond will be constructed at the north end of the site and will provide treatment for approximately 55.4 acres of the overall development including Canterbury Residences, Outlots “A”, “F”, Hauer Drive, and a portion of Shenandoah Drive.

The total proposed impervious surface will be approximately 32.54 acres, which includes and assumed 65% impervious lot coverage for future development within Outlot “F” and 85% impervious coverage for future development within Outlot “A”. The proposed design conservatively assumes an HSG type C soil to account for compaction related to construction activities.

A portion of the westerly side of development, totaling 0.75 acres of vegetated side slopes, will remain as uncontrolled overland flow to the Upper Valley Drainageway.

The proposed regional NURP pond has been designed in accordance with the City’s CWRMP and will provide the required water quality treatment and rate control using HydroCAD stormwater modeling software. The regional pond outlets via an Outlet Control Structure with a primary outlet of a 24” pipe which is directed to a junction manhole where it is combined with a 48” bypass pipe, which conveys the rerouted 42” pipe serving the existing Canterbury Park, and conveyed via a 54” pipe which then continues southwest discharging to the Upper Valley Drainageway which has a final outfall location of the Minnesota River approximately 1.0 miles to the northwest.

As shown on the attached drainage exhibit, Future Development Area “A” will continue to drain to the existing Canterbury Park Stormwater Management System. At the time when development of this area occurs, consideration could be given towards expansion of the two existing ponds adjacent to the Vierling Drive roundabout to provide the appropriate detention volume needed for the required water quality and rate control.

Future Development Area “B”, as shown on the attached drainage exhibit, will continue to follow the existing drainage condition which directs runoff to the public storm sewer system within Vierling Drive and 12th Avenue. Based on discussions with City Staff at the Pre-application Meeting, it is our understanding that the downstream regional treatment facility has been design to accommodate this tributary area.

RATE CONTROL

Rate control will be provided in accordance with the City's CWRMP which allows a maximum discharge rate of 1/3 CFS per acre of newly developed land for areas of land tributary to the Minnesota River via within the Mill Pond Subcatchment Area.

The City's WRMP does allow the maximum peak discharge rate to be waived to the extents necessary to be limited to no less than the area of an 8-inch opening, and/or allow the outlet to be sized to allow the detention area to draw down to within one foot of the normal run-out elevation within the 72-hour following the onset of a 100-year rainfall event. Please refer to Appendix C for HydroCAD calculations.

Maximum Rate of Runoff (cfs)		
Subcatchment	Allowed	Total Proposed
<i>Mill Pond</i>	18.47	18.33 (via 24" pipe)

WATER QUALITY

The City of Shakopee requires water quality treatment in accordance with NURP guidelines.

NURP standards require that wet ponds have a dead storage volume equal to the volume of runoff from a 2.5 inch rainfall event over the contributing area. The regional pond was designed in HydroCAD to meet this standard and modeled in MIDS calculator to estimate the annual pollutant load reductions for total phosphorus (TP) and total suspended solids (TSS).

The results of the water quality analysis are summarized in the tables below; please refer to the attached calculations for further detail. Please refer to Appendix D for the MIDS Calculations.

Dead Storage Volume (cf)		
Wet Pond	Required	Provided
<i>North Regional Pond</i>	321,895	482,799

Nutrient Analysis		
BMP	TSS Removal (%)	TP Removal (%)
<i>North NURP Pond</i>	90.0	60.0

VOLUME REDUCTION

In accordance with the outcome of the City Pre-application Meeting discussed above; attempts to reduce the quantity of stormwater runoff in accordance with the City's , as well as the MPCA General Permit, through the use of infiltration is discouraged due to the presence of shallow bedrock, potential for karst conditions, and the site being located within a wellhead protection area. However, the Developer will continue to coordinate with the City in effort to provide volume reduction to the extent practical through alternative methods such as offsite facilities, available infiltration credits, and/or onsite irrigation credits.

EMERGENCY OVERFLOW

The Emergency Overland Flow (EOF) for the North Regional NURP pond is located at the southwest corner of the pond and is designed at an elevation of 753.0. Should the pond outlet become clogged, flow will be directed overland to the Upper Valley Drainageway located at the westerly property line via this spillway.

EROSION & SEDIMENT CONTROL

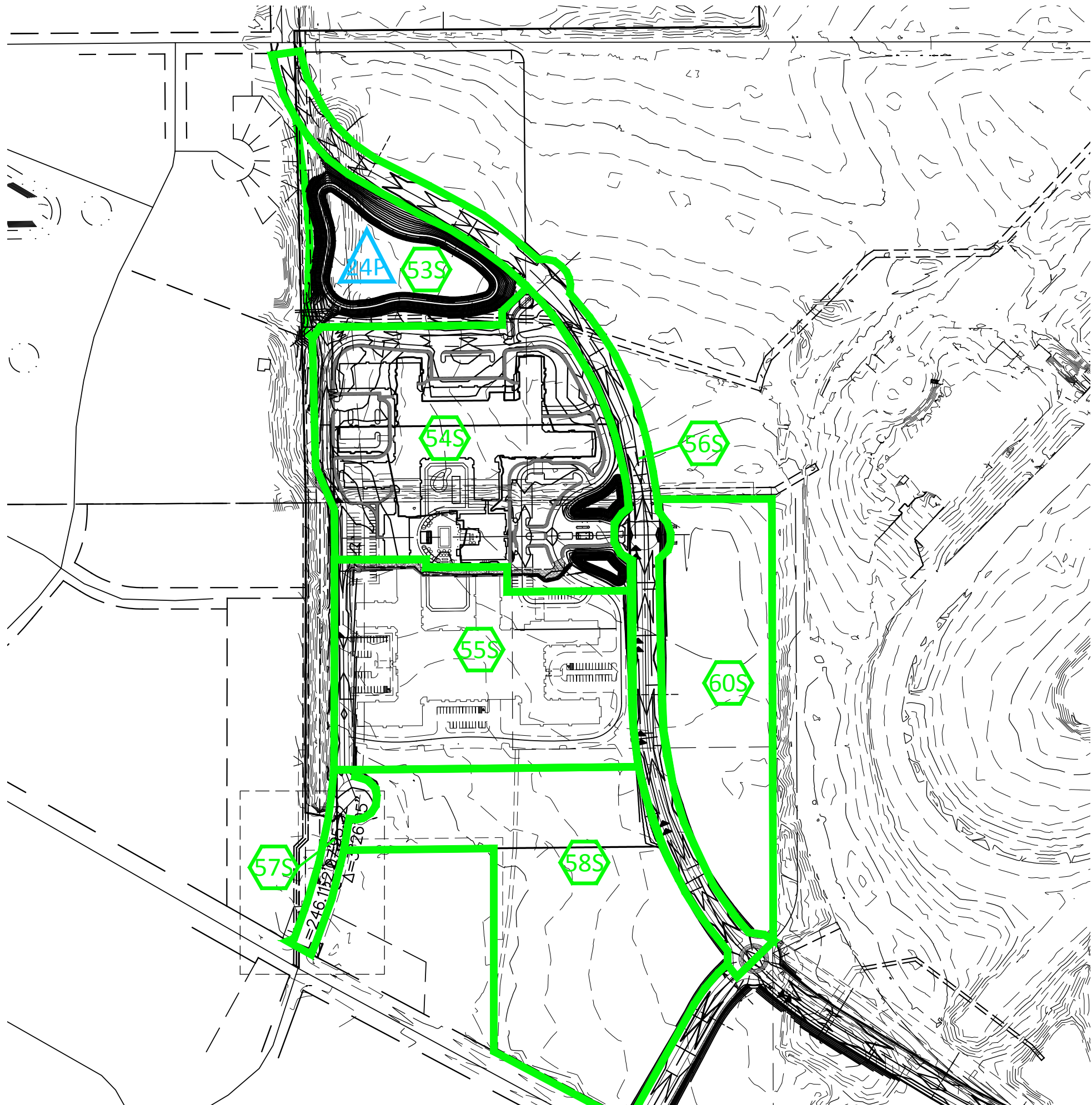
A comprehensive Stormwater Pollution Prevention Plan (SWPPP) meeting the requirements of the 2013 MPCA NPDES permit will be developed as part of the proposed plans.

SUMMARY

The proposed Canterbury 7th Addition project will meet the requirements of the City of Shakopee through the construction of North Regional NURP Pond and in accordance with Flexible Treatment Option #2 under the design sequencing flow chart of the Minnesota Stormwater Manual. The proposed regional NURP pond will provide the required rate control, and water quality, for the proposed improvements prior to discharging stormwater runoff from the site to downstream receiving waters.

If you have any questions, comments, or additional information regarding this report, please contact me at gabernathy@sambatek.com or 763.259.6012.

APPENDIX A



LEGEND

- XX LINK
- XX POND
- XX REACH
- XX SUB-CATCHMENT

Client

**DORAN
DEVELOPMENT, LLC**

**Project
CANTERBURY
7TH ADD.**

**Location
SHAKOPEE, MN**

Certification

Summary
Approved: AAA Drawn: AAA

Revision History
No. Date By Submittal / Rev.

**Sheet Title
PROPOSED
DRAINAGE MAP**

**Sheet No. Revision
1/2**

Project No. 20629.01

Client

**DORAN
DEVELOPMENT, LLC**

**Project
CANTERBURY
7TH ADD.**

**Location
SHAKOPEE, MN**

Certification

Summary

Approved: AAA Drawn: AAA

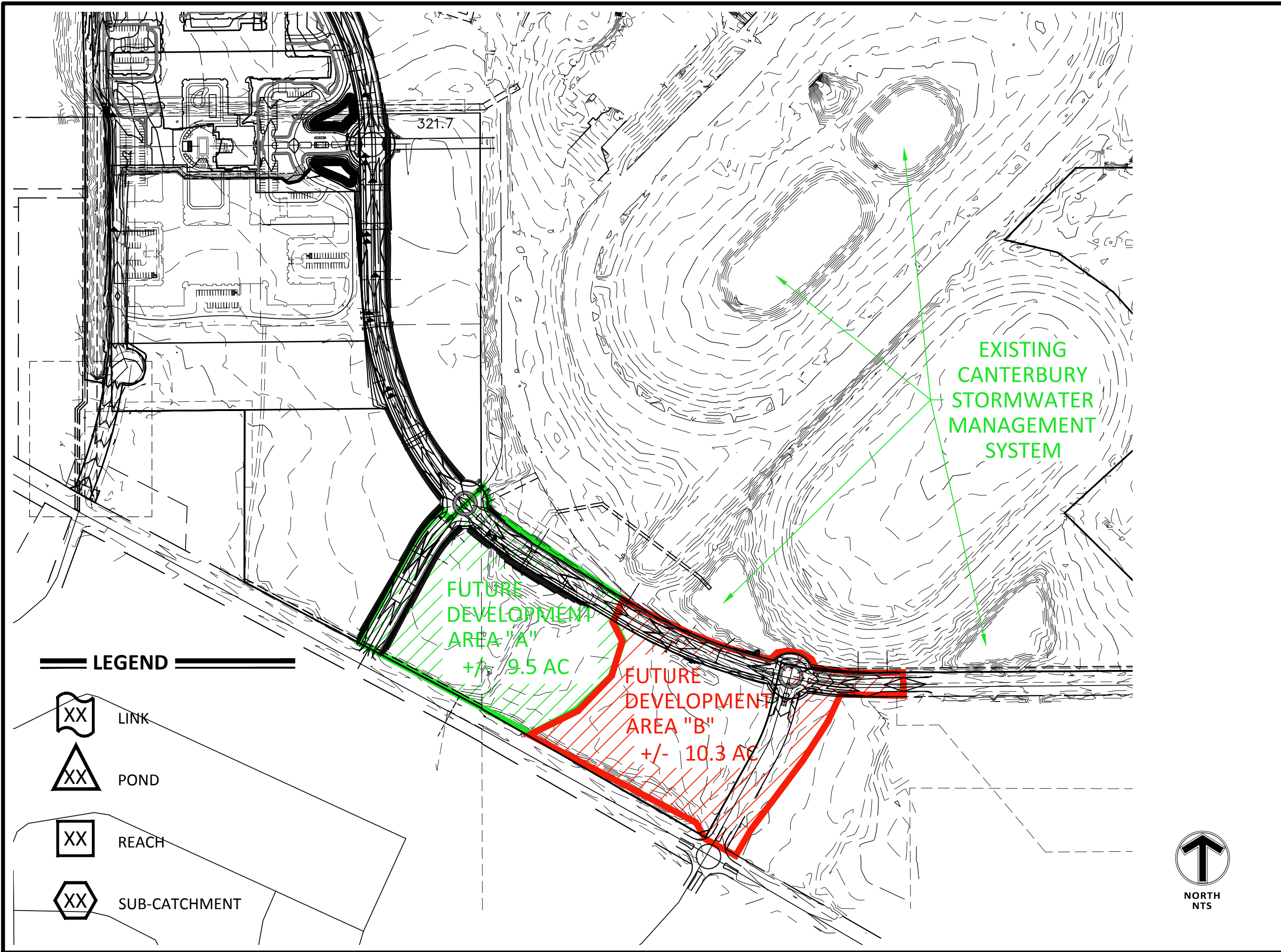
Revision History

No.	Date	By	Submittal / Rev.

**Sheet Title
PROPOSED
DRAINAGE MAP**

**Sheet No. Revision
2/2**

Project No. 20629.01



APPENDIX B

Design sequence flow chart

A flow chart was developed to determine the appropriate performance goal or Flexible Treatment Option for a new development, redevelopment, or linear site. You may access a pdf version of the flow chart ([link](#)) or follow the flow chart through the sequence of questions using the Manual website.

If you would like a copy of the flowchart in Visio, so that you can edit it, please contact us.

Using the wiki version of the flow chart

The wiki version of the flow chart takes you through a series of questions and steps to ultimately arrive at a performance goal. The wiki version does not necessarily take you through each step shown in the pdf version of the flow chart. The structure of the wiki version differs from the pdf version of the flow chart. You can see the structure used for the wiki version at [this link](#).

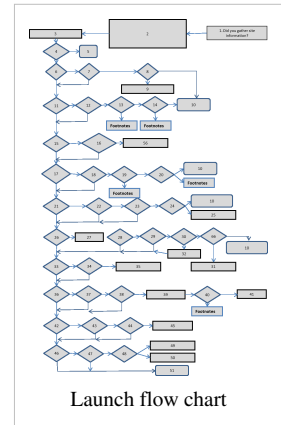
If you proceed through the flow chart using the wiki, we recommend you create a book to document the steps in the process.

- On the left Toolbar, click **Create a Book**.
- If you have created a book previously, that book may still be in memory. In this case, you will get a message asking if you want to use the previous book or start a new book.
- Click on **Start book creator**
- Click on **Add this page to your book**
- Answer the question
- Click on **Add this page to your book**
- Answer the question
- Continue adding the page to your book and then answering the question until you have completed the flow chart
- Upon completing the flow chart, create a pdf document from your book and save it to your computer.

Note that you cannot control the formatting of the book you create within the wiki. You can export the book as a pdf document and edit the pdf document.

Flow chart links

- [Launch flow chart](#)
- [Preliminary information for Design Sequence Flow Chart](#)
- [Overview of wiki version of flowchart and summary of flowchart questions.](#)
- [pdf version of the flow chart:](#)



MIDS design sequence flow chart - Box 1

Information: NOTE: you have arrived at a step in the Design Sequence flow Chart. This flow chart is used to determine your performance goal. For more information see this link

QUESTION:

Did you gather the site information necessary to proceed through the flow chart?

Yes

No or Unsure



Minimal Impact Design Standards
for enhancing stormwater management in Minnesota

For more information on the Design Sequence Flow Chart see the following:
[Flexible treatment options](#)
[MIDS flow chart](#)
[List of flow chart questions](#)
[List of steps in flow chart](#)

Links

- [Return to Flexible treatment options](#)
- [Return to Design sequence flow chart](#)
- [Return to List of flow chart questions](#)

References

[1] http://stormwater.pca.state.mn.us/index.php/File:Final_MIDS_Flow_chart.pdf

MIDS design sequence flow chart - Box 6

Information: NOTE: you have arrived at a step in the Design Sequence Flow Chart. This flow chart is used to determine your performance goal. For more information see this link

QUESTION:

Is the project linear?



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For more information on the Design Sequence Flow Chart see the following:
[Flexible treatment options](#)
[MIDS flow chart](#)
[List of flow chart questions](#)
[List of steps in flow chart](#)

Yes

No

PREVIOUS QUESTION and ANSWER:

Does project create one acre or more of new and/or fully reconstructed impervious surfaces?

Answer - Yes

Links

- [Return to Flexible treatment options](#)
- [Return to Design sequence flow chart](#)
- [Return to List of flow chart questions](#)



Example of a linear project

MIDS design sequence flow chart - Box 15

Information: NOTE: you have arrived at a step in the Design Sequence flow Chart. This flow chart is used to determine your performance goal. For more information see this link

QUESTION:

Is the site located in a DWSMA (Drinking Water Supply Management Area), wellhead protection area, or within 200 feet of a drinking water well?

Yes

No



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For more information on the Design Sequence Flow Chart see the following:
[Flexible treatment options](#)
[MIDS flow chart](#)
[List of flow chart questions](#)
[List of steps in flow chart](#)

PREVIOUS QUESTION and ANSWER:

- Are there zoning and land use requirements that make the Performance Goal not feasible?
 - Answer: No

or

- Is BMP relocation feasible?

- Answer: Yes

Discussion

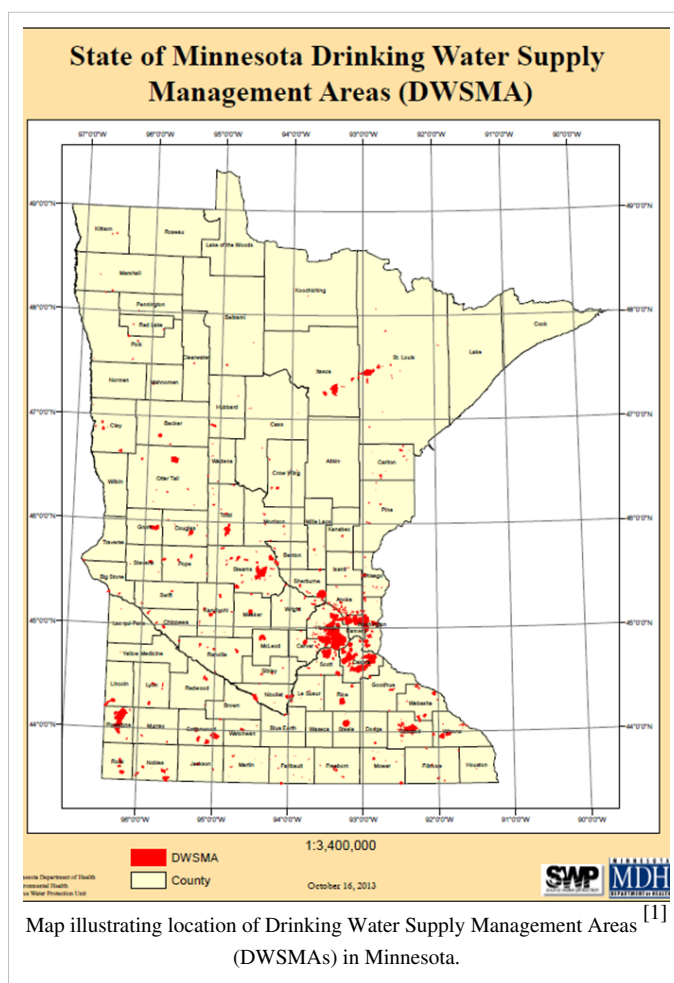
A drinking water supply management area (DWSMA) is the Minnesota Department of Health (MDH) approved surface and subsurface area surrounding a public water supply well that completely contains the scientifically calculated wellhead protection area and is managed by the entity identified in a wellhead protection plan. The boundaries of the drinking water supply management area are delineated by identifiable physical features, landmarks or political and administrative boundaries.

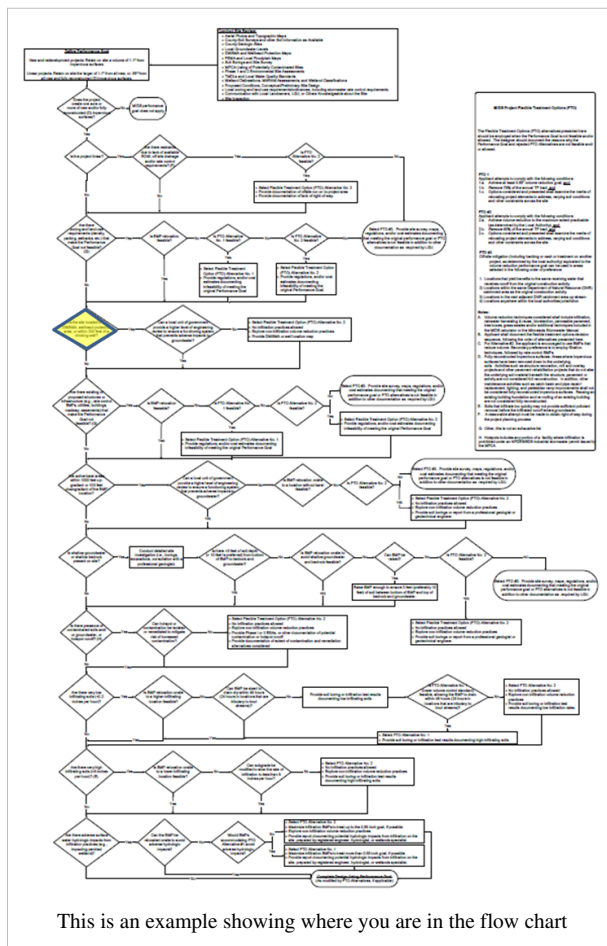
Links

- The Minnesota Department of Health maintains maps ^[1], shapefiles and other information on source water protection in Minnesota, including maps of Drinking Water Supply Management Areas (DWSMAs).
- Minnesota Department of Health Source Water Protection ^[2] main page
- <http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/index.cfm> United States Environmental Protection Agency] Source Water protection page
- Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas ^[3]

Kinks

- Return to Flexible treatment options
- Return to Design sequence flow chart
- Return to List of flow chart questions





References

- [1] <http://www.health.state.mn.us/divs/eh/water/swp/maps/>
- [2] <http://www.health.state.mn.us/divs/eh/water/swp/>
- [3] <http://www.health.state.mn.us/divs/eh/water/swp/stormwater.pdf>

MIDS design sequence flow chart - Box 21

Information: NOTE: you have arrived at a step in the Design Sequence flow chart. This flow chart is used to determine your performance goal. For more information see this link

QUESTION:

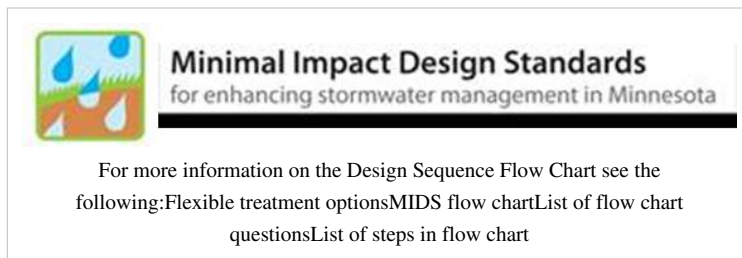
Is karst present on the site?

Yes

No

If you are unsure, we recommend you review the guidance for karst in this manual.

To retain your place in this flowchart, either open the karst guidance ^[1] page in a new tab (right click on the link and select *Open Link in New Tab*), use the back arrow after visiting the karst guidance page, or use the Breadcrumbs at the top of the page.



PREVIOUS QUESTION and ANSWER:

- Are there existing or proposed structures or infrastructure that make the performance goal not feasible?

- Answer: No

or

- Is BMP relocation feasible?

- Answer: Yes

Links

- Return to Flexible treatment options
- Return to Design sequence flow chart
- Return to List of flow chart questions

References

[1] <http://stormwater.pca.state.mn.us/index.php/Karst>

MIDS design sequence flow chart - Box 24

Information: NOTE: you have arrived at a step in the Design Sequence Flow Chart. This flow chart is used to determine your performance goal. For more information see this link

QUESTION:

Is Flexible Treatment Option (FTO) 2 feasible?

Yes

No



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for enhancing stormwater management in Minnesota

For more information on the Design Sequence Flow Chart see the following: Flexible treatment options MIDS flow chart List of flow chart questions List of steps in flow chart

PREVIOUS QUESTION and ANSWER:

- Is BMP relocation onsite to a location without karst feasible?
 - Answer: No

Links

- Return to Flexible treatment options
- Return to Design sequence flow chart
- Return to List of flow chart questions

MIDS design sequence flow chart - Box 25

Information: NOTE: you have arrived at a step in the Design Sequence flow Chart. This flow chart is used to determine your performance goal. For more information see this link

Select Flexible treatment Option 2

- No infiltration practices allowed
- Explore non-infiltration volume reduction practices
- Provide soil borings or report from a professional geologist or geotechnical engineer



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For more information on the Design Sequence Flow Chart see the following: Flexible treatment options MIDS flow chart List of flow chart questions List of steps in flow chart

Flexible Treatment Option 2 (FTO #2)

Applicant attempts to comply with the following conditions:

1. Achieve volume reduction to the maximum extent practicable (as determined by the Local Authority), and

2. Remove 60 percent of the annual total phosphorus load, and
3. options considered and presented shall examine the merits of relocating project elements to address varying soil conditions and other constraints across the site.

Information: Previous step: It was determined that karst is present within 1000 feet of the site and the BMP cannot be relocated so that it is more than 1000 feet from karst



You have completed the flow chart

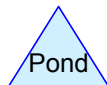
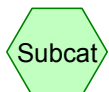
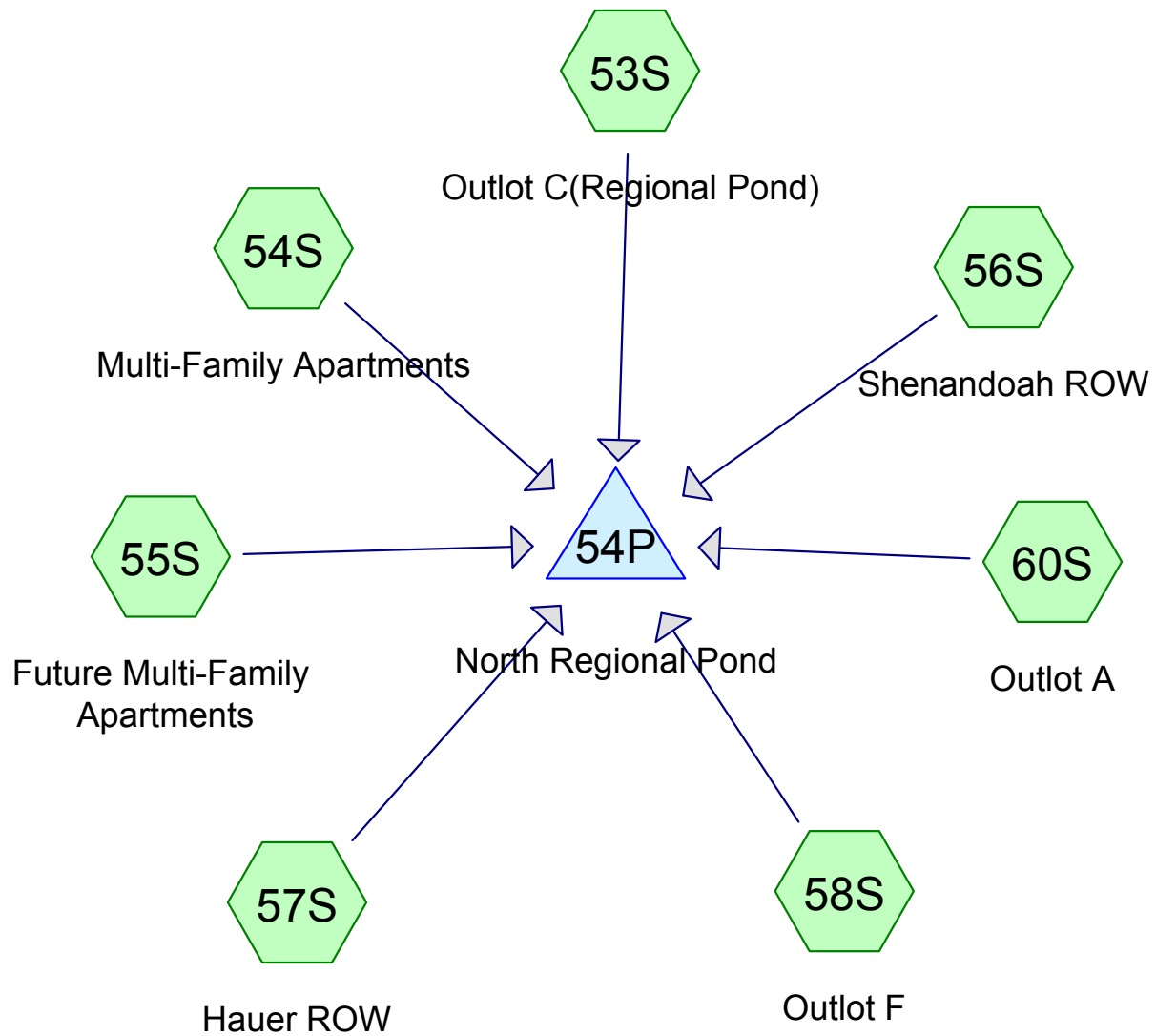
If you created a book documenting your steps in the flow chart, create a pdf document and save the pdf document to your computer. You can then disable the book function.

NOTE: The wiki always keeps the most recent working version of your book in memory. However, if you start a new book, you will lose the previous book.

Links

- [Return to Flexible treatment options](#)
- [Return to Design sequence flow chart](#)
- [Return to List of flow chart questions](#)

APPENDIX C



Routing Diagram for PUD Layout - Revised North Pond_021218
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PUD Layout - Revised North Pond_021218

Prepared by {enter your company name here}

Printed 2/27/2018

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Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
36.482	90	1/8 acre lots, 65% imp, HSG C (54S, 55S, 58S)
2.063	74	>75% Grass cover, Good, HSG C (53S)
6.877	94	Paved roads w/curbs & sewers, 85% Impervious HSG C (56S, 57S)
7.538	94	Urban commercial, 85% imp, HSG C (60S)
2.419	98	Water Surface, HSG C (53S)
55.379	91	TOTAL AREA

PUD Layout - Revised North Pond_021218

Prepared by {enter your company name here}

Printed 2/27/2018

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Page 3

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
55.379	HSG C	53S, 54S, 55S, 56S, 57S, 58S, 60S
0.000	HSG D	
0.000	Other	
55.379		TOTAL AREA

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Page 4

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover
0.000	0.000	36.482	0.000	0.000	36.482	1/8 acre lots, 65% imp
0.000	0.000	2.063	0.000	0.000	2.063	>75% Grass cover, Good
0.000	0.000	6.877	0.000	0.000	6.877	Paved roads w/curbs & sewers, 85% Impervious
0.000	0.000	7.538	0.000	0.000	7.538	Urban commercial, 85% imp
0.000	0.000	2.419	0.000	0.000	2.419	Water Surface
0.000	0.000	55.379	0.000	0.000	55.379	TOTAL AREA

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Page 5

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	54P	744.70	744.60	46.0	0.0022	0.013	24.0	0.0	0.0
2	54P	744.60	744.38	110.0	0.0020	0.012	54.0	0.0	0.0
3	54P	744.70	744.60	83.0	0.0012	0.012	48.0	0.0	0.0

PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment53S: Outlot C(Regional)	Runoff Area=195,222 sf 53.97% Impervious Runoff Depth=1.31" Tc=10.0 min CN=87 Runoff=9.05 cfs 0.490 af
Subcatchment54S: Multi-Family	Runoff Area=576,021 sf 65.00% Impervious Runoff Depth=1.53" Tc=30.0 min CN=90 Runoff=17.61 cfs 1.687 af
Subcatchment55S: Future Multi-Family	Runoff Area=456,252 sf 65.00% Impervious Runoff Depth=1.53" Tc=30.0 min CN=90 Runoff=13.95 cfs 1.336 af
Subcatchment56S: Shenandoah ROW	Runoff Area=260,943 sf 0.00% Impervious Runoff Depth=1.87" Tc=30.0 min CN=94 Runoff=9.59 cfs 0.933 af
Subcatchment57S: Hauer ROW	Runoff Area=38,639 sf 0.00% Impervious Runoff Depth=1.87" Tc=10.0 min CN=94 Runoff=2.44 cfs 0.138 af
Subcatchment58S: Outlot F	Runoff Area=556,868 sf 65.00% Impervious Runoff Depth=1.53" Tc=30.0 min CN=90 Runoff=17.03 cfs 1.631 af
Subcatchment60S: Outlot A	Runoff Area=328,365 sf 85.00% Impervious Runoff Depth=1.87" Tc=20.0 min CN=94 Runoff=15.32 cfs 1.174 af
Pond 54P: North Regional Pond	Peak Elev=743.00' Storage=321,895 cf Inflow=73.70 cfs 7.390 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 55.379 ac Runoff Volume = 7.390 af Average Runoff Depth = 1.60"
41.24% Pervious = 22.840 ac 58.76% Impervious = 32.539 ac

PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

Printed 2/27/2018

Page 7

Summary for Subcatchment 53S: Outlot C(Regional Pond)

Runoff = 9.05 cfs @ 12.02 hrs, Volume= 0.490 af, Depth= 1.31"

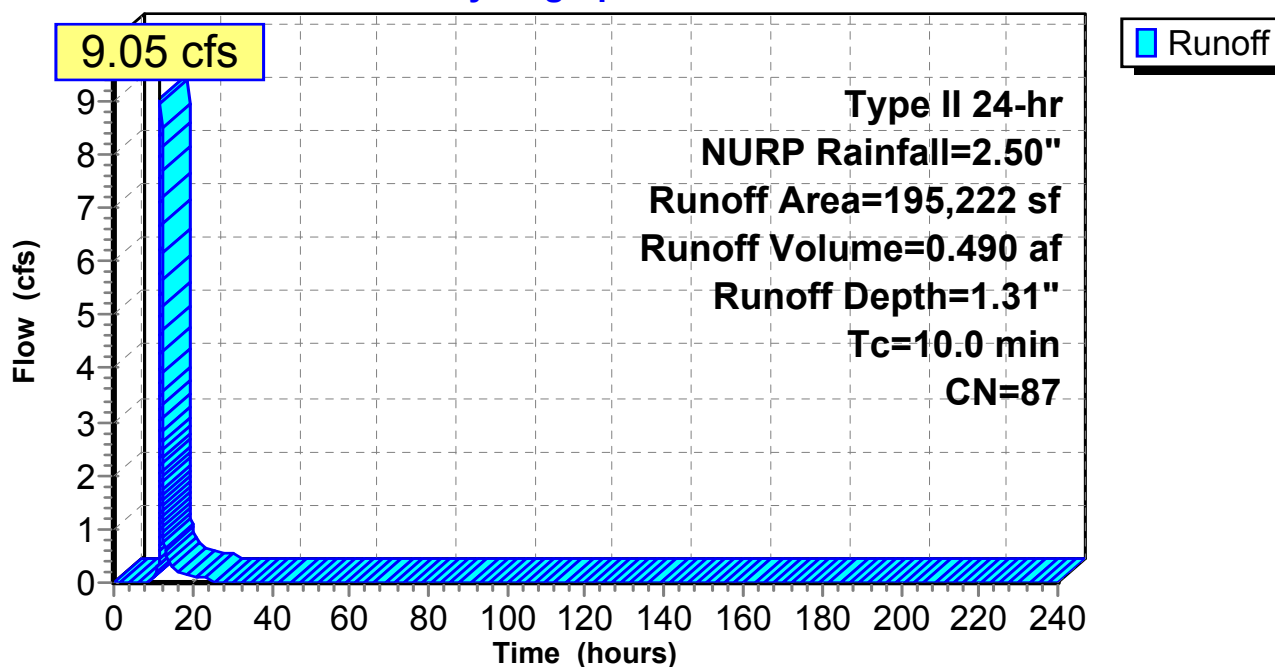
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

Area (sf)	CN	Description
105,363	98	Water Surface, HSG C
89,859	74	>75% Grass cover, Good, HSG C
195,222	87	Weighted Average
89,859		46.03% Pervious Area
105,363		53.97% Impervious Area

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

Subcatchment 53S: Outlot C(Regional Pond)

Hydrograph



PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Subcatchment 54S: Multi-Family Apartments

Runoff = 17.61 cfs @ 12.23 hrs, Volume= 1.687 af, Depth= 1.53"

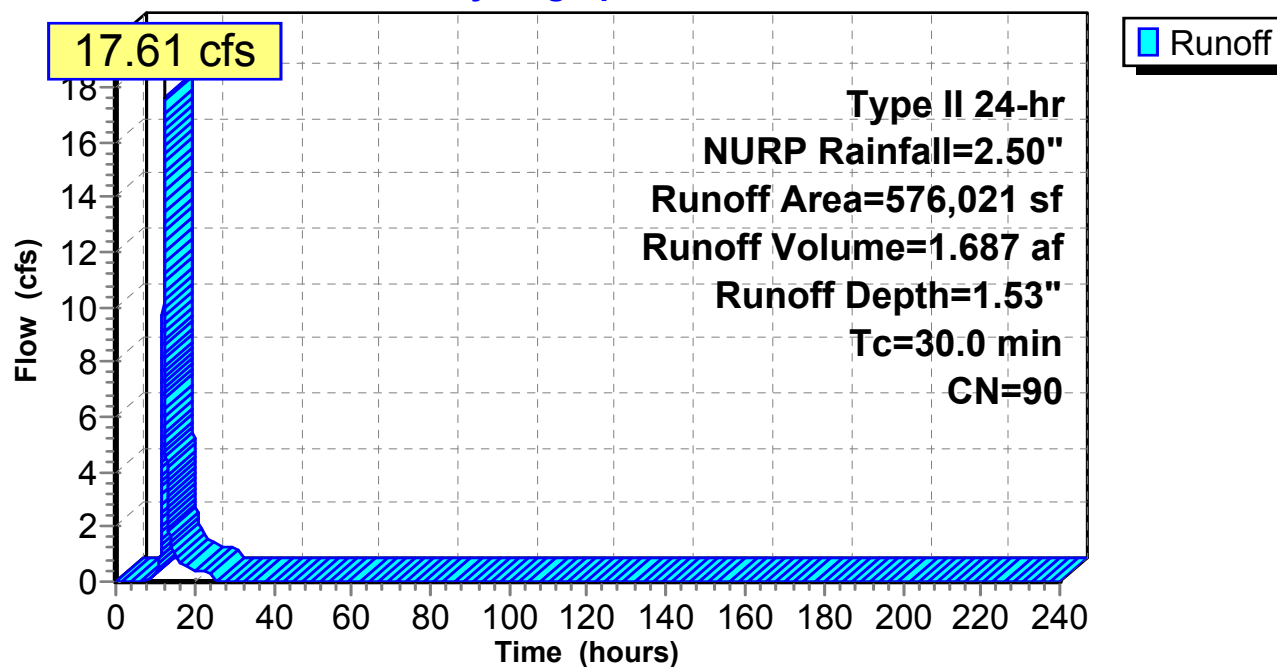
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

Area (sf)	CN	Description
576,021	90	1/8 acre lots, 65% imp, HSG C
201,607		35.00% Pervious Area
374,414		65.00% Impervious Area

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

Subcatchment 54S: Multi-Family Apartments

Hydrograph



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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Subcatchment 55S: Future Multi-Family Apartments

Runoff = 13.95 cfs @ 12.23 hrs, Volume= 1.336 af, Depth= 1.53"

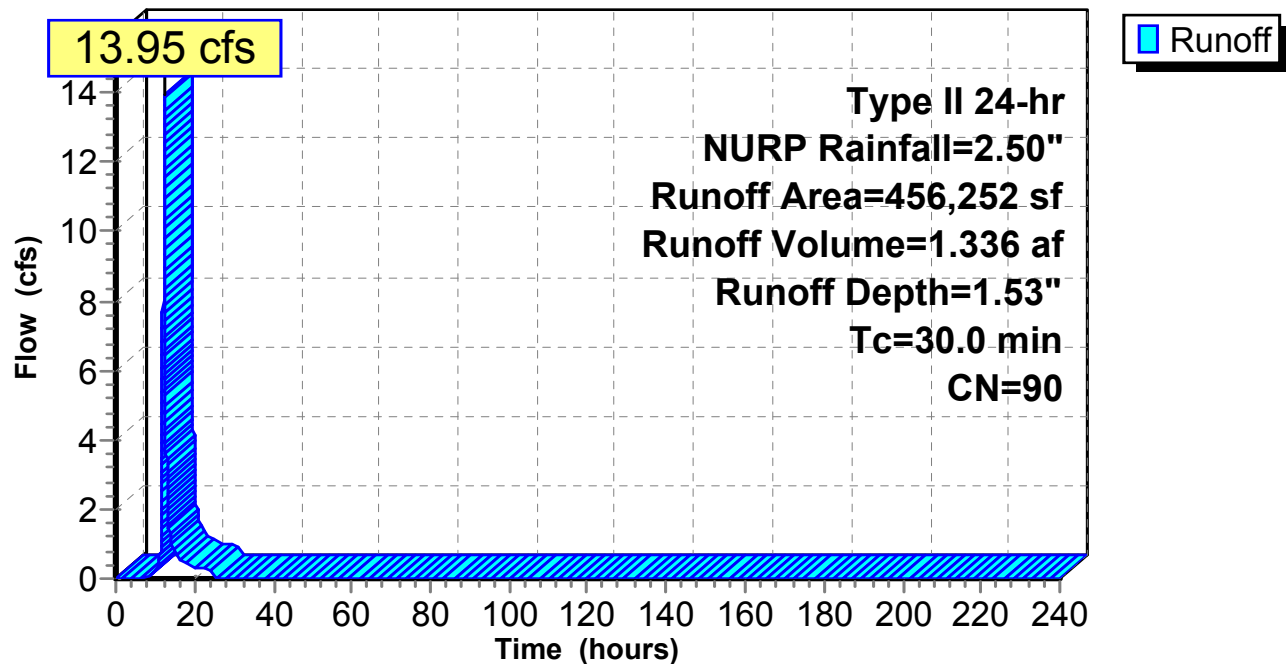
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

Area (sf)	CN	Description
456,252	90	1/8 acre lots, 65% imp, HSG C
159,688		35.00% Pervious Area
296,564		65.00% Impervious Area

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

Subcatchment 55S: Future Multi-Family Apartments

Hydrograph



PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Subcatchment 56S: Shenandoah ROW

Shenandoah
Vierling to Eastway

Runoff = 9.59 cfs @ 12.23 hrs, Volume= 0.933 af, Depth= 1.87"

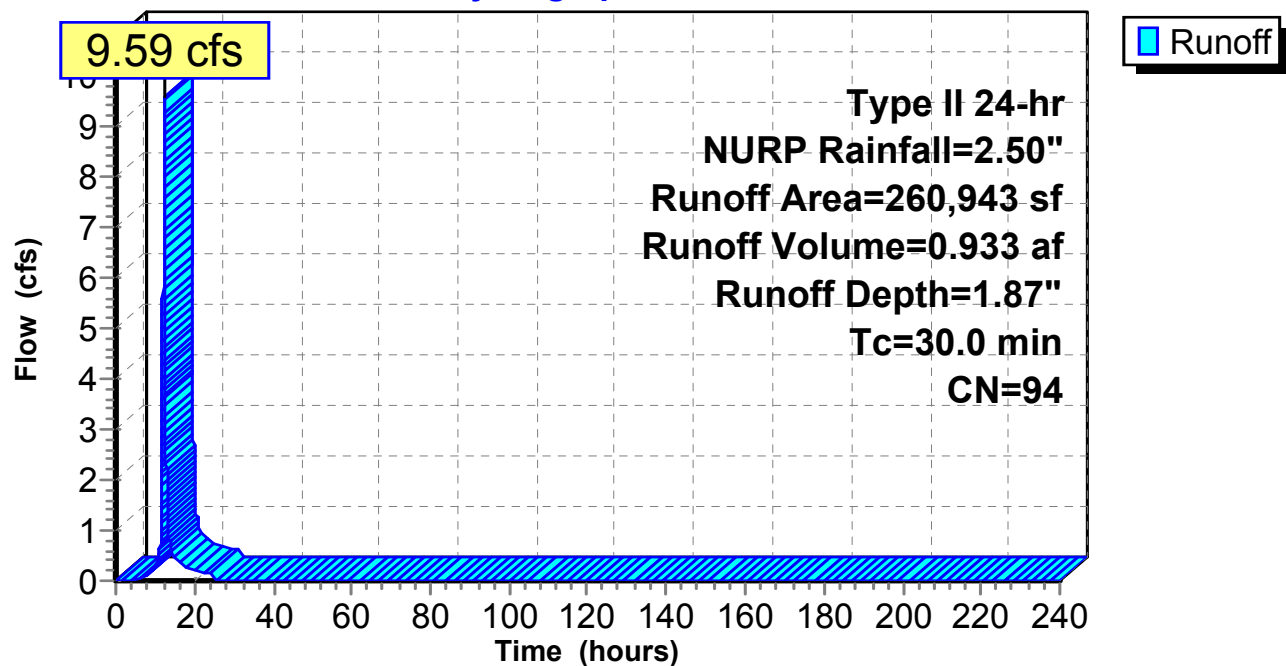
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

Area (sf)	CN	Description
* 260,943	94	Paved roads w/curbs & sewers, 85% Impervious HSG C
260,943		100.00% Pervious Area

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

Subcatchment 56S: Shenandoah ROW

Hydrograph



PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Subcatchment 57S: Hauer ROW

Shenandoah
Vierling to Eastway

Runoff = 2.44 cfs @ 12.01 hrs, Volume= 0.138 af, Depth= 1.87"

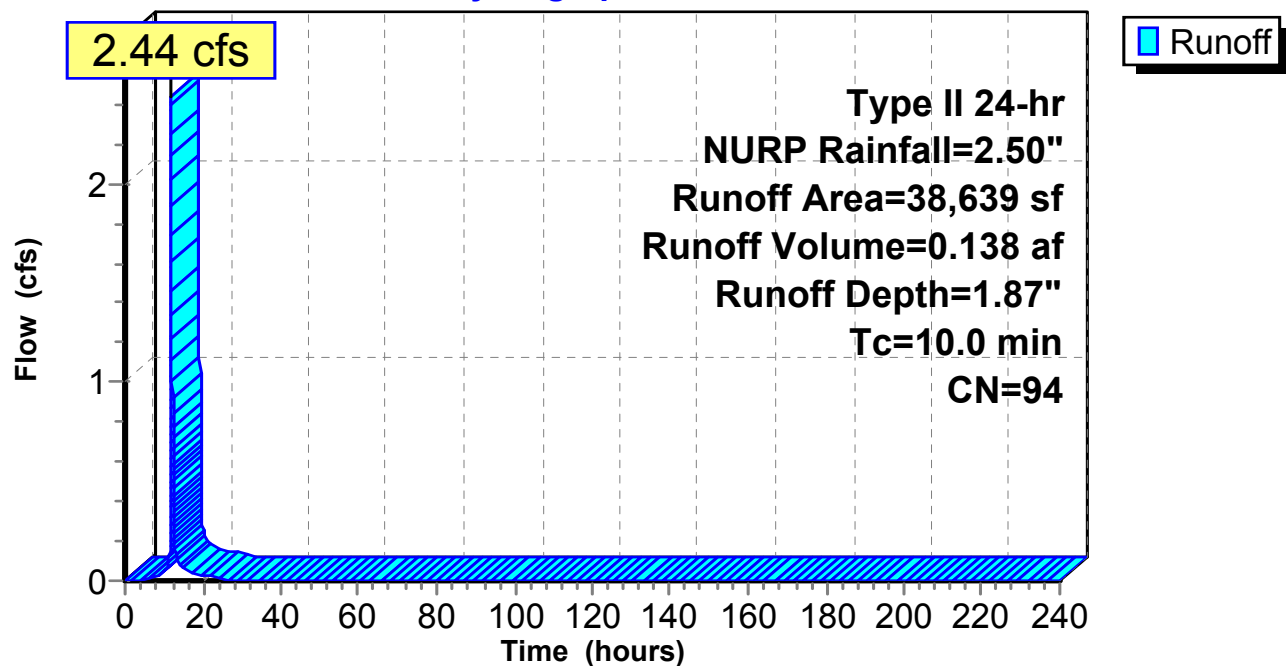
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

	Area (sf)	CN	Description
*	38,639	94	Paved roads w/curbs & sewers, 85% Impervious HSG C
	38,639		100.00% Pervious Area

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

Subcatchment 57S: Hauer ROW

Hydrograph



PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Subcatchment 58S: Outlot F

Runoff = 17.03 cfs @ 12.23 hrs, Volume= 1.631 af, Depth= 1.53"

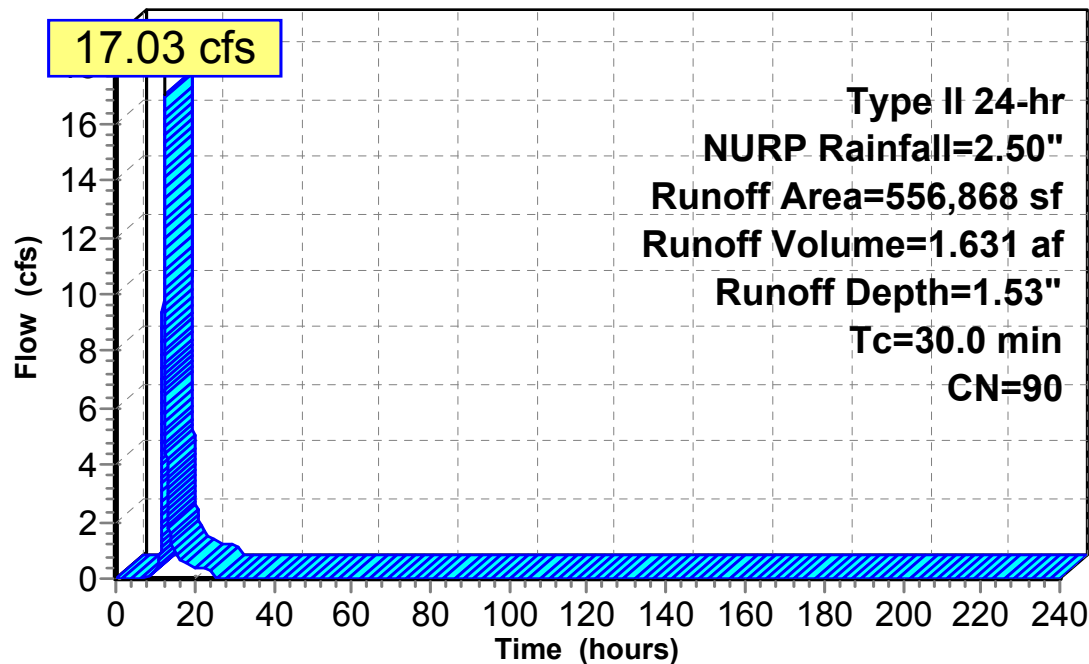
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

Area (sf)	CN	Description
556,868	90	1/8 acre lots, 65% imp, HSG C
194,904		35.00% Pervious Area
361,964		65.00% Impervious Area

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

Subcatchment 58S: Outlot F

Hydrograph



Runoff

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Subcatchment 60S: Outlot A

Runoff = 15.32 cfs @ 12.11 hrs, Volume= 1.174 af, Depth= 1.87"

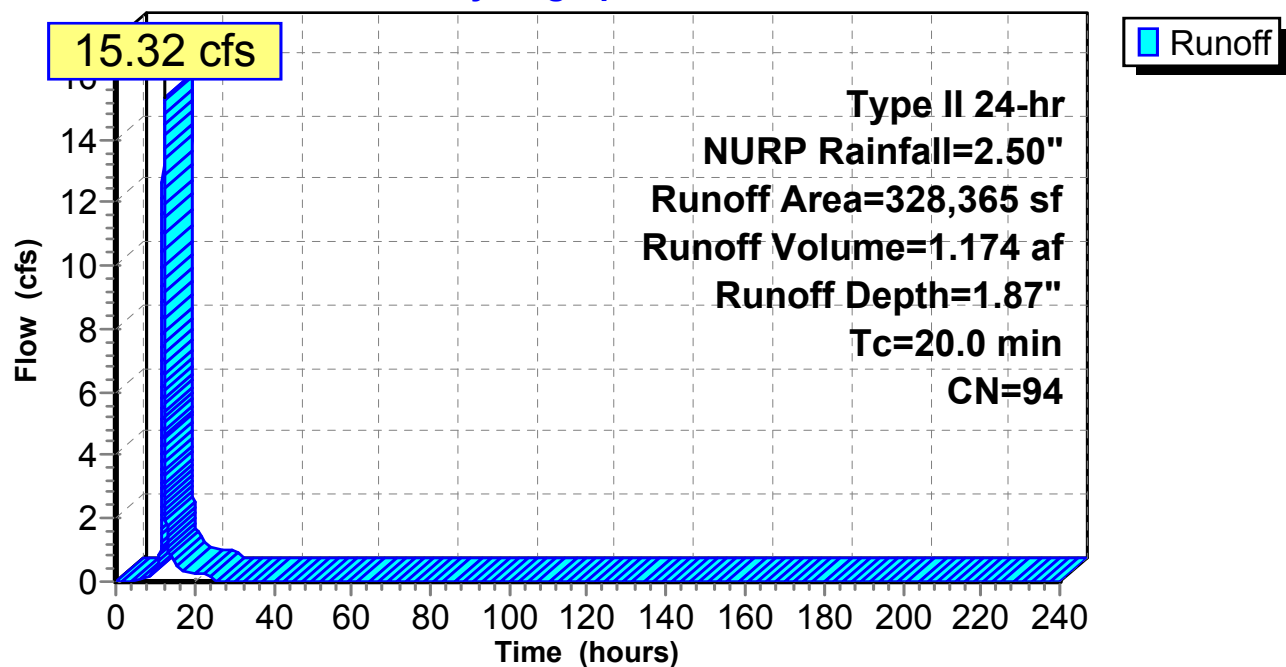
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr NURP Rainfall=2.50"

Area (sf)	CN	Description
328,365	94	Urban commercial, 85% imp, HSG C
49,255		15.00% Pervious Area
279,110		85.00% Impervious Area

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

Subcatchment 60S: Outlot A

Hydrograph



PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Summary for Pond 54P: North Regional Pond

Tributary to Mill Pond

100yr Allowable = 1/3cfs per AC

100yr Allowed = 12.63 cfs (Private)

100yr Allowed = 18.47 (ALL)

Inflow Area = 55.379 ac, 58.76% Impervious, Inflow Depth = 1.60" for NURP event
 Inflow = 73.70 cfs @ 12.20 hrs, Volume= 7.390 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Peak Elev= 743.00' @ 25.68 hrs Surf.Area= 88,440 sf Storage= 321,895 cf
 Flood Elev= 752.00' Surf.Area= 138,500 sf Storage= 1,372,903 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	739.00'	8,296,903 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
739.00	72,382	0	0
743.70	91,235	384,500	384,500
744.70	105,364	98,300	482,799
752.00	138,500	890,104	1,372,903
800.00	150,000	6,924,000	8,296,903

Device	Routing	Invert	Outlet Devices
#1	Device 4	744.70'	24.0" Round Culvert L= 46.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 744.70' / 744.60' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	744.70'	12.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	750.60'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Primary	744.60'	54.0" Round Culvert L= 110.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 744.60' / 744.38' S= 0.0020 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 15.90 sf
#5	Device 4	744.70'	48.0" Round Culvert L= 83.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 744.70' / 744.60' S= 0.0012 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

PUD Layout - Revised North Pond_021218

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Required NURP Dead Storage
Type II 24-hr NURP Rainfall=2.50"

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Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=739.00' (Free Discharge)

4=Culvert (Controls 0.00 cfs)

1=Culvert (Controls 0.00 cfs)

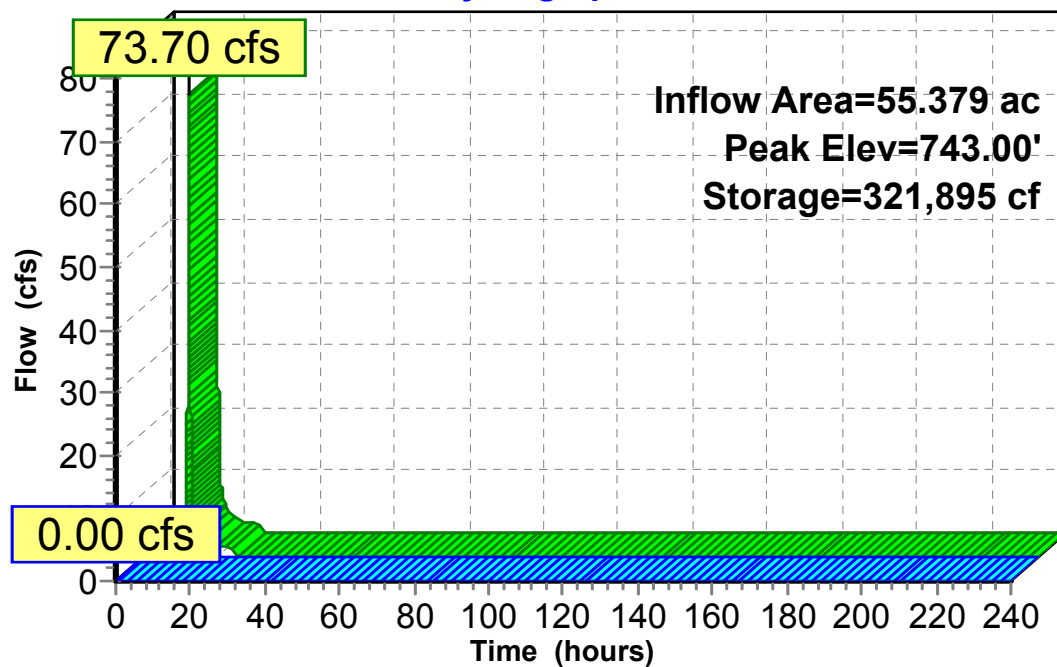
2=Orifice/Grate (Controls 0.00 cfs)

3=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

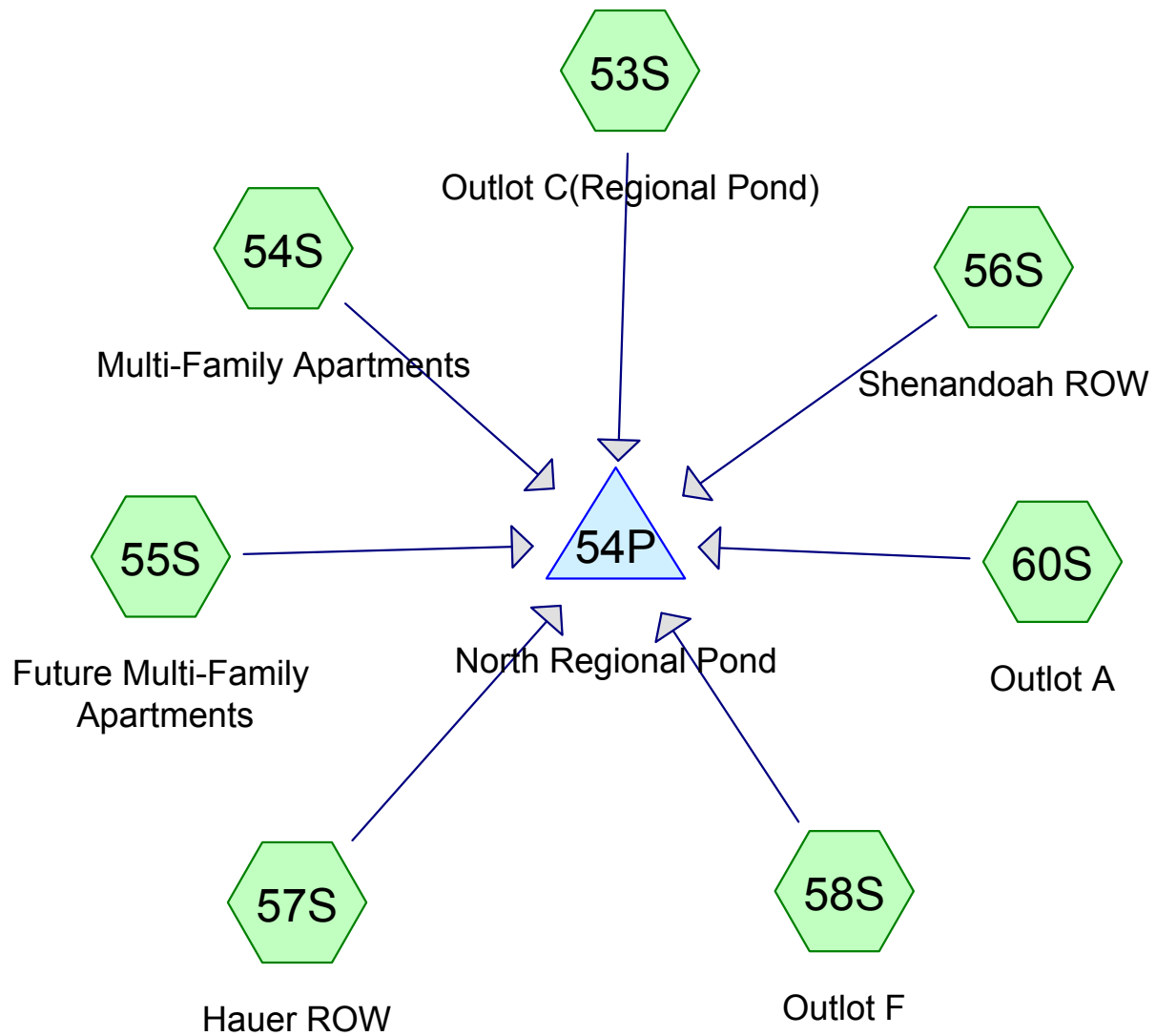
5=Culvert (Controls 0.00 cfs)

Pond 54P: North Regional Pond

Hydrograph



Inflow
Primary



PUD Layout - Revised North Pond_021218

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
36.482	90	1/8 acre lots, 65% imp, HSG C (54S, 55S, 58S)
2.063	74	>75% Grass cover, Good, HSG C (53S)
6.877	94	Paved roads w/curbs & sewers, 85% Impervious HSG C (56S, 57S)
7.538	94	Urban commercial, 85% imp, HSG C (60S)
2.419	98	Water Surface, HSG C (53S)
55.379	91	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
55.379	HSG C	53S, 54S, 55S, 56S, 57S, 58S, 60S
0.000	HSG D	
0.000	Other	
55.379		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover
0.000	0.000	36.482	0.000	0.000	36.482	1/8 acre lots, 65% imp
0.000	0.000	2.063	0.000	0.000	2.063	>75% Grass cover, Good
0.000	0.000	6.877	0.000	0.000	6.877	Paved roads w/curbs & sewers, 85% Impervious
0.000	0.000	7.538	0.000	0.000	7.538	Urban commercial, 85% imp
0.000	0.000	2.419	0.000	0.000	2.419	Water Surface
0.000	0.000	55.379	0.000	0.000	55.379	TOTAL AREA

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	54P	744.70	744.60	46.0	0.0022	0.013	24.0	0.0	0.0
2	54P	744.60	744.38	110.0	0.0020	0.012	54.0	0.0	0.0
3	54P	744.70	744.60	83.0	0.0012	0.012	48.0	0.0	0.0

Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment53S: Outlot C(Regional	Runoff Area=195,222 sf 53.97% Impervious Runoff Depth=5.76" Tc=10.0 min CN=87 Runoff=37.44 cfs 2.151 af
Subcatchment54S: Multi-Family	Runoff Area=576,021 sf 65.00% Impervious Runoff Depth=6.11" Tc=30.0 min CN=90 Runoff=67.29 cfs 6.730 af
Subcatchment55S: Future Multi-Family	Runoff Area=456,252 sf 65.00% Impervious Runoff Depth=6.11" Tc=30.0 min CN=90 Runoff=53.30 cfs 5.331 af
Subcatchment56S: Shenandoah ROW	Runoff Area=260,943 sf 0.00% Impervious Runoff Depth=6.58" Tc=30.0 min CN=94 Runoff=31.81 cfs 3.283 af
Subcatchment57S: Hauer ROW	Runoff Area=38,639 sf 0.00% Impervious Runoff Depth=6.58" Tc=10.0 min CN=94 Runoff=7.97 cfs 0.486 af
Subcatchment58S: Outlot F	Runoff Area=556,868 sf 65.00% Impervious Runoff Depth=6.11" Tc=30.0 min CN=90 Runoff=65.05 cfs 6.507 af
Subcatchment60S: Outlot A	Runoff Area=328,365 sf 85.00% Impervious Runoff Depth=6.58" Tc=20.0 min CN=94 Runoff=50.56 cfs 4.131 af
Pond 54P: North Regional Pond	Peak Elev=751.28' Storage=1,274,955 cf Inflow=311.13 cfs 826.801 af Outflow=132.64 cfs 819.513 af

Total Runoff Area = 55.379 ac Runoff Volume = 28.619 af Average Runoff Depth = 6.20"
41.24% Pervious = 22.840 ac 58.76% Impervious = 32.539 ac

Summary for Subcatchment 53S: Outlot C(Regional Pond)

Runoff = 37.44 cfs @ 12.01 hrs, Volume= 2.151 af, Depth= 5.76"

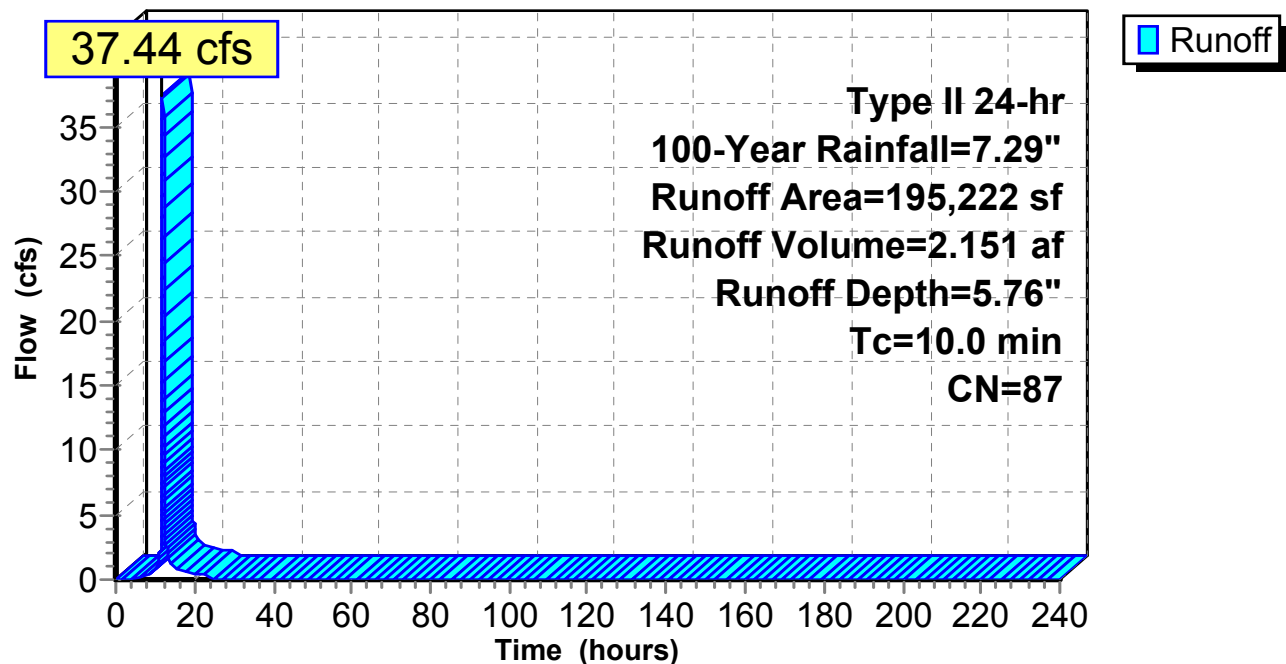
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
105,363	98	Water Surface, HSG C
89,859	74	>75% Grass cover, Good, HSG C
195,222	87	Weighted Average
89,859		46.03% Pervious Area
105,363		53.97% Impervious Area

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

Subcatchment 53S: Outlot C(Regional Pond)

Hydrograph



Summary for Subcatchment 54S: Multi-Family Apartments

Runoff = 67.29 cfs @ 12.23 hrs, Volume= 6.730 af, Depth= 6.11"

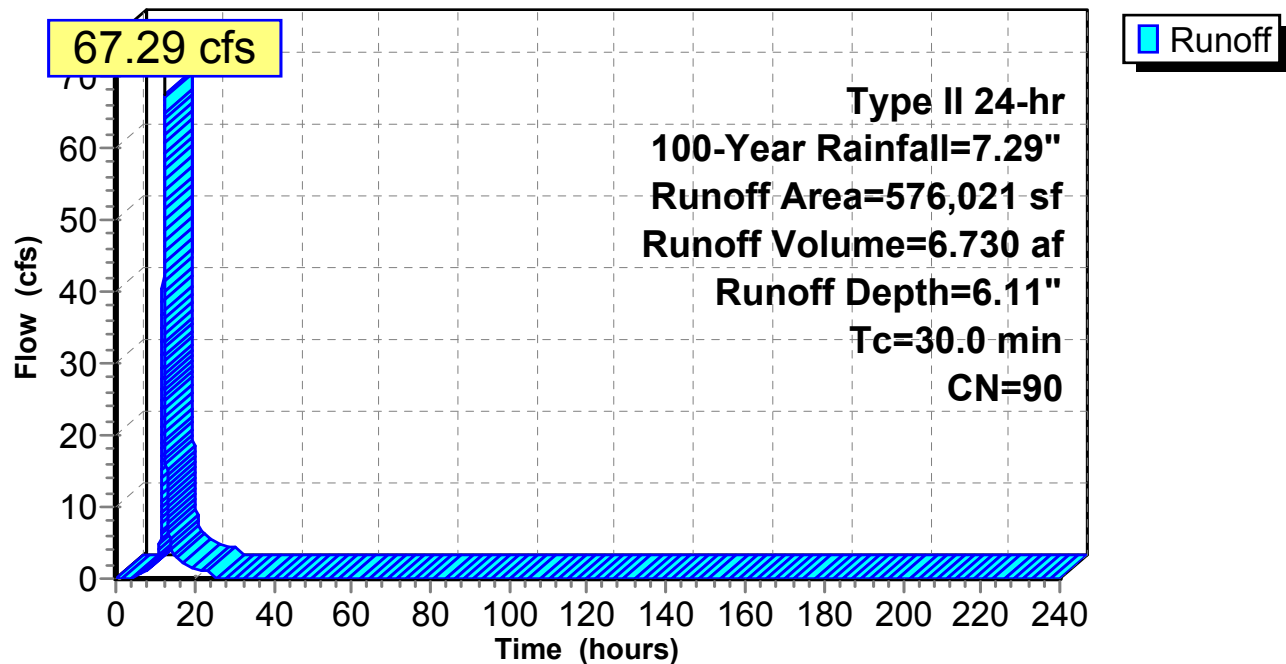
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
576,021	90	1/8 acre lots, 65% imp, HSG C
201,607		35.00% Pervious Area
374,414		65.00% Impervious Area

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

Subcatchment 54S: Multi-Family Apartments

Hydrograph



Summary for Subcatchment 55S: Future Multi-Family Apartments

Runoff = 53.30 cfs @ 12.23 hrs, Volume= 5.331 af, Depth= 6.11"

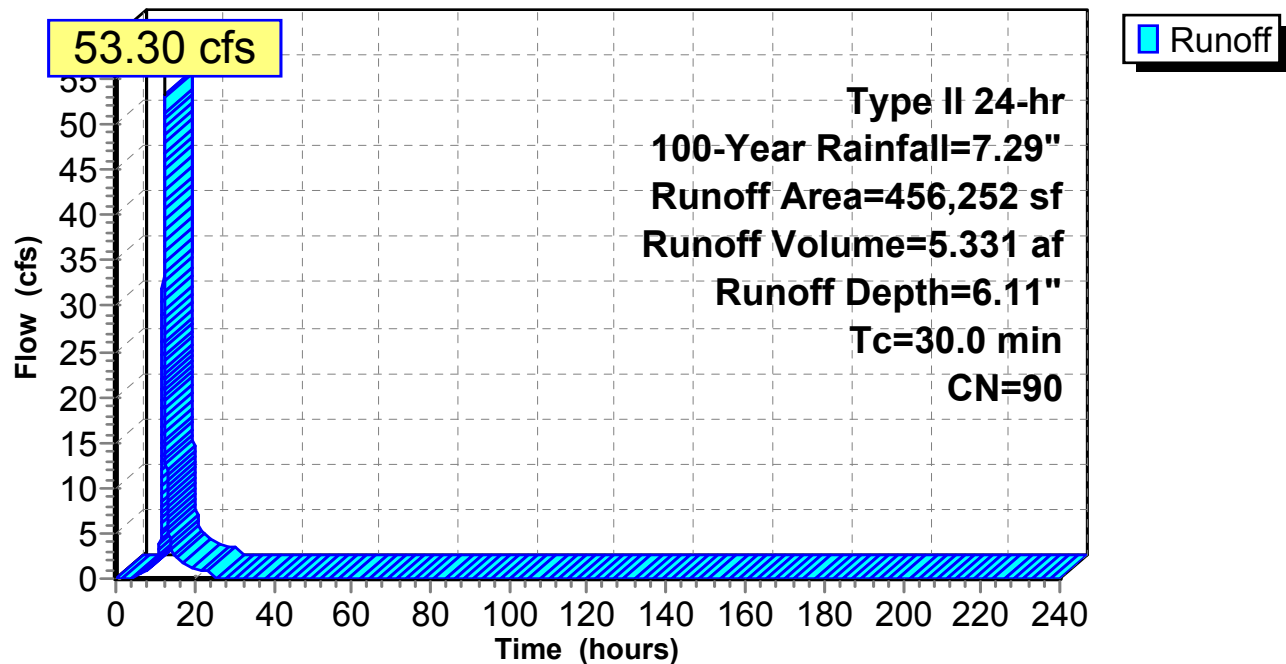
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
456,252	90	1/8 acre lots, 65% imp, HSG C
159,688		35.00% Pervious Area
296,564		65.00% Impervious Area

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

Subcatchment 55S: Future Multi-Family Apartments

Hydrograph



Summary for Subcatchment 56S: Shenandoah ROW

Shenandoah
Vierling to Eastway

Runoff = 31.81 cfs @ 12.23 hrs, Volume= 3.283 af, Depth= 6.58"

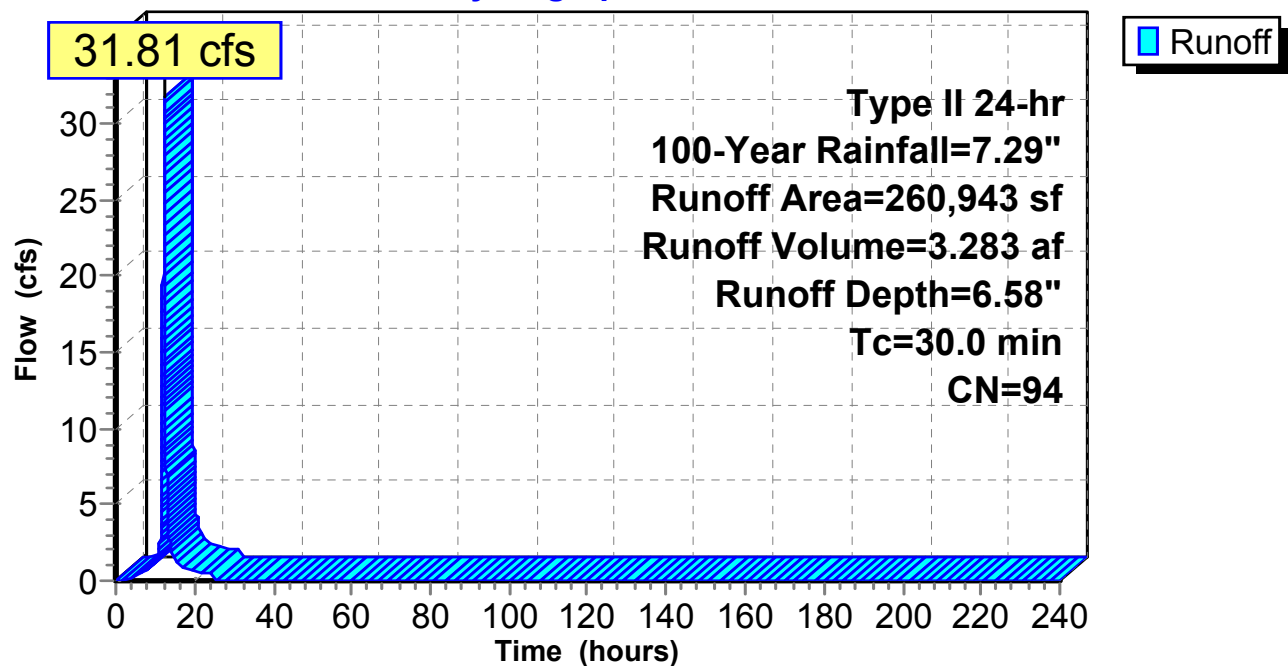
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
* 260,943	94	Paved roads w/curbs & sewers, 85% Impervious HSG C
260,943		100.00% Pervious Area

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

Subcatchment 56S: Shenandoah ROW

Hydrograph



Summary for Subcatchment 57S: Hauer ROW

Shenandoah
Vierling to Eastway

Runoff = 7.97 cfs @ 12.01 hrs, Volume= 0.486 af, Depth= 6.58"

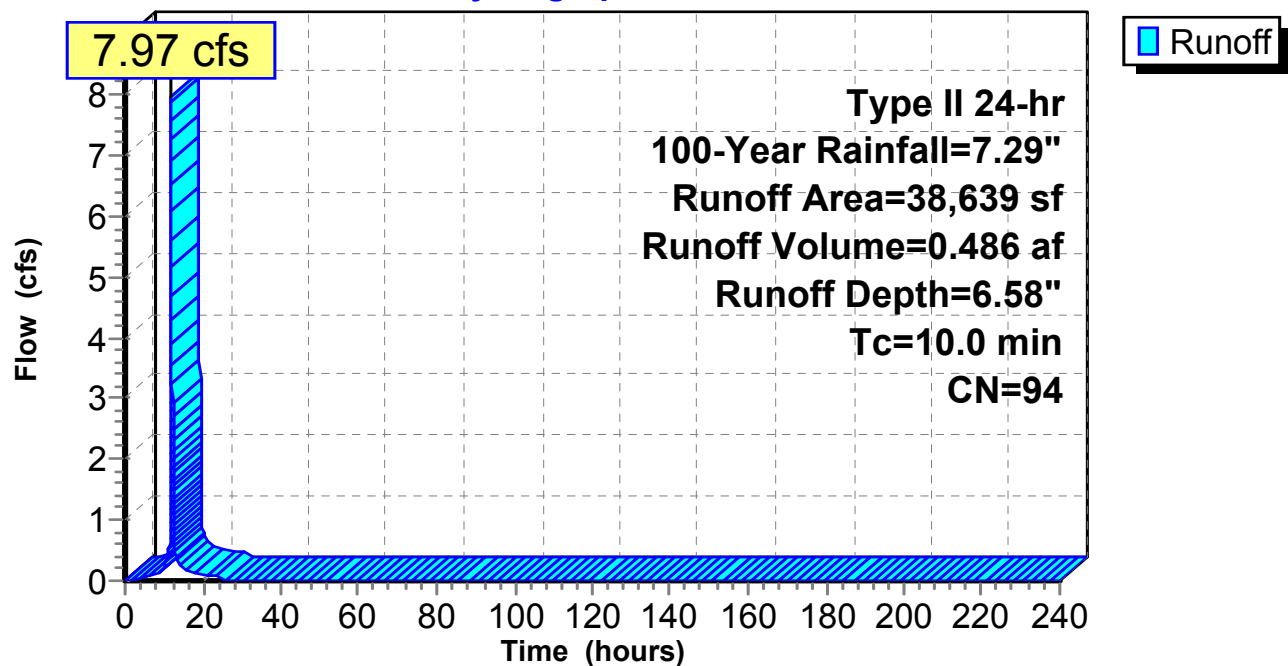
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
* 38,639	94	Paved roads w/curbs & sewers, 85% Impervious HSG C
38,639		100.00% Pervious Area

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

Subcatchment 57S: Hauer ROW

Hydrograph



Summary for Subcatchment 58S: Outlot F

Runoff = 65.05 cfs @ 12.23 hrs, Volume= 6.507 af, Depth= 6.11"

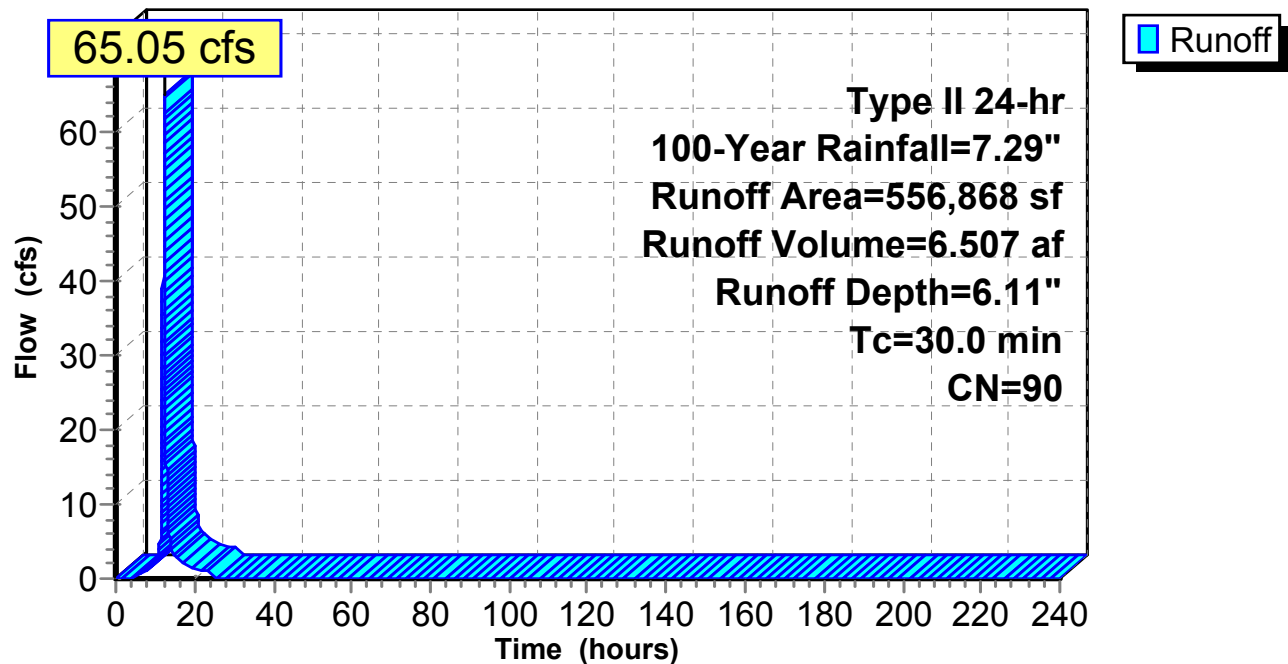
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
556,868	90	1/8 acre lots, 65% imp, HSG C
194,904		35.00% Pervious Area
361,964		65.00% Impervious Area

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

Subcatchment 58S: Outlot F

Hydrograph



Summary for Subcatchment 60S: Outlot A

Runoff = 50.56 cfs @ 12.11 hrs, Volume= 4.131 af, Depth= 6.58"

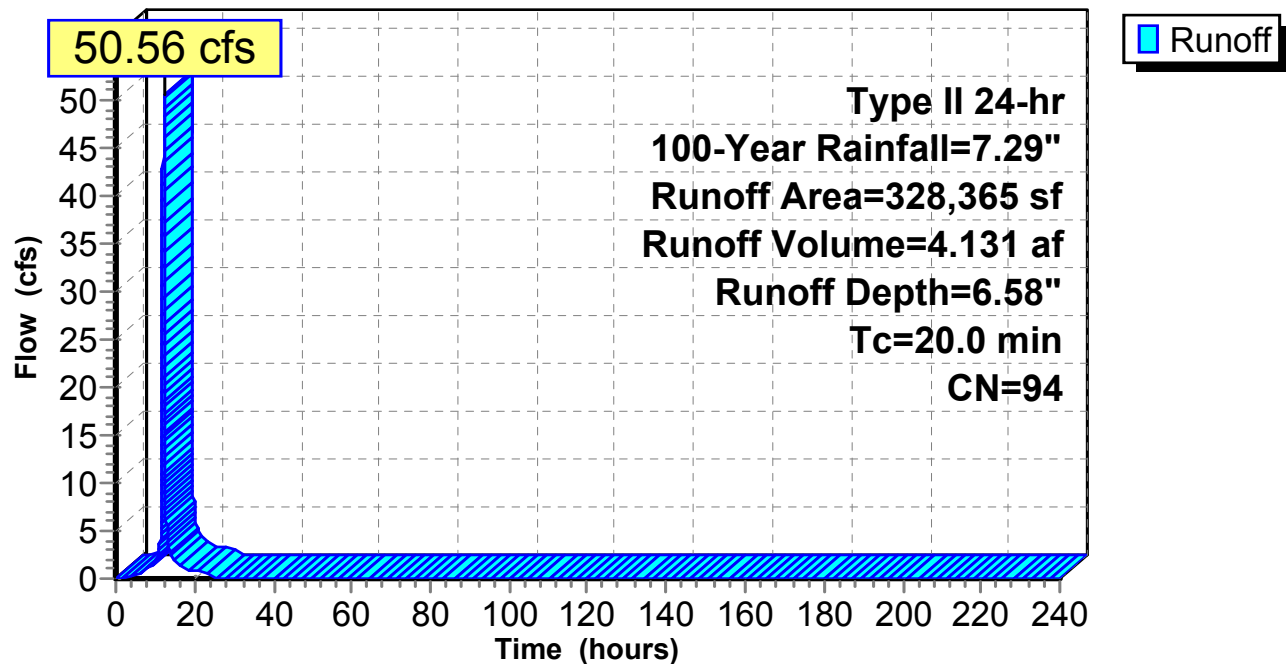
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-Year Rainfall=7.29"

Area (sf)	CN	Description
328,365	94	Urban commercial, 85% imp, HSG C
49,255		15.00% Pervious Area
279,110		85.00% Impervious Area

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

Subcatchment 60S: Outlot A

Hydrograph



Summary for Pond 54P: North Regional Pond

Tributary to Mill Pond

100yr Allowable = 1/3cfs per AC

100yr Allowed = 12.63 cfs (Private)

100yr Allowed = 18.47 (ALL)

Inflow Area = 55.379 ac, 58.76% Impervious, Inflow Depth >179.16" for 100-Year event
Inflow = 311.13 cfs @ 12.17 hrs, Volume= 826.801 af, Incl. 40.24 cfs Base Flow
Outflow = 132.64 cfs @ 12.64 hrs, Volume= 819.513 af, Atten= 57%, Lag= 28.1 min
Primary = 132.64 cfs @ 12.64 hrs, Volume= 819.513 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
Starting Elev= 744.70' Surf.Area= 105,364 sf Storage= 482,799 cf
Peak Elev= 751.28' @ 12.64 hrs Surf.Area= 135,252 sf Storage= 1,274,955 cf (792,155 cf above start)
Flood Elev= 752.00' Surf.Area= 138,500 sf Storage= 1,372,903 cf (890,104 cf above start)

Plug-Flow detention time= 323.1 min calculated for 808.413 af (98% of inflow)
Center-of-Mass det. time= 64.2 min (7,042.4 - 6,978.2)

Volume	Invert	Avail.Storage	Storage Description
#1	739.00'	8,296,903 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
739.00	72,382	0	0
743.70	91,235	384,500	384,500
744.70	105,364	98,300	482,799
752.00	138,500	890,104	1,372,903
800.00	150,000	6,924,000	8,296,903

Device	Routing	Invert	Outlet Devices
#1	Device 4	744.70'	24.0" Round Culvert L= 46.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 744.70' / 744.60' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	744.70'	12.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	750.60'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Primary	744.60'	54.0" Round Culvert L= 110.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 744.60' / 744.38' S= 0.0020 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 15.90 sf
#5	Device 4	744.70'	48.0" Round Culvert L= 83.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 744.70' / 744.60' S= 0.0012 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

PUD Layout - Revised North Pond_021218

Prepared by {enter your company name here}

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North Regional Pond - Proposed Discharge 100YR Event

Type II 24-hr 100-Year Rainfall=7.29"

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Primary OutFlow Max=132.64 cfs @ 12.64 hrs HW=751.28' (Free Discharge)

4=Culvert (Passes 132.64 cfs of 136.69 cfs potential flow)

1=Culvert (Passes 18.33 cfs of 31.54 cfs potential flow)

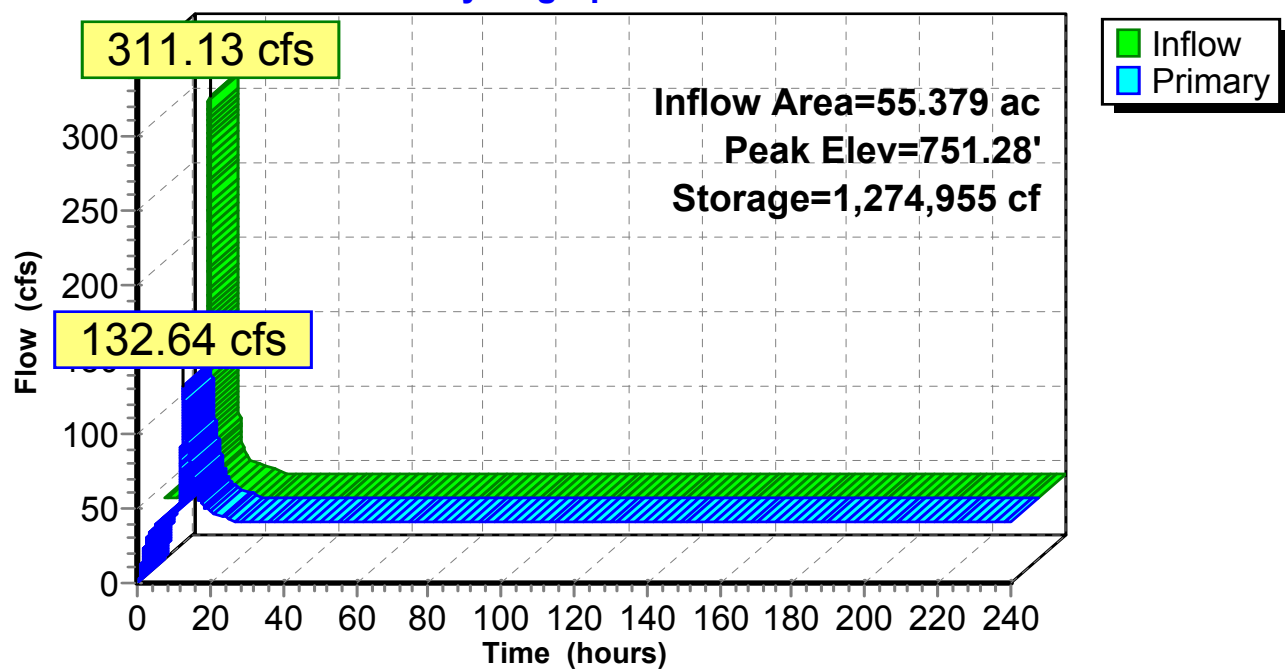
2=Orifice/Grate (Orifice Controls 9.33 cfs @ 11.88 fps)

3=Sharp-Crested Rectangular Weir (Weir Controls 9.00 cfs @ 2.71 fps)

5=Culvert (Inlet Controls 114.31 cfs @ 9.10 fps)

Pond 54P: North Regional Pond

Hydrograph



APPENDIX D

Project Information

Calculator Version:	Version 3: January 2017
Project Name:	Canterbury 7th Addition
User Name / Company Name:	
Date:	02-27-2018
Project Description:	
Construction Permit?:	Yes

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55379
Annual Rainfall (inches):	30.1
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed			27.6		27.6
			Impervious Area (acres)		32.54
			Total Area (acres)		60.14

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed			27.6		27.6
			Impervious Area (acres)		32.54
			Total Area (acres)		60.14

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement: 129932 ft3
Volume removed by BMPs towards performance goal: ft3
Percent volume removed towards performance goal %

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume 83.4936 acre-ft
Annual runoff volume removed by BMPs: 0 acre-ft
Percent annual runoff volume removed: 0 %

Post development annual particulate P load: 37.472 lbs
Annual particulate P removed by BMPs: 33.725 lbs
Post development annual dissolved P load: 30.659 lbs
Annual dissolved P removed by BMPs: 7.052 lbs
Percent annual total phosphorus removed: 60 %

Post development annual TSS load: 12377.1 lbs
Annual TSS removed by BMPs: 11139.4 lbs
Percent annual TSS removed: 90 %

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
1 - Constructed stormwater pond	0	129932	0	129932	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
1 - Constructed stormwater pond	83.4936	0	0	83.4936	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Constructed stormwater pond	37.4719	0	33.7247	3.7472	90

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Constructed stormwater pond	30.6589	0	7.0515	23.6074	23

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Constructed stormwater pond	12377.1	0	11139.39	1237.71	90

BMP Schematic

