TERRADYN CONSULTANTS, LLC

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January 31, 2023

RESPONSE TO REVIEW COMMENTS

PL-002614-2023 | 19 West Street
Portland, Maine 04101
Project #23-020

Town of Kennebunkport Planning Board
6 Elm Street
Kennebunkport, ME 04046

Dear Chairman Boak and members of the Planning Board:

We have received and reviewed the peer review comments from Acorn Engineering related to the proposed Wildes District Road Subdivision, dated December 4, 2023. We have prepared the following responses to the comments. For clarity, each comment is repeated below, followed by our response in **bold text**.

GENERAL REVIEW COMMENTS

Jurisdiction:

1. §240-6.142 ("Road construction, filling and grading"): this section of the Town's Land Use Zoning Ordinance states that construction of a road that will serve more than two residential units requires site plan review (under Article 10). This project proposes a road that will serve three residential units. The applicant has submitted a Preliminary Application for Subdivision. The Town should verify whether a Site Plan Application is also required.

   Applicant Response: Terradyn does not believe a Site Plan Application is necessary for this project.

2. The Subdivision Application asks the applicant to state whether the proposed project is located within 250 feet of the high-water mark of a "…pond, river, or saltwater body". This applicant does not answer this question, but the proposed project is located immediately adjacent to a pond as defined in the Town's Land Use Ordinance. The pond has the potential to be a Wetland of Special Significance (WOSS) as defined by Maine DEP in Rule Chapter 310 ("Wetlands and Waterbodies Protection Rules")3. The application form should be revised for accuracy. This Memo includes additional questions about potential impact of this pond and whether it is considered a WOSS, which could have substantial impact on the proposed design.

Applicant Response: A revised Subdivision Application form is attached with updated information. Longview Partners has determined that the pond does not meet the definition of a WOSS due to the area of open water and emergent vegetation, and a representative from the Maine Department of Environmental Protection has confirmed this with a site visit. The attached Wetland Summary Report from Longview Partners addresses the question of whether the pond is a WOSS.

3. At the November 15, 2023 Planning Board meeting, the engineer acknowledged that the project will require a permit from the United States Army Corps of Engineers (USACE). List the USACE permit number in the "Permits" box on the cover sheet, and provide a copy of the USACE permit.

   Applicant Response: All required site permits have been added to the list on the cover sheet. Copies will be provided to the town when submitted.

General Comments:

4. The provided purchase and sale agreement (P&S) (between Beachwood Development Fund, LLC and the property owner, Michael D. Prendergast) expired on August 17, 2022. Please provide an updated P&S Agreement or otherwise demonstrate that Beachwood Development Fund, LP has right, title, or interest to submit the application on the property owned by Mr. Prendergast.

   Applicant Response: An updated Purchase & Sale agreement will be submitted under separate cover.

5. §415-7.2.D(6):
   a. The proposed Inspection and Maintenance Manual (included in the Stormwater Management Report in Attachment 6) states that either the Owner or a Homeowners Association (HOA) will be the party responsible for inspection and maintenance of the stormwater management system. Please provide sample HOA Bylaws and a sample Declaration of Covenants, Conditions, and Restrictions ("Declaration") that together define the process in which responsibility for stormwater system maintenance is conveyed from one entity to the other. Final approval will require proof of formation of the HOA and execution of HOA Bylaws and Declaration.

      Applicant Response: Draft HOA documents will be provided prior to final approval.

   b. The application proposes a private road to serve the three proposed residential lots. Please provide a sample roadway maintenance agreement that describes what entity will be responsible for maintenance of the private road. Final approval will require an executed copy of a roadway maintenance agreement.

      Applicant Response: Roadway maintenance will be addressed in the HOA documents, which will be submitted prior to final approval.

6. §415-7.2.D(10): A waiver is being requested for the preparation of a high-intensity soil survey. Acorn concurs that this is appropriate for the reasons stated in the application.

   Applicant Response: No response necessary.

7. §415-7.2.D(13): Acorn concurs that a hydrogeologic assessment is not required given the subdivision will not trigger any of three criteria listed in this section.

   Applicant Response: No response necessary.

8. §415-7.2.D(14): Plans shall be revised to include the limit of tree clearing and the location of any existing large specimen trees (21-inches or larger).

   Applicant Response: Large trees (>21" DBH) have been surveyed and added to the project drawings. Tree clearing has also been added to applicable drawings.

9. §415-7.2.D(16): Lots will be offered for sale to the general public, not developed by the applicant. Acorn concurs that the building envelopes shown on plans are not required to include locations of dwellings, driveways, and lawns/ gardens. The plans show land on each lot to be graded for the creation of buildable area. Acorn observes that if the feature crossing the parcel is considered to be a stream, a 75-foot riparian buffer setback would significantly reduce the area on Lots 2 and 3 that could be graded (and/or would require coverage under a Natural Resources Protection Act [NRPA] Permit by Rule [PBR]), and may reduce the lot size to less than the VR district minimum (40,000 SF) and may result in buildable area too small to be functional. We recommend that this be revisited once the nature of this feature (per other comments in this Memo) is resolved.

   Applicant Response: The drainage channel in question has been reviewed by DEP staff in coordination with the project wetland scientist. It was determined that a portion of the channel meets the definition of a stream, and a regulatory setback should apply to the stream segment. The stream and applicable setback has been added to the project drawings. A NRPA Permit-by-Rule will be submitted to reduce the stream setback to 25' within the identified building envelopes on Lots 2 and 3. Updated lot area setbacks have been included in the updated plan set and the field determination is attached herein.

10. §415-7.2.D(28) and §415-11.8:
    a. Attachment 10 of the application includes correspondence with the Maine Natural Areas Program. Based on Maine Department of Inland Fisheries and Wildlife (MDIFW's) "Beginning with Habitat" map, we recommended that correspondence with this agency be included for the identification of high or moderate value wildlife habitat.

       Applicant Response: Terradyn Consultants contacted MDIFW to request information on known locations of Endangered, Threatened, and Special Concern species, designated Essential and Significant Wildlife Habitats, and inland fisheries habitat concerns within the vicinity of the project site. MDIFW reported no mapped

Essential habitats, endangered, threatened, and special concern species or significant wildlife habitat in the vicinity of the project. The Department did make standard recommendations on significant vernal pools and streams, which the project design takes into account. MDIFW's review letter is attached herein.

b. A vernal pool is depicted on Lot 3 of the subdivision. The Subdivision Application states that since the potential significant vernal pool was not studied in 2023 during the official identification period established by Maine DEP and MDIFW, it is being considered a significant vernal pool for the purposes of this application. The applicant shall show the required 250-foot natural resource buffer around this vernal pool on the Revised Subdivision Plan (Sheet C-20) and provide calculations that demonstrate a minimum 75% of the buffer area will be protected, consistent with Maine DEP Rule Chapter 3354 ("Significant Wildlife Habitat"). Acorn defers to the Town about portions of the three lots being deed-restricted for the protection of the natural resource buffer extending 250-feet around the significant vernal pool.

Applicant Response: Information on the potential vernal pool and its associated Critical Terrestrial Habitat has been added to the Subdivision Plan.

11. §415-7.2.D(29): Correspondence with the Maine Historic Preservation Commission (MHPC) shall be provided, and a review of the National Register of Historic Places be completed, to satisfy this section of the Subdivision Regulations.

Applicant Response: Terrradyn Consultants contacted MHPC to request information on historic properties in the vicinity of the project site. MHPC responded that no historic properties (architectural or archaeological) will be affected by the proposed project. Correspondence with MHPC is attached.

Stormwater Management Comments:

12. The narrative shall identify the drainage watershed in which the proposed project is located.

Applicant Response: The project is in the Batson River Watershed. This information has been added to the Stormwater Report Narrative.

Water Quality

13. The narrative includes a section on Stormwater Quantity Control, but does not address Stormwater Quality Control. Town Subdivision Regulations include a Stormwater Management requirement (§415-11.15.B15) addresses water quality as follows:

> (1) Subdivisions. Stormwater runoff in subdivisions must be treated by the use of best management practices equivalent to those described in the Stormwater Management for Maine: Best Management Practices, published by the Maine Department of Environmental Protection, 1995 (or most recent edition), to achieve, by design, 40% reduction in total suspended solids.

The most recent version of the Maine DEP Stormwater Management BMP Design Manual is dated May 2016 and no longer uses reduction in total suspended solids (TSS) as the water quality requirement.

The application does not address water quality, and no BMPs are proposed to treat runoff from the proposed impervious and developed areas. Please revise the application to provide BMPs for stormwater treatment, include calculations for each BMP, show locations of each BMP on the proposed lots, revise the Inspection and Maintenance Manual (included in the Stormwater Management Report in Attachment 6) to identify the post-construction inspection and maintenance requirements for each proposed BMP, and clarify what party will be responsible for maintaining each BMP,

Applicant Response: A Focal Point Stormwater treatment BMP has been incorporated into the design to meet Kennebunkport Stormwater Quality Ordinance requirements. Design calculations and inspection and maintenance requirements are provided in the attached Revised Stormwater Management Report.

Water Quantity

14. Minor recommended changes to the stormwater analysis include:
    a. Appendix 1: Re-evaluate TC path for Subcatchment 1. Acorn believes there may be a longer path with a longer stretch of sheet flow from the northeasterly corner.
    b. Appendix 2: Re-evaluate the drainage divide between Subcatchments 10 and 11. The current drainage divide is between the 78 and 79 contours, whereas the divide appears to be closer to the middle of Lot 2.
    c. Appendix 3: The TC path for Subcatchment 2 is longer in the post-development condition than existing.
    d. Appendix 4: The inlet invert of Reach 22 has a higher elevation than the outlet of the receiving culvert (C22).
    e. Appendix 4: The size of the pipe outlet from C22 should be 18-inches as depicted on the plans.
    f. Appendix 4: The size of the pipe outlets from C21 and C22 should be 18-inches as depicted on the plans.

Applicant Response:

a) The TC path starting in the northeasterly corner was evaluated. While sheet flow is slightly longer, the overall time of concentration is shorter than the original path.
b) There is a high point near the 79' contour to allow drainage from Lot 2 to flow to the existing pond in subcatchment 20. However, watershed lines had not been updated to reflect the most recent changes. Spot grades have been added to show the high points and the outer boundary of subcatchment 11 has been updated to reflect those changes.
c) TC paths have been adjusted so that Subcatchment 2 in the pre-development condition is longer than in the post development condition.
d) The inlet invert has been adjusted for Reach 22 to match the receiving culvert outlet.

e) The size of the pipe outlet from C22 has been changed to 18 inch as depicted on the plan.
f) The size of the pipe outlets from C21 and C22 have been changed to 18 inches as depicted on the plan.

Comments on Natural Resources

15. A large pond is located partially on the subject property (Tax Map 9, Lot 10-23) and partially on the adjacent property (Tax Map 9, Lot 10-22-A), which is owned by the same person as the subject property. Acorn estimates that the pond has an overall water surface area of approximately 36,000 SF based upon the water surface line depicted on Sheet C-2.0. This is greater than the 20,000 square feet threshold that Maine DEP considers a freshwater Wetland of Special Significance (WOSS) per Rule Chapter 310.4.A(5)6, which is inset below.

> (5) Aquatic vegetation, emergent marsh vegetation or open water. The freshwater wetland contains under normal circumstances at least 20,000 square feet of aquatic vegetation, emergent marsh vegetation or open water, unless the 20,000 or more square foot area is the result of an artificial ponds or impoundment.

During the 11/15/23 Planning Board meeting, the engineer stated that the pond was determined to be "man-made". The application should include information about how this determination was made, by whom, and provide documentation demonstrating that the Maine DEP was consulted and concurred with this determination.

If it cannot be demonstrated that the pond is man-made, it would be considered a wetland of special significance per Chapter 310.4(5) language and could have substantial impact on the proposed design.

Applicant Response: A MDEP staff member visited the site and reviewed the pond with the project wetland scientist and concurred that the pond is man made. Further, the area of the pond containing "aquatic vegetation, emergent marsh vegetation or open water" was determined to be significantly less than 20,000 square feet. More information is provided in the attached Wetland Summary Report.

16. The Existing Conditions Plan (Sheet 1 of 1) shows a feature labeled "ditch" that extends from the outlet of the pond on Lot 10-22-A and crosses Lot 10-23.

This feature is labeled as a "30-foot-wide drainage easement" on Revised Sheet C-2.0 (11/27/23) but no drainage easement is mentioned in the recorded deed (York County Registry of Deeds, Book 16177 Page 988). Within the drainage easement shown on Revised Sheet C-2.0, the feature is shown as wetlands (type not specified).

The USGS Quadrangle7 for this area (image inset below, with the subject parcel outlined in red), the feature is shown as a "blue line" which is an indicator of a potential stream.

The Town's Zoning and Shoreland Zoning Map8 (image inset below, with the subject parcel outlined in red) also shows this as a stream.

The Maine Department of Inland Fisheries and Wildlife (MDIFW) also considers this feature to be a stream in its Beginning with Habitat online map viewer9 (image inset below, with the subject parcel outlined in red) and requests maintaining a 75-foot riparian habitat buffer around it.

The Natural Resource Protection Act (NRPA) Identification Guide for Rivers, Streams and Brooks10 lists five characteristics of a stream. To be considered a stream, the feature must have a defined channel and two of the five characteristics; this feature does have a defined channel and appears to have at least two of the five characteristics

The application shall include information about who performed the field determination of the feature, address each of the NRPA Identification characteristics, and provide documentation demonstrating that the Maine DEP was consulted and concurred. Otherwise

Applicant Response: A drainage easement is proposed as part of the subdivision. There is no existing easement for the property.

More information on the ditch and stream is provided in the attached Wetland Summary Report.

17. Revised Sheet C-2.0 depicts a 30-foot wide drainage easement on Lot 10-23. A copy of the draft drainage easement with metes and bounds will be required with the Final Subdivision application.

    Applicant Response: A copy of the draft drainage easement with metes and bounds will be provided in the Final Subdivision Application.

18. Revised Subdivision Plan Sheet C-2.0 shows the location and area of Wetland impacts #1, #2, and #3, which total 1,507 SF of impacts.

    a. Lot 1 includes additional delineated wetland within the footprint of the building envelope shown. In reality, this wetland will likely be impacted during development of this lot, so additional area should be defined as Wetland Impact #4.

    b. The project narrative states a total of 1,527 SF of wetland impacts. Please clarify.

    Applicant Response: Additional Lot 1 wetland impacts have been calculated and included in the updated plan and will be carried through to Final Subdivision Application. 1507 SF is a typo. 1,527 is the correct number and will be revised to include the additional wetland impacts to Lot 1 for Final Subdivision Application.

19. Revise note #12 on the Existing Conditions Plan (Sheet 1 of 1) and Revised Sheet C-2.0 to include the names of the professionals who performed each of the investigations listed, and the license number of each professional.

    Applicant Response: Notes have been updated to include the name and license number of the professional who performed the wetland delineation.

20. Construction of the pipe outlets adjacent to (or within) wetlands ─ for example, at the catch basin outlet at Station 2+75, which is 15 feet from the wetland ─ require coverage under Section 7 of a NRPA Permit by Rule (PBR). A NRPA PBR application does not appear to have been submitted as of the date of this Memo11. Provide a copy of the NRPA PBR application, once submitted, and list the PBR number in the Permits box on the Cover Page.

    Applicant Response: The previously proposed catch basin outlet has been removed from the plan. A NRPA Permit by Rule for disturbance within 75' of a stream will be submitted to DEP and a copy will be provided to the town prior to Final Subdivision Approval.

21. The wetland delineation map included in Attachment 7 does not identify the type(s) of freshwater wetland delineated. Provide a copy of the natural resources report prepared by Longview Partners. The report should include information on the pond (a potential WOSS) including documentation about whether it is man-made, wetland types, vernal pool forms (if available), and all field determinations (including evaluation of the stream). The wetland report should describe the features of the wetland drainage way.

    Applicant Response: The Wetland Summary Report prepared by Longview Partners is attached herein.

22. Wetland disturbance will require a permit from the US Army Corps of Engineers (USACE). Provide a copy of the application and approval letter, if available.

    Applicant Response: A copy of the US Army Corps of Engineers permit will be provided to the town prior to Final Subdivision approval.

Plan Set Comments:

23. Sheet C-1.0 (Cover Sheet)
    a. General Note #1 states that that project is subject to a Maine DEP permit. Please clarify what permit.
    b. Please list any and all Maine DEP permit numbers in the Permits box.
    c. Please list the USACE permit number (for wetland disturbance) and Maine DEP permits in the Permits box.
    d. Update Sheet Index (and numbers) based on comments below. a. Update the location map to meet the standards of §415-7.2.B:

    Applicant Response:

    a. Maine DEP permits are listed in the "PERMITS" box on the cover sheet.
    b. Permit numbers will be added once received and included in the Final Subdivision Application.
    c. USACE Permit Numbers and MaineDEP Permits will be included in the permit box once received.
    d. The Sheet Index and location map have been updated.

24. Sheet C-2.0 (Revised Subdivision Plan)
    a. Per §415-12.2, where the subdivision streets are to remain private roads, the following words shall appear on the recorded plan: "All roads in this subdivision shall remain private roads to be maintained by the developer or the lot owners." Please add this note to Sheet C-2.0.
    b. Visually represent (and state numerically) the area on each lot that shall be deed-restricted to protect the significant vernal pool critical terrestrial habitat.
    c. Subdivision Regulation §415-11.8.B(7) requires that at least 1/3 of the total area of required open space will be "..upland areas or areas unsuitable for active of passive recreation". Open space calculations on Sheet C-2.0 include 27,248 SF of pond area as open space but . The pond is not upland area and not accessible for recreational needs. Revise the open space calculation on this sheet to list other proposed open space and show that at least 1/3 of the proposed open area is upland and is suitable per this section of the Subdivision Regulations.

    Applicant Response:

    a. Note added.
    b. Annotation added.
    c. The edge of ponded water within the proposed open space has been recently field surveyed and added to the project drawings. 27,248 SF represents the total proposed open space area. The ponded area is 4,065 sf, or 15% of the total open space. The remaining area of open space is a combination of upland and freshwater forested wetlands. Per Subdivision Regulation §415-11.8.B(7): any wetlands or otherwise unusable area will be allowed as part of the area for passive recreation with trails or walkways. A future pathway is under consideration to access the man-made pond, therefor, 85% of the open space is considered usable and meets the Ordinance requirements.

25. Sheet C-3.0 (Plan & Profile)
    a. Depict sight distances from entry along Wildes District Road.
    b. Show new stop sign for private road.
    c. Label curb radii at entry and hammerhead.
    d. Confirm material and location of the new curb within public right-of-way with Public Works Director, and provide documentation of this consensus.
    e. Show required trenching for utility installation within Wildes District Road.
    f. Include spot grades on hammerhead to identify slopes and drainage direction.
    g. A waiver is being requested for slopes steeper than 3:1 (H:V) adjacent to wetland areas. The entire easterly edge of roadway is graded with 2:1 (H:V) sideslopes. Where possible, slopes should be 3:1 (H:V) per §250-6.14(D).
    h. The hammerhead turnaround is designed in general conformance with §250-6.14(F). The proposed project description in the cover letters notes that a streetlight will be located near the hammerhead. The plan shall be revised to depict the streetlight outside the limits of the obstruction free zone.
    i. Show the outlet riprap apron for SD-3 per the pipe outlet protection detail and the associated easement on adjacent property, if required.

Applicant Response:

a. An entrance permit has been approved by the city and attached herein.
b. A stop sign has been added to the drawings.
c. Labels have been added to curve radii.
d. The proposed curb has bee adjusted to terminate before connection into public ROW to help facilitate stormwater runoff.
e. Trenching locations have been added to the drawings.
f. Spot grades have been added within the proposed hammerhead.
g. Slopes are 3:1 where possible. Due to the proximity to the property line, slopes are proposed at 2:1 on the easterly side of the proposed road.
h. A streetlight has been added to the project drawings near the hammerhead.
i. Pipe outlet riprap aprons are shown appropriately.

26. Sheet C-4.0 (Erosion & Sediment Control Notes and Details): This sheet is included as Sheet C-5.0 and can be deleted without impacting other sheet numbers.

Applicant Response: C-4.0 is the plan view and shows all the lots and associated erosion and sediment control, C-5.0 provides the sediment and erosion control details. Sheet will remain.

27. Sheet C-5.0 (Erosion and Sediment Control Notes and Details
    a. Show storm drain inlet protection at proposed catch basins.
    b. Provide detail for storm drain inlet protection.

Applicant Response:

a. The updated plan set includes no proposed storm drains or catch basins.
b. No storm drain inlet protection is needed.

28. Sheet C-5.1
    a. Include note on the driveway culvert detail for minimum pipe size of 15-inches for a driveway cross culvert (per §415-12.5.C).
    b. The typical water service connection detail should remove reference to a sidewalk.
    c. Provide detail for the slipform curb.
    d. Update the Tee & Bend Detail to include a two-inch diameter water service.

Applicant Response:

a. Note added to driveway culvert detail.
b. Reference to sidewalk removed from detail.
c. Slipform curb detail added.
d. After consultation with the Kennebunk, Kennebunkport and Wells Water District, the water main has been revised to 4" PVC. The Tee and Bend Detail has been revised to include 4" pipe.

29. Sheet C-5.2
    a. Provide water and sewer pipe materials in the typical trench detail.

Applicant Response:

a. Water and Sewer pipe materials added to pipe data tables on sheet C-3.0 Plan and Profile.

The project team is looking forward to continuing discussion about the project with the Planning Board at an upcoming meeting. In the interim, please contact me with additional questions or comments.

Sincerely,
TERRADYN CONSULTANTS, LLC

Michael Tadema-Wielandt, P.E.
Vice President

cc.

Attachments:
Attachment 1 - Revised Subdivision Application Form
Attachment 2 - MDIFW Correspondence
Attachment 3 - MHPC Correspondence
Attachment 4 - Wetland Summary Report by Longview Partners
Attachment 5 - Entrance Permit
Attachment 6 - Updated Stormwater Report

Updated Plan Set
C-1.0 – Cover Sheet
1 – Topographic Survey
C-2.0 – Subdivision Plan
C-3.0 – Plan & Profile
C-4.0 – Erosion and Sedimentation Control Plan
C-5.0 – Erosion and Sedimentation Control Details
C-5.1 – Site and Utility Details
C-5.2 – Drainage and Utility Details
C-5.3 – Stormwater BMP Details

Attachment 1

Revised Subdivision Application Form

APPLICATION FOR SUBDIVISION
KENNEBUNKPORT PLANNING BOARD

Preliminary Plan Application ☑ **Final Plan Application** ☐

PROPOSED SUBDIVISION NAME: Wildes District Subdivision

APPLICANT INFORMATION

Property Owner: Michael D. Prendergast
Address: 0 Wildes District Road
Kennebunkport, ME 04046
Phone: _____ Email: _____

Applicant/
Authorized Agent
Name: Beachwood Development Fund LP (Michael Tadema-Wielandt, Authorized Agent)
Address: P.O. Box 261
Kennebunk, ME 04043
Phone: 207-632-9010 Email: mtw@terradynconsultants.com

**** Please be sure to include a Letter of Authority if you are the Agent****

If applicant is a corporation, check if licensed in Maine: Yes ☐ No ☑ and attach a copy of State's "Certificate of Good Standing".

Land surveyor, engineer, architect or others preparing plan: _____
Michael Tadema-Wielandt, P.E.
Address: 565 Congress Street Suite 201

Phone: 207-632-9010 Email: mtw@terradynconsultants.com

Please provide proof of the applicant(s) legal interest in the property to be developed? Please provide one of the following:

- A copy of the recorded Deed.
- Executed Purchase and Sales Agreement.

LAND INFORMATION

Location of Property: Wildes District Road
street address

Assessor's Tax Maps: Map: 23-003 Block: _____ Lot(s) 9-10-23
Registry of Deeds: Book: 16177 Page: 988

Zoning District? Village Residential District

Resource Protection ☐ Shoreland Zone ☐

Is any portion of the property withing two hundred fifty (250) feet of the high water mark of a pond, river or saltwater body? Yes ☑ No ☐

Total acreage of parcel: 4.1
Acreage to be developed: 1.95

Has this land been part of a prior approved subdivision? Yes ☐ No ☑
Or part of other divisions within the past 5 years? Yes ☐ No ☑

Identify existing uses of land (farmland, woodlot, etc.): Forsted Undeveloped

Does the parcel include any water bodies? Yes ☑ No ☐

Is any portion of the property within a special flood hazard area as identified by the Federal Emergency Management Agency (FEMA)? Yes ☐ No ☑

List the names and addresses of abutting property owners within 200' on a separate sheet and attach to this application.

GENERAL INFORMATION

Proposed name of development: Wildes District Subdivision

Number of lots or units: 3

Anticipated date for construction: Spring 2024

Anticipated date of completion: Fall 2024

Does this development require extension of public infrastructure: Yes ☑ No ☐

If yes, what?

- ☐ Roads
- ☑ Water Lines
- ☐ Other
- ☐ Fire Protect
- ☐ Storm Drainage
- ☑ Sewer Lines
- ☐ Sidewalks

Estimated cost for infrastructure improvements: $ 250,000

Identify method for water supply to the proposed development:

- ☐ Individual Wells
- ☑ Public Water Supply
- ☐ Central Well w/Distribution
- ☐ Other (please state alternative)

Identify method of sewage disposal to the proposed development:

- ☐ Individual Septic Tanks
- ☐ Central On-site Disposal w/Distribution Lines
- ☑ Connection to Public Sewer
- ☐ Other (please state alternative)

Identify method of fire protection for the proposed development:

- ☑ Hydrants connected to the public water system
- ☐ Dry hydrants located on existing pond or water body
- ☐ Existing fire pond
- ☐ Individual Fire Suppression System
- ☐ Other (please state alternative)

Does the applicant propose to dedicate to the public any streets, recreation or common lands?

If any:

Streets	Yes ☐	No ☑	Estimated Length _____
Recreation Area	Yes ☐	No ☑	Estimated Acreage _____
Common Land(s)	Yes ☐	No ☑	Estimated Acreage _____

Does the applicant intend to request waivers of any of the subdivision submission requirements? If yes, list them and state reasons for the request:

Waive road side slope maximum from 3:1 down to 2:1 within wetland crossing areas to reduce the area of impact

Waive the requirement for a high intensity soil survey, subdivison will connect to the public sewer system

Waive the requirement for sidewalks along the proposed road. There are no sidewalks along Wildes District Road in the vicinity of the parcel, the minor amount of lots created should allow for pedestrian safety along the road.

To the best of my knowledge, all the above stated information submitted in this application is true and correct.

Signature _____ Date 10/2/2023

Printed name Michael Tadema-Wielandt, P.E.

For Office Use Only

Date Received: _____

Application Fee: _____
Lot/Dwelling Fee: _____
Legal Notice Posting Fee: _____
Postage Fee: _____
Paid by (payment type/name): _____
Escrow Funds: _____
Escrow Funds Lot/Dwelling: _____

Attachment 2

MDIFW Correspondence

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

November 20, 2023

Matthew Pelletier
Terradyn Consultants, LLC
565 Congress Street, Suite 201
Portland, Maine 04101

RE: Information Request – Wildes District Road, Kennebunkport Project (ERID 7110)

Dear Matthew:

Per your request received on September 07, 2023, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Wildes District Road, Kennebunkport* project. Please note that as project details are lacking our comments should be considered preliminary.

Our Department has not mapped any Essential Habitats that would be directly affected by your project. Essential Habitats are areas formally designated as essential to the conservation of a State Endangered or Threatened species and are protected pursuant to the Maine Endangered Species Act (MESA, 12 M.R.S, §12804.2). Currently, Essential Habitats are only designated for three State Endangered coastal breeding bird species.

Endangered, Threatened, and Special Concern Species

Bat Species – Of the eight species of bats that occur in Maine, four species are afforded protection under Maine's Endangered Species Act (MESA, 12 M.R.S §12801 et. seq.): little brown bat (State Endangered), northern long-eared bat (State Endangered), eastern small-footed bat (State Threatened), and tri-colored bat (State Threatened). The four remaining bat species are designated as Species of Special Concern (Rare): big brown bat, red bat, hoary bat, and silver-haired bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence, it is likely that several of these species occur within the project area during spring/fall migration, the summer breeding season, and/or for overwintering. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Significant Wildlife Habitat

Significant Vernal Pools – Significant Vernal Pools (SVPs) are Significant Wildlife Habitats under Maine's Natural Resources Protection Act. MDIFW's resource maps do not currently document SVPs on the project parcel. However, a comprehensive statewide inventory for SVPs has not been completed. SVPs are not included on MDIFW maps until project areas have been surveyed using approved methods and the survey results confirmed. Thus, their absence from resource maps is not necessarily indicative of an absence on the ground. MDIFW recommends that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are SVPs present in the area. These surveys should extend up to 250 feet beyond the anticipated project

footprint because of potential performance standard requirements for off-site SVPs, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our Agency for review well before the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

Aquatic Resources

Fish Habitat - We recommend maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands. Maintaining and enhancing buffers along these resources is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support fish and other aquatic species. Riparian buffers also provide critical habitat and important travel corridors for a variety of wildlife species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide for full aquatic passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis. Undersized crossings may inhibit these functions and become a frequent maintenance problem that causes reoccurring damage to the resource. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e., natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in providing habitat connectivity for fish and other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils can travel significant distances as well as transport other pollutants resulting in direct impacts to fish, other aquatic life, and their habitats. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance, we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

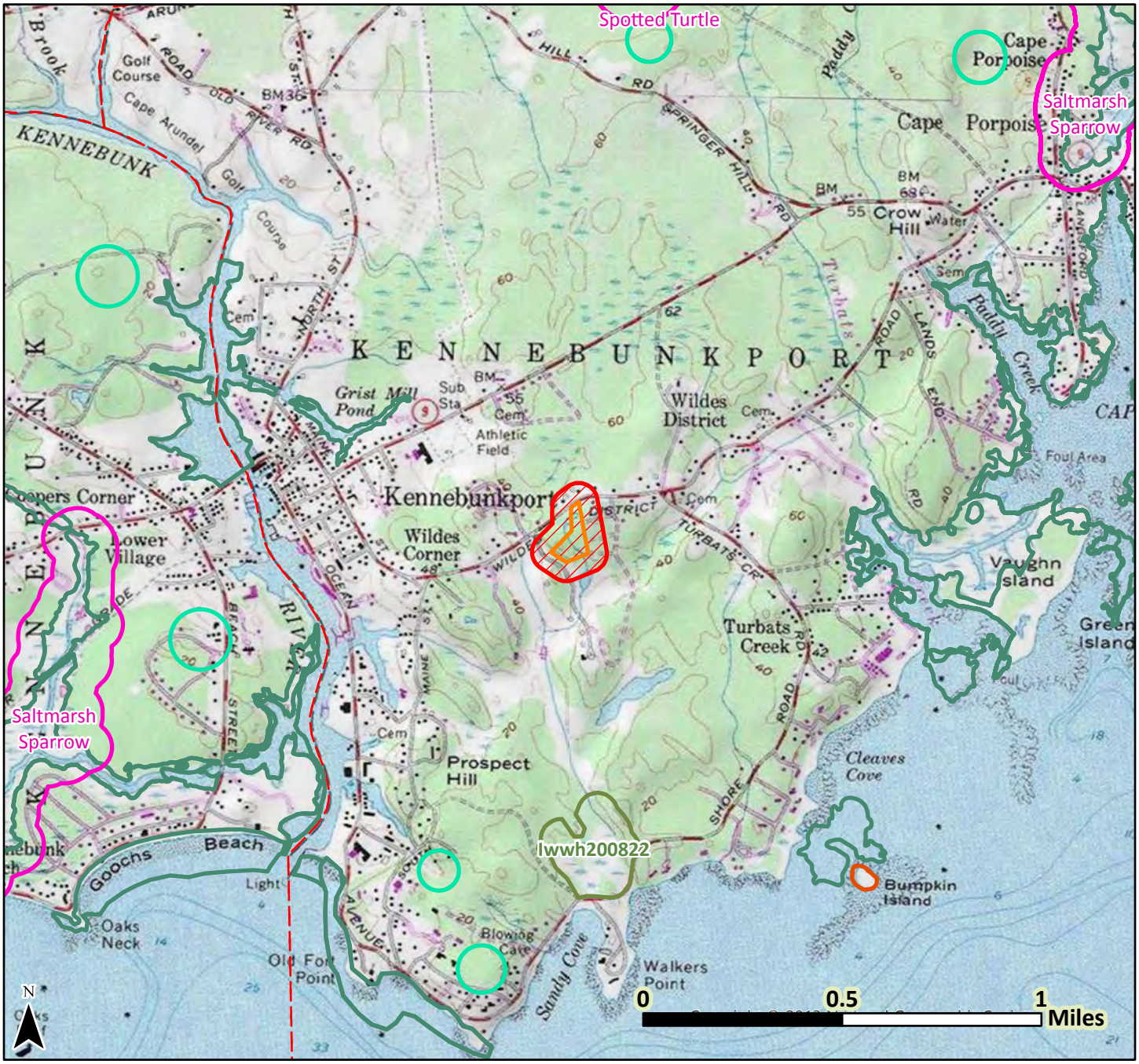
Best regards,

Emily Robinson

Emily Robinson
Resource Biologist

Maine Department of Inland Fisheries and Wildlife
Environmental Review of Fish and Wildlife Observations and Priority Habitats

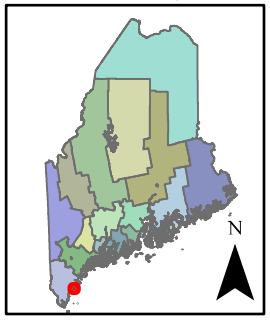
Wildes District Road, Kennebunkport



County Boundary
Township Boundary
Project Footprint
Search Area

E, T, & SC Species
Inland Waterfowl/Wading Bird
Seabird Nesting Island
Significant Vernal Pool
Tidal Waterfowl/Wading Bird

Date: 9/13/2023
Projection:
UTM Zone 19N, NAD83



Legend only lists resources visible in the map; see response letter for all resources that were evaluated.

Attachment 3

MHPC Correspondence

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

October 16, 2023

Mr. Matthew Pelletier
Terradyn Consultants
565 Congress St
Suite 201
Portland, ME 04101

Project: MHPC #1348-23 Beachwood Development Fund LLC; Wildes District Rd Subdivision

Town: Kennebunkport, ME

Dear Mr. Pelletier:

In response to your recent request, I have reviewed the information received October 2, 2023 to continue consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that there will be no historic properties (architectural or archaeological) affected by this proposed undertaking, as defined by Section 106.

Please contact Megan Rideout at (207) 287-2992 or megan.m.rideout@maine.gov if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
State Historic Preservation Officer

PHONE: (207) 287-2132 FAX: (207) 287-2335

Attachment 4

Wetland Summary Report

LONGVIEW PARTNERS, LLC

ENVIRONMENTAL PERMITTING SPECIALISTS

Wetland Summary Report

Prepared for

Terradyn Consultants, LLC

(N/F Beachwood Development Fund)

Wildes District Road (Map 9, Block 10, Lot 23)

Kennebunkport, Maine

January 2024

6 Second Street
Buxton, Maine
207-807-1739

WETLAND SUMMARY

prepared for

Terradyn Consultants, LLC
Wildes District Road
Kennebunkport, Maine

Longview Partners, LLC was contracted by Terradyn Consulting in September of 2022 to conduct wetland delineation on 4.41+/- acres located off Wildes District Road in Kennebunkport. Longview Partners soil and wetland scientists conducted the identification, delineation, and submeter GPS location of wetland boundaries on September 27, 2022 utilizing project limits as identified by Terradyn Consultants.

Scope of Work , Study Limits and Field Methodology

Wetland delineation took place on 4.41+/- acres off Wildes District Road. Longview Partners, LLC field staff consisted of a Licensed Soil Scientist and a Professional Wetland Scientist. Wetlands on-site were delineated in accordance with the US Army Corps of Engineers *Wetlands Delineation Manual* (version 1987) *with Regional Supplements* and wetland boundaries (as well as other site features) were located using submeter GPS.

Wetland Types Identified within Study Limits

The US Army Corps of Engineers *Wetlands Delineation Manual* (version 1987) *with Regional Supplements* outlines a three-parameter approach to the identification of wetlands.

Wetlands have the following general diagnostic environmental characteristics per the above-referenced *Manual:*

(1) Hydrophytic Vegetation: Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic conditions

(2) Hydric Soil: Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions

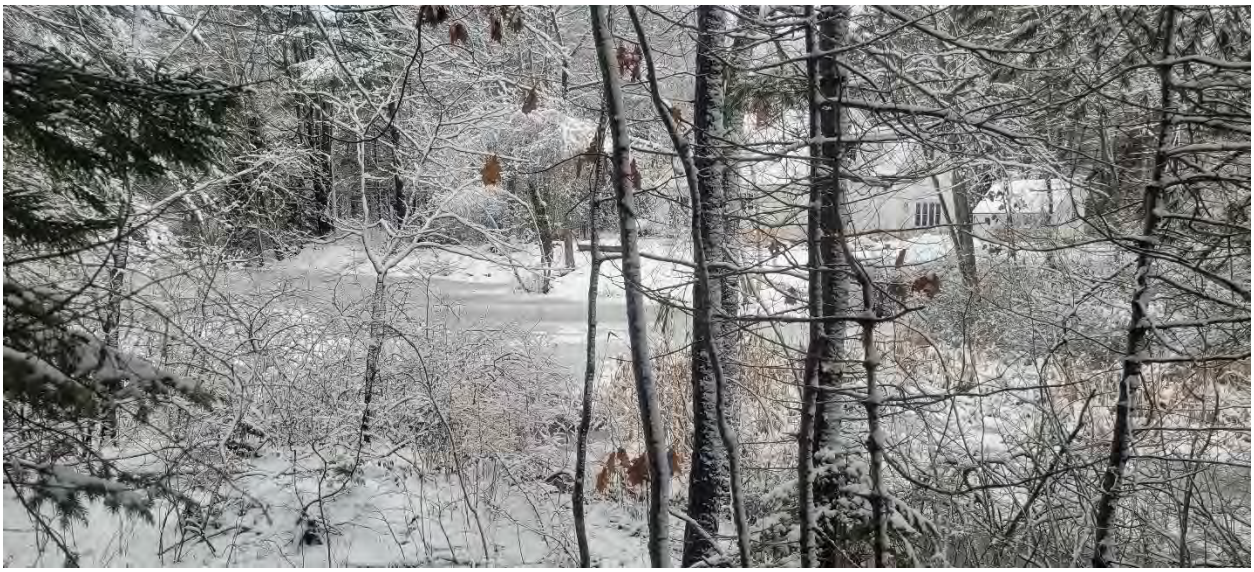
(3) Hydrology: The area is inundated either permanently or periodically at mean water depths less than 6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation

All three parameters must be evident for land to be classified as wetland. Maine has a broad range of types of wetland that can be identified and classified. Freshwater wetlands are classified as the following: forested wetland, scrub-shrub wetland, wet meadows, and emergent wetland. Within the study area just one wetland type was identified.

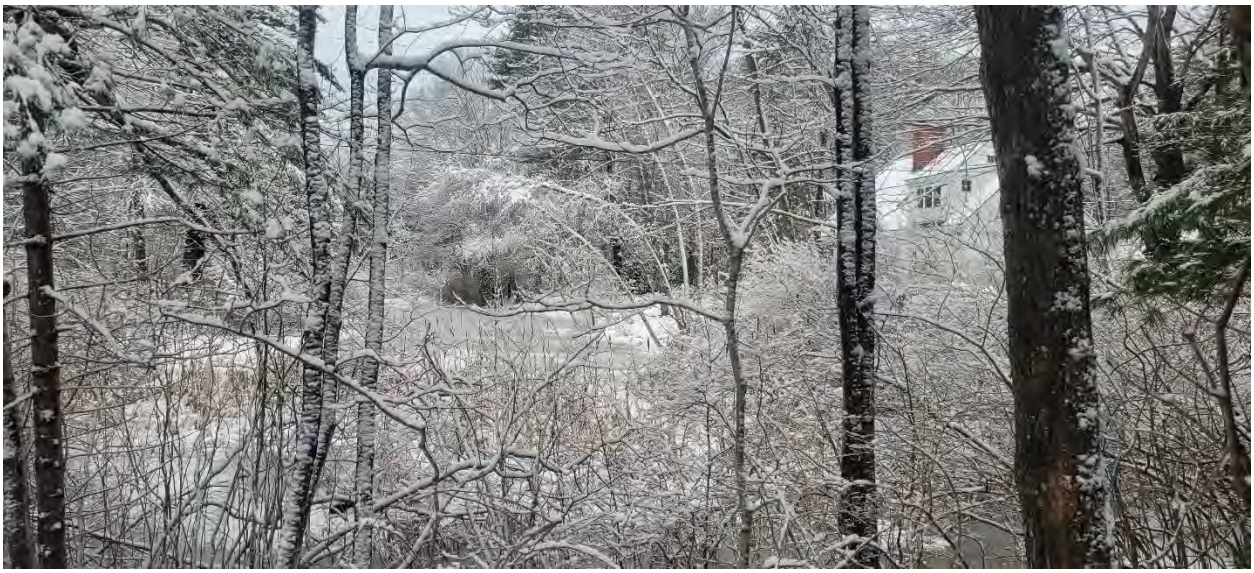
Forested Wetland

The wetlands within the study area consist of forested, freshwater wetland. These wetlands generally occur in gently-sloping to nearly level portions of the topography. Some areas of these wetlands grade into *scrub-shrub* wetlands where ponding occurs during the wettest seasons, after snowmelt, and during long-duration storm events. A small, discontinuous stream channel is present, and has been confirmed as being a jurisdictional feature by MDEP Field Staff during DEP's site visit. Flagging was placed on-site to mark the beginning and end of the jurisdictional stream segment. These flags have

been located by Professional Land Survey for inclusion to project plans. A man-made pond is also present in one portion of the wetlands.



Man-made Pond within a portion of the wetland system



Forested wetlands grading into *scrub-shrub* wetlands at edge of the man-made pond

One area of "naturally occurring" vernal pool habitat was identified during the delineation. This area was not studied during the official study dates to determine *Significance.* As such, this area is being treated as a *Significant* vernal pool per Maine Department of Environmental Protection *Natural Resources Protection Act* definitions.

Area of naturally-occurring vernal pool habitat found on-site

Typical *forested* wetland found on-site

Predominant plant species identified were Interupted Fern (*Osmunda claytoniana*), Sensitive Fern (*Onoclea sensibilis*), Cinnamon Fern (*Osmundastrum cinnamomeum*), Ostrich Fern (*Matteuchia struthiopteris*), and several varieties of sedge in the herbaceous layer. Sphagnum moss is also dominant in the wettest locations. In the sapling layer the predominant plant species identified were Highbush Blueberry (*Vaccinium corymbosum*), and Speckled Alder (*Alnus incana*). The predominant tree species found along the wetland boundary were Red Maple (*Acer rubrum*), and White Pine (*Pinus strobus*), The White Pine has morphologically adapted to living in a wet area through buttressing of roots.

Head of jurisdictional stream segment as identified by MDEP Field Staff

Limits of jurisdictional stream segment as identified by MDEP Field Staff

Soils observed in wetland areas have a seasonal high groundwater table found less than 7 inches from the mineral surface of the soil. The shallowness of the seasonal high groundwater table is most likely due to the shallow depth to bedrock or hardpan layer in the soils in the study area. The USDA Natural Resources Conservation Service classifies soils in wetland areas of the site as *Lyman-Rock Outcrop Complex*.

Evident wetland hydrology in these forested areas consisted of areas of surface water runoff, water-stained leaves, and saturation. Areas of standing water are evident within tree-throw locations which is common on sites with shallow-to-bedrock soils. No contiguous open water/*emergent* wetland exists within the wetland system that exceeds 20,000 sq. ft. As such, this wetland cannot be considered as a *Wetland of Special Significance* per MDEP NRPA standards.

Rare Plants and Rare, Threatened, and Endangered Animal Species

The study area was not reviewed by Longview Partners for rare plants or the presence of RTE animal species (other than those included in the vernal pool assessment).

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

January 29, 2024

To whom it may concern:

On December 21,2023 and January 18, 2024, Department staff visited a site on Wildes District Road in Kennebunkport. The site is identified as Map 9, Block 10, Lot 23 on the town of Kennebunkport's tax maps. Department staff met with Jim Logan of Longview Partners, LLC to review site plans, identify protected natural resources, and discuss potential permitting for the proposed project.

On site, staff observed a potential significant vernal pool near the southern boundary of the parcel and a pond at the northern boundary. Longview Partners, LLC had previously mapped the potential significant vernal pool and plan to survey the pool in Spring, 2024. The pond appears to be manmade based on the steep side slopes and adjacent topography. The pond outlets to a freshwater, scrub-shrub wetland to the south. The wetland leads to a watercourse that continues south before reaching a culvert that crosses a neighboring driveway. Sections of the watercourse appear to have been manipulated over time, as made evident by cut side-slopes, spoils piles, adjacent topography, and a small weir. The watercourse was not constructed, or constructed and maintained, solely for the purpose of draining storm water.

The watercourse is depicted as a solid or broken blue line on the most recent edition of the U.S. Geological Survey 7.5-minute series topographic map. It is known to contain flowing water continuously for a period of at least 6 months of the year in most years. Sections of the watercourse have a channel between defined banks and are primarily composed of mineral material. Other sections do not have a defined channel and are not essentially devoid of upland vegetation. In those areas that the watercourse is a defined channel, the watercourse is considered a stream as defined in the Natural Resources Protection Act (NRPA), 38 M.R.S. § 480-B(9). The activities proposed within 75 feet of the stream would require review by the Department.

This opinion is based upon the site visits conducted on December 21,2023 and January 18, 2024. Due to site conditions such as snow-covered side slopes and iced-over waters, the Department recommends an additional visit be made in Spring, 2024, to confirm which sections of the watercourse would be a stream as defined in the NRPA. This opinion is subject to change if the proposed project changes or is revised. The relevance of this opinion may also be affected by changes or revisions to the applicable laws or regulations. This opinion does not imply conformance with any other local, state, or federal requirements.

If you have any questions, please do not hesitate to contact the Department.

Sincerely,

Anna Smith
Bureau of Land Resources

Cc: David Gilchrest, Town of Kennebunkport – Code Enforcement Officer
Greg Reid, Town of Kennebunkport – Assistant Code Enforcement Officer
April Fortier, Town of Kennebunkport – Administrative Assistant

Attachment 5

Entrance Permit

TOWN OF KENNEBUNKPORT, MAINE

– INCORPORATED 1653 –

MAINE'S FINEST RESORT

Date _____

BUILDING PERMIT DENIAL

Name _____

Address _____

_____

_____

Please be advised that your recent application for a building permit must be and hereby is denied. The application is denied per Section _____ of the Kennebunkport Zoning Ordinance, which states:

You have the right to appeal this decision to the Kennebunkport Zoning Board of Appeals. Appeal must be made within thirty (30) days through the office of the Town Clerk.

Sincerely,

_____

Code Enforcement Officer

Elm Street, P.O. Box 566, Kennebunkport, Maine 04046 • Tel. (207) 967-4243

TOWN OF KENNEBUNKPORT

BUILDING OR USE PERMIT APPLICATION

Zone VR Map 009 Block 010 Lot 0023

FOR OFFICE USE ONLY
PERMIT NO. 01-114
ISSUE DATE May 14, 2001
FEE AMOUNT 30.00
APPROVED BY ACB.

1. PROPERTY OWNER: Wesley H. + Phillips — H 947-0125 W 985-3333

2. PHONE

3. PROPERTY ADDRESS: Wildes Dist. Rd.

4. OWNER'S ADDRESS: 55 Dyke Rd. K'Bunk., Me.

5. CONTRACTOR

6. PHONE

7. CONTRACTOR'S ADDRESS

8. NEW CONSTRUCTION
Provide detailed plans of new structures & plot plan.

9. LOT OF RECORD
WHAT YEAR _____

10. CONTIGUOUS LOTS
LOT NO.(S) _____

11. HISTORICAL BUILDING?
WHAT YEAR _____

12. PROPOSED USE

13. COST

C.E.O.

14. SPECIAL ZONES
☐ SHORELAND ____ initial
☐ WETLANDS
☐ FLOOD ZONE
☐ CRITICAL EDGE
☐ SAND DUNE
__/__/__ date

15. PROJECT DESCRIPTION
Driveway – Will install culvert as per request of Road Comm. and clear brush as requested by Police Chief. – Also will avoid the pond (wetlands) Culvert width 12-15 feet. length 35'

16. NUMBER OF STORIES
PRESENT _____
* PROPOSED _____

17. HEIGHT OF BUILDING
PRESENT _____ FT.
PROPOSED _____ FT.

18. NUMBER OF BATHROOMS
PRESENT _____ (FULL | HALF)
PROPOSED _____

19. NUMBER OF BEDROOMS
PRESENT _____
PROPOSED _____

20. PRESENT SEPTIC SYSTEM IS APPROVED FOR:
_____ BEDROOMS

21. YEAR ROUND USE _____
SEASONAL USE _____

* PROPOSED = TOTAL, EXISTING + REQUESTED

22. TYPE OF WATER SUPPLY:
____ Private
____ Public _____
Water District Sup.

23. TYPE OF SEWAGE SUPPLY:
_____ Private
_____ Public _____
Sewer Dept. Sup.

24. **CURB CUT** - Need Highway Superintendent (967-5728) AND Police Chief (967-2700) APPROVAL below.

John Cluff 5/10/02 Steve Kelly 5/11/02.
Highway Superintendent Date Police Chief Date

20 FT OF 12" CULVERT Need permit cut or left of proposed drive

ADDITIONAL PERMITS, APPROVALS AND INSPECTIONS REQUIRED

☐ PLUMBING	☐ BEACH WETLANDS	☐ D.E.P.	☐ SWIMMING POOL
☐ SEPTIC/HHE200	☐ HIGHWAY ZONE	☐ E.P.A.	☐ WELL
☐ SEPTIC VARIANCE	☐ BOARD OF APPEALS	☐ FIRE ADMINISIRATOR	☐ FILL
☐ PLANNING BOARD	☐ SELECTMEN	☐ ROAD OPENING	☐ SIGN
☐ SHORELAND	☐ ARMY CORP OF ENG.	☐ CULVERT	☐ CURB CUT
☐ _____	☐ _____	☐ _____	☐ _____

PROPERTY INFORMATION

25. FRONTAGE 124 FT.
☐ NONCONFORMING

26. MORE THAN ONE USE EXISTING ON THE PROPERTY. ACCESSORY USE:
_____
☐ NONCONFORMING

27. SETBACKS ☐ NONCONFORMING
_____ _____ _____
FRONT SIDE REAR

28. HOW MANY DWELLING UNITS ARE PRESENTLY EXISTING ON THE LOT _____

29. LOT SIZE (IN SQ. FT. OR ACRES)
4 acres
☐ NON CONFORMING

30. TOTAL SQ. FT. OF ALL BUILDINGS
PRESENT _____
PROPOSED _____

31. LOT COVERAGE (IN PERCENT)
PRESENT _____
PROPOSED _____
ZONE % _____

32. NUMBER OF OFF STREET PARKING SPACES
PRESENT _____
PROPOSED _____
COVERED | UNCOVERED

33. BUILDING PERMITS DO NOT INCLUDE PLUMBING, SEPTIC OR COMMERCIAL ELECTRICAL WORK. BUILDING PERMITS ARE VALID FOR ONE YEAR. ANY FALSE INFORMATION MAY INVALIDATE A BUILDING PERMIT AND STOP ALL WORK. SIGNING AUTHORIZES INSPECTIONS NECESSARY TO ISSUE PERMIT AND INSURE COMPLIANCE WITH REGULATIONS.

_____ _____
APPLICANT DATE

BY SIGNING THIS APPLICATION, THE APPLICANT AGREES TO NOTIFY THE BUILDING INSPECTOR FOR THE FOLLOWING INSPECTIONS:
1. Foundation inspection **before** any backfilling; 2. Rough in plumbing, framing and wiring **before** insulation and wall covering is installed; and 3. An occupancy permit **MUST** be obtained **before** occupancy of any new structure.

PLOT PLAN

PLEASE INCLUDE ALL SETBACK DISTANCES FROM PROPERTY BOUNDARIES, ROADS, STREETS AND RIGHT OF WAYS; ALL WETLANDS AND WATERBODIES; ANY EXISTING WELLS AND SEPTIC SYSTEMS. INCLUDE_____SHORELAND SETBACK OR FLOOD ELEVATIONS IF APPLICABLE. SHOW ALL PROPOSED DECKS AND PORCHES.

POST IN VISIBLE LOCATION ON PROPERTY BEFORE STARTING ANY WORK

PERMIT NO. 01-114 **TOWN OF KENNEBUNKPORT**

BUILDING PERMIT

This is to certify that WESLEY H. PHILLIPS

has permission to CONSTRUCT A DRIVEWAY ABOUT 350 FEET LONG AVOIDING THE POND AREA - AS STATED ON APPLICATION

Street WILMES DISTRICT ROAD **Zone** VR **MAP** 9 **BLOCK** 10 **LOT** 23

All work done under this permit shall comply with all Federal, State and local laws, ordinances or other restrictions. No work shall commence until all required permits and approvals are on file at the Town Office. No change(s) from the building application shall be made without prior written approval of the Code Enforcement Officer.

Any permit issued shall become invalid if the authorized work is not commenced within six (6) months after issuance of the permit, or if the authorized work is suspended or abandoned for a period of six (6) months after the time of commencing the work under section 112.2 of the B.O.C.A. Code, and work must be substantially completed within two (2) years of the date on which the permit was granted, under section 11.7A of the Kennebunkport Land Use Ordinance.

Alan C Burgess, Asst CEO

Town of Kennebunkport - Code Enforcement Officer

Date Issued May 14, 2001

CERTIFICATE OF USE AND OCCUPANCY REQUIRED

Foundation & Footing		Framing	Occupancy
First Inspection _____ Date	1st - Fireplace _____ Date	Second Inspection _____ Date	Final Inspection _____ Date
Second Inspection _____ Date	2nd - Chimney _____ Date		
_____ C.E.O.	_____ C.E.O. / Fire Adm.	_____ C.E.O.	_____ C.E.O.

DO NOT REMOVE UNTIL WORK IS COMPLETED

Attachment 6

Updated Stormwater Report

207.926.5111
info@terradynconsultants.com
www.terradynconsultants.com

WILDES DISTRICT ROAD

WILDES DISTRICT ROAD, KENNEBUNKPORT, MAINE

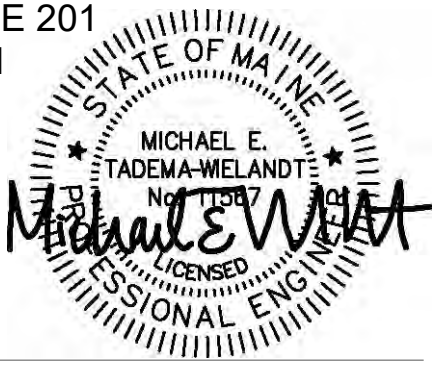
STORMWATER MANAGEMENT REPORT

PREPARED FOR:

BEACHWOOD DEVELOPMENT FUND, LLC
92 YORK STREET
KENNEBUNK, MAINE 04043

PREPARED BY:

TERRADYN CONSULTANTS LLC
565 CONGRESS STREET, SUITE 201
PORTLAND, MAINE 04101



JANUARY 2024

Introduction

The following Stormwater Management Plan has been prepared for the Wildes District Road Subdivision identified as lot 10-23 on Kennebunkport Tax Map 9 to evaluate stormwater runoff and erosion control for the proposed 3-lot subdivision.

Site Calculations

Below is a summary of existing and proposed impervious and developed areas on the project site.

	Area (Acres)
Total Lot Area	**4.14 Ac**
Existing Impervious Area	0.00 Ac
Existing Developed Area	0.00 Ac
Proposed New Impervious (Road Only)	0.32 Ac
Proposed New Developed (Road Only)	0.63 Ac
Proposed New Lot Impervious	0.28 Ac
Proposed New Lot Developed	0.93 Ac
Proposed Open Space	0.63 Ac
Wetland Impacts	0.04 Ac

Existing Conditions

The project site is approximately 4.14 acres in size and is depicted on the Town of Kennebunkport Tax Map 9 as lot 10-23, off Wildes District Road in the Village Residential Zone. The site is undeveloped woodland with an existing earthen driveway and curb cut to access the site. There is a CMP utility corridor running along the eastern edge of the property line. Rocky Pasture Lane, a private way, runs along the western edge of the property and a manmade pond sits on the northern edge where part of the stormwater runoff discharges. Runoff eventually makes its way through a drainage channel running down the middle of the site and discharges south. There is a primitive weir control structure made from cinder blocks that is used to attenuate flow through the drainage channel. The property is located in the Batson River-Frontal Goosefare Bay watershed.

There are approximately 0.48 acres of wetlands in separate pockets throughout the site, including a vernal pool delineated by Longview Partners in 2022 in the southwest corner of the property. The pool was not studied in the official identification period as defined by MDEP (Maine Department of Environmental Protection) and, as such, is conservatively considered as a significant vernal pool. More information on the vernal pool is provided in the preliminary subdivision application.

A review of the medium density soil conditions was conducted. The site is comprised of the following soil types.

Name	HSG
Lyman-Loam	D
Lyman-Rock	D
Waskish Peat	D

Existing Conditions Figures are provided in the preliminary subdivision application.

Proposed Project

The applicant is proposing to develop a three-lot subdivision, including a 590 linear-foot road, stormwater management infrastructure, and underground utilities.

The proposed lots and infrastructure are located in the eastern part of the site, away from wetlands and potentially significant vernal pool. The proposed lots are roughly an acre in size and 0.63 acres will be preserved as open space. Lots will be served by town water and sewer. Electric and telecommunications services will be installed below ground.

Stormwater runoff from the roadway will be collected in a Focal Point stormwater BMP and discharge into the manmade pond after being treated through R-Tanks. Stormwater runoff from the proposed roadway, Lot 1, and Lot 2 will drain to the existing manmade pond off site. The storage in the existing pond will help attenuate peak flows from the roadway and Lot 1 and 2 developed areas so peak discharge rates will be limited to pre-development levels. Lot 3 will discharge to an existing culvert leaving the site to the south.

Construction of the road will result in approximately 974 square feet of wetland impact, an additional 553 square feet of impacts on Lot 3 developed areas and 50 square feet of impacts on Lot 1 developed areas. There will be no impact to the identified potential Vernal Pool.

Applicable Design Standards

The Town of Kennebunkport Subdivision Ordinance Article 415-11.15:
Adequate provision shall be made for the management of the quantity and quality of all stormwater generated within the subdivision, and any drained groundwater through a management system of swales, culverts, under drains, storm drains and best management practices equivalent to those described in the Stormwater Management for Maine: Best Management Practices, published by the Maine Department of Environmental Protection, 1995 (or most recent edition), in conformance with the policies of the Comprehensive Plan and subsequent amendments or revisions.

The project also must meet the Maine DEP Chapter 500 Basic Standard.

Stormwater Quantity Control (Town of Kennebunkport only)

Stormwater Quantity control is required as part of town requirements for this project; the proposed development has been designed to minimize stormwater runoff from the site in excess of the natural pre-development conditions. A hydrologic analysis of pre-development and post-development conditions was conducted based upon the methodology contained in the USDA Soil Conservation Service's Technical Releases No. 20 and 55 (SCS TR-20 and TR-55). For York County, Maine a 24-hour SCS Type III Storm distribution was used for the analysis using the following storm frequencies and rainfall amounts, per Maine DEP Chapter 500:

Storm Event	24-Hour Rainfall
2–Year Storm	3.3 inches
10–Year Storm	4.9 inches
25–Year Storm	6.2 inches

Runoff curve numbers, time of concentration, and travel time data were established based on methods outlined in TR-5.

Individual lot development will be carried out by lot owners, not the applicant. However, the applicant will grade the lots as shown on the project drawings to ensure stormwater is routed as intended and modeled in the post-development stormwater model. The following amount of developed area on each lot was assumed based on lot size and configuration:

Lot Number	Impervious (SF)	Lawn (SF)
Lot 1	4,000	10,000
Lot 2	4,000	14,369
Lot 3	4,000	16,000

A minimum time of concentration of 5 minutes and a maximum sheet flow distance of 150 linear feet was used in the models.

Stormwater Quality Control (Town of Kennebunkport only)

Stormwater Quality Control is required for this project as part of town requirements. Per Maine DEP chapter 500, no less than 75% impervious of the linear portion of a project needs to be treated. The proposed road is superelevated and curbed on the easterly side of the road to direct stormwater to a Rain Guardian and Focal Point stormwater BMP to properly treat the road impervious area. Stormwater is then directed into R-tanks to control runoff which then outlets into the man-made pond. The table below outlines the amount of roadway impervious that is treated by the Focal Point compared to the total roadway impervious.

	Total (SF)	Treated (SF)	Percent Treated (%)
Roadway Impervious	14,020	11,253	80%

Pre-Development Conditions

The pre-development HydroCAD model includes six (6) subcatchments and five (5) study points. Stormwater runoff from the site flows partially through the large man-made pond and discharges through a drainage channel, which leads off site. The rest of the stormwater runoff discharges through a series of wetlands and channels that flow in different directions offsite.

Study Point SP1 – Located at the southern site boundary, stormwater runoff flows south to a 15” culvert across an offsite driveway.

Study Point SP2 – Located at the southeast site boundary, runoff flows through a series of channels and wetlands to a 15” culvert across an offsite driveway separate from Study Point 1. Overflow from the pond also discharges to Study Point 2 through a defined drainage channel, which collects stormwater runoff from the northern site boundary.

Study Point SP3 – Located at the western site boundary, adjacent to Rocky Pasture Lane. Runoff flows offsite across the road.

Study Point SP4 – Similar to SP3 Located, SP4 is located at the western site boundary, adjacent to Rocky Pasture Lane. Runoff flows across the road to an offsite field.

Study Point SP5 – Located at the northwestern site boundary, at the corner of Rocky Pasture Lane and Wildes District Road. Runoff flows to Rocky Hill Pasture Lane and then eventually Wildes District Road.

A Pre-Development Watershed Map, showing sub-watershed boundaries, time of concentration flow paths, and Study Points is provided in Appendix 1. The Pre-development HydroCAD model is attached in Appendix 3.

Existing condition peak rates of runoff at the Study Points are as follows:

Pre-Development Peak Rates of Runoff (cfs)			
Study Point	**2-Year**	**10-Year**	**25-Year**
SP1	1.35	2.58	3.42
SP2	1.54	3.13	4.52
SP3	0.55	1.09	1.56
SP4	0.83	1.66	2.37
SP5	2.27	3.94	5.31

The pre-development peak rates of runoff are a baseline used for comparison to the post-development condition.

Post-Development Conditions

The proposed post-development HydroCAD model includes eleven (11) subcatchments and five (5) study points. The study points remain the same from the pre-development model. A Post-development Watershed Map showing sub-watershed boundaries, time of concentration flow paths, and Study Points is provided in Appendix 2. The Post-development HydroCAD model is attached in Appendix 4.

Post-development peak rates of runoff at the Study Points are as follows:

Post-Development Peak Rates of Runoff (cfs)			
Study Points	**2-Year**	**10-Year**	**25-Year**
SP1	1.29	2.27	2.98
SP2	1.54	3.13	4.51
SP3	0.55	1.09	1.56
SP4	0.83	1.66	2.37
SP5	2.27	3.94	5.31

Peak Flow Analysis

The results of the pre-development and post-development models were compared at the defined Study Points described above. The direct comparison of the pre-development and post-development conditions at the Study Points are as follows:

Peak Runoff Flow Rates Comparison						
Study Points	**2-Year**		**10-Year**		**25-Year**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
SP1	1.35	1.29	2.58	2.27	3.42	2.98
SP2	1.54	1.54	3.13	3.13	4.52	4.51
SP3	0.55	0.55	1.09	1.09	1.56	1.56
SP4	0.83	0.83	1.66	1.66	2.37	2.37
SP5	2.27	2.27	3.94	3.94	5.31	5.31

The hydrologic models predict that peak rates of runoff at all study points will remain the same or decrease in the 2, 10 & 25-year design storm events. The reduction in peak flow rates is due

to the large pond collecting and attenuating stormwater from Lot 1, Lot 2, and the proposed roadway.

Erosion and Sedimentation Control

The project was designed to meet the Maine DEP Chapter 500 Basic Standard, related to erosion and sedimentation control, inspection and maintenance of stormwater management facilities and housekeeping standards. A site-specific erosion and sedimentation control plan was developed and is located on the project drawings for ease of reference during construction.

Summary

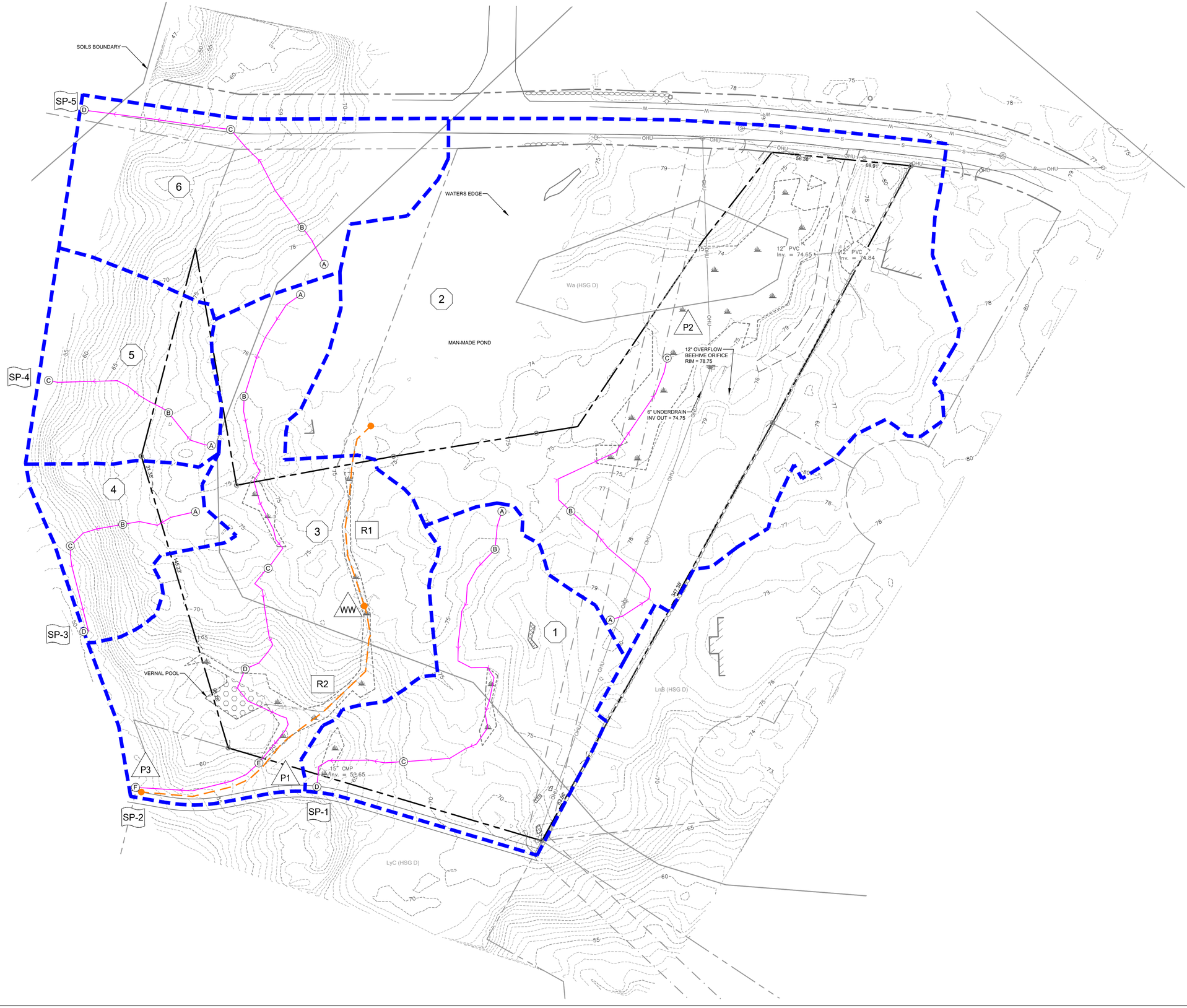
The proposed three-lot subdivision includes construction of a 590-foot-long roadway. Runoff from the road will be collected in a storm drain system and will be discharged in an existing man-made pond. Stormwater runoff from Lot 1 and Lot 2 will also discharge into the onsite pond to help attenuate flows. The proposed lots will be graded by the applicant and developer to ensure runoff is routed in accordance with the hydraulic model. Pre and post-development hydrologic models were developed to determine the effect of the proposed development on peak runoff rates at the site boundary. Based upon the results of this evaluation, the proposed project meets the applicable performance standards and is not expected to cause flooding, erosion, or other significant adverse effects downstream of the site.

Appendices

1 – Watershed Maps
2 – Pre-Development HydroCAD Model
3 – Post-Development HydroCAD Model
4 – Stormwater Inspection & Maintenance Manual
5 – Stormwater BMP Calculations

APPENDIX 1

WATERSHED MAPS



WATERSHED LEGEND

PRE DEVELOPMENT

- WATERSHED BOUNDARY
- Tc FLOWPATH
- REACH PATH
- SOILS BOUNDARY
- 000 — SUBCATCHMENT
- 000 — POND
- 000 — REACH
- 000 — STUDY POINT
- A — Tc LABEL

NOTES:

- SOILS WITHIN THE WATERSHED AREAS ARE PRIMARILY MAPPED AS LYMAN-ROCK OUTCROP COMPLEX (HSG D), LYMAN LOAM (HSG D) AND WASKISH PEAT (HSG D) BY THE NRCS WEB SOIL SURVEY IN JUNE 2023.

PREDEVELOPMENT WATERSHED AREAS

Watershed	Soil Type	Area (sqft)
1	D	49,893
2	D	189,237
3	D	80,137
4	D	18,330
5	D	26,955
6	D	46,555
Total Watershed Area =		411,107

PREDEVELOPMENT TIME OF CONCENTRATION

Watershed 1		
Segment ID	Length	Slope
A-B	35	0.057
B-C	285	0.021
C-D	100	0.060

Watershed 2		
Segment ID	Length	Slope
A-B	150	0.027
B-C	189	0.005

Watershed 3		
Segment ID	Length	Slope
A-B	110	0.036
B-C	170	0.012
C-D	115	0.104
D-E	65	0.008
E-F	60	0.150
F-G	50	0.010

Watershed 4		
Segment ID	Length	Slope
A-B	70	0.086
B-C	55	0.291
C-D	85	0.024

Watershed 5		
Segment ID	Length	Slope
A-B	55	0.055
B-C	120	0.175

Watershed 6		
Segment ID	Length	Slope
A-B	40	0.075
B-C	110	0.127
C-D	100	0.090

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)
1 INCH = 40 FT.

STATE OF MAINE
MICHAEL E. TADEMA-WIELANDT
No. 13201
REGISTERED PROFESSIONAL ENGINEER

DATE: 11/27/2023

NO.	DATE	REVISIONS
3	01/30/2024	ACORN COMMENT RESPONSE UPDATES
2	11/27/2023	ADDED BUILDING ENVELOPES ON PROPOSED LOTS
1	10/2/2023	SUBMITTED FOR PRELIMINARY SUBDIVISION APPROVAL

ADDRESS: 41 CAMPUS DRIVE, SUITE 301 NEW GLOUCESTER, ME 04260
PHONE (207) 926-5111
WEB SITE: www.terradynconsultants.com
TERRADYN CONSULTANTS, LLC
Civil Engineering | Land Surveying | Geomatics
Stormwater Design | Land Planning | Environmental Permitting

PERMIT DRAWING
NOT FOR CONSTRUCTION

PROJECT: WILDES DISTRICT ROAD SUBDIVISION
WILDES DISTRICT ROAD, KENNEBUNKPORT, MAINE

SHEET TITLE: PRE-DEVELOPMENT WATERSHED MAP

CLIENT: BEACHWOOD DEVELOPMENT FUND, LP
88 YORK STREET #3
KENNEBUNK, MAINE 04043

DATE: 10/2/2023
SCALE: 1" = 40'
JOB NO: 23-003
SHEET: WS-1

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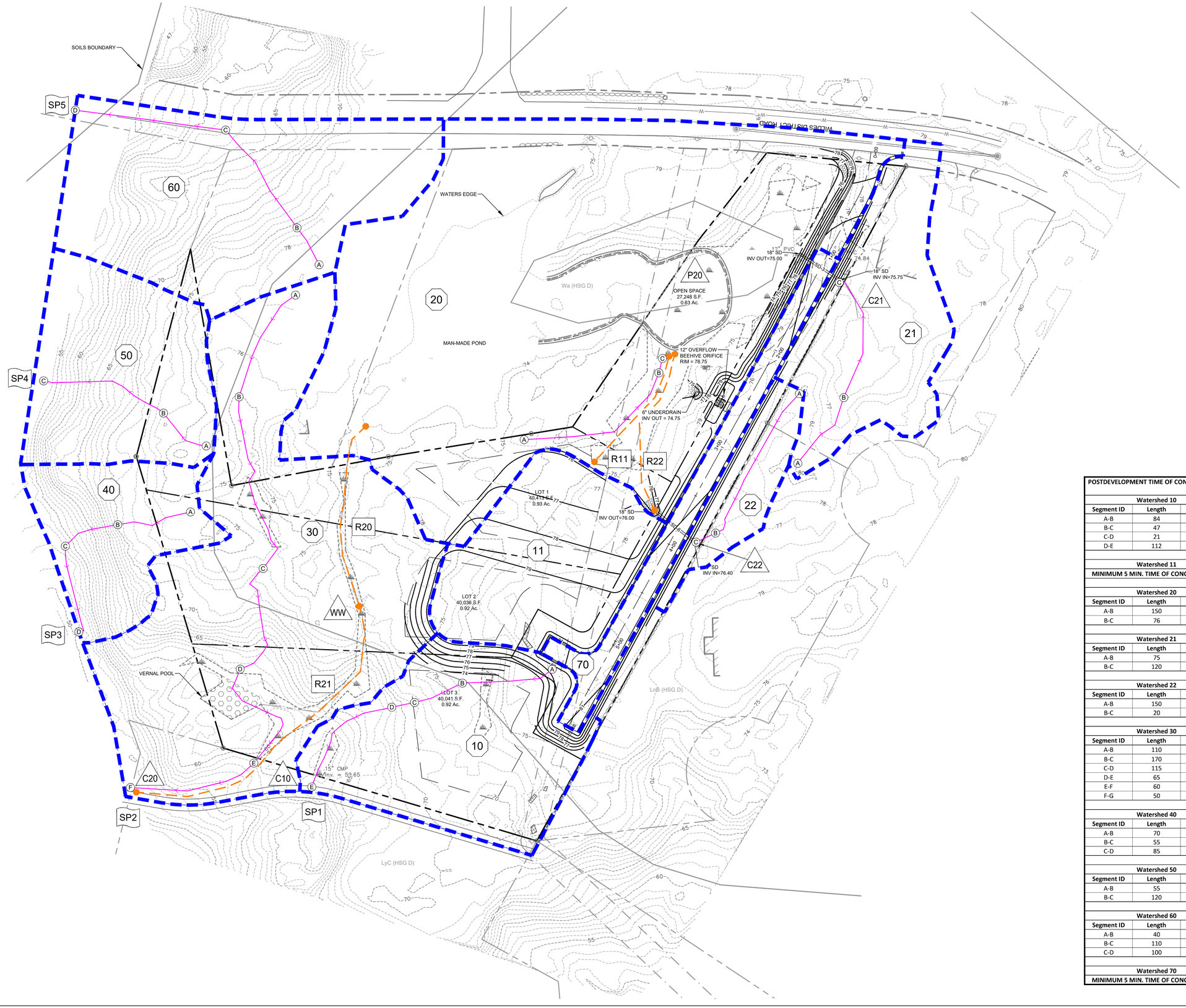

WATERSHED LEGEND

POST DEVELOPMENT

- WATERSHED BOUNDARY
- Tc FLOWPATH
- REACH PATH
- SOILS BOUNDARY
- 000 — SUBCATCHMENT
- 000 — POND
- 000 — REACH
- 000 — STUDY POINT
- A — Tc LABEL

NOTES:

- SOILS WITHIN THE WATERSHED AREAS ARE PRIMARILY MAPPED AS LYMAN-ROCK OUTCROP COMPLEX (HSG D), LYMAN LOAM (HSG D) AND WASKISH PEAT (HSG D) BY THE NRCS WEB SOIL SURVEY IN JUNE 2023.

POSTDEVELOPMENT TIME OF CONCENTRATION

Watershed 10		
Segment ID	Length	Slope
A-B	84	0.033
B-C	47	0.100
C-D	21	0.330
D-E	112	0.062
Watershed 11		
MINIMUM 5 MIN. TIME OF CONCENTRATION		
Watershed 20		
Segment ID	Length	Slope
A-B	150	0.013
B-C	76	0.005
Watershed 21		
Segment ID	Length	Slope
A-B	75	0.053
B-C	120	0.004
Watershed 22		
Segment ID	Length	Slope
A-B	150	0.020
B-C	20	0.025
Watershed 30		
Segment ID	Length	Slope
A-B	110	0.036
B-C	170	0.012
C-D	115	0.104
D-E	65	0.008
E-F	60	0.150
F-G	50	0.010
Watershed 40		
Segment ID	Length	Slope
A-B	70	0.086
B-C	55	0.291
C-D	85	0.024
Watershed 50		
Segment ID	Length	Slope
A-B	55	0.055
B-C	120	0.175
Watershed 60		
Segment ID	Length	Slope
A-B	40	0.075
B-C	110	0.127
C-D	100	0.090
Watershed 70		
MINIMUM 5 MIN. TIME OF CONCENTRATION		

POSTDEVELOPMENT WATERSHED AREAS

Watershed	Soil Type	Area (sqft)
10	D	33,665
11	D	25,536
20	D	133,166
21	D	26,615
22	D	9,025
30	D	80,008
40	D	18,330
50	D	26,955
60	D	46,555
70	D	11,252
Total Watershed Area =		**411,107**

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)
1 INCH = 40 FT.

STATE OF MAINE
MICHAEL E. TADEMA-WIELANDT
No. 12100
LICENSED PROFESSIONAL ENGINEER

DATE: 11/27/2023

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PERMIT DRAWING
NOT FOR CONSTRUCTION

PROJECT: WILDES DISTRICT ROAD SUBDIVISION
WILDES DISTRICT ROAD, KENNEBUNKPORT, MAINE

SHEET TITLE: POST-DEVELOPMENT WATERSHED MAP

CLIENT: BEACHWOOD DEVELOPMENT FUND, LP
98 YORK STREET #3
KENNEBUNK, MAINE 04043

DATE: 10/2/2023
SCALE: 1" = 40'
JOB NO: 23-003
SHEET: WS-2

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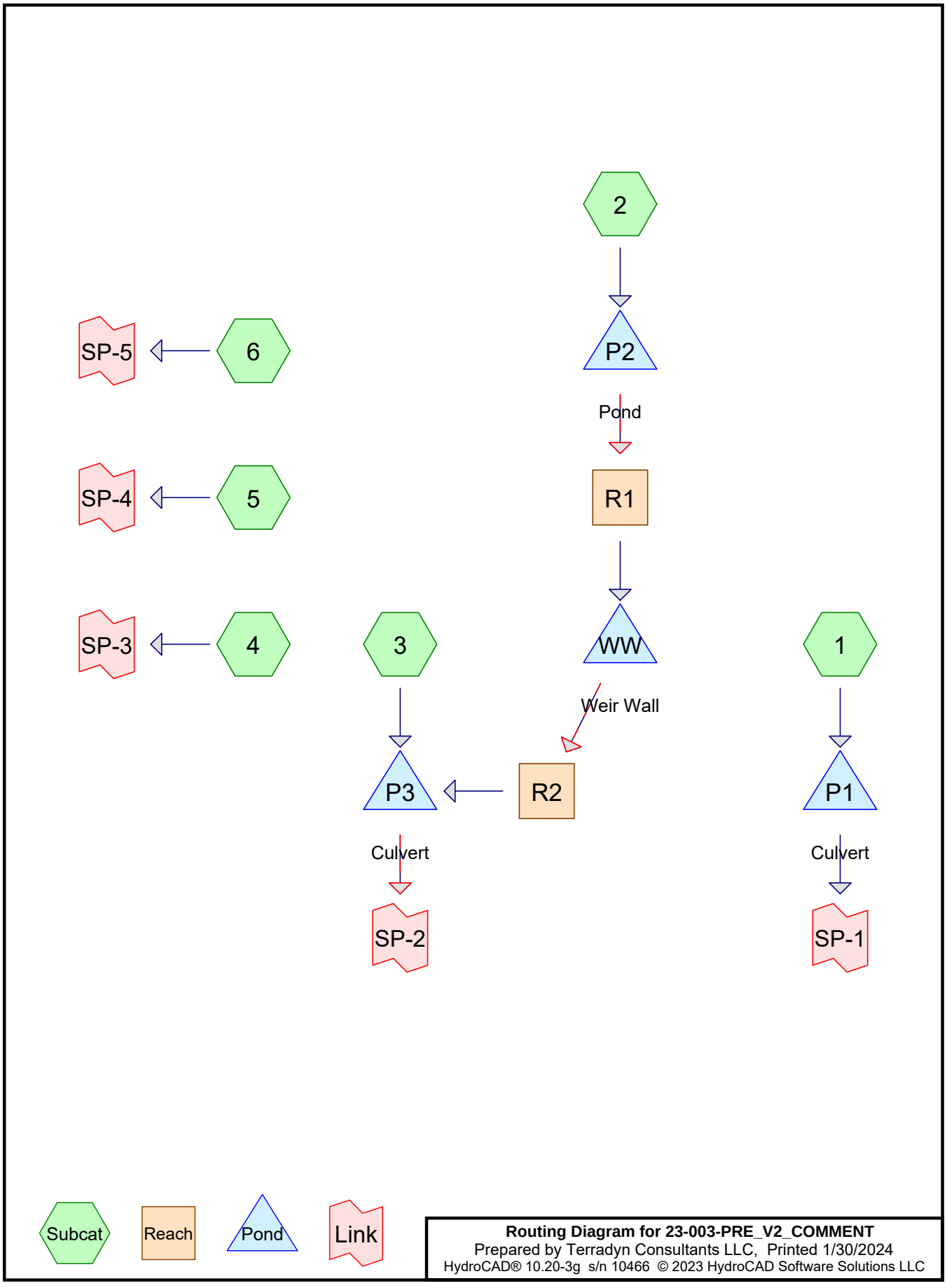
APPENDIX 2

PRE DEVELOPMENT HYDROCAD MODEL



Routing Diagram for 23-003-PRE_V2_COMMENT
Prepared by Terradyn Consultants LLC, Printed 1/30/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.528	80	>75% Grass cover, Good, HSG D (2, 6)
0.284	98	Impervious (1, 2, 4, 5)
0.036	98	Paved parking, HSG D (3)
0.922	98	Water Surface, HSG D (2)
0.398	98	Wildes District Road (6)
7.269	77	Woods, Good, HSG D (1, 2, 3, 4, 5, 6)

Summary for Subcatchment 1:

Runoff = 1.37 cfs @ 12.20 hrs, Volume= 0.129 af, Depth= 1.35"
Routed to Pond P1 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	1,240	98	Impervious
	48,653	77	Woods, Good, HSG D
	49,893	78	Weighted Average
	48,653		97.51% Pervious Area
	1,240		2.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	35	0.0570	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
6.6	285	0.0210	0.72		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.4	100	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.0	420	Total			

Summary for Subcatchment 2:

Runoff = 4.52 cfs @ 12.50 hrs, Volume= 0.612 af, Depth= 1.69"
Routed to Pond P2 : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	9,290	98	Impervious
	6,500	80	>75% Grass cover, Good, HSG D
	40,175	98	Water Surface, HSG D
	133,272	77	Woods, Good, HSG D
	189,237	83	Weighted Average
	139,772		73.86% Pervious Area
	49,465		26.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0267	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
8.9	189	0.0050	0.35		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
35.0	339	Total			

Summary for Subcatchment 3:

Runoff = 1.54 cfs @ 12.43 hrs, Volume= 0.197 af, Depth= 1.28"
Routed to Pond P3 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
1,560	98	Paved parking, HSG D
78,577	77	Woods, Good, HSG D
80,137	77	Weighted Average
78,577		98.05% Pervious Area
1,560		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	110	0.0360	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
5.2	170	0.0120	0.55		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.2	115	0.1040	1.61		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.4	65	0.0080	0.45		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.5	60	0.1500	1.94		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
1.7	50	0.0100	0.50		**Shallow Concentrated Flow, F-G** Woodland Kv= 5.0 fps
29.0	570	Total			

Summary for Subcatchment 4:

Runoff = 0.55 cfs @ 12.16 hrs, Volume= 0.047 af, Depth= 1.35"
Routed to Link SP-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
	17,475	77	Woods, Good, HSG D
*	855	98	Impervious
	18,330	78	Weighted Average
	17,475		95.34% Pervious Area
	855		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	70	0.0860	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	55	0.2910	2.70		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.8	85	0.0240	0.77		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.0	210	Total			

Summary for Subcatchment 5:

Runoff = 0.83 cfs @ 12.15 hrs, Volume= 0.069 af, Depth= 1.35"
Routed to Link SP-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
	25,970	77	Woods, Good, HSG D
*	985	98	Impervious
	26,955	78	Weighted Average
	25,970		96.35% Pervious Area
	985		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	55	0.0550	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	120	0.1750	2.09		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
9.7	175	Total			

Summary for Subcatchment 6:

Runoff = 2.27 cfs @ 12.11 hrs, Volume= 0.171 af, Depth= 1.92"
Routed to Link SP-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	17,350	98	Wildes District Road
	16,500	80	>75% Grass cover, Good, HSG D
	12,705	77	Woods, Good, HSG D
	46,555	86	Weighted Average
	29,205		62.73% Pervious Area
	17,350		37.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	40	0.0750	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	110	0.1270	1.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	100	0.0900	6.09		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
7.3	250	Total			

Summary for Reach R1:

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Pond WW : Weir Wall

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 7.51 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 175.0' Slope= 0.0086 '/'
Inlet Invert= 74.50', Outlet Invert= 73.00'

Summary for Reach R2:

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Pond P3 : Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 22.04 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 305.0' Slope= 0.0738 '/'
Inlet Invert= 73.00', Outlet Invert= 50.50'

Summary for Pond P1: Culvert

Inflow Area = 1.145 ac, 2.49% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 1.37 cfs @ 12.20 hrs, Volume= 0.129 af
Outflow = 1.35 cfs @ 12.22 hrs, Volume= 0.129 af, Atten= 1%, Lag= 1.1 min
Primary = 1.35 cfs @ 12.22 hrs, Volume= 0.129 af
Routed to Link SP-1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 60.36' @ 12.22 hrs Surf.Area= 210 sf Storage= 75 cf

Plug-Flow detention time= 0.9 min calculated for 0.128 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (855.8 - 854.9)

Volume	Invert	Avail.Storage	Storage Description
#1	59.65'	1,009 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.65	10	0	0
60.00	100	19	19
61.00	405	253	272
62.00	1,070	738	1,009

Device	Routing	Invert	Outlet Devices
#1	Primary	59.65'	**12.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.00' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.33 cfs @ 12.22 hrs HW=60.35' (Free Discharge)
1=Culvert (Inlet Controls 1.33 cfs @ 2.26 fps)

Summary for Pond P2: Pond

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth = 1.69" for 2-Yr event
Inflow = 4.52 cfs @ 12.50 hrs, Volume= 0.612 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
Routed to Reach R1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.21' @ 26.05 hrs Surf.Area= 44,862 sf Storage= 26,676 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	73.50'	68,631 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.50	30,000	0	0
74.00	40,175	17,544	17,544
75.00	62,000	51,088	68,631

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Channel/Reach** using Reach R1:

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.50' (Free Discharge)
└**1=Channel/Reach** (Controls 0.00 cfs)

Summary for Pond P3: Culvert

Inflow Area = 6.184 ac, 18.94% Impervious, Inflow Depth = 0.38" for 2-Yr event
Inflow = 1.54 cfs @ 12.43 hrs, Volume= 0.197 af
Outflow = 1.54 cfs @ 12.43 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min
Primary = 1.54 cfs @ 12.43 hrs, Volume= 0.197 af
Routed to Link SP-2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP-2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 48.60' @ 12.43 hrs Surf.Area= 8 sf Storage= 4 cf

Plug-Flow detention time= 0.1 min calculated for 0.197 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (872.1 - 872.0)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	515 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.00	5	0	0
49.00	10	8	8
50.00	25	18	25
51.00	955	490	515

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Secondary	50.95'	**10.0' long x 65.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.54 cfs @ 12.43 hrs HW=48.60' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.54 cfs @ 2.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond WW: Weir Wall

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 73.00' @ 0.00 hrs Surf.Area= 100 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	4,913 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	100	0	0
74.00	2,760	1,430	1,430
75.00	4,205	3,483	4,913

Device	Routing	Invert	Outlet Devices
#1	Secondary	74.00'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

#2	Primary	73.00'	**16.0" x 1.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP-1:

Inflow Area = 1.145 ac, 2.49% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 1.35 cfs @ 12.22 hrs, Volume= 0.129 af
Primary = 1.35 cfs @ 12.22 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 6.184 ac, 18.94% Impervious, Inflow Depth = 0.38" for 2-Yr event
Inflow = 1.54 cfs @ 12.43 hrs, Volume= 0.197 af
Primary = 1.54 cfs @ 12.43 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 0.421 ac, 4.66% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 0.55 cfs @ 12.16 hrs, Volume= 0.047 af
Primary = 0.55 cfs @ 12.16 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 0.619 ac, 3.65% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 0.83 cfs @ 12.15 hrs, Volume= 0.069 af
Primary = 0.83 cfs @ 12.15 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-5:

Inflow Area = 1.069 ac, 37.27% Impervious, Inflow Depth = 1.92" for 2-Yr event
Inflow = 2.27 cfs @ 12.11 hrs, Volume= 0.171 af
Primary = 2.27 cfs @ 12.11 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1:

Runoff = 2.72 cfs @ 12.20 hrs, Volume= 0.251 af, Depth= 2.63"
Routed to Pond P1 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	1,240	98	Impervious
	48,653	77	Woods, Good, HSG D
	49,893	78	Weighted Average
	48,653		97.51% Pervious Area
	1,240		2.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	35	0.0570	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
6.6	285	0.0210	0.72		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.4	100	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.0	420	Total			

Summary for Subcatchment 2:

Runoff = 8.24 cfs @ 12.48 hrs, Volume= 1.116 af, Depth= 3.08"
Routed to Pond P2 : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	9,290	98	Impervious
	6,500	80	>75% Grass cover, Good, HSG D
	40,175	98	Water Surface, HSG D
	133,272	77	Woods, Good, HSG D
	189,237	83	Weighted Average
	139,772		73.86% Pervious Area
	49,465		26.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0267	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
8.9	189	0.0050	0.35		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
35.0	339	Total			

Summary for Subcatchment 3:

Runoff = 3.14 cfs @ 12.41 hrs, Volume= 0.389 af, Depth= 2.54"
Routed to Pond P3 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

Area (sf)	CN	Description
1,560	98	Paved parking, HSG D
78,577	77	Woods, Good, HSG D
80,137	77	Weighted Average
78,577		98.05% Pervious Area
1,560		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	110	0.0360	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
5.2	170	0.0120	0.55		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.2	115	0.1040	1.61		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.4	65	0.0080	0.45		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.5	60	0.1500	1.94		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
1.7	50	0.0100	0.50		**Shallow Concentrated Flow, F-G** Woodland Kv= 5.0 fps
29.0	570	Total			

Summary for Subcatchment 4:

Runoff = 1.09 cfs @ 12.16 hrs, Volume= 0.092 af, Depth= 2.63"
Routed to Link SP-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
	17,475	77	Woods, Good, HSG D
*	855	98	Impervious
	18,330	78	Weighted Average
	17,475		95.34% Pervious Area
	855		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	70	0.0860	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	55	0.2910	2.70		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.8	85	0.0240	0.77		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.0	210	Total			

Summary for Subcatchment 5:

Runoff = 1.66 cfs @ 12.14 hrs, Volume= 0.135 af, Depth= 2.63"
Routed to Link SP-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
	25,970	77	Woods, Good, HSG D
*	985	98	Impervious
	26,955	78	Weighted Average
	25,970		96.35% Pervious Area
	985		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	55	0.0550	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	120	0.1750	2.09		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
9.7	175	Total			

Summary for Subcatchment 6:

Runoff = 3.94 cfs @ 12.10 hrs, Volume= 0.300 af, Depth= 3.37"
Routed to Link SP-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	17,350	98	Wildes District Road
	16,500	80	>75% Grass cover, Good, HSG D
	12,705	77	Woods, Good, HSG D
	46,555	86	Weighted Average
	29,205		62.73% Pervious Area
	17,350		37.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	40	0.0750	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	110	0.1270	1.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	100	0.0900	6.09		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
7.3	250	Total			

Summary for Reach R1:

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth > 0.45" for 10-yr event
Inflow = 0.15 cfs @ 24.26 hrs, Volume= 0.162 af
Outflow = 0.15 cfs @ 24.36 hrs, Volume= 0.162 af, Atten= 0%, Lag= 6.2 min
Routed to Pond WW : Weir Wall

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.71 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 6.2 min

Peak Storage= 38 cf @ 24.29 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 2.21'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 7.51 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 175.0' Slope= 0.0086 '/'
Inlet Invert= 74.50', Outlet Invert= 73.00'

Summary for Reach R2:

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth > 0.45" for 10-yr event
Inflow = 0.15 cfs @ 24.44 hrs, Volume= 0.162 af
Outflow = 0.15 cfs @ 24.53 hrs, Volume= 0.162 af, Atten= 0%, Lag= 5.6 min
Routed to Pond P3 : Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 5.5 min

Peak Storage= 34 cf @ 24.48 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 2.11'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 22.04 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 305.0' Slope= 0.0738 '/'
Inlet Invert= 73.00', Outlet Invert= 50.50'

Summary for Pond P1: Culvert

Inflow Area = 1.145 ac, 2.49% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 2.72 cfs @ 12.20 hrs, Volume= 0.251 af
Outflow = 2.58 cfs @ 12.24 hrs, Volume= 0.251 af, Atten= 5%, Lag= 2.8 min
Primary = 2.58 cfs @ 12.24 hrs, Volume= 0.251 af
Routed to Link SP-1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 60.90' @ 12.24 hrs Surf.Area= 374 sf Storage= 232 cf

Plug-Flow detention time= 1.0 min calculated for 0.250 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (836.4 - 835.4)

Volume	Invert	Avail.Storage	Storage Description
#1	59.65'	1,009 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.65	10	0	0
60.00	100	19	19
61.00	405	253	272
62.00	1,070	738	1,009

Device	Routing	Invert	Outlet Devices
#1	Primary	59.65'	**12.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.00' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.57 cfs @ 12.24 hrs HW=60.89' (Free Discharge)
1=Culvert (Inlet Controls 2.57 cfs @ 3.28 fps)

Summary for Pond P2: Pond

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth = 3.08" for 10-yr event
Inflow = 8.24 cfs @ 12.48 hrs, Volume= 1.116 af
Outflow = 0.15 cfs @ 24.26 hrs, Volume= 0.162 af, Atten= 98%, Lag= 706.5 min
Primary = 0.15 cfs @ 24.26 hrs, Volume= 0.162 af
Routed to Reach R1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.60' @ 24.26 hrs Surf.Area= 53,331 sf Storage= 45,727 cf

Plug-Flow detention time= 990.3 min calculated for 0.162 af (15% of inflow)
Center-of-Mass det. time= 818.2 min (1,659.3 - 841.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	68,631 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.50	30,000	0	0
74.00	40,175	17,544	17,544
75.00	62,000	51,088	68,631

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Channel/Reach** using Reach R1:

Primary OutFlow Max=0.15 cfs @ 24.26 hrs HW=74.60' (Free Discharge)
↑└**1=Channel/Reach** (Channel Controls 0.15 cfs @ 0.71 fps)

Summary for Pond P3: Culvert

Inflow Area = 6.184 ac, 18.94% Impervious, Inflow Depth > 1.07" for 10-yr event
Inflow = 3.14 cfs @ 12.41 hrs, Volume= 0.551 af
Outflow = 3.13 cfs @ 12.41 hrs, Volume= 0.551 af, Atten= 0%, Lag= 0.0 min
Primary = 3.13 cfs @ 12.41 hrs, Volume= 0.551 af
Routed to Link SP-2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP-2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 48.91' @ 12.41 hrs Surf.Area= 10 sf Storage= 7 cf

Plug-Flow detention time= 0.1 min calculated for 0.550 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,093.2 - 1,093.2)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	515 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.00	5	0	0
49.00	10	8	8
50.00	25	18	25
51.00	955	490	515

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Secondary	50.95'	**10.0' long x 65.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.13 cfs @ 12.41 hrs HW=48.91' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.13 cfs @ 3.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond WW: Weir Wall

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth > 0.45" for 10-yr event
Inflow = 0.15 cfs @ 24.36 hrs, Volume= 0.162 af
Outflow = 0.15 cfs @ 24.44 hrs, Volume= 0.162 af, Atten= 0%, Lag= 4.8 min
Primary = 0.15 cfs @ 24.44 hrs, Volume= 0.162 af
Routed to Reach R2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 73.08' @ 24.44 hrs Surf.Area= 322 sf Storage= 18 cf

Plug-Flow detention time= 1.5 min calculated for 0.162 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (1,668.0 - 1,666.7)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	4,913 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	100	0	0
74.00	2,760	1,430	1,430
75.00	4,205	3,483	4,913

Device	Routing	Invert	Outlet Devices
#1	Secondary	74.00'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

#2	Primary	73.00'	**16.0" x 1.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.15 cfs @ 24.44 hrs HW=73.08' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP-1:

Inflow Area = 1.145 ac, 2.49% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 2.58 cfs @ 12.24 hrs, Volume= 0.251 af
Primary = 2.58 cfs @ 12.24 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 6.184 ac, 18.94% Impervious, Inflow Depth > 1.07" for 10-yr event
Inflow = 3.13 cfs @ 12.41 hrs, Volume= 0.551 af
Primary = 3.13 cfs @ 12.41 hrs, Volume= 0.551 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 0.421 ac, 4.66% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 1.09 cfs @ 12.16 hrs, Volume= 0.092 af
Primary = 1.09 cfs @ 12.16 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 0.619 ac, 3.65% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 1.66 cfs @ 12.14 hrs, Volume= 0.135 af
Primary = 1.66 cfs @ 12.14 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-5:

Inflow Area = 1.069 ac, 37.27% Impervious, Inflow Depth = 3.37" for 10-yr event
Inflow = 3.94 cfs @ 12.10 hrs, Volume= 0.300 af
Primary = 3.94 cfs @ 12.10 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1:

Runoff = 3.89 cfs @ 12.19 hrs, Volume= 0.359 af, Depth= 3.76"
Routed to Pond P1 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	1,240	98	Impervious
	48,653	77	Woods, Good, HSG D
	49,893	78	Weighted Average
	48,653		97.51% Pervious Area
	1,240		2.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	35	0.0570	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
6.6	285	0.0210	0.72		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.4	100	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
14.0	420	Total			

Summary for Subcatchment 2:

Runoff = 11.34 cfs @ 12.48 hrs, Volume= 1.549 af, Depth= 4.28"
Routed to Pond P2 : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	9,290	98	Impervious
	6,500	80	>75% Grass cover, Good, HSG D
	40,175	98	Water Surface, HSG D
	133,272	77	Woods, Good, HSG D
	189,237	83	Weighted Average
	139,772		73.86% Pervious Area
	49,465		26.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0267	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
8.9	189	0.0050	0.35		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
35.0	339	Total			

Summary for Subcatchment 3:

Runoff = 4.52 cfs @ 12.40 hrs, Volume= 0.560 af, Depth= 3.65"
Routed to Pond P3 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

Area (sf)	CN	Description
1,560	98	Paved parking, HSG D
78,577	77	Woods, Good, HSG D
80,137	77	Weighted Average
78,577		98.05% Pervious Area
1,560		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	110	0.0360	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
5.2	170	0.0120	0.55		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.2	115	0.1040	1.61		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.4	65	0.0080	0.45		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.5	60	0.1500	1.94		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
1.7	50	0.0100	0.50		**Shallow Concentrated Flow, F-G** Woodland Kv= 5.0 fps
29.0	570	Total			

Summary for Subcatchment 4:

Runoff = 1.56 cfs @ 12.15 hrs, Volume= 0.132 af, Depth= 3.76"
Routed to Link SP-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
	17,475	77	Woods, Good, HSG D
*	855	98	Impervious
	18,330	78	Weighted Average
	17,475		95.34% Pervious Area
	855		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	70	0.0860	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	55	0.2910	2.70		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.8	85	0.0240	0.77		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.0	210	Total			

Summary for Subcatchment 5:

Runoff = 2.37 cfs @ 12.14 hrs, Volume= 0.194 af, Depth= 3.76"
Routed to Link SP-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
	25,970	77	Woods, Good, HSG D
*	985	98	Impervious
	26,955	78	Weighted Average
	25,970		96.35% Pervious Area
	985		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	55	0.0550	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	120	0.1750	2.09		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
9.7	175	Total			

Summary for Subcatchment 6:

Runoff = 5.31 cfs @ 12.10 hrs, Volume= 0.410 af, Depth= 4.60"
Routed to Link SP-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	17,350	98	Wildes District Road
	16,500	80	>75% Grass cover, Good, HSG D
	12,705	77	Woods, Good, HSG D
	46,555	86	Weighted Average
	29,205		62.73% Pervious Area
	17,350		37.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	40	0.0750	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	110	0.1270	1.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	100	0.0900	6.09		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
7.3	250	Total			

Summary for Reach R1:

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth > 1.63" for 25-yr event
Inflow = 0.59 cfs @ 17.06 hrs, Volume= 0.589 af
Outflow = 0.59 cfs @ 17.13 hrs, Volume= 0.588 af, Atten= 0%, Lag= 4.3 min
Routed to Pond WW : Weir Wall

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.15 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 4.2 min

Peak Storage= 89 cf @ 17.09 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 2.46'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 7.51 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 175.0' Slope= 0.0086 '/'
Inlet Invert= 74.50', Outlet Invert= 73.00'

Summary for Reach R2:

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth > 1.62" for 25-yr event
Inflow = 0.53 cfs @ 19.14 hrs, Volume= 0.588 af
Outflow = 0.53 cfs @ 19.20 hrs, Volume= 0.588 af, Atten= 0%, Lag= 3.7 min
Routed to Pond P3 : Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.22 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.37 fps, Avg. Travel Time= 3.7 min

Peak Storage= 73 cf @ 19.16 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 2.23'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 22.04 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 305.0' Slope= 0.0738 '/'
Inlet Invert= 73.00', Outlet Invert= 50.50'

Summary for Pond P1: Culvert

Inflow Area = 1.145 ac, 2.49% Impervious, Inflow Depth = 3.76" for 25-yr event
Inflow = 3.89 cfs @ 12.19 hrs, Volume= 0.359 af
Outflow = 3.42 cfs @ 12.27 hrs, Volume= 0.359 af, Atten= 12%, Lag= 4.6 min
Primary = 3.42 cfs @ 12.27 hrs, Volume= 0.359 af
Routed to Link SP-1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.46' @ 12.27 hrs Surf.Area= 714 sf Storage= 532 cf

Plug-Flow detention time= 1.3 min calculated for 0.359 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (826.4 - 825.2)

Volume	Invert	Avail.Storage	Storage Description
#1	59.65'	1,009 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.65	10	0	0
60.00	100	19	19
61.00	405	253	272
62.00	1,070	738	1,009

Device	Routing	Invert	Outlet Devices
#1	Primary	59.65'	**12.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.00' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.40 cfs @ 12.27 hrs HW=61.45' (Free Discharge)
1=Culvert (Inlet Controls 3.40 cfs @ 4.33 fps)

Summary for Pond P2: Pond

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth = 4.28" for 25-yr event
Inflow = 11.34 cfs @ 12.48 hrs, Volume= 1.549 af
Outflow = 0.59 cfs @ 17.06 hrs, Volume= 0.589 af, Atten= 95%, Lag= 275.0 min
Primary = 0.59 cfs @ 17.06 hrs, Volume= 0.589 af
Routed to Reach R1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.73' @ 17.06 hrs Surf.Area= 56,082 sf Storage= 52,623 cf

Plug-Flow detention time= 640.2 min calculated for 0.589 af (38% of inflow)
Center-of-Mass det. time= 512.2 min (1,344.1 - 831.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	68,631 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.50	30,000	0	0
74.00	40,175	17,544	17,544
75.00	62,000	51,088	68,631

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Channel/Reach** using Reach R1:

Primary OutFlow Max=0.59 cfs @ 17.06 hrs HW=74.73' (Free Discharge)
↑└**1=Channel/Reach** (Channel Controls 0.59 cfs @ 1.15 fps)

Summary for Pond P3: Culvert

Inflow Area = 6.184 ac, 18.94% Impervious, Inflow Depth > 2.23" for 25-yr event
Inflow = 4.52 cfs @ 12.40 hrs, Volume= 1.148 af
Outflow = 4.52 cfs @ 12.40 hrs, Volume= 1.148 af, Atten= 0%, Lag= 0.1 min
Primary = 4.52 cfs @ 12.40 hrs, Volume= 1.148 af
Routed to Link SP-2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP-2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 49.20' @ 12.40 hrs Surf.Area= 13 sf Storage= 10 cf

Plug-Flow detention time= 0.1 min calculated for 1.147 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,116.2 - 1,116.1)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	515 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.00	5	0	0
49.00	10	8	8
50.00	25	18	25
51.00	955	490	515

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Secondary	50.95'	**10.0' long x 65.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.51 cfs @ 12.40 hrs HW=49.20' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.51 cfs @ 3.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond WW: Weir Wall

Inflow Area = 4.344 ac, 26.14% Impervious, Inflow Depth > 1.63" for 25-yr event
Inflow = 0.59 cfs @ 17.13 hrs, Volume= 0.588 af
Outflow = 0.53 cfs @ 19.14 hrs, Volume= 0.588 af, Atten= 9%, Lag= 120.3 min
Primary = 0.53 cfs @ 19.14 hrs, Volume= 0.588 af
Routed to Reach R2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 73.99' @ 19.14 hrs Surf.Area= 2,735 sf Storage= 1,404 cf

Plug-Flow detention time= 24.2 min calculated for 0.588 af (100% of inflow)
Center-of-Mass det. time= 24.0 min (1,373.2 - 1,349.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	4,913 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	100	0	0
74.00	2,760	1,430	1,430
75.00	4,205	3,483	4,913

Device	Routing	Invert	Outlet Devices
#1	Secondary	74.00'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

#2	Primary	73.00'	**16.0" x 1.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.53 cfs @ 19.14 hrs HW=73.99' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 4.79 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP-1:

Inflow Area = 1.145 ac, 2.49% Impervious, Inflow Depth = 3.76" for 25-yr event
Inflow = 3.42 cfs @ 12.27 hrs, Volume= 0.359 af
Primary = 3.42 cfs @ 12.27 hrs, Volume= 0.359 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 6.184 ac, 18.94% Impervious, Inflow Depth > 2.23" for 25-yr event
Inflow = 4.52 cfs @ 12.40 hrs, Volume= 1.148 af
Primary = 4.52 cfs @ 12.40 hrs, Volume= 1.148 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 0.421 ac, 4.66% Impervious, Inflow Depth = 3.76" for 25-yr event
Inflow = 1.56 cfs @ 12.15 hrs, Volume= 0.132 af
Primary = 1.56 cfs @ 12.15 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 0.619 ac, 3.65% Impervious, Inflow Depth = 3.76" for 25-yr event
Inflow = 2.37 cfs @ 12.14 hrs, Volume= 0.194 af
Primary = 2.37 cfs @ 12.14 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

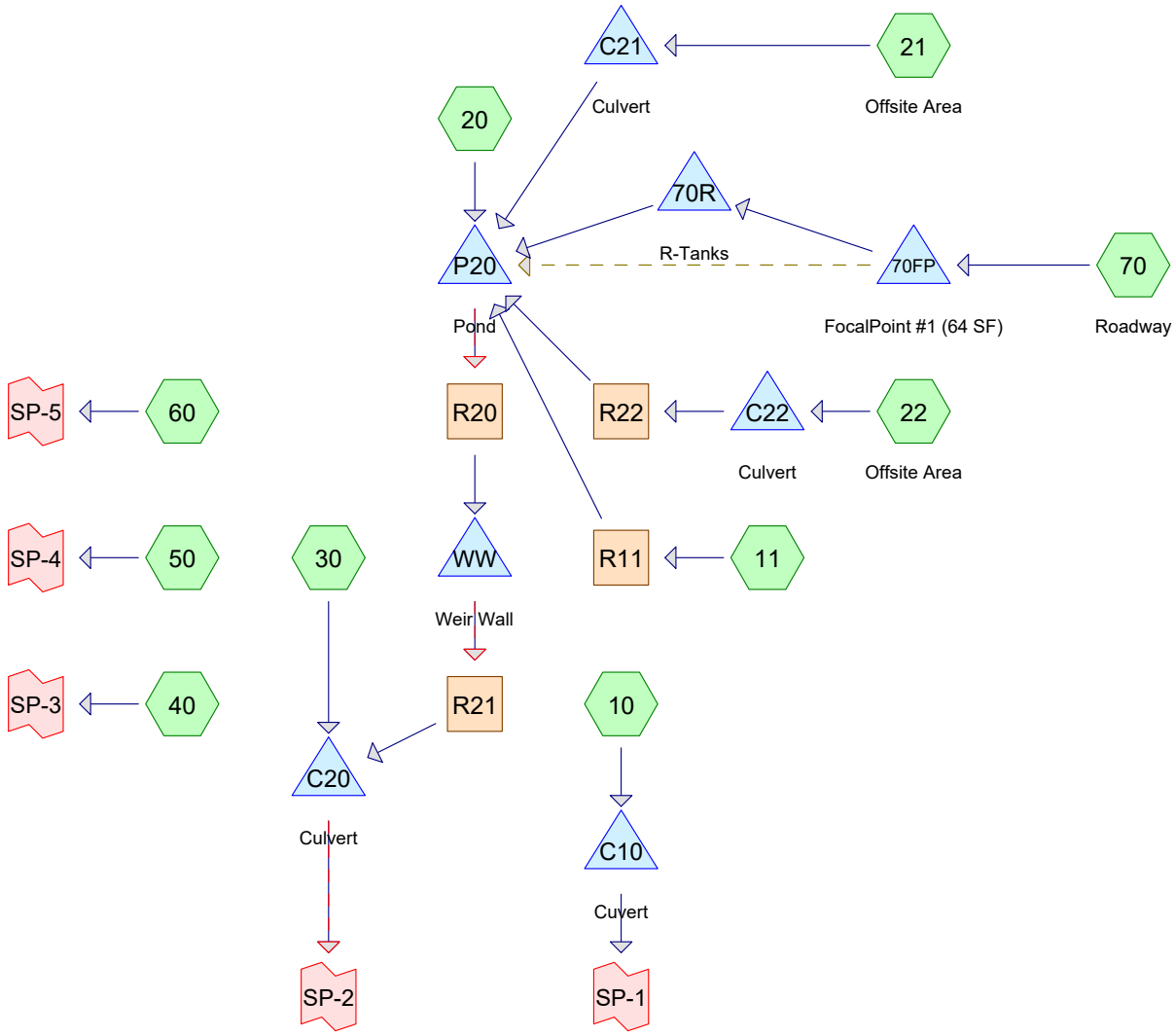
Summary for Link SP-5:

Inflow Area = 1.069 ac, 37.27% Impervious, Inflow Depth = 4.60" for 25-yr event
Inflow = 5.31 cfs @ 12.10 hrs, Volume= 0.410 af
Primary = 5.31 cfs @ 12.10 hrs, Volume= 0.410 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

APPENDIX 3

POST DEVELOPMENT HYDROCAD MODEL



Subcat Reach Pond Link

Routing Diagram for 23-003-POST_V2_COMMENT
Prepared by Terradyn Consultants LLC, Printed 1/31/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.453	80	>75% Grass cover, Good, HSG D (21, 60)
0.042	98	Impervious (40, 50)
0.873	80	Lot Developed Grass (10, 11, 20, 30)
0.092	98	Lot Impervious (10)
0.184	99	Lot Impervious (11)
0.064	98	Offsite Driveway (10, 30)
0.258	98	Road (70)
0.053	98	Subdivision Road (20)
0.922	98	Water Surface, HSG D (20)
0.566	98	Wildes District Road (20, 21, 60)
5.930	77	Woods, Good, HSG D (10, 20, 21, 22, 30, 40, 50, 60)

Summary for Subcatchment 10:

Runoff = 1.30 cfs @ 12.13 hrs, Volume= 0.104 af, Depth= 1.62"
Routed to Pond C10 : Cuvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
	12,427	77	Woods, Good, HSG D
*	1,238	98	Offsite Driveway
*	4,000	98	Lot Impervious
*	16,000	80	Lot Developed Grass
	33,665	82	Weighted Average
	28,427		84.44% Pervious Area
	5,238		15.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	84	0.0330	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
0.4	47	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	21	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
1.5	112	0.0620	1.24		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
8.9	264	Total			

Summary for Subcatchment 11:

Runoff = 1.32 cfs @ 12.08 hrs, Volume= 0.094 af, Depth= 1.92"
Routed to Reach R11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	8,000	99	Lot Impervious
*	17,536	80	Lot Developed Grass
	25,536	86	Weighted Average
	17,536		68.67% Pervious Area
	8,000		31.33% Impervious Area

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

Summary for Subcatchment 20:

Runoff = 3.47 cfs @ 12.49 hrs, Volume= 0.470 af, Depth= 1.84"
Routed to Pond P20 : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	2,500	80	Lot Developed Grass
	40,175	98	Water Surface, HSG D
	82,389	77	Woods, Good, HSG D
*	5,794	98	Wildes District Road
*	2,308	98	Subdivision Road
	133,166	85	Weighted Average
	84,889		63.75% Pervious Area
	48,277		36.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0133	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	13	0.0050	0.35		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
35.0	163	Total			

Summary for Subcatchment 21: Offsite Area

Runoff = 0.70 cfs @ 12.25 hrs, Volume= 0.072 af, Depth= 1.41"
Routed to Pond C21 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	1,500	98	Wildes District Road
	3,250	80	>75% Grass cover, Good, HSG D
	21,865	77	Woods, Good, HSG D
	26,615	79	Weighted Average
	25,115		94.36% Pervious Area
	1,500		5.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	75	0.0533	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
6.2	120	0.0042	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.6	195	Total			

Summary for Subcatchment 22: Offsite Area

Runoff = 0.17 cfs @ 12.44 hrs, Volume= 0.022 af, Depth= 1.28"
Routed to Pond C22 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
9,025	77	Woods, Good, HSG D
9,025		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.2	150	0.0200	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	20	0.0250	0.79		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
29.6	170	Total			

Summary for Subcatchment 30:

Runoff = 1.54 cfs @ 12.43 hrs, Volume= 0.196 af, Depth= 1.28"
Routed to Pond C20 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	1,560	98	Offsite Driveway
	76,448	77	Woods, Good, HSG D
*	2,000	80	Lot Developed Grass
	80,008	77	Weighted Average
	78,448		98.05% Pervious Area
	1,560		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	110	0.0360	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
5.2	170	0.0120	0.55		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.2	115	0.1040	1.61		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.4	65	0.0080	0.45		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.5	60	0.1500	1.94		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
1.7	50	0.0100	0.50		**Shallow Concentrated Flow, F-G** Woodland Kv= 5.0 fps
29.0	570	Total			

Summary for Subcatchment 40:

Runoff = 0.55 cfs @ 12.16 hrs, Volume= 0.047 af, Depth= 1.35"
Routed to Link SP-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
	17,475	77	Woods, Good, HSG D
*	855	98	Impervious
	18,330	78	Weighted Average
	17,475		95.34% Pervious Area
	855		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	70	0.0860	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	55	0.2910	2.70		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.8	85	0.0240	0.77		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.0	210	Total			

Summary for Subcatchment 50:

Runoff = 0.83 cfs @ 12.15 hrs, Volume= 0.069 af, Depth= 1.35"
Routed to Link SP-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
	25,970	77	Woods, Good, HSG D
*	985	98	Impervious
	26,955	78	Weighted Average
	25,970		96.35% Pervious Area
	985		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	55	0.0550	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	120	0.1750	2.09		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
9.7	175	Total			

Summary for Subcatchment 60:

Runoff = 2.27 cfs @ 12.11 hrs, Volume= 0.171 af, Depth= 1.92"
Routed to Link SP-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	17,350	98	Wildes District Road
	16,500	80	>75% Grass cover, Good, HSG D
	12,705	77	Woods, Good, HSG D
	46,555	86	Weighted Average
	29,205		62.73% Pervious Area
	17,350		37.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	40	0.0750	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	110	0.1270	1.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	100	0.0900	6.09		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
7.3	250	Total			

Summary for Subcatchment 70: Roadway

Runoff = 0.83 cfs @ 12.07 hrs, Volume= 0.066 af, Depth= 3.07"
Routed to Pond 70FP : FocalPoint #1 (64 SF)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

	Area (sf)	CN	Description
*	11,253	98	Road
	11,253		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, A-B**

Summary for Reach R11:

Inflow Area = 0.586 ac, 31.33% Impervious, Inflow Depth = 1.92" for 2-Yr event
Inflow = 1.32 cfs @ 12.08 hrs, Volume= 0.094 af
Outflow = 1.17 cfs @ 12.18 hrs, Volume= 0.094 af, Atten= 12%, Lag= 6.4 min
Routed to Pond P20 : Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.50 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 14.0 min

Peak Storage= 279 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 44.31'
Bank-Full Depth= 0.50' Flow Area= 29.4 sf, Capacity= 53.29 cfs

40.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 50.0 25.0 '/' Top Width= 77.50'
Length= 115.0' Slope= 0.0087 '/'
Inlet Invert= 75.00', Outlet Invert= 74.00'

‡

Summary for Reach R20:

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Pond WW : Weir Wall

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 7.51 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 175.0' Slope= 0.0086 '/'
Inlet Invert= 74.50', Outlet Invert= 73.00'

Summary for Reach R21:

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Pond C20 : Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 7.58 cfs

2.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 305.0' Slope= 0.0738 '/'
Inlet Invert= 73.00', Outlet Invert= 50.50'

‡

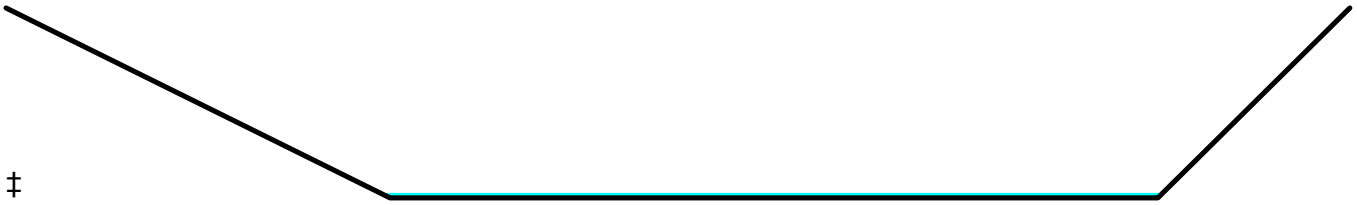
Summary for Reach R22:

Inflow Area = 0.207 ac, 0.00% Impervious, Inflow Depth = 1.28" for 2-Yr event
Inflow = 0.17 cfs @ 12.48 hrs, Volume= 0.022 af
Outflow = 0.16 cfs @ 12.79 hrs, Volume= 0.022 af, Atten= 8%, Lag= 18.4 min
Routed to Pond P20 : Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.24 fps, Min. Travel Time= 10.9 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 20.0 min

Peak Storage= 102 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.01' , Surface Width= 50.98'
Bank-Full Depth= 0.50' Flow Area= 34.4 sf, Capacity= 77.80 cfs

50.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 50.0 25.0 '/' Top Width= 87.50'
Length= 155.0' Slope= 0.0129 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'



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Summary for Pond 70FP: FocalPoint #1 (64 SF)

Inflow Area = 0.258 ac,100.00% Impervious, Inflow Depth = 3.07" for 2-Yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 0.066 af
Outflow = 0.80 cfs @ 12.09 hrs, Volume= 0.066 af, Atten= 4%, Lag= 1.3 min
Primary = 0.15 cfs @ 11.65 hrs, Volume= 0.053 af
Routed to Pond 70R : R-Tanks
Secondary = 0.65 cfs @ 12.09 hrs, Volume= 0.013 af
Routed to Pond P20 : Pond
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 78.91' @ 12.09 hrs Surf.Area= 64 sf Storage= 193 cf

Plug-Flow detention time= 6.4 min calculated for 0.066 af (100% of inflow)
Center-of-Mass det. time= 3.2 min (758.0 - 754.8)

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	22 cf	**8.00'W x 8.00'L x 1.75'H FocalPoint** 112 cf Overall x 20.0% Voids
#2	78.25'	310 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		332 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.25	64	0	0
78.75	376	110	110
79.25	422	200	310

Device	Routing	Invert	Outlet Devices
#1	Primary	76.50'	**100.000 in/hr Exfiltration over Surface area** Phase-In= 0.10'
#2	Secondary	78.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	79.01'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.15 cfs @ 11.65 hrs HW=76.63' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.15 cfs)

Secondary OutFlow Max=0.63 cfs @ 12.09 hrs HW=78.91' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.63 cfs @ 1.29 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.50' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 70R: R-Tanks

Inflow Area = 0.258 ac,100.00% Impervious, Inflow Depth = 2.45" for 2-Yr event
Inflow = 0.15 cfs @ 11.65 hrs, Volume= 0.053 af
Outflow = 0.15 cfs @ 12.70 hrs, Volume= 0.053 af, Atten= 0%, Lag= 63.0 min
Primary = 0.15 cfs @ 12.70 hrs, Volume= 0.053 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 75.25' @ 12.55 hrs Surf.Area= 34 sf Storage= 8 cf
Flood Elev= 45.00' Storage= 0 cf

Plug-Flow detention time= 3.1 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (766.9 - 765.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	74.71'	20 cf	**5.31'W x 6.35'L x 1.54'H Field A** 52 cf Overall - 2 cf Embedded = 49 cf x 40.0% Voids
#2A	74.96'	2 cf	**Ferguson R-Tank HD 0.5** Inside #1 Inside= 15.7"W x 9.4"H => 0.98 sf x 2.35'L = 2.3 cf Outside= 15.7"W x 9.4"H => 1.03 sf x 2.35'L = 2.4 cf
		22 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	74.96'	**6.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.96' / 74.75' S= 0.0042 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Primary OutFlow Max=0.15 cfs @ 12.70 hrs HW=75.25' (Free Discharge)
1=Culvert (Barrel Controls 0.15 cfs @ 1.84 fps)

Summary for Pond C10: Cuvert

Inflow Area = 0.773 ac, 15.56% Impervious, Inflow Depth = 1.62" for 2-Yr event
Inflow = 1.30 cfs @ 12.13 hrs, Volume= 0.104 af
Outflow = 1.29 cfs @ 12.15 hrs, Volume= 0.104 af, Atten= 1%, Lag= 1.2 min
Primary = 1.29 cfs @ 12.15 hrs, Volume= 0.104 af
Routed to Link SP-1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 60.34' @ 12.15 hrs Surf.Area= 203 sf Storage= 71 cf

Plug-Flow detention time= 0.9 min calculated for 0.104 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (838.4 - 837.5)

Volume	Invert	Avail.Storage	Storage Description
#1	59.65'	1,009 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.65	10	0	0
60.00	100	19	19
61.00	405	253	272
62.00	1,070	738	1,009

Device	Routing	Invert	Outlet Devices
#1	Primary	59.65'	**12.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.00' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.28 cfs @ 12.15 hrs HW=60.34' (Free Discharge)
1=Culvert (Inlet Controls 1.28 cfs @ 2.23 fps)

Summary for Pond C20: Culvert

Inflow Area = 6.557 ac, 24.72% Impervious, Inflow Depth = 0.36" for 2-Yr event
Inflow = 1.54 cfs @ 12.43 hrs, Volume= 0.196 af
Outflow = 1.54 cfs @ 12.43 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min
Primary = 1.54 cfs @ 12.43 hrs, Volume= 0.196 af
Routed to Link SP-2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP-2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 48.60' @ 12.43 hrs Surf.Area= 8 sf Storage= 4 cf

Plug-Flow detention time= 0.1 min calculated for 0.196 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (872.1 - 872.0)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	515 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.00	5	0	0
49.00	10	8	8
50.00	25	18	25
51.00	955	490	515

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Secondary	50.95'	**10.0' long x 65.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.54 cfs @ 12.43 hrs HW=48.60' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.54 cfs @ 2.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C21: Culvert

Inflow Area = 0.611 ac, 5.64% Impervious, Inflow Depth = 1.41" for 2-Yr event
Inflow = 0.70 cfs @ 12.25 hrs, Volume= 0.072 af
Outflow = 0.23 cfs @ 12.73 hrs, Volume= 0.053 af, Atten= 67%, Lag= 28.4 min
Primary = 0.23 cfs @ 12.73 hrs, Volume= 0.053 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 75.97' @ 12.73 hrs Surf.Area= 2,440 sf Storage= 1,309 cf

Plug-Flow detention time= 213.2 min calculated for 0.053 af (74% of inflow)
Center-of-Mass det. time= 119.6 min (974.7 - 855.1)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	6,298 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	250	0	0
76.00	2,500	1,375	1,375
77.00	7,345	4,923	6,298

Device	Routing	Invert	Outlet Devices
#1	Primary	75.75'	**18.0" Round Culvert**

L= 50.0' CPP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 75.75' / 75.00' S= 0.0150 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.23 cfs @ 12.73 hrs HW=75.97' (Free Discharge)
1=Culvert (Inlet Controls 0.23 cfs @ 1.42 fps)

Summary for Pond C22: Culvert

Inflow Area = 0.207 ac, 0.00% Impervious, Inflow Depth = 1.28" for 2-Yr event
Inflow = 0.17 cfs @ 12.44 hrs, Volume= 0.022 af
Outflow = 0.17 cfs @ 12.48 hrs, Volume= 0.022 af, Atten= 1%, Lag= 2.7 min
Primary = 0.17 cfs @ 12.48 hrs, Volume= 0.022 af
Routed to Reach R22 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.59' @ 12.48 hrs Surf.Area= 278 sf Storage= 15 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.6 min (873.2 - 872.5)

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	331 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	50	0	0
77.00	1,275	331	331

Device	Routing	Invert	Outlet Devices
#1	Primary	76.40'	**18.0" Round Culvert**
			L= 50.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 76.40' / 76.00' S= 0.0080 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.17 cfs @ 12.48 hrs HW=76.59' (Free Discharge)
1=Culvert (Barrel Controls 0.17 cfs @ 1.94 fps)

Summary for Pond P20: Pond

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth = 1.79" for 2-Yr event
Inflow = 4.36 cfs @ 12.47 hrs, Volume= 0.704 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
Routed to Reach R20 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.30' @ 48.00 hrs Surf.Area= 46,770 sf Storage= 30,680 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	73.50'	68,631 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.50	30,000	0	0
74.00	40,175	17,544	17,544
75.00	62,000	51,088	68,631

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Channel/Reach** using Reach R20:

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.50' (Free Discharge)
1=Channel/Reach (Controls 0.00 cfs)

Summary for Pond WW: Weir Wall

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R21 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R21 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 73.00' @ 0.00 hrs Surf.Area= 100 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	4,913 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	100	0	0
74.00	2,760	1,430	1,430
75.00	4,205	3,483	4,913

Device	Routing	Invert	Outlet Devices
#1	Secondary	74.00'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	73.00'	**16.0" x 1.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link SP-1:

Inflow Area = 0.773 ac, 15.56% Impervious, Inflow Depth = 1.62" for 2-Yr event
Inflow = 1.29 cfs @ 12.15 hrs, Volume= 0.104 af
Primary = 1.29 cfs @ 12.15 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 6.557 ac, 24.72% Impervious, Inflow Depth = 0.36" for 2-Yr event
Inflow = 1.54 cfs @ 12.43 hrs, Volume= 0.196 af
Primary = 1.54 cfs @ 12.43 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 0.421 ac, 4.66% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 0.55 cfs @ 12.16 hrs, Volume= 0.047 af
Primary = 0.55 cfs @ 12.16 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 0.619 ac, 3.65% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 0.83 cfs @ 12.15 hrs, Volume= 0.069 af
Primary = 0.83 cfs @ 12.15 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-5:

Inflow Area = 1.069 ac, 37.27% Impervious, Inflow Depth = 1.92" for 2-Yr event
Inflow = 2.27 cfs @ 12.11 hrs, Volume= 0.171 af
Primary = 2.27 cfs @ 12.11 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 10:

Runoff = 2.40 cfs @ 12.13 hrs, Volume= 0.193 af, Depth= 2.99"
Routed to Pond C10 : Cuvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
	12,427	77	Woods, Good, HSG D
*	1,238	98	Offsite Driveway
*	4,000	98	Lot Impervious
*	16,000	80	Lot Developed Grass
	33,665	82	Weighted Average
	28,427		84.44% Pervious Area
	5,238		15.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	84	0.0330	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
0.4	47	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	21	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
1.5	112	0.0620	1.24		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
8.9	264	Total			

Summary for Subcatchment 11:

Runoff = 2.30 cfs @ 12.07 hrs, Volume= 0.165 af, Depth= 3.37"
Routed to Reach R11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	8,000	99	Lot Impervious
*	17,536	80	Lot Developed Grass
	25,536	86	Weighted Average
	17,536		68.67% Pervious Area
	8,000		31.33% Impervious Area

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

Summary for Subcatchment 20:

Runoff = 6.13 cfs @ 12.48 hrs, Volume= 0.835 af, Depth= 3.28"
Routed to Pond P20 : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	2,500	80	Lot Developed Grass
	40,175	98	Water Surface, HSG D
	82,389	77	Woods, Good, HSG D
*	5,794	98	Wildes District Road
*	2,308	98	Subdivision Road
	133,166	85	Weighted Average
	84,889		63.75% Pervious Area
	48,277		36.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0133	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	13	0.0050	0.35		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
35.0	163	Total			

Summary for Subcatchment 21: Offsite Area

Runoff = 1.38 cfs @ 12.25 hrs, Volume= 0.138 af, Depth= 2.72"
Routed to Pond C21 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	1,500	98	Wildes District Road
	3,250	80	>75% Grass cover, Good, HSG D
	21,865	77	Woods, Good, HSG D
	26,615	79	Weighted Average
	25,115		94.36% Pervious Area
	1,500		5.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	75	0.0533	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
6.2	120	0.0042	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.6	195	Total			

Summary for Subcatchment 22: Offsite Area

Runoff = 0.35 cfs @ 12.42 hrs, Volume= 0.044 af, Depth= 2.54"
Routed to Pond C22 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

Area (sf)	CN	Description
9,025	77	Woods, Good, HSG D
9,025		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.2	150	0.0200	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	20	0.0250	0.79		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
29.6	170	Total			

Summary for Subcatchment 30:

Runoff = 3.13 cfs @ 12.41 hrs, Volume= 0.389 af, Depth= 2.54"
Routed to Pond C20 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	1,560	98	Offsite Driveway
	76,448	77	Woods, Good, HSG D
*	2,000	80	Lot Developed Grass
	80,008	77	Weighted Average
	78,448		98.05% Pervious Area
	1,560		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	110	0.0360	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
5.2	170	0.0120	0.55		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.2	115	0.1040	1.61		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.4	65	0.0080	0.45		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.5	60	0.1500	1.94		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
1.7	50	0.0100	0.50		**Shallow Concentrated Flow, F-G** Woodland Kv= 5.0 fps
29.0	570	Total			

Summary for Subcatchment 40:

Runoff = 1.09 cfs @ 12.16 hrs, Volume= 0.092 af, Depth= 2.63"
Routed to Link SP-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
	17,475	77	Woods, Good, HSG D
*	855	98	Impervious
	18,330	78	Weighted Average
	17,475		95.34% Pervious Area
	855		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	70	0.0860	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	55	0.2910	2.70		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.8	85	0.0240	0.77		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.0	210	Total			

Summary for Subcatchment 50:

Runoff = 1.66 cfs @ 12.14 hrs, Volume= 0.135 af, Depth= 2.63"
Routed to Link SP-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
	25,970	77	Woods, Good, HSG D
*	985	98	Impervious
	26,955	78	Weighted Average
	25,970		96.35% Pervious Area
	985		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	55	0.0550	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	120	0.1750	2.09		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
9.7	175	Total			

Summary for Subcatchment 60:

Runoff = 3.94 cfs @ 12.10 hrs, Volume= 0.300 af, Depth= 3.37"
Routed to Link SP-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	17,350	98	Wildes District Road
	16,500	80	>75% Grass cover, Good, HSG D
	12,705	77	Woods, Good, HSG D
	46,555	86	Weighted Average
	29,205		62.73% Pervious Area
	17,350		37.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	40	0.0750	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	110	0.1270	1.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	100	0.0900	6.09		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
7.3	250	Total			

Summary for Subcatchment 70: Roadway

Runoff = 1.25 cfs @ 12.07 hrs, Volume= 0.100 af, Depth= 4.66"
Routed to Pond 70FP : FocalPoint #1 (64 SF)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.90"

	Area (sf)	CN	Description
*	11,253	98	Road
	11,253		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, A-B**

Summary for Reach R11:

Inflow Area = 0.586 ac, 31.33% Impervious, Inflow Depth = 3.37" for 10-yr event
Inflow = 2.30 cfs @ 12.07 hrs, Volume= 0.165 af
Outflow = 2.14 cfs @ 12.16 hrs, Volume= 0.165 af, Atten= 7%, Lag= 5.2 min
Routed to Pond P20 : Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.62 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 12.1 min

Peak Storage= 400 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 46.07'
Bank-Full Depth= 0.50' Flow Area= 29.4 sf, Capacity= 53.29 cfs

40.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 50.0 25.0 '/' Top Width= 77.50'
Length= 115.0' Slope= 0.0087 '/'
Inlet Invert= 75.00', Outlet Invert= 74.00'

‡

Summary for Reach R20:

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth > 0.78" for 10-yr event
Inflow = 0.26 cfs @ 21.13 hrs, Volume= 0.305 af
Outflow = 0.26 cfs @ 21.22 hrs, Volume= 0.305 af, Atten= 0%, Lag= 5.5 min
Routed to Pond WW : Weir Wall

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.87 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 5.1 min

Peak Storage= 53 cf @ 21.16 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 2.28'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 7.51 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 175.0' Slope= 0.0086 '/'
Inlet Invert= 74.50', Outlet Invert= 73.00'

Summary for Reach R21:

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth > 0.77" for 10-yr event
Inflow = 0.26 cfs @ 21.60 hrs, Volume= 0.304 af
Outflow = 0.26 cfs @ 21.68 hrs, Volume= 0.304 af, Atten= 0%, Lag= 5.0 min
Routed to Pond C20 : Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 4.6 min

Peak Storage= 48 cf @ 21.63 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 2.29'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 7.58 cfs

2.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 305.0' Slope= 0.0738 '/'
Inlet Invert= 73.00', Outlet Invert= 50.50'

‡

Summary for Reach R22:

Inflow Area = 0.207 ac, 0.00% Impervious, Inflow Depth = 2.54" for 10-yr event
Inflow = 0.34 cfs @ 12.47 hrs, Volume= 0.044 af
Outflow = 0.33 cfs @ 12.70 hrs, Volume= 0.044 af, Atten= 5%, Lag= 13.9 min
Routed to Pond P20 : Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.31 fps, Min. Travel Time= 8.2 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 19.0 min

Peak Storage= 161 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 51.54'
Bank-Full Depth= 0.50' Flow Area= 34.4 sf, Capacity= 77.80 cfs

50.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 50.0 25.0 '/' Top Width= 87.50'
Length= 155.0' Slope= 0.0129 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'

‡

Summary for Pond 70FP: FocalPoint #1 (64 SF)

Inflow Area = 0.258 ac,100.00% Impervious, Inflow Depth = 4.66" for 10-yr event
Inflow = 1.25 cfs @ 12.07 hrs, Volume= 0.100 af
Outflow = 1.20 cfs @ 12.09 hrs, Volume= 0.100 af, Atten= 4%, Lag= 1.1 min
Primary = 0.15 cfs @ 11.55 hrs, Volume= 0.073 af
Routed to Pond 70R : R-Tanks
Secondary = 1.05 cfs @ 12.09 hrs, Volume= 0.027 af
Routed to Pond P20 : Pond
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 78.97' @ 12.09 hrs Surf.Area= 64 sf Storage= 217 cf

Plug-Flow detention time= 4.9 min calculated for 0.100 af (100% of inflow)
Center-of-Mass det. time= 2.9 min (750.4 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	22 cf	**8.00'W x 8.00'L x 1.75'H FocalPoint** 112 cf Overall x 20.0% Voids
#2	78.25'	310 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		332 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.25	64	0	0
78.75	376	110	110
79.25	422	200	310

Device	Routing	Invert	Outlet Devices
#1	Primary	76.50'	**100.000 in/hr Exfiltration over Surface area** Phase-In= 0.10'
#2	Secondary	78.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	79.01'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.15 cfs @ 11.55 hrs HW=76.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Secondary OutFlow Max=1.02 cfs @ 12.09 hrs HW=78.96' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 1.02 cfs @ 1.51 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.50' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 70R: R-Tanks

Inflow Area = 0.258 ac,100.00% Impervious, Inflow Depth = 3.40" for 10-yr event
Inflow = 0.15 cfs @ 11.55 hrs, Volume= 0.073 af
Outflow = 0.15 cfs @ 12.60 hrs, Volume= 0.073 af, Atten= 0%, Lag= 63.0 min
Primary = 0.15 cfs @ 12.60 hrs, Volume= 0.073 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 75.25' @ 12.40 hrs Surf.Area= 34 sf Storage= 8 cf
Flood Elev= 45.00' Storage= 0 cf

Plug-Flow detention time= 2.2 min calculated for 0.073 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (760.0 - 758.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	74.71'	20 cf	**5.31'W x 6.35'L x 1.54'H Field A** 52 cf Overall - 2 cf Embedded = 49 cf x 40.0% Voids
#2A	74.96'	2 cf	**Ferguson R-Tank HD 0.5** Inside #1 Inside= 15.7"W x 9.4"H => 0.98 sf x 2.35'L = 2.3 cf Outside= 15.7"W x 9.4"H => 1.03 sf x 2.35'L = 2.4 cf
		22 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	74.96'	**6.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.96' / 74.75' S= 0.0042 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Primary OutFlow Max=0.15 cfs @ 12.60 hrs HW=75.25' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.15 cfs @ 1.84 fps)

Summary for Pond C10: Cuvert

Inflow Area = 0.773 ac, 15.56% Impervious, Inflow Depth = 2.99" for 10-yr event
Inflow = 2.40 cfs @ 12.13 hrs, Volume= 0.193 af
Outflow = 2.27 cfs @ 12.16 hrs, Volume= 0.193 af, Atten= 5%, Lag= 2.1 min
Primary = 2.27 cfs @ 12.16 hrs, Volume= 0.193 af
Routed to Link SP-1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 60.73' @ 12.16 hrs Surf.Area= 323 sf Storage= 174 cf

Plug-Flow detention time= 1.0 min calculated for 0.193 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (820.8 - 819.8)

Volume	Invert	Avail.Storage	Storage Description
#1	59.65'	1,009 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.65	10	0	0
60.00	100	19	19
61.00	405	253	272
62.00	1,070	738	1,009

Device	Routing	Invert	Outlet Devices
#1	Primary	59.65'	**12.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.00' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.25 cfs @ 12.16 hrs HW=60.72' (Free Discharge)
1=Culvert (Inlet Controls 2.25 cfs @ 2.86 fps)

Summary for Pond C20: Culvert

Inflow Area = 6.557 ac, 24.72% Impervious, Inflow Depth > 1.27" for 10-yr event
Inflow = 3.13 cfs @ 12.41 hrs, Volume= 0.693 af
Outflow = 3.13 cfs @ 12.41 hrs, Volume= 0.693 af, Atten= 0%, Lag= 0.0 min
Primary = 3.13 cfs @ 12.41 hrs, Volume= 0.693 af
Routed to Link SP-2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP-2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 48.91' @ 12.41 hrs Surf.Area= 10 sf Storage= 7 cf

Plug-Flow detention time= 0.1 min calculated for 0.692 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,148.2 - 1,148.2)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	515 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.00	5	0	0
49.00	10	8	8
50.00	25	18	25
51.00	955	490	515

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Secondary	50.95'	**10.0' long x 65.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.12 cfs @ 12.41 hrs HW=48.91' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.12 cfs @ 3.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C21: Culvert

Inflow Area = 0.611 ac, 5.64% Impervious, Inflow Depth = 2.72" for 10-yr event
Inflow = 1.38 cfs @ 12.25 hrs, Volume= 0.138 af
Outflow = 0.85 cfs @ 12.49 hrs, Volume= 0.119 af, Atten= 38%, Lag= 14.8 min
Primary = 0.85 cfs @ 12.49 hrs, Volume= 0.119 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.19' @ 12.49 hrs Surf.Area= 3,410 sf Storage= 1,930 cf

Plug-Flow detention time= 132.6 min calculated for 0.119 af (86% of inflow)
Center-of-Mass det. time= 71.6 min (907.7 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	6,298 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	250	0	0
76.00	2,500	1,375	1,375
77.00	7,345	4,923	6,298

Device	Routing	Invert	Outlet Devices
#1	Primary	75.75'	**18.0" Round Culvert**

L= 50.0' CPP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 75.75' / 75.00' S= 0.0150 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.85 cfs @ 12.49 hrs HW=76.19' (Free Discharge)
1=Culvert (Inlet Controls 0.85 cfs @ 1.99 fps)

Summary for Pond C22: Culvert

Inflow Area = 0.207 ac, 0.00% Impervious, Inflow Depth = 2.54" for 10-yr event
Inflow = 0.35 cfs @ 12.42 hrs, Volume= 0.044 af
Outflow = 0.34 cfs @ 12.47 hrs, Volume= 0.044 af, Atten= 2%, Lag= 3.3 min
Primary = 0.34 cfs @ 12.47 hrs, Volume= 0.044 af
Routed to Reach R22 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.67' @ 12.47 hrs Surf.Area= 478 sf Storage= 46 cf

Plug-Flow detention time= 1.1 min calculated for 0.044 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (853.6 - 852.5)

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	331 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	50	0	0
77.00	1,275	331	331

Device	Routing	Invert	Outlet Devices
#1	Primary	76.40'	**18.0" Round Culvert**
			L= 50.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 76.40' / 76.00' S= 0.0080 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.34 cfs @ 12.47 hrs HW=76.67' (Free Discharge)
1=Culvert (Barrel Controls 0.34 cfs @ 2.34 fps)

Summary for Pond P20: Pond

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth = 3.21" for 10-yr event
Inflow = 8.27 cfs @ 12.45 hrs, Volume= 1.263 af
Outflow = 0.26 cfs @ 21.13 hrs, Volume= 0.305 af, Atten= 97%, Lag= 520.8 min
Primary = 0.26 cfs @ 21.13 hrs, Volume= 0.305 af
Routed to Reach R20 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.64' @ 21.13 hrs Surf.Area= 54,174 sf Storage= 47,802 cf

Plug-Flow detention time= 837.6 min calculated for 0.305 af (24% of inflow)

Center-of-Mass det. time= 676.8 min (1,511.0 - 834.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	68,631 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.50	30,000	0	0
74.00	40,175	17,544	17,544
75.00	62,000	51,088	68,631

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Channel/Reach** using Reach R20:

Primary OutFlow Max=0.26 cfs @ 21.13 hrs HW=74.64' (Free Discharge)
└**1=Channel/Reach** (Channel Controls 0.26 cfs @ 0.87 fps)

Summary for Pond WW: Weir Wall

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth > 0.77" for 10-yr event
Inflow = 0.26 cfs @ 21.22 hrs, Volume= 0.305 af
Outflow = 0.26 cfs @ 21.60 hrs, Volume= 0.304 af, Atten= 0%, Lag= 22.6 min
Primary = 0.26 cfs @ 21.60 hrs, Volume= 0.304 af
Routed to Reach R21 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R21 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 73.24' @ 21.60 hrs Surf.Area= 737 sf Storage= 100 cf

Plug-Flow detention time= 3.8 min calculated for 0.304 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (1,520.9 - 1,517.3)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	4,913 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	100	0	0
74.00	2,760	1,430	1,430
75.00	4,205	3,483	4,913

Device	Routing	Invert	Outlet Devices
#1	Secondary	74.00'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	73.00'	**16.0" x 1.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.26 cfs @ 21.60 hrs HW=73.24' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.26 cfs @ 2.36 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link SP-1:

Inflow Area = 0.773 ac, 15.56% Impervious, Inflow Depth = 2.99" for 10-yr event
Inflow = 2.27 cfs @ 12.16 hrs, Volume= 0.193 af
Primary = 2.27 cfs @ 12.16 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 6.557 ac, 24.72% Impervious, Inflow Depth > 1.27" for 10-yr event
Inflow = 3.13 cfs @ 12.41 hrs, Volume= 0.693 af
Primary = 3.13 cfs @ 12.41 hrs, Volume= 0.693 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 0.421 ac, 4.66% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 1.09 cfs @ 12.16 hrs, Volume= 0.092 af
Primary = 1.09 cfs @ 12.16 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 0.619 ac, 3.65% Impervious, Inflow Depth = 2.63" for 10-yr event
Inflow = 1.66 cfs @ 12.14 hrs, Volume= 0.135 af
Primary = 1.66 cfs @ 12.14 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-5:

Inflow Area = 1.069 ac, 37.27% Impervious, Inflow Depth = 3.37" for 10-yr event
Inflow = 3.94 cfs @ 12.10 hrs, Volume= 0.300 af
Primary = 3.94 cfs @ 12.10 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 10:

Runoff = 3.34 cfs @ 12.12 hrs, Volume= 0.269 af, Depth= 4.17"
Routed to Pond C10 : Cuvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
	12,427	77	Woods, Good, HSG D
*	1,238	98	Offsite Driveway
*	4,000	98	Lot Impervious
*	16,000	80	Lot Developed Grass
	33,665	82	Weighted Average
	28,427		84.44% Pervious Area
	5,238		15.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	84	0.0330	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
0.4	47	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	21	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
1.5	112	0.0620	1.24		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
8.9	264	Total			

Summary for Subcatchment 11:

Runoff = 3.10 cfs @ 12.07 hrs, Volume= 0.225 af, Depth= 4.60"
Routed to Reach R11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	8,000	99	Lot Impervious
*	17,536	80	Lot Developed Grass
	25,536	86	Weighted Average
	17,536		68.67% Pervious Area
	8,000		31.33% Impervious Area

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

Summary for Subcatchment 20:

Runoff = 8.33 cfs @ 12.47 hrs, Volume= 1.144 af, Depth= 4.49"
Routed to Pond P20 : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	2,500	80	Lot Developed Grass
	40,175	98	Water Surface, HSG D
	82,389	77	Woods, Good, HSG D
*	5,794	98	Wildes District Road
*	2,308	98	Subdivision Road
	133,166	85	Weighted Average
	84,889		63.75% Pervious Area
	48,277		36.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	150	0.0133	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	13	0.0050	0.35		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
35.0	163	Total			

Summary for Subcatchment 21: Offsite Area

Runoff = 1.95 cfs @ 12.24 hrs, Volume= 0.196 af, Depth= 3.86"
Routed to Pond C21 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	1,500	98	Wildes District Road
	3,250	80	>75% Grass cover, Good, HSG D
	21,865	77	Woods, Good, HSG D
	26,615	79	Weighted Average
	25,115		94.36% Pervious Area
	1,500		5.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	75	0.0533	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
6.2	120	0.0042	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.6	195	Total			

Summary for Subcatchment 22: Offsite Area

Runoff = 0.50 cfs @ 12.41 hrs, Volume= 0.063 af, Depth= 3.65"
Routed to Pond C22 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

Area (sf)	CN	Description
9,025	77	Woods, Good, HSG D
9,025		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.2	150	0.0200	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	20	0.0250	0.79		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
29.6	170	Total			

Summary for Subcatchment 30:

Runoff = 4.51 cfs @ 12.40 hrs, Volume= 0.559 af, Depth= 3.65"
Routed to Pond C20 : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	1,560	98	Offsite Driveway
	76,448	77	Woods, Good, HSG D
*	2,000	80	Lot Developed Grass
	80,008	77	Weighted Average
	78,448		98.05% Pervious Area
	1,560		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	110	0.0360	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
5.2	170	0.0120	0.55		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.2	115	0.1040	1.61		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.4	65	0.0080	0.45		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.5	60	0.1500	1.94		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
1.7	50	0.0100	0.50		**Shallow Concentrated Flow, F-G** Woodland Kv= 5.0 fps
29.0	570	Total			

Summary for Subcatchment 40:

Runoff = 1.56 cfs @ 12.15 hrs, Volume= 0.132 af, Depth= 3.76"
Routed to Link SP-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
	17,475	77	Woods, Good, HSG D
*	855	98	Impervious
	18,330	78	Weighted Average
	17,475		95.34% Pervious Area
	855		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	70	0.0860	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	55	0.2910	2.70		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.8	85	0.0240	0.77		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.0	210	Total			

Summary for Subcatchment 50:

Runoff = 2.37 cfs @ 12.14 hrs, Volume= 0.194 af, Depth= 3.76"
Routed to Link SP-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
	25,970	77	Woods, Good, HSG D
*	985	98	Impervious
	26,955	78	Weighted Average
	25,970		96.35% Pervious Area
	985		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	55	0.0550	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	120	0.1750	2.09		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
9.7	175	Total			

Summary for Subcatchment 60:

Runoff = 5.31 cfs @ 12.10 hrs, Volume= 0.410 af, Depth= 4.60"
Routed to Link SP-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	17,350	98	Wildes District Road
	16,500	80	>75% Grass cover, Good, HSG D
	12,705	77	Woods, Good, HSG D
	46,555	86	Weighted Average
	29,205		62.73% Pervious Area
	17,350		37.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	40	0.0750	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.30"
1.0	110	0.1270	1.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	100	0.0900	6.09		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
7.3	250	Total			

Summary for Subcatchment 70: Roadway

Runoff = 1.58 cfs @ 12.07 hrs, Volume= 0.128 af, Depth= 5.96"
Routed to Pond 70FP : FocalPoint #1 (64 SF)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	11,253	98	Road
	11,253		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, A-B**

Summary for Reach R11:

Inflow Area = 0.586 ac, 31.33% Impervious, Inflow Depth = 4.60" for 25-yr event
Inflow = 3.10 cfs @ 12.07 hrs, Volume= 0.225 af
Outflow = 2.91 cfs @ 12.15 hrs, Volume= 0.225 af, Atten= 6%, Lag= 4.8 min
Routed to Pond P20 : Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 11.1 min

Peak Storage= 487 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 47.27'
Bank-Full Depth= 0.50' Flow Area= 29.4 sf, Capacity= 53.29 cfs

40.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 50.0 25.0 '/' Top Width= 77.50'
Length= 115.0' Slope= 0.0087 '/'
Inlet Invert= 75.00', Outlet Invert= 74.00'

‡

Summary for Reach R20:

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth > 1.97" for 25-yr event
Inflow = 0.85 cfs @ 16.07 hrs, Volume= 0.776 af
Outflow = 0.85 cfs @ 16.13 hrs, Volume= 0.776 af, Atten= 0%, Lag= 3.8 min
Routed to Pond WW : Weir Wall

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.30 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 3.9 min

Peak Storage= 114 cf @ 16.09 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 2.57'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 7.51 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 1.0 '/' Top Width= 4.00'
Length= 175.0' Slope= 0.0086 '/'
Inlet Invert= 74.50', Outlet Invert= 73.00'

Summary for Reach R21:

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth > 1.97" for 25-yr event
Inflow = 0.85 cfs @ 16.33 hrs, Volume= 0.776 af
Outflow = 0.85 cfs @ 16.39 hrs, Volume= 0.776 af, Atten= 0%, Lag= 3.4 min
Routed to Pond C20 : Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.53 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.45 fps, Avg. Travel Time= 3.5 min

Peak Storage= 102 cf @ 16.35 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 2.58'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 7.58 cfs

2.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 2.0 '/' Top Width= 4.00'
Length= 305.0' Slope= 0.0738 '/'
Inlet Invert= 73.00', Outlet Invert= 50.50'

‡

Summary for Reach R22:

Inflow Area = 0.207 ac, 0.00% Impervious, Inflow Depth = 3.65" for 25-yr event
Inflow = 0.49 cfs @ 12.47 hrs, Volume= 0.063 af
Outflow = 0.47 cfs @ 12.67 hrs, Volume= 0.063 af, Atten= 4%, Lag= 11.9 min
Routed to Pond P20 : Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.36 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 18.3 min

Peak Storage= 202 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.03' , Surface Width= 51.92'
Bank-Full Depth= 0.50' Flow Area= 34.4 sf, Capacity= 77.80 cfs

50.00' x 0.50' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 50.0 25.0 '/' Top Width= 87.50'
Length= 155.0' Slope= 0.0129 '/'
Inlet Invert= 76.00', Outlet Invert= 74.00'

‡

Summary for Pond 70FP: FocalPoint #1 (64 SF)

Inflow Area = 0.258 ac,100.00% Impervious, Inflow Depth = 5.96" for 25-yr event
Inflow = 1.58 cfs @ 12.07 hrs, Volume= 0.128 af
Outflow = 1.52 cfs @ 12.09 hrs, Volume= 0.128 af, Atten= 4%, Lag= 1.0 min
Primary = 0.15 cfs @ 11.30 hrs, Volume= 0.089 af
Routed to Pond 70R : R-Tanks
Secondary = 1.37 cfs @ 12.09 hrs, Volume= 0.039 af
Routed to Pond P20 : Pond
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 79.01' @ 12.09 hrs Surf.Area= 64 sf Storage= 234 cf

Plug-Flow detention time= 4.3 min calculated for 0.128 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (746.8 - 743.7)

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	22 cf	**8.00'W x 8.00'L x 1.75'H FocalPoint** 112 cf Overall x 20.0% Voids
#2	78.25'	310 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		332 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.25	64	0	0
78.75	376	110	110
79.25	422	200	310

Device	Routing	Invert	Outlet Devices
#1	Primary	76.50'	**100.000 in/hr Exfiltration over Surface area** Phase-In= 0.10'
#2	Secondary	78.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	79.01'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.15 cfs @ 11.30 hrs HW=76.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Secondary OutFlow Max=1.33 cfs @ 12.09 hrs HW=79.01' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 1.33 cfs @ 1.66 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.50' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 70R: R-Tanks

Inflow Area = 0.258 ac,100.00% Impervious, Inflow Depth = 4.12" for 25-yr event
Inflow = 0.15 cfs @ 11.30 hrs, Volume= 0.089 af
Outflow = 0.15 cfs @ 12.30 hrs, Volume= 0.089 af, Atten= 0%, Lag= 60.0 min
Primary = 0.15 cfs @ 12.30 hrs, Volume= 0.089 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 75.25' @ 12.15 hrs Surf.Area= 34 sf Storage= 8 cf
Flood Elev= 45.00' Storage= 0 cf

Plug-Flow detention time= 2.0 min calculated for 0.089 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (756.3 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	74.71'	20 cf	**5.31'W x 6.35'L x 1.54'H Field A** 52 cf Overall - 2 cf Embedded = 49 cf x 40.0% Voids
#2A	74.96'	2 cf	**Ferguson R-Tank HD 0.5** Inside #1 Inside= 15.7"W x 9.4"H => 0.98 sf x 2.35'L = 2.3 cf Outside= 15.7"W x 9.4"H => 1.03 sf x 2.35'L = 2.4 cf
		22 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	74.96'	**6.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.96' / 74.75' S= 0.0042 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Primary OutFlow Max=0.15 cfs @ 12.30 hrs HW=75.25' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.15 cfs @ 1.84 fps)

Summary for Pond C10: Cuvert

Inflow Area = 0.773 ac, 15.56% Impervious, Inflow Depth = 4.17" for 25-yr event
Inflow = 3.34 cfs @ 12.12 hrs, Volume= 0.269 af
Outflow = 2.98 cfs @ 12.18 hrs, Volume= 0.269 af, Atten= 11%, Lag= 3.2 min
Primary = 2.98 cfs @ 12.18 hrs, Volume= 0.269 af
Routed to Link SP-1 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 61.15' @ 12.18 hrs Surf.Area= 503 sf Storage= 338 cf

Plug-Flow detention time= 1.1 min calculated for 0.268 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (811.4 - 810.3)

Volume	Invert	Avail.Storage	Storage Description
#1	59.65'	1,009 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.65	10	0	0
60.00	100	19	19
61.00	405	253	272
62.00	1,070	738	1,009

Device	Routing	Invert	Outlet Devices
#1	Primary	59.65'	**12.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.00' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.95 cfs @ 12.18 hrs HW=61.13' (Free Discharge)
1=Culvert (Inlet Controls 2.95 cfs @ 3.75 fps)

Summary for Pond C20: Culvert

Inflow Area = 6.557 ac, 24.72% Impervious, Inflow Depth > 2.44" for 25-yr event
Inflow = 4.51 cfs @ 12.40 hrs, Volume= 1.335 af
Outflow = 4.51 cfs @ 12.40 hrs, Volume= 1.335 af, Atten= 0%, Lag= 0.1 min
Primary = 4.51 cfs @ 12.40 hrs, Volume= 1.335 af
Routed to Link SP-2 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP-2 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 49.20' @ 12.40 hrs Surf.Area= 13 sf Storage= 10 cf

Plug-Flow detention time= 0.1 min calculated for 1.335 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,119.9 - 1,119.9)

Volume	Invert	Avail.Storage	Storage Description
#1	48.00'	515 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.00	5	0	0
49.00	10	8	8
50.00	25	18	25
51.00	955	490	515

Device	Routing	Invert	Outlet Devices
#1	Primary	48.00'	**15.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.00' / 47.50' S= 0.0125 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Secondary	50.95'	**10.0' long x 65.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.51 cfs @ 12.40 hrs HW=49.20' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.51 cfs @ 3.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C21: Culvert

Inflow Area = 0.611 ac, 5.64% Impervious, Inflow Depth = 3.86" for 25-yr event
Inflow = 1.95 cfs @ 12.24 hrs, Volume= 0.196 af
Outflow = 1.36 cfs @ 12.44 hrs, Volume= 0.178 af, Atten= 31%, Lag= 11.8 min
Primary = 1.36 cfs @ 12.44 hrs, Volume= 0.178 af
Routed to Pond P20 : Pond

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.31' @ 12.44 hrs Surf.Area= 4,005 sf Storage= 2,385 cf

Plug-Flow detention time= 105.0 min calculated for 0.177 af (90% of inflow)
Center-of-Mass det. time= 59.2 min (885.3 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	6,298 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	250	0	0
76.00	2,500	1,375	1,375
77.00	7,345	4,923	6,298

Device	Routing	Invert	Outlet Devices
#1	Primary	75.75'	**18.0" Round Culvert**

L= 50.0' CPP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 75.75' / 75.00' S= 0.0150 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.35 cfs @ 12.44 hrs HW=76.31' (Free Discharge)
1=Culvert (Inlet Controls 1.35 cfs @ 2.25 fps)

Summary for Pond C22: Culvert

Inflow Area = 0.207 ac, 0.00% Impervious, Inflow Depth = 3.65" for 25-yr event
Inflow = 0.50 cfs @ 12.41 hrs, Volume= 0.063 af
Outflow = 0.49 cfs @ 12.47 hrs, Volume= 0.063 af, Atten= 3%, Lag= 3.6 min
Primary = 0.49 cfs @ 12.47 hrs, Volume= 0.063 af
Routed to Reach R22 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 76.73' @ 12.47 hrs Surf.Area= 616 sf Storage= 77 cf

Plug-Flow detention time= 1.3 min calculated for 0.063 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (843.4 - 842.1)

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	331 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	50	0	0
77.00	1,275	331	331

Device	Routing	Invert	Outlet Devices
#1	Primary	76.40'	**18.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 76.40' / 76.00' S= 0.0080 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.49 cfs @ 12.47 hrs HW=76.73' (Free Discharge)
1=Culvert (Barrel Controls 0.49 cfs @ 2.56 fps)

Summary for Pond P20: Pond

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth = 4.42" for 25-yr event
Inflow = 11.43 cfs @ 12.44 hrs, Volume= 1.738 af
Outflow = 0.85 cfs @ 16.07 hrs, Volume= 0.776 af, Atten= 93%, Lag= 217.8 min
Primary = 0.85 cfs @ 16.07 hrs, Volume= 0.776 af
Routed to Reach R20 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.79' @ 16.07 hrs Surf.Area= 57,312 sf Storage= 55,817 cf

Plug-Flow detention time= 583.7 min calculated for 0.776 af (45% of inflow)

Center-of-Mass det. time= 457.9 min (1,283.1 - 825.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	68,631 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.50	30,000	0	0
74.00	40,175	17,544	17,544
75.00	62,000	51,088	68,631

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Channel/Reach** using Reach R20:

Primary OutFlow Max=0.85 cfs @ 16.07 hrs HW=74.79' (Free Discharge)
└**1=Channel/Reach** (Channel Controls 0.85 cfs @ 1.30 fps)

Summary for Pond WW: Weir Wall

Inflow Area = 4.720 ac, 33.58% Impervious, Inflow Depth > 1.97" for 25-yr event
Inflow = 0.85 cfs @ 16.13 hrs, Volume= 0.776 af
Outflow = 0.85 cfs @ 16.33 hrs, Volume= 0.776 af, Atten= 0%, Lag= 11.9 min
Primary = 0.56 cfs @ 16.33 hrs, Volume= 0.690 af
Routed to Reach R21 :
Secondary = 0.29 cfs @ 16.33 hrs, Volume= 0.086 af
Routed to Reach R21 :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 74.09' @ 16.33 hrs Surf.Area= 2,889 sf Storage= 1,681 cf

Plug-Flow detention time= 28.9 min calculated for 0.776 af (100% of inflow)
Center-of-Mass det. time= 28.8 min (1,316.5 - 1,287.7)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	4,913 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	100	0	0
74.00	2,760	1,430	1,430
75.00	4,205	3,483	4,913

Device	Routing	Invert	Outlet Devices
#1	Secondary	74.00'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	73.00'	**16.0" x 1.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.56 cfs @ 16.33 hrs HW=74.09' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.56 cfs @ 5.02 fps)

Secondary OutFlow Max=0.29 cfs @ 16.33 hrs HW=74.09' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.29 cfs @ 0.80 fps)

Summary for Link SP-1:

Inflow Area = 0.773 ac, 15.56% Impervious, Inflow Depth = 4.17" for 25-yr event
Inflow = 2.98 cfs @ 12.18 hrs, Volume= 0.269 af
Primary = 2.98 cfs @ 12.18 hrs, Volume= 0.269 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-2:

Inflow Area = 6.557 ac, 24.72% Impervious, Inflow Depth > 2.44" for 25-yr event
Inflow = 4.51 cfs @ 12.40 hrs, Volume= 1.335 af
Primary = 4.51 cfs @ 12.40 hrs, Volume= 1.335 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-3:

Inflow Area = 0.421 ac, 4.66% Impervious, Inflow Depth = 3.76" for 25-yr event
Inflow = 1.56 cfs @ 12.15 hrs, Volume= 0.132 af
Primary = 1.56 cfs @ 12.15 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-4:

Inflow Area = 0.619 ac, 3.65% Impervious, Inflow Depth = 3.76" for 25-yr event
Inflow = 2.37 cfs @ 12.14 hrs, Volume= 0.194 af
Primary = 2.37 cfs @ 12.14 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Link SP-5:

Inflow Area = 1.069 ac, 37.27% Impervious, Inflow Depth = 4.60" for 25-yr event
Inflow = 5.31 cfs @ 12.10 hrs, Volume= 0.410 af
Primary = 5.31 cfs @ 12.10 hrs, Volume= 0.410 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

APPENDIX 4

INSPECTION AND MAINTENANCE MANUAL

207.926.5111
info@terradynconsultants.com
www.terradynconsultants.com

WILDES DISTRICT ROAD
KENNEBUNKPORT, MAINE
STORMWATER MANAGEMENT SYSTEM
INSPECTION & MAINTENANCE PLAN

Project Owner/Developer: Beachwood Development Fund LP
P.O. Box 261
Kennebunk, ME 04043
(207) 985-3646

Responsible Party: Owner or Homeowners Association

Prepared By: Terradyn Consultants, LLC
565 Congress Street, Suite 201
Portland, ME 04101
(207) 926-5111

INTRODUCTION:

Regular inspection and maintenance of the entire stormwater management system is crucial to the long-term effectiveness of the system. The responsible party must provide regular inspection and maintenance of all permanent erosion control measures and stormwater management structures, establish any contract services required to implement the program, and keep records and a maintenance log book of inspection and maintenance activities. At a minimum, the inspection and maintenance activities outlined herein should be performed at the recommended intervals. A rainfall event of 1” in a 24 hour period would trigger a wet weather post-constrction inspection.

All measures must be maintained in effective operating condition. A person with knowledge of erosion and sedimentation practices, stormwater management, and the standards and conditions of all local, state and federal permits for the project shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected.

INSPECTION TASKS

1. Inspect **vegetated areas**, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

2. Inspect **ditches, swales and other open stormwater channels** in the spring, late fall and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, control vegetated growth that could obstruct flow and repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. The channel must receive routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or sideslopes.

3. Inspect **culverts** in the spring, in late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris at the inlet, the outlet and within the culvert. Repair any erosion damage at the culvert’s inlet and outlet.

4. Clear accumulations of winter sand **along roadways** at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder.

5. See attached **R-tank** Operation, Inspection & Maintenance documents from ACF Environmental. General Maintenance Requirements for Subsurface Sand Filters include:

    a. A legal agreement between the owner and an approved maintenance operator should identity the responsible inspector, all inspection and maintenance tasks, and all financial obligations.
    b. A legal contract with a 5 year time period should establish maintenance responsibilities and the cost to cover long-term inspection and maintenance needs.
    c. Pre-treatment Device: Cleaning of the pretreatment device should be performed at least twice per year, in the fall and spring, or if clogging or excessive sediment is observed.
    d. Drainage: The filter should be draining within 48 hours following a one-inch storm or greater.

6. The **focal point** should be inspected semi-annually and following major storm events. The following should be included in the inspection and maintenance visit. See the attached focal point specific operations & maintenance manual.

    a. Inspection of FocalPoint® HPMBS and surrounding area
    b. Removal of debris, trash and mulch
    c. Mulch replacement
    d. Plant health evaluation (including measurements) and pruning or replacement as necessary
    e. Clean area around FocalPoint® HPMBSComplete paperwork, including date stamped photos of the tasks listed above.

DOCUMENTATION

Keep a log (report) summarizing inspections, maintenance, and any corrective actions taken. The log must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal. The log must be made accessible to Maine DEP staff and a copy provided to the department upon request. The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization.

The log attached at the end of this plan is from the *Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual for Designers and Engineers (May 2016)*. The log may be used or adapted for this project.

ATTACHMENTS:
Stormwater Management Facilities Inspection & Maintenance Log
R-Tank Operation, Inspection and Maintenance Manual
Focal Point Operations and Maintenance Manual

Stormwater Management Facilities
Post Construction Inspection & Maintenance Log
Whitetail Drive Subdivision, Freeport, Maine

General Information:

Inspected by:	Date:	Weather:

Reason for Inspection: (Regular Inspection) (Major Rain Event, 1" in 24 hours)

BMP	Conditions Observed	Repairs Needed?
1. Vegetated Areas		
2. Ditches, Swales, Open Channels		
3. Culverts		
4. R-Tanks		
5. Focal Point		

Detailed Repair Notes:

BMP Type	Date	Description of Repairs & Sediment Disposal

Notes:
If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal. A copy of this log shall be retained for a period of at least five years from the completion of permanent stabilization. The log must be made accessible to Department of Environmental Protection staff and a copy provided to the Department upon request.

FocalPoint

BIOFILTRATION SYSTEMS

HIGH PERFORMANCE MODULAR BIOFILTRATION SYSTEM (HPMBS)

Operations & Maintenance

ACF ENVIRONMENTAL

Customer Focused, Environmentally Committed

GENERAL DESCRIPTION

The following general specifications describe the general operations and maintenance requirements for the FocalPoint® High Performance Modular Biofiltration System (HPMBS). The system utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban stormwater runoff. The treatment system is a fully equipped, modular, constructed in place system designed to treat contaminated runoff.

Stormwater enters the FocalPoint® HPMBS, is filtered by the High Flow Biofiltration Media and passes through to the underdrain/storage system where the treated water is detained, retained or infiltrated to sub-soils, prior to discharge to the storm sewer system of any remaining flow.

Higher flows bypass the FocalPoint® HPMBS via a downstream inlet or other overflow conveyance. Maintenance is a simple, inexpensive and safe operation that does not require confined space entry, pumping or vacuum equipment, or specialized tools. Properly trained landscape personnel can effectively maintain FocalPoint® HPMBS by following instructions in this manual.

BASIC OPERATIONS

FocalPoint® is a modular, high performance biofiltration system that often works in tandem with other integrated management practices (IMP). Contaminated stormwater runoff enters the biofiltration bed through a conveyance swale, planter box, or directly through a curb cut or false inlet. Energy is dissipated by a rock or vegetative dissipation device and is absorbed by a 3-inch layer of aged, double shredded hardwood mulch, with fines removed, (when specified) on the surface of the biofiltration media.

As the water passes through the mulch layer, most of the larger sediment particles and heavy metals are removed through sedimentation and chemical reactions with the organic material in the mulch. Water passes through the biofiltration media where the finer particles are removed and numerous chemical reactions take place to immobilize and capture pollutants in the soil media.

The cleansed water passes into the underdrain/storage system and remaining flows are directed to a storm sewer system or other appropriate discharge point. Once the pollutants are in the soil, bacteria begin to break down and metabolize the materials and the plants begin to uptake and metabolize the pollutants. Some pollutants such as heavy metals, which are chemically bound to organic particles in the mulch, are released over time as the organic matter decomposes to release the metals to the feeder roots of the plants and the cells of the bacteria in the soil where they remain and are recycled. Other pollutants such as phosphorus are chemically bound to the soil particles and released slowly back to the plants and bacteria and used in their metabolic processes. Nitrogen goes through a variety of very complex biochemical processes where it can ultimately end up in the plant/bacteria biomass, turned to nitrogen gas or dissolves back into the water column as nitrates depending on soil temperature, pH and the availability of oxygen. The pollutants ultimately are retained in the mulch, soil and biomass with some passing out of the system into the air or back into the water.

DESIGN AND INSTALLATION

Each project presents different scopes for the use of FocalPoint® HPMBS. To ensure the safe and specified function of this stormwater BMP, Convergent Water Technologies and/or its Value Added Resellers (VAR) review each application before supply. Information and design assistance is available to the design engineer during the planning process. Correct FocalPoint® sizing is essential to optimum performance. The engineer shall submit calculations for approval by the local jurisdiction when required. The contractor and/or VAR is responsible for the correct installation of FocalPoint® HPMBS units as described in approved plans. A comprehensive installation manual is available at www.convergentwater.com.

FocalPoint
BIOFILTRATION SYSTEMS

MAINTENANCE

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons for maintenance include:

- Avoid legal challenges from your jurisdiction's maintenance enforcement program.
- Prolong the lifespan of your FocalPoint® HPMBS.
- Avoid costly repairs.
- Help reduce pollutant loads leaving your property.

Simple maintenance of the FocalPoint® HPMBS is required to continue effective pollutant removal from stormwater runoff before any discharge into downstream waters. This procedure will also extend the longevity of the living biofiltration system. The unit will recycle and accumulate pollutants within the biomass, but may also subjected to other materials entering the surface of the system. This may include trash, silt and leaves etc. which will be contained above the mulch and/or biofiltration media layer. Too much silt may inhibit the FocalPoint's® HPMBS flow rate, which is a primary reason for system maintenance. Removal of accumulated silt/sediment and/or replacement of the mulch layer (when specified), is an important activity that prevents over accumulation of such silt/sediment.

When to Maintain?

Convergent Water Technologies and/or its VAR includes a 1-year maintenance plan with each system purchased. Annual included maintenance consists of two (2) scheduled maintenance visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated for full operation. Full operation is defined as when the site is appropriately stabilized, the unit is installed and activated (by VAR), i.e., when mulch (if specified) and plantings are added.

Activation should be avoided until the site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed). Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands. The fall visit helps the system by removing excessive leaf litter.

A first inspection to determine if maintenance is necessary should be performed at least twice annually after storm events of greater than (1) one inch total depth (subject to regional climate). Please refer to the maintenance checklist for specific conditions that indicate if maintenance is necessary.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required. Regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the VAR/Maintenance contractor and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the VAR/Maintenance contractor of any damage to the plant(s), which constitute(s) an integral part of the biofiltration technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance of the FocalPoint® HPMBS to the VAR/Maintenance contractor (i.e. no pruning or fertilizing).

EXCLUSION OF SERVICES

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant(s) in the FocalPoint® HPMBS.

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the VAR/Maintenance contractor maintenance contract. Should a major contamination event occur, the Owner must block off the outlet pipe of the FocalPoint® (where the cleaned runoff drains to, such as drop-inlet) and block off the point where water enters of the FocalPoint® HPMBS. The VAR/Maintenance contractor should be informed immediately.

MAINTENANCE VISIT SUMMARY

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of FocalPoint® HPMBS and surrounding area
2. Removal of debris, trash and mulch
3. Mulch replacement
4. Plant health evaluation (including measurements) and pruning or replacement as necessary
5. Clean area around FocalPoint® HPMBS
6. Complete paperwork, including date stamped photos of the tasks listed above.

MAINTENANCE TOOLS, SAFETY EQUIPMENT AND SUPPLIES

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes.

MAINTENANCE VISIT PROCEDURE

Inspection of FocalPoint® HPMBS and surrounding area

Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

- Standing Water yes | no
- Is Bypass Inlet Clear? yes | no
- Damage to HPMBS System yes | no
- to Overflow conveyance yes | no

Removal of Silt / Sediment / Clay

Dig out silt (if any) and mulch and remove trash & foreign items.

- Silt / Clay Found? yes | no
- Cups / Bags Found? yes | no
- Leaves? yes | no
- Volume of material removed _____ (volume or weight)

Removal of debris, trash and mulch

After removal of mulch and debris, measure distance from the top of the FocalPoint® HPMBS engineered media soil to the flow line elevation of the adjacent overflow conveyance. If this distance is greater than that specified on the plans (typ. 6" - 12"), add media (not top soil or other) to recharge to the distance specified.

- Distance to media surface to flow line of overflow conveyance (inches) _____
- # of Buckets of Media Added _____

Mulch Replacement

Most maintenance visits require only replacement mulch (if utilized) which must be, aged, double shredded hardwood mulch with fines removed. For smaller projects, one cubic foot of mulch will cover four square feet of biofiltration bed, and for larger projects, one cubic yard of mulch will cover 108 square feet of biofiltration bed. Some visits may require additional FocalPoint® HPMBS engineered soil media available from the VAR/Contractor.

- Add double shredded, aged hardwood mulch which has been screened to remove fines, evenly across the entire biofiltration media bed to a depth of 3".
- Clean accumulated sediment from energy dissipation system at the inlet to the FocalPoint® HPMBS to allow for entry of trash during a storm event.

Plant health evaluation and pruning or replacement as necessary

Examine the plant's health and replace if dead or dying.
Prune as necessary to encourage growth in the correct directions

- Height above Grate (feet) _____
- Width at Widest point (feet) _____
- Health alive | dead
- Damage to Plant yes | no

Clean area around FocalPoint® HPMBS

- Clean area around unit and remove all refuse to be disposed of appropriately.

Complete paperwork

- Deliver Maintenance Report and photographs as appropriate.
- Some jurisdictions may require submission of maintenance reports in accordance with approvals.
- It is the responsibility of the Owner to comply with local regulations.

FocalPoint Warranty

Seller warrants goods sold hereunder against defects in materials and workmanship only, for a period of (1) year from date the Seller activates the system into service. Seller makes no other warranties, express or implied.

Seller's liability hereunder shall be conditioned upon the Buyer's installation, maintenance, and service of the goods in strict compliance with the written instructions and specifications provided by the Seller. Any deviation from Seller's instructions and specifications or any abuse or neglect shall void warranties.

In the event of any claim upon Seller's warranty, the burden shall be upon the Buyer to prove strict compliance with all instructions and specifications provided by the Seller.

Seller's liability hereunder shall be limited only to the cost or replacement of the goods. Buyer agrees that Seller shall not be liable for any consequential losses arising from the purchase, installation, and/or use of the goods.

Maintenance Checklist

Element	Problem	What To Check	Should Exist	Action
Inlet	Excessive sediment or trash accumulation	Accumulation of sediment or trash impair free flow of water into FocalPoint	Inlet free of obstructions allowing free flow into FocalPoint System	Sediments or trash should be removed
Mulch Cover	Trash and floatable debris accumulation	Excessive trash or debris accumulation.	Minimal trash or other debris on mulch cover	Trash and debris should be removed and mulch cover raked level. Ensure that bark nugget
Mulch Cover	Ponding of water on mulch cover	Ponding in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils	Stormwater should drain freely and evenly over mulch cover.	Contact VAR for advice.
Plants	Plants not growing, or in poor condition	Soil/mulch too wet, evidence of spill. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact VAR for advice.
Plants	Plant growth excessive	Plants should be appropriate to the species and location of FocalPoint		Trim/prune plants in accordance with typical landscaping and

R-TANK OPERATION, INSPECTION & MAINTENANCE

Operation

Your ACF R-Tank System has been designed to function in conjunction with the engineered drainage system on your site, the existing municipal infrastructure, and/or the existing soils and geography of the receiving watershed. Unless your site included certain unique and rare features, the operation of your R-Tank System will be driven by naturally occurring systems and will function autonomously. However, upholding a proper schedule of Inspection & Maintenance is critical to ensuring continued functionality and optimum performance of the system.

Inspection

Both the R-Tank and all stormwater pre-treatment features incorporated into your site must be inspected regularly. Inspection frequency for your system must be determined based on the contributing drainage area, but should never exceed one year between inspections (six months during the first year of operation).

Inspections may be required more frequently for pre-treatment systems. You should refer to the manufacturer requirements for the proper inspection schedule.

With the right equipment your inspection and measurements can be accomplished from the surface without physically entering any confined spaces. If your inspection does require confined space entry, you MUST follow all local/regional requirements as well as OSHA standards.

R-Tank Systems may incorporate Inspection Ports, Maintenance Ports, and/or adjoining manholes. Each of these features are easily accessed by removing the lid at the surface. With the cover removed, a visual inspection can be performed to identify sediment deposits within the structure. Using a flashlight, ALL access points should be examined to complete a thorough inspection.

Inspection Ports
Usually located centrally in the R-Tank System, these perforated columns are designed to give the user a base-line sediment depth across the system floor.

Maintenance Ports
Usually located near the inlet and outlet connections, you'll likely find deeper deposits of heavier sediments when compared to the Inspection Ports.

Manholes
Most systems will include at least two manholes - one at the inlet and another at the outlet. There may be more than one location where stormwater enters the system, which would result in additional manholes to inspect.

Bear in mind that these manholes often include a sump below the invert of the pipe connecting to the R-Tank. These sumps are designed to capture sediment before it reaches the R-Tank, and they should be kept clean to ensure they function properly. However, existence of sediment in the sump does NOT necessarily mean sediment has accumulated in the R-Tank.

After inspecting the bottom of the structure, use a mirror on a pole (or some other device) to check for sediment or debris in the pipe connecting to the R-Tank.

R-TANK OPERATION INSPECTION & MAINTENANCE

If sediment or debris is observed in any of these structures, you should determine the depth of the material. This is typically accomplished with a stadia rod, but you should determine the best way to obtain the measurement.

All observations and measurements should be recorded on an Inspection Log kept on file. We've included a form you can use at the end of this guideline.

Maintenance

The R-Tank System should be back-flushed once sediment accumulation has reached 6" or 15% of the total system height. Use the chart below as a guideline to determine the point at which maintenance is required on your system.

R-Tank Unit	Height	Max Sediment Dept
Mini	9.5"	1.5"
Single	17"	3"
Double	34"	5"
Triple	50"	6"
Quad	67"	6"
Pent	84"	6"

Before any maintenance is performed on your system, be sure to plug the outlet pipe to prevent contamination of the adjacent systems.

To back-flush the R-Tank, water is pumped into the system through the Maintenance Ports as rapidly as possible. Water should be pumped into ALL Maintenance Ports. The turbulent action of the water moving through the R-Tank will suspend sediments which may then be pumped out.

If your system includes an Outlet Structure, this will be the ideal location to pump contaminated water out of the system. However, removal of back-flush water may be accomplished through the Maintenance Ports, as well.

For systems with large footprints that would require extensive volumes of water to properly flush the system, you should consider performing your maintenance within 24 hours of a rain event. Stormwater entering the system will aid in the suspension of sediments and reduce the volume of water required to properly flush the system.

Once removed, sediment-laden water may be captured for disposal or pumped through a Dirtbag™ (if permitted by the locality).

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Step-By-Step Inspection & Maintenance Routine

1) **Inspection**
    a. Inspection Port
        i. Remove Cap
        ii. Use flashlight to detect sediment deposits
        iii. If present, measure sediment depth with stadia rod
        iv. Record results on Maintenance Log
        v. Replace Cap
    b. Maintenance Port/s
        i. Remove Cap
        ii. Use flashlight to detect sediment deposits
        iii. If present, measure sediment depth with stadia rod
        iv. Record results on Maintenance Log
        v. Replace Cap
        vi. Repeat for ALL Maintenance Ports
    c. Adjacent Manholes
        i. Remove Cover
        ii. Use flashlight to detect sediment deposits
        iii. If present, measure sediment depth with stadia rod, accounting for depth of sump (if present)
        iv. Inspect pipes connecting to R-Tank
        v. Record results on Maintenance Log
        vi. Replace Cover
        vii. Repeat for ALL Manholes that connect to the R-Tank

2) **Maintenance**
    a. Plug system outlet to prevent discharge of back-flush water
    b. Determine best location to pump out back-flush water
    c. Remove Cap from Maintenance Port
    d. Pump water as rapidly as possible (without over-topping port) into system until at least 1”
    of water covers system bottom
    e. Replace Cap
    f. Repeat at ALL Maintenance Ports
    g. Pump out back-flush water to complete back-flushing
    h. Vacuum all adjacent structures and any other structures or stormwater pre-treatment systems that require attention
    i. Sediment-laden water may be captured for disposal or pumped through a Dirtbag™.
    j. Replace any remaining Caps or Covers
    k. Record the back-flushing event in your Maintenance Log with any relevant specifics

R-Tank Maintenance Log

Site Name:_____

Location:_____

System Owner:_____

Company Responsible for Maintenance:_____

Contact:_____

Phone Number:_____

Date	Location	Depth to Bottom	Depth to Sediment	Sediment Depth	Observations/Notes	Initials

For more information about our products, contact Inside Sales at 800.448.3636 or email at info@acfenv.com

APPENDIX 5

STORMWATER BMP CALCULATIONS

Focal Point

Tributary Area

Landscaped Area	**0**
Impervious Area	**11253**
Total	11,253

Minimum Surface Area = 174 sf per 1 ac Impervious

Required Min. SA	45
Provided SA	**63**

Minimum Volume = No less then 1:5

Required Volume	315
Provided Volume	**322**

Stage Storage

Elevation	Area (sf)	Incremental Volume (CF)	Total Volume (CF)	
78.25	63	0	0	<-- Surface of Filter
78.75	376	110	110	
79	423	100	210	
79.25	472	112	322	<-- Volume

Hydrograph for Pond 70FP: FocalPoint #1 (64 SF)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Tertiary (cfs)
0.00	0.00	0	76.50	0.00	0.00	**0.00**	**0.00**
1.00	0.00	0	76.50	0.00	0.00	0.00	0.00
2.00	0.00	0	76.50	0.00	0.00	0.00	0.00
3.00	0.00	0	76.50	0.00	0.00	0.00	0.00
4.00	0.00	0	76.50	0.00	0.00	0.00	0.00
5.00	0.00	0	76.50	0.00	0.00	0.00	0.00
6.00	0.00	0	76.50	0.00	0.00	0.00	0.00
7.00	0.00	0	76.50	0.00	0.00	0.00	0.00
8.00	0.00	0	76.50	0.00	0.00	0.00	0.00
9.00	0.00	0	76.50	0.00	0.00	0.00	0.00
10.00	0.01	0	76.51	0.01	0.01	0.00	0.00
11.00	0.01	0	76.51	0.01	0.01	0.00	0.00
12.00	**0.15**	**1**	**76.61**	**0.15**	**0.15**	0.00	0.00
13.00	**0.02**	**0**	**76.51**	**0.02**	**0.02**	0.00	0.00
14.00	0.01	0	76.51	0.01	0.01	0.00	0.00
15.00	0.01	0	76.51	0.01	0.01	0.00	0.00
16.00	0.01	0	76.50	0.01	0.01	0.00	0.00
17.00	0.01	0	76.50	0.01	0.01	0.00	0.00
18.00	0.00	0	76.50	0.00	0.00	0.00	0.00
19.00	0.00	0	76.50	0.00	0.00	0.00	0.00
20.00	0.00	0	76.50	0.00	0.00	0.00	0.00
21.00	0.00	0	76.50	0.00	0.00	0.00	0.00
22.00	0.00	0	76.50	0.00	0.00	0.00	0.00
23.00	0.00	0	76.50	0.00	0.00	0.00	0.00
24.00	0.00	0	76.50	0.00	0.00	0.00	0.00
25.00	0.00	0	76.50	0.00	0.00	0.00	0.00
26.00	0.00	0	76.50	0.00	0.00	0.00	0.00
27.00	0.00	0	76.50	0.00	0.00	0.00	0.00
28.00	0.00	0	76.50	0.00	0.00	0.00	0.00
29.00	0.00	0	76.50	0.00	0.00	0.00	0.00
30.00	0.00	0	76.50	0.00	0.00	0.00	0.00
31.00	0.00	0	76.50	0.00	0.00	0.00	0.00
32.00	0.00	0	76.50	0.00	0.00	0.00	0.00
33.00	0.00	0	76.50	0.00	0.00	0.00	0.00
34.00	0.00	0	76.50	0.00	0.00	0.00	0.00
35.00	0.00	0	76.50	0.00	0.00	0.00	0.00
36.00	0.00	0	76.50	0.00	0.00	0.00	0.00
37.00	0.00	0	76.50	0.00	0.00	0.00	0.00
38.00	0.00	0	76.50	0.00	0.00	0.00	0.00
39.00	0.00	0	76.50	0.00	0.00	0.00	0.00
40.00	0.00	0	76.50	0.00	0.00	0.00	0.00
41.00	0.00	0	76.50	0.00	0.00	0.00	0.00
42.00	0.00	0	76.50	0.00	0.00	0.00	0.00
43.00	0.00	0	76.50	0.00	0.00	0.00	0.00
44.00	0.00	0	76.50	0.00	0.00	0.00	0.00
45.00	0.00	0	76.50	0.00	0.00	0.00	0.00
46.00	0.00	0	76.50	0.00	0.00	0.00	0.00
47.00	0.00	0	76.50	0.00	0.00	0.00	0.00
48.00	0.00	0	76.50	0.00	0.00	0.00	0.00