# REGULAR MEETING <br> PLANNING BOARD <br> PORTSMOUTH, NEW HAMPSHIRE 

EILEEN DONDERO FOLEY COUNCIL CHAMBERS
CITY HALL, MUNICIPAL COMPLEX, 1 JUNKINS AVENUE
Members of the public also have the option to join the meeting over Zoom
(See below for more details)*
7:00 PM PUBLIC HEARING
October 21, 2021

## AGENDA

## I. APPROVAL OF MINUTES

A. Approval of the Planning Board minutes from the September 16, 2021 meeting.

## II. DETERMINATIONS OF COMPLETENESS

## SUBDIVISION AMENDMENT REVIEW

A. The request of Frederick W. Watson Revocable Trust (Owner), for property located at 1 Clark Drive requesting for Subdivision Amendment approval.
B. The request of Elizabeth B Larsen Trust (Owner), for property located at 668 Middle Street for Preliminary and Final Subdivision approval.

## SITE PLAN REVIEW

A. Request of Green \& Company (Applicant), and Philip J. Stokel and Stella B. Stokel (Owners) for property located at 83 Peverly Hill Road for Site Plan Review approval.
B. Request of Ricci Construction Company Inc. (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at $\mathbf{3 4 0 0}$ Lafayette Rd for Site Plan Review approval.

## III. PUBLIC HEARINGS - OLD BUSINESS

The Board's action in these matters has been deemed to be quasi-judicial in nature. If any person believes any member of the Board has a conflict of interest, that issue should be raised at this point or it will be deemed waived.
A. REQUEST TO POSTPONE The request of Banfield Realty, LLC, Owner, for property located at $\mathbf{3 7 5}$ Banfield Road requesting a Wetland Conditional Use Permit according to Section 10.1017 of the Zoning Ordinance for work related to the construction of an industrial building that will require the removal of pavement in the 100 ' wetland buffer to create a vegetated area which will receive some of the stormwater runoff from the property. Said property is shown on Assessor Map 266, Lot 7 and lies within the Industrial (I) District. REQUEST TO POSTPONE
B. REQUEST TO POSTPONE The request of Banfield Realty, LLC, Owner, for property located at $\mathbf{3 7 5}$ Banfield Road requesting Site Plan review approval to demolish two existing commercial buildings and an existing shed and construct a 75,000 s.f. industrial warehouse building with 75 parking spaces as well as associated paving, stormwater management, lighting, utilities and landscaping. Said property is shown on Assessor Map 266 Lot 7 and lies within the Industrial (I) District. REQUEST TO POSTPONE
C. Request of Green \& Company (Applicant), and Philip J. Stokel and Stella B. Stokel (Owners), for property located at $\mathbf{8 3}$ Peverly Hill Road requesting Conditional Use Permit approval for an Open Space Planned Unit Development according to the requirements of Section 10.725 of the Zoning Ordinance and Site Plan Review approval for the construction of 56 single-family homes and a new 2,950-foot public road with related utilities, landscaping, drainage and associated site improvements. Said property is shown on Assessor Map 242 Lot 4 and lie within the Single Residence A (SRA) and Single Residence B (SRB) Districts. (LU-21-74)
D. Request of Ricci Construction Company Inc. (Owner), and Green \& Company Building \& Development Corp., (Applicant), for property located at 3400 Lafayette Rd requesting a wetland Conditional Use Permit under section 10.1017 to construct 50 town homes on an undeveloped lot. The applicant is proposing five areas of wetland impact for a total of 21,350 square feet of permanent impact and three areas of temporary impact for a total of 2,350 square feet. Said property is shown on Assessor Map 297 Lot 11 and lies within the Gateway Neighborhood Mixed Use Corridor (G1) District and the Natural Resource Protection (NRP) District. (LU-2198)
E. Request of Ricci Construction Company Inc. (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at $\mathbf{3 4 0 0}$ Lafayette Rd requesting Conditional Use Permit for a Development Site in accordance with Section 10.5B40 of the Zoning Ordinance and Site Plan Review approval for construction of a 50-unit multi-family residential development that includes community space and related landscaping, drainage, paving, utilities and other site
improvements. Said property is shown on Assessor Map 297 Lot 11 and lies within the Gateway Neighborhood Mixed Use Corridor (G1) District and the Natural Resource Protection (NRP) District. (LU-21-98)

## IV. PUBLIC HEARINGS - NEW BUSINESS

A. The request of Karen Butz Webb Revocable Living Trust (Owner), for the property located at 910 Sagamore Avenue requesting a Wetland Conditional Use Permit according to article 10.1017 to expand an enclosed living space by 362 square feet which will create a disturbance of 3,375 square feet within the inland wetland buffer. The living space is supported by piles over an area of crushed stone to allow infiltration of stormwater. The roof runoff will be captured in gutters which will be directed to stone infiltration trenches with 4' x 4 ' stone outlet area for any stormwater that does not infiltrate. The applicant is disconnecting the existing septic system and will connect to a new City sewer line. The mowing of the wetland at the rear of the property will be discontinued and the area will be planted with wildflowers and other buffer plantings. Said property is shown on Assesor Map 223 Lot 26A and lies within the Waterfront Business (WB) District. (LU-21-170)
B. The request of Elizabeth B Larsen Trust (Owner), for property located at $\mathbf{6 6 8}$ Middle Street requesting Preliminary and Final Subdivision approval to subdivide 1 existing lot with 81,046 square feet of lot area, and 69.83 feet of street frontage into 3 lots as follows: Proposed Lot 1 with 18,646 square feet of lot area and no street frontage; Proposed Lot 2 with 18,756 square feet of lot area and no street frontage; Proposed Lot 3 with 43,644 square feet of lot area and 69.83 feet of street frontage. The existing buildings will remain and be on Proposed Lot 3. Said property is shown on Assessor Map 147 Lot 18 and lies within the General Residence A (GRA) and Historic Districts. (LU-21-23)
C. The request of Frederick W. Watson Revocable Trust (Owner), for property located at 1 Clark Drive requesting Amended Subdivision approval to correct the previously approved plan, approved on March 18, 2021, to include an additional lot that encompasses the proposed road with an area of 25,524 square feet, bringing the total to five (5) proposed lots. The previously approved plan consists of four (4) residential lots that will not be changing in size or shape and have the following dimensions: Proposed lot 1 with an area of 20,277 s.f. and 137.23 ft . of continuous street frontage; Proposed Lot 2 with an area of 17,103 s.f. and 100 ft . of continuous street frontage; Proposed Lot 3 with an area of 20,211 s.f. and 100 ft . of continuous street frontage; and Proposed Lot 4 with an area of 53,044 s.f. and 592.50 ft . of continuous street frontage. Said property is shown on Assessor Map 209 Lot 33 and lies within the Single Residence B (SRB) District. (LU-2110)

## V. PUBLIC HEARING - CITY COUNCIL REFERRALS

A. The request of Borthwick Forest, LLC (Owner), for Amended Easement Documents for the property located at $\mathbf{0}$ Borthwick Forest, now known as Eileen Dondero Foley Avenue, to amend four easements relative to the Approved Site Plan for Borthwick Forest. Easements are specific to municipal rights to both new and existing public water lines as well as to public bicycle and pedestrian infrastructure. Easements include the following subject properties: Map 234 Lot 07-4a, Map 241 Lots 25 and 25-1, Map 165 Lot Lot 14, Map 233 Lots 111, 114 and 115.

## VI. DESIGN REVIEW APPLICATION ACCEPTANCE

A. The proposed project is the application of Hill Hanover Group, LLC (Applicant), for the property located at $\mathbf{1 8 1}$ Hill Street, for the demolition of three existing buildings and the construction of one three story building containing 12 units with basement level parking accessed from Autumn Street. Said property is shown on Assessor Map 125 Lot 14 and lies within the Character District 4-L1 (CD4-L1) (LUPD-21-9)

## VII. OTHER BUSINESS

## VIII. ADJOURNMENT

*Members of the public also have the option to join the meeting over Zoom, a unique meeting ID and password will be provided once you register. To register, click on the link below or copy and paste this into your web browser:
https://us06web.zoom.us/webinar/register/WN G8lgUl-PQUalwedur05ydQ

# REGULAR MEETING <br> PLANNING BOARD PORTSMOUTH, NEW HAMPSHIRE 

# EILEEN DONDERO FOLEY COUNCIL CHAMBERS CITY HALL, MUNICIPAL COMPLEX, 1 JUNKINS AVENUE 

## MINUTES

MEMBERS PRESENT:
Dexter Legg, Chair; Elizabeth Moreau, Vice Chair Karen Conard, City Manager; Ray Pezzullo, Assistant City Engineer; Colby Gamester; Corey Clark; and Rick Chellman

ALSO PRESENT: Peter Britz, Interim Planning Director; Stefanie Casella, Planner 1
MEMBERS ABSENT: Peter Harris and Polly Henkel, Alternate

## I. PRESENTATIONS

A. FY 2023-2028 Capital Improvement Plan Process and Schedule

Peter Britz provided an overview of the CIP process to the Planning Board. An overview and the schedule can be found on the City's web site. The CIP is a City Charter requirement. The program covers the next 6 years of capital improvements. The Planning Board oversees the plan and then the City Council adopts it. That helps inform the City's budget. The deadline for the citizen suggestion period is in October. The Planning Board has an information meeting in November. In December the Planning Board forms a CIP Advisory Committee to review the project proposals. Then the Planning Board approves the CIP and sends it to the City Council. The City Council has a work session on it in January/February. Then they adopt it in March. The CIP projects typically include larger one-time purchases or infrequent expenditures. The project requests must include a justification, cost, and schedule. Citizens can make requests online. There is criteria to evaluate why a project is needed and prioritize how it fits in. Sources for projects include federal mandates, infrastructure, city priorities identified in planning, and other city policies. The financing depends on the cost of the project, lifetime of the project and what other revenue sources are available. Some sources include the general fund, federal or state grants, revenue or bonds, and public/private partnerships. Projects are sorted by what can be implemented within 3 years, 6 years, after 6 years and ongoing allocations. The budget process begins in December. The CIP must be completed 45 days before the budget is adopted. Typically, the target is to use $2 \%$ or less of the general fund budget.

## II. APPROVAL OF MINUTES

A. Approval of the Planning Board minutes from the August 19, 2021 meeting.

Vice Chairman Moreau moved to approve the minutes from the August 19, 2021, meeting, seconded by Mr. Gamester. The motion passed unanimously.

## III. DETERMINATIONS OF COMPLETENESS

SITE PLAN REVIEW
A. Request of Green \& Company (Applicant) and Philip J. Stokel and Stella B. Stokel (Owners) for property located at $\mathbf{8 3}$ Peverly Hill Road for Site Plan Review approval.
B. Request of Ricci Construction Company Inc, (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at $\mathbf{3 4 0 0}$ Lafayette Rd for Site Plan Review approval.

Chairman Legg commented that these applications would be postponed later in the agenda.

## SUBDIVISION

C. Request of 64 Vaughan Mall, LLC and Northern Tier Real Estate Acquisition \& Development, LLC, (Owners) for properties located at 64 Vaughan Street (Lot 1) and 172 Hanover Street (Lot 1-A), requesting Preliminary and Final Subdivision approval (Lot Line Revision).

Vice Chairman Moreau moved to determine that the application is complete according to the Subdivision Rules and Regulations, (contingent on the granting of any required waivers under Section VI of the agenda) and to accept the application for consideration, seconded by Mr. Gamester. The motion passed unanimously.

## IV. PUBLIC HEARINGS - OLD BUSINESS

The Board's action in these matters has been deemed to be quasi-judicial in nature. If any person believes any member of the Board has a conflict of interest, that issue should be raised at this point or it will be deemed waived.
A. Request of Brora, LLC, Owner, and 210 Commerce Way LLC, Applicant, for property located at Shearwater Drive (at intersection of Portsmouth Boulevard and Market Street) for a Wetland Conditional Use Permit according to Section 10.1017 of the Zoning Ordinance for an after the fact approval for cutting of vegetation on 88,700 square feet in the wetland and vegetated buffer areas. Said property is shown on Assessor Map 217 Lot 2-1975 and lies within the Office Research (OR) District.

## SPEAKING TO THE APPLICATION

James Gove from Gove Environmental Services spoke to the application. There was a misunderstanding with the landscaper who was removing the invasive species on the site. The cat tails are invasive, but they are also native. They are not on the invasive species list for the state of New Hampshire. This is an after the fact application. They have worked with Mr. Britz and the Conservation Commission on this. There was no physical damage to the wetland. The vegetation grew back. They had a landscape architect put together a long-term maintenance plan. They will remove invasive plants and add protection and signage. This will not happen again.

Chairman Legg questioned if markers would be installed to indicate the buffer. Mr. Gove confirmed there would.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Mr. Clark moved to approve the wetland Conditional Use Permit as presented, seconded by Mr. Gamester. The motion passed unanimously.

City Council Representative Whelan questioned if the Conservation Commission voted on this. Mr. Britz confirmed that they did.
B. REQUEST TO POSTPONE Request of Banfield Realty, LLC, Owner, for property located at $\mathbf{3 7 5}$ Banfield Road requesting Site Plan review approval to demolish two existing commercial buildings and an existing shed and construct a 75,000 s.f. industrial warehouse building with 75 parking spaces as well as associated paving, stormwater management, lighting, utilities and landscaping. Said property is shown on Assessor Map 266 Lot 7 and lies within the Industrial (I) District.
REQUEST TO POSTPONE

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application to the October 21, 2021, Planning Board Meeting, seconded by Mr. Gamester. The motion passed unanimously.
C. REQUEST TO POSTPONE Request of Banfield Realty, LLC, Owner, for property located at $\mathbf{3 7 5}$ Banfield Road requesting a Wetland Conditional Use Permit according to Section 10.1017 of the Zoning Ordinance for work related to the construction of an industrial building that will require the removal of pavement in the 100 ' wetland buffer to create a vegetated area which will receive some of the stormwater runoff from the property. Said property is shown on Assessor Map 266, Lot 7 and lies within the Industrial (I) District. REQUEST TO POSTPONE

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application to the October 21, 2021, Planning Board Meeting, seconded by Mr. Gamester. The motion passed unanimously.


#### Abstract

D. REQUEST TO POSTPONE Request of The Fritz Family Revocable Living Trust, Owner, for property located at 0 Patricia Drive for amended subdivision approval to revise the roadway design and stormwater treatment for a previously approved subdivision that proposes to subdivide a lot with an area of 137,549 s.f. and 414.15 of continuous street frontage on a private road into two (2) lots as follows: Proposed lot 1 with an area of 92,908 s.f. and 150 ft . of continuous street frontage on a private road; and Proposed Lot 2 with an area of 44,641 s.f. and 264.15 ft . of continuous street frontage on a private road. Said property is shown on Assessor Map 283 Lot 11 and lies within the Single Residence A (SRA) District. REQUEST TO POSTPONE


## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone the public hearing indefinitely until the applicant is ready to proceed, seconded by Mr. Gamester. The motion passed unanimously.
E. REQUEST TO POSTPONE Request of The Fritz Family Revocable Living Trust, Owner, for property located at 0 Patricia Drive for amended wetland Conditional Use Permit approval under Section 10.1017 of the Zoning Ordinance to revise the roadway design and stormwater treatment for a previously approved subdivision which will result in 5,718 square feet of temporary wetland buffer impact. Said property is shown on Assessor Map 283 Lot 11 and lies within the Single Residence A (SRA) District. REQUEST TO POSTPONE

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application indefinitely, seconded by Mr. Gamester. The motion passed unanimously.
F. Request of Green \& Company (Applicant) and Philip J. Stokel and Stella B. Stokel (Owners) for property located at $\mathbf{8 3}$ Peverly Hill Road requesting Conditional Use Permit approval for an Open Space Planned Unit Development according to the requirements of Section 10.725 of the Zoning Ordinance and Site Plan Review approval for the construction of 56 single-family homes and a new 2,950-foot public road with related utilities, landscaping, drainage and associated site improvements. Said property is shown on Assessor Map 242 Lot 4 and lie within the Single Residence A (SRA) and Single Residence B (SRB) Districts.

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application to the October 21, 2021, Planning Board Meeting, seconded by Mr. Clark. The motion passed unanimously.

## V. PUBLIC HEARINGS - CITY COUNCIL REFERRALS (OLD BUSINESS)

A. REQUEST TO POSTPONE Request of David Higgins and Julia Higgins, Owners, for the restoration of involuntarily merged lots at $\mathbf{3 4 4}$ Aldrich Road to their pre-merger status pursuant to NH RSA 674:39-aa. Said property is shown on Assessor Map 166 Lot 50 and lies within the Single Residence B (SRB) District. REQUEST TO POSTPONE

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application indefinitely, seconded by Mr. Gamester. The motion passed unanimously.

## VI. PUBLIC HEARINGS - NEW BUSINESS

A. Request of Ricci Construction Company Inc, (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at $\mathbf{3 4 0 0}$ Lafayette Rd requesting Conditional Use Permit for a Development Site in accordance with Section 10.5B40 of the Zoning Ordinance and Site Plan Review approval for construction of a 50-unit multi-family residential development that includes community space and related landscaping, drainage, paving, utilities and other site improvements. Said property is shown on Assessor Map 297 Lot 11 and lies within the Gateway Neighborhood Mixed Use Corridor (G1) District and the Natural Resource Protection (NRP) District.

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application to the October 21, 2021, Planning Board Meeting, seconded by Mr. Gamester. The motion passed unanimously.
B. Request of Ricci Construction Company Inc, (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at 3400 Lafayette Rd requesting a wetland Conditional Use Permit under section 10.1017 to construct 50 town homes on an undeveloped lot. The applicant is proposing five areas of wetland impact for a total of 21,350 square feet of permanent impact and three areas of temporary impact for a total of 2,350 square feet. Said property is shown on Assessor Map 297 Lot 11 and lies within the Gateway Neighborhood Mixed Use Corridor (G1) District and the Natural Resource Protection (NRP) District.

## DISCUSSION AND DECISION OF THE BOARD

City Council Representative Whelan moved to postpone this application to the October 21, 2021, Planning Board Meeting, seconded by Mr. Gamester. The motion passed unanimously.


#### Abstract

C. Request of Kelly Property Trust A.B. and Ashley W.M. (Owners), for property located at $\mathbf{0}$ Oriental Gardens requesting an application for a wetland Conditional Use Permit under section 10.1017 to remove existing obsolete sewer infrastructure and improve a storm water outfall on the site with a proposed temporary impact of 4,554 square feet and permanent impact of 187 square feet. Said property is shown on Assessor Map 215 Lot 9 and lies within the Gateway Corridor (G1) and Office Research (OR) Districts.


## SPEAKING TO THE APPLICATION

John Chagnon from Ambit Engineering spoke to the application. The project is in the park known as Oriental Gardens. The CUP is for drainage maintenance and sewer improvements. This was approved by the Planning Board in 2017 but the permit lapsed. A portion of the sewer will be removed from the existing pump station and connected to the existing trunk line. There will be drainage maintenance to clean up an outfall. The drainage pipe runs through Starbucks and drains onto this property. It is partially plugged with sediment. That will be removed, and a plunge pool will be installed to keep it open longer. There is a small area of direct wetland impact. The rest of the impacted area is in the buffer. The Conservation Commission unanimously recommended approval.

Mr. Pezzullo commented that the DPW was reviewing this connection and questioned if they had approved it. Mr. Chagnon responded that they have met with DPW. They are making some minor changes to the connection plan. They are reviewing it and Mr. Chagnon expected to receive approval. Chairman Legg noted that it could be a condition of approval.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Mr. Gamester moved to grant wetland Conditional Use Permit, seconded by Vice Chairman Moreau with the following stipulation:

1. City of Portsmouth Department of Public Works shall provide final approval of stormwater improvements.

The motion passed unanimously.
D. Request of Spaulding Group, LLC, (Owner) for property located at 180 Spaulding Turnpike requesting a wetland Conditional Use Permit under section 10.1017 to expand and reconstruct an existing building within the wetland buffer. The application calls for temporary impacts of 2,528 square feet and permanent impacts of 3,287 square feet. The entire application is proposed where the site is completely impervious surface where a portion of pavement is being converted in to a building. Said property is shown on Assessor Map 236 Lot 39 and lies within the General Business (GB) District.

## SPEAKING TO THE APPLICATION

John Chagnon from Ambit Engineering spoke to the application. They were here last month for a site plan approval. This is for a CUP. There is no increase in impervious area. The plan shows the permanent and temporary impacts. The addition is to keep up with Mazda's corporate image and cover the drop off service area. The Conservation Commission recommended approval. A letter of support from the abutter Port City Nissan was included in the packet.

Chairman Legg commented that this application was reviewed in detail in the August Meeting. If anyone wanted to know more, then they could find that discussion on the City's YouTube channel.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Vice Chairman Moreau moved to grant approval of the wetland Conditional Use Permit as presented, seconded by Mr. Clark.

Vice Chairman Moreau commented that the lot is already developed, and this will provide better runoff treatment.

Mr. Chellman commented that this points out a weakness in the ordinance. It could be modified to better address a situation like this.

The motion passed unanimously.
E. Request of Ivo and Caitlin Van Der Graaff, (Owners) for property located at 10 FW Hartford Drive requesting a wetland Conditional Use Permit according to section 10.1010 of the City's Zoning Ordinance to remove 15 trees 12 of which are located in the wetland or wetland buffer adjacent to the residence at 10 FW Hartford. The removal of the trees will result in a disturbance of 450 square feet in the wetland area and 500 square feet in the inland wetland buffer. Said property is shown on Assessor Map 269 Lot 53 and lies within the Single Residence B (SRB) District.

## SPEAKING TO THE APPLICATION

Ivo Van Der Graff spoke to the application. They moved into their home a year ago. There are several trees that need to be removed. The trees labeled 8-14 are in the wetland area and need to be removed because they are hanging over the house. Trees 4-7 and 15 are in the buffer. Trees $1-3$ are outside the wetland and buffer. The Conservation Commission recommended approval unanimously. Mr. Van De Graff agreed to leave the trees in the wetland in place and will plant new shrubs on his property.

Chairman Legg clarified that the stump and felled tree would be left in the wetland. Mr. Van De Graff confirmed that was correct.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Vice Chairman Moreau moved to grant approval of the wetland Conditional Use Permit, seconded by Mr. Clark with the following stipulations:
o The stumps and trees that are cut shall be left in place
o The applicant install native plants along the edge of the wetland in the buffer

- The property owner shall utilize NOFA (Northeast Organic Farming Association) approved practices (or comparable equivalent) for the maintenance of landscaped areas

The motion passed unanimously.
F. Request of 64 Vaughan Mall, LLC and Northern Tier Real Estate Acquisition \& Development, LLC, (Owners) for properties located at 64 Vaughan Street (Lot 1) and 172 Hanover Street (Lot 1-A), requesting Preliminary and Final Subdivision approval (Lot Line Revision) to convey 133 square feet from Lot 1 to Lot 1-A which will result in a total lot area of 13,964 square feet of lot area for Lot 1 and 5,621 square feet of lot area for Lot 1-A. Said properties are shown on Assessor Map 126 Lot 1 and Lot 1-A and lie within the Character District 5 (CD5), Downtown Overlay District, and Historic District.

## SPEAKING TO THE APPLICATION

Shane Forsley spoke to the application. They came here last month for a site plan review. A few documents were delayed. They have now been submitted. The easement and boundary line agreement will benefit both properties. This allows the neighbor to their land fire escape for their building on this property.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Vice Chairman Moreau moved to grant Preliminary and Final Subdivision (Lot Line Revision) Approval, seconded by Mr. Gamester with the following stipulations:
o Property monuments shall be set as required by the Department of Public Works prior to the filing of the plat.
o GIS data shall be provided to the Department of Public Works in the form as required by the City.
o The final plat and all easement deeds shall be recorded concurrently at the Registry of Deeds by the City or as deemed appropriate by the Planning Department.

The motion passed unanimously.
G. Request of Mary M. Griffin, (Owner), for property located at 7 Curriers Cove requesting a wetland Conditional Use Permit under section 10.1017. The applicant is proposing to replace and failing culvert under the Currier's Cove roadway with 192 square feet of wetland disturbance and 1,208 square feet of wetland buffer disturbance. The existing 36 "corrugated metal culvert is proposed to be replaced with a reinforced concrete culvert four feet shorter than the existing culvert with new concrete headwalls for both the inlet and outlet location with areas of rip rap proposed to dissipate energy on the outlet side and to protect the inlet side from erosion and undercutting. The application also proposed removal of existing vegetation and includes a planting plan for new vegetation. Said properties are shown on Assessor Map 204 Lot 16 and lie within the Single Residence A (SRA) District.

## SPEAKING TO THE APPLICATION

Chase Bailey Manager of the Currier's Cove Association spoke to the application. Eric Weinrieb from Altus Engineering designed this plan. Mr. Bailey did not know the details of the plan but could answer questions if needed.

Chairman Legg questioned how this would be installed without impacting access to the property. Mr. Bailey responded that they would do it half and half.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Mr. Clark moved to grant the wetland Conditional Use Permit, seconded by Mr. Gamester with the following stipulation:
o The arbor vitea that is being removed shall be replaced by evergreen shrubs to be planted in at least equal number to those being removed.

Mr. Clark commented that this was a dangerous situation, and it should be addressed immediately. It's a public safety issue. Chairman Legg agreed and noted that they would be replacing it with a higher quality culvert.

The motion passed unanimously.

## VII. DESIGN REVIEW

A. Request of $\mathbf{2 4 2 2}$ Lafayette Road Associates, LLC C/O Waterstone Retail (Owner) for property located at $\mathbf{2 4 5 4}$ Lafayette Road requesting Design Review Approval to demolish the existing 29,000 square foot structure and replace it with a 41,000 square foot footprint structure consisting of five (5) stories and 100 multi-family condominium units. Said property is shown on Assessor Map 273 Lot 3 and lies within the Gateway Corridor (G1) District.

## SPEAKING TO THE APPLICATION

Patrick Crimmins, Jay Bisognano and Gregg Mikolaities spoke to the presentation. Mr.
Crimmins noted that they presented the concept consultation in August. The proposed building is in the north corner of Portsmouth Green. The site is 950 feet back from the intersection at Route 1. Last month the Board provided feedback on connectivity and community space. This is a 95unit multifamily building with parking underneath and $20 \%$ affordable housing. The community space is 3 times larger than what was presented last month. This plan has improved connectivity
to it as well. There is a patio seating area and pickle ball courts. One comment from last month was about providing a connection to the Veridian building in the back. The plan is to bring Veridian residents down the sidewalk along Pinz and connect that to the community space. The community space is about $14 \%$ of the total area. It is $150,00 \mathrm{sf}$ total area. There will be dog park in the area. There is an existing dog park behind the cinema now. The new one will be double the size of what exists out there. There will be connectivity from the building to the park and then out to the plaza. A chamfer at the entrance was added to help break up the façade. The fitness center and wifi lounge amenities were moved out to the front corner of the building. The intent is to activate the corner of the building and tie it in with the rest of the plaza. There were some modifications to the parking, but the target is 2 spots per unit. The infrastructure and stormwater can be reused. The plan will reduce the amount of impervious surface on the site. Utilities are already all in place.

Mr. Clark questioned if the pickle ball courts would be open to the public. Mr. Crimmins confirmed that was correct.

Chairman Legg commented that it is important to sign that appropriately. The City should document all of these public spaces and make it fully visible to the public.

Mr. Clark commented that he appreciated the quality of this community space. It is a good use of space.

Vice Chairman Moreau requested more information about the corner of the building. Mr. Crimmins responded that the intent is to activate that corner by moving the fitness center and wifi lounge to that area. They were previously deeper in the building. The façade for that corner will be all windows.

Mr. Chellman commented that a list of all the CUPs related to this project would be helpful. Mr. Chellman questioned if they looked at breaking this building up into smaller buildings. Mr. Mikolaities responded that they did look at that. They looked at 4 buildings but the second-floor garden space would not work with multiple buildings. Mr. Chellman clarified that the multiple buildings would not accommodate the amenities. Mr. Mikolaities responded that they worked hard to get the building to fit. They looked at multiple buildings, but the one large building works the best.

Mr. Chellman questioned how many CUP's they were seeking. Mr. Crimmins responded that they will be described in the cover letter on the formal submission. The biggest one is the building size.

## PUBLIC HEARING

Chairman Legg asked if anyone was present from the public wishing to speak to, for, or against the petition. Seeing no one rise, the Chair closed the public hearing.

## DISCUSSION AND DECISION OF THE BOARD

Vice Chairman Moreau moved to find that the design review process is complete, seconded by Mr. Gamester. The motion passed unanimously.

## VIII. OTHER BUSINESS

## A. Request of Spyglass Development, LLC \& C/O The Kane Company (Owners).

 Proposed lot line revision is located at $\mathbf{3 0}$ New Hampshire Drive which is identified as Map 301 Lot 3 on the City of Portsmouth Tax Maps. The proposed revision is to reduce the lot of record from the existing 369,643 sf to 314,607 sf30 New Hampshire Avenue.Patrick Crimmins commented that this was a request through the PDA process. They are making their headquarters at this building. At one point in time the land was partially owned by the PDA. The building was leased partially from the PDA. This is to re-subdivide the land. It is creating some lots that are not conforming, so that is why it's here.

Chairman Legg commented that there was a memo from the PDA that indicates their requirements do not require a public hearing.

Mr. Gamester moved to recommend approval of the lot line revision, seconded by Mr. Clark The motion passed unanimously.

## VIV. ADJOURNMENT

Vice Chairman Moreau moved to adjourn the meeting at 8:00 p.m., seconded by Mr. Gamester. The motion passed unanimously.

Respectfully submitted,
Becky Frey, Secretary for the Planning Board

## Memorandum

| To: | Planning Board |
| :--- | :--- |
| From: | Peter Britz, Acting Planning Director |
|  | Stefanie L. Casella, Planner |
| Date: | October 15, 2021 |
| Re: | Recommendations for the October 21, 2021 Planning Board Meeting |

## I. DETERMINATIONS OF COMPLETENESS

## SUBDIVISION AMENDMENT REVIEW

A. The request of Frederick W. Watson Revocable Trust (Owner), for property located at 1 Clark Drive requesting for Subdivision Amendment approval.
B. The request of Elizabeth B Larsen Trust (Owner), for property located at 668 Middle Street for Preliminary and Final Subdivision approval.

## SITE PLAN REVIEW

A. Request of Green \& Company (Applicant), and Philip J. Stokel and Stella B. Stokel (Owners) for property located at 83 Peverly Hill Road for Site Plan Review approval.
B. Request of Ricci Construction Company Inc. (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at $\mathbf{3 4 0 0}$ Lafayette Rd for Site Plan Review approval.

## II. PUBLIC HEARINGS -- OLD BUSINESS

The Board's action in these matters has been deemed to be quasi-judicial in nature. If any person believes any member of the Board has a conflict of interest, that issue should be raised at this point or it will be deemed waived.

It is recommended that Item II.A and II.B be discussed together and voted on separately.

A motion is required to consider these items together.
A. REQUEST TO POSTPONE The request of Banfield Realty, LLC, Owner, for property located at 375 Banfield Road requesting a Wetland Conditional Use Permit according to Section 10.1017 of the Zoning Ordinance for work related to the construction of an industrial building that will require the removal of pavement in the 100 ' wetland buffer to create a vegetated area which will receive some of the stormwater runoff from the property. Said property is shown on Assessor Map 266, Lot 7 and lies within the Industrial (I) District. REQUEST TO POSTPONE
B. REQUEST TO POSTPONE The request of Banfield Realty, LLC, Owner, for property located at 375 Banfield Road requesting Site Plan review approval to demolish two existing commercial buildings and an existing shed and construct a 75,000 s.f. industrial warehouse building with 75 parking spaces as well as associated paving, stormwater management, lighting, utilities and landscaping. Said property is shown on Assessor Map 266 Lot 7 and lies within the Industrial (I) District. REQUEST TO POSTPONE

Description
These applications are still pending TAC and Conservation Commission review.

## Planning Department Recommendation

Vote to postpone these items to the November Planning Board meeting.

## II. PUBLIC HEARINGS -- OLD BUSINESS

C. Request of Green \& Company (Applicant), and Philip J. Stokel and Stella B.

Stokel (Owners), for property located at 83 Peverly Hill Road requesting Conditional Use Permit approval for an Open Space Planned Unit Development according to the requirements of Section 10.725 of the Zoning Ordinance and Site Plan Review approval for the construction of 56 singlefamily homes and a new 2,950-foot public road with related utilities, landscaping, drainage and associated site improvements. Said property is shown on Assessor Map 242 Lot 4 and lie within the Single Residence A (SRA) and Single Residence B (SRB) Districts. (LU-21-74)

Open Space Planned Unit Development Conditional Use Permit and Site Plan Review Approval

According to the Zoning Ordinance, the purpose of allowing open space planned unit developments is to permit a higher density clustering of residential units than a conventional subdivision in order to preserve natural features and create usable open space. The base residential density for an OSPUD is calculated in either one of the following ways:

- The number obtained by dividing the developable area of the parcel by the minimum lot area per dwelling unit required in the underlying zoning district.
- The number of lots that could be developed in a conventional subdivision of the lot.

The developable area excludes open water bodies, wetlands, floodplains, slopes exceeding 15 percent, and areas subject to existing valid open space restrictions.

In addition to allowing clustering of the residential units (rather than spreading out on individual conforming lots) an OSPUD has reduced requirements for interior building setbacks and allows for a variety of residential types (single family dwelling, two-family dwelling, townhouse, and multifamily dwelling).

An OSPUD must dedicate at least 25 percent of the total site area as permanently protected common open space according to the following guidelines/requirements:

- A portion of the minimum required open space must be developable area that is at least equal to the portion of the overall site that is developable. In order to comply with this requirement for this site, the applicant must include 6 acres of developable area in the permanently protected open space area.
- Preserved in perpetuity by restrictive covenant owned by either a private, nonprofit corporation, association, or other non-profit legal entity (such as a condominium agreement or homeowners association), a public body (such as the City), a private non-profit organization (such as The Nature Conservancy).
- Linear open space that connects or contributes to other public or private open space is encouraged.
- Regulated public access to the common open space is encouraged.

The approval process for an OSPUD follows the procedures and standards for BOTH the City's Subdivision Rules and Regulations and Site Plan Review Regulations and therefore is subject to Technical Advisory Committee Review. In addition, the Conservation Commission shall be afforded an opportunity to comment on the particulars of a proposed PUD, including but not limited to the natural features of the parcel and how these may be impacted by the proposed project.

Prior to granting a conditional use permit for an OSPUD, the Planning Board must make the following findings:

1) The site is appropriate for an OSPUD.
2) The anticipated impacts of the proposed OSPUD on traffic, market values, stormwater runoff or environmental factors will not be more detrimental to the surrounding area than the impacts of conventional residential development of the site.

At its discretion, the Planning Board shall consider one of the following courses of action when considering a project submitted under the OSPUD requirements of the Ordinance:

- To grant a conditional use permit for the maximum number of allowable dwelling units authorized;
- To grant a conditional use permit for a number of dwelling units which is less than the maximum number authorized;
- To deny the conditional use permit.

Representations made at public hearings or in materials submitted to the Planning Board by an applicant for a conditional use permit for a PUD (including specifications for exterior building design and features; dwelling types, e.g., garden style, townhouse, free standing; dwelling unit sizes; number of buildings on lot; mix of market rate and affordable units; and parking) shall be deemed conditions and shall be documented in a development agreement entered into between the applicant and the City. Said development agreement must be reviewed and approved by the City Attorney prior to Planning Board approval of a conditional use permit. The applicant has submitted the draft development agreement to the City Attorney for review. Staff will advise the Planning Board on the status of that review at the meeting.

## Technical Advisory Committee Review

The TAC reviewed this application at the August 3, 2021 meeting and voted to recommend approval with the following stipulations:

1. Applicant will construct a temporary shared use path to connect to the existing sidewalk network and install crossing equipment to cross Peverly Hill Road at Middle Rd.
2. Applicant should provide detailed written confirmation that the application meets all of the requirements of Article 7 of the Site Plan Review regulations as these relate to stormwater management, specifically that the post-development flows all meet or decrease the pre-development stormwater flows.
3. Update subdivision and site plan review checklists prior to submission to PB.
4. Road profiles will show geometry, sewer manhole numbers, and inverts.
5. Final calculations regarding both the gravity and force sewer systems will be provided.
6. Cross slope percentages will be added as details.
7. Pavement will be used instead of pavers for areas of road that are widened at hydrant areas.
8. Water main shall be cl 52 CLDI wrapped in polyethylene with continuity wedges as per City Standards and called on in detail.
9. Design of Irrigation systems for houses will use smart controls and noted on plan set.
10. NHDES Sewer extension permit will be obtained.
11. Force main's entry into the gravity sewer will be detailed in plan set.
12. Reroute water main at entrance to provide separation from sewer line.
13. Show expanded tree clearing for City vehicle access.

After reviewing the revised plans submitted subsequent to TAC review, staff provided the following additional comments:

## To be addressed by applicant prior to Planning Board review

1. Engineer indicated that Section 7.6.2 - Enhanced Stormwater Standards for New and Redevelopment Disturbing More than 15,000 square feet of Area is Not Applicable to this submission. The City does not agree/ Engineer to address.
2. Drainage pipes alignment and manhole locations interfere with water main pipes and water services in multiple areas. Engineer to address.
3. Engineer to submit calculations for drainage pipe sizing to verify sizes shown.
4. It appears that spacing of CB's will not have sufficient inlet capacity to accommodate stormwater flow for the larger storms which might not correlate to the drainage analysis/report and pipe sizing calculations. Possible additional CB's may be considered. Engineer to address.
5. The naming of a public roadway is the purview of the City Council with recommendations from the Planning Board. If you have a specific roadway name in mind that you would like to request, that should be part of your presentation package to the Planning Board. It is helpful to include an explanation for the road name you are requesting.

Recommended for Conditions of Planning Board approval (some of these will be required prior to building permit issuance, others can be completed subsequent)
6. All easements to benefit the City shall be reviewed and approved by the DPW, Planning and Legal Departments prior to final acceptance by the City Council. In most cases, metes and bounds describing the easement area shall be required.
7. It is understood the homeowners and/or homeowners association will own all stormwater facilities, drainage pipes and outfalls outside the roadway easement/ROW. This will include all activities associated with ownership and maintenance of the stormwater facilities and pipelines. For this reason, easements will be required in order for the City to have drainage and flowage rights for any stormwater draining from the public road into the private facilities or across private property.
8. Road Plan/Profile is missing information including roadway horizontal curve information, stationing and pipe sizes at SMH's and CB's, pipe material. The City
will complete the design review once a revised plan set is received and additional comments may be provided.
9. Low pressure sewer force main appears to be excessively deep in areas. Engineer to address/redesign and final design shall be subject to DPW review and approval. City may require third party review at applicant's expense.
10. All "Cleanout/Air Vacuum" and "Terminal Manholes" for the sewer force main need to be clearly located and called out on the plan view and detail sheet.
11. Details and design for the proposed retaining wall along proposed roadway shall be designed by a qualified registered engineer. Design and wall type shall be reviewed and approved by DPW prior to building permit approval. Details shall include the required guard rail and drainage pipe penetration.
12. Plans indicated a significant amount of the construction for new utilities and roadway will be in areas to be filled. The approach to construction will be important for the stability of the proposed utilities and longevity or the roadway. A Construction Mitigation and Management Plan shall be required for this project, to include a proposed approach to progress of constructions in the areas with significant fill.
13. The City will require a full set of construction plans and specifications prior to construction. This will be reviewed by a third party at the cost of the applicant.
14. The applicant shall agree to pay for the services of an oversight engineer, to be selected by the City, to monitor the construction of improvements within the public rights-of-way and on site;
15. The applicant shall provide an easement along the frontage on Peverly Hill Road for construction of the shared use path. The easement must be donated to the City of Portsmouth for the shared use path per Federal Requirements. The City will provide the appropriate documentation for the applicant's use. The applicant shall provide a contribution for future construction of the section from the new roadway to the south of property line in the amount of $\$ 100,000$. [note: this is a change from the TAC recommendation]
16. A statement shall be added to the Condominium documents stating that the dumping of yard debris and other materials and storage is not permitted in the wetland buffer;
17. A statement shall be added to the Condominium documents stating that no salt is to be used for ice control on property owners' driveways or walkways on the site;
18. A statement shall be added to the Condominium documents that property owners shall utilize NOFA (Northeast Organic Farming Association) approved practices (or comparable equivalent) for maintenance of landscaped areas;
19. The Applicant or its engineer shall submit a copy of a completed Land Use Development Tracking Form using the Pollutant Tracking and Accounting Program (PTAP) online portal currently managed by the UNH Stormwater Center or similar form approved by the City;
20. The applicant shall enter into a development agreement with the City per the requirements of the Zoning Ordinance and subject to review and approval by the Legal Department.
21. The applicant shall install signage/markers indicating the location of the wetland buffer boundary;
22. A NHDES sewer extension permit is required;
23. The Engineer of Record shall submit a written report (with photographs and engineer stamp) certifying that the stormwater infrastructure was constructed to the approved plans and specifications and will meet the design performance;
24. A stormwater inspection and maintenance report shall be completed annually and copies shall be submitted to the City's Planning and Public Works Departments.

## Conservation Commission Review

According to section 10.727.22 the Conservation Commission shall be provided an opportunity to comment on the particulars of a proposed PUD, including but not limited to the natural features of the parcel and how these may be impacted by the proposed project. The Conservation Commission reviewed this application at the August 11, 2021 meeting and provided the following comments for consideration by the Planning Board (these have been incorporated into the recommended stipulations below):

1. The applicant should install signage demarking the location of the wetland buffer boundary;
2. A statement should be added to the Condominium documents stating that the dumping of yard debris and other materials and storage is not permitted in the wetland buffer;
3. A statement should be added to the Condominium documents stating that no salt is to be used for ice control on property owners driveways or walkways on the site;
4. A statement should be added to the Condominium documents stating that the owners follow NOFA standards in the maintenance of landscaped areas.

## Waiver Requests

The applicant has requested waivers to the subdivision and site plan review requirements for this project including the requirements for Residential Street standards and Truck Turning template standards unless otherwise approved by TAC. Given TAC recommended approval of the plans as presented, staff does not believe that the second waiver is required, however the applicant has requested one so it is included in the recommended vote. The explanations for the waiver requirements are provided in a letter in the application. The Planning Board may waive any provision of these Regulations by a vote of six members, provided that such waiver will not have the effect of nullifying the spirit and intent of the Master Plan or these Regulations; and in granting a waiver, the Planning Board may require such conditions as will in its judgment secure the objectives of these Rules and Regulations.

On April 30, 2015, the Planning Board considered a request from the City to approve one element of a settlement in a court case. The case pertained to the taking of a parcel of land in connection with the construction of the Route 33 bridge over the former Hampton Branch railroad line. The property owners had argued that the taking deprived them of a second access to the lot and thereby reduced its development potential. The City disputed this and prevailed in initial appeals. However, in order to avoid the cost of litigation and the potential risk associated with it, the Legal Department negotiated a compromise under which the owners would refrain from further appeals if granted a waiver from the Subdivision Regulations requiring a maximum of 500-foot on the length of a cul-de-sac.

The requested waiver was unusual in two respects. First, it was not attached to any specific development plan, but rather would open up the possibility for the current owners or any future owners to submit a subdivision or PUD plan showing a longer cul-de-sac road than allowed by the Subdivision Rules and Regulations. Thus, the Planning Board did not have a plan to review in connection with the request at that time. Second, the waiver would expire after 10 years if no development plan is submitted within that time period.

On April 30, 2015, the Board voted to waive in its entirety the 500 foot cul-de-sac limitation found in Section VI.3.I of the Subdivision Rules and Regulations for the property located at 83 Peverly Hill Road (Map 242, Lot 4); subject to any owner/applicant otherwise obtaining all other approvals and permits from local land use boards as may be necessary to develop the property. The decision stipulated that the waiver would run with the land and shall be effective for any subdivision application submitted to the Planning Board within ten (10) years of the date of approval of the waiver.

## Planning Department Review

On September 29, 2021, the applicant submitted revised plans that addressed the outstanding items from the TAC, Conservation Commission, and Planning Department. The remaining items are listed as conditions of approval in the section below titled "Planning Department Recommendations."

Applicant has proposed Bayberry Path as a street name. Staff recommends Board discuss a name for this project and consider making a recommendation to the City Council.

## Planning Department Recommendations

1) If the Planning Board determines that the applicant has made the case that the proposed OSPUD will not be more detrimental than a conventional subdivision, the Planning Board should vote to find that:
1.1) The site is appropriate for an $O S P U D$, and;
1.2) The anticipated impacts of the proposed OSPUD on traffic, market values, stormwater runoff or environmental factors will not be more detrimental to the surrounding area than the impacts of conventional residential development of the site.
2) Vote to grant waivers to the Subdivision Regulations Residential Streets Standards (Appendix to the Subdivision Regulations) and Minimum Right of Way requirements (Section VI(3)(b)) by finding that:
[NOTE: NH RSA 674:36, II(n) requires the Planning Board to make one of the following findings in order to grant a waiver and the City's Subdivision Regulations require approval by a vote of six members]
a) Strict conformity would pose an unnecessary hardship to the applicant and waiver would not be contrary to the spirit and intent of the regulations
[OR]
b) Specific circumstances relative to the subdivision, or conditions of the land in such subdivision, indicate that the waiver will properly carry out the spirit and intent of the regulations
3) Vote to find that the requested waiver to the Site Plan Review regulations will not have the effect of nullifying the spirit and intent of the City's Master Plan or the Site Plan Review Regulations, and to waive the following requirement:

Requirement of Section 2.5.4.3(c) requiring use of AASHTO truck turning templates.

## [Note: An affirmative vote of six members of the Planning Board is required to grant a waiver.]

4) Vote to grant the conditional use permit and site plan review approval with the following stipulations:

Conditions Precedent (to be completed prior to the issuance of a building permit):
4.1) The Applicant or its engineer shall submit a copy of a completed Land Use Development Tracking Form using the Pollutant Tracking and Accounting Program (PTAP) online portal currently managed by the UNH Stormwater Center or similar form approved by the City;
4.2) The applicant shall enter into a development agreement with the City per the requirements of the Zoning Ordinance and subject to review and approval by the Planning and Legal Departments.
4.3) It is understood the homeowners and/or homeowners association will own all stormwater facilities, drainage pipes and outfalls outside the roadway easement/ROW. This will include all activities associated with ownership and maintenance of the stormwater facilities and pipelines. For this reason, easements will be required in order for the City to have drainage and flowage rights for any stormwater draining from the public road into the private facilities or across private property.
4.4) All easements to benefit the City shall be reviewed and approved by the DPW, Planning and Legal Departments prior to final acceptance by the City Council. Metes and bounds describing the easement area shall be required.
4.5) Applicant shall provide an easement to benefit the City to have drainage and flowage rights for any stormwater draining from the public road into the private facilities or across private property.
4.6) A Construction Mitigation and Management Plan shall be required for this project, to include a proposed approach to progress of constructions in the areas with significant fill.
4.7) Plans indicated a significant amount of the construction for new utilities and roadway will be in areas to be filled. The approach to construction will be important for the stability of the proposed utilities and longevity or the roadway. Applicant shall provide means and methods in the construction specifications for the construction of roadways and utilities and specific areas that need to be filled to the satisfaction of DPW and City selected $3^{\text {rd }}$ party reviewer at the cost of the applicant.
4.8) The City will require a full set of construction plans and specifications for site improvements and utilities prior to construction. This will be reviewed by a third party at the cost of the applicant.
4.9) The applicant shall agree to pay for the services of an oversight engineer, to be selected by the City, to monitor the construction of improvements within the public rights-of-way and on site;
4.10) The applicant shall provide an easement along the frontage on Peverly Hill Road for construction of the shared use path. The easement must be donated to the City of Portsmouth for the shared use path per Federal Requirements. The City will provide the appropriate documentation for the applicant's use. The applicant shall provide a contribution for future construction of the section from the new roadway to the south of property line in the amount of \$100,000.
4.11) Prior to construction, applicant will coordinate with DPW to ensure no interference between drainage pipes and main water pipes

## Conditions Subsequent:

4.12) The applicant shall install signage/markers indicating the location of the wetland buffer boundary;
4.13) The Engineer of Record shall submit a written report (with photographs and engineer stamp) certifying that the stormwater infrastructure was constructed to the approved plans and specifications and will meet the design performance;
4.14) A stormwater inspection and maintenance report shall be completed annually and copies shall be submitted to the City's Planning and Public Works Departments.
4.15) All permits are obtained per State and Local regulations.
5) Vote to recommend a proposed street name to the City Council.

It is recommended that Item II. D and II.E be discussed together and voted on separately.

A motion is required to consider these items together.
D. Request of Ricci Construction Company Inc. (Owner), and Green \& Company Building \& Development Corp., (Applicant), for property located at $\mathbf{3 4 0 0}$ Lafayette Rd requesting a wetland Conditional Use Permit under section 10.1017 to construct 50 town homes on an undeveloped lot. The applicant is proposing three areas of temporary impact for a total of 2,650 square feet. Said property is shown on Assessor Map 297 Lot 11 and lies within the Gateway Neighborhood Mixed Use Corridor (G1) District and the Natural Resource Protection (NRP) District. (LU-21-98)
E. Request of Ricci Construction Company Inc. (Owner) and Green \& Company Building \& Development Corp. (Applicant) for property located at $\mathbf{3 4 0 0}$ Lafayette Rd requesting Conditional Use Permit for a Development Site in accordance with Section 10.5B40 of the Zoning Ordinance and Site Plan Review approval for construction of a 50 -unit multi-family residential development that includes community space and related landscaping, drainage, paving, utilities and other site improvements. Said property is shown on Assessor Map 297 Lot 11 and lies within the Gateway Neighborhood Mixed Use Corridor (G1) District and the Natural Resource Protection (NRP) District. (LU-21-98)

## Wetland Conditional Use Permit

The majority of the proposed development falls outside of the wetland buffer however there is stormwater treatment area and site drainage construction proposed to go into the wetland and wetland buffer area.

1. The land is reasonably suited to the use activity or alteration. Given this area is intended to be a highly functioning wetland system it is critical that the stormwater treatment does not introduce contaminants. The applicant has stated their willingness to avoid the use of salt to treat the driving areas in this development.
2. There is no alternative location outside the wetland buffer that is feasible and reasonable for the proposed use, activity or alteration. The applicant has designed a dense residential development on this site which could have longterm impacts to the wetland area adjacent to it. The applicant has stated
their willingness to reduce stormwater impacts by not using salt in the snow removal process.
3. There will be no adverse impact on the wetland functional values of the site or surrounding properties. The applicant has stated they will stipulate that snow removal will not include the use of salt. This needs to be documented in a way that can be enforced in the long term. The applicant has moved the trail closer to the development and has provided a fence to reduce impacts to the wetland buffer in this trail area. In addition they have provided a dog park which will reduce the impact of dog waste in the buffer.
4. Alteration of the natural vegetative state or managed woodland will occur only to the extent necessary to achieve construction goals. The area proposed for development is currently being used as a wood processing area therefore a portion of the natural vegetation has been impacted. The introduction of 50 housing units in this area will require removal of all the natural vegetation outside of the buffer and some of the vegetation in the buffer at least as a temporary impact. The application includes a fairly robust planting plan to restore the current wetland buffer.
5. The proposal is the alternative with the least adverse impact to areas and environments under the jurisdiction of this section. The applicant has kept the majority of the development and all of the buildings outside the Wetland buffer. To reduce impacts to the wetland the removal of snow should be done without the use of sodium chloride.
6. Any area within the vegetated buffer strip will be returned to a natural state to the extent feasible. The applicant is proposing an extensive planting plan for the buffer impacts at the front of the site.

## Conservation Commission Review

The Commission reviewed this application at the August 11, 2021 meeting and voted to recommend approval with stipulations. It should be noted that the vote to recommend approval was not unanimous, with three members voting to approve and two opposed.

1. The applicant will plant trees and other tall vegetation in the wetland buffer across from units 20-24 at the end of the proposed development to protect the wetland from light spillover.
2. The applicant shall follow NOFA standards for the landscaping on the site.
3. The Condominium docs should include maintenance for the landscaping and plants proposed for the wetland buffer
4. The applicant shall provide signage for the wetland buffer designating its location and requiring all dogs be leashed.
5. The applicant shall provide a three bar split rail fence at the wetland side of the proposed trail behind the buildings in the wetland buffer.
6. The applicant shall have the snow removal company staff attend the Green Snow Pro Trainings.
7. The applicant shall include language in the condominium docs prohibiting the use of salt.
8. Drainage plan TR1 shall be corrected to accurately depict the contributing area for stormwater.

On August 25, 2021 the applicant submitted updated plans addressing items 1, 4-6, and 8 to the satisfaction of the Planning Department staff. The remaining items have been included as stipulations below.

## Conditional Use Permit Approval for Development Site

Per Section 10.5B43.10, prior to granting a conditional use permit for development sites in the Gateway Neighborhood Mixed Use Districts, the Planning Board shall make the following findings.

1) The development project is consistent with the Portsmouth Master Plan.
2) The development project has been designed to allow uses that are appropriate for its context and consistent with City's planning goals and objectives for the area.
3) The project includes measures to mitigate or eliminate anticipated impacts on traffic safety and circulation, demand on municipal services, stormwater runoff, natural resources, and adjacent neighborhood character.
4) The project is consistent with the purpose and intent set forth in Section 10.5B11.

## Site Plan Review

## Technical Advisory Committee Review

At the August 3, 2021 meeting, the TAC voted to recommend approval with the following conditions:

1. Applicant will update community space area terminology to be consistent with Ordinance terminology.
2. Trailhead connections and wayfinding signs will be included for residents on the eastern side of the development to access the recreational trails.
3. Deeded public access will be provided to the proposed open space and undeveloped portion of the property that abuts city-owned parcels.
4. Water main sizes will be labeled.
5. Applicant will provide written statement that demonstrates conformance with Article 7 of the City's Site Plan Review regulations.
6. Applicant will hire a 3rd party company to identify areas of ground water infiltration that can be eliminated from the local municipal sewer collection system. After agreement from the City on the targeted areas, the developer will need to permit and construct via whatever means are approved (repair/replace/reline) areas of the sewer successfully in order to create capacity for this development in the sewer system. The amount of infiltration to be removed must be a value equal or greater to two times the amount of waste predicted from the development.
7. Applicant will hire a third party to inspect all utilities and stormwater systems.
8. Applicant will provide a fire hydrant flow rate plan that shows acceptable pressure as determined by city DPW and Fire Department.

On August 25, 2021 the applicant submitted updated plans addressing items 1, 2, and 4. For item 8, the applicant completed a fire hydrant flow rate test and determined that the project is in need of a booster pump. DPW staff is still reviewing items 5 and 6 and an update on the status of that review will be provided at the Planning Board meeting.

For item 3, staff feels that more discussion is needed with the Planning Board to determine how the deeded public access should be provided, to what extent, and whether there should be any limitations on access.

In addition to the comments above, Planning Department staff have noted that the applicant is required by the Zoning (Section 10.5B92) to provide an 8' wide pedestrian walkway throughout the lot that connects to adjacent streets, accessways, sidewalks, and off-street parking areas to the entrances of all principal buildings. In reviewing these plans, the plans have been revised in an effort to comply with this requirement. The Planning Board should review to determine if this design complies with the intent of the Ordinance.

## Planning Department Recommendations

1) Vote to determine that the applicant's revised plans comply with the requirements of Section 10.5 B92 related to the provision of an $8^{\prime}$ wide pedestrian walkway throughout the site.
[NOTE: if the Board does not act on or does not approve the above recommended action, then the following votes are recommended for approval of the application as presented]
2) Vote to approve the wetland conditional use permit with the following stipulations:
1.1) The Condominium documents shall include maintenance for the landscaping and plants proposed for the wetland buffer area and also a requirement that the property owners shall utilize NOFA (Northeast Organic Farming Association) approved practices (or comparable equivalent) for landscaped areas on the site.
1.2) The condominium documents shall prohibit the use of salt on paved surfaces.
3) Vote to find that the application meets the requirements of Section $10.5 B 43.10$ and to grant a conditional use permit for a Development Site subject to the requirements and conditions of site plan review approval.
4) Vote to grant site plan review approval with the following stipulations:

Note: An update will be provided at the meeting as to the completeness of stipulation 3.3 below

Conditions Precedent
3.1) Deeded public access will be provided to the proposed open space and undeveloped portion of the property that abuts city-owned parcels.
[NOTE: staff feels that more discussion is required with the Planning Board to determine the scope of the public access to the site and any proposed limitations on use]
3.2) Any easement plans and deeds for which the City is a grantor or grantee shall be reviewed and approved by the Planning and Legal Departments prior to acceptance by City Council.
3.3) Applicant will hire a 3rd party company to identify areas of ground water infiltration that can be eliminated from the local municipal sewer collection system. After agreement from the City on the targeted areas, the developer will need to permit and construct via whatever means are approved (repair/replace/reline) areas of the sewer successfully in order to create capacity for this development in the sewer system. The amount of infiltration to be removed must be a value equal or greater to two times the amount of waste predicted from the development.
3.4) The applicant shall agree to pay for the services of an oversight engineer, to be selected by the City, to monitor the installation of utilities and stormwater infrastructure.
3.5) The Applicant or its engineer shall submit a copy of a completed Land Use Development Tracking Form using the Pollutant Tracking and Accounting Program (PTAP) online portal currently managed by the UNH Stormwater Center or similar form approved by the City.
3.6) The site plan and any easement plans and deeds shall be recorded at the Registry of Deeds by the City or as deemed appropriate by the Planning Department.

## Conditions Subsequent:

3.7) The Engineer of Record shall submit a written report (with photographs and engineer stamp) certifying that the stormwater infrastructure was constructed to the approved plans and specifications and will meet the design performance;
3.8) A stormwater inspection and maintenance report shall be completed annually and copies shall be submitted to the City's Planning and Public Works Departments.

## III. PUBLIC HEARINGS - NEW BUSINESS

The Board's action in these matters has been deemed to be quasi-judicial in nature. If any person believes any member of the Board has a conflict of interest, that issue should be raised at this point or it will be deemed waived.
A. The request of Karen Butz Webb Revocable Living Trust (Owner), for the property located at 910 Sagamore Avenue requesting a Wetland Conditional Use Permit according to article 10.1017 to expand an enclosed living space by 362 square feet which will create a disturbance of 3,375 square feet within the inland wetland buffer. The living space is supported by piles over an area of crushed stone to allow infiltration of stormwater. The roof runoff will be captured in gutters which will be directed to stone infiltration trenches with $4^{\prime} \times 4^{\prime}$ stone outlet area for any stormwater that does not infiltrate. The applicant is disconnecting the existing septic system and will connect to a new City sewer line. The mowing of the wetland at the rear of the property will be discontinued and the area will be planted with wildflowers and other buffer plantings. Said property is shown on Assessor Map 223 Lot 26A and lies within the Waterfront Business (WB) District. (LU-21-170)

## Project Description

The applicant is proposing to expand an enclosed $10^{\prime} \times 15^{\prime}$ living space to a $16^{\prime} \times 32^{\prime}$ or an increase of 362 square feet of living space in the inland wetland buffer. The living space is supported by piles over an area of crushed stone to allow infiltration of stormwater. The roof runoff will be captured in gutters which will be directed to stone infiltration trenches with $4^{\prime} \times 4^{\prime}$ stone outlet area for any stormwater that does not infiltrate. The applicant is disconnecting the existing septic system and will connect to a new City sewer line. The mowing of the wetland at the rear of the property will be discontinued and the area will be planted with wildflowers and other buffer plantings.

## Conservation Commission Review

1. The land is reasonably suited to the use activity or alteration.

The proposed addition is expanding an existing addition which is being constructed without a foundation so stormwater will be allowed to infiltrate. Given the current configuration of the house this is a reasonable request.
2. There is no alternative location outside the wetland buffer that is feasible and reasonable for the proposed use, activity or alteration.
The entire property is within the $100^{\prime}$ wetland buffer therefore there is no location outside of the buffer that is feasible for this work.
3. There will be no adverse impact on the wetland functional values of the site or surrounding properties.
While the applicant is proposing an expansion of the building the plans to stop mowing and removal of the septic system will likely be a net benefit to the wetland area.
4. Alteration of the natural vegetative state or managed woodland will occur only to the extent necessary to achieve construction goals.

The applicant is proposing to stop mowing the lawn area which has been delineated as wetland and plans to install wildflowers and other plants. They also plan to remove the invasive Asiatic bittersweet (Celastrus orbiculatus) to protect the native plants at the rear of the site.
5. The proposal is the alternative with the least adverse impact to areas and environments under the jurisdiction of this section.
While the new addition does expand the size of the structure the applicant has proposed significant improvements in the wetland and wetland buffer to offset the impact. Given the improvements proposed this application has the least adverse impact for this location.
6. Any area within the vegetated buffer strip will be returned to a natural state to the extent feasible.
The applicant is proposing to return a wetland area to a more natural state through plantings and management of the site by stopping the mowing of this area.

## Conservation Commission Review

The Commission reviewed this application at the September 15, 2021 meeting and voted unanimously to recommend approval of the Wetland Conditional Use Permit to the Planning Board with the following stipulations:

1. NOFA standards shall be maintained.
2. Install and maintain their wetland delineation buffer plantings with (along the delineation line as marked in the application) every 4 ft . (recommended plantings).
3. The stone infiltration shall be terminated at the wetland delineation line.

## Planning Department Recommendations:

A) Vote to grant conditional use permit as presented with the following stipulations:

1. NOFA standards shall be maintained.
2. Install and maintain wetland buffer plantings along the delineation line as marked in the application every 4 ft . (recommended plantings).
3. The stone infiltration, as shown on the plan, shall be terminated at the wetland delineation line.

## III. PUBLIC HEARINGS - NEW BUSINESS (see note below)

B. The request of Elizabeth B Larsen Trust (Owner), for property located at 668 Middle Street requesting Preliminary and Final Subdivision approval to subdivide 1 existing lot with 81,046 square feet of lot area, and 69.83 feet of street frontage into 3 lots as follows: Proposed Lot 1 with 18,646 square feet of lot area and no street frontage; Proposed Lot 2 with 18,756 square feet of lot area and no street frontage; Proposed Lot 3 with 43,644 square feet of lot area and 69.83 feet of street frontage. The existing buildings will remain and be on Proposed Lot 3 . Said property is shown on Assessor Map 147 Lot 18 and lies within the General Residence A (GRA) and Historic Districts. (LU-21-23)

## Note: Stipulation 3 below has not been satisfied. Staff recommends postponement

 until this condition is satisfied.
## Technical Advisory Committee Review

At the September 7, 2021 Technical Advisory Committee meeting the Committee voted to recommend approval to the Planning Board with the following stipulations:

1. In order to prevent segmentation from the Site Plan Review requirements, construction of a structure on either lot that will contain more than one dwelling unit shall require site plan approval.
2. Fee simple transfer of the exclusive use area is highly recommended in order to minimize future land use conflicts between the effected lots.
3. The sewer line shall be reconfigured and approved by DPW (prior to Planning Board approval).
4. The sewer profile shall be added to the plan set.
5. The right of way and utility easement over Chevrolet Ave (approximately 6' off the edge of pavement) shall be provided.
6. Milling and overlay of the full road width for length of the disturbance area shall be required and, the sidewalk shall be repaired or replaced (as needed and determined by the DPW).
7. Subject to DPW review and approval temporary pavement shall be required at time of construction. Such paving shall be to the existing pavement depth and, after a winter season the street shall receive a full mill and overlay.

## Planning Department Recommendations:

(A) Vote to grant Preliminary and Final Subdivision Approval with the following stipulations:

1. Lot numbers as determined by the Assessor shall be added to the final plat.
2. Property monuments shall be set as required by the Department of Public Works prior to the filing of the plat.
3. GIS data shall be provided to the Department of Public Works in the form as required by the City.
4. The final plat and all easement deeds shall be recorded concurrently at the Registry of Deeds by the City or as deemed appropriate by the Planning Department.
5. Fee simple transfer of the exclusive use area is highly recommended in order to minimize future land use conflicts between the effected lots.
6. The sewer line shall be reconfigured and approved by DPW (prior to Planning Board approval).
7. Milling and overlay of the full road width for length of the disturbance area shall be required and, the sidewalk shall be repaired or replaced (as needed and determined by the DPW).
8. Subject to DPW review and approval temporary pavement shall be required at time of construction. Such paving shall be to the existing pavement depth and, after a winter season the street shall receive a full mill and overlay.

## III. PUBLIC HEARINGS - NEW BUSINESS

C. The application of Frederick W. Watson Revocable Trust, Owner, for property located at 1 Clark Drive requesting Amended Subdivision approval to correct the previously approved plan, approved on March 18, 2021, to include an additional lot that encompasses the proposed road with an area of 25,524 square feet, bringing the total to five (5) proposed lots. The previously approved plan consists of four (4) residential lots that will not be changing in size or shape and have the following dimensions: Proposed lot 1 with an area of 20,277 s.f. and 137.23 ft . of continuous street frontage; Proposed Lot 2 with an area of 17,103 s.f. and 100 ft . of continuous street frontage; Proposed Lot 3 with an area of 20,211 s.f. and 100 ft . of continuous street frontage; and Proposed Lot 4 with an area of 53,044 s.f. and 592.50 ft . of continuous street frontage. Said property is shown on Assessor Map 209 Lot 33 and lies within the Single Residence B (SRB) District.

## Amendment Description:

Previously approved on March 18, 2021, the proposed plan amendment corrects the titled 4 lot subdivision to 5 . This amendment does not change the previously approved lot configurations or dimensions and each of the four building lots depicted on the plan will own an equal and undivided interest in the roadway parcel.

## Planning Department Recommendations:

(A) Vote to grant Subdivision Amendment Approval with the following stipulations:

1. All conditions of original Planning Board approval as amended to remain in effect.
2. The Amended Site Plan shall be recorded at the Registry of Deeds by City of as deemed appropriate by the planning department but not before legal department has been provide with and reviewed the first deeds for all lots.

## IV. CITY COUNCIL REFERRALS - PUBLIC HEARING

A. The request of Borthwick Forest, LLC (Owner), for Amended Easement Documents for the property located at $\mathbf{0}$ Borthwick Forest, now known as Eileen Dondero Foley Avenue, to amend four easements relative to the Approved Site Plan for Borthwick Forest. Easements are specific to municipal rights to both new and existing public water lines as well as to public bicycle and pedestrian infrastructure. Easements include the following subject properties: Map 234 Lot 07-4a, Map 241 Lots 25 and 25-1, Map 165 Lot 14, Map 233 Lots 111, 114 and 115.

Planning Department Recommendation:

1. Vote to recommend that the Council approve the amended easements.

## V. DESIGN REVIEW - ACCEPTANCE OF DESIGN REVIEW

A. 181 Hill St

Project Description
Applicant is proposing the demolition of three existing buildings and the construction of one three story building with parking on the basement level.

## Planning Department Recommendation

1. Vote to approve Design Review and schedule the public hearing for the November 18, 2021 Planning Board meeting.
VII. OTHER BUSINESS

No other business is proposed at this time

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- 06 Site Plan Checklist, Updated August 25, 2021 .............................................................. Page 13
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## Job \#47388.11

September 29, 2021

Dexter Legg, Chair
Portsmouth Planning Board
1 Junkins Avenue, 3 rd Floor
Portsmouth, NH 03801

## Re: Open Space Planned Unit Development, 83 Peverly Hill Road

Dear Chairman Legg \& Members of the Planning Board,

On behalf of the Applicant, Green \& Company, TF Moran, Inc. (TFM) respectfully submits the following revised plans and supporting documents for review at the September 16 Planning Board meeting:

- Table of Contents - Listing PDF's and PDF Page Numbers of the Contents of this Submittal.
- Site Development Plans, Parson Woods Condominium, 83 Peverly Hill Road, Portsmouth, New Hampshire Dated April 19, 2021, Last Revised September 29, 2021 (1-Full Sized Plan Set / 1-11x17 Plan set)
- Letter of Authorization
- Response to Comment Letter, Dated September 29, 2021
- Abutters List
- Site Plan Checklist, Updated August 25, 2021
- Subdivision Checklist, Updated August 25, 2021
- Waiver Requests, Dated June 23, 2021
- A copy of a letter to Michael Green from GDS Associates, Inc. Engineers \& Consultants
- Planned Unit Development Versus Conventional Subdivision Memorandum, Dated August 6, 2021
- Developers Agreement
- Declaration and Bylaws, Draft Dated September 29, 2021
- Access and Drainage Easements \#1, Draft Dated September 29, 2021
- Access and Drainage Easements \#2, Draft Dated September 29, 2021
- Drainage Easements, Draft Dated September 29, 2021
- Pocket Park Easement, Draft Dated September 29, 2021
- Conservation Easement, Draft Dated September 29, 2021
- Public Right-of-Way Easement, Draft Dated September 29, 2021
- Traffic Memorandum by Stephen Pernaw, Date October 6, 2020
- Traffic Calming by Stephen Pernaw, Date June 17, 2021
- Transportation Peer Review by TEC, Dated June 22, 2021


## Job \#47388.11

September 29, 2021

- Traffic Memo - Response to TEC's Comments, Dated July 3, 2021
- Transportation Peer Review \#2 by TEC, Dated July 20, 2021
- Will serve letter from Unitil, Dated June 14, 2021
- Will serve letter from Eversource, Dated June 18, 2021
- Water Distribution Analysis from Weston and Sampson, Dated May 21, 2021
- Drainage Report dated April 19, 2021, Last Revised August 25, 2021
- Operation and Maintenance Manual, Dated August 25, 2021, Last Revised September 29, 2021
- Drainage Letter Conforming to Article 7 of the Site Plan Review Regulations, Dated August 25, 2021
- Inlet Capacity Memo - Addressing grate inlet capacity
- Pipe Sizing Memo - Addressing pipe sizing calculations, dated
- Draft of the NHDES Application for Sewer Connection Permit, Dated April 19, 2021, Last Revised August 11, 2021
- Architectural Plans
- Overall Site Layout Color Plan - Dated May 4, 2021, Last Revised July 20, 2021
- Peverly Hill Road Future Improvement Plan, Dated September 29, 2021
- Overall Proposed Developed and Remaining Land - Dated June 21, 2021
- Concept - Conventional Subdivision Plan - Dated July 19, 2021

This proposal is for an Open Space Planned Unit Development containing 56 single-family condominium dwelling units with 2,950 linear feet of public roadway. Associated improvements include underground utility installation, 2 recreational pocket parks, a public bike/pedestrian path to an existing rail trail, a multi-use path to Middle Road, landscaping, and open space.

The property contains 105 acres and is bounded by Peverly Hill Road on the East, the New Hope Baptist Church, conservation land, the Swift Water Girl Scout Council, and several smaller properties on the South, the Boston and Main Railroad on the West, and the Calvary Cemetery on the North.

The project proposes to put 71 acres, in the form of a conservation easement, to the city. These 71 acres will abut Map 255 Lot 5, a property already in conservation which abuts the recently required 27.5 acre conservation easement on Map 256 Lot 2.

This project has had several reviews and/or meetings with City Staff, TAC and the Planning Board. A summary of our meetings to date, in order is listed below.

- August 20, 2020 - Preliminary meeting with the Planning Board
- September 3, 2020 - Meeting with Mark Newport of Portsmouth Police Department
- September 4, 2020 - Meeting with Patrick Howe of Portsmouth Fire Department
- September 17, 2020 - Preliminary Conceptual Consultation with Planning Board
- October 13, 2020 - Technical Advisory Committee (TAC) Work Session
- October 30, 2020 - Meeting with Planning Department Staff
- December 11, 2020 - Michael Cuomo review of Wetland Delineation
- December 21, 2020 - Meeting with Planning Department Staff
- February 9, 2021 - TAC Work Session


## Job \#47388.11

September 29, 2021

- May 4, 2021 - TAC Meeting
- May 12, 2021 - Meeting with Planning Department Staff
- July 6, 2021 - TAC Meeting
- August 3, 2021 - TAC Meeting \& Conditional Approval

Based on comments received from the TAC and Planning staff during those meetings, we have revised the plans as follows:

- We removed the hammer head drive and limited the development to the smaller area abutting Peverly Drive.
- Reduced paved width of loop road from $26^{\prime}$ to $22 .{ }^{\prime}$
- Created an offset intersection at the loop road to prevent a long straight thru roadway.
- Changed $5^{\prime}$ wide asphalt sidewalk to $51 / 2^{\prime}$ wide concrete.
- Increased the $2^{\prime}$ wide grass strip between roadway and sidewalk to $41 / 2^{\prime}$.
- Added horizontal curves to the loop road to prevent long straight sections.
- Added a raised crosswalk at the bike path entrance.
- Provided a $10^{\prime}$ wide equipment access (15' wide easement) to drainage BMP's.
- Added pavement markings to delineate bike route to bike path.
- Revised street lighting to comply with City preferences.
- Added all utilities to roadway profiles.
- Added underdrain at bottom of slope adjacent to cemetery.
- Added a 5' sidewalk from the development to Middle Street and a pedestrian crossing across Peverly Hill Road and the Middle Street Intersection.

The project received Conditional Approval from the Technical Advisory Committee on August 3, 2021.

We look forward to reviewing this project with you at your next Planning Board Meeting.

Cordially,
TFMoran, Inc.

Jack McTigue, PE
Project Manager

JJM/jcc
cc: Green \& Company
Greg Mikolaities
John Kuzinevich, Esq.























BA YBERRY PATH PROFILE
(PUBLIC STREET)
9


## SITE DEVELOPMENT PLANS

TAX MAP 242 LOT 4
PARSON WOAD-A PLAN \& PROFILE 83 PEVERLY HILL ROAD, PORTSMOUTH, NH

STOKEL SB \& NA TRUST, PHLLIP J $25 \%$ INT
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SITE DEVELOPMENT PLANS -RAXMAP 242 Lot 4 PARSON WOODS CONDOMINIUM LL 83 PEVERLY HLLL ROAD, PORTSMOUTH, NH

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## SITE DEVELOPMENT PLANS

PARSON WOODS CONDOMINIUM LLC 83 PEVERLY HLLL ROAD，PORTSMOUTH，NH

STOKEL SB \＆NA TRUST，PHILIP J 25\％INT green \＆COMPANY real estate $1^{\prime \prime}=40^{\prime}\left(11^{1} x^{17} 17^{\prime}\right)$
$1^{\prime}=20^{\prime}\left(22^{2} \times 34^{\prime \prime}\right)$

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Detail "A" - PIPE to manhole joints



DETALL "B" - HORIZONTAL JOINTS


PLAN VEW

SITE DEVELOPMENT PLANS
DETAILS 83 PEVERLY HILL ROAD, PORTSMOUTH, NH

STOKEL SB \& NA TRUST, PHLLP J $25 \%$ IN green \& company real estate $1^{\prime \prime}=40^{\prime}\left(17 x^{\prime \prime} 17^{\prime \prime}\right)$
$1^{\prime}=20^{\prime}\left(22^{\prime \prime} \times 34^{\prime \prime}\right)$

IFM $\qquad$



## Letter of Authorization

We, Philip J. Stoke of 73 South Street, Concord, NH 03301, and Stella B. Stokel 1993 Trust, Stella B. Stokel, Trustee, of 83 Peverly Hill Road, Portsmouth, NH 03801, as owners of certain real property situated in Portsmouth, New Hampshire further described as 83 Peverly Hill Road, Portsmouth, consisting of approximately 107 acres of land as shown on the City of Portsmouth Tax Assessor Map 242, Lot 4, improved with a single-family residence with 665 feet of frontage on Peverly Hill Road, along with all easement and rights of record, do hereby authorize Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers to act on our behalf and to appear before the conservation commission, zoning board of adjustment and/or the planning board of Portsmouth, New Hampshire and/or any of its boards or commissions, in our behalf for the purpose of seeking any regulatory relief that may be requested by the person we have above authorized, including variances, special exceptions, dimensional waivers, site plan approval, lot line adjustment approval and subdivision approval, hereby ratifying any actions taken by him/her/them to obtain any such relief. We authorize Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers to act in our behalf in all matters concerning the development and approval process, without limitation, for the above stated property, to include any required signatures.

We shall cooperate fully with Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers in seeking timely public approvals and for the completion of the sale contemplated herein. We agree to use our good faith efforts to provide any assistance we reasonably can to Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers throughout the development process, including but not limited to signing permit applications as needed.



Owner: Philip J. Stoke l


Owner: Stella B. Stokel, Trustee of the Stella B. Stokel 1993 Trust


Date $\frac{20-19-2019}{\text { Date }}$

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
NEW

Scientists

September 29, 2021

Dexter Legg, Chair
Portsmouth Planning Board
1 Junkins Avenue, $3^{\text {rd }}$ Floor
Portsmouth, NH 03801

## Re: Open Space Planned Unit Development, 83 Peverly Hill Road Request for a Conditional Use Permit

Dear Chairman Legg \& Members of the Planning Board,
On behalf of the Applicant, Green \& Company, TF Moran, Inc. (TFM) respectfully submits the following response to comments to the Staff Memorandum regarding Recommendations for the September 16, 2021 Planning Board Meeting.

To facilitate your review of the plans, we have provided the Technical Advisory Committee (TAC) and the staff comments along with our responses which are shown in bold blue italics.

Open Space Planned Unit Development Conditional Use Permit and Site Plan Review Approval
See Planned Unit Development Versus Conventional Subdivision Memorandum, Dated August 6, 2021 (Included in the Planning Board submittal on August 25, 2021.) In the PDF, pages 21-23 and pages 557-558 of the Planning Board Submittal for the September 16 Meeting.

## Technical Advisory Committee Review

The TAC reviewed this application at the August 3, 2021 meeting and voted to recommend approval with the following stipulations:

A response to comment letter was provided to TAC on August 25, 2021 addressing these issues. Additional responses are provided below.

1. Applicant will construct a temporary shared use path to connect to the existing sidewalk network and install crossing equipment to cross Peverly Hill Road at Middle Rd.
A conceptual plan was agreed upon by the applicant and city and is shown on sheet C-68. This plan shows a sidewalk providing a connection from the intersection of Middle Rd and Peverly Hill Rd to the proposed residential development. (Included in the Planning Board submittal on August 25, 2021.)
2. Applicant should provide detailed written confirmation that the application meets all of the requirements of Article 7 of the Site Plan Review regulations as these relate to stormwater
management, specifically that the post-development flows all meet or decrease the predevelopment stormwater flows.
A Drainage Letter was provided in the Planning Board submittal of August 25, and was updated based on September 1, 2021 comments and is included herein.
3. Update subdivision and site plan review checklists prior to submission to PB.

Included in the Planning Board submittal on August 25, 2021 and is included herein.
4. Road profiles will show geometry, sewer manhole numbers, and inverts.

Revised profiles accordingly. See sheets C-12 - C-15. (Included in the Planning Board submittal on August 25, 2021. Updated based on September 1, 2021 comments and resubmitted on September 8, 2021. Additional information added to the profile sheets in this submission.)
5. Final calculations regarding both the gravity and force sewer systems will be provided. Provided (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
6. Cross slope percentages will be added as details. Detail of existing path for bicycle/pedestrian use added to plans. This detail shows the cross slopes. See sheet C-69. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
7. Pavement will be used instead of pavers for areas of road that are widened at hydrant areas.
Pavers removed from widened road sections. See sheets C-06 - C-10. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
8. Water main shall be cl 52 CLDI wrapped in polyethylene with continuity wedges as per City Standards and called on in detail.
Note added to plans. See sheets C-01 (Utility Note \#11) and C-71 (Water Main Trench Detail). (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
9. Design of Irrigation systems for houses will use smart controls and noted on plan set. Note added to plans. See sheets C-01 (Utility Note \#13) and C-45 (Landscape Note \#18). (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
10. NHDES Sewer extension permit will be obtained.

Agreed. Pending City's approval and signature of the NHDES Application for Sewer Connection Permit. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
11. Force main's entry into the gravity sewer will be detailed in plan set. Detail added to plans. See sheet C-75. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
12. Reroute water main at entrance to provide separation from sewer line.

Revised plans accordingly. See sheet C-27. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
13. Show expanded tree clearing for City vehicle access.

Revised plans accordingly. See sheet C-24. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)

## Additional items that were not part of the TAC stipulations, but addressed in the August 25,2021 submittal:

14. Show the gas main at the centerline of the road.

Revised plans accordingly. See sheets C-27-C-33. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
15. Add note stating that construction and utility installation shall be overseen by a $3^{\text {rd }}$ party reviewer.
Revised plans accordingly. See sheet C-01, General Note \#19. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
16. Add note stating that signage shall be installed demarcating the $100^{\prime}$ wetland buffer prior to commencement of earthwork.
Revised plans accordingly. See sheet S-06, Note \#19. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)

## September 1, 2021 - Email

After reviewing the revised plans submitted subsequent to TAC review, staff provided the following additional comments (in the September 1, 2021 email from Juliet Walker).

Items to be addressed prior to the Planning Board Review were addressed and submitted in a supplemental submittal on September 8, 2021.

## To be addressed by applicant prior to Planning Board review

1. Engineer indicated that Section 7.6.2 - Enhanced Stormwater Standards for New and Redevelopment Disturbing More than 15,000 square feet of Area is Not Applicable to this submission. The City does not agree/ Engineer to address.
The drainage letter was updated to address section 7.6 .2 (Included in the supplemental submittal on September 8, 2021 and is included herein.)
2. Drainage pipes alignment and manhole locations interfere with water main pipes and water services in multiple areas. Engineer to address.
Water lines have been revised on the plan and profile sheets to avoid interference with drainage structures and pipes. (Included in the supplemental submittal on September 8, 2021 and is included herein.)
3. Engineer to submit calculations for drainage pipe sizing to verify sizes shown.

Pipe size calculations are included in the HydroCad calculations. A separate Pipe Sizing Memo is included that breaks out the pipe sizes. (Included in the supplemental submittal on September 8, 2021 and is included herein.)
4. It appears that spacing of CB's will not have sufficient inlet capacity to accommodate stormwater flow for the larger storms which might not correlate to the drainage analysis/report and pipe sizing calculations. Possible additional CB's may be considered. Engineer to address.
We've added double grates and two (2) additional catch basins(\# 7\&118) to provide additional inlet capacity. The Inlet Capacity Memo addresses the inlet capacity calculations. (Included in the supplemental submittal on September 8, 2021 and is included herein.)
5. The naming of a public roadway is the purview of the City Council with recommendations from the Planning Board. If you have a specific roadway name in mind that you would like to request, that should be part of your presentation package to the Planning Board. It is helpful to include an explanation for the road name you are requesting.
The developers have chosen the name of Bayberry Path for consideration by City Council.
Items 6-24 (below) are to be addresses after Planning Board approval.

## Recommended for Conditions of Planning Board approval (some of these will be required prior to building permit issuance, others can be completed subsequent)

6. All easements to benefit the City shall be reviewed and approved by the DPW, Planning and Legal Departments prior to final acceptance by the City Council. In most cases, metes and bounds describing the easement area shall be required.
The easements have been completed and are included for City approval.
7. It is understood the homeowners and/or homeowners association will own all stormwater facilities, drainage pipes and outfalls outside the roadway easement/ROW. This will include all activities associated with ownership and maintenance of the stormwater facilities and pipelines. For this reason, easements will be required in order for the City to have drainage and flowage rights for any stormwater draining from the public road into the private facilities or across private property.
The easement has been completed and are included for City approval.
8. Road Plan/Profile is missing information including roadway horizontal curve information, stationing and pipe sizes at SMH's and CB's, pipe material. The City will complete the design review once a revised plan set is received and additional comments may be provided. Sewer and Drainage Structures and pipe sizes were added to the Road Plan and Profile for the September 8 submittal. The remainder items have been added. (Updated plans are included in this submittal.)
9. Low pressure sewer force main appears to be excessively deep in areas. Engineer to address/redesign and final design shall be subject to DPW review and approval. City may require third party review at applicant's expense.
The sewer force main is deeper than the minimum depth between stations 12+00 to 14+00 to avoid the need for sewer cleanout and air vacuum. The plans will be made available for submittal to a third party for their review.
10. All "Cleanout/Air Vacuum" and "Terminal Manholes" for the sewer force main need to be clearly located and called out on the plan view and detail sheet. The terminal manholes have been shown on the Road Profiles and Utility Plans and details have been provided. (See Sheets C-15, C-32 and C-76).
11. Details and design for the proposed retaining wall along proposed roadway shall be designed by a qualified registered engineer. Design and wall type shall be reviewed and approved by DPW prior to building permit approval. Details shall include the required guard rail and drainage pipe penetration.
Grading Note 22 on Sheet C-1 states that the design of the block retaining wall to be used shall be designed by a registered structural engineer and stamped plans shall be provided to the City for their approval.
12. Plans indicated a significant amount of the construction for new utilities and roadway will be in areas to be filled. The approach to construction will be important for the stability of the proposed utilities and longevity or the roadway. A Construction Mitigation and Management Plan shall be required for this project, to include a proposed approach to progress of constructions in the areas with significant fill.
Agreed, this will be submitted to the City for their approval prior to commencement of construction.
13. The City will require a full set of construction plans and specifications prior to construction. This will be reviewed by a third party at the cost of the applicant. Construction plans to be provided and reviewed by a third-party engineer prior to the commencement of construction.
14. The applicant shall agree to pay for the services of an oversight engineer, to be selected by the City, to monitor the construction of improvements within the public rights-of-way and on site.
Agreed, a fund will be set up to provide for a City approved oversight engineer.
15. The applicant shall provide an easement along the frontage on Peverly Hill Road for construction of the shared use path. The easement must be donated to the City of Portsmouth for the shared use path per Federal Requirements. The City will provide the appropriate documentation for the applicant's use. The applicant shall provide a contribution for future construction of the section from the new roadway to the south of property line in the amount of $\$ 100,000$. [note: this is a change from the TAC recommendation] An easement shall be provided, and the contribution will be made towards the future construction of the new roadway prior to the commencement of construction. (See Peverly Hill Road Future Improvement Plan, included in this submittal).
16. A statement shall be added to the Condominium documents stating that the dumping of yard debris and other materials and storage is not permitted in the wetland buffer. Stated in Section U(d) of the Condominium By-laws. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
17. A statement shall be added to the Condominium documents stating that no salt is to be used for ice control on property owners' driveways or walkways on the site.
A Chlorine Management Plan has been included in the Operation and Maintenance Manual and the statement, "There shall be no use of salt for ice control on the driveways and walkways within the Condominium", has been added to the Condominium By-laws and submitted to the City for their review, Article 6, Section A. (Included with this submission.)
18. A statement shall be added to the Condominium documents that property owners shall utilize NOFA (Northeast Organic Farming Association) approved practices (or comparable equivalent) for maintenance of landscaped areas.
The statement, "The Board of Directors shall utilize Northeast Organic Farming Association ("NOFA") approved practices (or comparable equivalent) for the maintenance of all landscaped areas", has been added to the Condominium By-laws and submitted to the City for their review, Article 6, Section A. (Included with this submission.)
19. The Applicant or its engineer shall submit a copy of a completed Land Use Development Tracking Form using the Pollutant Tracking and Accounting Program (PTAP) online portal currently managed by the UNH Stormwater Center or similar form approved by the City. The PTAP will be completed and submitted to the City for their review upon Planning Board Approval.
20. The applicant shall enter into a development agreement with the City per the requirements of the Zoning Ordinance and subject to review and approval by the Legal Department. A development agreement has been submitted to the City for their review.
21. The applicant shall install signage/markers indicating the location of the wetland buffer boundary.
Revised plans accordingly. See sheet S-06 (Note \#19). (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
22. A NHDES sewer extension permit is required.

Permit pending City's approval and signature. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
23. The Engineer of Record shall submit a written report (with photographs and engineer stamp) certifying that the stormwater infrastructure was constructed to the approved plans and specifications and will meet the design performance.
Agreed, and a copy will be submitted to the City upon completion of the project.
24. A stormwater inspection and maintenance report shall be completed annually, and copies shall be submitted to the City's Planning and Public Works Departments.
Agreed, a statement has been added to the Operation and Maintenance manual stating that copies of the inspection and maintenance report shall be submitted annually to the City's Planning and Public Works Department. (Included in this submittal).

## Conservation Commission Review

According to section 10.727 .22 the Conservation Commission shall be provided an opportunity to comment on the particulars of a proposed PUD, including but not limited to the natural features of the parcel and how these may be impacted by the proposed project. The Conservation Commission reviewed this application at the August 11, 2021 meeting and provided the following comments for consideration by the Planning Board (these have been incorporated into the recommended stipulations below):

1. The applicant should install signage demarking the location of the wetland buffer boundary. Revised plans accordingly. See sheet S-06 (Note \#19). (Included in the Planning Board submittal on August 25, 2021 and is included herein.) [See item 21 above.]
2. A statement should be added to the Condominium documents stating that the dumping of yard debris and other materials and storage is not permitted in the wetland buffer. Stated in Section U(d) of the Condominium By-laws. (Included in the Planning Board submittal on August 25, 2021 and is included herein.) [See item 16 above.]
3. A statement should be added to the Condominium documents stating that no salt is to be used for ice control on property owner's driveways or walkways on the site. A Chlorine Management Plan has been included in the Operation and Maintenance Manual and the statement, "There shall be no use of salt for ice control on the driveways and
walkways within the Condominium", has been added to the Condominium By-laws and submitted to the City for their review, Article 6, Section A. (Included with this submission.) [See item 17 above.]
4. A statement should be added to the Condominium documents stating that the owners follow NOFA standards in the maintenance of landscaped areas.
The statement, "The Board of Directors shall utilize Northeast Organic Farming Association ("NOFA") approved practices ( or comparable equivalent) for the maintenance of all landscaped areas", has been added to the Condominium By-laws and submitted to the City for their review, Article 6, Section A. (Included with this submission.) [See item 18 above.]

## Planning Department Recommendations

1) If the Planning Board determines that the applicant has made the case that the proposed OSPUD will not be more detrimental than a conventional subdivision, the Planning Board should vote to find that that:
1.1) The site is appropriate for an OSPUD, and;
1.2) The anticipated impacts of the proposed OSPUD on traffic, market values, stormwater runoff or environmental factors will not be more detrimental to the surrounding area than the impacts of conventional residential development of the site.
See Planned Unit Development Versus Conventional Subdivision Memorandum, dated August 6, 2021 (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
2) Vote to grant waivers to the Subdivision Regulations Residential Streets Standards (Appendix to the Subdivision Regulations) and Minimum Right of Way requirements (Section VI(3)(b)) by finding that:
[NOTE: NH RSA 674:36, II(n) requires the Planning Board to make one of the following findings in order to grant a waiver and the City's Subdivision Regulations require approval by a vote of six members
a) Strict conformity would pose an unnecessary hardship to the applicant and waiver would not be contrary to the spirit and intent of the regulations
[OR]
b) Specific circumstances relative to the subdivision, or conditions of the land in such subdivision, indicate that the waiver will properly carry out the spirit and intent of the regulations
This was discussed with TAC. Originally, a private road was proposed, but members of TAC indicated that their preference was for a public road with a 40' right-of-way over a private road with no public right-of-way.

This was included in the waiver request. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
3) Vote to find that the requested waiver to the Site Plan Review regulations will not have the effect of nullifying the spirit and intent of the City's Master Plan or the Site Plan Review Regulations, and to waive the following requirement:

Requirement of Section 2.5.4.3(c) requiring use of AASHTO truck turning templates.
[Note: An affirmative vote of six members of the Planning Board is required to grant a waiver.]

This was discussed with TAC. The requirement for the truck turning comes from the site development regulations. This is primarily a residential development and the requirements do not apply for this situation.

This was included in the waiver request. (Included in the Planning Board submittal on August 25, 2021 and is included herein.)
4) Vote to grant the conditional use permit and site plan review approval with the following stipulations:

## Conditions Precedent (to be completed prior to the issuance of a building permit):

(These stipulations are the same as previously listed herein).
4.1) The Applicant or its engineer shall submit a copy of a completed Land Use Development Tracking Form using the Pollutant Tracking and Accounting Program (PTAP) online portal currently managed by the UNH Stormwater Center or similar form approved by the City. This is to be completed upon Planning Board approval of the site. [See Item 19 from the September 1, 2021 email.]
4.2) The applicant shall enter into a development agreement with the City per the requirements of the Zoning Ordinance and subject to review and approval by the Planning and Legal Departments.
A development agreement has been submitted to the City for their review. [See Item 20 from the September 1, 2021 email.]
4.3) It is understood the homeowners and/or homeowners association will own all stormwater facilities, drainage pipes and outfalls outside the roadway easement/ROW. This will include all activities associated with ownership and maintenance of the stormwater facilities and pipelines. For this reason, easements will be required in order for the City to have drainage and flowage rights for any stormwater draining from the public road into the private facilities or across private property.
Agreed. This will be added to the Condominium documents and submitted to the City for their review. [See Item 7 from the September 1, 2021 email.]
4.4) All easements to benefit the City shall be reviewed and approved by the DPW, Planning and Legal Departments prior to final acceptance by the City Council. In most cases, metes and bounds describing the easement area shall be required.
The easements have been completed and are included for City approval. [See Item 6 from the September 1, 2021 email.]
4.5) Road Plan/Profile is missing information including roadway horizontal curve information, stationing and pipe sizes at SMH's and CB's, pipe material. The City will complete the design review once a revised plan set is received and additional comments may be provided. Low pressure sewer force main appears to be excessively deep in areas. Engineer to address/redesign and final design shall be subject to DPW review and approval. City may require third party review at applicant's expense.
Sewer and Drainage Structures and pipe sizes have been added to the Road Plan and Profile. The remainder items have been added. (Included in this submittal.) [See Item 8 from the September 1, 2021 email.]
4.6) Low pressure sewer force main appears to be excessively deep in areas. Engineer to address/redesign and final design shall be subject to DPW review and approval. City may require third party review at applicant's expense.
The sewer force main is deeper than the minimum depth between stations 12+00 to 14+00 to avoid the need for sewer cleanout and air vacuum. The plans will be submitted to a third party for their review. [See Item 9 from the September 1, 2021 email.]
4.7) All "Cleanout/Air Vacuum" and "Terminal Manholes" for the sewer force main need to be clearly located and called out on the plan view and detail sheet. The terminal manholes have been shown on the Road Profiles and Utility Plans and details have been provided. (See Sheets C-15, C-32 and C-76). [See Item 10 from the September 1, 2021 email.]
4.8) Details and design for the proposed retaining wall along the proposed roadway shall be designed by a qualified registered engineer. Design and wall type shall be reviewed and approved by DPW prior to building permit approval. Details shall include the required guard rail and drainage pipe penetration.
Grading Note 22 on Sheet C-1 states that the design of the block retaining wall to be used shall be designed by a registered structural engineer and stamped plans shall be provided to the City for their approval. [See Item 11 from the September 1, 2021 email.]
4.9) Plans indicated a significant amount of the construction for new utilities and roadway will be in areas to be filled. The approach to construction will be important for the stability of the proposed utilities and longevity or the roadway. A Construction Mitigation and Management Plan shall be required for this project, to include a proposed approach to progress of constructions in the areas with significant fill.
Agreed, this will be submitted to the City for their approval prior to commencement of construction. [See Item 12 from the September 1, 2021 email.]
4.10) The City will require a full set of construction plans and specifications for site improvements and utilities prior to construction. This will be reviewed by a third party at the cost of the applicant.
Construction plans to be provided and reviewed by a third-party engineer prior to the commencement of construction. [See Item 13 from the September 1, 2021 email.]
4.11) The applicant shall agree to pay for the services of an oversight engineer, to be selected by the City, to monitor the construction of improvements within the public rights-of-way and on site.
Agreed, a fund will be set up to provide for a City selected oversight engineer. [See Item 14 from the September 1, 2021 email.]
4.12) The applicant shall provide an easement along the frontage on Peverly Hill Road for construction of the shared use path. The easement must be donated to the City of Portsmouth for the shared use path per Federal Requirements. The City will provide the appropriate documentation for the applicant's use. The applicant shall provide a contribution for future construction of the section from the new roadway to the south of property line in the amount of \$100,000.
An easement shall be provided, and the contribution will be made towards the future construction of the new roadway prior to the commencement of construction. (See Future Peverly Hill Road Improvement Plan, included in this submittal). [See Item 15 from the September 1, 2021 email.]

## ConditionsSubsequent:

(These stipulations are same as previously listed herein).
4.13) The applicant shall construct a temporary shared use path to connect to the existing sidewalk network and install crossing equipment to cross Peverly Hill Road at Middle Road. The design and installation shall be subject to review and approval by the DPW. Agreed.
Following a site walk with the DPW manager, a conceptual plan was decided upon and is shown on sheet C-68. This plan shows a sidewalk providing a connection from the intersection of Middle Rd and Peverly Hill Rd to the proposed residential development. [See item 1 of the TAC stipulations for approval].
4.14) A statement shall be added to the Condominium documents stating that the dumping of yard debris and other materials and storage is not permitted in the wetland buffer. Stated in Section $U(d)$ of the Condominium By-laws. [See Item 16 from the September 1, 2021 email.]
4.15) A statement shall be added to the Condominium documents stating that no salt is to be used for ice control on property owners' driveways or walkways on the site. A Chlorine Management Plan has been included in the Operation and Maintenance Manual and the statement, "There shall be no use of salt for ice control on the driveways and walkways within the Condominium", has been added to the Condominium By-laws and submitted to the City for their review, Article 6, Section A. (Included with this submission.) [See Item 17 from the September 1, 2021 email.]
4.16) A statement shall be added to the Condominium documents that property owners shall utilize NOFA (Northeast Organic Farming Association) approved practices (or comparable equivalent) for maintenance of landscaped areas; 4.17) The applicant shall install signage/markers indicating the location of the wetland buffer boundary. The statement, "The Board of Directors shall utilize Northeast Organic Farming Association ("NOFA") approved practices ( or comparable equivalent) for the maintenance of all landscaped areas", has been added to the Condominium Bylaws and submitted to the City for their review, Article 6, Section A. (Included with this submission.) [See Item 18 from the September 1, 2021 email.]
4.17) A NHDES sewer extension permit is required.

Permit pending City's approval and signature. (Included in the Planning Board submittal on August 25, 2021 and is included herein.) [See Item 22 from the September 1, 2021 email.]
4.18) The Engineer of Record shall submit a written report (with photographs and engineer stamp) certifying that the stormwater infrastructure was constructed to the approved plans and specifications and will meet the design performance.
Agreed, and a copy will be submitted to the City upon completion of the project. [See Item 23 from the September 1, 2021 email.]
4.19) A stormwater inspection and maintenance report shall be completed annually, and copies shall be submitted to the City's Planning and Public Works Departments. Agreed, a statement will be added to the Operation and Maintenance manual stating this. [See Item 24 from the September 1, 2021 email.]

We trust the above responses satisfy the concerns expressed in the Staff Memorandum. We look forward to presenting the project to you at the next Planning Board Meeting.

Sincerely,
TFMoran, Inc.


Project Manager
cc: Peter Britz, Rick Green, Michael Green, Jenna Green

Civil Engineers
Structural Engineers Traffic Engineers Land Surveyors
Landscape Architects
Scientists

Green \& Company 83 Peverly Hill Rd, Portsmouth, NH

April 19, 2021
47388-11

| Assessors Map |  | Abutter Name | Mailing Address |
| :---: | :---: | :--- | :--- |$|$| Map |
| :--- |
| LOCUS 242 |

## City of Portsmouth, New Hampshire Site Plan Application Checklist

This site plan application checklist is a tool designed to assist the applicant in the planning process and for preparing the application for Planning Board review. A pre-application conference with a member of the planning department is strongly encouraged as additional project information may be required depending on the size and scope. The applicant is cautioned that this checklist is only a guide and is not intended to be a complete list of all site plan review requirements. Please refer to the Site Plan review regulations for full details.

Applicant Responsibilities (Section 2.5.2): Applicable fees are due upon application submittal along with required attachments. The application shall be complete as submitted and provide adequate information for evaluation of the proposed site development. Waiver requests must be submitted in writing with appropriate justification. STOKEL SB \& NA TRUST. STOKEL PHILIP J

| Name of Owner/Applicant: Green \& Company Building \& Development Corp. Date Submitted: 8/25/21 |  |
| :---: | :---: |
| Phone Number: 603-964-7572 | E-mail: mgreen@greenandcompany.com |
| Address: 83 Peverly Hill Road | 242 Lot: 4 |
| Zoning District: Single Residence A (SRA) \& B (SRB) | rea: $4,604,509$ sq. ft. |


| Application Requirements |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location (e.g. Page or Plan Sheet/Note \#) | Waiver Requested |
| $\checkmark$ | Fully executed and signed Application form. (2.5.2.3) | Submitted online and <br> (1) copy to City | N/A |
| $\checkmark$ | All application documents, plans, supporting documentation and other materials provided in digital Portable Document Format (PDF) on compact disc, DVD or flash drive. (2.5.2.8) | Submitted online | N/A |


| Site Plan Review Application Required Information |  |  |  |
| :---: | :--- | :--- | :--- |
| $\boldsymbol{\nabla}$ | Required Items for Submittal | Item Location <br> (e.g. Page/line or <br> Plan Sheet/Note \#) | Waiver <br> Requested |
| $\boldsymbol{V}$ | Statement that lists and describes "green" building components and <br> systems. <br> (2.5.3.1A) | Provided in Letter from <br> GDS and Paragraph in <br> Cover Letter | $\square$ |
| $\boldsymbol{V}$ | Gross floor area and dimensions of all buildings and statement of <br> uses and floor area for each floor. <br> (2.5.3.1B) | Architectul Plans <br> Submitted, Areas Listed <br> Online | N/A |
| $\boldsymbol{V}$ | Tax map and lot number, and current zoning of all parcels under Site <br> Plan Review. <br> (2.5.3.1C) | See sheet S-01 | N/A |
| $\boldsymbol{V}$ | Owner's name, address, telephone number, and signature. Name, <br> address, and telephone number of applicant if different from owner. <br> (2.5.3.1D) | See sheet C-00 | N/A |

## Site Plan Review Application Required Information

| Site Plan Review Application Required Information |  |  |  |
| :---: | :--- | :--- | :--- |
| $\boldsymbol{\nabla}$ | Required Items for Submittal | Item Location <br> (e.g. Page/line or <br> Plan Sheet/Note \#) | Waiver <br> Requested |
| $\boldsymbol{\nearrow}$ | Names and addresses (including Tax Map and Lot number and <br> zoning districts) of all direct abutting property owners (including <br> properties located across abutting streets) and holders of existing <br> conservation, preservation or agricultural preservation restrictions <br> affecting the subject property. <br> (2.5.3.1E) | See sheet S-01 | N/A |
| $\boldsymbol{V}$ | Names, addresses and telephone numbers of all professionals <br> involved in the site plan design. <br> (2.5.3.1F) | See sheet C-00 | N/A |
| $\boldsymbol{\nearrow}$ | List of reference plans. <br> (2.5.3.1G) | See sheet S-01 | N/A |
| $\boldsymbol{V}$ | List of names and contact information of all public or private utilities <br> servicing the site. <br> (2.5.3.1H) | See sheet C-00/C-01 | N/A |


| Site Plan Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| $\square$ | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
| $\checkmark$ | Full size plans shall not be larger than 22 inches by 34 inches with match lines as required, unless approved by the Planning Director. Submittals shall be a minimum of 11 inches by 17 inches as specified by Planning Dept. staff. (2.5.4.1A) | Required on all plan sheets | N/A |
| $\checkmark$ | Scale: Not less than 1 inch $=60$ feet and a graphic bar scale shall be included on all plans. (2.5.4.1B) | Required on all plan sheets | N/A |
| $\checkmark$ | GIS data should be referenced to the coordinate system New Hampshire State Plane, NAD83 (1996), with units in feet. (2.5.4.1C) | Required on all plan sheets | N/A |
| $\checkmark$ | Plans shall be drawn to scale. (2.5.4.1D) | Required on all plan sheets | N/A |
| $\checkmark$ | Plans shall be prepared and stamped by a NH licensed civil engineer. (2.5.4.1D) | Required on all plan sheets | N/A |
| $\checkmark$ | Wetlands shall be delineated by a NH certified wetlands scientist. (2.5.4.1E) | S-01 | N/A |
| $\checkmark$ | Title (name of development project), north point, scale, legend. (2.5.4.2A) | Required on all plan sheets | N/A |
| $\checkmark$ | Date plans first submitted, date and explanation of revisions. (2.5.4.2B) | Required on all plan sheets | N/A |
| $\checkmark$ | Individual plan sheet title that clearly describes the information that is displayed. (2.5.4.2C) | Required on all plan sheets | N/A |



## Site Plan Specifications - Required Exhibits and Data

| Site Plan Specifications - Required Exhibits and Data |  |  |  |
| :---: | :---: | :---: | :---: |
| $\square$ | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
|  | 1. Existing Conditions: (2.5.4.3A) |  |  |
| $\checkmark$ | a. Surveyed plan of site showing existing natural and built features; | S-01 |  |
| $\checkmark$ | b. Zoning boundaries; | S-01 |  |
| $\checkmark$ | c. Dimensional Regulations; | S-05 |  |
| $\checkmark$ | d. Wetland delineation, wetland function and value assessment; | S-01 |  |
| $\checkmark$ | e. SFHA, 100-year flood elevation line and BFE data. | S-01 |  |
|  | 2. Buildings and Structures: (2.5.4.3B) |  |  |
| $\checkmark$ | a. Plan view: Use, size, dimensions, footings, overhangs, 1st fl. elevation; | Attached |  |
| $\checkmark$ | b. Elevations: Height, massing, placement, materials, lighting, façade treatments; | Attached |  |
| $\checkmark$ | c. Total Floor Area; | Attached |  |
| $\checkmark$ | d. Number of Usable Floors; | Attached |  |
| $\checkmark$ | e. Gross floor area by floor and use. | Attached |  |
|  | 3. Access and Circulation: (2.5.4.3C) |  |  |
| $\checkmark$ | a. Location/width of access ways within site; | C-04-C-11 |  |
| $\checkmark$ | b. Location of curbing, right of ways, edge of pavement and sidewalks; | S-06 and C-04-C-11 |  |
| $\checkmark$ | c. Location, type, size and design of traffic signing (pavement markings); | C-03 - C-11 |  |
| $\checkmark$ | d. Names/layout of existing abutting streets; | S-01 |  |
|  | e. Driveway curb cuts for abutting prop. and public roads; | C-02 \& C-04 |  |
| $\checkmark$ | f. If subdivision; Names of all roads, right of way lines and easements noted; | S-06 |  |
|  | g. AASHTO truck turning templates, description of minimum vehicle allowed being a WB-50 (unless otherwise approved by TAC). | N/A (Fire truck turning provided) | $\checkmark$ |
|  | 4. Parking and Loading: (2.5.4.3D) |  |  |
| $\checkmark$ | a. Location of off street parking/loading areas, landscaped areas/buffers; | C-04 - C-11 |  |
| $\checkmark$ | b. Parking Calculations (\# required and the \# provided). | C-03 |  |
|  | 5. Water Infrastructure: (2.5.4.3E) |  |  |
| $\checkmark$ | a. Size, type and location of water mains, shut-offs, hydrants \& Engineering data; | C-27-C-33 |  |
|  | b. Location of wells and monitoring wells (include protective radii). | N/A |  |
|  | 6. Sewer Infrastructure: (2.5.4.3F) |  |  |
| $\checkmark$ | a. Size, type and location of sanitary sewage facilities \& Engineering data. | C-12-C-15 \& C-27-C-33 |  |
|  | 7. Utilities: (2.5.4.3G) |  |  |
| $\checkmark$ | a. The size, type and location of all above \& below ground utilities; | C-12-C-15 \& C-27-C-33 |  |
| $\checkmark$ | b. Size type and location of generator pads, transformers and other fixtures. | C-27-C-33 |  |


| Site Plan Specifications - Required Exhibits and Data |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
|  | 8. Solid Waste Facilities: (2.5.4.3H) |  |  |
| $\checkmark$ | a. The size, type and location of solid waste facilities. | N/A |  |
|  | 9. Storm water Management: (2.5.4.31) |  |  |
| $\checkmark$ | a. The location, elevation and layout of all storm-water drainage. | C-17-C-25 |  |
|  | 10. Outdoor Lighting: (2.5.4.3J) |  |  |
| $\checkmark$ | a. Type and placement of all lighting (exterior of building, parking lot and any other areas of the site) and; <br> b. photometric plan. | C-56-C-63 | $\square$ |
| $\checkmark$ | 11. Indicate where dark sky friendly lighting measures have been implemented. (10.1) | C-56-C-63 |  |
|  | 12. Landscaping: (2.5.4.3K) |  |  |
| $\checkmark$ | a. Identify all undisturbed area, existing vegetation and that which is to be retained; | C-45-C-53 |  |
|  | b. Location of any irrigation system and water source. | C-01 |  |
|  | 13. Contours and Elevation: (2.5.4.3L) |  |  |
| $\checkmark$ | a. Existing/Proposed contours (2 foot minimum) and finished grade elevations. | C-17-C-25 |  |
|  | 14. Open Space: (2.5.4.3M) |  |  |
| $\checkmark$ | a. Type, extent and location of all existing/proposed open space. | S-06-S08 |  |
| $\checkmark$ | 15. All easements, deed restrictions and non-public rights of ways. (2.5.4.3N) | S-06-S-08 |  |
| $\checkmark$ | 16. Location of snow storage areas and/or off-site snow removal. (2.5.4.30) | C-4-C-11 (Road shoulders) |  |
| $\Gamma$ | 17. Character/Civic District (All following information shall be included): (2.5.4.3Q) | N/A |  |
|  | a. Applicable Building Height ( 10.5 A 21.20 \& 10.5A43.30); |  |  |
|  | b. Applicable Special Requirements (10.5A21.30); |  |  |
|  | c. Proposed building form/type (10.5A43); |  |  |
|  | d. Proposed community space (10.5A46). |  |  |

## Other Required Information

| Other Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| , | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
| $\checkmark$ | Traffic Impact Study or Trip Generation Report, as required. (Four (4) hardcopies of the full study/report and Six (6) summaries to be submitted with the Site Plan Application) (3.2.1-2) | Traffic Memo | $\square$ |
| $\checkmark$ | Indicate where Low Impact Development Design practices have been incorporated. (7.1) | Stormwater Management Plan/Report |  |
| $\checkmark$ | Indicate whether the proposed development is located in a wellhead protection or aquifer protection area. Such determination shall be approved by the Director of the Dept. of Public Works. (7.3.1) | In wellhead protection area. |  |
| $\checkmark$ | Indicate where measures to minimize impervious surfaces have been implemented. (7.4.3) | Narrowed roadways |  |
| $\checkmark$ | Calculation of the maximum effective impervious surface as a percentage of the site. (7.4.3.2) | C-03 |  |
|  | Stormwater Management and Erosion Control Plan. <br> (Four (4) hardcopies of the full plan/report and Six (6) summaries to be submitted with the Site Plan Application) (7.4.4.1) | C-17-C-25 \& C-35-C-44. Submitted 1 Hard Copy and one Electronic Copy per Planning Instructions | $\pm$ |


| Final Site Plan Approval Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| $\square$ | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
| $\checkmark$ | All local approvals, permits, easements and licenses required, including but not limited to: <br> a. Waivers; <br> b. Driveway permits; <br> c. Special exceptions; <br> d. Variances granted; <br> e. Easements; <br> f. Licenses. <br> (2.5.3.2A) | C-00 | $\square$ |
| $\checkmark$ | Exhibits, data, reports or studies that may have been required as part of the approval process, including but not limited to: <br> a. Calculations relating to stormwater runoff; <br> b. Information on composition and quantity of water demand and wastewater generated; <br> c. Information on air, water or land pollutants to be discharged, including standards, quantity, treatment and/or controls; <br> d. Estimates of traffic generation and counts pre- and postconstruction; <br> e. Estimates of noise generation; <br> f. A Stormwater Management and Erosion Control Plan; <br> g. Endangered species and archaeological / historical studies; <br> h. Wetland and water body (coastal and inland) delineations; <br> i. Environmental impact studies. <br> (2.5.3.2B) | a. See Stormwater Report <br> b. See Sewer Report <br> c. N/A <br> d. Traffic Memo <br> e. N/A <br> f. C-17 to C-25 \& C-35 <br> to C-43 <br> g. NHB21-0943 <br> h. S-01 <br> i. N/A | $\square$ |

Final Site Plan Approval Required Information

| Final Site Plan Approval Required Information |  |  |  |
| :--- | :--- | :--- | :---: |
| $\square$ | Required Items for Submittal | Item Location <br> (e.g. Page/line or <br> Plan Sheet/Note \#) | Waiver <br> Requested |
| $\checkmark$ | A document from each of the required private utility service <br> providers indicating approval of the proposed site plan and <br> indicating an ability to provide all required private utilities to the <br> site. <br> (2.5.3.2D) | Utility Will Serve <br> Letters Submitted as <br> Separate <br> Attachments. | $\square$ |
| $\square$ | A list of any required state and federal permit applications required <br> for the project and the status of same. <br> (2.5.3.2E) | C-00 | $\square$ |

## City of Portsmouth, New Hampshire Subdivision Application Checklist

This subdivision application checklist is a tool designed to assist the applicant in the planning process and for preparing the application for Planning Board review. A pre-application conference with a member of the planning department is strongly encouraged as additional project information may be required depending on the size and scope. The applicant is cautioned that this checklist is only a guide and is not intended to be a complete list of all subdivision review requirements. Please refer to the Subdivision review regulations for full details.

Applicant Responsibilities (Section III.C): Applicable fees are due upon application submittal along with required number of copies of the Preliminary or final plat and supporting documents and studies. Please consult with Planning staff for submittal requirements.

Owner:
STOKEL SB \& NA TRUST. STOKEL PHILIP J Date Submitted:

8/25/2021 Applicant: Green \& Company Building \& Development Corp.
Phone Number $\qquad$ E-mail: mgreen@greenandcompany.com

Site Address 1: $\qquad$ Map: 242 Lot: 4

Site Address 2: $\qquad$ Map: $\qquad$ Lot: 4

| Application Requirements |  |  |  |
| :---: | :---: | :---: | :---: |
| ■ | Required Items for Submittal | Item Location (e.g. Page or Plan Sheet/Note \#) | Waiver Requested |
| $\checkmark$ | Completed Application form. (III.C.2-3) | Submitted online and (1) copy to City | N/A |
| $\checkmark$ | All application documents, plans, supporting documentation and other materials provided in digital Portable Document Format (PDF) on compact disc, DVD or flash drive. (III.C.4) | Submitted online and <br> (1) copy to City | N/A |


| Requirements for Preliminary/Final Plat |  |  |  |  |
| :---: | :--- | :--- | :---: | :---: |
| $\boxed{\nabla}$ | Required Items for Submittal <br> Ie.g. Page/line or <br> Plan Sheet/Note \#) | Required for <br> Preliminary / Final <br> Plat | Waiver <br> Requested |  |
| $\checkmark$ | Name and address of record owner, any <br> option holders, descriptive name of <br> subdivision, engineer and/or surveyor or <br> name of person who prepared the plat. <br> (Section IV.1/V.1) | C-00 | V Preliminary Plat <br> $\nabla$ Final Plat | N/A |


| Requirements for Preliminary/Final Plat |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Required for Preliminary / Final Plat | Waiver Requested |
| (1) | Preliminary Plat <br> Names and addresses of all adjoining property owners. (Section IV.2) <br> Final Plat <br> Names and addresses of all abutting property owners, locations of buildings within one hundred (100) feet of the parcel, and any new house numbers within the subdivision. <br> (Section V.2) | S-01-S-05 | Preliminary Plat Final Plat | N/A |
| $\checkmark$ | North point, date, and bar scale. (Section IV.3/V3) | Required on all Plan Sheets | Preliminary Plat Final Plat | N/A |
| $\checkmark$ | Zoning classification and minimum yard dimensions required. (Section IV.4/V.4) | S-01-S-05 | 『 Preliminary Plat Final Plat | N/A |
| $\square$ | Preliminary Plat <br> Scale (not to be smaller than one hundred (100) feet = 1 inch) and location map (at a scale of $1^{\prime \prime}=1000^{\prime}$ ). (Section IV.5) <br> Final Plat <br> Scale (not to be smaller than $1^{\prime \prime}=100^{\prime}$ ), Location map (at a scale of $1^{\prime \prime}=1,000^{\prime}$ ) showing the property being subdivided and its relation to the surrounding area within a radius of 2,000 feet. Said location map shall delineate all streets and other major physical features that my either affect or be affected by the proposed development. (Section V.5) | S-01-S-05 | V Preliminary Plat V Final Plat | N/A |
| $\checkmark$ | Location and approximate dimensions of all existing and proposed property lines including the entire area proposed to be subdivided, the areas of proposed lots, and any adjacent parcels in the same ownership. (Section IV.6) | S-01-S-05 | Preliminary Plat Final Plat |  |
| $\checkmark$ | Dimensions and areas of all lots and any and all property to be dedicated or reserved for schools, parks, playgrounds, or other public purpose. Dimensions shall include radii and length of all arcs and calculated bearing for all straight lines. <br> (Section V.6/ IV.7) | S-07 | V Preliminary Plat V Final Plat | N/A |
| $\checkmark$ | Location, names, and present widths of all adjacent streets, with a designation as to whether public or private and approximate location of existing utilities to be used. Curbs and sidewalks shall be shown. <br> (Section IV.8/V.7) | S-01-S-05 | V Preliminary Plat Final Plat |  |


| Requirements for Preliminary/Final Plat |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| - | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Required for Preliminary / Final Plat | Waiver Requested |
| $\checkmark$ | Dates and permit numbers of all necessary permits from governmental agencies from which approval is required by Federal or State law. <br> (Section V.10) | C-00 | Preliminary Plat Final Plat |  |
| $\checkmark$ | For subdivisions involving greater than five (5) acres or fifty (50) lots, the final plat shall show hazard zones and shall include elevation data for flood hazard zones. <br> (Section V.11) | N/A (Flood Zone X) | Preliminary Plat Final Plat |  |
| $\boxed{\square}$ | Location of all permanent monuments. (Section V.12) | S-02 - S-04 | Preliminary Plat Final Plat |  |


| General Requirements ${ }^{1}$ |  |  |  |
| :---: | :---: | :---: | :---: |
| చ | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
| $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ | 1. Basic Requirements: (VI.1) <br> a. Conformity to Official Plan or Map <br> b. Hazards <br> c. Relation to Topography <br> d. Planned Unit Development | All sheets N/A $\begin{aligned} & \text { S-02 - S-04 } \\ & \text { S-06 } \end{aligned}$ |  |
| $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ | 2. Lots: (VI.2) <br> a. Lot Arrangement <br> b. Lot sizes <br> c. Commercial and Industrial Lots | $\begin{aligned} & \mathrm{S}-06 \\ & \mathrm{~S}-06 \\ & \mathrm{~N} / \mathrm{A} \end{aligned}$ |  |
| $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ | 3. Streets: (VI.3) <br> a. Relation to adjoining Street System <br> b. Street Rights-of-Way <br> c. Access <br> d. Parallel Service Roads <br> e. Street Intersection Angles <br> f. Merging Streets <br> g. Street Deflections and Vertical Alignment <br> h. Marginal Access Streets <br> i. Cul-de-Sacs <br> j. Rounding Street Corners <br> k. Street Name Signs <br> l. Street Names <br> m. Block Lengths <br> n. Block Widths <br> o. Grade of Streets <br> p. Grass Strips | a. S-06 <br> b. S-06 <br> c. S-06 <br> d. S-06 <br> e. C-12-C-15 <br> f. N/A <br> g. C-12-C-15 <br> h. N/A <br> i. N/A <br> j. C-12-C-15 <br> k. TBD <br> I. TBD <br> m. N/A <br> n. N/A <br> o. C-12-C-15 \& C-17-C-24 <br> p. C-04-C-11 |  |
| $\square$ | 4. Curbing: (VI.4) | C-04-C-11 |  |
| $\square$ | 5. Driveways: (VI.5) | C-04-C-11 |  |
| $\square$ | 6. Drainage Improvements: (VI.6) | C-17-C-25 |  |
| $\square$ | 7. Municipal Water Service: (VI.7) | C-27-C-33 |  |
| $\square$ | 8. Municipal Sewer Service: (VI.8) | $\mathrm{C}-12$ - C-15 \& C-27-C-33 |  |
| $\square$ | 9. Installation of Utilities: (VI.9) <br> a. All Districts <br> b. Indicator Tape | C-27-C-33 |  |
|  | 10. On-Site Water Supply: (VI.10) | C-12-C-15 \& C-27-C-33 |  |
|  | 11. On-Site Sewage Disposal Systems: (VI.11) | C-12-C-15 \& C-27-C-33 |  |
| $\square$ <br> $\square$ <br> $\square$ <br> $\square$ <br> $\square$ | 12. Open Space: (VI.12) <br> a. Natural Features <br> b. Buffer Strips <br> c. Parks <br> d. Tree Planting | a. S-06-S-08, C-02 <br> b. C-46-C-53 <br> c. S-06 <br> d. C-46-C-54 |  |
| $\square$ <br> $\square$ | 13. Flood Hazard Areas: (VI.13) <br> a. Permits <br> b. Minimization of Flood Damage <br> c. Elevation and Flood-Proofing Records <br> d. Alteration of Watercourses | N/A |  |
| $\square$ | 14. Erosion and Sedimentation Control (VI.14) | C-42-C-51 |  |


| $\square$ | Required Items for Submittal | Item Location <br> (e.g. Page/line or <br> Plan Sheet/Note \#) | Waiver <br> Requested |
| :---: | :---: | :---: | :---: |
| $\square$ | 15. Easements (VI.15) <br> a. Utilities <br> b. Drainage | S-06 |  |
| $\square$ | 16. Monuments: (VI.16) |  |  |
| $\checkmark$ | S-01 - S-04 |  |  |
| $\checkmark$ | 17. Benchmarks: (VI.17) | S-02 |  |
| $\checkmark$ | 18. House Numbers (VI.18) | S-06 (Final Numbers TBD) |  |
| $\checkmark$ |  |  |  |


| Design Standards |  |  |  |
| :---: | :---: | :---: | :---: |
|  | Required Items for Submittal | Indicate compliance and/or provide explanation as to alternative design | Waiver Requested |
| $\checkmark$ | 1. Streets have been designed according to the design standards required under Section (VII.1). <br> a. Clearing <br> b. Excavation <br> c. Rough Grade and Preparation of Sub-Grade <br> d. Base Course <br> e. Street Paving <br> f. Side Slopes <br> g. Approval Specifications <br> h. Curbing <br> i. Sidewalks <br> j. Inspection and Methods | Yes |  |
| $\checkmark$ | 2. Storm water Sewers and Other Drainage Appurtenances have been designed according to the design standards required under Section (VII.2). <br> a. Design <br> b. Standards of Construction | Yes |  |
| $\square$ | 3. Sanitary Sewers have been designed according to the design standards required under Section (VII.3). <br> a. Design <br> b. Lift Stations <br> c. Materials <br> d. Construction Standards | Yes |  |
| $\checkmark$ | 4. Water Mains and Fire Hydrants have been designed according to the design standards required under Section (VII.4). <br> a. Connections to Lots <br> b. Design and Construction <br> c. Materials <br> d. Notification Prior to Construction | Yes |  |



[^1]Page 6 of 6

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects

June 23, 2021
Mr. Dexter Legg, Chair
Portsmouth Planning Board
1 Junkins Avenue
Portsmouth, NH 03801

## RE: Waiver Requests for Condominium Development, Parson Woods Condominium LLC, Tax Map 242, Lot 4

## Dear Chairman Legg:

On behalf of our client, Green and Company, we respectfully request the following waivers as part of our submittal of the Parsons Woods Condominium Open Space Planned Unit Development:

Waiver Request: for Subdivision Rules and Regulations, Residential Street Minimum Standards (page 36), requiring 32' of pavement width.

Explanation: The pavement width of 26 ' at the entrance of the subdivision and 22 ' within the inner loop, is provided pursuant to City Staff recommendations. This recommendation is based on "City of Portsmouth Complete Street Design Guidelines," dated June 2017. Page 8 of this document suggests a pavement width of 20 for a neighborhood slow street, which best describes the street for this Planned Unit Development. A width of $26^{\prime}$ is provided to meet fire code standards for roads over 750 ' long. Two (2) access points are provided for the looped section of road, where the width is reduced to 22 '.

Waiver Request: For Subdivision Rules and Regulations Section $\mathrm{VI}(3)(\mathrm{b})$, "The minimum right-ofway for main thoroughfares shall be as shown on the City's Master Plan or Official Map and shall, when not indicated on such Master Plan or Official Map, be not less than sixty (60) feet; for residential streets, fifty (50) feet."

Explanation: The ROW width of 40' was provided pursuant to City Staff recommendations. This recommendation is based on the narrower road width and by the applicant's desire to avoid impacting the remainder of the property. This is in alignment with a Planned Unit Development.

Waiver Request: For Site Plan Review Regulations Section 2.5.4.3(c), "Use current AASHTO truck turning templates descriptions with the minimum vehicle allowed being a WB-50, unless otherwise approved by the TAC."

Explanation: The proposed development is residential, and the largest vehicle anticipated to travel the roadway is a Portsmouth Fire Truck (H3635). This vehicle template was applied in the truck turning analysis, and can maneuver throughout this planned unit development.

Parson Woods Condominium LLC Submittal
83 Peverly Hill Road - Tax Map 242 Lot 4
Project \#47388.11
We look forward to your review of these waiver requests at the next Planning Board hearing.
Respectfully,
TFMoran, Inc.

Jack McTigue, PE, CPESC
Project Manager

Green \& Co
Attn: Michael Green
11 Lafayette Road, P.O. Box 1297
North Hampton, NH 03862

## RE: 83 Peverly Hill Rd, Portsmouth, New Hampshire

## Hello Michael:

Thank you for your continued commitment to NH Saves. We look forward to working with you on the energy ratings for the home being constructed at 83 Peverly Hill Rd. Our team here at GDS is happy to be working with Green and Company on another NH Saves project.

For the benefit of others not familiar with the NH Saves and the Home Energy Rating System index (HERS index) and what it means for homes receiving the label, these units are modeled and analyzed to estimate annual energy consumption but are more than just energy efficient. The program also includes an element of building durability and healthy building environments. The process includes energy modeling and performance-based testing as well as on-site inspections to confirm the modeling inputs, to identify opportunities to improve insulation and air-sealing prior to drywall, duct leakage testing, and blower door testing.

These homes are by design at least $30 \%$ more efficient than code built home (IECC 2015) and include high efficient HVAC and water heating equipment, insulation installed to attain an installation grading of grade, excellent window efficiencies (u-value $\leq 0.30$ ) and high efficacy lighting and ENERGY STAR appliances.

Because NH Saves encourages tight, well insulated buildings, the program does not want to create any issues with indoor air quality. Therefore, the program requires some means of whole-house ventilation (compliant with ASHRAE Standard 62.2) and includes a moisture management checklist. All of this adds a non-energy benefit to constructing a home that is energy efficiency, healthy and durable.

Our plan is to utilize the NHSaves program (sponsored by Eversource, Unitil, Liberty and NHEC) to provide support for modeling and inspections.

Once we receive a set of plans we can begin the take-off and energy modeling. In the meantime, as always, please contact me with any questions or design changes that may impact the HERS index.


Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
NEW

Scientists

August 6, 2021

Dexter Legg, Chair
Portsmouth Planning Board
1 Junkins Avenue, $3^{\text {rd }}$ Floor
Portsmouth, NH 03801

## Re: Parson Woods Condominium, Proposed Open Space PUD Article 7, Section 10.727.30 of Portsmouth Zoning Ordinance Planning Board Findings Relative to a Planned Unit Development TFMoran Project: 47388.11

Dear Chairman Legg \& Members of the Planning Board,
In accordance with the above referenced section, prior to granting conditional use permit for a Planned Unit Development (PUD), the planning board shall make the following findings:
(10.727.311) The site is appropriate for an OS-PUD or RDI-PUD, as applicable.
(10.727.312) The anticipated impacts of the proposed PUD on traffic, market values, stormwater runoff or environmental factors will not be more detrimental to the surrounding area than the impacts of conventional residential development of the site
10.727.311 - The site is appropriate for an OS-PUD. This site is 105.70 acres with 665 'of frontage on Peverly Hill Road. The site is almost entirely vegetated, with one existing single-family home located at 83 Peverly Hill Road. The majority of the property is surrounded by undeveloped conservation land and residential properties, as well the Calvary Cemetery to the north, the Boston-Maine Railroad property to the west, and religious properties, Girl Scout Camp, and city-owned property to the southern and eastern side. There are approximately 60 acres of upland and 45 acres of wetland on the subject parcel.

The proposed OS-PUD allows us to cluster the units, with no impact to wetlands or wetland buffers, significantly reduce impervious surface, reduce tree clearing, preserve natural features of the property, provide public amenities, and create open space land which will be protected by a conservation easement. For these reasons, the site is well suited and appropriate for an OS-PUD.
10.727.312 - These anticipated impacts of the proposed OS-PUD are less than the impacts of a conventional subdivision on stormwater runoff, traffic, market values, and environmental factors, further described below:

## Stormwater Runoff

A conventional subdivision on this property would generate considerably more stormwater runoff than an OSPUD. The paved roadway for a conventional subdivision would be $32^{\prime}$ wide and $7,332^{\prime}$ long with individual driveways for each home. Clustering of the homes in the OS-PUD layout allows us to reduce the road length to $2,945^{\prime}$, which is $4,387^{\prime}$ less roadway than a conventional layout. With a conventional layout, individual lots are a minimum of 15,000 s.f. to 1 acre in size and owned in fee by individual homeowners with one driveway to each lot. This layout pushes homes further back from the main roadway and thus creating longer driveways to each home than the proposed OS-PUD layout where homes are closer to the road and driveways are shorter. The reduction in road length and driveway length in the OS-PUD significantly reduces impervious surface area of the site, which reduces stormwater runoff when compared to a conventional layout. The conventional layout impacts all of the upland of the subject property. In comparison, the OS-PUD impacts approximately $30 \%$ of the property. The increase in road length, driveway length, and area to be cleared for a conventional subdivision generates significantly more stormwater runoff than the OS-PUD proposed on this property.

## Traffic

A traffic memorandum has been prepared by Stephen G Pernaw, P.E. A condominium unit, which are proposed within this PUD, have 15\%-43\% fewer vehicle trips than a single-family home, depending upon the day of the week and hour of the day. According to the Institute of Transportation Engineers, "Single family detached units had the highest trip generation rate per dwelling units of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than any other residential land uses." Condominium units tend to generate fewer trips than conventional single-family homes as these are typically smaller in gross floor area and family size. In similar developments completed by the applicants, these condominium units typically attract the empty nester market due to the low-maintenance amenities and lifestyle the condominiums units offer, and often have 1-2 residents per unit where a conventional single family home averages 3.5 residents per unit. For these reasons, a conventional subdivision would generate more traffic than an OS-PUD.

## Market Value

The property containing the proposed OS-PUD is located in the Single Residence A and Single Residence B zoning districts. The development of the property is concentrated in a small portion of the property in the northeast part of the parcel, and the remaining majority of the property will be protected by a conservation easement. The new proposed homes will be of equal or greater value than surrounding single family homes and condominium properties and will not diminish their market value. Furthermore, the public park and rail trail connection proposed in the OS-PUD layout is a benefit to the community that could increase property value of surrounding homes. The surrounding properties that abut the portion of the property that will be protected by a conservation easement will not be affected or diminished in value by the proposed OS-PUD. The abutting properties of the proposed developed portion of the parcel (cemetery, religious property, and undeveloped land) will not be impacted by the OS-PUD, but will also be protected by a landscaping buffer surrounding the OSPUD. The anticipated difference in market value for the condominium units within this OS-PUD versus the market values of a conventional subdivision development are negligible.

## Environmental Factors

When comparing the proposed OS-PUD and the conventional subdivision plan for this property, it is clear that the OS-PUD will be far less detrimental to the environment. By clustering the homes, we are able to reduce the road length by less than half the length of that of a conventional layout. There is a significant reduction in impervious surface by the reduction in road length and driveway lengths. The OS -PUD allows us to impact a much smaller portion of the site and significantly reduce tree clearing, thus preserving more of the natural environment. The reduction in tree clearing and impervious surface reduces stormwater runoff. The conventional layout has two wetland crossings and wetland buffer impacts, while the OS-PUD layout has no impacts to wetlands or wetland buffers. The OS-PUD allow us to preserve 71 of the 105.70 acres of land in the form of a conservation easement, where a conventional subdivision allows for zero acres of conservation land. With a conventional subdivision, these wetlands and adjacent buffers would be owned by many different owners. The OS-PUD allows the condominium form of ownership. Therefore, wetlands and adjacent buffers would be owned by the Condominium Association, and one owner of all undeveloped land allows us to preserve it in the form of a conservation easement which is a benefit for the environment and the public.

In summary, for the reasons stated above, it is our professional opinion that the anticipated impacts of this proposed PUD on traffic, market values, stormwater runoff, and environmental factors will be far less detrimental to the surrounding area than the impacts of a conventional residential development.

Respectfully Submitted,

Sincerely,

## TFMoran, Inc.



Corey Colwell
Division Manager/Principal

Project Manager/Typist
CC:

THIS AGREEMENT is entered into by and between Green \& Co. Building and Development Corp., a New Hampshire corporation with a mailing address of 11 Lafayette Road, North Hampton, New Hampshire (the "Developer") and the CITY OF PORTSMOUTH, a New Hampshire municipal corporation having a mailing address of 1 Junkins Avenue, Portsmouth, New Hampshire 03801 (the "City").

## RECITALS

WHEREAS, this Agreement relates to an Open-Space Planned Unit Development (the "PUD") pursuant to Article 10.725 of the City of Portsmouth Zoning Ordinance (the "Ordinance") consisting of 56 units and other improvements together with conservation open space common area of approximately 77 acres identified on a plan of land entitled "Condominium Site plan" prepared by T. F. Moran, Inc. and recorded in Rockingham County Registry of Deeds as Plan No. $\qquad$ ,as revised to the date hereof (the "Site Plan"); AND

WHEREAS, the Site Plan together with a Conditional Use Permit (the "CUP") for the PUD were approved by the City of Portsmouth Planning Board (the "Planning Board") on $\qquad$ subject to certain conditions as set forth in Exhibit A attached hereto and incorporated herein (the "Conditions of Approval"); AND

WHEREAS, pursuant to Article 10.727.52 of the Ordinance, all representations made in public hearings and in materials submitted by an Applicant for a CUP are deemed to be conditionals of approval which shall be memorialized in a signed Development Agreement between the Applicant and City; AND

WHEREAS, this Development Agreement is intended to comply with Article 10.727.52 of the Ordinance; AND

WHEREAS, the parties agree that any violation of the terms and conditions set forth in this Development Agreement or of the Conditions of Approval shall be subject to enforcement action as provided for by RSA 676, the City of Portsmouth Zoning Ordinance, and the City of Portsmouth Site Plan Regulations and Subdivision Regulations, and as provided for by law ; AND

WHEREAS, the Developer, its heirs, successors and assigns shall implement, develop, and maintain the PUD in accordance with the approved Site Plan, Conditional Use Permit and Conditions of Approval. All substantive revisions and/or amendments to the Site Plan, Conditional Use Permit or Conditions of Approval must be approved by the Planning Board; AND

WHEREAS, it is intended that this Development Agreement be binding upon the heirs, successors and assigns of the Developer.

NOW THEREFORE, in consideration of the foregoing Recitals and mutual covenants and representations contained herein, the Developer and City agree as follows:

1. The Developer agrees to adhere to the Conditions of Approval, incorporated as Exhibit A,
and all conditions precedent and subsequent to recording of the Site Plan and all documents related thereto , unless it has received written approval from the Planning Board allowing it to modify said conditions.
2. The Developer shall prepare and provide a Grant of Conservation Restrictions and Conservation Open Space Management Plan relative to the Conservation Open Space Common Area to the Planning Department and Legal Department for their review, approval and recording. Once approved, this document shall not be modified absent written approval from the Planning Department and Legal Department.
3. This Development Agreement may, at the discretion of the Planning Department and Legal Department, be rolled into and incorporated by reference into a future Site Review Agreement to be executed between the Parties.
4. The Developer shall provide Site Review Surety (i.e. Letter of Irrevocable Credit, Surety Bond or Cash) to the City in a form and amount(s) acceptable to the Legal Department prior to issuance of any building permit associated with the PUD.
5. This Development Agreement may be assigned in whole or in part at any time by the Developer so long as written approval has been provided by the City of Portsmouth, which written approval shall not be unreasonably withheld, deleted or conditioned upon receipt of written notice of intent to transfer.
6. Prior to issuance of a building permit for the PUD, the Site Plan, Easement Plans and any Deeds/Grants required by the Conditions of Approval or by this Development Agreement shall be recorded in the Rockingham County Registry of Deeds with the recording costs being borne by the Developer.
7. This Development Agreement shall be binding upon and insure to the benefit of the heirs, successors and assigns of the parties.
8. It is expressly understood by the parties hereto that a waiver by the City of any breach or default by the Developer of the obligations, terms, and/or conditions of this Development Agreement shall not be deemed a waiver of any other or future breaches and/or defaults thereof.
9. If any clause of this Agreement shall be declared invalid or unconstitutional in whole or in part and is for any reason rendered null and void, the remaining clauses shall remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have set their hands this $\qquad$ day of $\qquad$ 2020.

## Developer:

$\qquad$
Witness

## City of Portsmouth:

## Witness

By:

Date: 9/29/2021

DECLARATION OF CONDOMINIUM OF<br>PARSON WOODS CONDOMINIUM, PORTSMOUTH, NEW HAMPSHIRE

Parson Woods Investments, LLC, a duly organized New Hampshire limited liability company with an address of 11 Lafayette Road, North Hampton, New Hampshire 03862, and its successors or assigns, ("Declarant"). The covenants and restrictions provided for herein may also be enforced by Green \& Co. Building \& Development Corp., a Massachusetts corporation with a place of business at 11 Lafayette Road, North Hampton, New Hampshire 03862 ("Green \& Company"), who is the builder of the Development.

## ARTICLE 1 SUBMISSION OF PROPERTY

The Declarant hereby submits land located in the City of Portsmouth, Rockingham County, New Hampshire, consisting of approximately 107 acres, more or less, situated on Peverly Hill Road, Portsmouth, New Hampshire, and more particularly described in Exhibit A hereto ("Land"), together with the buildings and other improvements heretofore or hereafter constructed thereon, and all easements, rights and appurtenances thereto described in said Exhibit A, or as shown on plans of said land, all of which are owned by the Declarant, to the provisions of the Condominium Act, in order to create a plan of condominium ownership in such property containing up to fifty six (56) units, as shown on the following plan; See plan of land entitled, "Condominium Site Plan," project for "Peverly Hill Road, Portsmouth, NH 03801" prepared by TFM Engineering, Inc., dated ___ with revision \#__ dated and recorded in the Rockingham County Registry of Deeds as Plan \#D- $\qquad$ .

## ARTICLE 2 <br> DEFINITIONS

As provided in Section 12, I of the Condominium Act capitalized terms not otherwise defined in this Declaration or in the Bylaws attached hereto as Exhibit B, as amended from time to time, shall have the meanings specified in Section 3 of the Condominium Act. The following terms are expressly defined herein:
(a) "Building" means any building constructed on a Unit or on the Limited Common Area assigned to a Unit as permitted herein, which Buildings shall be owned by the Unit Owner of the Unit.
(b) "Bylaws" mean the Bylaws provided for the self-government of the Condominium attached hereto, as amended from time to time.
(c) "Common Area" means all parts of the Property other than the Units, as more fully set forth in Article 5 of this Declaration and in the Site Plans, and includes the Limited Common Area.
(d) "Condominium" means "Parson Woods Condominium", the condominium established by this Declaration.
(e) "Condominium Act" means Chapter 356-B of the New Hampshire Revised Statutes Annotated, as amended.
(f) "Condominium Plan" or "Plans" or "Plat" means the plan entitled Condominium Site Plan," project for, "Peverly Woods, Portsmouth, NH 03811," prepared by TFM Engineering, Inc., dated ___ with revision \# ___ dated and recorded in the Rockingham County Registry of Deeds as Plan \#D-__ and any revisions thereof, recorded in the Registry simultaneously herewith or recorded subsequently pursuant to the Condominium Act, and any updated or amended site or floor plans.
(g) "Limited Common Area" means all those certain portions of the Common Area which are assigned to each Unit, 15 feet on either side of each unit, 30 feet behind each unit and 20 feet in front of each unit, or to the edge of pavement, whichever is less. Such Limited Common Area shall be restricted for use by the owner(s) of each such Unit, as more fully set forth in this Declaration and in the Plans, and additional limited common area as Declarant may determine in the future.
(h) "Majority of the Owners" means the Owners of the Units to which more than fifty one percent (51\%) of the votes in the Unit Owners' Association appertain. Any specified percentage of the Owners means the Owners of Units to which the specified percentage of the votes in the Unit Owners’ Association appertain.
(i) "Owner" or "Unit Owner" means any Person or Persons who holds or hold fee simple title to a Unit. No mortgagee shall be deemed to be an Owner until such mortgagee has acquired such title pursuant to foreclosure or any procedure in lieu of foreclosure.
(j) "Percentage Interest" or "Undivided Percentage Interest" means the interest of each Unit in the Common Area as set forth in Exhibit E of this Declaration and as may be amended hereafter, which may be expressed as a fraction.
(k) "Registry" means the Rockingham County Registry of Deeds, or any then applicable real property recording office.
(l) "Property" means the Land and the buildings and all other improvements heretofore and hereafter constructed thereon, and all easements, rights and appurtenances thereto, and all articles of personal property intended for common use in connection therewith which are submitted to the Condominium by this Declaration, as amended from time to time.
(m) "Rules" means those rules and regulations adopted from time to time by the Association relative to the use of the Condominium, provided they are not in conflict with the condominium Act, the Declaration or the Bylaws, the City of Portsmouth Zoning Ordinance and the conditions on the plat approved by the Planning Board.
(n) "Site Plan" means the plat of the land submitted to the Condominium Act by this Declaration, which plat is being recorded in the Registry simultaneously herewith. Such term shall include, as appropriate, any such plat recorded in the Registry: (i) subsequently pursuant to RSA 356-B: 20, III, and 356-B:21 or any other provisions of the Condominium Act, or (ii) subsequently for the purpose of amending any previously recorded plat, as the case may be.
(o) "Unit" means a unit as defined by the Condominium Act, which is bounded and described (i) as shown on the Condominium Site Plan; (ii) Floor Plan; and (iii) as provided in Article 4, below.
(p) "Unit Owners’ Association" or "Association" means all of the Owners acting as a group in accordance with this Declaration and Bylaws.

## ARTICLE 3 STATUTORY REQUIREMENTS

The following information is provided pursuant to the provisions of the Condominium Act:
(a) Name: The name of the Condominium is "Parson Woods Condominium."
(b) Location: The Condominium is located on Peverly Hill Road, City of Portsmouth, Rockingham County, New Hampshire.

## ARTICLE 4

 DIVISION OF PROPERTYThe property, together with all buildings and improvements thereon, is hereby divided into fifty sixty (56) separate freehold condominium units, hereinafter referred to as Units \#1, \#2, \#3, \#4, \#5, \#6, \#7, \#8, \#9, \#10, \#11, \#12, \#13, \#14, \#15, \#16, \#17, \#18, \#19, \#20, \#21, \#22, \#23, \#24, \#25, \#26, \#27, \#28, \#29, \#30, \#31, \#32, \#33, \#34, \#35, \#36, \#37, \#38, \#39, \#40, \#41, \#42, \#43, \#44, \#45, \#46, \#47, \#48, \#49, \#50, \#51, \#52, \#53, \#54, \#55, and \#56. The layout, numerical designation, dimensions and area of each Unit are shown on the Condominium Site Plan.
A. The boundaries of the Units are defined as follows:

The Units shall be Land Units, the vertical boundaries being coextensive with the area identified as such Unit on the Site Plan and the horizontal boundaries being from the center of the earth to the upper edge of the atmosphere and includes the entirety of any building or addition to buildings or improvements to be constructed on the land and includes all rights above the land and any existing building and improvements or any building or improvements constructed within the Land Unit. For the purposes of RSA 356-B, the Condominium Plan shall serve as the Floor Plan for each Land Unit declared herein. In the event a building is constructed within the Land Unit, upon completion of the foundation, a Floor Plan, certified as required by RSA 356-B:20 shall also be recorded, provided the boundary of the Land Unit shall remain the unit boundary.

## ARTICLE 5

DESCRIPTION OF COMMON AREAS

Common Areas are set forth on the Condominium Plan Common Areas include, but are not limited to, the following:

SECTION A. All open space, common utilities, walkways, and paths.
SECTION B. All roadways servicing the Condominium and shown on the Plat shall be public and shall be maintained by the City of Portsmouth.

## ARTICLE 6 DESCRIPTION OF LIMITED COMMON AREA

Limited Common Area (herein "LCA") is defined as a portion of the Common Area which has been reserved for the exclusive use of the specific Unit or Units to which the Limited Common Area is assigned.

Limited Common Area shall be assigned as set forth in these Condominium Instruments. The "Condominium Instruments" is a term collectively referring to the Declaration, the ByLaws, and the Condominium Site Plan, and the building envelopes depicted on the Condominium Site Plan and recorded pursuant to the provisions of the Condominium Act. To the extent there is a conflict within the Condominium Instruments regarding the assignment of the Limited Common Area to a specific Unit, the assignment of Limited Common Area as set forth on the Condominium Plan shall control.

Reassignment of the LCA is expressly permitted if the reassignment complies with the Condominium Instruments and RSA 356-B, as amended. However, LCA may not be reassigned without the express written permission of the Unit Owner(s) who possesses the exclusive use of
the LCA. Any reassignment of the LCA must be recorded in the Rockingham Registry of Deeds to be effective.

It is the intention of the Declarant that the following portions of the Common Area shall be exclusively assigned as LCA:

1. The land shown on the Condominium Plan and which includes the septic system serving the appurtenant units and the appurtenant driveways.
2. All piping, wiring, cable, facilities, improvements, utilities, propane tanks, septic tank or other portions of the Common Area contained within any Limited Common Area shall be exclusively assigned to such appurtenant Units, except the piping, duct work or other improvements which serve the condominium as a whole.

SECTION A. Subject to the restrictions, easements, covenants, conditions, and terms set forth in these Condominium Instruments, the Condominium Act, the ordinance of the City of Portsmouth, and any documents of record, the Owner of the Unit which possesses the assignment and exclusive use of Limited Common Area shall be permitted to encroach upon, use and possess the Limited Common Area. The Declarant shall provide for lawn mowing and landscape maintenance, operation and maintenance of the septic systems, driveway plowing, and walkway snow shoveling within the Limited Common Areas and Unit (collectively referred to as "Maintenance"). There shall be no use of salt for ice control on the driveways and walkways within the Condominium. The Board of Directors shall be responsible for the Maintenance when its takes control of the Association. The Board of Directors shall utilize Northeast Organic Farming Association ("NOFA") approved practices ( or comparable equivalent) for the maintenance of all landscaped areas.

The exterior of Units shall be kept in good repair by the Unit Owner and maintained to the aesthetic and repair standards set forth in this Declaration and By-Laws. Failure of a Unit owner to maintain its Unit to such standards shall give cause to the Association to enter the Limited Common Area to effectuate such repairs or maintenance and to invoice the Unit Owner for the expense thereof.

SECTION B. The LCA, including any improvements or developments, shall run with and be appurtenant to the Unit to which it is assigned and shall automatically pass with the title to the Unit whether or not the LCA is expressly conveyed.

## ARTICLE 7 <br> ALLOCATION OF UNDIVIDED INTERESTS ("COMMON INTERESTS")

There is hereby allocated to each Unit an undivided interest in the Common Areas as set forth on Exhibit E attached hereto and made a part hereof, under the column "Common Interest". Said undivided interest appurtenant to each Unit is herein called the "common interest". The interest appurtenant to each Unit are shown on Exhibit E. The common interest appurtenant to each Unit will have a permanent character and shall not be altered without the consent of the owner of each Unit affected thereby. The common interest appurtenant to each

Unit will not be separated from said Unit even though not expressly mentioned or described in the conveyance or other instrument. The Common Areas will remain equal and undivided and no right shall exist to partition or divide any part thereof except as may be provided in the New Hampshire Condominium Law.

## ARTICLE 8 PARKING

Subject to regulation by the Association of Unit Owners (as set forth in the Condominium By-Laws to be recorded with this Declaration as well as Rules and Regulations to be adopted) the Unit owners shall have the exclusive right to park vehicles in the portion of the Limited Common Area associated with his/her Unit as shown on the Plan.

## ARTICLE 9 <br> EASEMENTS

SECTION A. Each Unit shall have appurtenant thereto non-exclusive easements in the Common Areas designed for such purposes for ingress to, egress from, and utility services for such Unit, and in the other Common Areas for their use according to their respective purposes, subject always to the exclusive or limited use of the Limited Common Areas as herein provided. These non-exclusive easement rights include, but are not limited to, the right to for the purposes of maintenance or repair of same and any Common Area. If any Unit or Common Area encroaches on any other Unit or Common Area, a valid easement for such encroachment and the maintenance and use thereof so long as it continues shall exist;

SECTION B. To the extent permitted by New Hampshire Revised Statutes Annotated Section 356-B:42 II, as amended from time to time or any successor statute, the Association of Unit Owners shall have the irrevocable power as attorney in fact on behalf of all of the Unit Owners and their successors in title to grant easements through the Common Areas and accept easements benefiting the condominium or any portion thereof;

SECTION C. Declarant hereby expressly reserves the right to grant easements to the owners of abutting property, as well as to the City of Portsmouth, private utilities, electric utilities or gas line utilities, telephone utilities or cable utilities, and any other utilities over, under and through the common and Limited Common Areas of the Condominium for whatever use may be made thereof.

## ARTICLE 10

## STATEMENT OF PURPOSES, USE, AND RESTRICTIONS.

The Units, Common Areas, and Limited Common Areas shall be occupied subject to the following rules and restrictions:

SECTION A. The Developer shall have the right to transact any business on the Condominium property necessary to consummate sales of Condominium units; including, but not
limited to the right to maintain models, having signs identifying units, maintaining employees in the offices, use of the Common Areas and facilities on the Condominium property, and to show units for sale. All furniture and furnishings and equipment in the model units, signs, and all items pertaining to sales shall not be considered Common Areas and facilities and shall remain the property of the Developer. In the event there are unsold Condominium units, Developer's right as the owner of said unsold units shall be the same as all other unit owners in the Condominium; and the Developer, as the owner of the Condominium units, shall contribute the common expenses in the same manner as other Condominium unit owners once an Occupancy Permit has been issued and the Developer, as the owner of the Condominium units, shall have a vote in the Association for each unsold Condominium unit.

SECTION B. None of the fifty-six (56) residential units shall be used for any purpose except residential purposes.

SECTION C. Nothing shall be done or kept in any unit or in the Common Areas or Limited Common Areas, which will increase the rate of insurance in those areas without the prior written consent of the Owners' Association. No owner shall permit anything to be done or kept in his Unit or in the Common Areas or Limited Common Areas which will result in the cancellation of insurance of any unit or any part of the Common Areas or Limited Common Areas, which would be in violation of any law. No waste will be permitted in the Common Areas or the Limited Common Areas.

SECTION D. Units shall be used solely for residential purposes and for uses accessory thereto as may be permitted from time to time by the zoning ordinances of the City of Portsmouth. Notwithstanding the restrictions of this paragraph, the Declarant and its successors in interest may, until all of the residential Units shall have been sold by the Declarant or such successor(s), use unsold Units as models for purposes of promoting the sale or leasing of Units.

## SECTION E. DESIGN AND PLAN APPROVAL.

(1) All buildings and structures shall be architecturally designed in keeping with traditional styles as determined by the Declarant. The Declarant, at Declarant's sole discretion, subject to federal, state, and/or municipal approvals, if applicable, reserves the right to approve the plans and specifications of all residences and other structures for as long as the Declarant is the owner of any Unit in the condominium. At such time as the Declarant relinquishes its control to the Association, the responsibility and/or authority for any architectural approvals in accordance with the Declaration and By-Laws shall become the responsibility of the Board of Directors of the Association or any subcommittee of the Association appointed to perform that task. The Declarant reserves the right to turn over responsibility for architectural approvals to the Association at any time prior to its conveyance of the last Unit it owns.
(2) No construction of any kind shall be commenced on any Unit nor shall any exterior addition or change or alteration be made to any structure nor shall utility lines be erected or installed until plans for the foregoing have been approved in writing by the Declarant at Declarant's sole discretion, subject to federal, state, and/or municipal approvals, if applicable. A copy of such plans shall be provided to the Association for its records.
(3) The architectural integrity of the buildings and the Units shall be preserved, and to that end, no awnings, antennas, and no exterior change, addition, structure, projection, decoration or other feature which is visible from the exterior of a Unit, shall be erected or placed upon or attached to the buildings or any Unit, or any part of either, unless previously approved by the Declarant, at Declarant's sole discretion, subject to federal, state, and/or municipal approvals, if applicable,. This subparagraph, however, shall not restrict the right of the Owner(s) of each Unit to decorate the interiors of the Unit as said Owner(s) may desire;

## SECTION F. ARCHITECTURAL FEATURES

(1) Renovations of the Units must be in keeping with the architectural character of the condominium.
(2) Without limiting the generality of the foregoing, all renovations, including the painting, repairing and replacing of exterior doors, door frames, windows, window frames, roofs, siding, porches, decks, entries and other exterior features of the buildings shall be subject to the review and approval of the Board of Directors or its subcommittee established for this purpose prior to commencement of the work.

SECTION G. No animals, livestock, or poultry of any kind shall be raised, bred, or kept in any unit or in any of the Common Areas or Limited Common Areas without the express written permission of the Board of Directors. Pets shall be allowed only with the written permission of the Board of Directors and such permission may be withdrawn should the pets become a nuisance to other unit owners. Owners shall strictly comply with all rules and regulations concerning pets as may be adopted by the Association. No exotic pets are allowed. Pets shall be kept under control of their owners at all times and shall not be allowed to run loose except in the presence and under the control of their owner. The board of directors may make further provisions in the Rules for the control and regulation of household pets on the property. The owner of a unit where a pet is kept or maintained shall be responsible for the maintenance of said pet, and any costs incurred by the association in enforcing the rules prescribed or to be prescribed by the Board of Directors for the control and regulation of pets and each such owner, by electing to keep a pet, shall be deemed to indemnify and hold the Board harmless against such loss or liability resulting from said pet. Owner shall comply with all town ordinances related to pets and pet laws.

SECTION H. The Declarant has adopted and the Association Board may amend from time to time detailed rules and regulations for the use and enjoyment of the Common Areas, for avoiding noxious or offensive activity which may disturb the occupants of any Unit, and for the occupants of any Unit, and for the general governing of the Condominium, consistent with, and not in conflict with, this Declaration and the Bylaws. All Owners and their tenants, guests and licensees will strictly comply with said rules and regulations.

SECTION I. Units may be rented. All rental agreements shall be documented by a written lease for a term of not less than six (6) months. The lease shall be subject to the Declaration, Bylaws and Rules and Regulations of the Condominium.

SECTION J. The Declarant shall be responsible for arranging for snow removal and lawn mowing within the Common Areas and Limited Common Areas as a Common Expense, together with the maintenance of all drainage improvements, stormwater facilities and outfalls that lie outside the roadway(s). This includes arranging for the maintenance of the road and gate and snow removal for the emergency access road for the purpose of keeping it accessible for the Fire Department. There shall be no use of salt for ice control on the driveways and walkways within the Condominium.

SECTION K. Declarant reserves the right to make use of unsold Units as may facilitate the completion, construction or sale of the Condominium, including the right to enter all Units, and Limited Common Areas, upon reasonable notice to the Owner thereof, or Common Areas for construction purposes. Declarant reserves the right to store materials, to maintain a sales office or a rental office in any unsold Units, to show such Units for sale or lease, and to display appropriate signs, at Declarant's sole discretion, in conjunction therewith, on unsold buildings or building envelopes, and has the right to implement any other marketing signage anywhere in the entire development.

SECTION L. SIGNS. No sign of any kind, towels, blankets or laundry of any kind, shall be displayed to the public view on or from any unit without the prior written consent of the Board of Directors. No commercial or advertising signs of any kind shall be erected, placed, permitted or maintained on any common area or limited common area or improvement except such signs as may be approved by the Association for the operation of the condominium or for the sale of Units within the condominium. Declarant shall be permitted, at Declarant's sole discretion, to place signs advertising the sale or lease of units, along with development signage, entrance way signage, directional and temporary signage. Display of the United States Flag shall be regulated by RSA 356-B:47-a and rules and regulations adopted thereunder by the Owners' Association and any applicable Zoning and Planning Regulations of the City of Portsmouth.

SECTION M. MOBILE HOMES AND TEMPORARY STRUCTURES. Mobile homes or structures of any kind or character, whether temporary or otherwise, shall not be permitted on any common area or limited common area. However, Declarant, at Declarant's sole discretion, may maintain a trailer for development purposes.

SECTION N. NO VEHICLE STORAGE. No commercial vehicles, pleasure or commercial boats or vessels of any kind, motor homes, campers, trailers, school buses, all-terrain vehicles, off road vehicles or snow mobiles shall be used in the condominium nor shall they be stored within the common area or limited common area, including, but not limited to parking areas and trails. Golf carts may be allowed on the premises subject to the approval of the Declarant, at Declarant's sole discretion, and subject to the approval of the Association after the Declarant relinquishes control. None of the above referenced vehicles may be kept on the premises except out of sight of the roadway, behind the structure or properly screened from the roadway and abutters or if the same be kept stored in a garage or outbuilding conforming to these covenants. Unregistered or uninspected automobiles or automobiles being repaired, refinished, restored or otherwise brought onto the premises for a period of more than seven (7) days shall be stored in a garage or other enclosed structure.

SECTION O. TREE REMOVAL. Only the Declarant shall be permitted to cut trees on the property. No unit owner shall be permitted to cut any tree(s) without the express written permission of the Declarant. All clearing shall comply with the City of Portsmouth's land use regulations and ordinances.

SECTION P. No noxious or offensive activities shall be carried on in any unit or in the Common Areas or Limited Common Areas, nor shall anything be done therein which may become an annoyance or nuisance to the other unit owners.

SECTION Q. There shall be no violation of the rules of the use of the units, Common Area, or Limited Common Area as adopted by the Owners' Association and furnished in writing to the owners. The Declarant, until such time as the Owners' Association is formed, and thereafter the Owners' Association are authorized to adopt such rules.

SECTION R. Insofar as may be necessary, the Developer and persons that they may select shall have the right of ingress and egress over, upon, and across the Common Area and Limited Common Area and the right to store materials thereon and to make such other use thereof as may be reasonable, necessary, and incidental to construction and complete development and sale of the project, but the Declarant and the persons to whom he has granted this permission shall not unduly interfere with the unit owners or persons living in the units and their rights to use the Common Area and Limited Common Area and facilities.

SECTION S. No unit owner shall paint or otherwise decorate or change the appearance or the type of exterior siding of any portion of the exterior of his/her unit.

SECTION T. No unit owner shall make any alterations to his/her unit; provided, however, any unit owner shall have the right to make interior decorating improvements or any interior changes which do not affect any facilities, which are shared with the other units.

## SECTION U. ADDITIONAL PROVISIONS.

The following are prohibited:
(1) Clotheslines;
(2) Above ground swimming pools;
(3) Antennas or satellite dishes with diameters larger than 24 inches;
(4) Additions or outbuildings or appurtenances unless prior approval has been obtained;
(5) Any basketball hoops, soccer nets or other personal property in the right-of-way;

SECTION V. OPEN S PACE USE LIMITATIONS. The Declarant on behalf of itself and its successors in interest covenants that "Open Space" as depicted on the Condominium Site Plan, is and shall forever be and remain subject to the following restrictions, which covenants and restrictions shall bind the Declarant, its successors in interest, and the Owner of each Unit:
(a) The purpose of the Open Space after completion of the proposed improvements depicted on the Condominium Site Plan is to retain the area forever in its scenic and open space condition and to prevent any use of the Open Space that will significantly impair, or interfere with, its conservation value. Notwithstanding the foregoing, green energy uses shall be permitted within the Open Space;
(b) To protect and conserve the natural biological diversity of the region including, Blanding's and spotted turtle, and other rare plants and animals, exemplary natural communities, wetlands and other significant wildlife habitats on the Restricted Property;
(c) It shall be maintained in perpetuity as open space.
(d) There shall be no motorized vehicles permitted upon the Open Space with the exception of temporary intrusions associated with the implantation or ongoing maintenance of any green energy uses.
(e) No structure of any kind, size or shape shall be constructed, on the Open Space, except for structures or equipment associated with a green energy use such as solar panels, windfarms, etc.
(f) Upon completion of the proposed improvements, no filling or excavation of soil or other alteration of topography or cutting or removal of standing trees shall be allowed, except those that present an imminent threat to person or property. In addition, trees may be removed in accordance with accepted silvacultural forest practices as outlined in the publication entitled Good Forestry Practices in the Granite State by the Society for the Protection of NH Forests. No disturbance of other natural features shall be allowed unless such activities are commonly necessary to maintain the existing natural environment of the open space.
(g) There shall be no dumping or depositing of trash, debris, stumps, yard waste, hazardous fluid or materials, vehicle bodies or parts within the Open Space or Wetland Buffer.
(h) No discharge of firearms or shooting with a bow and arrow or trapping of animals shall be permitted upon the Open Space in violation of RSA 207:3-a, as amended.
(i) The "Open Space" comprises a portion of the Common Area of the Condominium. As such, maintenance, if any, in the Open Space will be performed pursuant to the other provisions of this Declaration and the Bylaws. Costs for the maintenance, monitoring and annual reporting of the Open Space will be treated as a Common Expense and paid by the Unit Owners in accordance with the provisions of this Declaration. The term maintenance shall include monitoring and reporting of the conditions of the open space requirements by the

Association or by the City of Portsmouth. The Association will be responsible for annually monitoring the Open Space and reporting any violations to the City of Portsmouth.
(j) Such reasonable rules and regulations as may from time to time be promulgated by the Condominium Association for "open space recreational uses."
(k) Access to the Open Space shall be as depicted on the Plan.
(l) Acceptance of any deed for any Unit within the condominium constitutes acknowledgment by the purchaser of the existence of these restrictions and agreement to be bound by it and that said purchaser will not take any action which might violate any provision hereof.

SECTION W. PERMITTED USES OF OPEN SPACE
(a) The Declarant, its successors or assigns, reserve the right to perform cutting, grading, planting and seeding on the common area or limited common area for construction and to install and maintain drainage structures as needed in the development of the condominium.
(b) The Declarant, its successors or assigns, reserve the right to grant utility easements on the common area or limited common area to install and maintain utilities as needed in the development of the condominium.
(c) Dead, diseased, unsafe or fallen trees, saplings, shrubs and ground cover may be removed by the Declarant, its successors or assigns.

## ARTICLE 11 ENFORCEMENT OF RESTRICTIONS

If any person or entity shall violate or attempt to violate any of the rules or restrictions set forth in this Declaration, in the By-Laws or in any rules or regulations adopted by the Association of Unit Owners, the Association may commence legal action against said person or entity or against the owner(s) of any Units within which such violation is occurring, either to prevent or abate such violation, or to recover damages caused by such violation or both. In the event of a successful prosecution, the Association of Unit Owners will be entitled to receive its costs, including reasonable attorney's fees, as part of its judgment against the defendant.

If the Association of Unit Owners shall fail to enforce this or any one or more of the covenants set forth in this Declaration or any rule contained in the By-Laws or any rules of the Association of Unit Owners after receiving written request to do so from any Unit Owner within the condominium, then any such Unit Owner may attempt to enforce said requirements by giving ten (10) days' prior written notice to the person violating them, followed by legal proceedings either to enjoin the violation or to recover damages or other compensation, including reasonable collection costs and attorney's fees if the court deems it appropriate under the circumstances.

Notwithstanding anything in this Declaration or in the By-Laws to the contrary, no Unit Owner shall be liable for any violations except such as occur during his or her Unit ownership.

## ARTICLE 12 <br> INSURANCE

1. Insurance Required. Pursuant to Section 43 of the Condominium Act, the Board of Directors shall obtain (i) a master casualty policy affording fire and extended coverage in an amount equal to the full replacement value of the common structures within the Condominium; (ii) a master liability policy covering the Association, the Board, the Manager and agents or employees of the foregoing with respect to the Condominium, and all Owners and other persons entitled to occupy any portion of the Condominium; and (iii) such other policies as specified hereinbelow; which insurance shall be governed by the following provisions to the extent obtainable or possible:
(a) Fire insurance with standard extended coverage endorsement, vandalism and malicious mischief endorsements insuring all the common buildings in the Condominium including without limitation all portions of the interior of such buildings are for insurance purposes normally deemed to constitute part of the building and customarily covered by such insurance, such as heating and air conditioning and other service machinery, interior walls, all finished wall surfaces, ceiling and floor surfaces including any wall to wall floor coverings, bathroom and kitchen cabinets and heating and lighting fixtures, except for improvements which exceed a total value of One Thousand Dollars ( $\$ 1,000.00$ ) and are not reported to the insurer, such insurance to be in an amount at least equal to the replacement value of the buildings and to be payable to the board as trustee for the Owners and their mortgagees as their respective interests may appear.
(b) Public liability insurance in such amounts as the Board may from time to time determine, but in no event shall the limits of liability be less than One Million Dollars ( $\$ 1,000,000.00$ ) for bodily injury and property damage per occurrence, insuring the Association and all individuals referred to in Section I (ii) above, against any liability to anyone, and with cross liability coverage with respect to liability claims of anyone insured thereunder against any other insured thereunder. The insurance, however, shall not insure against individual liability for negligence occurring within a Unit or within the Limited Common Area to which a Unit has exclusive use.
c) Workmen's compensation insurance as required by law.
d) Such other insurance as the Board may determine.

## 2. General Insurance Provisions.

(a) The Board shall deal with the insurer or insurance agent in connection with the adjusting of all claims under insurance policies provided for under Paragraph 1 above and shall review with the insurer or insurance agent, at least annually, the coverage under said policies, said review to include an appraisal of improvements within the Condominium, and shall make any necessary changes in the policy provided for under Paragraph 1 (a) above (prior to the expiration date set forth in any agreed amount endorsement contained in said policy) in order to meet the coverage requirements of such Paragraph.
(b) The Board shall be required to make every effort to see that all policies of physical damage insurance provide for under Paragraph 1 above : (i) shall contain waivers of subrogation by the insurer as to claims against the Association, its employees and agents, members of the Board, the Manager, Owners and members of the family of any Owner who reside with said Owner, except in cases of arson and fraud; (ii) shall contain a waiver of defense of invalidity or prejudice on account of the conduct of any of the Owners over which the Association has "no control"; (iii) shall contain a waiver of defense of invalidity or prejudice by failure of the insured, or Owners collectively, to comply with any warranty or condition with regard to any portion of the Condominium over which the insured, or Owners collectively, have no control; (iv) shall provide that such policies may not be canceled or substantially modified without at least thirty (30) days written notice to all of the insureds thereunder and all mortgagees of Units in the Condominium; (v) shall provide that in no event shall the insurance under said policies be brought into contribution with insurance purchased individually by Owners or their mortgagees; (vi) shall exclude policies obtained by individual Owners for consideration under any "no other insurance" clause; and (vii) shall provide that until the expiration of thirty (30) days after the insurer gives notice in writing to the mortgagee of any Unit, the mortgagee's insurance coverage will not be affected or jeopardized by any act or conduct of the Owner of such Unit, the other Owners, the Board of Directors, or any of their agents, employees or household members, nor canceled for non-payment of premiums.
3. Individual Policies. All Owners shall obtain, at his own expense, insurance insuring his own unit and all buildings thereon and insurance against loss or damage to personal property used or incidental to the occupancy of the Unit, additional living expense, vandalism or malicious mischief, theft, personal liability and the like.
(a) Each Owner shall obtain additional insurance for his own benefit and at his own expense. No such policy shall be written so as to decrease the coverage under any of the policies obtained by the Board pursuant to paragraph 1(a) above, and each Owner hereby assigns to the Board the proceeds to be applied pursuant to the terms hereof as if produced by such coverage. Copies of all such policies (except policies covering only personal property, owned or supplied by individual Owners) shall be filed with the Association.
(b) Each Owner shall obtain insurance for his own benefit and at his own expense insuring all personal property presently or hereafter located in his Unit or Limited Common Area, any floor coverings, appliances and other personal property not covered in the master policy, and any insurance deductible that the unit may be assessed and all improvements.
(c) Each Owner, prior to commencement of construction of such improvements, shall notify the Board of all improvements to his Unit (except personal property other than fixtures) which exceed a total value of One Thousand Dollars (\$1,000.00).
(d) Each Owner shall obtain liability insurance with respect to his ownership and/or use of his Unit.
4. Notice to Unit Owners. When any policy of insurance has been obtained on behalf of the Association, written notice of the obtainment thereof and of any subsequent changes therein or termination thereof shall be promptly furnished to each Unit Owner by the Secretary of the Association. Such notice shall be sent by U.S. Mail, return receipt requested, to all Unit Owners of record at the address of their respective Units and to such other addresses as any of them may have designated to the Secretary; or such notice may be hand delivered by the Secretary or Manager obtains a receipt of acceptance of such notice from the Unit Owner.

## ARTICLE 13 CONDEMNATION

If part of the project shall be taken or condemned by any authority having the power of eminent domain such that no Unit or any part thereof is taken, then all compensation and damages for on account of the taking or the common elements, exclusive of compensation for consequential damages to certain affected Units, shall be payable to the President of the Association as Trustee for all Unit Owners and Mortgagees according to the loss or damage to their respective interests in such common elements. The Association shall have the right to act on behalf of the Unit Owners with respect to all issues related to the taking and compensation affecting the common elements. Such proceeds shall, subject to the prior rights of such mortgagees, become a part of the reserve funds of the Association.

If any Unit or a part thereof is taken, the Unit Owners directly affected by such taking and their respective mortgagees shall represent and negotiate for themselves with respect to the damages affecting their respective Units. The awards so made shall, subject to the prior rights of mortgagees, be used and distributed by the Trustee first to restore the Units on the remaining land of the project in the same manner as provided for restoration under Section 13 hereof to the extent possible, attempting to rebuild the building, containing new units of the same number, size and basic plan as the units taken, with any excess award distributed in accordance with the provisions of this section.

## ARTICLE 14

## REVIEW OF INSURANCE

The Association will review not less frequently than annually the adequacy of its insurance program and will, if requested by Unit Owners report to each Unit Owner in writing the Association's conclusions and actions taken, from time to time. Such review shall include an appraisal of all improvements to the project by a representative of the insurance carrier writing the Master Policy. Also, the Association shall provide each Unit Owner with notices describing each new policy of insurance and all amendments and terminations thereof, as and when occurring, in the same manner as it provides notices of Association meetings as set forth in the By-Laws, all as required by New Hampshire Revised Statutes Annotated, Section 356-B:43 II, or any successor statute.

## ARTICLE 15 <br> AMENDMENTS TO THE CONDOMINIUM AND TERMINATION

This Declaration, the By-Laws, the Floor Plan, the Condominium Plan or any other condominium instruments (as defined by New Hampshire Revised Statutes Annotated Chapter 356-B) may be amended from time to time, or this condominium may be terminated, only in strict compliance with New Hampshire Revised Statutes Annotated Section 356-B:34, as amended from time to time, or any successor statute. In no event shall such amendments be made without the consent of at least $2 / 3$ of the Unit Owners.

## ARTICLE 16

## DEFINITIONS

All terms and expressions used in this Declaration which are defined in New Hampshire Revised Statutes Annotated Chapter 356-B shall have the same meanings here unless the context otherwise requires.

## ARTICLE 17 PARTIAL INVALIDITY

The invalidity of any provision of this Declaration shall not impair or affect the validity of the remainder of this Declaration and all valid provisions shall remain enforceable and in effect notwithstanding such invalidity.

## ARTICLE 18

## MORTGAGES

1. Notice to Board. An Owner who mortgages his Condominium Unit shall notify the Board of the name and address of his mortgagee, and shall file a conformed copy of the mortgage with the Board. The Board shall maintain suitable records pertaining to such mortgages.
2. Notice of Action. Upon written request to the Unit Owners’ Association, identifying the name and address of the holder, insurer or guarantor and the Unit number or address, any such Eligible Mortgage Holder or Eligible Insurer or Guarantor will be entitled to timely written notice of:
(a) Any condemnation loss or any casualty loss which affects a material portion of the Condominium or any Unit on which there is a first mortgage held, insured, or guaranteed by such Eligible Mortgage holder or Eligible Insurer or Guarantor, as applicable;
(b) Any delinquency in the payment of assessments or charges owed by an Owner of a Unit subject to a first mortgage held, insured or guaranteed by such Eligible Mortgage Holder or Eligible Insurer or Guarantor, which remains uncured for a period of 60 days.
(c) Any lapse, cancellation or material modification of any insurance policy or fidelity bond maintained by the Owners' Association;
(d) Any proposed action which the Declaration, these Bylaws or the Condominium Act, requires the consent of a specified percentage of mortgage holders.
3. Notice of Default. The Board shall give written notice to an owner of any default by the Owner in the performance of any obligations under the Act, Declaration or Bylaws and, if such default is not cured within thirty (30) days, shall send a copy of such notice to each holder of a mortgage covering such Unit whose name and address has theretofore been furnished to the Board. No suit or other proceeding may be brought to foreclose the lien for any assessment levied pursuant to the Declaration or these Bylaws except after ten (10) days written notice to the holder of the first mortgage on the Unit which is the subject matter of such suit or proceeding.
4. Notice of Damage. The Board of Directors shall notify (i) the mortgagee of a Unit whenever damage to the Unit covered by the mortgage exceeds One Thousand Dollars ( $\$ 1,000.00$ ) and the Board is made aware of such damage; and (ii) all the mortgagees whenever damage to the Common Area exceeds Ten Thousand Dollars (\$10,000.00).
5. Examination of Books. Each Owner and each mortgagee shall be permitted to examine the books on account of the Condominium at reasonable times, on business days, but, with respect to Owners, not more often than once a month.

DECLARATION OF THE PARSON WOODS CONDOMINIUM EXECUTED as of the day and year first above written.

# Parson Woods Investments, LLC 

Witness
By:
Richard W. Green, Manager
Duly Authorized

STATE OF NEW HAMPSHIRE COUNTY OF ROCKINGHAM, ss.

This instrument was acknowledged before me on $\qquad$ , 2021, by Richard W. Green, Manager of Parson Woods Investments, LLC, a New Hampshire limited liability company.

Notary Public
Printed Name: $\qquad$
My Commission Expires: $\qquad$

## EXHIBIT A

## LEGAL DESCRIPTION

## EXHIBIT B

## EXHIBIT C

## EXHIBIT D

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## EXHIBIT E

## COMMON INTEREST

| Unit No. | Common Interest |
| :--- | :--- |
|  |  |
| 1 | $1 / 56$ |
| 2 | $1 / 56$ |
| 3 | $1 / 56$ |
| 4 | $1 / 56$ |
| 5 | $1 / 56$ |
| 6 | $1 / 56$ |
| 7 | $1 / 56$ |
| 8 | $1 / 56$ |
| 9 | $1 / 56$ |
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# BYLAWS <br> OF <br> PARSON WOODS CONDOMINIUM OWNERS ASSOCIATION 

## 1. PURPOSE AND DEFINITIONS

Purpose. The administration of Parson Woods Condominium (the "Condominium") shall be governed by these By-Laws which are annexed to the Declaration of Parson Woods Condominium (the "Declaration") and are made a part thereof.

Definitions. Certain of the terms used in these By-Laws have been defined in the Declaration and, when used herein, shall have the same meaning as set forth in the Declaration, unless the context clearly indicates a different meaning therefor.

Applicability of By-Laws. The provisions of these By-Laws are applicable to all of the property which now constitutes or hereafter may be added to the Condominium, and to the use and occupancy thereof.

## 2. MEMBERS AND MEETINGS

A. Members and Voting Rights. Each unit owner and the Declarant, until such time as all of the Declarant's development rights have expired or been terminated (each an "Owner" and collectively the "Owners") shall be a member of Parson Woods Condominium Owner's Association. The membership of the Association shall consist of all of the Owners. The Owner of each Unit shall be entitled to one (1) vote.
B. Transfer of Membership. Membership in the Association may be transferred only as an incident to the transfer of title to a Unit and shall become effective upon recordation of a deed of conveyance to the said Unit.
C. Annual Meeting. The annual meeting of the members shall be held on the second Monday of March, for the purpose of electing officers and for the transaction of such other business as may come before the meeting.
D. Regular Meetings. Regular meetings of the Board of Directors shall be held in accordance with the provisions of RSA 356-B: 37-c at such time and place as shall be determined, from time to time, by a majority of the directors, but at least quarterly meetings shall be held during each twelve-month period after the annual meeting of the Unit Owners’ Association. Notice of regular meetings of the Board of Directors shall be posted to the community and given to each director, personally or by mail, e-mail, telephone or telegraph, at least five (5) business days prior to the day named for such meeting, except that no notice shall be required for a regular meeting held immediately after, and at the same place as the annual meeting of the Association. Directors may attend vote and participate at meetings by telephone or E-Mail pursuant to RSA 356-B:37-b. Pursuant to RSA 356-B:37-c (II) at least once per
quarter the Board shall hold open regular meeting to afford owners an opportunity to common on any matter affecting the Association. Notice of the meeting and any materials distributed to the Board shall be available to the owner pursuant to RSA 356-B:37 (c) (III) and (IV).
E. Special Meetings. Special meetings of the Owners may be called at any time for the purpose of considering matters which, by the terms of the Declaration, these By-Laws, or the Condominium Act, (the "Act"), require the approval of the Owners, or for any other reasonable purposes. Special meetings shall be called by the President upon at least three (3) days written notice prior to the date of the meeting.
F. Contents of Notice. Pursuant to RSA 356-B:37 (I) and 356-B:37-a, it shall be the duty of the clerk or secretary, to send to all owners of record, at least twenty-one (21) days in advance of any meeting notice of any meeting. Said Notice shall state the time, place and purpose of the meeting and shall be sent to the unit owners at the addresses on file with the Association. The clerk or secretary shall attest that the notice was sent to the list of owners attached to the affidavit at the addresses on file with the association in the manner conforming with RSA 356-B: 37-a.Any such notice shall be deemed waived by any Owner who expressly waives the same in writing or who is present in person or by proxy at any such meeting.
G. Quorum. The presence in person or by proxy at the commencement of any meeting of the Association of Unit Owners of two thirds of the Unit Owners shall constitute a quorum at all meetings of the Unit Owners. In determining a quorum, the term "all Unit Owners" in this paragraph will not include Units the title of which is held by the Association. Pursuant to RSA 356-B: 38 (III) if a quorum is not met for an annual meeting, the board shall reschedule the meeting within sixty days and provide proper notice and proxies.
H. (1). Number of Directors and Initial Selection of Board. The Board of Directors shall be composed of three (3) persons. Until the election of the Board of Directors takes place at the first annual meeting of the Unit Owners' Association, the Board of Directors shall consist of such persons as shall have been designated by the Declarant. Thereafter, anything in these Bylaws to the contrary notwithstanding, until seven (7) years after the date of recordation of this Declaration, or until ninety percent (90\%) of the Units have been conveyed by the Declarant, whichever occurs later, the members of the Board of Directors shall be selected and designated by the Declarant. The Declarant shall have the right in its sole discretion to replace such Directors as may be so selected and designated by it, and to select and designated their successors. The Declarant may relinquish its rights hereunder at any prior time. Directors shall consist only of Owners or spouses of Owners, or, where a Person which is an Owner is not a natural person, any natural person having authority to execute deeds in behalf of such person.
(2). Election and Term of Office. The initial Board of Directors shall be elected to staggered terms of one, two and three years. Thereafter, each Director shall serve a three (3) year term and one Director shall be elected at every annual meeting. At the expiration of the initial term of office of each director, his successor shall serve a term of three (3) years and each director shall hold office until his successor has been appointed or elected as appropriate.
I. Voting and Minutes. At any meeting of the Association, the Owners shall be entitled to cast their votes for each condominium unit owned as provided in the Declaration. The
majority vote of all Unit Owners shall be required to adopt decisions at any meeting of the Association. Any Owner may attend and vote at such meeting in person or by proxy. The provisions of the Condominium Act shall govern all votes (including proxy votes and the votes of units owned by more than one person) at meetings of the Association. Pursuant to RSA 356B: 37 (VI) the Board of Directors shall make copies of the minutes of all meetings available to the unit owners within 60 days of the date of the meeting or 15 days of the date the minutes are approved by the Board whichever occurs first. The association may opt to provide the minutes electronically or post them on the association website in which case the owners shall be informed of the web address.
J. Budget Ratification. Pursuant to RSA 356-B:40-c (I) the board of directors shall annually adopt a budget for the unit owners' association for consideration by the unit owners at a meeting. The board of directors shall, within 30 days of adoption of the proposed budget, provide the owners a summary of the budget, including any reserves and a statement of the basis on which any reserves are calculated and funded. The board of directors shall set a date not less than 10 days or more than 60 days after providing the budget summary to consider the ratification of the budget. Unless at that meeting, $2 / 3$ of all unit owners reject the budget the budget is ratified whether or not a quorum is present. If no budget is proposed or the proposed budget is rejected, the last budget ratified by the owners shall be in effect until a new budget is ratified by the owners. Pursuant to RSA 356-B:40-c (II) the board of directors at any time may propose a special assessment which shall be ratified by the owners. The assessment shall be in accordance with the provisions of RSA 356-B:40-c (III).

## 3. POWERS

Powers and Duties. The Association shall have all of the powers and responsibilities assigned by the New Hampshire Condominium Act, RSA 356-B, as amended from time to time or any successor statute. Without limiting the generality of the preceding sentence, the Association will have all of the powers and duties necessary for the administration of the affairs of the condominium. Said powers and duties shall include, but not be limited to, the following:
A. Operation, care, upkeep and maintenance of the common areas;
B. The employment, dismissal and replacement of agents and employees to facilitate the operation, care, upkeep and maintenance of the common areas;
C. To make or cause to be made additional improvements on and as part of the common areas (subject to Article VII, Section 2 below);
D. To acquire, hold, manage, convey and encumber title to real property (including but not limited to condominium Units conveyed to or acquired by the Association) in the name of and on behalf of the Association;
E. To grant easements through the common areas and to accept easements benefitting the condominium or any portion thereof;
F. The assessment and collection of the common expenses from the Unit Owners, and the enforcement of liens to secure unpaid assessments, pursuant to RSA Section 356-B:46, as amended from time to time, or any successor statute;
G. The adoption and amendment of rules and regulations covering the details of the operation and use of the condominium, the common areas or any portion thereof;
H. Opening of bank accounts on behalf of the Association and designating the signatories required for such accounts;
I. Obtaining and administering insurance for the condominium as set forth in the Declaration;
J. Repairing, restoring or replacing common areas after damage or destruction, or as a result of eminent domain proceedings, as provided in the By-Laws;
K. Procuring legal and accounting services necessary or proper in the operation of the condominium or the enforcement of these By-Laws;
L. The assessment of costs or damages against any Unit Owner whose actions have proximately caused damages to the common areas;
M. Payment of any amount necessary to discharge any lien or encumbrance levied against the entire condominium or any part thereof which may in the opinion of the Association constitute a lien against the condominium or against the common areas, rather than merely against the interests of particular Unit Owners (where one or more Owners are responsible for the existence of such lien, they shall be jointly and severally liable for the cost of discharging it and the costs incurred by the Association by reason of said lien or liens);
N. All other powers granted by the Declaration or these By-Laws, permitted by law or enjoyed by associations of this kind.

## 4. OFFICERS

A. Officers. The officers of the Association shall be a president, a treasurer and a secretary, all of whom shall be appointed by the Unit Owners. Such other officers and assistant officers as may be deemed necessary may be appointed by the Association. Any two or more offices may be held by the same person. Pursuant to RSA 356-B:35 (II), the board of directors/officers shall have a fiduciary relationship to members of the unit owners' association.
B. Appointment and Term of Office. The officers of the Association shall be appointed at the annual meeting. If the appointment of officers shall not be made at such meeting, such appointment shall be made as soon thereafter as conveniently may be. Each officer shall hold office until his successor shall have been duly appointed and shall have qualified or until his death or until he shall resign or shall have been removed in the manner hereinafter provided.
C. Removal. Any officer or agent may be removed by the Association whenever, in its judgment, the best interests of the Association will be served thereby, but such removal shall be without prejudice to the contract rights, if any, of the person so removed. Appointment of an officer or agent shall not in and of itself create contract rights. Removal of officers or directors shall be by a vote held in accordance with RSA 356-B: 40-b.
D. Vacancies. A vacancy in any office because of death, resignation, removal, disqualification, or otherwise may be filled by the Association for the unexpired portion of the term.
E. President. The president shall be the principal executive officer of the Association and shall in general supervise and control all of the business and affairs of the corporation. He shall, when present, preside at all meetings of the unit owners at meetings of the Association. He may sign with the secretary or with any other proper officer of the Association, deeds, mortgages, bonds, contracts, or other instruments which the Association has authorized to be executed, except in cases where the signing and execution thereof shall be expressly delegated by the Association or by these bylaws to some other officer or agent of the Association, or which is required by law to be otherwise signed or executed; and in general shall perform all duties incident to the office of president and such other duties as may be prescribed by the Association from time to time.
F. The Secretary. The secretary shall: (a) keep the minutes of the proceedings of the annual meeting in one or more books provided for that purpose; (b) see that all notices are duly given in accordance with the provisions of these bylaws or as required by law; (c) be custodian of the Unit Owner records of the Association; (d) keep a register of the post office address of each Unit Owner which shall be furnished to the secretary by such Unit Owner; (e) have general charge of the books of the Association; and (f) in general perform all duties incident to the office of secretary and such other duties as from time to time may be assigned to him by the president or by the Association.
G. The Treasurer. The treasurer if any is appointed and, if none, then the president shall: (a) have charge and custody of and be responsible for all funds and securities of the Association; (b) receive and give receipts for monies due and payable to the Association from any source whatsoever and deposit all such monies in the name of the Association in such banks, trust companies, or other depositories as may be authorized by the Association; (c) in general perform all of the duties incident to the office of treasurer and such other duties as from time to time may be assigned to him by the president or by the Association.
H. Execution of Instruments. All checks, drafts, notes, deeds, acceptances, conveyances, contracts or other instruments shall be signed on behalf of the Association by such person or persons as shall be provided authority by general or special resolution of the Association or, in the absence of any such resolution applicable to such instrument, by the President and by the Treasurer.

## 5. INTERIM MANAGEMENT BY DECLARANT

From and after the date of the recording of these By-Laws, the Declarant shall exercise all powers and responsibilities assigned by these By-Laws, the Declaration and by the New Hampshire Condominium Act to the Association of Unit Owners, and the Officers until such time as it turns over said powers and responsibilities to the Unit Owners. Said transfer of said powers and responsibilities shall in no event occur later than the first to occur of (1) the time at which the Declarants have completed the passing of title to third party purchasers of Units to which are assigned a total of $90 \%$ of the undivided interest in the common areas, or (2) the expiration of seven (7) years from the date of the incorporation of the Association. No contract binding the Association of Unit Owners, or the Unit Owners as a group, which shall have been entered into during the period of Declarant's control as described in this Article shall be binding after the termination of the Declarant's control unless ratified or renewed with the consent or affirmative vote of Unit Owners of a majority of the Units in the Association of Unit Owners.

## 6. COMMON EXPENSES

A. Common Expenses. The Owner of each Unit shall be equally liable for and shall pay as and when assessed a share of common expenses. Common expenses will include all charges, costs and expenses of every kind incurred by or on behalf of the Association for and in connection with the administration of the condominium, including without limitation all charges for taxes (except real property taxes or other such taxes which are or may hereafter be assessed separately on each Unit and the common interest appurtenant thereto or the personal property or any other interest of a Unit Owner) assessments, insurance, liability for loss or damage arising out of or in connection with the common areas or any fire, accident or nuisance thereon, the cost of repair, reinstatement, rebuilding and replacement of facilities in the common areas, wages, accounting and legal fees, management fees and all other necessary expenses of upkeep, maintenance, management and operation incurred on or for the common areas. The common expenses may also include such amount as the Association may deem proper to make up any deficit in the reserve. Common expenses will also include all common expense assessments against all Units, title to which is held by the Association.
B. Capital Improvements. Whenever in the judgment of the Association the common areas should be improved by new construction, any such new or replacement construction may be made by the Association only after obtaining approval of all Units. If such approval is so obtained, the cost thereof shall constitute a part of the common expenses.
C. Reserves. The Association shall assess as a common expense an amount or amounts on a monthly basis for the purpose of establishing and maintaining a general operating reserve and general replacement reserve, against anticipated future outlays for operations or for maintenance or replacement of facilities within the common areas or equipment or other property held by the Association in connection with the condominium. The size of any such reserve shall be reviewed at each annual meeting of the Association. The funds will be deposited in a responsible bank and may be intermingled with the Association's general operating account, or segregated in a separate account, in the Association's discretion.

Any such reserve may be used at the discretion of the Association to meet any deficiencies in operating funds from time to time resulting from higher than expected operating expenses and maintenance costs, or any delinquency by any Unit Owner or Owners in the payment of assessment for common expenses. Said reserve shall not operate to exempt any Owner from liability to contribute his or her proportionate share of such expenses or to pay any such assessments thereof and any funds withdrawn from said reserve for the purpose of making up any delinquency shall be reimbursed upon the payment of such delinquent assessments. The proportionate interest of each Owner in said reserve shall not be withdrawn or assigned separately but shall be deemed to be transferred with each Unit even though not mentioned or described expressly in the instrument of transfer.
D. Expenses for Limited Common Areas. Common expenses relating to the limited common areas shall be charged in accordance with Article 6, Section A of the Declaration.
i. Maintenance and Repair. The Board of Directors shall be responsible for the maintenance, repair and replacement (unless necessitated by the negligence, misuse or neglect of an Owner, or of a person gaining access with said Owner's actual or implied consent, in which case such expenses shall be charged to such Owner) of all Limited Common Area, whether located inside or outside of the Units, the costs of which shall be charged to all Owners as a Common Expense except the cost of repairing and replacing Limited Common Area shall be assessed to the units assigned such Limited Common Area.
E. Books. The Association will maintain books of account for common expenses for the common areas, general operating reserves and replacement reserves, in accordance with generally recognized accounting practices, and will have such books of account available for inspection by each Owner or his authorized representative at reasonable business hours. The Association will not less frequently than annually render or cause to be rendered a statement to each Owner of all receipts and disbursements during the preceding year and the balances of the various accounts.
F. Enforcement. The Association of Unit Owners shall have a lien on every Unit for unpaid assessments of common expenses levied against the Unit, which may be applicable to said Unit, in accordance with the provisions of the New Hampshire Condominium Act. Reference is made to RSA Section 356-B:46, as amended from time to time, and any successor statute, describing the enforcement of the Association's lien rights.
G. Delinquent Assessments. In the event an assessment is not paid within thirty (30) days of the date it is due and payable, the Association, through its Board of Directors, may proceed to enforce and collect the said assessment, with interest at the maximum lawful rate of eighteen percent (18\%) per annum, whichever is greater, against the unit Owner owing the same in the manner set forth in RSA 356-B:46. Each delinquent unit Owner shall be responsible for attorney's fees, interest and costs incurred by the Association incident to the collection of such delinquent assessments or enforcement of any lien held by the Association for unpaid assessments.
H. Assessments. The Association shall determine the amounts and frequency of assessments for common expenses. In determining the amount, the Association shall in its discretion set a figure for a reasonable prospective period (up to one year) sufficient to accumulate and pay when due the anticipated common expenses for that period. In determining the frequency of the payments, the Association has full discretion to levy the assessments on a quarterly basis or as otherwise determined by the Association. If at the end of any assessment period it is determined that the assessments were estimated too low, the deficiency may be forthwith assessed by the Association and paid by the Unit Owners as a special assessment or assessments.
I. Expense to Unit Owner. No one shall obstruct, commit any waste in or otherwise cause any damage beyond reasonable wear and tear to the Common Area and any one causing such damage shall pay the expense incurred by the Association in repairing same.

## 8. GENERAL PROVISIONS

A. Violations. In the event of a violation other than non-payment violation of the Declaration, these By-Laws, or the applicable portions of the Act, the Association, by direction of its Board of Directors, may notify the unit owner by written notice of such breach, and if such violation shall continue for a period of thirty (30) days from the date of this notice, the Association, through its Board of Directors, shall have the right to treat such violation as an intentional and inexcusable and material breach of the Declaration, the By-Laws, or the pertinent provisions of the Condominium Act, and the Association may then, at its option, have the following election: (a) an action at law to recover for its damage on behalf of the Association or on behalf of the other unit owners; (b) an action in equity to enforce performance on the part of the unit owner; or (c) an action in equity for such equitable relief as may be necessary under the circumstances, including injunctive relief. Failure on the part of the Association to maintain such an action at law or in equity within ninety (90) days from date of a written request, signed by a unit owner, sent to the Board of Directors, shall authorize any unit Owner to bring an action in equity or suit at law on account of the violation. Any violations which are deemed by the Board of Directors to be a hazard to public health may be corrected immediately as an emergency matter. The Association shall be entitled to collect all legal fees incurred as a result of any such action or any action instituted for collection of any unpaid assessments.
B. Waiver. The failure of the Association of Unit Owners to insist in any one or more instances upon strict performance of or compliance with any of the covenants of the Owner hereunder, or to exercise any right or option herein contained or to serve any notice, or to institute any action or summary proceeding, shall not be construed as a waiver or a relinquishment for the future, of such covenant or option or right, but such covenant or option or right shall continue and remain in full force and effect.
C. Notices. All notices to Unit Owners shall be deemed given if hand delivered or sent by Registered or Certified Mail, Return Receipt Requested, to the Owner, addressed to the Owner's address appearing on the records of the Association. Any notice given or mailed to one co-Owner shall be presumed to have been properly given to any other co-Owner, regardless of
whether a separate notice was given or sent to said other co-Owner. When any policy of insurance has been obtained on behalf of the Association, written notice of the obtainment thereof and of any subsequent changes therein or termination thereof shall be promptly furnished to each Unit Owner by the Secretary of the Association. Pursuant to the provisions of RSA 356B:43 (II) all notices shall be sent in accordance with the provisions of the last sentence of RSA 356-B:37-a.
D. Amendment. Except as otherwise provided in the Condominium Act and this Declaration and Bylaws, this Declaration and Bylaws may only be amended by agreement of at least two thirds (2/3) of the Owners, provided, however, that (i) any such amendment shall be executed by such two thirds (2/3) of the Owners or by the President and Treasurer of the Association accompanied by a certification of vote of the Secretary; (ii) evidence of such amendment shall be duly recorded at the Registry pursuant to Section 34 IV , of the Condominium Act; (iii) no amendment to the Declaration shall be adopted that could interfere with the construction, sale, lease or other disposition or use of such Units; (iv) no such amendment shall be contrary to the provisions of the Condominium Act. Any approval of amendments by Mortgagees shall be subject to the provisions of and limitations of RSA 356-B.
E. Resale by Purchaser. In the event of any resale of a unit or any interest therein by any person (other than the Declarant or its successors in interest) the prospective Unit Owner shall have the right to obtain from the Association, prior to the contract date of the disposition, the following:
i. A statement of any capital expenditures and major maintenance expenditures anticipated by the Association within the current or succeeding two fiscal years;
ii. A statement of the status and amount of any reserve for the major maintenance or replacement fund, and any portion of such fund earmarked for any specified project by the Association;
iii. A copy of the income statement and balance sheet of the Association for the last fiscal year for which such statement is available;
iv. A statement of the status of any pending suits or judgments in which the Association is a defendant;
v. A statement setting forth what insurance coverage is provided for all Unit Owners by the Association and what additional insurance coverage would normally be secured by each individual Unit Owner;
vi. A statement that any improvements or alterations made to the Unit or the limited common area assigned thereto by the prior Unit Owner are not known to be in violation of the Declaration.

The President of the Association or any other Officer of the Association shall furnish such statements upon written request of any prospective Unit Owner within ten (10) days of the receipt of such request.

Said statement once issued shall be binding upon the Association, and every other Unit Owner. The Association may establish a fee to be charged to the Unit Owner in consideration of issuing said statement, which fee shall not exceed $\$ 10.00$ for each request, unless a higher amount is permitted by law.

## F. Notices to or from Mortgagees

i. Notice to Board. A Unit Owner who mortgages his condominium unit shall notify the Board of the name and address of his mortgagee and the principal amount of such mortgage. The Board shall maintain suitable records pertaining to such mortgages.
ii. Reporting. The Board, whenever so requested in writing by a mortgagee of a condominium unit, shall promptly report any then unpaid assessments for common expenses due from, or any other default by, the Owner of the mortgaged condominium unit. The Board shall be entitled to require a fee of Ten Dollars (\$10.00) for each report provided a mortgagee.
iii. Default. The Board shall give written notice to an Owner of any default by the Owner in the performance of any obligations under the Condominium Instruments and, if such default is not cured within thirty (30) days, shall send a copy of such notice to each holder of a mortgage covering such unit whose name and address has theretofore been furnished to the Board. No suit or other proceeding may be brought to foreclose the lien for any assessment levied pursuant to the Declaration or these By-Laws except after ten (10) days written notice to the holder of the first mortgage on the unit which is the subject matter of such suit or proceeding.

Dated this $\qquad$ day of $\qquad$ 2021.

## Parson Woods Investments, LLC

STATE OF NEW HAMPSHIRE
COUNTY OF ROCKINGHAM, ss.
This instrument was acknowledged before me on , 2021, by Richard W. Green, Manager of Parson Woods Investments, LLC, a New Hampshire limited liability company.

Notary Public
Printed Name:
My Commission Expires: $\qquad$

Date: 9/29/2021

## ACCESS \& DRAINAGE EASEMENT DEED

NOW COMES Parson Woods Investments, LLC, a New Hampshire limited liability company having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants, the following described easement:

AN ACCESS AND DRAINAGE EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement area being shown on a plan (the "Plan") prepared by TFMoran, Inc., entitled, "Tax Map 242 Lot 4, Easement Plan, Peverly Hill Road, 83 Peverly Hill Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Stella B. Stokel 1993 Trust, Nancy A. Stokel 1993 Trust \& Philip Stokel" dated July 21, 2021, and recorded at the Rockingham County Registry of Deeds as Plan $\qquad$ . The "Easement Area" is depicted as "Access \& Drainage Easement \#1 For The Benefit of The City of Portsmouth" on the Plan.

This ACCESS AND DRAINAGE EASEMENT is granted to the City of Portsmouth to for the purpose of permitting the installation, maintenance, removal and servicing of drainage within the Easement Area, and the ingress and egress reasonably necessary to carry out the purpose of this easement.

The Grantee shall be responsible for all construction and maintenance in the Easement Area and shall indemnify and hold the Grantor harmless from any claims for damages or injury arising out of the use or maintenance of the easement. This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

THIS IS A CONVEYANCE EXEMPT FROM TRANSFER TAX PURSUANT TO NH RSA 78-B:2,I.

Signed this $\qquad$ day of $\qquad$ 2021.

Parson Woods Investments, LLC

By:
Richard W. Green, Manager

## STATE OF NEW HAMPSHIRE COUNTY OF ROCKINGHAM

The foregoing instrument was acknowledged before me on $\qquad$ by Richard W. Green, Manager of Parson Woods Investments, LLC.

Before me,

Notary Public
My commission expires:

Date: 9/29/2021

## ACCESS \& DRAINAGE EASEMENT DEED

NOW COMES PARSON WOODS INVESTMENTS, LLC, a New Hampshire limited liability company having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants, the following described easement:

AN ACCESS AND DRAINAGE EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement area being shown on a plan (the "Plan") prepared by TF Moran, Inc., entitled, "Tax Map 242 Lot 4, Easement Plan, Peverly Hill Road, 83 Peverly Hill Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Stella B. Stokel 1993 Trust, Nancy A. Stokel 1993 Trust \& Philip Stokel" dated July 21, 2021, and recorded at the Rockingham County Registry of Deeds as Plan $\qquad$ . The "Easement Area" is depicted as "Access \& Drainage Easement \#2 For The Benefit of The City of Portsmouth" on the Plan, and are more particularly bounded and described on the Plan as follows:

Beginning at a point along a stone wall and the southerly sideline of a Public Park \& Path Easement depicted on the Plan;
Thence running South $50^{\circ} 44^{\prime} 00.60^{\prime \prime}$ East a distance of 19.06 feet to a point;
Thence turning and running South $04^{\circ} 11^{\prime} 12^{\prime \prime}$ East a distance of 117.74 feet to a point; Thence turning and running South $21^{\circ} 27^{\prime} 42.23^{\prime \prime}$ West a distance of 10.82 feet to a point; Thence turning and running South $47^{\circ} 06^{\prime} 36.84^{\prime \prime}$ West a distance of 102.16 feet to a point; Thence turning and running North $42^{\circ} 53^{\prime} 23.16^{\prime \prime}$ West a distance of 20.50 feet to a point; Thence turning and running South $47^{\circ} 06^{\prime} 36.84^{\prime \prime}$ West a distance of 20.00 feet to a point; Thence turning and running South $42^{\circ} 53^{\prime} 23.16^{\prime \prime}$ East a distance of 15.79 feet to a point; Thence turning and running South $45^{\circ} 12^{\prime} 17.22^{\prime \prime}$ West a distance of 209.76 feet to a point; Thence turning and running South $04^{\circ} 17^{\prime} 00.65^{\prime \prime}$ East a distance of 130.12 feet to a point; Thence turning and running South $83^{\circ} 29^{\prime} 19.22^{\prime \prime}$ East a distance of 39.79 feet to a point; Thence turning and running North $37^{\circ} 37^{\prime} 57.33^{\prime \prime}$ East a distance of 140.01 feet to a point; Thence turning and running South $60^{\circ} 52^{\prime} 52.83^{\prime \prime}$ East a distance of 21.29 feet to a point; Thence turning and running North $33^{\circ} 01^{\prime} 55.28^{\prime \prime}$ East a distance of 74.35 feet to a point; Thence turning and running South ${ }^{\circ} 55^{\prime} 41.44$ " West a distance of 41.09 feet to a point; Thence turning and running North $00^{\circ} 04^{\prime} 18.56^{\prime \prime}$ West a distance of 83.35 feet to a point; Thence turning and running North $45^{\circ} 22^{\prime} 38.96^{\prime \prime}$ East a distance of 153.44 feet to a point; Thence turning and running North $04^{\circ} 11^{\prime} 12.38^{\prime \prime}$ West a distance of 148.61 feet to a point;

Thence turning and running North $50^{\circ} 44^{\prime} 00.60^{\prime \prime}$ West a distance of 21.92 feet to a point along a stonewall and the southerly sideline of a Public Park \& Path Easement depicted on the Plan;
Thence turning and running along the said stonewall South $38^{\circ} 55^{\prime} 50.76^{\prime \prime}$ West a distance of 18.90 feet to the point and place of beginning.

This ACCESS AND DRAINAGE EASEMENT is granted to the City of Portsmouth to for the purpose of permitting the installation, maintenance, removal and servicing of drainage within the Easement Area, and the ingress and egress reasonably necessary to carry out the purpose of this easement.

The Grantee shall be responsible for all construction and maintenance in the Easement Area and shall indemnify and hold the Grantor harmless from any claims for damages or injury arising out of the use or maintenance of the easement. This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

THIS IS A CONVEYANCE EXEMPT FROM TRANSFER TAX PURSUANT TO NH RSA 78-B:2,I.

Signed this $\qquad$ day of $\qquad$ 2021.

Parson Woods Investments LLC

By:
Richard W. Green, Manager

STATE OF NEW HAMPSHIRE COUNTY OF ROCKINGHAM

The foregoing instrument was acknowledged before me on $\qquad$ by Richard W. Green, Manager of Parson Woods Investments LLC.

Before me,

> Notary Public
> My commission expires:

Date: 9/29/2021

## DRAINAGE EASEMENT DEED

NOW COMES Parson Woods Investments, LLC, a New Hampshire limited liability company having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF
PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants, the following described easement:

A DRAINAGE EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement area being shown on a plan (the "Plan") prepared by TF Moran, entitled, "Tax Map 242 Lot 4, Easement Plan, Peverly Hill Road, 83 Peverly Hill Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Stella B. Stokel 1993 Trust, Nancy A. Stokel 1993 Trust \& Philip Stokel" dated July 21, 2021, and recorded at the Rockingham County Registry of Deeds as Plan The "Easement Areas" are depicted as "Drainage Easement \#1 For The Benefit of The City of Portsmouth" and "Drainage Easement \#1 For The Benefit of The City of Portsmouth" on the Plan, and are more particularly bounded and described on the Plan as follows:

## Drainage Easement \#1:

Beginning at a point along a stonewall and the southwesterly side of Peverly Hill Road; Thence running South $55^{\circ} 16^{\prime} 14^{\prime \prime}$ West a distance of 19.42 feet to a point;
Thence turning and running South $34^{\circ} 43^{\prime} 46^{\prime \prime}$ East a distance of 10.00 feet to a point; Thence turning and running North $55^{\circ} 16^{\prime} 14^{\prime \prime}$ East a distance of 19.05 feet to a point; Thence turning and running North $32^{\circ} 36^{\prime} 14^{\prime \prime}$ West along a stonewall and the southwesterly side of Peverly Hill Road a distance of 10.01 feet to the point and place of beginning.

## Drainage Easement \#2:

Beginning at a point along a stonewall and the southwesterly side of Peverly Hill Road; Thence running South $56^{\circ} 41^{\prime} 58^{\prime \prime}$ West a distance of 12.50 feet to a point;
Thence turning and running South $33^{\circ} 18^{\prime} 02^{\prime \prime}$ East a distance of 10.00 feet to a point; Thence turning and running North $56^{\circ} 41^{\prime} 58^{\prime \prime}$ East a distance of 12.36 feet to a point;

Thence turning and running North $32^{\circ} 28^{\prime} 55^{\prime \prime}$ West along a stonewall and the southwesterly side of Peverly Hill Road a distance of 10.00 feet to the point and place of beginning.

These DRAINAGE EASEMENTS are granted to the City of Portsmouth for the purpose of permitting the installation, maintenance, removal and servicing of drainage, and the ingress and egress reasonably necessary to carry out the purpose of this easement.

The Grantee shall be responsible for all construction and maintenance in the Easement Areas and shall indemnify and hold the Grantor harmless from any claims for damages or injury arising out of the use or maintenance of the easements. This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

THIS IS A CONVEYANCE EXEMPT FROM TRANSFER TAX PURSUANT TO NH RSA 78-B:2,I.

Signed this $\qquad$ day of $\qquad$ 2021.

Parson Woods Investments, LLC

## By:

Richard W. Green, Manager

STATE OF NEW HAMPSHIRE
COUNTY OF ROCKINGHAM

The foregoing instrument was acknowledged before me on $\qquad$ by Richard W. Green, Manager of Parson Woods Investments, LLC.

Before me,

[^2]Date: 9/29/2021

## EASEMENT DEED

NOW COMES PARSON WOODS INVESTMENTS LLC, a New Hampshire limited liability company having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants, the following described easement:

AN EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement areas being shown on a plan (the "Plan") prepared by TFMoran, Inc., entitled, "Tax Map 242 Lot 4, Overall Easement Plan, Peverly Hill Road, 83 Peverly Hill Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Stella B. Stokel 1993 Trust, Nancy A. Stokel 1993 Trust \& Philip Stokel" dated July 21, 2021, and recorded at the Rockingham County Registry of Deeds as Plan . The "Easement Area" is depicted as "Public Park \& Path Easement for the Benefit of the Public" on the Plan, and is more particularly bounded and described on the Plan as follows:

Beginning at a point at the intersection of stone walls and the northern corner of a burial ground as shown on the Plan;
Thence running in a curve to the left having a radius of 219.00 feet and an arc length of 102.72 feet to a point;
Thence turning and running North $74^{\circ} 16^{\prime} 25^{\prime \prime}$ West a distance of 16.53 feet to a point;
Thence turning and running South $66^{\circ} 40^{\prime} 18^{\prime \prime}$ West a distance of 64.41 feet to a point along land now or formerly of the State of New Hampshire Fish \& Game Dept;
Thence turning and running in a curve to the right having a radius of 209.00 feet and an arc length of 198.67 feet to a point;
Thence running South $38^{\circ} 55^{\prime} 51^{\prime \prime}$ West a distance of 136.50 feet to a point;
Thence turning and running South $50^{\circ} 33^{\prime} 19^{\prime \prime}$ West a distance of 248.37 feet to a point; Thence turning and running South $51^{\circ} 37^{\prime} 18^{\prime \prime}$ West a distance of 544.02 feet to a point; Thence turning and running in a curve to the right having a radius of 400.00 feet and an arc length of 184.76 feet to a point;
Thence turning and running South $78^{\circ} 08^{\prime} 44^{\prime \prime}$ West a distance of 85.87 feet to a point; Thence turning and running South $22^{\circ} 55^{\prime} 14^{\prime \prime}$ West a distance of 18.26 feet to a point; Thence turning and running North $78^{\circ} 08^{\prime} 44^{\prime \prime}$ East a distance of 96.28 feet to a point; Thence turning and running in a curve to the left having a radius of 415.02 feet and an arc length of 191.70 feet to a point;

Thence turning and running North $51^{\circ} 37^{\prime} 18^{\prime \prime}$ East a distance of 544.03 feet to a point; Thence turning and running North $50^{\circ} 33^{\prime} 19^{\prime \prime}$ East a distance of 248.37 feet to a point; Thence turning and running North $38^{\circ} 55^{\prime} 51^{\prime \prime}$ East a distance of 136.50 feet to a point; Thence turning and running in a curve to the left having a radius of 224.00 feet and an arc length of 114.11 feet to a point;
Thence turning and running North $75^{\circ} 23^{\prime} 43^{\prime \prime}$ East a distance of 52.51 feet to the point and place of beginning.

This EASEMENT is granted to the City of Portsmouth to for the purpose of providing a public park and path over the above-described property.

The Grantee shall be responsible for all construction and maintenance in the Easement Area and shall indemnify and hold the Grantor harmless from any claims for damages or injury arising out of the use or maintenance of the easement. This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

THIS IS A CONVEYANCE EXEMPT FROM TRANSFER TAX PURSUANT TO NH RSA 78-B:2,I.

Signed this $\qquad$ day of $\qquad$ 2021.

Parson Woods Investments LLC

## By:

Richard W. Green, Manager

## STATE OF NEW HAMPSHIRE

 COUNTY OF ROCKINGHAMThe foregoing instrument was acknowledged before me on $\qquad$ by Richard W. Green, Manager of Parson Woods Investments LLC.

Before me,

Notary Public
My commission expires:

## CONSERVATION EASEMENT DEED

NOW COMES PARSON WOODS INVESTMENTS, LLC, a New Hampshire limited liability company having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants:

A CONSERVATION EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement areas being shown on a plan (the "Plan") prepared by TF Moran, Inc., entitled, "Tax Map 242 Lot 4, Overall Easement Plan, Peverly Hill Road, 83 Peverly Hill Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Stella B. Stokel 1993 Trust, Nancy A. Stokel 1993 Trust \& Philip Stokel" dated July 21, 2021, and recorded at the Rockingham County Registry of Deeds as Plan $\qquad$ . The "Easement Areas" are depicted as "Conservation Easement Area 1" and "Conservation Easement Area 2" on the Plan, and are more particularly bounded and described on the Plan as follows:

## Conservation Easement Area 1:

Beginning at a 1.75 " iron pipe found at the southeastern corner of grantor's property;
Thence running South $65^{\circ} 32^{\prime} 22^{\prime \prime}$ West a distance of 961.06 feet to a point;
Thence turning and running South $69^{\circ} 39^{\prime} 32^{\prime \prime}$ West partially along a stonewall a distance of 39.97 feet to a point;
Thence turning and running in a northerly and northeasterly direction along the edge of wetland a distance of 1,246 feet, more or less, to a point along the southwesterly sideline of Peverly Hill Road;
Thence turning and running along a stone wall South $34^{\circ} 50^{\prime} 10^{\prime \prime}$ East a distance of 64.05 feet to a point;
Thence turning and running along a stone wall South $32^{\circ} 23^{\prime} 37^{\prime \prime}$ East a distance of 59.65 feet to a point;
Thence turning and running along a stone wall South $32^{\circ} 36^{\prime} 14^{\prime \prime}$ East a distance of 75.31 feet to a point;
Thence turning and running along a stone wall South $32^{\circ} 30^{\prime} 33^{\prime \prime}$ East a distance of 44.57 feet to a point;
Thence turning and running along a stone wall South $31^{\circ} 38^{\prime} 38^{\prime \prime}$ East a distance of 14.39 feet to a point;

Thence turning and running along a stone wall South $33^{\circ} 17^{\prime} 28^{\prime \prime}$ East a distance of 36.28 feet to a point;
Thence turning and running South $33^{\circ} 32^{\prime} 47^{\prime \prime}$ East a distance of 33.10 feet to a point; Thence turning and running South $32^{\circ} 28^{\prime} 55^{\prime \prime}$ East a distance of 58.19 feet to a $1.75^{\prime \prime}$ iron pipe found at the point and place of beginning.

This easement area contains 6.6485 acres.

## Conservation Easement Area 2:

Beginning at a point that is South $21^{\circ} 45^{\prime} 52^{\prime \prime}$ East a distance of 10.17 feet from a stone wall and the northwestern corner of land now or formerly of New Hope Baptist Church;
Thence running South $20^{\circ} 39^{\prime} 30^{\prime \prime}$ East a distance of 392.22 feet to a point;
Thence turning and running along a stonewall South $24^{\circ} 19^{\prime} 08^{\prime \prime}$ East a distance of 65.84 feet to a point;
Thence turning and running South $22^{\circ} 34^{\prime} 53^{\prime \prime}$ East a distance of 52.86 feet to a point; Thence turning and running South $23^{\circ} 02^{\prime} 43^{\prime \prime}$ East a distance of 111.50 feet to a point; Thence turning and running South $22^{\circ} 45^{\prime} 01^{\prime \prime}$ East a distance of 171.93 feet to a point; Thence turning and running South $67^{\circ} 19^{\prime} 43^{\prime \prime}$ West a distance of 152.24 feet to a point; Thence turning and running South $69^{\circ} 35^{\prime} 00^{\prime \prime}$ West a distance of 360.76 feet to a point; Thence turning and running South $71^{\circ} 11^{\prime} 01^{\prime \prime}$ West a distance of 41.19 feet to a point; Thence turning and running South $69^{\circ} 52^{\prime} 05^{\prime \prime}$ West a distance of 74.38 feet to a point; Thence turning and running South $68^{\circ} 05^{\prime} 19^{\prime \prime}$ West a distance of 38.26 feet to a point; Thence turning and running South $69^{\circ} 37^{\prime} 42^{\prime \prime}$ West a distance of 88.49 feet to a point; Thence turning and running South $69^{\circ} 05^{\prime} 04^{\prime \prime}$ West a distance of 85.94 feet to a point; Thence turning and running South $68^{\circ} 46^{\prime} 51^{\prime \prime}$ West a distance of 56.81 feet to a point; Thence turning and running South $67^{\circ} 27^{\prime} 31^{\prime \prime}$ West a distance of 81.81 feet to a point; Thence turning and running South $67^{\circ} 26^{\prime} 04^{\prime \prime}$ West a distance of 87.58 feet to a point; Thence turning and running South $68^{\circ} 24^{\prime} 11^{\prime \prime}$ West a distance of 247.91 feet to a point; Thence turning and running South $70^{\circ} 35^{\prime} 06^{\prime \prime}$ West a distance of 20.09 feet to a point; Thence turning and running South $02^{\circ} 20^{\prime} 46^{\prime \prime}$ West a distance of 96.94 feet to a point; Thence turning and running South $04^{\circ} 10^{\prime} 09^{\prime \prime}$ West a distance of 71.99 feet to a point; Thence turning and running South $02^{\circ} 55^{\prime} 30^{\prime \prime}$ West a distance of 60.89 feet to a point; Thence turning and running South $04^{\circ} 46^{\prime} 48^{\prime \prime}$ West a distance of 64.75 feet to a point; Thence turning and running South $04^{\circ} 06^{\prime} 17^{\prime \prime}$ West a distance of 73.30 feet to a point; Thence turning and running South $02^{\circ} 44^{\prime} 38^{\prime \prime}$ West a distance of 55.33 feet to a point; Thence turning and running South $30^{\circ} 51^{\prime} 45^{\prime \prime}$ West a distance of 36.06 feet to a point; Thence turning and running South $29^{\circ} 37^{\prime} 18^{\prime \prime}$ West a distance of 72.38 feet to a point; Thence turning and running South $30^{\circ} 17^{\prime} 36^{\prime \prime}$ West a distance of 108.68 feet to a point; Thence turning and running South $29^{\circ} 36^{\prime} 04^{\prime \prime}$ West a distance of 113.60 feet to a point; Thence turning and running South $29^{\circ} 36^{\prime} 07^{\prime \prime}$ West a distance of 62.04 feet to a point; Thence turning and running South $30^{\circ} 55^{\prime} 15^{\prime \prime}$ ' West a distance of 107.77 feet to a point; Thence turning and running South $27^{\circ} 41^{\prime} 10^{\prime \prime}$ West a distance of 68.75 feet to a point; Thence turning and running South $30^{\circ} 19^{\prime} 04^{\prime \prime}$ West a distance of 62.95 feet to a point; Thence turning and running South $28^{\circ} 10^{\prime} 44^{\prime \prime}$ West a distance of 90.88 feet to a point; Thence turning and running South $27^{\circ} 46^{\prime} 33^{\prime \prime}$ West a distance of 84.72 feet to a point;

Thence turning and running South $28^{\circ} 09^{\prime} 12^{\prime \prime}$ West a distance of 63.04 feet to a point; Thence turning and running South $29^{\circ} 23^{\prime} 48^{\prime \prime}$ West a distance of 74.83 feet to a point; Thence turning and running South $29^{\circ} 32^{\prime} 16^{\prime \prime}$ West a distance of 94.54 feet to a point; Thence turning and running South $29^{\circ} 00^{\prime} 39^{\prime \prime}$ West a distance of 86.86 feet to a point; Thence turning and running South $28^{\circ} 38^{\prime} 51^{\prime \prime}$ West a distance of 79.24 feet to a point; Thence turning and running South $15^{\circ} 03$ '54" East a distance of 206.01 feet to a point; Thence turning and running South $15^{\circ} 34^{\prime} 48^{\prime \prime}$ East a distance of 56.79 feet to a point; Thence turning and running South $16^{\circ} 34^{\prime} 18^{\prime \prime}$ East a distance of 55.67 feet to a point; Thence turning and running South $14^{\circ} 35^{\prime} 44^{\prime \prime}$ East a distance of 35.23 feet to a point; Thence turning and running South $15^{\circ} 16^{\prime} 42^{\prime \prime}$ East a distance of 66.01 feet to a point; Thence turning and running South $16^{\circ} 55^{\prime} 11^{\prime \prime}$ East a distance of 94.64 feet to a point; Thence turning and running South $15^{\circ} 41^{\prime} 57^{\prime \prime}$ East a distance of 93.63 feet to a point; Thence turning and running South $62^{\circ} 33^{\prime} 20^{\prime \prime}$ West a distance of 210.79 feet to a point; Thence turning and running South $60^{\circ} 22^{\prime} 36^{\prime \prime}$ West a distance of 85.15 feet to a point; Thence turning and running South $60^{\circ} 02^{\prime} 43^{\prime \prime}$ West a distance of 125.36 feet to a point; Thence turning and running South $61^{\circ} 36^{\prime} 13^{\prime \prime}$ " West a distance of $1,100.89$ feet to a point; Thence turning and running North $22^{\circ} 55^{\prime} 14^{\prime \prime}$ East a distance of $3,930.00$ feet to a point; Thence turning and running North $78^{\circ} 08^{\prime} 44^{\prime \prime}$ East a distance of 96.28 feet to a point; Thence turning and running in a curve to the left having a radius of 415.02 feet and an arc length of 191.70 feet to a point;
Thence turning and running South $43^{\circ} 56^{\prime} 08^{\prime \prime}$ East a distance of 128.95 feet to a point; Thence turning and running along the edge of the wetland as shown on the Plan a distance of 1,377 feet, more or less, to the point and place of beginning.

This easement area contains 71.0365 acres, more or less.
This CONSERVATION EASEMENT is granted to the City of Portsmouth to for the purpose of preserving and protecting in perpetuity the natural vegetation, soils, hydrology, natural habitat and scenic and aesthetic character of the Property so that the Property retains its natural qualities and functions.

This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

THIS IS A CONVEYANCE EXEMPT FROM TRANSFER TAX PURSUANT TO NH RSA 78-B:2,I.

Signed this $\qquad$ day of $\qquad$ 2021.

Parson Woods Investments LLC

By:
Richard W. Green, Manager

STATE OF NEW HAMPSHIRE COUNTY OF ROCKINGHAM

The foregoing instrument was acknowledged before me on $\qquad$ by Richard W. Green, Manager of Parson Woods Investments LLC.

Before me,

Notary Public
My commission expires:

## EASEMENT DEED

NOW COMES PARSON WOODS INVESTMENTS LLC, a New Hampshire limited liability company having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants, the following described easement:

AN EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement areas being shown on a plan (the "Plan") prepared by TFMoran, Inc., entitled, "Tax Map 242 Lot 4, Easement Plan, Peverly Hill Road, 83 Peverly Hill Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Stella B. Stokel 1993 Trust, Nancy A. Stokel 1993 Trust \& Philip Stokel" dated July 21, 2021, and recorded at the Rockingham County Registry of Deeds as Plan $\qquad$ The "Easement Area" is depicted as "Public Right of Way" on the Plan, and is more particularly bounded and described on the Plan as follows:

Beginning at a point along the westerly sideline of Peverly Hill Road;
Thence running in a curve to the left having a radius of 25.00 feet and an arc length of 43.82 feet to a point;
Thence turning and running South $46^{\circ} 06^{\prime} 30.10^{\prime \prime}$ West a distance of 44.36 feet to a point;
Thence turning and running in a curve to the right having a radius of 216.50 feet and an arc length of 74.16 feet to a point;
Thence turning and running South $65^{\circ} 44^{\prime} 02.07^{\prime \prime}$ West a distance of 343.37 feet to a point; Thence turning and running in a curve to the left having a radius of 183.50 feet and an arc length of 214.26 feet to a point;
Thence turning and running in a curve to the right having a radius of 216.50 feet and an arc length of 169.33 feet to a point;
Thence turning and running South $43^{\circ} 38^{\prime} 44.95^{\prime \prime}$ West a distance of 194.02 feet to a point;
Thence turning and running in a curve to the right having a radius of 319.00 feet and an arc length of 217.88 feet to a point;
Thence turning and running in a curve to the left having a radius of 183.50 feet and an arc length of 132.36 feet to a point;
Thence turning and running in a curve to the right having a radius of 219.00 feet and an arc length of 822.41 feet to a point;
Thence turning and running North $76^{\circ} 36^{\prime} 49.24^{\prime \prime}$ East a distance of 215.94 feet to a point;

Thence turning and running in a curve to the left having a radius of 481.00 feet and an arc length of 110.11 feet to a point;
Thence turning and running North $63^{\circ} 29^{\prime} 53.04$ " East a distance of 215.94 feet to a point;
Thence turning and running in a curve to the right having a radius of 219.00 feet and an arc length of 167.80 feet to a point;
Thence turning and running North $70^{\circ} 03^{\prime} 21.14^{\prime \prime}$ East a distance of 36.45 feet to a point;
Thence turning and running in a curve to the right having a radius of 223.50 feet and an arc length of 138.58 feet to a point;
Thence turning and running North $65^{\circ} 44^{\prime} 02.07^{\prime \prime}$ East a distance of 343.37 feet to a point;
Thence turning and running in a curve to the left having a radius of 176.50 feet and an arc length of 60.46 feet to a point;
Thence turning and running North $46^{\circ} 06^{\prime} 30.10^{\prime \prime}$ East a distance of 34.71 feet to a point; Thence turning and running in a curve to the right having a radius of 223.50 and an arc length of 23.39 feet to a point;

Thence turning and running in a curve to the left having a radius of 25.00 feet and an arc length of 37.34 feet to a point;

Thence turning and running South $33^{\circ} 28^{\prime} 11.00^{\prime \prime}$ West a distance of 253.49 feet to a point and place of beginning.

EXCEPTING and reserving from the above-described property, the following parcel of land:
Beginning at a point at the easternmost tip of a "Proposed Pocket Park" shown on the Plan; Thence running in a curve to the left having a radius of 223.50 feet and an arc length of 48.29 feet to a point;
Thence turning and running in a curve to the right having a radius of 176.50 feet and an arc length of 138.04 feet to a point;
Thence turning and running South $43^{\circ} 38^{\prime} 44.95^{\prime \prime}$ West a distance of 194.02 feet to a point;
Thence turning and running in a curve to the right having a radius of 279.00 feet and an arc length of 190.56 feet to a point;
Thence turning and running in a curve to the left having a radius of 223.50 feet and an arc length of 161.21 feet to a point;
Thence turning and running in a curve to the right having a radius of 179.00 feet and an arc length of 672.20 feet to a point;
Thence running North $76^{\circ} 36^{\prime} 49.24^{\prime \prime}$ East a distance of 215.94 feet to a point;
Thence turning and running in a curve to the left having a radius of 521.00 feet and an arc length of 119.26 feet to a point;
Thence turning and running North $63^{\circ} 29^{\prime} 53.04$ " East a distance of 215.94 feet to a point;
Thence turning and running in a curve to the right having a radius of 179.00 feet and an arc length of 144.46 feet to a point;
Thence turning and running South $70^{\circ} 15^{\prime} 40.67^{\prime \prime}$ East a distance of 5.50 feet to the point and place of beginning.

This EASEMENT is granted to the City of Portsmouth to for the purpose of providing a public right-of-way over the above-described property.

The Grantee shall be responsible for all construction and maintenance in the Easement Area and shall indemnify and hold the Grantor harmless from any claims for damages or injury arising out of the use or maintenance of the easement. This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

THIS IS A CONVEYANCE EXEMPT FROM TRANSFER TAX PURSUANT TO NH RSA 78-B:2,I.

Signed this $\qquad$ day of $\qquad$ 2021.

Parson Woods Investments LLC

By:
Richard W. Green, Manager

STATE OF NEW HAMPSHIRE COUNTY OF ROCKINGHAM

The foregoing instrument was acknowledged before me on $\qquad$ by Richard W. Green, Manager of Parson Woods Investments LLC.

Before me,

> Notary Public
> My commission expires:

MEMORANDUM
Ref: 2047A

To: Michael Green
Green \& Company
From: Stephen G. Pernaw, P.E., PTOE
Subject: Proposed Residential Development - Traffic Evaluation
Portsmouth, New Hampshire
Date: October 6, 2020

As requested, Pernaw \& Company, Inc. has conducted this "Traffic Evaluation" regarding your proposed residential development project located on the west side of Peverly Hill Road in Portsmouth, New Hampshire. This study evaluates the Peverly Hill Road / Private Road A intersection and in terms of traffic operations, capacity, and safety based on 2032 Build traffic volumes. The purpose of this memorandum is to summarize our research of available traffic count data, our recent traffic counts at the subject site, the trip generation analysis for the proposed development, the post-development traffic projections, and the results of the various technical analyses. This study has determined that this proposed intersection will function safely and adequately as a conventional three-leg T-intersection with one shared general-purpose travel lane on each approach. To summarize:
Proposed Development - The conceptual design plan entitled "Concept A-PUD Plan," prepared by TFM, Inc., Sheet A-02, dated July 28, 2020 shows that the proposed development will create 60 single-family detached residential units along a private roadway system (see Attachment 1). Private Road A is proposed to intersect the west side of Peverly Hill Road approximately 450feet south of NH33 (Middle Road). The location of the automatic traffic recorders and the subject site with respect to the area roadway system is shown on Figure 1.
Existing Conditions - Peverly Hill Road extends in a general north-south direction along the site frontage and provides access between NH33 and US1. This road provides one travel lane in each direction in the vicinity of the subject site. The pavement width is delineated with a four-inch double yellow centerline and four-inch single white edge lines. Paved, grass and gravel shoulders of variable width are present along both sides of the roadway. The speed limit is posted at 25 mph in each direction in this area.

Existing Traffic Volumes - According to a short-term NHDOT traffic count conducted on Peverly Hill Road (south of NH33) in June 2019, this roadway section carried an estimated Annual Average Daily Traffic (AADT) volume of approximately 9,549 vehicles per day in 2019. The hourly data indicates that weekday volumes typically reached peak levels from 8:00 to 9:00 AM and from 4:00 to 5:00 PM. The diagrams on Page 3 summarize the daily and hourly variations in traffic demand at this location (see Attachments $2 \& 3$ ). This information was supplemented by a 24 -hour Automatic Traffic Recorder count conducted by our office in September 2020.

Pernaw \& Company, Inc.

= AUTOMATIC TRAFFIC RECORDER LOCATION (NHDOT)
= AUTOMATIC TRAFFIC RECORDER LOCATION (PERNAW \& CO., INC.)

Figure 1

## Site Location

Traffic Evaluation, Proposed Residential Development, Portsmouth, New Hampshire


Stephen G. Pernaw \& Company, Inc.

DAILY TRAFFIC VARIATIONS
Portsmouth, NH - Peverly Hill Road (South of NH33) June 2019 \& September 2020


HOURLY TRAFFIC VARIATIONS


The raw 2020 directional traffic volume data on Peverly Hill Road are summarized in the diagrams below. This data shows that travel in the southbound direction is predominant during the morning peak hour, and this reverses to northbound during the evening peak hour. This pattern is indicative of the employment opportunities in the city, and the proximity of Interstate Route 95.


AM PEAK HOUR Wednesday, September 30, 2020

7:30 to 8:30 AM


PM PEAK HOUR Wednesday, September 30, 2020

4:00 to 5:00 PM

When compared with the 2019 NHDOT count data, it is obvious that the current traffic levels on Peverly Hill Road have been affected by the COVID-19 pandemic. For this reason, the subsequent post-development traffic volumes contained herein reflect the use of a separate COVID adjustment factor. The raw traffic count data is attached (see Attachment 4).

Trip Generation - To estimate the quantity of vehicle-trips that will be produced by the proposed residential development, the standard trip generation rates and equations published by the Institute of Transportation Engineers ${ }^{1}$ (ITE) were considered. Both Land Use Code 210 and 220 are somewhat applicable, for different reasons. LUC 210 applies to single-family detached dwellings; however, the proposed units are condominiums and are much smaller in size than is found in a conventional residential subdivision. LUC 220 applies to condominiums, apartments, and townhouses; however, with multiple units in the same building. Consequently, the trip rates per person for LUC 210 and the trip rates per dwelling unit for LUC 220 were considered; and the higher of the two results were utilized for traffic projection and analysis purposes. According to Green \& Company's experience with similar development projects, there are approximately two persons per unit in this type of housing.

[^3]
${ }^{1}$ ITE Land Use Code 210 - Single-Family Detached Housing (Use 2 persons per unit, Trip Equation M ethod)
${ }^{2}$ ITE Land Use Code 220 - M ultifamily Housing - Low-Rise ( 60 Dwelling Units, Trip Equation M ethod)

Based upon ITE Land Use Code 210 (Single-Family Detached Housing) and ITE Land Use Code 220 (Multifamily Housing - Low Rise), the overall development is expected to generate approximately 29 vehicle-trips ( 7 arrivals, 22 departures) during the AM peak hour, and 42 vehicle-trips (28 arrivals, 14 departures) during the PM peak hour, on an average weekday basis (see Attachment 5).

Future Build Traffic Projections - The diagrams below summarize the Build traffic projections for the 2032 horizon year. These projections are based on the September 2020 traffic count data, a peak-month seasonal adjustment factor of 1.05 (see Attachment 6), a 2.0\% background traffic growth rate, compounded annually (see Attachment 7), and a COVID-19 adjustment factor of 1.28 (see Attachment 8). The trip distribution analysis (see Attachment 9) indicates that the majority of site traffic (78\%) will travel to/from points north on Peverly Hill Road.


2032 AM Build


2032 PM Build

Intersection Capacity and Level of Service - The long-range (2032) traffic projections form the basis for assessing traffic operations at the Peverly Hill Road / Private Road A intersection from a capacity and delay standpoint. This intersection was analyzed according to the methodologies of the Highway Capacity Manual $2010^{2}$ as replicated by the latest edition of the Synchro Signal Timing Software (Version 10), which is capable of analyzing unsignalized intersections as well.

Capacity and Level of Service (LOS) calculations pertaining to unsignalized intersections address the quality of service for those vehicles turning into and out of the intersecting side street or driveway. The availability of adequate gaps in the traffic stream on the major street actually controls the potential capacity for vehicle movements to and from the minor approaches, in terms of vehicles per hour.

The results of the analysis for the subject intersection show that all applicable turning movements will operate well below capacity through 2032 with the proposed development fully occupied. Nevertheless, departures from the Private Road A approach to Peverly Hill Road can be expected to encounter moderate delays during the peak hour periods in 2032: Level of Service E during the morning peak hour; Level of Service D during the evening peak hour (see Attachments 10 \& 11).

## Auxiliary Turn Lane Warrants Analysis

Left-Turn Treatment - The type of treatment needed to accommodate left-turning vehicles from any street or highway to an intersecting side street (or driveway) can range from no treatment, where turning volumes are low; to the provision of a bypass lane for through traffic to travel around left-turning vehicles; to the addition of a formal center turn lane used exclusively by leftturning vehicles for deceleration and storage while waiting to complete their maneuvers.
Analysis of the 2032 traffic volumes using NCHRP 457 guidelines confirmed that no special treatment is needed for left-turn arrivals from Peverly Hill Road. The results of the analysis are summarized on Table 2. This finding means that the northbound through lane on Peverly Hill Road will function safely and adequately as a shared through-left lane (see Attachments 12 \& 13).

Right-Turn Treatment - The type of treatment needed to accommodate right-turning vehicles from any street or highway to any intersecting side street (or driveway) can range from a radius only, where turning volumes are low; to the provision of a short 10:1 right-turn taper; to the addition of an exclusive right-turn lane, where turning volumes and through traffic volumes are significant.

Analysis of the 2032 traffic volumes contained herein using NCHRP 457 guidelines confirmed that right-turn treatment is not warranted at the subject intersection. The results of these analyses are summarized on Table 2 and the computations are attached (Attachments $14 \& 15$ ).

Minor Road Approach Treatment - The type of treatment needed to accommodate exiting vehicles from the minor-road approach at a stop-controlled intersection can range from a single lane (shared left-right lane) in low-volume conditions, to two exit lanes (exclusive left-turn lane and exclusive right-turn lane) where turning volumes and through traffic volumes are significant,

[^4]
to multiple exit lanes in extreme cases. The analysis is summarized on Table 2 and shows that a single departure lane on the Private Road A approach to Peverly Hill Road is sufficient (see Attachments 16 \& 17).
Table 2
Auxiliary Turn Lane Warrants Analysis
Peverly Hill Road / Private Road A

## Findings \& Conclusions

1. The September 2020 traffic count conducted on Peverly Hill Road at the subject site revealed that this section of roadway carried approximately 8,500 vehicles on a typical weekday, with 673 vehicles observed passing the site during the AM peak hour (7:30 to 8:30 AM) and 803 vehicles observed during the PM peak hour (4:00 to 5:00 PM). The predominant travel direction was southbound during the AM, and northbound during the PM.
2. The proposed residential development is expected to generate approximately 29 (AM) and 42 (PM) vehicle-trips during the peak hour periods. The majority (78\%) are expected to travel to/from points north on Peverly Hill Road (via NH33).
3. Site traffic is expected to increase the two-way traffic volume on Peverly Hill Road by $+2 \%$ north of the site, and $+1 \%$ south of the site by 2032.
4. The intersection capacity and Level of Service analysis indicates that all applicable traffic movements at this intersection will operate well below capacity through 2032 with the development fully occupied. By 2032, departures from the site are expected to operate at Level of Service E during the morning peak hour, and at Level of Service D during the PM peak hour. Left-turn arrivals (from Peverly Hill Road northbound) will operate at Level of Service B, or higher, during all hours of the day through 2032. Vehicle queuing on the Private Road A approach to Peverly Hill Road is expected to be minimal.
5. The 2032 Build traffic volumes do not satisfy the NCHRP guidelines for left-turn treatment or right-turn treatment at the Private Road A intersection on Peverly Hill Road. The subject intersection will function safely and efficiently with one shared travel lane on each approach to the subject intersection.

From a traffic operations and safety standpoint, providing ample sight distances looking left and right from the Proposed Road A approach to Peverly Hill Road is an important safety consideration. This new access road should operate under stop sign control, and be delineated with a 18-inch white stop line and a short section of 4-inch double-yellow centerline to separate inbound and outbound vehicles.

## Attachments



Stephen G. Pernaw \& Company, Inc.

## ATTACHMENTS




Transportation Data Management System


Directions: 2-WAY (2)

| Year | AADT | DHV-30 | K \% | D \% | PA |  | BC |  | Src |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2019 | 9,549 | 1,062 11 |  |  | 8,748 (92\%) |  | 801 (8\%) |  |  |
| 2018 | $10,823^{3}$ | 11 |  |  | 9,978 (92\%) |  | 845 (8\%) |  | Grown <br> from 2017 |
| 2017 | $10,611^{3}$ | 11 |  |  | 9,847 (93\%) |  | 764 (7\%) fromer |  | Grown <br> from 2016 |
| 2016 | 10,403 | 1,150 | 11 |  | 9,487 (91\%) |  | 916 (9\%) |  | Grown <br> from 2014 |
| 2015 | $10,527^{3}$ | 1-5 of 20 |  |  |  |  |  |  |  |
|  | $\ggg 1$ |  |  |  |  |  |  |  |  |
| Demand Modal |  |  |  |  |  |  |  |  |  |
| Model Year | Model AADT | AM PHV | AM PPV | MD PHV | MD PPV | PM PHV | PM PPV | NT PHV | NT PPV |
| Ulatay |  |  |  |  |  |  |  |  |  |
| Date |  |  | Int | Total |  |  |  |  |  |  |
| Thu 6/6/2019 |  |  | 60 | 11,266 | $\begin{gathered} \text { Year } \\ 2019 \end{gathered}$ |  | -12\% |  |  |
| Wed 6/5/2019 |  |  | 60 | 11,049 | $2019$ |  | 2\% |  |  |
| Tue 6/4/2019 |  |  | 60 | 10,901 | 2018 |  | 2\% |  |  |
| Tue 7/19/2016 |  |  | 60 | 12,808 | 2017 |  | -1\% |  |  |
| Mon 7/18/2016 |  |  | 60 | 12,033 | 2016 |  | 3\% |  |  |
| Sun 7/17/2016 |  |  | 60 | 6,806 | 2015 |  |  |  |  |  |
| Fri 9/13/2013 |  |  | 60 | 11,838 | 2014 |  | 2\% |  |  |
| Thu 9/12/2013 |  |  | 60 | 11,713 | 2013 |  | 4\% |  |  |
| Wed 9/11/2013 |  |  | 60 | 11,902 | 2010 |  | -7\% |  |  |
|  | 9/10/2013 |  | 60 | 11,404 | 2007 |  | -10\% |  |  |



Excel Version

|  |  |  |  |
| ---: | :--- | ---: | :--- |
| Location ID: | 82379124 | Type: | SPOT |
| Located On: | Peverly Hill Rd | $:$ |  |
| Direction: | 2-WAY |  |  |
| Community: | PORTSMOUTH | Period: | Mon $6 / 3 / 2019-$ Sun $6 / 9 / 2019$ |
| AADT: | 9549 |  |  |


| Start Time | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Avg | Graph |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 12:00 AM |  | 14 | 28 | 24 |  |  |  | 22 |  | 0.2\% |
| 1:00 AM |  | 11 | 18 | 12 |  |  |  | 14 |  | 0.1\% |
| 2:00 AM |  | 16 | 13 | 13 |  |  |  | 14 |  | 0.1\% |
| 3:00 AM |  | 13 | 17 | 20 |  |  |  | 17 |  | 0.2\% |
| 4:00 AM |  | 35 | 39 | 40 |  |  |  | 38 |  | 0.3\% |
| 5:00 AM |  | 125 | 113 | 115 |  |  |  | 118 | - | 1.1\% |
| 6:00 AM |  | 286 | 290 | 263 |  |  |  | 280 | $\square$ | 2.5\% |
| 7:00 AM |  | 710 | 771 | 786 |  |  |  | 756 | $\square 2$ | 6.8\% |
| 8:00 AM |  | (867) | 906 | 902 |  |  |  | 892 | $\square$ | 8.1\% |
| 9:00 AM |  | 700 | 664 | 707 |  |  |  | 690 | $\square$ | 6.2\% |
| 10:00 AM |  | 666 | 688 | 674 |  |  |  | 676 | $\square$ | 6.1\% |
| 11:00 AM |  | 773 | 751 | 792 |  |  |  | 772 | - | 7.0\% |
| 12:00 PM |  | 893 | 835 | 916 |  |  |  | 881 | - | 8.0\% |
| 1:00 PM |  | 802 | 872 | 858 |  |  |  | 844 | $\square$ | 7.6\% |
| 2:00 PM |  | 828 | 840 | 830 |  |  |  | 833 | $\square$ | 7.5\% |
| 3:00 PM |  | 904 | 861 | 916 |  |  |  | 894 | $\square$ | 8.1\% |
| 4:00 PM |  | 1004 | 1025 | 1062 |  |  |  | 1,030 | - | 9.3\% |
| 5:00 PM |  | 926 | 963 | 973 |  |  |  | 954 | $\square$ | 8.6\% |
| 6:00 PM |  | 543 | 548 | 524 |  |  |  | 538 | Whand | 4.9\% |
| 7:00 PM |  | 299 | 340 | 336 |  |  |  | 325 | $\square$ | 2.9\% |
| 8:00 PM |  | 246 | 216 | 237 |  |  |  | 233 | - | 2.1\% |
| 9:00 PM |  | 124 | 133 | 148 |  |  |  | 135 | - | 1.2\% |
| 10:00 PM |  | 74 | 78 | 79 |  |  |  | 77 | - | 0.7\% |
| 11:00 PM |  | 42 | 40 | 39 |  |  |  | 40 |  | 0.4\% |
| Total | 0 | 10,901 | 11,049 | 11,266 | 0 | 0 | 0 |  |  |  |
| 24hr Total |  | 10901 | 11049 | 11266 |  |  |  | 11,072 |  |  |
| AM Pk Hr |  | 8:00 | 8:00 | 8:00 |  |  |  |  |  |  |
| AM Peak |  | 867 | 906 | 902 |  |  |  | 892 |  |  |
| PM Pk Hr |  | 4:00 | 4:00 | 4:00 |  |  |  |  |  |  |
| PM Peak |  | 1004 | 1025 | 1062 |  |  |  | 1,030 |  |  |
| \% Pk Hr |  | 9.21\% | 9.28\% | 9.43\% |  |  |  | 9.31\% |  |  |

Stephen G. Pernaw \& Company, Inc.

## Automatic Traffic Recorder Count - Peverly Hill Road, Portsmouth, NH (South of NH Route 33)

 Wednesday, September 30, 2020| Period | CARS |  | TRUCKS |  | TOTAL |  | TOT |  | Period Beginning | CARS |  | TRUCKS |  | TOTAL |  | TOT |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Beginning | SB | NB | SB | NB | SB | NB |  |  |  | SB | NB | SB | NB | SB | NB |  |  |
| 12:00 AM | 6 | 3 | 0 | 0 | 6 | 3 | 9 |  | 12:00 PM | 98 | 80 | 10 | 10 | 108 | 90 | 198 | 683 |
| 12:15 AM | 5 | 2 | 0 | 0 | 5 | 2 | 7 |  | 12:15 PM | 88 | 86 | 3 | 2 | 91 | 88 | 179 | 714 |
| 12:30 AM | 4 | 1 | 0 | 0 | 4 | 1 | 5 |  | 12:30 PM | 92 | 81 | 8 | 2 | 100 | 83 | 183 | 740 |
| 12:45 AM | 2 | 2 | 0 | 0 | 2 | 2 | 4 | 25 | 12:45 PM | 88 | 66 | 2 | 3 | 90 | 69 | 159 | 719 |
| 1:00 AM | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 17 | 1:00 PM | 75 | 81 | 4 | 2 | 79 | 83 | 162 | 683 |
| 1:15 AM | 2 | 0 | 0 | 0 | 2 | 0 | 2 | 12 | 1:15 PM | 79 | 74 | 4 | 3 | 83 | 77 | 160 | 664 |
| 1:30 AM | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 9 | 1:30 PM | 79 | 76 | 8 | 6 | 87 | 82 | 169 | 650 |
| 1:45 AM | 1 | 1 | 0 | 1 | 1 | 2 | 3 | 8 | 1:45 PM | 100 | 80 | 3 | 8 | 103 | 88 | 191 | 682 |
| 2:00 AM | 1 | 0 | 1 | 0 | 2 | 0 | 2 | 9 | 2:00 PM | 94 | 68 | 8 | 6 | 102 | 74 | 176 | 696 |
| 2:15 AM | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 9 | 2:15 PM | 92 | 79 | 6 | 6 | 98 | 85 | 183 | 719 |
| 2:30 AM | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 8 | 2:30 PM | 107 | 68 | 5 | 5 | 112 | 73 | 185 | 735 |
| 2:45 AM | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 7 | 2:45 PM | 110 | 102 | 3 | 7 | 113 | 109 | 222 | 766 |
| 3:00 AM | 1 | 2 | 0 | 1 | 1 | 3 | 4 | 9 | 3:00 PM | 113 | 90 | 7 | 2 | 120 | 92 | 212 | 802 |
| 3:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 3:15 PM | 89 | 81 | 3 | 5 | 92 | 86 | 178 | 797 |
| 3:30 AM | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 7 | 3:30 PM | 91 | 91 | 8 | 6 | 99 | 97 | 196 | 808 |
| 3:45 AM | 3 | 0 | 0 | 0 | 3 | 0 | 3 | 8 | 3:45 PM | 94 | 68 | 3 | 2 | 97 | 70 | 167 | 753 |
| 4:00 AM | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 6 | 4:00 PM | 93 | 110 | 0 | 3 | 93 | 113 | 206 | 747 |
| 4:15 AM | 1 | 2 | 0 | 0 | 1 | 2 | 3 | 9 | 4:15 PM | 99 | 111 | 2 | 1 | 101 | 112 | 213 | 782 |
| 4:30 AM | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 9 | 4:30 PM | 86 | 92 | 5 | 0 | 91 | 92 | 183 | 769 |
| 4:45 AM | 4 | 4 | 1 | 0 | 5 | 4 | 9 | 15 | 4:45 PM | 110 | 82 | 4 | 5 | 114 | 87 | 201 | 803 ' |
| 5:00 AM | 6 | 2 | 1 | 0 | 7 | 2 | 9 | 22 | 5:00 PM | 89 | 100 | 2 | 0 | 91 | 100 | 191 | 788 |
| 5:15 AM | 17 | 4 | 0 | 0 | 17 | 4 | 21 | 40 | 5:15 PM | 100 | 71 | 2 | 0 | 102 | 71 | 173 | 748 |
| 5:30 AM | 9 | 10 | 1 | 0 | 10 | 10 | 20 | 59 | 5:30 PM | 79 | 76 | 1 | 1 | 80 | 77 | 157 | 722 |
| 5:45 AM | 20 | 3 | 1 | 1 | 21 | 4 | 25 | 75 | 5:45 PM | 76 | 48 | 0 | 0 | 76 | 48 | 124 | 645 |
| 6:00 AM | 13 | 13 | 3 | 1 | 16 | 14 | 30 | 96 | 6:00 PM | 72 | 55 | 0 | 0 | 72 | 55 | 127 | 581 |
| 6:15 AM | 17 | 7 | 0 | 0 | 17 | 7 | 24 | 99 | 6:15 PM | 60 | 40 | 0 | 0 | 60 | 40 | 100 | 508 |
| 6:30 AM | 26 | 11 | 3 | 2 | 29 | 13 | 42 | 121 | 6:30 PM | 49 | 40 | 0 | 1 | 49 | 41 | 90 | 441 |
| 6:45 AM | 63 | 22 | 4 | 1 | 67 | 23 | 90 | 186 | 6:45 PM | 58 | 32 | 0 | 0 | 58 | 32 | 90 | 407 |
| 7:00 AM | 50 | 27 | 5 | 0 | 55 | 27 | 82 | 238 | 7:00 PM | 31 | 43 | 0 | 0 | 31 | 43 | 74 | 354 |
| 7:15 AM | 76 | 33. | 4 | 3 | 80 | 36 | 116 | 330 | 7:15 PM | 33 | 25 | 0 | 0 | 33 | 25 | 58 | 312 |
| 7:30 AM | 91 | 41 | 2 | 7 | 93 | 48 | 141 | 429 | 7:30 PM | 29 | 21 | 0 | 0 | 29 | 21 | 50 | 272 |
| 7:45 AM | 150 | 73 | 8 | 6 | 158 | 79 | 237 | 576 | 7:45 PM | 20 | 19 | 0 | 1 | 20 | 20 | 40 | 222 |
| 8:00 AM | 76 | 72 | 4 | 6 | 80 | 78 | 158 | 652 | 8:00 PM | 21 | 23 | 0 | 0 | 21 | 23 | 44 | 192 |
| 8:15 AM | 69 | 61 | 4 | 3 | 73 | 64 | 137 | 673' | 8:15 PM | 16 | 19 | 0 | 0 | 16 | 19 | 35 | 169 |
| 8:30 AM | 71 | 36 | 2 | 7 | 73 | 43 | 116 | 648 | 8:30 PM | 17 | 23 | 0 | 0 | 17 | 23 | 40 | 159 |
| 8:45 AM | 91 | 72 | 3 | 7 | 94 | 79 | 173 | 584 | 8:45 PM | 20 | 13 | 0 | 0 | 20 | 13 | 33 | 152 |
| 9:00 AM | 71 | 54 | 1 | 2 | 72 | 56 | 128 | 554 | 9:00 PM | 15 | 9 | 1 | 0 | 16 | 9 | 25 | 133 |
| 9:15 AM | 68 | 43 | 7 | 2 | 75 | 45 | 120 | 537 | 9:15 PM | 11 | 6 | 0 | 0 | 11 | 6 | 17 | 115 |
| 9:30 AM | 65 | 50 | 4 | 7 | 69 | 57 | 126 | 547 | 9:30 PM | 6 | 9 | 0 | 0 | 6 | 9 | 15 | 90 |
| 9:45 AM | 86 | 45 | 1 | 2 | 87 | 47 | 134 | $\underbrace{508}$ | 9:45 PM | 12 | 11 | 2 | 0 | 14 | 11 | 25 | 82 |
| 10:00 AM | 80 | 44 | 7 | 0 | 87 | 44 | 131 | 511 | 10:00 PM | 3 | 11 | 0 | 0 | 3 | 11 | 14 | 71 |
| 10:15 AM | 79 | 60 | 8 | 6 | 87 | 66 | 153 | 544 | 10:15 PM | 5 | 7 | 0 | 0 | 5 | 7 | 12 | 66 |
| 10:30 AM | 64 | 51 | 2 | 1 | 66 | 52 | 118 | 536 | 10:30 PM | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 53 |
| 10:45 AM | 85 | 53 | 7 | 3 | 92 | 56 | 148 | 550 | 10:45 PM | 2 | 7 | 0 | 0 | 2 | 7 | 9 | 37 |
| 11:00 AM | 79 | 51 | 7 | 3 | 86 | 54 | 140 | 559 | 11:00 PM | 5 | 5 | 0 | 0 | 5 | 5 | 10 | 33 |
| 11:15 AM | 77 | 60 | 7 | 4 | 84 | 64 | 148 | 554 | 11:15 PM | 2 | 5 | 0 | 0 | 2 | 5 | 7 | 28 |
| 11:30 AM | 81 | 61 | 6 | 9 | 87 | 70 | 157 | 593 | 11:30 PM | 9 | 4 | 0 | 0 | 9 | 4 | 13 | 39 |
| 11:45 AM | 93 | 71 | 7 | 9 | 100 | 80 | 180 | $\underline{625}$ | 11:45 PM | 2 | 7 | 0 | 0 | 2 | 7 | 9 | 39 |
|  |  |  |  |  | 1920 | 1247 | 3167 |  |  |  |  |  |  | 2824 | 2483 | 5307. |  |
| 7:30-8:30 AM Peak Hour |  |  |  |  | 404 | 269 | 673 |  | 4:00-5:00 PM Peak Hour |  |  |  |  | 399 | 404 | 803 |  |

Trip Generation Summary



Stephen G. Pernaw \& Company, Inc.

Year 2019 Monthly Data - Urban

|  |  | Adjustment to |  |
| :---: | :---: | :---: | :---: |
| Month | ADT | Average | Peak |
| Jan | 11,431 | 1.12 | 1.23 |
| Feb | 11,848 | 1.08 | 1.18 |
| Mar | 12,141 | 1.06 | 1.15 |
| Apr | 12,860 | 1.00 | 1.09 |
| May | 13,551 | 0.95 | 1.03 |
| Jun | 13,785 | 0.93 | 1.02 |
| Jul | 13,942 | 0.92 | 1.01 |
| Aug | 14,016 | 0.92 | 1.00 |
| Sep | 13,379 | 0.96 | 1.05 |
| Oct | 13,339 | 0.96 | 1.05 |
| Nov | 12,265 | 1.05 | 1.14 |
| Dec | 11,496 | 1.12 | 1.22 |

Year 2018 Monthly Data - Urban

|  |  | Adjustment to |  |
| :---: | :---: | :---: | :---: |
| Month | ADT | Average | Peak |
| Jan | 11,282 | 1.13 | 1.24 |
| Feb | 11,848 | 1.08 | 1.18 |
| Mar | 11,828 | 1.08 | 1.18 |
| Apr | 12,491 | 1.02 | 1.12 |
| May | 13,587 | 0.94 | 1.03 |
| Jun | 13,911 | 0.92 | 1.00 |
| Jul | 13,765 | 0.93 | 1.01 |
| Aug | 13,945 | 0.92 | 1.00 |
| Sep | 13,168 | 0.97 | 1.06 |
| Oct | 13,367 | 0.96 | 1.04 |
| Nov | 12,215 | 1.05 | 1.14 |
| Dec | 11,963 | 1.07 | 1.17 |

Year 2017 Monthly Data - Urban

|  |  | Adjustment to |  |
| :---: | :---: | :---: | :---: |
| Month | ADT | Average | Peak |
| Jan | 12254 | 1.21 | 1.33 |
| Feb | 13494 | 1.10 | 1.21 |
| Mar | 14335 | 1.03 | 1.14 |
| Apr | 15004 | 0.99 | 1.09 |
| May | 15547 | 0.95 | 1.05 |
| Jun | 16310 | 0.91 | 1.00 |
| Jul | 15523 | 0.95 | 1.05 |
| Aug | 15974 | 0.93 | 1.02 |
| Sep | 15546 | 0.95 | 1.05 |
| Oct | 15104 | 0.98 | 1.08 |
| Nov | 14544 | 1.02 | 1.12 |
| Dec | 14151 | 1.05 | 1.15 |

September to Peak-Month Factor = 1.05


Stephen G. Pernaw \& Company, Inc.
STEPHEN G. PERNAW \& COMPANY, INC.
PROJECT:
NUMBER:
Proposed Residential Development, Portsmouth New Hampshire 2047A
COUNT STATION: 82379124

## HISTORICAL GROWTH CALCULATIONS

LOCATION :
CASE :

Peverly Hill Road (S. of NH33)
AADT

## ARITHMETIC PROJECTIONS

| YEAR | AADT |  |  | PROJECTIONS |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Regression Output: |  |  |  |
| 2015 | 10527 | Constant | -210417.4 | 2020 | 10975 |
| 2016 | 10403 | Std Err of Y Est | 129.62099 | 2021 | 11084 |
| 2017 | 10611 | R Squared | 0.6412368 | 2022 | 11194 |
| 2018 | 10823 | No. of Observations | 4 | 2023 | 11303 |
|  |  | Degrees of Freedom | 2 | 2024 | 11413 |
|  |  |  |  | 2025 | 11523 |
|  |  | X Coefficient | 109.6 | 2026 | 11632 |
|  |  | Std Err of Coef. | 57.968267 | 2027 | 11742 |
|  |  |  |  | 2028 | 11851 |
|  |  |  |  | 2029 | 11961 |
|  |  |  |  | 2030 | 12071 |
|  |  |  |  | RATE = | 110 VPD/YEAR |

## GEOMETRIC PROJECTIONS

| YEAR | AADT | Ln AADT |  |  | PROJECTIONS |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Regression Output: |  |  |  |  |  |  |  |
| 2015 | 10527 | 9.26170 | Constant | -11.49974 | 2020 | 10979 |  |
| 2016 | 10403 | 9.24985 | Std Err of Y Est | 0.0122527 | 2021 | 11092 |  |
| 2017 | 10611 | 9.26965 | R Squared | 0.6384951 | 2022 | 11207 |  |
| 2018 | 10823 | 9.28943 | No. of Observations | 4 | 2023 | 11323 |  |
|  |  |  | Degrees of Freedom | 2 | 2024 | 11440 |  |
|  |  |  |  |  | 2025 | 11559 |  |
|  |  |  | $X$ Coefficient | 0.0102987 | 2026 | 11678 |  |
|  |  |  | Std Err of Coef. | 0.0054796 | 2027 | 11799 |  |
|  |  |  |  |  | 2028 | 11921 |  |
|  |  |  |  |  | 2029 | 12045 |  |
|  |  |  |  |  | 2030 | 12170 |  |
|  |  |  |  |  | RATE = | 1.0 | \%/YEAR |

CALCULATION SHEET

| Project: | Portsmouth - Res. | Job Number: | 2047A |
| :---: | :---: | :---: | :---: |
| Calculated By: | SGP | Date: | 10/5/2020 |
| Checked By: | CA | Date: | 10/5/2020 |
| Sheet No: | 1 | Of: | 1 |
| Subject: | COVID-19 Adjustment Factor |  |  |

L. Given:

1. NHDOT traffic count on Peverly Hill Road (south of NH33) in June 2019 (Pre-covid conditions)

Average AM peak hour $=892$ veh.
Average $P M$ peak hour $=1,030$ veh.
Average weekday $=11,072$ veh.
2. SGP ATR count on Wednesday, September 30, 2020
$A M$ peak hour $=673$ veh.
PM peak hour $=803$ veh.
Weekday $=8,474$ veh.
3. NHDOT Group 4 (Urban Highways) seasonal adjustment factors

September to peak month $=1.05$ (average of 2017, 2018 \& 2019)
June to peak month $=1.01$ (average of 2017, $2018 \& 2019$ )
4. Background growth rate $=1.0 /$ year; use $2.0 \%$ to account for other unknown development projects
II. Calculate 2020 peak month volumes using NHDOT June 2019 data (pre-covid conditions)

1. $A M=892 \times 1.02 \times 1.01=919$ veh
2. $P M=1,030 \times 1.02 \times 1.01=1,061$ veh
3. Weekday $=11,072 \times 1.02 \times 1.01=11,406$ veh
III. Calculate 2020 peak month volumes using SGP September 2020 data (during covid)
4. $A M=673 \times 1.05=707$ veh
5. $\mathrm{PM}=803 \times 1.05=843 \mathrm{veh}$
6. Weekday $=8,474 \times 1.05=8,898$ veh
IV. Calculate individual COVID-19 factors
7. $\mathrm{AM}=919 / 707=1.30$
8. $\mathrm{PM}=1,061 / 843=1.26$
9. Weekday $=11,406 / 8,898=1.28$
V. Calculate average COVID-19 factor

Average covid factor $=(1.30+1.26+1.28) / 3=1.28$

Work Destination Report - Where Workers are Employed Who Live in the Selection Area - by County Subdivisions


Jobs Counts by County Subdivisions Where Workers are Employed - All Jobs Count
4,355
604 423
399
371
343
266
266
249
193

7469 | Portsmouth city (Rockingham, NH) |
| :--- |
| Dover city (Strafford, NH) |
| Exeter town (Rockingham, NH) |
| Manchester city (Hillsborough, NH) |
| Boston city (Suffolk, MA) |
| Newington town (Rockingham, NH) |
| Hampton town (Rockingham, NH) |
| Durham town (Strafford, NH) |
| Nashua city (Hillsborough, NH) |
| Salem town (Rockingham, NH) |
| KEY |
| A=To/From Points West via NH Route 33 |
| B=To/From Points East via NH Route 33 |
| C=To/From Points South via Peverly Hill Road |



| Major/Minor | Minor2 | Major1 | Major2 |  |  |
| :--- | ---: | ---: | ---: | ---: | :--- |
| Conflicting Flow All | 16222 | 1079 | 1083 | 0 | - |


| Approach | EB | NB | SB |
| :--- | ---: | ---: | ---: |
| HCM Control Delay, s | 38.7 | 0 | 0 |
| HCM LOS | E |  |  |


| Minor Lane/Major Mumt | NBL | NBTEBLn1 | SBT | SBR |  |
| :--- | ---: | ---: | ---: | ---: | :--- |
| Capacity (veh/h) | 652 | -131 | - | - |  |
| HCM Lane V/C Ratio | 0.004 | -0.187 | - | - |  |
| HCM Control Delay (s) | 10.5 | 0 | 38.7 | - | - |
| HCM Lane LOS | B | A | E | - | - |
| HCM 95th \%tile Q(veh) | 0 | - | 0.7 | - | - |



Figure 2-5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.
2032 PM Build
Peverly Hill Road - Proposed Site Driveway
Stephen G. Pernaw \& Company, Inc.
Figure 2-5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

## 

Figure 2-6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

2032 PM Build
Peverly Hill Road / Proposed Site Driveway
Figure 2-6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.


2032 AM Build
Peverly Hill Road / Proposed Site Driveway
Figure 2-4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.
INPUT


* according to Table 17-5 of the HCM
2032 PM Build
Peverly Hill Road / Proposed Site Driveway

P.O. Box 1721 - Concord, NH 03302 tel: (603) 731-8500 • fax: (866) 929-6094 • sgp@ pernaw.com

Transportation: Engineering • Planning • Design

MEMORANDUM
Ref: 2047A

To: Jack McTigue, P.E., CPESC
TFMoran - Seacoast Division
From: Stephen G. Pernaw, P.E., PTOE
Subject: Proposed Residential Development - 83 Peverly Hill Road
Portsmouth, New Hampshire
Date: June 17, 2021
As requested, our office has reviewed the plan entitled: "Overall Site Layout Plan - Peverly Hill Road Condominiums" dated April 19, 2021 (no revisions, see Attachment 1) and the "Site Layout Plans" (Sheets C-04 through C-12) and offer the following comments:

1. The proposed development has been reduced in size since the publication of our "Traffic Evaluation" memorandum dated 10/6/20 from 60 dwelling units to 56 units. This change translates into a slight reduction of $-2(\mathrm{AM})$ and $-3(\mathrm{PM})$ fewer vehicle-trips during the peak hour periods than was previously analyzed.
2. The roadway system employs a 26 -foot pavement width on the section that extends from Peverly Hill Road to the first and only internal T-intersection. From there, the loop road will be constructed with a 22 -foot pavement width. The proposed pavement widths are acceptable from a traffic engineering standpoint given the traffic volumes and travel speeds involved.
3. The various "Site Layout Plans" include several horizontal curves and reverse curves and specifies the installation of vertical granite curb on both sides of the roadway. The elimination of the previously proposed straight tangent sections will reduce travel speeds in the neighborhood. The "side friction" associated with vertical curbing will also serve to reduce travel speeds.
4. The raised crosswalk located between units $\# 44$ and $\# 45$ will require slower speeds and the advanced warning signs (W17-1) are appropriate. These should be supplemented with an Advisory Speed Plaque (W13-1P).

We find that the current layout of the proposed roadway system is superior to the initial conceptual layout in terms of travel speeds and overall livability. The proposed roadway layout reasonably mitigates the previous concerns with travel speeds within the development.

[^5]Juliet T.H. Walker, AICP
Planning Director
June 22, 2021
City of Portsmouth Planning Department
City Hall, $3^{\text {rd }}$ Floor
1 Junkins Avenue
Portsmouth, NH 03801
Ref. T1118
$\begin{array}{cl}\text { Re: } \quad \text { Peverly Hill Road Residential Development } \\ & \text { Transportation Peer Review }\end{array}$

Dear Ms. Walker:
On behalf of the City of Portsmouth, TEC, Inc. (TEC) has reviewed documents as part of the transportation engineering peer review of a proposed mixed used development located at 83 Peverly Hill Road in Portsmouth. The project consists of constructing 56 dwelling units. Access is provided by one site roadway intersection onto Peverly Hill Road. It is proposed that the site roadway be accepted as a public road by the City.

The following documents were received as part of our review:

- Traffic Evaluation - Proposed Residential Development, prepared by Stephen G. Pernaw \& Company, Inc. - October 6, 2020
- Proposed Residential Development Traffic Calming Memorandum, prepared by Stephen G. Pernaw \& Company, Inc. - April 5, 2021
- Peverly Hill Road Condominiums Site Development Plans, prepared by TFM - April 19, 2021
- Peverly Hill Road Condominiums Conceptual plan, prepared by TFM, May 10, 2021

TEC completed a review of these documents for the City of Portsmouth, and the following provides a summary of the comments that were compiled during our review:

1. In order to be consistent with the Traffic Evaluation, Peverly Hill Road is designated as a north/south roadway within this letter.
2. The Traffic Evaluation presents a study area including one intersection of the site roadway with Peverly Hill Road. TEC concurs with the scope of the study area and does not find that additional intersections are warranted based upon the documented trip generation levels.
3. Traffic counts utilized within the Traffic Evaluation were conducted along Peverly Hill Road in September 2020, when vehicular traffic volumes were impacted by the Covid-19
pandemic. The 2020 volumes were compared with June 2019 traffic volumes recorded by NHDOT in the same location. In order to project future traffic volumes along Peverly Hill Road for the design year of 2032, the September 2020 volumes were increased by a seasonal adjustment factor, a background growth rate, and a Covid-19 adjustment factor. TEC concurs with this methodology and the use of a 2032 horizon year.
The weekday morning and evening peak commuter hours were studied to determine the project's overall effect on the adjacent roadway system. TEC concurs that these time periods are generally appropriate to study the impact for a residential development.
4. The Traffic Evaluation uses data published in the industry standard Institute of Transportation Engineers (ITE) publication, Trip Generation, 10th Edition to estimate the traffic generated by the proposed development. The Traffic Evaluation uses a combination of data found under Land Use Code (LUC) 221 - Multi-Family Housing (Mid-Rise) and LUC 210 - Single Family Detached Housing to project future traffic volumes associated with the proposed residential units. The information provided in the TAC Submission, dated April 19, 2021, illustrates the units as three-bedroom detached dwellings averaging 2,400 square feet of living space. No age restriction is proposed for the development. The units appear to be intended to be sold as condominium units, however, the traffic generation characteristics may more closely resemble single family dwellings due to the size, separation, and number of bedrooms in each unit.
The Traffic Evaluation projects 29 vehicle trips during the weekday morning peak hour and 42 vehicle trips during the weekday evening peak hour using the combined methodology. TEC recommends the use of only LUC 210 - Single Family Detached Housing to reflect the trip generation characteristics of the proposed residential units more accurately. For the 56 proposed units as shown on the Site Plan, LUC 210 projects 41 vehicle trips during the weekday morning peak hour and 55 vehicle trips during the weekday evening peak hour. TEC understands that the increase likely will not change the impact of the site on the adjacent roadway system. However, the Applicant should discuss whether these additional trips can be accommodated safely and efficiently at the site roadway intersection onto Peverly Hill Road.
5. The vehicular traffic generated by the proposed project was distributed onto the adjacent roadway system based upon available Journey-to-Work data published by the US Census Bureau for persons residing in the City of Portsmouth. TEC notes that there are significant employment opportunities within the City of Portsmouth along the Route 1 corridor to the south of the site, which can be accessed directly via Peverly Hill Road. The Applicant should discuss if these employment opportunities were considered when preparing the vehicular traffic distribution, as only $22 \%$ of the site generated traffic is projected to travel to/from this direction. The Applicant should review the site distributions and revise the analyses at the intersection of the site roadway with Peverly Hill Road, as necessary.
6. TEC generally concurs with the use of the Highway Capacity Manual 2010 methodology as used within the Synchro version 10 software.
7. The Traffic Evaluation indicates that the site traffic is expected to increase the two-way traffic volume along Peverly Hill Road by $2 \%$ north of the site and $1 \%$ south of the site in the 2032 future conditions, which is unlikely to be noticeable. The intersection of the site
roadway with Peverly Hill Road is projected to operate with available capacity, minimal queues, and typical delays for intersecting side streets under stop control. No off-site mitigation is proposed to be implemented.
8. The comments as noted above may result in modifications to the results of the capacity and queue analysis and therefore TEC reserves the right to provide additional comments and improvement recommendations upon completion of the peer review comment responses.
9. The site roadway approach to its intersection with Peverly Hill Road is shown with one exiting lane to accommodate left turning and right turning vehicles. Provision of two lanes on this approach may not significantly improve the operation of this approach and maintaining a minimum crossing distance for pedestrians is preferred.
10. Peverly Hill Road provides one travel lane in each direction along most of its length. The northbound approach of Peverly Hill Road widens at its intersection with Middle Road, just to the north of the site, to provide an exclusive left turn lane and a shared left/right turn lane. The taper area for this widening occurs along the site frontage. No dedicated left turn lane is required or provided for northbound left turns into the site roadway. The Applicant should discuss whether any conflicts are anticipated between northbound left turns accessing the site roadway and northbound vehicles wishing to enter the exclusive left turn lane at Middle Road.
11. Provision of a multi-use path along the west side of Peverly Hill Road, extending between Middle Road and West Road is under design by the City of Portsmouth to increase safety for pedestrians and bicyclists and provide infrastructure to accommodate alternative modes of transportation between residential areas and commercial areas along Route 1. The multi-use path will directly benefit the residents of the proposed development by providing the opportunity for multi-modal travel along Peverly Hill Road as well as safe and uninterrupted access to the Portsmouth Plains Playground and recreational area at the intersection of Peverly Hill Road with Middle Road. The Applicant should provide any necessary easements identified by the City in order to facilitate the construction of this path. The site roadway approach at its intersection with Peverly Hill Road should be designed and constructed in anticipation of the multi-use path by including a crosswalk with ADA-compliant curb ramps across the site roadway approach. The City should consider requiring the Applicant to construct the multi-use path along the site frontage and extending north 500 feet toward Middle Road in accordance with the City's design plans to provide a direct connect between the residential development and the recreation area and pedestrian facilities along Middle Road.
12. Sidewalk is provided along one side of the site roadway throughout the site, creating a pedestrian network. Further, connection to the planned Seacoast Greenway Rail Trail is proposed, along with a pocket park and four parking spaces for visitor access. The Applicant should discuss the volume of vehicular traffic that may access the site daily and the anticipated volume of pedestrian and bicycle traffic that are anticipated to use the site roadway between the Rail Trail and the proposed multi-use path along Peverly Hill Road.
13. The site roadway has been designed in accordance with the City of Portsmouth Complete Streets Design Guidelines for a Neighborhood Slow Street. The roadway is 26 feet wide,
which allows for parking along one side of the roadway and two 9 -foot travel lanes. Sidewalk along one side of the roadway creates a pedestrian network facility. Bicycles will be accommodated within the roadway. However, in order to experience the benefit of a Complete Streets design along the site roadway, residents should be encouraged to park along at least one side of the roadway.

Should residents not park on-street, the traffic calming nature of the roadway will be reduced, as the entire 26 -foot width would be useable by vehicle traffic. While the circular curvature of the roadway will aid in reducing vehicle speeds, alternative forms of traffic calming, such as raising the proposed crosswalks or the addition of speed humps, can be considered along the straight portion of the roadway to keep both resident and visitor vehicular speeds low.
14. The Pernaw memorandum discussing traffic calming opportunities, dated April 5, 2021, recommends additional signage around the proposed crosswalk located at the internal Tintersection to alert vehicles to potential crossing pedestrians. TEC concurs with these recommendations. Similar additional signage is recommended for the proposed crosswalk across the site roadway at the pocket park/Rail Trail connection.

Please do not hesitate to contact me directly if you have any questions concerning this peer review at 978-794-1792.Thank you for your consideration.

Sincerely, TEC, Inc.
"The Engineering Corporation"


Elizabeth Oltman, PE
Director of Transportation Planning
P.O. Box 1721 - Concord, NH 03302 tel: (603) 731-8500 • fax: (866) 929-6094 • sgp@ pernaw.com

Transportation: Engineering • Planning • Design

## MEMORANDUM

## Ref: 2047A

To: Michael Green
Green \& Company
From: Stephen G. Pernaw, P.E., PTOE
Subject: Proposed Residential Development - Response to Comments
Portsmouth, New Hampshire

Date: July 3, 2021
On October 6, 2020 and April 5, 2021 our office published traffic memoranda relative to the proposed residential development located at 83 Peverly Hill Road in Portsmouth, New Hampshire. We are now in receipt of the TEC peer review letter dated June 22, 2021, and offer the following responses:

TEC Comment 1: "In order to be consistent with the Traffic Evaluation, Peverly Hill Road is designated as a north/south roadway within this letter."

SGP Response: Comment acknowledged.
TEC Comment 2: "The Traffic Evaluation presents a study area including one intersection of the site roadway with Peverly Hill Road. TEC concurs with the scope of the study area and does not find that additional intersections are warranted based upon the documented trip generation levels."

SGP Response: Comment acknowledged.
TEC Comment 3: "Traffic counts utilized within the Traffic Evaluation were conducted along Peverly Hill Road in September 2020, when vehicular traffic volumes were impacted by the Covid-19 pandemic. The 2020 volumes were compared with June 2019 traffic volumes recorded by NHDOT in the same location. In order to project future traffic volumes along Peverly Hill Road for the design year of 2032, the September 2020 volumes were increased by a seasonal adjustment factor, a background growth rate, and a Covid-19 adjustment factor. TEC concurs with this methodology and the use of a 2032 horizon year.

The weekday morning and evening peak commuter hours were studied to determine the project's overall effect on the adjacent roadway system. TEC concurs that these time periods are generally appropriate to study the impact for a residential development.

SGP Response: Comment acknowledged.
TEC Comment 4: "The Traffic Evaluation uses data published in the industry standard Institute of Transportation Engineers (ITE) publication, Trip Generation, 10th Edition to estimate the traffic generated by the proposed development. The Traffic Evaluation uses a combination of data found under Land Use Code (LUC) 221 - Multi-Family Housing (Mid-Rise) and LUC 210 - Single Family Detached

Housing to project future traffic volumes associated with the proposed residential units. The information provided in the TAC Submission, dated April 19, 2021, illustrates the units as three-bedroom detached $d$ wellings averaging 2,400 square feet of living space. No age restriction is proposed for the development. The units appear to be intended to be sold as condominium units, however, the traffic generation characteristics may more closely resemble single family dwellings due to the size, separation, and number of bedrooms in each unit.

The Traffic Evaluation projects 29 vehicle trips during the weekday morning peak hour and 42 vehicle trips during the weekday evening peak hour using the combined methodology. TEC recommends the use of only LUC 210 - Single Family Detached Housing to reflect the trip generation characteristics of the proposed residential units more accurately. For the 56 proposed units as shown on the Site Plan, LUC 210 projects 41 vehicle trips during the weekday morning peak hour and 55 vehicle trips during the weekday evening peak hour. TEC understands that the increase likely will not change the impact of the site on the adjacent roadway system. However, the Applicant should discuss whether these additional trips can be accommodated safely and efficiently at the site roadway intersection onto Peverly Hill Road."

SGP Response: The trip generation estimates contained in the traffic evaluation are intended to reflect the type of housing that is proposed, and the fact that Green \& Company's experience with similar development projects is that these types of units are occupied by approximately two persons per unit. We believe that using LUC 210 only, as recommended by TEC, would not accurately reflect the fact that these are condominium units with approximately two persons per unit. It should be noted that the ITE LUC 210 trip rates reflect approximately 3.5 persons per unit, well above the 2.0 persons per unit that Green \& Company anticipates.

Nevertheless, supplemental traffic projections utilizing LUC 210, as recommended by TEC, show that during the worst-case weekday PM peak hour the projected number of southbound right turn arrivals would increase from 22 to 29 vehicle over the course of the one-hour period. This particular traffic movement is not capacity-constrained as it is a Rank 1 Movement that does not encounter a conflicting traffic stream, nor does it have a Level of Service associated with it. The remaining traffic movements at this intersection would increase by 1-3 vehicles during the PM peak hour using LUC 210, which is an inconsequential amount in terms of traffic operations, capacity, and safety.

TEC Comment 5: "The vehicular traffic generated by the proposed project was distributed onto the adjacent roadway system based upon available Journey-to-Work data published by the US Census Bureau for persons residing in the City of Portsmouth. TEC notes that there are significant employment opportunities within the City of Portsmouth along the Route 1 corridor to the south of the site, which can be accessed directly via Peverly Hill Road. The Applicant should discuss if these employment opportunities were considered when preparing the vehicular traffic distribution, as only $22 \%$ of the site generated traffic is projected to travel to/from this direction. The Applicant should review the site distributions and revise the analyses at the intersection of the site roadway with Peverly Hill Road, as necessary."

SGP Response: While it was recognized that there are significant employment opportunities along US1 south of the site, it important to recognize that there are even more employment opportunities at Pease International Tradeport and in downtown Portsmouth. As a sensitivity analysis, doubling of the site traffic to/from the south would add only +6 left-turn arrivals and +3 right-turn departures to the subject intersection during the worst-case weekday PM peak hour period. Again, dealing with changes of this order of magnitude will not significantly alter the prevailing traffic operations and safety aspects at the subject intersection.

TEC Comment 6: "TEC generally concurs with the use of the Highway Capacity Manual 2010 methodology as used within the Synchro version 10 software."
SGP Response: Comment acknowledged.
TEC Comment 7: "The Traffic Evaluation indicates that the site traffic is expected to increase the twoway traffic volume along Peverly Hill Road by $2 \%$ north of the site and $1 \%$ south of the site in the 2032 future conditions, which is unlikely to be noticeable. The intersection of the site roadway with Peverly Hill Road is projected to operate with available capacity, minimal queues, and typical delays for intersecting side streets under stop control. No off-site mitigation is proposed to be implemented."

SGP Response: We concur; a standard three-leg T-intersection with one general-purpose travel lane on each approach is appropriate for the size and type of development that is proposed at this location.

TEC Comment 8: "The comments as noted above may result in modifications to the results of the capacity and queue analysis and therefore TEC reserves the right to provide additional comments and improvement recommendations upon completion of the peer review comment responses.

SGP Response: Our responses to Comments 4 \& 5 noted above do not warrant re-analysis given the magnitudes involved.

TEC Comment 9: "The site roadway approach to its intersection with Peverly Hill Road is shown with one exiting lane to accommodate left turning and right turning vehicles. Provision of two lanes on this approach may not significantly improve the operation of this approach and maintaining a minimum crossing distance for pedestrians is preferred."
SGP Response: We concur.
TEC Comment 10: "Peverly Hill Road provides one travel lane in each direction along most of its length. The northbound approach of Peverly Hill Road widens at its intersection with Middle Road, just to the north of the site, to provide an exclusive left turn lane and a shared left/right turn lane. The taper area for this widening occurs along the site frontage. No dedicated left turn lane is required or provided for northbound left turns into the site roadway. The Applicant should discuss whether any conflicts are anticipated between northbound left turns accessing the site roadway and northbound vehicles wishing to enter the exclusive left turn lane at Middle Road."

SGP Response: As is the case when approaching any intersection while traveling along a major street, there is always the potential need to temporarily slow or brake for another vehicle that is decelerating with its turn signal flashing. In this particular case, only six vehicles are expected to turn left into the site during the weekday PM peak hour (one vehicle every 10 -minutes, on average), thus the potential conflict exists, but is totally manageable. Decelerating northbound vehicles on this section of Peverly Hill Road is a frequent occurrence given the proximity of the nearby traffic signal at NH33.

TEC Comment 11: "Provision of a multi-use path along the west side of Peverly Hill Road, extending between Middle Road and West Road is under design by the City of Portsmouth to increase safety for pedestrians and bicyclists and provide infrastructure to accommodate alternative modes of transportation between residential areas and commercial areas along Route 1. The multi-use path will directly benefit the residents of the proposed development by providing the opportunity for multi-modal travel along Peverly Hill Road as well as safe and uninterrupted access to the Portsmouth Plains Playground and recreational area at the intersection of Peverly Hill Road with Middle Road. The Applicant should provide any necessary easements identified by the City in order to facilitate the construction of this path. The site roadway approach at its intersection with Peverly Hill Road should be designed and constructed in anticipation of the multi-use path by including a crosswalk with ADA-compliant curb ramps across the site roadway approach. The City should consider requiring the Applicant to construct the multi-use path
along the site frontage and extending north 500 feet toward Middle Road in accordance with the City's design plans to provide a direct connect between the residential development and the recreation area and pedestrian facilities along Middle Road.
SGP Response: This comment is best addressed by Green \& Company and TFM, Inc.
TEC Comment 12: "Sidewalk is provided along one side of the site roadway throughout the site, creating a pedestrian network. Further, connection to the planned Seacoast Greenway Rail Trail is proposed, along with a pocket park and four parking spaces for visitor access. The Applicant should discuss the volume of vehicular traffic that may access the site daily and the anticipated volume of pedestrian and bicycle traffic that are anticipated to use the site roadway between the Rail Trail and the proposed multiuse path along Peverly Hill Road."

SGP Response: We are not familiar the details of the Rail Trail or proposed multi-use path, and will defer to others.

TEC Comment 13: "The site roadway has been designed in accordance with the City of Portsmouth Complete Streets Design Guidelines for a Neighborhood Slow Street. The roadway is 26 feet wide, which allows for parking along one side of the roadway and two 9-foot travel lanes. Sidewalk along one side of the roadway creates a pedestrian network facility. Bicycles will be accommodated within the roadway. However, in order to experience the benefit of a Complete Streets design along the site roadway, residents should be encouraged to park along at least one side of the roadway.

Should residents not park on-street, the traffic calming nature of the roadway will be reduced, as the entire 26-foot width would be useable by vehicle traffic. While the circular curvature of the roadway will aid in reducing vehicle speeds, alternative forms of traffic calming, such as raising the proposed crosswalks or the addition of speed humps, can be considered along the straight portion of the roadway to keep both resident and visitor vehicular speeds low."
SGP Response: This comment has been previously addressed by utilizing a combination of 22 -foot and 26-foot pavement widths within the development, along with a curvilinear roadway alignment that includes several horizontal curves and reverse curves.

TEC Comment 14: "The Pernaw memorandum discussing traffic calming opportunities, dated April 5, 2021, recommends additional signage around the proposed crosswalk located at the internal $T$ intersection to alert vehicles to potential crossing pedestrians. TEC concurs with these recommendations. Similar additional signage is recommended for the proposed crosswalk across the site roadway at the pocket park/Rail Trail connection."

SGP Response: Comment acknowledged; this comment is best addressed by TFM. Inc.

## Ref. T1118

Re: Peverly Hill Road Residential Development Transportation Peer Review \#2 Response to Comments Review

Dear Ms. Walker:
On behalf of the City of Portsmouth, TEC, Inc. (TEC) has reviewed additional documents as part of the transportation engineering peer review of a proposed residential development located at 83 Peverly Hill Road in Portsmouth, NH.

The following additional documents were received as part of our review:

- Response to Comments Memorandum, prepared by Stephen G. Pernaw \& Co., Inc, dated July 3, 2021
- Parson Woods Condominium Site Development Plans, prepared by TFM, revision dated June 23, 2021

Comments 1 thru 14 have been retained from the most recent TEC review letter dated June 22, 2021, originally issued as part of the project review. The Applicant's response to comments is shown as bold; TEC responses are shown as italic.

TEC completed a review of these documents for the City of Portsmouth, and the following provides a summary of the comments that were compiled during our review:

1. In order to be consistent with the Traffic Evaluation, Peverly Hill Road is designated as a north/south roadway within this letter.

## SGP Response: Comment acknowledged.

TEC: No response required.
2. The Traffic Evaluation presents a study area including one intersection of the site roadway with Peverly Hill Road. TEC concurs with the scope of the study area and does not find that additional intersections are warranted based upon the documented trip generation levels.

## SGP Response: Comment acknowledged.

TEC: No response required.
3. Traffic counts utilized within the Traffic Evaluation were conducted along Peverly Hill Road in September 2020, when vehicular traffic volumes were impacted by the Covid-19 pandemic. The 2020 volumes were compared with June 2019 traffic volumes recorded by NHDOT in the same location. In order to project future traffic volumes along Peverly Hill Road for the design year of 2032, the September 2020 volumes were increased by a seasonal adjustment factor, a background growth rate, and a Covid-19 adjustment factor. TEC concurs with this methodology and the use of a 2032 horizon year.
The weekday morning and evening peak commuter hours were studied to determine the project's overall effect on the adjacent roadway system. TEC concurs that these time periods are generally appropriate to study the impact for a residential development.

## SGP Response: Comment acknowledged.

## TEC: No response required.

4. The Traffic Evaluation uses data published in the industry standard Institute of Transportation Engineers (ITE) publication, Trip Generation, 10th Edition to estimate the traffic generated by the proposed development. The Traffic Evaluation uses a combination of data found under Land Use Code (LUC) 221 - Multi-Family Housing (Mid-Rise) and LUC 210 - Single Family Detached Housing to project future traffic volumes associated with the proposed residential units. The information provided in the TAC Submission, dated April 19, 2021, illustrates the units as three-bedroom detached dwellings averaging 2,400 square feet of living space. No age restriction is proposed for the development. The units appear to be intended to be sold as condominium units, however, the traffic generation characteristics may more closely resemble single family dwellings due to the size, separation, and number of bedrooms in each unit.

The Traffic Evaluation projects 29 vehicle trips during the weekday morning peak hour and 42 vehicle trips during the weekday evening peak hour using the combined methodology. TEC recommends the use of only LUC 210 - Single Family Detached Housing to reflect the trip generation characteristics of the proposed residential units more accurately. For the 56 proposed units as shown on the Site Plan, LUC 210 projects 41 vehicle trips during the weekday morning peak hour and 55 vehicle trips during the weekday evening peak hour. TEC understands that the increase likely will not change the impact of the site on the adjacent roadway system. However, the Applicant should discuss whether these additional trips can be accommodated safely and efficiently at the site roadway intersection onto Peverly Hill Road.

SGP Response: The trip generation estimates contained in the traffic evaluation are intended to reflect the type of housing that is proposed, and the fact that Green \& Company's experience with similar development projects is
that these types of units are occupied by approximately two persons per unit. We believe that using LUC 210 only, as recommended by TEC, would not accurately reflect the fact that these are condominium units with approximately two persons per unit. It should be noted that the ITE LUC 210 trip rates reflect approximately 3.5 persons per unit, well above the $\mathbf{2 . 0}$ persons per unit that Green \& Company anticipates. Nevertheless, supplemental traffic projections utilizing LUC 210, as recommended by TEC, show that during the worst-case weekday PM peak hour the projected number of southbound right turn arrivals would increase from 22 to 29 vehicle over the course of the onehour period. This particular traffic movement is not capacity-constrained as it is a Rank 1 Movement that does not encounter a conflicting traffic stream, nor does it have a Level of Service associated with it. The remaining traffic movements at this intersection would increase by 1-3 vehicles during the PM peak hour using LUC 210, which is an inconsequential amount in terms of traffic operations, capacity, and safety.
TEC: TEC concurs with this clarification. No further response necessary.
5. The vehicular traffic generated by the proposed project was distributed onto the adjacent roadway system based upon available Journey-to-Work data published by the US Census Bureau for persons residing in the City of Portsmouth. TEC notes that there are significant employment opportunities within the City of Portsmouth along the Route 1 corridor to the south of the site, which can be accessed directly via Peverly Hill Road. The Applicant should discuss if these employment opportunities were considered when preparing the vehicular traffic distribution, as only $22 \%$ of the site generated traffic is projected to travel to/from this direction. The Applicant should review the site distributions and revise the analyses at the intersection of the site roadway with Peverly Hill Road, as necessary.

SGP Response: While it was recognized that there are significant employment opportunities along US1 south of the site, it important to recognize that there are even more employment opportunities at Pease International Tradeport and in downtown Portsmouth. As a sensitivity analysis, doubling of the site traffic to/from the south would add only +6 left-turn arrivals and +3 right-turn departures to the subject intersection during the worst-case weekday PM peak hour period. Again, dealing with changes of this order of magnitude will not significantly alter the prevailing traffic operations and safety aspects at the subject intersection.
TEC: TEC concurs with the assessment of the site generated traffic distribution. No further response necessary.
6. TEC generally concurs with the use of the Highway Capacity Manual 2010 methodology as used within the Synchro version 10 software.

## SGP Response: Comment acknowledged.

TEC: No response required.
7. The Traffic Evaluation indicates that the site traffic is expected to increase the two-way traffic volume along Peverly Hill Road by $2 \%$ north of the site and $1 \%$ south of the site in the 2032 future conditions, which is unlikely to be noticeable. The intersection of the site roadway with Peverly Hill Road is projected to operate with available capacity, minimal queues, and typical delays for intersecting side streets under stop control. No off-site mitigation is proposed to be implemented.

SGP Response: We concur; a standard three-leg T-intersection with one general-purpose travel lane on each approach is appropriate for the size and type of development that is proposed at this location.
TEC: No response required.
8. The comments as noted above may result in modifications to the results of the capacity and queue analysis and therefore TEC reserves the right to provide additional comments and improvement recommendations upon completion of the peer review comment responses.

SGP Response: Our responses to Comments 4 \& 5 noted above do not warrant re-analysis given the magnitudes involved.

TEC: TEC concurs. No response required.
9. The site roadway approach to its intersection with Peverly Hill Road is shown with one exiting lane to accommodate left turning and right turning vehicles. Provision of two lanes on this approach may not significantly improve the operation of this approach and maintaining a minimum crossing distance for pedestrians is preferred.

SGP Response: We concur.
TEC: No response required.
10. Peverly Hill Road provides one travel lane in each direction along most of its length. The northbound approach of Peverly Hill Road widens at its intersection with Middle Road, just to the north of the site, to provide an exclusive left turn lane and a shared left/right turn lane. The taper area for this widening occurs along the site frontage. No dedicated left turn lane is required or provided for northbound left turns into the site roadway. The Applicant should discuss whether any conflicts are anticipated between northbound left turns accessing the site roadway and northbound vehicles wishing to enter the exclusive left turn lane at Middle Road.

SGP Response: As is the case when approaching any intersection while traveling along a major street, there is always the potential need to temporarily slow or brake for another vehicle that is decelerating with its turn signal flashing. In this particular case, only six vehicles are expected to turn left into the site during the weekday PM peak hour (one vehicle every 10-minutes, on average), thus the potential conflict exists, but is totally manageable.

## Decelerating northbound vehicles on this section of Peverly Hill Road is a frequent occurrence given the proximity of the nearby traffic signal at NH33.

TEC: TEC concurs with this clarification. No further response necessary.
11. Provision of a multi-use path along the west side of Peverly Hill Road, extending between Middle Road and West Road is under design by the City of Portsmouth to increase safety for pedestrians and bicyclists and provide infrastructure to accommodate alternative modes of transportation between residential areas and commercial areas along Route 1. The multi-use path will directly benefit the residents of the proposed development by providing the opportunity for multi-modal travel along Peverly Hill Road as well as safe and uninterrupted access to the Portsmouth Plains Playground and recreational area at the intersection of Peverly Hill Road with Middle Road. The Applicant should provide any necessary easements identified by the City in order to facilitate the construction of this path. The site roadway approach at its intersection with Peverly Hill Road should be designed and constructed in anticipation of the multi-use path by including a crosswalk with ADA-compliant curb ramps across the site roadway approach. The City should consider requiring the Applicant to construct the multi-use path along the site frontage and extending north 500 feet toward Middle Road in accordance with the City's design plans to provide a direct connect between the residential development and the recreation area and pedestrian facilities along Middle Road.
SGP Response: This comment is best addressed by Green \& Company and TFM, Inc.

TEC: Further discussion between the City and the Applicant on this recommendation is recommended.
12. Sidewalk is provided along one side of the site roadway throughout the site, creating a pedestrian network. Further, connection to the planned Seacoast Greenway Rail Trail is proposed, along with a pocket park and four parking spaces for visitor access. The Applicant should discuss the volume of vehicular traffic that may access the site daily and the anticipated volume of pedestrian and bicycle traffic that are anticipated to use the site roadway between the Rail Trail and the proposed multi-use path along Peverly Hill Road.

SGP Response: We are not familiar the details of the Rail Trail or proposed multi-use path, and will defer to others.

TEC: The proposed multi-use path has been provided between Peverly Hill Road and the Seacoast Greenway Rail Trail access within the site. The proposed crossings of Public Road A as shown in the June 23, 2021 Site Plan have been designed to be safely navigated by pedestrians and bicyclists. No further response required.
13. The site roadway has been designed in accordance with the City of Portsmouth Complete Streets Design Guidelines for a Neighborhood Slow Street. The roadway is 26 feet wide, which allows for parking along one side of the roadway and two 9 -foot travel lanes. Sidewalk along one side of the roadway creates a pedestrian network facility. Bicycles will be accommodated within the roadway. However, in order to experience the benefit of

Peverly Hill Road Residential Development Transportation Peer Review \#2

July 21, 2021
Page 6 of 6
a Complete Streets design along the site roadway, residents should be encouraged to park along at least one side of the roadway.
Should residents not park on-street, the traffic calming nature of the roadway will be reduced, as the entire 26 -foot width would be useable by vehicle traffic. While the circular curvature of the roadway will aid in reducing vehicle speeds, alternative forms of traffic calming, such as raising the proposed crosswalks or the addition of speed humps, can be considered along the straight portion of the roadway to keep both resident and visitor vehicular speeds low.
SGP Response: This comment has been previously addressed by utilizing a combination of 22-foot and 26-foot pavement widths within the development, along with a curvilinear roadway alignment that includes several horizontal curves and reverse curves.

TEC: The June 23, 2021 Site Plan shows reduced roadway widths of 22 feet and additional curvature within the roadway alignment, which will aid in maintaining low vehicle speeds within the development. A raised crosswalk is proposed at the multi-use path crossing to the Seacoast Greenway Rail Trail and pocket park for the safety of residents and visitors. Comment addressed. No further response required.
14. The Pernaw memorandum discussing traffic calming opportunities, dated April 5, 2021, recommends additional signage around the proposed crosswalk located at the internal Tintersection to alert vehicles to potential crossing pedestrians. TEC concurs with these recommendations. Similar additional signage is recommended for the proposed crosswalk across the site roadway at the pocket park/Rail Trail connection.
SGP Response: Comment acknowledged; this comment is best addressed by TFM. Inc.

TEC: Additional signage has been added at the raised crosswalk for the multi-use path crossing to the Seacoast Greenway Rail Trail and pocket park. The eastern crosswalk for the multi-use path has been relocated to the internal T-intersection of Public Road A, which is a more visible and appropriate location for pedestrians to cross. Comment addressed. No further response required.

Please do not hesitate to contact me directly if you have any questions concerning this peer review at 978-794-1792. Thank you for your consideration.

Sincerely,
TEC, Inc.
"The Engineering Corporation"


Elizabeth Oltman, PE
Director of Transportation Planning

June 14, 2021

Michael Green
Green \& Company
11 Lafayette Rd
North Hampton NH 03862

RE: Natural Gas Availability to 83 Peverly Hill Rd Portsmouth NH

Dear Michael,

Unitil's natural gas division has reviewed the requested site for natural gas service.

Unitil hereby confirms natural gas service will be available to the 83 Peverly Hill Rd Project in Portsmouth to serve 57 single family homes.

Installation is pending an authorized installation agreement with Green \& Company and street opening approval from the City of Portsmouth DPW.

Let me know if you have any questions. You can email me at oliver@unitil.com. My phone number is 603-294-5174.

Sincerely,

Janet Oliver
Senior Business Development Representative

June 18, 2021
Jack McTigue
TFMoran, Inc. Seacoast Division
170 Commerce Way-Suite 102
Portsmouth, NH 03801
Dear Jack McTigue:
I am responding to your request to confirm the availability of electric service for the proposed Peverly Hill Road Condominiums (83 Peverly Hill Road, Portsmouth, NH - Tax Map 242, Lot 4) project being constructed for Green and Company Real Estate.

The proposed project consists of 2-story buildings with 56 residential units, each unit with approximately 2,600 $s / f$ of residential space at the ground level parking. The proposed development will be constructed along Peverly Hill Road.

The developer will be responsible for the installation of all underground facilities and infrastructure required to service the proposed 56 residential units. Eversource will use the attached drawing titled "Peverly Hill Road Condominiums", dated April 19, 2021 (Utility Plans C-27 through C-35) to layout all required padmounted transformers and underground infrastructure. The proposed development will be fed from the relocated Utility Pole PSNH145/4 NETT4 on Peverly Hill Road as depicted on Utility Plans C-18. The developer will work with Eversource to obtain all necessary easements and licenses for the proposed overhead and underground facilities listed above.

This letter serves as confirmation that Eversource has sufficient capacity in the area to provide service to this proposed development. The cost of extending service to the aforementioned location and any associated infrastructure improvements necessary to provide service will be borne by the developer unless otherwise agreed upon.

Eversource will be responsible for the final design of all primary electrical equipment and secondary handholes to ensure locations meet all clearances, physical protection, and access requirements as outlined in Eversource's "Information \& Requirements for Electric Supply"
(https://www.eversource.com/content/docs/default-source/pdfs/requirements-for-electric-serviceconnections.pdf?sfursn=2).

If you require additional information or I can be of further assistance please do not hesitate to contact me at our Portsmouth Office, 603-436-7708 Ext. 555-5678

Respectfully.


NH Eastern Regional Engineering and Design Manager, Eversource
cc: (via e-mail)
Thomas Boulter, Eastern Region Operations Manager, Eversource
Nickolai Kosko, Field Supervisor, Electric Design, Eversource

Raymond C. Pezzullo, P.E.<br>Assistant City Engineer<br>Portsmouth Department of Public Works<br>680 Peverly Hill Road<br>Portsmouth, NH 03801<br>Corey Colwell, LLS<br>Division Manager / Principal<br>TFMoran Seacoast Division<br>170 Commerce Way, Suite 102<br>Portsmouth, NH 03801

## Re: Portsmouth Water Distribution System Model Peverly Hill Road Developer Review

Dear Mr. Pezzullo and Mr. Colwell:

As requested, Weston \& Sampson has completed the water system evaluation of the proposed residential development located on Peverly Hill Road in Portsmouth, NH. The proposed development includes 56 new single family condominiums on a cul-de-sac. The progress print, dated 03/09/2021, of the "Site Development Plans: Proposed Open Space Residential PUD," prepared by TFMoran Seacoast Division, was used for this review. The plan set shows the development connecting to the existing 6-inch water main in Peverly Hill Road and does not specify a size for the proposed water main in the development. The plans also note that each unit is to have a sprinkler system. Demands were estimated to be about 68,320 gpd by TFMoran Seacoast Division, dated 05/18/2021.

Two hydrant flow tests were performed by Weston \& Sampson and City staff, the results of which were used to calibrate the City's hydraulic model in the area of the proposed development. The results of the flow test indicated an available fire flow of $1,326 \mathrm{gpm}$ at 20 psi near the location of the proposed connection to the 8-inch water main on Peverly Hill Road. The hydrants on Peverly Hill Road are connected to the existing 6-inch water main. The hydraulic model was calibrated using the flow test data, carried over into the existing 8 -inch water main running parallel to the existing 6-inch water main in Peverly Hill Road. When compared to the hydraulic model, the simulated fire flows were similar to the field observations. Based on these results the model was determined to be adequately calibrated.

The purpose of this evaluation was to determine if the proposed development will receive adequate water pressure and fire flows from the existing Portsmouth water system, and if the development may have an adverse impact on the Portsmouth water system.

## REGULATIONS AND EVALUATION CRITERIA

The New Hampshire Code of Administrative Rules and the Insurance Services Office's (ISO) requirements for available fire flow were used as the basis for our determination. The New Hampshire Code of Administrative Rules PUC 600.02 states that: "Each utility shall maintain normal operating pressures of not less than 20 [psi]." Env-Dw 405.32, which applies to community water systems that serve between 25 and 1000 people and so is relevant but not directly applicable in this case, provides additional detail: "The water distribution piping system shall be capable of passing peak flow without excessive frictional loss. At peak flow, pressure at the sill elevation of each lot or unit shall be at least 20 psi." In addition to the regulatory requirement to maintain pressure greater than 20 psi during all conditions, Weston \& Sampson recommends that the City maintain a minimum of 35 psi pressure to
all residences in the system during all "typical" demand conditions, which would include peak hour and summertime irrigation demands but exclude fire flows.

The Insurance Services Office (ISO) is an independent organization that provides ratings for town insurance pricing on systems providing fire protection. ISO estimates needed fire flow requirements at representative locations throughout communities and publishes their methodology and guidance for calculating needed fire flow for individual buildings in their "Guide for Determination of Needed Fire Flow." In our experience, the necessary available fire flow for a development like the one proposed here at 83 Peverly Hill Road would be approximately $1,250 \mathrm{gpm}$ at 20 psi .

## MODELING RESULTS

The model was run to evaluate the development if connected to the existing 8 -inch water main in Peverly Hill Road. The connection to the existing parallel 6 -inch water main was evaluated and identified to be less than 1,000 gpm at 20 psi. It is recommended that the new development connect to the existing 8 -inch water main and not to the existing parallel 6 -inch water main.

The model was evaluated under peak hour demand (PHD) conditions to determine the potential impact on typical system pressure and under maximum day demand (MDD) conditions to determine if the development will receive adequate fire flows. The extended period simulation diurnal curve in the hydraulic model, previously developed for the City of Portsmouth, scaled the MDD by a factor of 2.33 for PHD. The estimated demands provided by the developer denoted that conditions for June/July, which would be a period of MDD conditions. Table 1 below shows how demands were scaled for PHD conditions.

Table 1: Estimated Demands

|  | Developer Estimated MDD <br> (gpm) | PHD <br> (gpm) |
| :---: | :---: | :---: |
| Demand (gpm) | 47.4 | 110.5 |

## EVALUATION

The hydraulic model indicates that the pressures in the development at PHD would be greater than 35 psi , as shown in Table 2 below.

Table 2: Hydraulic Model Results

| Pressure (psi) at PHD | Available Fire Flow (gpm) at 20 psi |
| :---: | :---: |
| 45.2 | 1352 |

The plans indicate that the proposed condominiums will have sprinklers for fire protection. However, it is still recommended that the system be able to provide adequate fire flows to the fire hydrants in the development to handle a fire event outside the limits of the sprinkler systems. Fires on the exterior of the buildings, roofs, a car, or a dumpster would require fire flows from nearby hydrants. It is anticipated that a fire flow of approximately 1,250 gpm for 2 hours at a pressure of 20 psi would be appropriate for this development. The hydraulic model indicates that the available fire flow from the existing 8 -inch water main on Peverly Hill Road is in excess of $1,250 \mathrm{gpm}$, as indicated in Table 2 above.

## RECOMMENDATIONS

The hydraulic model indicates that Peverly Hill Road can support peak domestic demands with subsequent pressure greater than the recommended pressure for this type of residential development. The model indicated that the available flow through the existing 8-inch water main in Peverly Hill Road would be in excess of 1,250 gpm. It is recommended that the proposed water main for the development connect to the existing 8 -inch water main in Peverly Hill Road and not to the existing parallel 6 -inch water main.

We appreciate the opportunity to assist the City of Portsmouth and TF Moran in this matter. Please contact me at 978-532-1900 should you have any questions or require further support.

Sincerely,

WESTON \& SAMPSON ENGINEERS, INC.


Leah Stanton, PE
Vice President

Attachments
Peverly Hill Water Utilities (plan set)
Peverly Hill Water Flows (estimate demands)










| Project <br> Location | Peverly Hill Rd Condominiums |  |  |
| :---: | :---: | :---: | :---: |
|  | Peverly Hill Rd |  |  |
|  | Portsmouth, NH |  |  |
| Unit Water Flows |  |  |  |
| Total Number of Units | 56 |  |  |
| Based on | 100\% 4 Bedroom Units |  |  |
| 4 Bedroom Houses |  |  |  |
| Residences Single Family - 2 Bedroom |  | 300 |  |
| Additional Flow for 2 Additional Bedroom |  | 300 |  |
| Gallons Per Day per 4 Bedroom Unit |  | 600 |  |
| Household Water Flows | (Based on NHDES Env-Wq 1008-3 Table 1008-1) |  |  |
|  | Number GPD/ of Units Unit | GPD |  |
| Number of 4 Bedroom | 56600 | 33,600 |  |
| Total Household Flow | 56 | 33,600 | GPD for Development |
| Irrigation Flows <br> Conversion Factor Eto - Highest Evapotrans. | (Eto $\times$ PF $\times$ SF $\times 0.62$ ) / IE |  |  |
|  | 0.62 Galloons p | in*sf |  |
|  | 0.15 Eto per Portsmouth (June and July) |  |  |
|  | Per Rainmaster Historic ET |  |  |
| PF - Plant Factor |  |  |  |
| IE - Irrigation Efficiency | $\begin{array}{ll}1.00 & \text { For Lawn } \\ 0.75\end{array}$ |  |  |
| Square Feet Per Yard | $\begin{array}{rr}0.75 \\ 5,000 & \\ 70\end{array}$ | n) - 2000 | (House) |
| Irrigation Flows | 620 GPD/Unit | GPD/Unit |  |
|  | Number GPD/ | GPD |  |
| Total Irrigation Flow | $56 \quad 620$ | 34,720 | GPD for Development |
| Total Water De | emand = | 68,320 | GPD for Development |

## NEW HAMPSHIRE CODE OF ADMINISTRATIVE RULES

(2) Metered water readings for uses that are as similar as possible to the proposed use, taking into consideration factors such as occupancy and frequency of use, determined as specified in (d), below.
(d) Design flows based on metered water readings shall be calculated:
(1) By finding the average of water meter readings over a period of time that is representative of the volume of water used and multiplying the average by a minimum peaking factor of 2 for commercial light flow or a maximum peaking factor of 3 for commercial heavy flow; or
(2) By measuring not less than 6 months of consecutive daily meter readings, including the month(s) of heaviest use for uses that are seasonal in nature, and using the highest daily flow without application of a peaking factor;
(e) The unit design flow figures referenced in (b) and (c), above, shall be as listed in Table 1008-1, below, subject to (f), below:

Table 1008-1: Unit Design Flow Figures

| Use | Unit Design Flow |
| :---: | :---: |
| AIRPORTS | $5 \mathrm{GPD} /$ Transient plus $10 \mathrm{GPD} /$ Employee |
| APARTMENTS | See Dwellings |
| BARS, LOUNGES | See Food Service |
| BED \& BREAKFAST | $60 \mathrm{GPD} /$ Guest, based on the greater of 2 guests per room or the actual number of guests the room is designed to accommodate, plus 10 GPD/Employee |
| BUNKHOUSE | 60 GPD/Person |
| CAMPS: |  |
| Campground with Central Comfort Station | $45 \mathrm{GPD} / \mathrm{site}$, plus $20 \mathrm{GPD} /$ Site for the dump station |
| Recreational Campgrounds with 3-way hookups | $60 \mathrm{GPD} /$ Site |
| Construction Camps | $50 \mathrm{GPD} /$ Person |
| Day Camps (not including meals) | 15 GPD/Person |
| Dining Facility | 3 GPD/Person/meal |
| Residential Youth Recreation Camps | $25 \mathrm{GPD} /$ Person plus $3 \mathrm{GPD} / \mathrm{Person/meal}$ |
| CATERERS - Function Rooms | $12 \mathrm{GPD} / \mathrm{patron}$ |
| CHURCHES: |  |
| Sanctuary Seating | 3 GPD/Seat |
| Church Suppers | $12 \mathrm{GPD} /$ Seat |
| COUNTRY CLUBS - PRIVATE |  |
| Dining Room | 10 GPD/Seat |
| Snack Bar | $10 \mathrm{GPD} /$ Seat |
| Locker \& Showers | 20 GPD/Locker |
| DAY CARE CENTERS | 10 GPD/Person |
| DENTISTS | 10 GPD/Chair plus 35 GPD/Staff Member |
| DOCTOR'S OFFICES | 250 GPD/Doctor |
| DOG KENNELS | $50 \mathrm{GPD} / \mathrm{Kennel}$, with one dog per kennel |
| DWELLINGS: |  |
| Apartment - Studio or One-Bedroom | 225 GPD |
| Apartment - 2 or More Bedrooms | 150 GPD/Bedroom |
| Residence - Single-Family | 300 GPD plus 150 GPD for each bedroom over 2 |
| Residence - Duplex | 300 GPD plus 150 GPD for each bedroom over 2 for each unit |
| Rooming House - With Meals | 60 GPD/Person |
| Rooming House - Without Meals | $40 \mathrm{GPD} / \mathrm{Person}$ |
| Senior Housing | See Senior Housing |

## DRAINAGE ANALYSIS

F O R

# The Peverly Hill Road Condominiums 

86 Peverly Hill Road Portsmouth, NH Rockingham County

Tax Map 242, Lot 4

Month April 19, 2021
Last Revised August 25, 2021

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## 1.0-SUMMARY \& PROJECT DESCRIPTION

The project includes the development of a 56-Unit PUD on 83 Peverly Hill Road, Portsmouth, NH. The existing Tax Map 242 Lot 6 is approximately 4,604,509 sf / 105.7 Acres and currently contains one residential building. The site is within the Single Residence A (SRA) \& Single Residence $B$ (SRB) Zoning district is adjacent to a Calvary Cemetery to the North and a wetland to the south. The majority of the buildings on Peverly Hill Road are residential and the surrounding area consists of residential neighborhoods.

The proposed project is to construct 56 single-family unit condominium in a planned unit development. Associated improvements include and are not limited to access, grading, utilities, stormwater management system, lighting, and landscaping. The project proposes 56 buildings and a roadway total 244,772 sf / 5.6 acres of impervious area with approximately 732,290 sf / 16.8 acres of disturbance to facilitate the development, this is approximately 5\% effective impervious cover. Aside from the 16.8 acres of disturbance, the approximately 88.9 remaining acreage is to be undeveloped. A pedestrian/bike path is to be constructed connecting the neighborhood with the existing bike path that is under development along the Boston and Main Railroad Tracks. The majority of this path is to be constructed along an existing access drive that runs along the northern edge of the property.

This analysis has been completed to verify the project will not pose adverse stormwater effects on-site and off-site. The post-development stormwater management system has been designed to reduce peak runoff rates, reduces runoff volume, reduces the risk of erosion and sedimentation, and improves stormwater runoff quality. There are not increased in runoff from the post-development conditions compared to the pre-development conditions. In addition, Best Management Practices will be employed to assures stormwater quality both during and after construction. The following summarizes the findings from the study.

## 2.0-CALCULATION METHODS

The design storms analyzed in this study are the 2-year, 10 -year, 25 -year and 50 -year 24 -hour storm events. The software program, HydroCAD version $10.00^{1}$ was utilized to calculate the peak runoff rates from these storm events. The program estimates the peak rates using the TR-20 method. A Type III storm pattern was used in the model. Rainfall frequencies for the analyzed region were also incorporated into the model. Rainfall frequencies from the higher of the Extreme Precipitation Rates from Cornell University's Northeast Regional Climate Center (see Appendix A) were used to determine the storm-event intensities, see Table 1. The site lies withing the Great Bay Region, and the rainfalls were increased to take this into account. Design standards were taken from the New Hampshire Stormwater Manual, December 200 ²². $^{2}$.

[^6]|  | 24-HOUR RAINFALL RATES |  |  |
| :---: | :---: | :---: | :---: |
| Storm-Event <br> (year) | Cornell <br> University <br> Rainfall <br> (in) | Factor of <br> Increase For <br> the Great Bay <br> Region | Design <br> Rainfall <br> (in) |
| 2 | 3.22 | $115 \%$ | 3.70 |
| 10 | 4.89 | $115 \%$ | 5.62 |
| 50 | 7.43 | $115 \%$ | 8.54 |

Table 1 - 24-Hour Rainfall Rates
Time of Concentration is the time it takes for water to flow from the hydraulically most remote point in the watershed (with the longest travel time) to the watershed outlet. This time is determined by calculating the time it takes runoff to travel this route under one of three hydrologic conditions: sheet flow, shallow concentrated flow, or channel flow. Because the Intensity-Duration-Frequency (IDF) curve is steep with short TC's, estimating the actual intensity is subject to error and overestimates actual runoff. Due to this, the TC's are adjusted to a minimum of 5 minutes.

## 3.0 - EXISTING SITE CONDITIONS

The soils within the proposed area of disturbance are identified in accordance with the SiteSpecific Soil Survey (see Existing Conditions detail and soil locations). The Site-Specific Soil Survey identifies the soils within the disturbed project area as primarily Newfields sandy loam (HSG B), Hoosic gravelly loamy sand (HSG A), Deerfield loamy sand (HSG B) and Canton sandy loam (HSG B). Hydrologic Soil Group A is classified as having low runoff potential and Hydrologic Soil Group B is classified as moderately low runoff potential.

All other areas that contribute runoff to the project site are composed of Boxford silt loam (HSG C), Scitico silt loam (HSG C), Walpole sandy loam, (HSG C). Hydrologic Soil Group C is classified as having moderately high runoff potential when thoroughly wet.

Offsite soils draining onto the site are classified by the Natural Resource Conservation Service (NRCS) as Scitico Silt Loam (HSG C/D), Eldridge Fine Sandy Loam (HSG C/D), Maybid Silt Loam (HSG C/D), Deefield Loamy Fine Sand (HSG A), Pennichuck Channery Very Fine Sand Loam (HSG C), Natchaug Mucky Peat (HSG B/D), Hoosic Gravelly Fine Sandy Loam (HSG A) and Squamscott Fine Sandy Loam (HSG C/D). In dual group classifications, the first letter is for drained areas while the second is for un-drained areas.

## 4.0 - PRE-DEVELOPMENT CONDITIONS

The pre-development condition is characterized by seven watersheds. Pre-development subcatchment areas are depicted on the attached plan entitled "Pre-Development Drainage Map," Sheet D-01 in.

Stormwater runoff from the site that does not infiltrates into the soil, drains into the wetland along the south side of the property (EPOI-1, EPOI-2, EPOI-3 and EPOI-5). A small portion, along the northern edge of the property, drains into the woodlands on the abutting property (EPOI-4 and EPOI-6).

In the pre-development condition, taking into account the surrounding land that drain onto the property, the total impervious area is 78,335 sf over a total drainage analysis area of $3,958,156$ sf.

## 5.0 - POST-DEVELOPMENT CONDITIONS

The post-development condition is characterized by six watershed divided into many subcatchment areas. Post-development subcatchment areas are depicted on the attached plan entitled "Post-Development Drainage Map," sheet D-02.

In the post-development condition, the total impervious area is 323,127 sf over a total drainage analysis area of $3,958,156$ sf disturbed. Impervious area from the project consists of 56 singlefamily residential buildings, 2932 If of roadway and associated improvements. Two bioretention areas and one subsurface gravel wetland are proposed to treat and mitigate the stormwater runoff from the impact of the new impervious area from the proposed development.

The proposed project maintains or reduces peak rates of runoff compared to existing conditions for all storm events, in accordance with AoT regulations and City stormwater regulations. For Channel protection, the State Regulations looks at the difference between the pre-development to post-development 2-year 24-hour storm event volumes that flow into major water bodies. The 3 areas that experienced changes in post development flows are PS-1, PS,2, PS-3 and PS-4. These flow into the wetland to the south of the property. Individual and as combined flows, none exceed the allowable 0.1 increase peak flow volumes. There will be no adverse effects on the abutting properties from the proposed stormwater management system. See Table 2.

Appendices B and D summarizes all 24-hour storm events for pre- and post-development drainage calculations using HydroCAD analysis. Appendices $C$ and $E$ provide a full summary of the 10-year, 24 -hour storm for the pre- and post-development drainage calculations using HydroCAD analysis.

| Area <br> Number | 2-Year <br> (Flow -cfs) |  | 2-Year <br> (Volume- <br> acre/ft) |  | 10-Year <br> (Flow -cfs) |  | 25-Year <br> (Flow -cfs) |  | 50-Year <br> (Flow -cfs) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Pre- <br> Dev. | Post <br> Dev. | Pre- <br> Dev. | Post <br> Dev. | Pre- <br> Dev. | Post <br> Dev. | Pre- <br> Dev. | Post <br> Dev. | Pre- <br> Dev. | Post <br> Dev. |
|  |  |  |  |  |  |  |  |  |  |  |
| POI-1 | 5.2 | 5.1 | 0.9 | 1.0 | 22.5 | 18.2 | 40.5 | 38.9 | 59.3 | 58.9 |
| POI-2 | 7.5 | 7.4 | 1.3 | 1.2 | 23.6 | 20.1 | 40.7 | 35.1 | 59.3 | 51.6 |
| POI-3 | 3.0 | 3.0 | 0.7 | 0.7 | 8.8 | 8.8 | 14.3 | 14.3 | 19.7 | 19.7 |
| POI-4 | 0.2 | 0.2 | 0 | 0 | 3.2 | 3.2 | 8.0 | 8.0 | 13.9 | 13.9 |
| POI-5 | 2.7 | 2.7 | 0.4 | 0.4 | 7.9 | 7.9 | 12.8 | 12.8 | 17.7 | 17.7 |
| POI-6 | 0.7 | 0.7 | 0.1 | 0.1 | 2.7 | 2.7 | 4.7 | 4.7 | 6.8 | 6.8 |
| Total <br> Volume |  |  | 3.6 | 3.6 |  |  |  |  |  |  |

Table 2- Pre and Post Flows

## 6.0 - REGULATORY COMPLIANCE

The project shall meet the stricter of the stormwater standards identified in the New Hampshire Department of Environmental Services (DES) Env-Wq 1500 Alteration of Terrain Regulations and City stormwater management regulations.

## 6.1 - ALTERATION OF TERRAIN (AOT) CRITERIA

The following regulatory requirements are provided to show the project conformance to the applicable criteria of the NHDES Env-Wq 1500 Alteration of Terrain Regulations which include and are not limited to the following:

Env-Wq 1507.03(a) Pollutant Discharge Minimization Requirements: Stormwater treatment practices described in Env-Wq 1508.03 through Env-Wq 1508.10 shall be acceptable methods for minimizing pollutant discharges to surface waters.

Stormwater is treated using an infiltration practice, specifically a subsurface infiltration basin. The subsurface infiltration basins are designed in accordance with the applicable criteria of Env-Wq 1508.06 as follows:

Per 1508.06(e), the volume of the practice shall be large enough to contain the WQV without depending on infiltration. Refer to the corresponding BMP Worksheet in Section 12 for verification.

Per 1508.06(f), the practice completely drains the WQV within 72 hours or less. Refer to the corresponding BMP Worksheet in Section 12 for verification.

Env-Wq 1507.03(c) Pollutant Discharge Minimization Requirements: Stormwater treatment practices shall be designed with infiltration rates in accordance with Env-Wq 1504.14

Per 1508.06(a), the design infiltration rate of underlaying native soil was considered in accordance with Env-Wq 1504.14. The design infiltration rate for each subsurface infiltration basin is the average from each infiltration test in each basin. Refer to the Infiltration Feasibility Report.

Env-Wq 1507.03(e) Pollutant Discharge Minimization Requirements: Stormwater treatment practices shall be designed for the WQV/WQF, calculated in accordance with Env-Wq 1504.10 and Env-Wq 1504.11.

The regulation is met. Refer to the corresponding BMP Worksheets.
Env-Wq 1507.04(a) Groundwater Recharge Requirements: The proposed development shall reduce to the maximum extent practicable by using groundwater recharge practices as described in Env-Wq 1508.16.

The regulation is met. Refer to the corresponding BMP Worksheet in Section 12 for verification.

Env-Wq 1507.04(c) Groundwater Recharge Requirements: Design Infiltration rates for groundwater recharge practices shall be determined in accordance with Env-Wq 1504.14.

Design infiltration rates were obtained per Ksat testing using a Guelph Permeameter (Amoozemeter) per Env-Wq 1504.14(d). The design infiltration rate for each subsurface infiltration basin is the average from each infiltration test in each basin. Refer to the Infiltration Feasibility Report in Section 16 for verification.

Env-Wq 1507.05 Channel Protection Requirements: The 2-year 24-hour post development peak rate shall not exceed the pre-development peak flow rate for all flows leaving the site and the conditions of Env-Wq 1507.05(b), Env-Wq 1507.05(b)(2), or Env-Wq 1507.05(b)(3).

The 2-year, 24-hour post-development peak flow rate generated from the proposed disturbance is equal to or less than the 2-year, 24 -hour pre-development peak flow rate and the 2 year, 24 -hour post-development storm volume, directed to the nearest water body has not increased over the pre-development volume by more than 0.1 acre-feet.

The regulation is met. Refer to Table 2 for peak discharge rate and 2-year stormwater volume comparisons.

Env-Wq 1507.06 Control Peak Runoff: The 2-year, 10-year and 50-year 24-hour post development peak rate shall not exceed the pre-development peak flow rate for all flows leaving the site.

The regulation is met. Refer to Table 2 for peak discharge rate comparison.

## 7.0 - BEST MANAGEMENT PRACTICES

Best Management Practices will be developed in accordance with the New Hampshire Stormwater Manual, Volumes Two and Three, December $2008^{3}$ to formulate a plan that assures stormwater quality both during and after construction. The intent of the outlined measures is to minimize erosion and sedimentation during construction, stabilize and protect the site from erosion after construction is complete and mitigate any adverse impacts to stormwater quality resulting from development. Best Management Practices for this project include:

- Temporary practices to be implemented during construction.
- Permanent practices to be implemented after construction.


## 7.1 - TEMPORARY PRACTICES

1. Erosion, sediment, and stormwater detention measures must be installed as directed by the engineer.
2. All disturbed areas, as well as loam stockpiles, shall be seeded and contained by a silt barrier.
3. Silt barriers must be installed prior to any construction commencing. All erosion control devices including silt barriers and storm drain inlet filters shall be inspected at least once per week and following any rainfall. All necessary maintenance shall be completed within twenty-four (24) hours.
4. Any silt barriers found to be failing must be replaced immediately. Sediment is to be removed from behind the silt fence if found to be one-third the height of the silt barrier or greater.

[^7]5. Any area of the site, which has been disturbed and where construction activity will not occur for more than twenty-one (21) days, shall be temporarily stabilized by mulching and seeding.
6. No construction materials shall be buried on-site.
7. After all areas have been stabilized, temporary practices are to be removed, and the area they are removed from must be smoothed and revegetated.
8. Areas must be temporarily stabilized within 14 days of disturbance or seeded and mulched within 3 days of final stabilization.
9. After November $15^{\text {th }}$, incomplete driveways or parking areas must be protected with a minimum of 3 " of crushed gravel, meeting the standards of NHDOT item 304.3.
10. An area shall be considered stable if one of the following has occurred:
a) Base course gravels are installed in areas to be paved.
b) A minimum of $85 \%$ vegetated growth has been established.
c) A minimum of 3 " of non-erosive material such as stone or rip rap has been installed.
d) Erosion control blankets have been properly installed.

## 7.2 - PERMANENT PRACTICES

The objectives for developing permanent Best Management Practices for this site include the following:

1. Maintain existing runoff flow characteristics.
a) Drainage is structured to minimize any offsite increase in runoff
2. Treatment BMP's are established to ensure the water quality.
3. Maintenance schedules are set to safeguard the long term working of the stormwater BMP's.

A Stormwater Management Operations \& Maintenance Manual is provided to ensure the proper functioning of the system over time.

## 7.3 - BEST MANAGEMENT PRACTICE EFFICIENCIES

Appendix E of Volume 2 of the New Hampshire Stormwater ${ }^{4}$ lists the pollutant removal efficiencies of various BMP's. All proposed BMP's meet all state and City requirements for total suspended solids (TSS) and pollutant removal, Total Nitrogen (TN), and Total Phosphorous (TP).

Bioretention Systems have a 90\% TSS removal efficiency, 65\% TN removal efficiency, and 65\% TP efficiency.

[^8]Subsurface Gravel Wetlands have a 95\% TSS removal efficiency, 85\% TN removal efficiency, and $64 \%$ TP efficiency. Subsurface Gravel Wetlands have the have the highest removal rating for total nitrogen. The surface of the wetland creates an aerobic zone allowing nitrification of the organic nitrogen and plant debris, and the rock area under the wetland soil allows for an anaerobic zone causing denitrification of the stormwater, releasing nitrogen gas back into the atmosphere.

Infiltration Basins have a 90\% TSS removal efficiency, 60\% TN removal efficiency, and 65\% TP efficiency. The area treated by this BMP is mostly runoff from the abutting cemetery, grass runoff and roof runoff. While not as efficient at treating water Subsurface Gravel Wetlands, it allows the water to infiltrate into the ground, recharging the ground water.

Bioretention Area \#1 and Subsurface Gravel Wetland \#1 both use sediment forebays to pretreat the stormwater. Bioretention Area \#2 And Infiltration Basin \#1 only receives impervious runoff from roofs and not pretreatment is required. The pretreatment areas help to settle sediment and prevent clogging of treatment areas.

### 7.3.1 - LID PRACTICES

Subsurface Gravel Wetlands, Infiltration Basins, and Bioretention Areas are all Low Impact Design. The goal of LID systems is to mimic a site's precondition hydrology by infiltrating, filtering, storming, evaporating and detaining stormwater but use of natural landscape features. These treatments filter and detain the stormwater. They use natural processes, such as soil filtration, evapotranspiration (from the plants in the system) and anaerobic and aerobic treatment of stormwater. The detain the stormwater and release it to mimic the predevelopment storm flows.

The inclusion of the infiltration basin allows for stormwater to infiltrate back into the ground,

## 9.0-CONCLUSION

The proposed stormwater management system will treat, infiltrate, and mitigate the runoff generated from the proposed development and provide protection of groundwater and surface waters as required through the Alteration of Terrain Bureau and City stormwater management regulations. The project has been designed in accordance with NHDES and City regulations. There is little change in the flow characteristics of the site. The proposed project has been designed to pose no adverse effects on surrounding properties.

Respectfully, TFMoran, Inc.

Jack McTigue, PE, CPESC

Project Manager
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## APPENDIX A - EXTREME PRECIPITATION RATES

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## Extreme Precipitation Tables

## Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

| Smoothing | Yes |
| :---: | :--- |
| State | New Hampshire |
| Location |  |
| Longitude | 70.783 degrees West |
| Latitude | 43.056 degrees North |
| Elevation | 0 feet |
| Date/Time | Mon, 19 Oct 2020 18:28:44-0400 |

## Extreme Precipitation Estimates

|  | 5 min | 10min | 15min | 30min | 60min | 120min |  | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr |  | 1day | 2day | 4day | 7day | 10day |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1yr | 0.26 | 0.40 | 0.50 | 0.65 | 0.82 | 1.04 | 1yr | 0.70 | 0.98 | 1.21 | 1.56 | 2.04 | 2.67 | 2.93 | 1yr | 2.36 | 2.82 | 3.23 | 3.95 | 4.57 | 1yr |
| 2 yr | 0.32 | 0.50 | 0.62 | 0.81 | 1.02 | 1.30 | 2 yr | 0.88 | 1.18 | 1.52 | 1.94 | 2.50 | 3.22 | 3.58 | 2yr | 2.85 | 3.45 | 3.95 | 4.70 | 5.35 | 2 yr |
| 5 yr | 0.37 | 0.58 | 0.73 | 0.98 | 1.25 | 1.6 | 5 yr | 1.08 | 1.47 | 1.89 | 2.43 | 3.15 | 4.08 | 4.60 | 5yr | 3.62 | 4.42 | 5.06 | 5.96 | 6.73 | 5yr |
| 10 yr | 0.41 | 0.65 | 0.82 | 1.12 | 1.45 | 1.89 | 10 yr | 1.25 | 1.73 | 2.24 | 2.90 | 3.76 | 4.89 | 5.55 | 10 yr | 4.33 | 5.34 | 6.11 | 7.14 | 8.01 | 10 yr |
| 25yr | 0.48 | 0.76 | 0.97 | 1.34 | 1.78 | 2.34 | $25 y r$ | 1.53 | 2.14 | 2.78 | 3.64 | 4.76 | 6.20 | 7.13 | 25 yr | 5.49 | 6.86 | 7.84 | 9.07 | 10.10 | $25 y \mathrm{yr}$ |
| 50 yr | 0.54 | 0.86 | 1.10 | 1.54 | 2.07 | 2.76 | 50yr | 1.79 | 2.53 | 3.29 | 4.33 | 5.68 | 7.43 | 8.62 | 50yr | 6.57 | 8.29 | 9.48 | 10.87 | 12.04 | 50 yr |
| 100 yr | 0.60 | 0.97 | 1.25 | 1.77 | 2.42 | 3.26 | 100 yr | 2.09 | 2.98 | 3.91 | 5.17 | 6.79 | 8.90 | 10.43 | 100 yr | 7.88 | 10.03 | 11.45 | 13.04 | 14.35 | 100 yr |
| 200yr | 0.68 | 1.10 | 1.43 | 2.05 | 2.83 | 3.84 | 200yr | 2.44 | 3.52 | 4.62 | 6.15 | 8.11 | 10.67 | 12.61 | 200yr | 9.44 | 12.13 | 13.84 | 15.64 | 17.12 | 200yr |
| 500yr | 0.80 | 1.32 | 1.72 | 2.49 | 3.48 | 4.77 | 500yr | 3.00 | 4.39 | 5.78 | 7.73 | 10.26 | 13.56 | 16.23 | 500yr | 12.00 | 15.60 | 17.80 | 19.91 | 21.62 | 500yr |

## Lower Confidence Limits

|  | 5min | 10 min | 15 min | 30min | 60 min | 120 min |  | 1 hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr |  | 1day | 2day | 4day | 7day | 10day |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 yr | 0.23 | 0.36 | 0.44 | 0.59 | 0.72 | 0.88 | 1 yr | 0.63 | 0.87 | 0.92 | 1.33 | 1.67 | 2.24 | 2.53 | 1 yr | 1.98 | 2.43 | 2.87 | 3.17 | 3.91 | 1yr |
| 2 yr | 0.32 | 0.49 | 0.60 | 0.81 | 1.00 | 1.19 | 2 yr | 0.86 | 1.16 | 1.37 | 1.82 | 2.34 | 3.07 | 3.47 | 2 yr | 2.72 | 3.34 | 3.84 | 4.57 | 5.10 | 2 yr |
| 5yr | 0.3 | 0.54 | 0.67 | 0.92 | 1.17 | 1.40 | 5 yr | 1.01 | 1.37 | 1.61 | 2.12 | 2.73 | 3.81 | 4.22 | 5 yr | 3.37 | 4.06 | 4.74 | 5.57 | 6.28 | 5 yr |
| 10yr | 0.39 | 0.59 | 0.74 | 1.03 | 1.33 | 1.60 | 10yr | 1.15 | 1.57 | 1.81 | 2.39 | 3.06 | 4.40 | 4.91 | 10yr | 3.90 | 4.72 | 5.49 | 6.47 | 7.25 | 10yr |
| 25 yr | 0.44 | 0.67 | 0.83 | 1.19 | 1.57 | 1.90 | $25 y r$ | 1.35 | 1.86 | 2.10 | 2.76 | 3.54 | 4.74 | 5.96 | $25 y \mathrm{r}$ | 4.19 | 5.73 | 6.73 | 7.88 | 8.76 | $25 y r$ |
| 50 yr | 0.48 | 0.74 | 0.92 | 1.32 | 1.77 | 2.17 | 50 yr | 1.53 | 2.12 | 2.35 | 3.07 | 3.93 | 5.36 | 6.90 | 50yr | 4.74 | 6.63 | 7.85 | 9.16 | 10.12 | 50 yr |
| 100 yr | 0.54 | 0.82 | 1.02 | 1.48 | 2.02 | 2.48 | 100 yr | 1.75 | 2.42 | 2.63 | 3.41 | 4.36 | 6.03 | 7.98 | 100yr | 5.33 | 7.67 | 9.15 | 10.66 | 11.69 | 100 yr |
| 200 yr | 0.60 | 0.90 | 1.14 | 1.65 | 2.30 | 2.82 | 200 yr | 1.98 | 2.76 | 2.94 | 3.78 | 4.80 | 6.76 | 9.22 | 200yr | 5.98 | 8.87 | 10.67 | 12.42 | 13.53 | $200 y r$ |
| 500 yr | 0.69 | 1.03 | 1.33 | 1.93 | 2.74 | 3.38 | 500 yr | 2.36 | 3.30 | 3.42 | 4.32 | 5.47 | 7.87 | 11.18 | 500 yr | 6.97 | 10.75 | 13.07 | 15.23 | 16.39 | 500 yr |

## Upper Confidence Limits

|  | 5 min | 10 min | 15 min | 30 min | 60min | 120min |  | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr |  | 1day | 2day | 4day | 7day | 10day |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 yr | 0.29 | 0.44 | 0.54 | 0.72 | 0.89 | 1.08 | 1yr | 0.77 | 1.06 | 1.26 | 1.74 | 2.20 | 3.00 | 3.16 | 1 yr | 2.66 | 3.04 | 3.60 | 4.39 | 5.07 | 1yr |
| 2 yr | 0.34 | 0.52 | 0.64 | 0.86 | 1.07 | 1.27 | 2y | 0.92 | 1.24 | 1.48 | 1.96 | 2.51 | 3.44 | 3.71 | 2 yr | 3.04 | 3.57 | 4.09 | 4.85 | 5.65 | 2 y |
| 5 yr | 0.40 | 0.62 | 0.77 | 1.05 | 1.34 | 1.62 | 5 yr | 1.15 | 1.58 | 1.88 | 2.53 | 3.25 | 4.35 | 4.96 | 5 yr | 3.85 | 4.77 | 5.39 | 6.38 | 7.16 | 5yr |
| 10 yr | 0.47 | 0.7 | 0.8 | 1.25 | 1.6 | 1.98 | 10 yr | 1.39 | 1.93 | 2.28 | 3.10 | 3.94 | 5.36 | 6.20 | 10 yr | 4.74 | 5.96 | 6.81 | 7.84 | 8.76 | 10 yr |
| 25 yr | 0.58 | 0.88 | 1.09 | 1.56 | 2.05 | 2.57 | 25 yr | 1.77 | 2.51 | 2.95 | 4.06 | 5.14 | 7.82 | 8.32 | $25 y r$ | 6.92 | 8.00 | 9.11 | 10.34 | 11.41 | 25 yr |
| 50 yr | 0.67 | 1.02 | 1.27 | 1.83 | 2.46 | 3.13 | 50 yr | 2.12 | 3.06 | 3.59 | 4.99 | 6.30 | 9.79 | 10.42 | 50 yr | 8.66 | 10.02 | 11.37 | 12.72 | 13.96 | 50 yr |
| 100 yr | 0.79 | 1.19 | 1.49 | 2.16 | 2.96 | 3.81 | 100 yr | 2.55 | 3.72 | 4.37 | 6.14 | 7.73 | 12.25 | 13.04 | 100yr | 10.84 | 12.54 | 14.19 | 15.67 | 17.07 | 100yr |
| 200 yr | 0.92 | 1.39 | 1.76 | 2.55 | 3.55 | 4.65 | 200 yr | 3.07 | 4.55 | 5.33 | 7.57 | 9.49 | 15.37 | 16.34 | $200 y r$ | 13.60 | 15.71 | 17.73 | 19.31 | 20.89 | $200 y r$ |
| 500 yr | 1.14 | 1.70 | 2.19 | 3.18 | 4.53 | 6.03 | 500 yr | 3.91 | 5.90 | 6.91 | 10.00 | 12.48 | 20.76 | 22.02 | 500 yr | 18.37 | 21.17 | 23.80 | 25.43 | 27.29 | 500 yr |

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## APPENDIX B - PRE-DEVELOPMENT CALCULATIONS

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## 8-19-21_47388-11_Pre-Post-Drainage

Prepared by \{enter your company name here\}
Printed 8/25/2021
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## Area Listing (selected nodes)

| Area <br> $(\mathrm{sq}-\mathrm{ft})$ | CN | Description <br> (subcatchment-numbers) |
| ---: | :--- | :--- |
| 803,900 | 39 | $>75 \%$ Grass cover, Good, HSG A (ES01, ES02, ES04) |
| 183,812 | 61 | $>75 \%$ Grass cover, Good, HSG B (ES01, ES04, ES07) |
| 3,097 | 74 | $>75 \%$ Grass cover, Good, HSG C (ES01, ES04) |
| 227 | 96 | Gravel surface, HSG A (ES04) |
| 6,625 | 96 | Gravel surface, HSG B (ES04) |
| 1,882 | 96 | Gravel surface, HSG C (ES04) |
| 76,964 | 98 | Paved parking, HSG A (ES01, ES02, ES04) |
| 1,391 | 98 | Roofs, HSG A (ES01) |
| 277,822 | 30 | Woods, Good, HSG A (ES01, ES02, ES04) |
| $1,407,239$ | 55 | Woods, Good, HSG B (ES01, ES03, ES04, ES05, ES06, ES07) |
| $1,195,197$ | 70 | Woods, Good, HSG C (ES01, ES03, ES04, ES05, ES06, ES07) |
| $3,958,156$ | 56 | TOTAL AREA |

## 8-19-21_47388-11_Pre-Post-Drainage

Prepared by \{enter your company name here\}
Printed 8/25/2021
HydroCAD® 10.10-6a s/n 00866 © 2020 HydroCAD Software Solutions LLC

## Soil Listing (selected nodes)

| Area <br> $(\mathrm{sq}-\mathrm{ft})$ | Soil <br> Group | Subcatchment <br> Numbers |
| ---: | :--- | :--- |
| $1,160,304$ | HSG A | ES01, ES02, ES04 |
| $1,597,676$ | HSG B | ES01, ES03, ES04, ES05, ES06, ES07 |
| $1,200,176$ | HSG C | ES01, ES03, ES04, ES05, ES06, ES07 |
| 0 | HSG D |  |
| 0 | Other |  |
| $3,958,156$ |  | TOTAL AREA |

Time span=0.00-24.00 hrs, $\mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentES01: ES-01

Subcatchment ES02: ES-02

SubcatchmentES03: ES-03

## SubcatchmentES04: ES-04

SubcatchmentES05: ES-05

SubcatchmentES06: ES-06

SubcatchmentES07: ES-02

Reach ER3: R-03 Reach

Link EPol01: Ex Pol-01

Link EPoI02: Ex Pol-02

## Link EPoI03: Ex Pol-03

Link EPoI04: Ex Pol-04

Link EPoI05: Ex Pol-05

Link EPoI06: Ex Pol-06

Runoff Area=1,086,569 sf $2.77 \%$ Impervious Runoff Depth $>0.45$ " Flow Length=1,030' Tc=22.6 $\mathrm{min} \quad \mathrm{CN}=56$ Runoff=5.2 cfs $40,724 \mathrm{cf}$

Runoff Area=399,877 sf $9.83 \%$ Impervious Runoff Depth $>0.12^{\prime \prime}$ Flow Length=724' Tc=14.3 min CN=45 Runoff=0.1 cfs 3,861 cf

Runoff Area=469,882 sf $0.00 \%$ Impervious Runoff Depth>0.74" Flow Length=1,040' Tc=62.6 min CN=63 Runoff=3.0 cfs 29,099 cf

Runoff Area=668,692 sf $1.33 \%$ Impervious Runoff Depth $>0.11^{\prime \prime}$ Flow Length $=1,040$ Tc=49.8 min $\mathrm{CN}=45$ Runoff $=0.2 \mathrm{cfs} 6,274 \mathrm{cf}$

Runoff Area $=305,212$ sf $0.00 \%$ Impervious Runoff Depth $>0.75{ }^{\prime \prime}$ Flow Length=720' Tc=34.6 min CN=63 Runoff=2.7 cfs $19,098 \mathrm{cf}$

Runoff Area=125,073 sf $0.00 \%$ Impervious Runoff Depth $>0.53$ "
Flow Length=340' Tc=27.5 min CN=58 Runoff=0.7 cfs 5,510 cf
Runoff Area=902,851 sf $0.00 \%$ Impervious Runoff Depth $>0.70$ " Flow Length=1,200' Tc=33.4 min CN=62 Runoff=7.5 cfs $52,941 \mathrm{cf}$

Avg. Flow Depth=0.03' Max Vel=0.17 fps Inflow=0.1 cfs 3,861 cf $\mathrm{n}=0.100 \mathrm{~L}=1,421.0$ ' $\mathrm{S}=0.0190$ '/' Capacity=19.1 cfs Outflow=0.1 cfs $3,229 \mathrm{cf}$

Inflow=5.2 cfs 40,724 cf Primary=5.2 cfs 40,724 cf

Inflow=7.5 cfs 56,170 cf Primary=7.5 cfs 56,170 cf

Inflow=3.0 cfs 29,099 cf Primary $=3.0$ cfs 29,099 cf

Inflow=0.2 cfs 6,274 cf Primary $=0.2 \mathrm{cfs} 6,274 \mathrm{cf}$

Inflow=2.7 cfs 19,098 cf Primary=2.7cfs 19,098 cf

Inflow=0.7 cfs 5,510 cf
Primary $=0.7 \mathrm{cfs} 5,510 \mathrm{cf}$

Total Runoff Area $=3,958,156$ sf Runoff Volume $=157,507$ cf Average Runoff Depth $=0.48$ " 98.02\% Pervious $=3,879,801$ sf $1.98 \%$ Impervious $=78,355$ sf

Time span=0.00-24.00 hrs, $\mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentES01: ES-01

SubcatchmentES02: ES-02

SubcatchmentES03: ES-03

## SubcatchmentES04: ES-04

SubcatchmentES05: ES-05

SubcatchmentES06: ES-06

SubcatchmentES07: ES-02

Reach ER3: R-03 Reach

Link EPol01: Ex Pol-01

Link EPol02: Ex Pol-02

Link EPol03: Ex Pol-03

Link EPol04: Ex Pol-04

Link EPoI05: Ex Pol-05

Link EPol06: Ex Pol-06

Runoff Area=1,086,569 sf $2.77 \%$ Impervious Runoff Depth>1.37" Flow Length=1,030' Tc=22.6 $\mathrm{min} \quad \mathrm{CN}=56$ Runoff=22.5 cfs $123,847 \mathrm{cf}$

Runoff Area=399,877 sf $9.83 \%$ Impervious Runoff Depth $>0.65{ }^{\prime \prime}$ Flow Length=724' Tc=14.3 min CN=45 Runoff=3.0 cfs $21,706 \mathrm{cf}$

Runoff Area=469,882 sf $0.00 \%$ Impervious Runoff Depth>1.88" Flow Length=1,040' Tc=62.6 $\mathrm{min} \mathrm{CN}=63$ Runoff=8.8 cfs $73,712 \mathrm{cf}$

Runoff Area $=668,692$ sf $1.33 \%$ Impervious Runoff Depth $>0.64$ " Flow Length=1,040' Tc=49.8 $\mathrm{min} \quad \mathrm{CN}=45$ Runoff $=3.2 \mathrm{cfs} 35,720 \mathrm{cf}$

Runoff Area $=305,212$ sf $0.00 \%$ Impervious Runoff Depth $>1.90$ " Flow Length=720' Tc=34.6 min CN=63 Runoff=7.9 cfs $48,275 \mathrm{cf}$

Runoff Area=125,073 sf $0.00 \%$ Impervious Runoff Depth $>1.51$ " Flow Length=340' Tc=27.5 min CN=58 Runoff=2.7 cfs $15,770 \mathrm{cf}$

Runoff Area=902,851 sf $0.00 \%$ Impervious Runoff Depth>1.82" Flow Length=1,200' Tc=33.4 min CN=62 Runoff=22.7 cfs 136,840 cf

Avg. Flow Depth=0.11' Max Vel=0.44 fps Inflow=3.0 cfs 21,706 cf $\mathrm{n}=0.100 \mathrm{~L}=1,421.0$ S $=0.0190$ '/' Capacity=19.1 cfs Outflow=1.3 cfs 20,450 cf

Inflow=22.5 cfs $123,847 \mathrm{cf}$ Primary=22.5 cfs 123,847 cf

Inflow=23.6 cfs 157,290 cf Primary $=23.6$ cfs 157,290 cf

Inflow=8.8 cfs 73,712 cf
Primary $=8.8$ cfs 73,712 cf
Inflow=3.2 cfs 35,720 cf
Primary $=3.2$ cfs 35,720 cf
Inflow=7.9 cfs 48,275 cf
Primary=7.9 cfs 48,275 cf
Inflow=2.7 cfs 15,770 cf
Primary=2.7 cfs 15,770 cf

Total Runoff Area $=3,958,156$ sf Runoff Volume $=455,871$ cf Average Runoff Depth $=1.38$ " 98.02\% Pervious $=3,879,801$ sf $1.98 \%$ Impervious $=78,355$ sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentES01: ES-01

Subcatchment ES02: ES-02

SubcatchmentES03: ES-03

## SubcatchmentES04: ES-04

SubcatchmentES05: ES-05

SubcatchmentES06: ES-06

SubcatchmentES07: ES-02

Reach ER3: R-03 Reach

Link EPol01: Ex Pol-01

Link EPol02: Ex Pol-02

Link EPol03: Ex Pol-03

Link EPoI04: Ex Pol-04

Link EPoI05: Ex Pol-05

Link EPol06: Ex Pol-06

Runoff Area=1,086,569 sf $2.77 \%$ Impervious Runoff Depth $>2.29^{\prime \prime}$ Flow Length=1,030' Tc=22.6 $\mathrm{min} \quad \mathrm{CN}=56$ Runoff=40.5 cfs $207,340 \mathrm{cf}$

Runoff Area=399,877 sf $9.83 \%$ Impervious Runoff Depth>1.29" Flow Length=724' Tc=14.3 min CN=45 Runoff=8.1 cfs $43,077 \mathrm{cf}$

Runoff Area=469,882 sf 0.00\% Impervious Runoff Depth>2.95" Flow Length=1,040' Tc=62.6 min CN=63 Runoff=14.3 cfs $115,597 \mathrm{cf}$

Runoff Area=668,692 sf $1.33 \%$ Impervious Runoff Depth $>1.28$ " Flow Length=1,040' Tc=49.8 $\mathrm{min} \quad \mathrm{CN}=45$ Runoff= $8.0 \mathrm{cfs} 71,088 \mathrm{cf}$

Runoff Area $=305,212$ sf $0.00 \%$ Impervious Runoff Depth>2.97" Flow Length=720' Tc=34.6 min CN=63 Runoff=12.8 cfs $75,647 \mathrm{cf}$

Runoff Area=125,073 sf $0.00 \%$ Impervious Runoff Depth $>2.48$ " Flow Length=340' Tc=27.5 min CN=58 Runoff=4.7 cfs $25,857 \mathrm{cf}$

Runoff Area=902,851 sf $0.00 \%$ Impervious Runoff Depth>2.87" Flow Length=1,200' Tc=33.4 min CN=62 Runoff=37.0 cfs 216,234 cf

Avg. Flow Depth=0.21' Max Vel=0.66 fps Inflow=8.1 cfs $43,077 \mathrm{cf}$ $\mathrm{n}=0.100 \mathrm{~L}=1,421.0$ S $=0.0190$ '/' Capacity=19.1 cfs Outflow=4.0 cfs $41,391 \mathrm{cf}$

Inflow=40.5 cfs 207,340 cf Primary $=40.5$ cfs 207,340 cf

Inflow=40.7 cfs 257,626 cf Primary $=40.7$ cfs 257,626 cf

Inflow=14.3 cfs 115,597 cf Primary=14.3 cfs 115,597 cf

Inflow=8.0 cfs 71,088 cf Primary $=8.0$ cfs 71,088 cf

Inflow=12.8 cfs 75,647 cf Primary=12.8 cfs 75,647 cf

Inflow=4.7 cfs 25,857 cf
Primary $=4.7$ cfs 25,857 cf

Total Runoff Area $=\mathbf{3 , 9 5 8 , 1 5 6}$ sf Runoff Volume $=754,841$ cf Average Runoff Depth $=2.29$ " 98.02\% Pervious $=3,879,801$ sf $1.98 \%$ Impervious $=78,355$ sf

Time span=0.00-24.00 hrs, $\mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentES01: ES-01

SubcatchmentES02: ES-02

Subcatchment ES03: ES-03

## SubcatchmentES04: ES-04

SubcatchmentES05: ES-05

SubcatchmentES06: ES-06

SubcatchmentES07: ES-02

Reach ER3: R-03 Reach

Link EPol01: Ex Pol-01

Link EPoI02: Ex Pol-02

Link EPol03: Ex Pol-03

Link EPoI04: Ex Pol-04

Link EPoI05: Ex Pol-05

## Link EPol06: Ex Pol-06

Runoff Area=1,086,569 sf $2.77 \%$ Impervious Runoff Depth $>3.26{ }^{\prime \prime}$ Flow Length=1,030' Tc=22.6 min CN=56 Runoff=59.3 cfs 295,011 cf

Runoff Area=399,877 sf $9.83 \%$ Impervious Runoff Depth>2.02" Flow Length=724' Tc=14.3 min CN=45 Runoff=14.3 cfs 67,325 cf

Runoff Area=469,882 sf $0.00 \%$ Impervious Runoff Depth>4.04" Flow Length=1,040' Tc=62.6 $\mathrm{min} \mathrm{CN}=63$ Runoff=19.7 cfs $158,145 \mathrm{cf}$

Runoff Area=668,692 sf $1.33 \%$ Impervious Runoff Depth $>2.00$ " Flow Length=1,040' Tc=49.8 $\mathrm{min} \quad \mathrm{CN}=45$ Runoff=13.9 cfs $111,263 \mathrm{cf}$

Runoff Area $=305,212$ sf $0.00 \%$ Impervious Runoff Depth $>4.07$ " Flow Length=720' Tc=34.6 min CN=63 Runoff=17.7 cfs $103,439 \mathrm{cf}$

Runoff Area=125,073 sf $0.00 \%$ Impervious Runoff Depth $>3.49$ " Flow Length=340' Tc=27.5 min CN=58 Runoff=6.8 cfs $36,339 \mathrm{cf}$

Runoff Area=902,851 sf $0.00 \%$ Impervious Runoff Depth $>3.95$ " Flow Length=1,200' Tc=33.4 min CN=62 Runoff=51.5 cfs 297,199 cf

Avg. Flow Depth=0.31' Max Vel=0.83 fps Inflow=14.3 cfs 67,325 cf $\mathrm{n}=0.100 \mathrm{~L}=1,421.0$ S $=0.0190$ '/' Capacity=19.1 cfs Outflow=8.0 cfs $65,268 \mathrm{cf}$

Inflow=59.3 cfs 295,011 cf Primary=59.3 cfs 295,011 cf

Inflow=59.3 cfs 362,467 cf Primary $=59.3$ cfs 362,467 cf

Inflow=19.7 cfs $158,145 \mathrm{cf}$ Primary=19.7 cfs 158,145 cf

Inflow=13.9 cfs 111,263 cf Primary=13.9 cfs 111,263 cf

Inflow=17.7 cfs 103,439 cf Primary $=17.7$ cfs $103,439 \mathrm{cf}$

Inflow=6.8 cfs $36,339 \mathrm{cf}$
Primary $=6.8$ cfs 36,339 cf

Total Runoff Area $=3,958,156$ sf Runoff Volume $=1,068,721$ cf Average Runoff Depth $=3.24$ " $98.02 \%$ Pervious $=3,879,801$ sf $1.98 \%$ Impervious $=78,355$ sf

## APPENDIX C - PRE-DEVELOPMENT CALCULATIONS (10-YEAR STORM EVENT)

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## Summary for Subcatchment ES01: ES-01

Run from top of graveyard, thru site, and into wetland.


Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 28,755 | 98 | Paved parking, HSG A | Pavement |
| 1,391 | 98 | Roofs, HSG A | Roofs |
| 107,595 | 30 | Woods, Good, HSG A | Woods |
| 333,961 | 55 | Woods, Good, HSG B | Woods |
| 284,601 | 70 | Woods, Good, HSG C | Woods |
| 190,112 | 39 | >75\% Grass cover, Good, HSG A | Open Space |
| 139,756 | 61 | >75\% Grass cover, Good, HSG B | Brush |
| 398 | 74 | >75\% Grass cover, Good, HSG C | Brush |

## Summary for Subcatchment ES02: ES-02

Runoff = 3.0 cfs @ 12.35 hrs, Volume= 21,706 cf, Depth> 0.65"
Routed to Reach ER3 : R-03 Reach
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES03: ES-03

Runoff $=\quad 8.8 \mathrm{cfs}$ @ 12.90 hrs , Volume= $\quad 73,712 \mathrm{cf}$, Depth> 1.88"
Routed to Link EPoI03 : Ex Pol-03
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES04: ES-04

Runoff $=\quad 3.2 \mathrm{cfs} @ 12.90 \mathrm{hrs}$, Volume= $35,720 \mathrm{cf}$, Depth> 0.64" Routed to Link EPoI04 : Ex Pol-04

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 8,918 | 98 | Paved parking, HSG A | Pavement |
| 227 | 96 | Gravel surface, HSG A | Roadway |
| 6,625 | 96 | Gravel surface, HSG B | Roadway |
| 1,882 | 96 | Gravel surface, HSG C | Roadway |
| 163,386 | 30 | Woods, Good, HSG A | Woods |
| 163,096 | 55 | Woods, Good, HSG B | Woods |
| 22,827 | 70 | Woods, Good, HSG C | Woods |
| 260,043 | 39 | >75\% Grass cover, Good, HSG A | Open Space |
| 38,989 | 61 | >75\% Grass cover, Good, HSG B | Open Space |
| 2,699 | 74 | $>75 \%$ Grass cover, Good, HSG C | Open Space |

## Summary for Subcatchment ES05: ES-05

Runoff $=\quad 7.9$ cfs @ 12.52 hrs, Volume= 48,275 cf, Depth> 1.90"
Routed to Link EPoI05: Ex Pol-05
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | ---: | :--- |
| 141,482 | 55 | Woods, Good, HSG B |  |
| 163,730 | 70 | Open Water |  |
| Woods, Good, HSG C | Woods |  |  |

## Summary for Subcatchment ES06: ES-06

Runoff $=\quad 2.7 \mathrm{cfs} @ 12.43 \mathrm{hrs}$, Volume= $\quad 15,770 \mathrm{cf}$, Depth> 1.51"

Routed to Link EPoI06 : Ex Pol-06
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES07: ES-02

Runoff $=\quad 22.7$ cfs @ 12.50 hrs, Volume= 136,840 cf, Depth> 1.82"
Routed to Link EPoI02 : Ex Pol-02
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Reach ER3: R-03 Reach

Inflow Area $=399,877$ sf, $9.83 \%$ Impervious, Inflow Depth $>0.65$ " for 10-Year event
Inflow = 3.0 cfs @ 12.35 hrs, Volume= 21,706 cf

Outflow = 1.3 cfs @ 12.86 hrs , Volume $=20,450 \mathrm{cf}$, Atten $=58 \%$, Lag $=30.5 \mathrm{~min}$
Routed to Link EPoI02: Ex Pol-02
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity $=0.44 \mathrm{fps}$, Min. Travel Time $=54.2 \mathrm{~min}$
Avg. Velocity $=0.29 \mathrm{fps}$, Avg. Travel Time $=82.3 \mathrm{~min}$
Peak Storage $=4,098$ cf @ 12.86 hrs
Average Depth at Peak Storage=0.11' , Surface Width= 29.25'
Bank-Full Depth= 0.50' Flow Area= 17.5 sf, Capacity= 19.1 cfs
$25.00^{\prime} \times 0.50$ deep channel, $\mathrm{n}=0.100$ Earth, dense brush, high stage
Side Slope Z-value= 20.0 '/' Top Width= 45.00'
Length= 1,421.0' Slope= 0.0190 ' $/$ '
Inlet Invert= 53.00', Outlet Invert= 26.00'


## Summary for Link EPol01: Ex Pol-01

| Inflow Area = | 1,086,569 | erviou | 硣 | 1.37" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 22.5 cfs @ | 12.36 hrs , Volume= | 123,847 cf |  |
| Primary | 22.5 cfs @ | 12.36 hrs, Volume= | 123,847 | Atten= 0\%, Lag= 0.0 |

Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol02: Ex Pol-02

| low Area | 1,302,728 | 2\% Imperviou | w Depth > 1.45" for 10-Year event |
| :---: | :---: | :---: | :---: |
| Inflow | 23.6 cfs @ | 12.51 hrs, Volume= | 157,290 cf |
| Primary | 23.6 cfs @ | 12.51 hrs , Volume= | 157,290 cf, Atten=0\%, Lag= 0.0 |

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol03: Ex Pol-03

| Inflow Area | 469,882 | 0.00\% Impervious | Depth > 1.88" for 10-Year event |
| :---: | :---: | :---: | :---: |
| Inflow | 8.8 cfs @ | 12.90 hrs , Volume= | 73,712 cf |
| Primary | 8.8 cfs @ | 12.90 hrs , Volume= | $73,712 \mathrm{cf}$, Atten= 0\%, Lag= 0.0 |

Primary outflow $=$ Inflow, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$

Summary for Link EPoI04: Ex Pol-04

| Inflow Area | 668,692 | 1.33\% Impervious, | - Depth | 0.64" |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 3.2 cfs @ | 12.90 hrs, Volume= | 35,720 cf |  |
| Primary | 3.2 cfs @ | 12.90 hrs , Volume= | $35,720 \mathrm{cf}$, | Atten= 0\%, Lag= 0.0 m |

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol05: Ex Pol-05

| Inflow Area | 305,212 sf | 0.00\% Impervious, | Inflow Depth > 1.90" for 10-Year event |
| :---: | :---: | :---: | :---: |
| Inflow | 7.9 cfs @ | 12.52 hrs , Volume= | 48,275 cf |
| Primary | 7.9 cfs @ | 12.52 hrs , Volume= | 48,275 cf, Atten $=0 \%$, Lag $=0$ |

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol06: Ex Pol-06



Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## APPENDIX D - POST-DEVELOPMENT CALCULATIONS

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## 8-19-21_47388-11_Pre-Post-Drainage

Prepared by \{enter your company name here\}
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## Area Listing (selected nodes)

| $\begin{array}{r} \text { Area } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | CN | Description (subcatchment-numbers) |
| :---: | :---: | :---: |
| 851,890 | 39 | ```>75% Grass cover, Good, HSG A (PS01, PS02, PS04, PS10, PS11, PS13, PS14, PS15, PS17, PS20, PS21)``` |
| 474,447 | 61 | ```>75% Grass cover, Good, HSG B (PS01, PS02, PS04, PS14, PS15, PS16, PS17, PS18, PS19, PS20, PS21, PS22, PS23, PS24, PS25, PS26, PS27, PS28, PS29, PS30, PS32, PS33)``` |
| 7,213 | 74 | >75\% Grass cover, Good, HSG C (PS04, PS20, PS32, PS33) |
| 227 | 96 | Gravel surface, HSG A (PS04) |
| 17,722 | 96 | Gravel surface, HSG B (PS03, PS04, PS17, PS18, PS21, PS23, PS24, PS25, PS26, PS29, PS30, PS33) |
| 1,882 | 96 | Gravel surface, HSG C (PS04) |
| 103,504 | 98 | Paved parking, HSG A (PS01, PS02, PS04, PS10, PS11, PS13, PS14, PS15, PS17) |
| 98,708 | 98 | Paved parking, HSG B (PS14, PS15, PS16, PS17, PS18, PS19, PS20, PS22, PS23, PS24, PS27, PS28, PS29, PS30) |
| 18,781 | 98 | Roofs, HSG A (PS01, PS10, PS13, PS14) |
| 102,134 | 98 | Roofs, HSG B (PS01, PS02, PS14, PS20, PS21, PS22, PS23, PS24, PS25, PS26, PS27, PS29, PS30, PS33) |
| 185,902 | 30 | Woods, Good, HSG A (PS01, PS02, PS04, PS10, PS20) |
| 904,665 | 55 | Woods, Good, HSG B (PS-06, PS01, PS02, PS03, PS04, PS05, PS20, PS24, PS30, PS32, PS33) |
| 1,191,081 | 70 | Woods, Good, HSG C (PS-06, PS03, PS04, PS05, PS20, PS33) |
| 3,958,156 | 59 | TOTAL AREA |

## 8-19-21_47388-11_Pre-Post-Drainage

Prepared by \{enter your company name here\}
Printed 8/25/2021
HydroCAD® 10.10-6a s/n 00866 © 2020 HydroCAD Software Solutions LLC

## Soil Listing (selected nodes)

| Area <br> $(\mathrm{sq}-\mathrm{ft})$ | Soil <br> Group | Subcatchment <br> Numbers |
| ---: | :--- | :--- |
| $1,160,304$ | HSG A | PS01, PS02, PS04, PS10, PS11, PS13, PS14, PS15, PS17, PS20, PS21 |
| $1,597,676$ | HSG B | PS-06, PS01, PS02, PS03, PS04, PS05, PS14, PS15, PS16, PS17, PS18, |
|  |  | PS19, PS20, PS21, PS22, PS23, PS24, PS25, PS26, PS27, PS28, PS29, <br>  <br> $1,200,176$ |
| 0 | HSG C | PS30, PS32, PS33 |
| 0 | HSG D |  |
| $\mathbf{3 , 9 5 8 , 1 5 6}$ |  |  |
|  |  |  |

Time span=0.00-24.00 hrs, $\mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

## SubcatchmentPS-06: PS06 <br> SubcatchmentPS01: PS-01 Cemetery

Runoff Area $=125,073$ sf $0.00 \%$ Impervious Runoff Depth $>0.53$ " Flow Length=340' $\quad \mathrm{c}=27.5 \mathrm{~min} \quad \mathrm{CN}=58$ Runoff $=0.7 \mathrm{cfs} 5,510 \mathrm{cf}$

Subcatchment PS02: PS-02 Cemetery

SubcatchmentPS03: PS-03

SubcatchmentPS04: PS-04

SubcatchmentPS05: PS-05

SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth>0.53" Flow Length=164' Tc=8.7 $\mathrm{min} \quad \mathrm{CN}=58$ Runoff=0.2 cfs 816 cf

SubcatchmentPS11: PS-11 Road Entrance
Runoff Area=3,232 sf $78.99 \%$ Impervious Runoff Depth $>2.27$ " Flow Length=131' Tc=5.0 min CN=86 Runoff=0.2 cfs 613 cf

SubcatchmentPS13: PS-13 Road

SubcatchmentPS14: PS-14 Road

## SubcatchmentPS15: PS-15 Road

SubcatchmentPS16: PS-16 Road

SubcatchmentPS17: PS-17 Road

SubcatchmentPS18: PS-18 Road

SubcatchmentPS19: PS-19 Road

SubcatchmentPS20: PS-20 Wetland

Runoff Area=31,258 sf $59.25 \%$ Impervious Runoff Depth>1.38" Flow Length=242' Tc=9.0 min CN=74 Runoff=1.0 cfs $3,588 \mathrm{cf}$

Runoff Area=46,676 sf $50.48 \%$ Impervious Runoff Depth $>1.44$ " Flow Length=330' Tc=9.8 min CN=75 Runoff=1.5 cfs $5,610 \mathrm{cf}$

Runoff Area=5,529 sf $78.57 \%$ Impervious Runoff Depth>2.19" Flow Length=207' Tc=5.0 min CN=85 Runoff=0.3 cfs $1,009 \mathrm{cf}$

Runoff Area=6,627 sf $55.82 \%$ Impervious Runoff Depth $>1.95{ }^{\prime \prime}$ Flow Length=177' Tc=5.0 min CN=82 Runoff=0.3 cfs $1,076 \mathrm{cf}$

Runoff Area=12,439 sf $58.98 \%$ Impervious Runoff Depth>1.87" Flow Length=362' Tc=5.7 min CN=81 Runoff=0.6 cfs $1,939 \mathrm{cf}$

Runoff Area $=21,966$ sf $41.08 \%$ Impervious Runoff Depth $>1.58$ " Flow Length=290' Tc=10.5 min CN=77 Runoff $=0.8$ cfs 2,887 cf

Runoff Area=10,861 sf $67.42 \%$ Impervious Runoff Depth $>2.27^{\prime \prime}$ Flow Length=239' Tc=5.3 min CN=86 Runoff=0.7 cfs $2,059 \mathrm{cf}$

Runoff Area=497,789 sf $3.51 \%$ Impervious Runoff Depth $>0.85$ " Flow Length=518' Tc=41.1 min CN=65 Runoff=4.8 cfs $35,186 \mathrm{cf}$

## Reach PR01: R-01 Reach

Reach PR02: R-02 Reach

Reach PR3: R-03 Reach

Reach PR4: R-04 Reach

Reach PR5: R-03 Reach

Avg. Flow Depth=0.03' Max Vel=0.19 fps Inflow=0.3 cfs $1,429 \mathrm{cf}$ $\mathrm{n}=0.100 \mathrm{~L}=501.0$ ' $\mathrm{S}=0.0199$ '/' Capacity=19.5 cfs Oufflow=0.1 cfs $1,362 \mathrm{cf}$

Avg. Flow Depth=0.04' Max Vel=0.22 fps Inflow=0.3 cfs $4,748 \mathrm{cf}$ $\mathrm{n}=0.100 \mathrm{~L}=487.0$ ' $\mathrm{S}=0.0189$ '//' Capacity=19.0 cfs Oufflow=0.2 cfs $4,545 \mathrm{cf}$

Avg. Flow Depth=0.03' Max Vel=0.14 fps Inflow=0.1 cfs 4,284 cf $\mathrm{n}=0.100 \mathrm{~L}=487.0^{\prime} \quad \mathrm{S}=0.0101$ '// Capacity=52.5 cfs Outflow=0.1 cfs $3,909 \mathrm{cf}$

Avg. Flow Depth=0.04' Max Vel=0.20 fps Inflow=0.2 cfs 6,583 cf $\mathrm{n}=0.100 \mathrm{~L}=594.0$ ' $\mathrm{S}=0.0126$ '/' Capacity=15.6 cfs Outflow= $0.2 \mathrm{cfs} 6,073 \mathrm{cf}$

Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf $\mathrm{n}=0.100 \mathrm{~L}=40.0$ ' $\mathrm{S}=0.0050 \mathrm{l} /$ Capacity= 9.8 cfs Outflow=0.0 cfs 0 cf



Pond MH13: Manhole 13

Link PPoi-01: Prop Pol-01

Link PPoi-02: POI

Link PPoi-03: PO3

Link PPoi-04: Pr Pol-04

Link PPoi-05: Pr Pol-05

Link PPoi-06: Ex Pol-06

Peak Elev=37.30' Inflow=0.0 cfs 0 cf 24.0" Round Culvert n=0.013 L=148.0' S=0.0257 '/' Oufflow=0.0 cfs 0 cf

Inflow=5.1 cfs 45,002 cf Primary $=5.1$ cfs 45,002 cf

Inflow=7.4 cfs 53,626 cf Primary=7.4 cfs 53,626 cf

Inflow=3.0 cfs 29,099 cf
Primary $=3.0$ cfs $29,099 \mathrm{cf}$
Inflow=0.2 cfs 6,274 cf Primary $=0.2 \mathrm{cfs} 6,274 \mathrm{cf}$

Inflow=2.7 cfs 19,098 cf Primary=2.7 cfs 19,098 cf

Inflow=0.7 cfs $5,510 \mathrm{cf}$ Primary $=0.7$ cfs 5,510 cf

Total Runoff Area $=\mathbf{3 , 9 5 8 , 1 5 6}$ sf Runoff Volume $=220,654$ cf Average Runoff Depth $=0.67$ " 91.84\% Pervious $=3,635,029$ sf $8.16 \%$ Impervious $=323,127$ sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPS-06: PS06

SubcatchmentPS01: PS-01 Cemetery

SubcatchmentPS02: PS-02 Cemetery

SubcatchmentPS03: PS-03

SubcatchmentPS04: PS-04

SubcatchmentPS05: PS-05

SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth>1.52"
Flow Length=164' Tc=8.7 min CN=58 Runoff=0.6 cfs $2,332 \mathrm{cf}$
SubcatchmentPS11: PS-11 Road Entrance Runoff Area=3,232 sf 78.99\% Impervious Runoff Depth>4.05"
Flow Length=131' Tc=5.0 min CN=86 Runoff=0.3 cfs $1,090 \mathrm{cf}$
SubcatchmentPS13: PS-13 Road

SubcatchmentPS14: PS-14 Road

## SubcatchmentPS15: PS-15 Road

## SubcatchmentPS16: PS-16 Road

SubcatchmentPS17: PS-17 Road

SubcatchmentPS18: PS-18 Road

SubcatchmentPS19: PS-19 Road

SubcatchmentPS20: PS-20 Wetland

Runoff Area $=125,073$ sf $0.00 \%$ Impervious Runoff Depth $>1.51$ " Flow Length=340' Tc=27.5 min CN=58 Runoff=2.7 cfs $15,770 \mathrm{cf}$

Runoff Area=301,519 sf $11.75 \%$ Impervious Runoff Depth $>0.83$ " Flow Length=517' Tc=11.5 min CN=48 Runoff=3.7 cfs $20,895 \mathrm{cf}$

Runoff Area=394,562 sf $8.81 \%$ Impervious Runoff Depth>0.71" Flow Length=1,189' Tc=25.2 min CN=46 Runoff=2.9 cfs $23,224 \mathrm{cf}$

Runoff Area $=469,882$ sf $0.00 \%$ Impervious Runoff Depth $>1.88$ " Flow Length=1,040' Tc=62.6 $\mathrm{min} \quad \mathrm{CN}=63$ Runoff= $8.8 \mathrm{cfs} 73,712 \mathrm{cf}$

Runoff Area=668,692 sf $1.33 \%$ Impervious Runoff Depth $>0.64$ " Flow Length=1,040' $\quad$ cc=49.8 min $\quad \mathrm{CN}=45$ Runoff $=3.2$ cfs $35,720 \mathrm{cf}$

Runoff Area=305,212 sf $0.00 \%$ Impervious Runoff Depth>1.90" Flow Length=720' Tc=34.6 min CN=63 Runoff=7.9 cfs 48,275 cf

Runoff Area=31,258 sf $59.25 \%$ Impervious Runoff Depth>2.86"
Flow Length=242' Tc=9.0 min CN=74 Runoff=2.1 cfs $7,459 \mathrm{cf}$
Runoff Area=46,676 sf $50.48 \%$ Impervious Runoff Depth>2.96" Flow Length=330' Tc=9.8 min CN=75 Runoff=3.2 cfs 11,497 cf

Runoff Area=5,529 sf $78.57 \%$ Impervious Runoff Depth $>3.94$ " Flow Length=207' Tc=5.0 min CN=85 Runoff=0.6 cfs $1,817 \mathrm{cf}$

Runoff Area=6,627 sf $55.82 \%$ Impervious Runoff Depth $>3.64$ " Flow Length=177' Tc=5.0 min CN=82 Runoff=0.6 cfs $2,008 \mathrm{cf}$

Runoff Area=12,439 sf $58.98 \%$ Impervious Runoff Depth $>3.54$ " Flow Length=362' Tc=5.7 min CN=81 Runoff=1.2 cfs $3,666 \mathrm{cf}$

Runoff Area $=21,966$ sf $41.08 \%$ Impervious Runoff Depth $>3.14$ " Flow Length=290' Tc=10.5 $\mathrm{min} \quad \mathrm{CN}=77$ Runoff=1.6 cfs $5,755 \mathrm{cf}$

Runoff Area=10,861 sf $67.42 \%$ Impervious Runoff Depth $>4.05$ " Flow Length=239' Tc=5.3 min CN=86 Runoff=1.2 cfs $3,663 \mathrm{cf}$

Runoff Area=497,789 sf $3.51 \%$ Impervious Runoff Depth>2.06" Flow Length=518' $\quad$ cc=41.1 min $C N=65$ Runoff=13.0 cfs 85,346 cf

| 8-19-21_47388-11_Pre-Post-Drainage | Type III 24-hr 10-Year Rain Printed |  |  |
| :---: | :---: | :---: | :---: |
| Prepared by \{enter your company name here\} |  |  |  |
| HydroCAD® 10.10-6a s/n 00866 © 2020 HydroCAD S | s LLC |  |  |

SubcatchmentPS21: PS-21 Inner-Circle Runoff Area=68,052 sf 28.33\% Impervious Runoff Depth>2.68"
Flow Length=138' Slope=0.0600 '/' Tc=6.1 $\mathrm{min} \quad \mathrm{CN}=72$ Runoff=4.8 cfs $15,214 \mathrm{cf}$

## SubcatchmentPS22: PS-22 Road Runoff Area=12,972 sf $53.89 \%$ Impervious Runoff Depth>3.53"

Flow Length=215' Tc=9.5 min CN=81 Runoff=1.1 cfs $3,820 \mathrm{cf}$
SubcatchmentPS23: PS-23 Road Runoff Area=21,891 sf 55.57\% Impervious Runoff Depth>3.64" Flow Length=333' Slope=0.0200 '/' Tc=6.1 min CN=82 Runoff=2.1 cfs 6,633 cf

## SubcatchmentPS24: PS-24 Road Runoff Area=55,697 sf 48.63\% Impervious Runoff Depth>3.34"

Flow Length=375' Slope=0.0200 '/' Tc=9.6 min CN=79 Runoff=4.4 cfs 15,489 cf
SubcatchmentPS25: PS-25 Inner-Circle Runoff Area=57,231 sf 16.32\% Impervious Runoff Depth>2.33"
Flow Length=154' Slope=0.0600 '/' Tc=6.1 $\mathrm{min} \quad \mathrm{CN}=68$ Runoff=3.5 cfs $11,113 \mathrm{cf}$

SubcatchmentPS27: PS-27 Road Runoff Area=12,543 sf 56.40\% Impervious Runoff Depth>3.63" Flow Length=378' Tc=10.1 min CN=82 Runoff=1.1 cfs $3,798 \mathrm{cf}$

SubcatchmentPS28: PS-28 Road

SubcatchmentPS29: PS-29 Road Runoff Area=31,769 sf $53.29 \%$ Impervious Runoff Depth $>3.53$ "
Flow Length=355' Tc=9.6 min CN=81 Runoff=2.6 cfs $9,355 \mathrm{cf}$
SubcatchmentPS30: PS-30 Road Runoff Area=43,899 sf 42.17\% Impervious Runoff Depth>3.14" Flow Length=446' Tc=13.0 min CN=77 Runoff=2.9 cfs $11,495 \mathrm{cf}$

SubcatchmentPS32: PS-32 - Gravel WetlandRunoff Area=67,368 sf $0.00 \%$ Impervious Runoff Depth>1.44" Flow Length=194' Tc=21.2 min CN=57 Runoff=1.5 cfs 8,093 cf

SubcatchmentPS33: PS-33 - Remainder of Runoff Area=597,509 sf 0.83\% Impervious Runoff Depth>2.23" Flow Length=794' Tc=34.5 min CN=67 Runoff=18.7 cfs $110,962 \mathrm{cf}$

## Reach PR01: R-01 Reach

Reach PR02: R-02 Reach

Reach PR3: R-03 Reach

Reach PR4: R-04 Reach

Reach PR5: R-03 Reach

Avg. Flow Depth=0.06' Max Vel=0.31 fps Inflow=0.9 cfs 3,422 cf $\mathrm{n}=0.100 \mathrm{~L}=501.0$ ' $\mathrm{S}=0.0199$ '/' Capacity=19.5 cfs Outflow=0.5 cfs $3,321 \mathrm{cf}$

Avg. Flow Depth=0.17' Max Vel=0.58 fps Inflow=3.7 cfs 20,894 cf n=0.100 L=487.0' S=0.0189 '/' Capacity=19.0 cfs Outflow=2.7 cfs 20,517 cf

Avg. Flow Depth=0.14' Max Vel=0.37 fps Inflow=1.5 cfs 27,765 cf $\mathrm{n}=0.100 \mathrm{~L}=487.0$ ' $\mathrm{S}=0.0101$ '/' Capacity=52.5 cfs Outflow=1.4 cfs 27,061 cf

Avg. Flow Depth=0.21' Max Vel=0.54 fps Inflow=4.3 cfs $35,080 \mathrm{cf}$ n=0.100 L=594.0' $\mathrm{S}=0.0126$ '/' Capacity=15.6 cfs Outflow=3.4 cfs $34,374 \mathrm{cf}$

Avg. Flow Depth=0.22' Max Vel=0.35 fps Inflow=2.3 cfs 5,692 cf $\mathrm{n}=0.100 \mathrm{~L}=40.0$ ' $\mathrm{S}=0.0050$ '/' Capacity=9.8 cfs Outflow=2.3 cfs $5,692 \mathrm{cf}$



## Link PPoi-01: Prop Pol-01

Link PPoi-02: POI

Link PPoi-03: PO3

Link PPoi-04: Pr Pol-04

Link PPoi-05: Pr Pol-05

Link PPoi-06: Ex Pol-06

Inflow=18.2 cfs 141,937 cf Primary=18.2 cfs 141,937 cf

Inflow=20.1 cfs 145,336 cf Primary=20.1 cfs 145,336 cf

Inflow=8.8 cfs 73,712 cf Primary $=8.8$ cfs 73,712 cf

Inflow=3.2 cfs 35,720 cf Primary $=3.2$ cfs 35,720 cf

Inflow=7.9 cfs 48,275 cf Primary=7.9 cfs 48,275 cf

Inflow=2.7 cfs 15,770 cf Primary=2.7cfs 15,770 cf

Total Runoff Area $=3,958,156$ sf Runoff Volume $=554,895$ cf Average Runoff Depth $=1.68$ " 91.84\% Pervious $=3,635,029$ sf $8.16 \%$ Impervious $=323,127$ sf


Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

## SubcatchmentPS-06: PS06 <br> Runoff Area $=125,073$ sf $0.00 \%$ Impervious Runoff Depth $>2.48$ "

 Flow Length=340' Tc=27.5 min CN=58 Runoff=4.7 cfs $25,857 \mathrm{cf}$Subcatchment PS01: PS-01 Cemetery
Runoff Area=301,519 sf $11.75 \%$ Impervious Runoff Depth $>1.55$ " Flow Length=517' Tc=11.5 min CN=48 Runoff=8.7 cfs $39,060 \mathrm{cf}$

## SubcatchmentPS02: PS-02 Cemetery

Runoff Area=394,562 sf $8.81 \%$ Impervious Runoff Depth>1.37" Flow Length=1,189' Tc=25.2 min CN=46 Runoff=7.2 cfs $45,144 \mathrm{cf}$

## SubcatchmentPS03: PS-03

SubcatchmentPS04: PS-04

SubcatchmentPS05: PS-05

SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth>2.49"
Flow Length=164' Tc=8.7 min CN=58 Runoff=1.1 cfs $3,821 \mathrm{cf}$
SubcatchmentPS11: PS-11 Road Entrance Runoff Area=3,232 sf 78.99\% Impervious Runoff Depth>5.49"
Flow Length=131' Tc=5.0 min CN=86 Runoff=0.5 cfs $1,478 \mathrm{cf}$

## SubcatchmentPS13: PS-13 Road

SubcatchmentPS14: PS-14 Road

## SubcatchmentPS15: PS-15 Road

## SubcatchmentPS16: PS-16 Road

SubcatchmentPS17: PS-17 Road

SubcatchmentPS18: PS-18 Road

SubcatchmentPS19: PS-19 Road

SubcatchmentPS20: PS-20 Wetland

Runoff Area=31,258 sf $59.25 \%$ Impervious Runoff Depth $>4.15$ " Flow Length=242' Tc=9.0 min CN=74 Runoff=3.1 cfs 10,809 cf

Runoff Area=46,676 sf $50.48 \%$ Impervious Runoff Depth $>4.26$ " Flow Length=330' Tc=9.8 min CN=75 Runoff=4.6 cfs 16,560 cf

Runoff Area=5,529 sf $78.57 \%$ Impervious Runoff Depth $>5.37$ " Flow Length=207' Tc=5.0 min CN=85 Runoff=0.8 cfs $2,476 \mathrm{cf}$

Runoff Area=6,627 sf $55.82 \%$ Impervious Runoff Depth $>5.04$ " Flow Length=177' Tc=5.0 min CN=82 Runoff=0.9 cfs $2,781 \mathrm{cf}$

Runoff Area=12,439 sf $58.98 \%$ Impervious Runoff Depth $>4.92$ " Flow Length=362' Tc=5.7 min CN=81 Runoff=1.6 cfs $5,103 \mathrm{cf}$

Runoff Area $=21,966$ sf $41.08 \%$ Impervious Runoff Depth $>4.48^{\prime \prime}$ Flow Length=290' Tc=10.5 min CN=77 Runoff=2.3 cfs 8,192 cf

Runoff Area=10,861 sf $67.42 \%$ Impervious Runoff Depth $>5.49$ " Flow Length=239' Tc=5.3 min CN=86 Runoff=1.5 cfs $4,967 \mathrm{cf}$

Runoff Area=497,789 sf $3.51 \%$ Impervious Runoff Depth>3.17" Flow Length=518' Tc=41.1 min CN=65 Runoff=20.6 cfs $131,633 \mathrm{cf}$


SubcatchmentPS32: PS-32 - GraveI WetlandRunoff Area=67,368 sf $0.00 \%$ Impervious Runoff Depth>2.39" Flow Length=194' Tc=21.2 min CN=57 Runoff=2.7 cfs $13,404 \mathrm{cf}$

SubcatchmentPS33: PS-33-Remainder of Runoff Area=597,509 sf $0.83 \%$ Impervious Runoff Depth $>3.39$ " Flow Length=794' Tc=34.5 min CN=67 Runoff=28.8 cfs $168,558 \mathrm{cf}$

## Reach PR01: R-01 Reach

Reach PR02: R-02 Reach

Reach PR3: R-03 Reach

Reach PR4: R-04 Reach

Reach PR5: R-03 Reach

Avg. Flow Depth=0.08' Max Vel=0.38 fps Inflow=1.5 cfs 5,299 cf $\mathrm{n}=0.100 \mathrm{~L}=501.0^{\prime} \mathrm{S}=0.0199$ '//' Capacity=19.5 cfs Oufflow=0.8 cfs $5,172 \mathrm{cf}$

Avg. Flow Depth=0.28' Max Vel=0.78 fps Inflow=8.7 cfs 39,059 cf n=0.100 L=487.0' S=0.0189 '/' Capacity=19.0 cfs Outflow=6.7 cfs 38,561 cf

Avg. Flow Depth=0.31' Max Vel=0.61 fps Inflow=7.6 cfs $57,745 \mathrm{cf}$ $\mathrm{n}=0.100 \mathrm{~L}=487.0$ ' $\mathrm{S}=0.0101$ '/' Capacity=52.5 cfs Outflow=6.0 cfs $56,909 \mathrm{cf}$

Avg. Flow Depth=0.33' Max Vel=0.71 fps Inflow=8.4 cfs 59,871 cf $\mathrm{n}=0.100 \mathrm{~L}=594.0$ ' $\mathrm{S}=0.0126$ '/' Capacity=15.6 cfs Outflow=7.4 cfs $59,029 \mathrm{cf}$

Avg. Flow Depth=0.44' Max Vel=0.52 fps Inflow=7.6 cfs 24,776 cf $\mathrm{n}=0.100 \mathrm{~L}=40.0$ ' $\mathrm{S}=0.0050$ '/' Capacity=9.8 cfs Outflow=7.6 cfs 24,776 cf



## Link PPoi-01: Prop Pol-01

Link PPoi-02: POI

Link PPoi-03: PO3

Link PPoi-04: Pr Pol-04

Link PPoi-05: Pr Pol-05

Link PPoi-06: Ex Pol-06

Inflow=38.9 cfs 257,051 cf Primary $=38.9$ cfs 257,051 cf

Inflow=35.1 cfs 227,587 cf Primary $=35.1$ cfs $227,587 \mathrm{cf}$

Inflow=14.3 cfs 115,597 cf Primary $=14.3$ cfs $115,597 \mathrm{cf}$

Inflow=8.0 cfs 71,088 cf Primary $=8.0$ cfs 71,088 cf

Inflow=12.8 cfs 75,647 cf Primary=12.8 cfs 75,647 cf

Inflow=4.7 cfs 25,857 cf Primary $=4.7$ cfs 25,857 cf

Total Runoff Area $=\mathbf{3 , 9 5 8 , 1 5 6}$ sf Runoff Volume $=876,343$ cf Average Runoff Depth $=\mathbf{2 . 6 6 "}$ 91.84\% Pervious $=3,635,029$ sf $8.16 \%$ Impervious $=323,127$ sf


Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

## SubcatchmentPS-06: PS06 <br> Runoff Area $=125,073$ sf $0.00 \%$ Impervious Runoff Depth $>3.49$ "

 Flow Length=340' Tc=27.5 min CN=58 Runoff=6.8 cfs $36,339 \mathrm{cf}$Subcatchment PS01: PS-01 Cemetery

Subcatchment PS02: PS-02 Cemetery

SubcatchmentPS03: PS-03

SubcatchmentPS04: PS-04

SubcatchmentPS05: PS-05

SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth>3.50"

SubcatchmentPS13: PS-13 Road

SubcatchmentPS14: PS-14 Road

## SubcatchmentPS15: PS-15 Road

SubcatchmentPS16: PS-16 Road

SubcatchmentPS17: PS-17 Road

SubcatchmentPS18: PS-18 Road

SubcatchmentPS19: PS-19 Road

SubcatchmentPS20: PS-20 Wetland

Flow Length=164' Tc=8.7 min CN=58 Runoff=1.5 cfs $5,368 \mathrm{cf}$
SubcatchmentPS11: PS-11 Road Entrance Runoff Area=3,232 sf 78.99\% Impervious Runoff Depth>6.85"
Flow Length=131' Tc=5.0 min CN=86 Runoff=0.6 cfs $1,845 \mathrm{cf}$
Runoff Area=301,519 sf $11.75 \%$ Impervious Runoff Depth $>2.35$ " Flow Length=517' Tc=11.5 min CN=48 Runoff=14.2 cfs 59,145 cf

Runoff Area=394,562 sf $8.81 \%$ Impervious Runoff Depth>2.12" Flow Length=1,189' Tc=25.2 min CN=46 Runoff=12.2 cfs 69,797 cf

Runoff Area $=469,882$ sf $0.00 \%$ Impervious Runoff Depth $>4.04$ " Flow Length=1,040' Tc=62.6 $\mathrm{min} \quad \mathrm{CN}=63$ Runoff=19.7 cfs $158,145 \mathrm{cf}$

Runoff Area=668,692 sf $1.33 \%$ Impervious Runoff Depth $>2.00$ " Flow Length=1,040' Tc=49.8 $\mathrm{min} \quad \mathrm{CN}=45$ Runoff=13.9 cfs $111,263 \mathrm{cf}$

Runoff Area $=305,212$ sf $0.00 \%$ Impervious Runoff Depth $>4.07$ " Flow Length=720' Tc=34.6 min CN=63 Runoff=17.7 cfs $103,439 \mathrm{cf}$

Runoff Area $=31,258$ sf $59.25 \%$ Impervious Runoff Depth $>5.40^{\prime \prime}$
Flow Length=242' Tc=9.0 min CN=74 Runoff=4.0 cfs 14,076 cf
Runoff Area=46,676 sf $50.48 \%$ Impervious Runoff Depth $>5.52$ " Flow Length=330' Tc=9.8 min CN=75 Runoff=6.0 cfs 21,483 cf

Runoff Area=5,529 sf $78.57 \%$ Impervious Runoff Depth>6.73"
Flow Length=207' Tc=5.0 min CN=85 Runoff=1.0 cfs $3,102 \mathrm{cf}$
Runoff Area=6,627 sf $55.82 \%$ Impervious Runoff Depth $>6.37^{\prime \prime}$
Flow Length=177' Tc=5.0 min CN=82 Runoff=1.1 cfs $3,518 \mathrm{cf}$
Runoff Area=12,439 sf $58.98 \%$ Impervious Runoff Depth>6.25"
Flow Length=362' Tc=5.7 min CN=81 Runoff=2.0 cfs $6,478 \mathrm{cf}$
Runoff Area $=21,966$ sf $41.08 \%$ Impervious Runoff Depth $>5.76$ " Flow Length=290' Tc=10.5 min CN=77 Runoff=2.9 cfs $10,548 \mathrm{cf}$

Runoff Area=10,861 sf $67.42 \%$ Impervious Runoff Depth $>6.85$ " Flow Length=239' Tc=5.3 min CN=86 Runoff=1.9 cfs $6,201 \mathrm{cf}$

Runoff Area=497,789 sf $3.51 \%$ Impervious Runoff Depth>4.30" Flow Length=518' Tc=41.1 min CN=65 Runoff=28.1 cfs $178,246 \mathrm{cf}$

| 8-19-21_47388-11_Pre-Post-Drainage Type III 24-hr 50-Year Rainfall=8.54" |  |
| :---: | :---: |
| $\begin{array}{lr}\text { Prepared by \{enter your company name here\} } & \text { Printed } 8 / 25 / 2021 \\ \text { HydroCAD® 10.10-6a s/n } 00866 \text { © } 2020 \text { HydroCAD Software Solutions LLC } & \text { Page } 19\end{array}$ |  |
|  |  |
| Subcatchment PS21: PS-21 Inner-Circle <br> Flow Length=138' | Runoff Area=68,052 sf 28.33\% Impervious Runoff Depth>5.17" |
|  | Slope $=0.0600$ '/' Tc=6.1 min CN=72 Runoff=9.2 cfs 29,301 cf |
| SubcatchmentPS22: PS-22 Road | Runoff Area=12,972 sf 53.89\% Impervious Runoff Depth>6.24" |
|  | Flow Length=215' Tc=9.5 min CN=81 Runoff=1.9 cfs 6,751 cf |
| SubcatchmentPS23: PS-23 Road <br> Flow Length=333' | Runoff Area=21,891 sf 55.57\% Impervious Runoff Depth>6.37" |
|  | Slope=0.0200 '/' Tc=6.1 min CN=82 Runoff=3.6 cfs 11,619 cf |
| SubcatchmentPS24: PS-24 Road Flow Length=375' | Runoff Area=55,697 sf 48.63\% Impervious Runoff Depth>6.00" |
|  | Slope=0.0200 '/' Tc=9.6 min CN=79 Runoff=7.7 cfs 27,868 cf |
| Subcatchment PS25: PS-25 Inner-Circle <br> Flow Length=154' | Runoff Area=57,231 sf 16.32\% Impervious Runoff Depth>4.69" |
|  | Slope=0.0600'/' Tc=6.1 min CN=68 Runoff=7.1 cfs 22,360 cf |
| SubcatchmentPS26: PS-26 Inner-Circle <br> Flow Length=154' | Runoff Area=56,221 sf 27.09\% Impervious Runoff Depth $>5.29$ " |
|  | Slope=0.0600 '/' Tc=6.1 min CN=73 Runoff=7.8 cfs 24,769 cf |
| SubcatchmentPS27: PS-27 Road | Runoff Area=12,543 sf 56.40\% Impervious Runoff Depth>6.36" |
|  | Flow Length=378' $\mathrm{Tc}=10.1 \mathrm{~min}$ CN=82 Runoff=1.8 cfs $6,653 \mathrm{cf}$ |
| Subcatchment PS28: PS-28 Road | Runoff Area=13,299 sf 49.44\% Impervious Runoff Depth>6.01" |
|  | Flow Length=364' $\mathrm{Tc}=7.9 \mathrm{~min}$ CN=79 Runoff=2.0 cfs 6,656 cf |
| Subcatchment PS29: PS-29 Road | Runoff Area=31,769 sf 53.29\% Impervious Runoff Depth>6.24" |
|  | Flow Length=355' Tc=9.6 min CN=81 Runoff=4.6 cfs 16,533 cf |
| Subcatchment PS30: PS-30 Road | Runoff Area=43,899 sf 42.17\% Impervious Runoff Depth>5.76" |
|  | low Length=446' Tc=13.0 min CN=77 Runoff=5.3 cfs 21,071 cf |

SubcatchmentPS32: PS-32 - Gravel WetlandRunoff Area=67,368 sf $0.00 \%$ Impervious Runoff Depth $>3.38$ " Flow Length=194' Tc=21.2 $\mathrm{min} \quad \mathrm{CN}=57$ Runoff=3.9 cfs $18,950 \mathrm{cf}$

SubcatchmentPS33: PS-33 - Remainder of Runoff Area=597,509 sf $0.83 \%$ Impervious Runoff Depth>4.54" Flow Length=794' $\mathrm{Tc}=34.5 \mathrm{~min} \quad \mathrm{CN}=67$ Runoff=38.8 cfs $226,104 \mathrm{cf}$

## Reach PR01: R-01 Reach

Reach PR02: R-02 Reach

Reach PR3: R-03 Reach

Reach PR4: R-04 Reach

Reach PR5: R-03 Reach

Avg. Flow Depth=0.10' Max Vel=0.44 fps Inflow=2.0 cfs 7,213 cf $\mathrm{n}=0.100 \mathrm{~L}=501.0^{\prime} \mathrm{S}=0.0199 \mathrm{l} / \mathrm{Capacity=19.5cfs} \mathrm{Outflow=1.3} \mathrm{cfs} \mathrm{7,068} \mathrm{cf}$

Avg. Flow Depth=0.38' Max Vel=0.93 fps Inflow=14.2 cfs 59,145 cf $\mathrm{n}=0.100 \mathrm{~L}=487.0^{\prime} \mathrm{S}=0.0189$ '/' Capacity=19.0 cfs Outflow=11.6 cfs 58,543 cf

Avg. Flow Depth=0.48' Max Vel=0.77 fps Inflow=14.6 cfs 89,490 cf $\mathrm{n}=0.100 \mathrm{~L}=487.0^{\prime} \mathrm{S}=0.0101$ '/' Capacity=52.5 cfs Outflow=12.9 cfs 88,539 cf

Avg. Flow Depth=0.45' Max Vel=0.84 fps Inflow=15.1 cfs 84,156 cf $n=0.100$ L=594.0' $S=0.0126$ '/' Capacity=15.6 cfs Outflow=12.9 cfs 83,199 cf

Avg. Flow Depth=0.47' Max Vel=0.54 fps Inflow=8.9 cfs 45,926 cf $\mathrm{n}=0.100 \mathrm{~L}=40.0$ ' $\mathrm{S}=0.0050$ '/' Capacity=9.8 cfs Outflow=8.9 cfs 45,926 cf



Pond MH13: Manhole 13

## Link PPoi-01: Prop Pol-01

Link PPoi-02: POI

Link PPoi-03: PO3

Link PPoi-04: Pr Pol-04

Link PPoi-05: Pr Pol-05

Link PPoi-06: Ex Pol-06

Peak Elev=38.64' Inflow=8.9 cfs 45,926 cf 24.0" Round Culvert n=0.013 L=148.0' S=0.0257 '/' Outflow=8.9 cfs 45,926 cf

Inflow=58.9 cfs 378,321 cf Primary $=58.9$ cfs 378,321 cf

Inflow=51.6 cfs 309,302 cf Primary $=51.6$ cfs $309,302 \mathrm{cf}$

Inflow=19.7 cfs 158,145 cf Primary $=19.7$ cfs 158,145 cf

Inflow=13.9 cfs 111,263 cf Primary $=13.9$ cfs 111,263 cf

Inflow=17.7 cfs 103,439 cf Primary $=17.7$ cfs 103,439 cf

Inflow=6.8 cfs 36,339 cf Primary $=6.8$ cfs 36,339 cf

Total Runoff Area $=3,958,156$ sf Runoff Volume $=1,207,626$ cf Average Runoff Depth $=3.66$ "
91.84\% Pervious $=3,635,029$ sf
8.16\% Impervious = 323,127 sf

## APPENDIX E - POST-DEVELOPMENT CALCULATIONS (10-YEAR STORM EVENT)

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## Summary for Subcatchment ES01: ES-01

Run from top of graveyard, thru site, and into wetland.


Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 28,755 | 98 | Paved parking, HSG A | Pavement |
| 10,391 | 98 | Roofs, HSG A | Roofs |
| 107,595 | 30 | Woods, Good, HSG A | Woods |
| 333,961 | 55 | Woods, Good, HSG B | Woods |
| 284,601 | 70 | Woods, Good, HSG C | Woods |
| 190,112 | 39 | >75\% Grass cover, Good, HSG A | Open Space |
| 139,756 | 61 | >75\% Grass cover, Good, HSG B | Brush <br> 398 |
| 74 | >75\% Grass cover, Good, HSG C | Brush |  |

## Summary for Subcatchment ES02: ES-02

Runoff = 3.0 cfs @ 12.35 hrs, Volume= 21,706 cf, Depth> 0.65"
Routed to Reach ER3 : R-03 Reach
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES03: ES-03

Runoff $=\quad 8.8 \mathrm{cfs}$ @ 12.90 hrs , Volume= $\quad 73,712 \mathrm{cf}$, Depth> 1.88"
Routed to Link EPol03 : Ex Pol-03
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES04: ES-04

Runoff $=\quad 3.2 \mathrm{cfs} @ 12.90 \mathrm{hrs}$, Volume= $35,720 \mathrm{cf}$, Depth> 0.64" Routed to Link EPoI04 : Ex Pol-04

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 8,918 | 98 | Paved parking, HSG A | Pavement |
| 227 | 96 | Gravel surface, HSG A | Roadway |
| 6,625 | 96 | Gravel surface, HSG B | Roadway |
| 1,882 | 96 | Gravel surface, HSG C | Roadway |
| 163,386 | 30 | Woods, Good, HSG A | Woods |
| 163,096 | 55 | Woods, Good, HSG B | Woods |
| 22,827 | 70 | Woods, Good, HSG C | Woods |
| 260,043 | 39 | >75\% Grass cover, Good, HSG A | Open Space |
| 38,989 | 61 | >75\% Grass cover, Good, HSG B | Open Space |
| 2,699 | 74 | $>75 \%$ Grass cover, Good, HSG C | Open Space |

## Summary for Subcatchment ES05: ES-05

Runoff = 7.9 cfs @ 12.52 hrs, Volume= 48,275 cf, Depth> 1.90"
Routed to Link EPoI05: Ex Pol-05
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES06: ES-06

Runoff $=\quad 2.7 \mathrm{cfs} @ 12.43 \mathrm{hrs}$, Volume= $\quad 15,770 \mathrm{cf}$, Depth> 1.51"

Routed to Link EPoI06 : Ex Pol-06
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment ES07: ES-02

Runoff $=\quad 22.7$ cfs @ 12.50 hrs, Volume= 136,840 cf, Depth> 1.82"
Routed to Link EPoI02 : Ex Pol-02
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment PS-06: PS06

Runoff $=\quad 2.7$ cfs @ 12.43 hrs, Volume= 15,770 cf, Depth> 1.51"
Routed to Link PPoi-06 : Ex Pol-06
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 99,363 | 55 | Woods, Good, HSG B | Woods |
| 25,710 | 70 | Woods, Good, HSG C | Woods |

Summary for Subcatchment PS01: PS-01 Cemetery
Run from top of graveyard, thru site, and into wetland.


Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 33,245 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Paved parking, HSG B | Woods |
| 1,260 | 98 | Roofs, HSG A | Woods |
| 924 | 98 | Roofs, HSG B | Woods |
| 11,085 | 30 | Woods, Good, HSG A | Open Space |
| 2,470 | 55 | Woods, Good, HSG B | Open Space |
| 227,444 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 25,091 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 301,519 | 48 | Weighted Average |  |
| 266,090 |  | $88.25 \%$ Pervious Area |  |
| 35,429 |  | $11.75 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | $\begin{aligned} & \text { Capacity } \\ & \text { (cfs) } \end{aligned}$ | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 7.7 | 100 | 0.0300 | 0.22 |  | Sheet Flow, Sheet Flow <br> Grass: Short $n=0.150$ P2 $=3.70^{\prime \prime}$ |
| 2.9 | 210 | 0.0300 | 1.21 |  | Shallow Concentrated Flow, Shallow Concentrated Short Grass Pasture Kv=7.0 fps |
| 0.2 | 30 | 0.4000 | 3.16 |  | Shallow Concentrated Flow, Shallow Concentrated Woodland $\mathrm{Kv}=5.0 \mathrm{fps}$ |
| 0.7 | 177 | 0.0100 | 4.22 | 46.39 | Channel Flow, Channel Flow <br> Area= 11.0 sf Perim=22.3' r=0.49' $\mathrm{n}=0.022$ Earth, clean \& straight |

## Summary for Subcatchment PS02: PS-02 Cemetery

Runoff $=\quad 2.9$ cfs @ 12.51 hrs, Volume= 23,224 cf, Depth> 0.71"
Routed to Pond DIO2 : Drop Inlet \#2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 33,461 | 98 | Paved parking, HSG A | Pavement |
| 0 | 98 | Paved parking, HSG B | Pavement |
| 0 | 98 | Roofs, HSG A | Pavement |
| 1,316 | 98 | Roofs, HSG B | Pavement |
| 5,444 | 30 | Woods, Good, HSG A | Brush |
| 4,043 | 55 | Woods, Good, HSG B | Woods |
| 316,738 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 33,560 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 394,562 | 46 | Weighted Average |  |
| 359,785 |  | $91.19 \%$ Pervious Area |  |
| 34,777 |  | $8.81 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \\ \hline \end{array}$ | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 11.2 | 100 | 0.0120 | 0.15 |  | Sheet Flow, Sheet Flow <br> Grass: Short $n=0.150 \quad \mathrm{P} 2=3.70$ " |
| 12.7 | 609 | 0.0130 | 0.80 |  | Shallow Concentrated Flow, Shallow Concentrated Short Grass Pasture Kv=7.0 fps |
| 1.3 | 480 | 0.0200 | 5.96 | 65.60 | Channel Flow, Channel Flow Area= 11.0 sf Perim=22.3' r=0.49' $\mathrm{n}=0.022$ Earth, clean \& straight |

[^9]
## Summary for Subcatchment PS03: PS-03

Runoff $=\quad 8.8$ cfs @ 12.90 hrs, Volume= $\quad 73,712$ cf, Depth> 1.88"
Routed to Link PPoi-03 : PO3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment PS04: PS-04

Runoff = 3.2 cfs @ 12.90 hrs, Volume= 35,720 cf, Depth> 0.64"
Routed to Link PPoi-04 : Pr Pol-04
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area $(\mathrm{sf})$ | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 8,918 | 98 | Paved parking, HSG A | Pavement |
| 227 | 96 | Gravel surface, HSG A | Roadway |
| 7,175 | 96 | Gravel surface, HSG B | Roadway |
| 1,882 | 96 | Gravel surface, HSG C | Roadway |
| 163,386 | 30 | Woods, Good, HSG A | Woods |
| 155,636 | 55 | Woods, Good, HSG B | Woods |
| 22,827 | 70 | Woods, Good, HSG C | Woods |
| 260,043 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 45,899 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 2,699 | 74 | $>75 \%$ Grass cover, Good, HSG C | Open Space |
| 668,692 | 45 | Weighted Average |  |
| 659,774 |  | $98.67 \%$ Pervious Area |  |
| 8,918 |  | $1.33 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 26.4 | 100 | 0.0400 | 0.06 |  | Sheet Flow, Sheet Flow |
|  |  |  |  |  | Woods: Dense underbrush $\mathrm{n}=0.800 \mathrm{P} 2=3.70$ " |
| 8.2 | 300 | 0.0150 | 0.61 |  | Shallow Concentrated Flow, Shallow Concentrated Woodland $\mathrm{Kv}=5.0 \mathrm{fps}$ |
| 15.2 | 640 | 0.0100 | 0.70 |  | Shallow Concentrated Flow, Shallow Concentrated Short Grass Pasture Kv=7.0 fps |
| 49.8 | 1,040 | Total |  |  |  |

## Summary for Subcatchment PS05: PS-05

Runoff $=\quad 7.9$ cfs @ 12.52 hrs, Volume= 48,275 cf, Depth> 1.90"
Routed to Link PPoi-05 : Pr Pol-05
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ Type III 24-hr $10-$ Year Rainfall=5.62"


## Summary for Subcatchment PS10: PS-10 Road Entrance

Run from top of graveyard, thru site, and into wetland.

| Runoff $=\quad 0.6$ cfs @ 12.14 hrs, Volume $=\quad 2,332 \mathrm{cf}$, Depth> 1.52 " |
| :--- |
| Routed to Pond CB01 : Catch Basin 01 |
| Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ |
| Type III 24-hr 10-Year Rainfall=5.62" |


8.7164 Total

## Summary for Subcatchment PS11: PS-11 Road Entrance

Run from top of graveyard, thru site, and into wetland.
Runoff $=0.3 \mathrm{cfs} @ 12.07 \mathrm{hrs}$, Volume= $\quad 1,090 \mathrm{cf}$, Depth> 4.05"

Routed to Pond CB02 : Catch Basin 02
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 2,553 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 0 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 679 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 0 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 3,232 | 86 | Weighted Average |  |
| 679 |  | $21.01 \%$ Pervious Area |  |
| 2,553 |  | $78.99 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0.6 | 3 | 0.0200 | 0.09 |  | Sheet Flow, Sheet Flow <br> Grass: Short n=0.150 P2=3.70" |
| 0.6 | 128 | 0.0150 | 3.55 | 6.04 | Channel Flow, Channel Flow Area $=1.7 \mathrm{sf}$ Perim $=13.3^{\prime} \mathrm{r}=0.13^{\prime}$ $\mathrm{n}=0.013$ Asphalt, smooth |
| 3.8 | 131 | Total |  |  | Direct Entry, Miniimum Tc of 5 Min |

Summary for Subcatchment PS13: PS-13 Road
Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 2.1$ cfs @ 12.13 hrs, Volume= 7,459 cf, Depth> 2.86"

Routed to Pond CB05 : Catch Basin 05
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 8,908 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Paved parking, HSG B | Woods |
| 9,613 | 98 | Roofs, HSG A | Woods |
| 0 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 55 | Woods, Good, HSG B | Open Space |
| 12,737 | 39 | >75\% Grass cover, Good, HSG A | Open Space |
| 0 | 61 | >75\% Grass cover, Good, HSG B | Open Space |

## Summary for Subcatchment PS14: PS-14 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 3.2$ cfs @ 12.14 hrs, Volume= 11,497 cf, Depth> 2.96"

Routed to Pond CB08 : Catch Basin 08

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ Type III 24-hr 10-Year Rainfall=5.62"

|  | Area (sf) | CN D | Description |  |  | Land Use |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 4,959 | 98 P | Paved parking, HSG A |  |  | Woods |
| * | 6,051 | 98 P | Paved parking, HSG B |  |  | Woods |
|  | 6,160 | 98 R | Roofs, HSG A |  |  | Woods |
|  | 6,390 | 98 R | Roofs, HSG B |  |  | Woods |
|  | 0 | 30 | Woods, Good, HSG A |  |  | Open Space |
|  | 0 | 55 | Woods, Good, HSG B |  |  | Open Space |
|  | 10,189 | $39>$ | >75\% Grass cover, Good, HSG A |  |  | Open Space |
|  | 12,927 | $61>$ | $>75 \%$ Grass cover, Good, HSG B |  |  | Open Space |
|  | $\begin{aligned} & 46,676 \\ & 23,116 \\ & 23,560 \end{aligned}$ | 75 | Weighted Average 49.52\% Pervious Area 50.48\% Impervious Area |  |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | $\begin{array}{r} \text { c } \begin{array}{r} \text { Length } \\ \text { (feet) } \end{array} \\ \hline \end{array}$ | Slope (ft/ft) | Velocity $(\mathrm{ft} / \mathrm{sec})$ | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \\ \hline \end{array}$ | Description |  |
| 9.1 | 100 | 0.0200 | 0.18 |  | Sheet Flow Grass: Sho | $\begin{aligned} & \text { Sheet Flow } \\ & \mathrm{n}=0.150 \quad \mathrm{P} 2=3.70 \end{aligned}$ |
| 0.7 | 230 | 0.0330 | - 5.27 | 8.96 | Channel FI <br> Area $=1.7 \mathrm{~s}$ $\mathrm{n}=0.013 \mathrm{~A}$ | w, Street Gutter <br> Perim=13.3' r= 0.13' <br> sphalt, smooth |
| 9.8 | 330 | Total |  |  |  |  |

## Summary for Subcatchment PS15: PS-15 Road

Run from top of graveyard, thru site, and into wetland.

Runoff $=$| $0.6 \mathrm{cfs} @ 12.07 \mathrm{hrs}$, Volume= |
| :--- |
| Routed to Pond CB06 : Catch Basin 04 |$\quad 1,817 \mathrm{cf}$, Depth> 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 4,333 | 98 | Paved parking, HSG A | Woods |
| 11 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 0 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 55 | Woods, Good, HSG B | Open Space |
| 1,181 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 4 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 5,529 | 85 | Weighted Average |  |
| 1,185 |  | $21.43 \%$ Pervious Area |  |
| 4,344 |  | $78.57 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0.6 | 3 | 0.0200 | 0.09 |  | Sheet Flow, Sheet Flow <br> Grass: Short $n=0.150$ P2 $=3.70^{\prime \prime}$ |
| 1.0 | 204 | 0.0150 | 3.55 | 6.04 | Channel Flow, Roadway Gutter Area= 1.7 sf Perim $=13.3^{\prime} \mathrm{r}=0.13^{\prime}$ $\mathrm{n}=0.013$ Asphalt, smooth |
| 3.4 |  |  |  |  | Direct Entry, Miniimum Tc of 5 Min |
| 5.0 | 207 | Total |  |  |  |

Summary for Subcatchment PS16: PS-16 Road
Run from top of graveyard, thru site, and into wetland.
Runoff $=0.6$ cfs @ 12.07 hrs, Volume= 2,008 cf, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

|  | Area (sf) | CN | Description |  |  | Land Use |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 0 | 98 P | Paved parking, HSG A |  |  | Woods |
|  | 3,699 | 98 | Paved parking, HSG B |  |  | Woods |
|  | 0 | 98 R | Roofs, HSG A |  |  | Woods |
|  | 0 | 98 Roc | Roofs, HSG B |  |  | Woods |
|  | 0 | 30 | Woods, Good, HSG A |  |  | Open Space |
|  | 0 | 55 | Woods, Good, HSG B |  |  | Open Space |
|  | 0 | $39>$ | >75\% Grass cover, Good, HSG A |  |  | Open Space |
|  | 2,928 | $61>$ | >75\% Grass cover, Good, HSG B |  |  | Open Space |
|  | 6,627 | 82 | Weighted Average 44.18\% Pervious Area 55.82\% Impervious Area |  |  |  |
|  | 2,928 |  |  |  |  |  |
|  | 3,699 |  |  |  |  | 55.82\% Impervious Area |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |  |
| 4.1 | 37 | 0.0200 | 0.15 |  | Sheet Flow | , Sheet Flow |
|  |  |  |  |  | Grass: Short | t $\mathrm{n}=0.150 \mathrm{P} 2=3.70{ }^{\prime \prime}$ |
| 0.7 | 140 | 0.0330 | - 3.11 | 5.29 | Channel Fl | ow, Channel Flow |
|  |  |  |  |  | Area= 1.7 s | Perim=13.3' $\mathrm{r}=0.13^{\prime}$ |
|  |  |  |  |  | $\mathrm{n}=0.022 \mathrm{E}$ | arth, clean \& straight |
| 0.2 |  |  |  |  | Direct Entr | , Miniimum Tc of 5 Min |
|  |  | Total |  |  |  |  |

## Summary for Subcatchment PS17: PS-17 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 1.2$ cfs @ 12.09 hrs, Volume= 3,666 cf, Depth> 3.54"
Routed to Pond CB09 : Catch Basin 09

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment PS18: PS-18 Road

Run from top of graveyard, thru site, and into wetland.

Runoff | $1.6 \mathrm{cfs} @ 12.15 \mathrm{hrs}$, Volume= |
| :--- |
| Routed to Pond CB19 : Catch Basin 19 |

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 0 | 98 | Paved parking, HSG A | Woods |
| 9,024 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 0 | 98 | Roofs, HSG B | Woods |
| 311 | 96 | Gravel surface, HSG B | Roadway |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 55 | Woods, Good, HSG B | Open Space |
| 0 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 12,631 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 21,966 | 77 | Weighted Average |  |
| 12,942 |  | $58.92 \%$ Pervious Area |  |
| 9,024 |  | $41.08 \%$ Impervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ | Description |
| ---: | ---: | ---: | ---: | ---: | :--- |
| 9.1 | 100 | 0.0200 | 0.18 | Sheet Flow, Sheet Flow <br> Grass: Short $\mathrm{n}=0.150$ P2= 3.70" |  |
| 0.2 | 27 | 0.0200 | 2.12 | Shallow Concentrated Flow, Shallow Concentrated <br> Grassed Waterway Kv= 15.0 fps |  |
| 1.2 | 163 | 0.0175 | 2.27 | 3.85Channel Flow, Channel Flow <br> Area= 1.7 sf Perim= 13.3' r=0.13' <br> n=0.022 Earth, clean \& straight |  |
| 10.5 | 290 | Total |  |  |  |

Summary for Subcatchment PS19: PS-19 Road
Run from top of graveyard, thru site, and into wetland.
Runoff $=1.2 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= $\quad 3,663 \mathrm{cf}$, Depth> 4.05"

Routed to Pond CB18 : Catch Basin 18
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment PS20: PS-20 Wetland

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 13.0 \mathrm{cfs} @ 12.60 \mathrm{hrs}$, Volume= $\quad 85,346 \mathrm{cf}$, Depth> 2.06"
Routed to Link PPoi-01 : Prop Pol-01

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 0 | 98 | Paved parking, HSG A | Woods |
| 330 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 17,137 | 98 | Roofs, HSG B | Woods |
| 5,689 | 30 | Woods, Good, HSG A | Open Space |
| 123,590 | 55 | Woods, Good, HSG B | Open Space |
| 284,601 | 70 | Woods, Good, HSG C | Open Space |
| 9,740 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 56,304 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 398 | 74 | $>75 \%$ Grass cover, Good, HSG C | Open Space |
| 497,789 | 65 | Weighted Average |  |
| 40,322 |  | $96.49 \%$ Pervious Area |  |
| 17,467 |  | $3.51 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0.4 | 9 | 0.5000 | 0.41 |  | Sheet Flow, Sheet Flow |
|  |  |  |  |  | Grass: Short $\mathrm{n}=0.150$ P2 $=3.70$ " |
| 27.4 | 91 | 0.0300 | 0.06 |  | Sheet Flow, Sheet Flow |
|  |  |  |  |  | Woods: Dense underbrush $\mathrm{n}=0.800 \mathrm{P} 2=3.70$ " |
| 0.7 | 40 | 0.0400 | 1.00 |  | Shallow Concentrated Flow, Shallow Concentrated |
|  |  |  |  |  | Woodland Kv= 5.0 fps |
| 12.6 | 378 | 0.0100 | 0.50 |  | Shallow Concentrated Flow, Shallow Concentrated Woodland $\mathrm{Kv}=5.0 \mathrm{fps}$ |

## Summary for Subcatchment PS21: PS-21 Inner-Circle (East)

Run from top of graveyard, thru site, and into wetland.

Runoff $=$| $4.8 \mathrm{cfs} @ 12.10 \mathrm{hrs}$ @ Volume $=$ |
| :---: |
| Routed to Pond BIO1 : Bioretention Area \#1 |$\quad 15,214 \mathrm{cf}$, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 0 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 19,277 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 55 | Woods, Good, HSG B | Open Space |
| 73 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 46,891 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 1,811 | 96 | Gravel surface, HSG B | Roadway |
| 68,052 | 72 | Weighted Average |  |
| 48,775 |  | $71.67 \%$ Pervious Area |  |
| 19,277 |  | $28.33 \%$ Impervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- |
| 5.9 | 100 | 0.0600 | 0.28 | Sheet Flow, Sheet Flow <br> Grass: Short $\mathrm{n}=0.150$ P2=3.70" <br> Shallow Concentrated Flow, Shallow Concentrated Flow <br> Grassed Waterway Kv= 15.0 fps |
| 0.2 | 38 | 0.0600 | 3.67 |  |

## $6.1 \quad 138$ Total

## Summary for Subcatchment PS22: PS-22 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=1.1 \mathrm{cfs} @ 12.14 \mathrm{hrs}$, Volume= $\quad 3,820 \mathrm{cf}$, Depth> 3.53"

Routed to Pond CB10 : Catch Basin 10
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| :---: | :---: | :---: | :---: |
| 0 | 98 | Paved parking, HSG A | Woods |
| 2,919 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 4,072 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 30 | Woods, Good, HSG B | Open Space |
| 0 | 39 | >75\% Grass cover, Good, HSG A | Open Space |
| 5,981 | 61 | >75\% Grass cover, Good, HSG B | Open Space |
| 0 | 96 | Gravel surface, HSG B | Roadway |
| 12,972 | 81 | Weighted Average |  |
| 5,981 |  | 46.11\% Pervious Area |  |
| 6,991 |  | 53.89\% Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\min ) \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 9.1 | 100 | 0.0200 | 0.18 |  | Sheet Flow, Sheet Flow <br> Grass: Short $n=0.150$ P2 $=3.70^{\prime \prime}$ |
| 0.4 | 115 | 0.0330 | 5.27 | 8.96 | Channel Flow, Street Gutter <br> Area= 1.7 sf Perim $=13.3^{\prime} \mathrm{r}=0.13^{\prime}$ <br> $\mathrm{n}=0.013$ Asphalt, smooth |
| 9.5 | 215 | Total |  |  |  |

## Summary for Subcatchment PS23: PS-23 Road

Run from top of graveyard, thru site, and into wetland.


Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description |  | Land Use |
| :---: | :---: | :---: | :---: | :---: |
| 0 | 98 P | Paved parking, HSG A |  | Woods |
| 12,141 | 98 P | Paved parking, HSG B |  | Woods |
| 0 | 98 R | Roofs, HSG A |  | Woods |
| 23 | 98 R | Roofs, HSG B |  | Woods |
| 0 | 30 | Woods, Good, HSG A |  | Open Space |
| 0 | 55 | Woods, Good, HSG B |  | Open Space |
| 0 | $39>$ | >75\% Grass cover, Good, HSG A |  | Open Space |
| 9,670 | $61>$ | >75\% Grass cover, Good, HSG B |  | Open Space |
| 57 | 96 | Gravel surface, HSG B |  | Roadway |
| $\begin{array}{r} \hline 21,891 \\ 9,727 \\ 12,164 \end{array}$ | 82 | Weighted Average 44.43\% Pervious Area 55.57\% Impervious Area |  |  |
| $\begin{array}{rr} \text { Tc } & \begin{array}{r} \text { Length } \\ (\mathrm{min}) \end{array} \\ \hline \end{array}$ | Slope <br> (ft/ft) | Velocity (ft/sec) | $\begin{gathered} \begin{array}{c} \text { Capacity } \\ \text { (cfs) } \end{array} \\ \hline \end{gathered}$ |  |
| 4.137 | 0.0200 | 0.15 | Sheet Flow Grass: Sho | $\begin{aligned} & \text { Sheet Flow } \\ & n=0.150 \quad P 2=3.70 " \end{aligned}$ |
| 2.0296 | 0.0200 | - 2.42 | 4.12 Channel F Area= 1.7 $\mathrm{n}=0.022$ | w, Channel Flow Perim=13.3' $\mathrm{r}=0.13^{\prime}$ arth, clean \& straight |

## Summary for Subcatchment PS24: PS-24 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 4.4$ cfs @ 12.14 hrs, Volume= 15,489 cf, Depth> 3.34"
Routed to Pond CB13 : Catch Basin 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ Type III 24-hr 10-Year Rainfall=5.62"

|  | Area (sf) | CN | Description |  |  | Land Use |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 0 | 98 | Paved parking, HSG A Paved parking, HSG B |  |  | Woods |
| * | 12,683 | 98 |  |  |  | Woods |
|  | 0 | 98 | Paved parking, HSG B Roofs, HSG A |  |  | Woods |
|  | 14,404 | 98 | Roofs, HSG B |  |  | Woods |
|  | 0 | 30 | Woods, Good, HSG A |  |  | Open Space |
|  | 32 | 55 | Woods, Good, HSG B |  |  | Open Space |
|  | 0 | $39>$ | >75\% Grass cover, Good, HSG A |  |  | Open Space |
|  | 27,910 | $61>$ | >75\% Grass cover, Good, HSG B |  |  | Open Space |
|  | 668 | 96 | Gravel surface, HSG B |  |  | Roadway |
|  | 55,697 | 79 | Weighted Average 51.37\% Pervious Area 48.63\% Impervious Area |  |  |  |
|  | 28,610 |  |  |  |  |  |
|  | 27,087 |  |  |  |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \\ \hline \end{array}$ | Description |  |
| 8.4 | 91 | 0.0200 | 0.18 | Sheet Flow, Sheet Flow |  |  |
|  |  |  |  | 6.97 | Grass: Sho | n=0.150 P2=3.70" |
| 1.2 | 284 | 0.0200 | 4.10 |  | Channel Flow, Street Gutter Area $=1.7$ sf Perim=13.3' r=0.13' $\mathrm{n}=0.013$ Asphalt, smooth |  |
|  |  |  |  |  |  |  |
| 9.6 | 375 | Total |  |  |  |  |

## Summary for Subcatchment PS25: PS-25 Inner-Circle (West)

Run from top of graveyard, thru site, and into wetland.
Runoff $=3.5 \mathrm{cfs} @ 12.10 \mathrm{hrs}$, Volume= $\quad 11,113 \mathrm{cf}$, Depth> 2.33"

Routed to Pond INF1 : Bioretention Area \#2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr $10-$ Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 0 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 9,338 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 55 | Woods, Good, HSG B | Open Space |
| 0 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 46,032 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 1,861 | 96 | Gravel surface, HSG B | Roadway |
| 57,231 | 68 | Weighted Average |  |
| 47,893 |  | $83.68 \%$ Pervious Area |  |
| 9,338 |  | $16.32 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \\ \hline \end{array}$ | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 5.9 | 100 | 0.0600 | 0.28 |  | Sheet Flow, Sheet Flow <br> Grass: Short $\mathrm{n}=0.150 \mathrm{P} 2=3.70^{\prime \prime}$ |
| 0.2 | 54 | 0.0600 | 3.67 |  | Shallow Concentrated Flow, Shallow Concentrated Flow Grassed Waterway Kv=15.0 fps |

## Summary for Subcatchment PS26: PS-26 Inner-Circle (Central)

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 4.1 \mathrm{cfs} @ 12.10 \mathrm{hrs}$, Volume $=$
Routed to Pond BIO2 : Bioretention Area \#2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

|  | Area (sf) | CN D | Description |  |  | Land Use |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 0 | 98 P | Paved parking, HSG A |  |  | Woods |
|  | 0 | 98 P | Paved parking, HSG B |  |  | Woods |
|  | 0 | 98 R | Roofs, HSG A |  |  | Woods |
|  | 15,228 | 98 R | Roofs, HSG B |  |  | Woods |
|  | 0 | 30 | Woods, Good, HSG A |  |  | Open Space |
|  | 0 | 55 | Woods, Good, HSG B |  |  | Open Space |
|  | 0 | $39>$ | >75\% Grass cover, Good, HSG A |  |  | Open Space |
|  | 38,434 | $61>$ | >75\% Grass cover, Good, HSG B |  |  | Open Space |
|  | 2,559 | 96 | Gravel surface, HSG B |  |  | Roadway |
|  | $\begin{aligned} & 56,221 \\ & 40,993 \\ & 15,228 \end{aligned}$ | 73 | Weighted Average 72.91\% Pervious Area 27.09\% Impervious Area |  |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |  |
| 5.9 | 100 | 0.0600 | 0.28 |  | Sheet Flow | , Sheet Flow |
|  |  |  |  |  | Grass: Shor | n=0.150 |
| 0.2 | 54 | 0.0600 | 3.67 |  | Shallow Co Grassed W | ncentrated F aterway Kv= |
| 6.1 | 154 | Total |  |  |  |  |

## Summary for Subcatchment PS27: PS-27 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=1.1 \mathrm{cfs} @ 12.14 \mathrm{hrs}$, Volume= $\quad 3,798 \mathrm{cf}$, Depth> 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ Type III 24-hr 10-Year Rainfall=5.62"

10.1378 Total

## Summary for Subcatchment PS28: PS-28 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=1.1 \mathrm{cfs} @ 12.11 \mathrm{hrs}$, Volume= $\quad 3,700 \mathrm{cf}$, Depth> 3.34"

Routed to Pond CB16 : Catch Basin 16
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 0 | 98 | Paved parking, HSG A | Woods |
| 6,575 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 0 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 0 | 55 | Woods, Good, HSG B | Open Space |
| 0 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 6,724 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 13,299 | 79 | Weighted Average |  |
| 6,724 |  | $50.56 \%$ Pervious Area |  |
| 6,575 |  | $49.44 \%$ Impervious Area |  |


| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 5.6 | 55 | 0.0200 | 0.16 |  | Sheet Flow, Sheet Flow <br> Grass: Short $\mathrm{n}=0.150 \quad \mathrm{P} 2=3.70$ " |
| 2.3 | 309 | 0.0171 | 2.24 | 3.81 | Channel Flow, Channel Flow Area $=1.7 \mathrm{sf}$ Perim $=13.3^{\prime} \mathrm{r}=0.13^{\prime}$ $\mathrm{n}=0.022$ Earth, clean \& straight |
| 7.9 | 364 | Total |  |  |  |

## Summary for Subcatchment PS29: PS-29 Road

Run from top of graveyard, thru site, and into wetland.

Runoff | 2.6 cfs @ 12.14 hrs, Volume= |
| :--- |
| Routed to Pond CB15 : Catch Basin 15 |$\quad 9,355 \mathrm{cf}$, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description |  |  | Land Use |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | 98 Pav | Paved parking, HSG A |  |  | Woods |
| 12,695 | 98 P | Paved parking, HSG B |  |  | Woods |
| 0 | 98 R | Roofs, HSG A |  |  | Woods |
| 4,234 | 98 R | Roofs, HSG B |  |  | Woods |
| 0 | 30 | Woods, Good, HSG A |  |  | Open Space |
| 0 | 55 | Woods, Good, HSG B |  |  | Open Space |
| 0 | $39>$ | >75\% Grass cover, Good, HSG A |  |  | Open Space |
| 14,813 | $61>$ | >75\% Grass cover, Good, HSG B |  |  | Open Space |
| 27 | 96 | Gravel surface, HSG B |  |  | Roadway |
| $\begin{aligned} & 31,769 \\ & 14,840 \\ & 16,929 \end{aligned}$ | 81 | Weighted Average 46.71\% Pervious Area 53.29\% Impervious Area |  |  |  |
| $\begin{array}{rr} \text { Tc } & \begin{array}{r} \text { Length } \\ (\min ) \end{array} \\ \text { (feet) } \end{array}$ | Slope (ft/ft) | $\begin{array}{rr} \text { Velocity } \\ \hline & (\mathrm{ft} / \mathrm{sec}) \\ \hline \end{array}$ | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |  |
| 7.578 | 0.0200 | 0.17 |  | Sheet Flow <br> Grass: Sho | , Sheet Flow <br> $\mathrm{t}=0.150 \mathrm{P} 2=3.70$ |
| 2.1277 | 0.0171 | 2.24 | 3.81 | Channel Fl <br> Area= 1.7 s $\mathrm{n}=0.022$ | ow, Channel Flow f Perim=13.3' r=0.13' arth, clean \& straight |

## Summary for Subcatchment PS30: PS-30 Road

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 2.9$ cfs @ 12.18 hrs, Volume $=11,495$ cf, Depth> 3.14"

Routed to Pond CB14 : Catch Basin 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$ Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Subcatchment PS32: PS-32 - Gravel Wetland

Run from top of graveyard, thru site, and into wetland.
Runoff $=1.5 \mathrm{cfs} @ 12.34 \mathrm{hrs}$, Volume= $\quad 8,093 \mathrm{cf}$, Depth> 1.44"

Routed to Pond GW01 : Gravel Wetland \#1
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"

| Area (sf) | CN | Description | Land Use |
| ---: | ---: | :--- | :--- |
| 0 | 98 | Paved parking, HSG A | Woods |
| 0 | 98 | Paved parking, HSG B | Woods |
| 0 | 98 | Roofs, HSG A | Woods |
| 0 | 98 | Roofs, HSG B | Woods |
| 0 | 30 | Woods, Good, HSG A | Open Space |
| 44,245 | 55 | Woods, Good, HSG B | Open Space |
| 0 | 39 | $>75 \%$ Grass cover, Good, HSG A | Open Space |
| 22,093 | 61 | $>75 \%$ Grass cover, Good, HSG B | Open Space |
| 1,030 | 74 | $>75 \%$ Grass cover, Good, HSG C | Open Space |
| 67,368 | 57 | Weighted Average |  |
| 67,368 |  | $100.00 \%$ Pervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ | Description |
| ---: | ---: | ---: | ---: | ---: | :--- |
| 20.0 | 100 | 0.0800 | 0.08 | Sheet Flow, Sheet Flow <br> Woods: Dense underbrush n=0.800 P2=3.70" <br> Shallow Concentrated Flow, Shallow Concentrated <br> Woodland Kv=5.0 fps |  |
| 1.2 | 94 | 0.0650 | 1.27 |  |  |
| 21.2 | 194 | Total |  |  |  |

## Summary for Subcatchment PS33: PS-33 - Remainder of ES02

Run from top of graveyard, thru site, and into wetland.
Runoff $=\quad 18.7$ cfs @ 12.51 hrs, Volume $=110,962$ cf, Depth> 2.23"

Routed to Link PPoi-02 : POI
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.62"


## Summary for Reach ER3: R-03 Reach

Inflow Area $=399,877$ sf, $9.83 \%$ Impervious, Inflow Depth > 0.65" for 10-Year event
Inflow $=3.0 \mathrm{cfs}$ @ 12.35 hrs , Volume= $\quad 21,706 \mathrm{cf}$

Outflow = $1.3 \mathrm{cfs} @ 12.86 \mathrm{hrs}$, Volume $=20,450 \mathrm{cf}$, Atten $=58 \%$, Lag $=30.5 \mathrm{~min}$
Routed to Link EPoI02 : Ex Pol-02

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity $=0.44 \mathrm{fps}, \mathrm{Min}$. Travel Time $=54.2 \mathrm{~min}$
Avg. Velocity $=0.29 \mathrm{fps}$, Avg. Travel Time $=82.3 \mathrm{~min}$
Peak Storage $=4,098$ cf @ 12.86 hrs
Average Depth at Peak Storage=0.11' , Surface Width= 29.25'
Bank-Full Depth= 0.50' Flow Area= 17.5 sf, Capacity= 19.1 cfs
$25.00^{\prime} \times 0.50$ deep channel, $\mathrm{n}=0.100$ Earth, dense brush, high stage
Side Slope Z-value= 20.0 '/' Top Width= 45.00'
Length=1,421.0' Slope= 0.0190 '/'
Inlet Invert= 53.00', Outlet Invert= 26.00'


## Summary for Reach PR01: R-01 Reach

| Inflow Area = | 21,620 sf, 39.76\% Imperviou | w Depth > 1.90" for 10-Year event |
| :---: | :---: | :---: |
| Inflow | 0.9 cfs @ 12.11 hrs, Volume= | 3,422 cf |
| Outflow | 0.5 cfs @ 12.36 hrs, Volume= | $3,321 \mathrm{cf}$, Atten= 48\%, Lag= 14.9 min |

Routed to Link PPoi-01 : Prop Pol-01
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity= 0.31 fps , Min. Travel Time $=27.2 \mathrm{~min}$
Avg. Velocity $=0.11 \mathrm{fps}$, Avg. Travel Time $=76.2 \mathrm{~min}$
Peak Storage= 766 cf @ 12.36 hrs
Average Depth at Peak Storage=0.06' , Surface Width= 27.34'
Bank-Full Depth= 0.50' Flow Area= 17.5 sf, Capacity= 19.5 cfs
$25.00^{\prime} \times 0.50^{\prime}$ deep channel, $n=0.100$ Earth, dense brush, high stage
Side Slope Z-value= 20.0 '/' Top Width= 45.00'
Length=501.0' Slope= 0.0199 '/'
Inlet Invert= 35.95', Outlet Invert= 26.00'


## Summary for Reach PR02: R-02 Reach

Inflow Area $=301,519$ sf, 11.75\% Impervious, Inflow Depth > 0.83" for 10-Year event
Inflow $=3.7$ cfs @ 12.22 hrs , Volume=

20,894 cf
Outflow = 2.7 cfs @ 12.46 hrs , Volume $=$
20,517 cf, Atten $=26 \%$, Lag $=14.7 \mathrm{~min}$
Routed to Link PPoi-01 : Prop Pol-01
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity $=0.58 \mathrm{fps}$, Min. Travel Time $=14.1 \mathrm{~min}$
Avg. Velocity $=0.28 \mathrm{fps}$, Avg. Travel Time $=29.4$ min
Peak Storage= 2,311 cf @ 12.46 hrs
Average Depth at Peak Storage=0.17' , Surface Width=31.69'
Bank-Full Depth= 0.50' Flow Area= 17.5 sf, Capacity= 19.0 cfs
$25.00^{\prime} \times 0.50$ deep channel, $\mathrm{n}=0.100$ Earth, dense brush, high stage
Side Slope Z-value= 20.0 '/' Top Width= 45.00'
Length=487.0' Slope= 0.0189 '/'
Inlet Invert= 35.20', Outlet Invert= 26.00'


## Summary for Reach PR3: R-03 Reach



Routed to Link PPoi-01 : Prop Pol-01
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity= $0.37 \mathrm{fps}, \mathrm{Min}$. Travel Time= 21.9 min
Avg. Velocity $=0.22 \mathrm{fps}$, Avg. Travel Time $=37.3 \mathrm{~min}$
Peak Storage= 1,834 cf @ 14.13 hrs
Average Depth at Peak Storage=0.14' , Surface Width=30.43'
Bank-Full Depth= 1.00' Flow Area= 45.0 sf, Capacity $=52.5$ cfs
$25.00^{\prime} \times 1.00$ deep channel, $n=0.100$ Earth, dense brush, high stage
Side Slope Z-value= 20.0 '/' Top Width= 65.00'
Length=487.0' Slope= 0.0101 '/'
Inlet Invert= 30.90', Outlet Invert= 26.00'


Summary for Reach PR4: R-04 Reach


Routed to Link PPoi-02 : POI
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity $=0.54 \mathrm{fps}$, Min. Travel Time $=18.3 \mathrm{~min}$
Avg. Velocity $=0.23 \mathrm{fps}$, Avg. Travel Time $=43.4$ min
Peak Storage= 3,675 cf @ 12.90 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 33.47'
Bank-Full Depth= 0.50' Flow Area= 17.5 sf, Capacity= 15.6 cfs
25.00' x 0.50' deep channel, $\mathrm{n}=0.100$ Earth, dense brush, high stage

Side Slope Z-value= 20.0 '/' Top Width= 45.00'
Length $=594.0^{\prime}$ Slope $=0.01266^{\prime} / \prime$
Inlet Invert= 33.50', Outlet Invert= 26.00'


## Summary for Reach PR5: R-03 Reach

Inflow Area = 451,793 sf, $9.76 \%$ Impervious, Inflow Depth $=0.15$ " for 10-Year event Inflow $=\quad 2.3 \mathrm{cfs} @ 12.62 \mathrm{hrs}$, Volume= $=5,692 \mathrm{cf}$ Outflow $=\quad 2.3 \mathrm{cfs} @ 12.64 \mathrm{hrs}$, Volume $=\quad 5,692 \mathrm{cf}$, Atten= $1 \%$, Lag= 1.4 min

Routed to Link PPoi-01 : Prop Pol-01
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Max. Velocity $=0.35 \mathrm{fps}$, Min. Travel Time $=1.9 \mathrm{~min}$
Avg. Velocity $=0.11 \mathrm{fps}$, Avg. Travel Time $=6.3 \mathrm{~min}$
Peak Storage= 264 cf @ 12.64 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 33.95'
Bank-Full Depth= 0.50 ' Flow Area= 17.5 sf, Capacity= 9.8 cfs
$25.00^{\prime} \times 0.50$ deep channel, $\mathrm{n}=0.100$ Earth, dense brush, high stage
Side Slope Z-value= 20.0 '/' Top Width= 45.00'
Length=40.0' Slope= 0.0050 '/'
Inlet Invert= 33.40', Outlet Invert= 33.20'


## Summary for Pond BIO1: Bioretention Area \#1

Inflow Area $=\quad 222,623$ sf, $46.28 \%$ Impervious, Inflow Depth > 3.05" for 10-Year event
Inflow $=16.3$ cfs @ 12.11 hrs, Volume $=56,551 \mathrm{cf}$

Outflow = 1.4 cfs @ 13.70 hrs , Volume $=\quad 22,860 \mathrm{cf}$, Atten= 92\%, Lag= 95.4 min
Primary $=1.4$ cfs @ 13.70 hrs, Volume=

Secondary $=\quad 0.0 \mathrm{cfs} @ 0.00 \mathrm{hrs}$, Volume $=0 \mathrm{cf}$
Routed to Reach PR3: R-03 Reach
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.75 ( 13.70 hrs Surf.Area= $15,317 \mathrm{sf}$ Storage $=35,121 \mathrm{cf}$
Plug-Flow detention time $=293.6 \mathrm{~min}$ calculated for 22,812 cf ( $40 \%$ of inflow)
Center-of-Mass det. time $=171.8 \mathrm{~min}$ (998.3-826.5)

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | :--- |
| $\# 1$ | 32.55 | 491 cf | Media (Irregular) Listed below (Recalc) <br> 1,636 cf Overall $\times 30.0 \%$ Voids |
| $\# 2$ | $33.00^{\prime}$ | $59,069 \mathrm{cf}$ | Pond Area (Irregular)Listed below (Recalc) |

59,559 cf Total Available Storage

| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Perim. <br> (feet) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) | Wet.Area <br> (sq-ft) |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 32.55 | 3,635 | 387.6 | 0 | 0 | 3,635 |
| 33.00 | 3,635 | 387.6 | 1,636 | 1,636 | 3,809 |
|  |  |  |  |  |  |
| Elevation | Surf.Area | Perim. | Inc.Store <br> (feet) | (sq-ft) | Cum.Store |$\quad$| Wet.Area |
| ---: |
| (feet) |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 32.65' | 18.0" Round Culvert |
|  |  |  | $\mathrm{L}=39.0^{\prime}$ CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 32.65 '/32.35' S=0.0077 '/' Cc= |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= |
| \#2 | Device 1 | 32.65' | 1.2" Vert. Lower UD Orifice $\mathrm{C}=0.600$ |
|  |  |  | Limited to weir flow at low heads |
| \#3 | Device 1 | 36.25' | 1.2" Vert. Upper UD Orifice C= 0.600 |
|  |  |  | Limited to weir flow at low heads |
| \#4 | Device 1 | 37.60' | 24.0" Horiz. Grate $\mathrm{C}=0.600$ Limited to weir flow at |
| \#5 | Secondary | 39.50' | 100.0' long x 10.0' breadth Broad-Crested Rectangula |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) 2.492 .562 .702 .692 .682 .692 .67 |
| Primary OutFlow Max=1.4 cfs @ 13.70 hrs HW=37.75' TW=32.54' (Dynamic Tailwater) L- Culvert (Passes 1.4 cfs of 17.8 cfs potential flow) $_{\text {( }}$ |  |  |  |
|  |  |  |  |  |  |
| -2=Lower UD Orifice (Orifice Controls 0.1 cfs @ 10.82 fps ) |  |  |  |
| -3=Upper UD Orifice (Orifice Controls 0.0 cfs @ 5.80 fps ) |  |  |  |
| -4=Grate (Weir Controls 1.2 cfs @ 1.28 fps ) |  |  |  |

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=32.55' TW=30.90' (Dynamic Tailwater)
${ }^{-} 5=$ Broad-Crested Rectangular Weir ( Controls 0.0 cfs )

## Summary for Pond BIO2: Bioretention Area \#2

\begin{tabular}{|c|c|c|c|c|}
\hline Inflow Area \(=\) \& 56,22 \& 27.09\% Impervious, In \& Depth > 2.77" \& 10-Year event \\
\hline Inflow = \& 4.1 cfs @ \& 12.10 hrs , Volume= \& 12,994 cf \& \\
\hline Outflow \& 0.2 cfs @ \& 15.38 hrs, Volume= \& 4,906 cf, Atten \& , Lag= 197.3 min \\
\hline Primary = Routed to \& \begin{tabular}{l}
\[
0.2 \text { cfs @ }
\] \\
Pond MH10 : M
\end{tabular} \& 15.38 hrs , Volume= anhole 10 \& 4,906 cf \& \\
\hline Secondary = Routed to \& \[
\begin{array}{r}
0.0 \mathrm{cfs} @ \\
\text { Pond BIO1 : Bio }
\end{array}
\] \& 0.00 hrs , Volume= etention Area \#1 \& 0 cf \& \\
\hline \begin{tabular}{l}
Routing by \(D\) \\
Peak Elev= 3
\end{tabular} \& yn-Stor-Ind meth 9.76' @ 15.38 h \& \begin{tabular}{l}
od, Time Span \(=0.00-24.00\) \\
s Surf.Area= 11,700 sf S
\end{tabular} \& \[
\begin{aligned}
\& \mathrm{s}, \mathrm{dt}=0.05 \mathrm{hrs} / \\
\& \text { rage }=8,904 \mathrm{cf}
\end{aligned}
\] \& \\
\hline Plug-Flow de Center-of-Ma \& \begin{tabular}{l}
tention time \(=353\) \\
ss det. time \(=228\)
\end{tabular} \& .2 min calculated for 4,895 8.4 min (1,062.2-833.8) \& (38\% of inflow) \& \\
\hline Volume \& Invert Ava \& Storage Storage Description \& \& \\
\hline \#1 \& 37.50

38.50 \& \begin{tabular}{ll}

$1,520 \mathrm{cf}$ \& | Media (Irregular |
| :--- |
| 5,068 cf Overall | <br>

$25,518 \mathrm{cf}$ \& Pond Area (Irre

 \& 

isted below (Re 30.0\% Voids <br>
lar)Listed below
\end{tabular} \& <br>

\hline \& \& 7,039 cf Total Available S \& rage \& <br>
\hline Elevation (feet) \& Surf.Area (sq-ft) \& $\begin{array}{rr}\text { Perim. } & \begin{array}{r}\text { Inc.Store } \\ \text { (feet) }\end{array} \\ \text { (cubic-feet) }\end{array}$ \& Cum.Store (cubic-feet) \& Wet.Area (sq-ft) <br>
\hline 37.50 \& 5,068 \& 402.0 \& 0 \& 5,068 <br>
\hline 38.50 \& 5,068 \& 402.0 5,068 \& 5,068 \& 5,470 <br>
\hline
\end{tabular}

| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Perim. <br> (feet) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) | Wet.Area <br> (sq-ft) |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 38.50 | 5,068 | 402.0 | 0 | 0 | 5,068 |
| 39.00 | 5,678 | 411.6 | 2,685 | 2,685 | 5,722 |
| 40.00 | 6,941 | 430.4 | 6,299 | 8,984 | 7,050 |
| 41.00 | 8,261 | 449.2 | 7,591 | 16,575 | 8,438 |
| 41.50 | 8,941 | 458.7 | 4,299 | 20,875 | 9,161 |
| 42.00 | 9,637 | 468.1 | 4,643 | 25,518 | 9,892 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 37.00' | 18.0" Round Culvert |
|  |  |  | L=54.0' CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 37.00' / 34.50' S=0.0463 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| \#2 | Device 1 | 37.50' | 0.5" Vert. Orifice $\mathrm{C}=0.600$ Limited to weir flow at low heads |
| \#3 | Device 1 | 39.50' | 6.0" Vert. Orifice $C=0.600$ Limited to weir flow at low heads |
| \#4 | Device 1 | 40.75' | 24.0" Horiz. Grate $\mathrm{C}=0.600$ Limited to weir flow at low heads |
| \#5 | Secondary | 41.50' | 100.0' long x 10.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) 2.492 .562 .702 .692 .682 .692 .672 .64 |

Primary OutFlow Max=0.2 cfs @ 15.38 hrs HW=39.76' TW=32.49' (Dynamic Tailwater)
L- $=$ Culvert (Passes 0.2 cfs of 12.1 cfs potential flow)
-2=Orifice (Orifice Controls 0.0 cfs @ 7.21 fps )
-3=Orifice (Orifice Controls 0.2 cfs @ 1.75 fps )
4=Grate (Controls 0.0 cfs )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=37.50' TW=32.55' (Dynamic Tailwater)
$-5=$ Broad-Crested Rectangular Weir ( Controls 0.0 cfs )

## Summary for Pond CB01: Catch Basin 01

| Inflow Area $=$ | $18,388 \mathrm{sf}, ~ 32.87 \%$ |  | Impervious, |
| :--- | :--- | :--- | :--- |

Routed to Pond CB02 : Catch Basin 02
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.15' @ 12.13 hrs
Flood Elev= 39.82'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 36.65' | 12.0" Round Culvert |
|  |  |  | $\mathrm{L}=20.0$ ' CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 36.65' / 36.50' S=0.0075 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area $=0.79 \mathrm{sf}$ |
| \#2 | Secondary | 39.43' | 20.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) |

Primary OutFlow Max=0.6 cfs @ 12.14 hrs HW=37.15' TW=36.96' (Dynamic Tailwater)
—1=Culvert (Outlet Controls 0.6 cfs @ 2.27 fps )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=36.65' TW=36.40' (Dynamic Tailwater)
-2=Sharp-Crested Rectangular Weir ( Controls 0.0 cfs)

## Summary for Pond CB02: Catch Basin 02

| Inflow Area = | 21,620 | 6\% Impervious | Depth > | 1.90" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 0.9 cfs @ | 12.11 hrs, Volume= | 3,422 cf |  |
| Outflow | 0.9 cfs @ | 12.11 hrs , Volume= | 3,422 cf, | Atten=0\%, Lag= 0.0 min |
| Primary | 0.9 cfs @ | 12.11 hrs , Volume= | 3,422 cf |  |
| Routed to | PR01 : | 1 Reach |  |  |
| Secondary = | 0.0 cfs @ | 0.00 hrs , Volume= | 0 c |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 36.98' @ 12.11 hrs
Flood Elev= 39.82'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 36.40' | 12.0" Round Culvert |
|  |  |  | $\mathrm{L}=60.0^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert=36.40' / 36.10' S=0.0050 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 0.79 sf |
| \#2 | Secondary | 39.85' | 20.0' long x 3.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .601 .80 |
|  |  |  | 2.503 .003 .504 .004 .50 |
|  |  |  | Coef. (English) 2.442 .582 .682 .672 .652 .6412 .6412 .682 .68 |
|  |  |  | 2.722 .812 .922 .973 .073 .32 |
| Primary OutFlow Max=0.9 cfs @ 12.11 hrs HW=36.97' TW=35.99' (Dynamic Tailwater) —1=Culvert (Barrel Controls 0.9 cfs @ 2.78 fps ) |  |  |  |
|  |  |  |  |  |  |
| Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=36.40' TW=35.95' (Dynamic Tailwater) L2=Broad-Crested Rectangular Weir ( Controls 0.0 cfs ) |  |  |  |

## Summary for Pond CB05: Catch Basin 05

| Inflow Area | 31,25 | 5\% | Depth > | 2.86" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 2.1 cfs @ | 12.13 hrs , Volume= | 7,459 cf |  |
| Outflow | 2.1 cfs @ | 12.13 hrs , Volume= | 7,459 cf, | Atten= 0\%, Lag= 0.0 min |
| Primary | 2.1 cfs @ | 12.13 hrs , Volume= | 7,459 cf |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 39.00' @ 12.13 hrs
Flood Elev= 41.60'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 38.05' | 12.0" Round Culvert |
|  |  |  | $\mathrm{L}=20.0$ ' CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 38.05' / 37.90' S=0.0075 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 0.79 sf |

Primary OutFlow Max=2.1 cfs @ 12.13 hrs HW=38.99' TW=38.47' (Dynamic Tailwater)
L-1=Culvert (Barrel Controls 2.1 cfs @ 3.52 fps )

## Summary for Pond CB06: Catch Basin 04



Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 38.49' @ 12.12 hrs
Flood Elev= 41.60'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 37.60' | 18.0" Round Culvert |
|  |  |  | L= 191.0' CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 37.60' / 36.60' S=0.0052 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| \#2 | Secondary | 42.06' | 50.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) |

Primary OutFlow Max=2.6 cfs @ 12.12 hrs HW=38.47' TW=37.46' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 2.6 cfs @ 3.46 fps )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=37.60' TW=35.20' (Dynamic Tailwater)
$\boldsymbol{L}_{\mathbf{2}}=$ Sharp-Crested Rectangular Weir ( Controls 0.0 cfs )

## Summary for Pond CB08: Catch Basin 08

| Inflow Area = | 46,676 sf, 50.48\% Impervious, | Inflow Depth > 2.96" for 10-Year event |
| :---: | :---: | :---: |
| Inflow = | 3.2 cfs @ 12.14 hrs, Volume= | 11,497 cf |
| Outflow = | 3.2 cfs @ 12.14 hrs , Volume= | $11,497 \mathrm{cf}$, Atten= 0\%, Lag= 0.0 min |
| Primary = Routed to Pond | 3.2 cfs @ 12.14 hrs , Volume= MH01b : Manhole 01b | 11,497 cf |
| Routing by Dyn-S <br> Peak Elev=39.66 <br> Flood Elev= 43.08 | or-Ind method, Time Span= 0.00@ 12.14 hrs | $.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs} / 3$ |
| Device Routing | Invert Outlet Devices |  |
| \#1 Primary | 38.75' 18.0' Round Cu | vert |

L= 24.0' CPP, square edge headwall, $\mathrm{Ke}=0.500$
Inlet / Outlet Invert= 38.75' / 38.45' S=0.0125 '/' Cc= 0.900 $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.2 cfs @ 12.14 hrs HW=39.65' TW=37.10' (Dynamic Tailwater)
—1=Culvert (Barrel Controls 3.2 cfs @ 4.13 fps )

## Summary for Pond CB09: Catch Basin 09



Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.75' @ 13.69 hrs
Flood Elev= 41.60'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 34.85' | 24.0" Round Culvert |
|  |  |  | $\mathrm{L}=171.0^{\prime}$ CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 34.85' / 33.90' S=0.0056 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 3.14 sf |

Primary OutFlow Max=6.8 cfs @ 12.12 hrs HW=36.47' TW=35.87' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 6.8 cfs @ 3.40 fps )

## Summary for Pond CB10: Catch Basin 10

 Routed to Pond CB11 : Catch Basin 11

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 45.65' @ 12.12 hrs
Flood Elev= 49.11'

| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- |
| $\# 1$ | Primary | $45.00^{\prime}$ | $15.0^{\prime \prime}$ Round Culvert |
|  |  | $\mathrm{L}=16.0^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ |  |
|  |  | Inlet $/$ Outlet Invert $=45.00^{\prime} / 44.90^{\prime} \mathrm{S}=0.0063^{\prime} / l^{\prime} \mathrm{Cc}=0.900$ |  |
|  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.23 sf |  |

Primary OutFlow Max=1.1 cfs @ 12.14 hrs HW=45.64' TW=45.45' (Dynamic Tailwater)
—1=Culvert (Outlet Controls 1.1 cfs @ 2.45 fps )

## Summary for Pond CB11: Catch Basin 11



Primary OutFlow Max=1.6 cfs @ 12.11 hrs HW=45.47' TW=44.01' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 1.6 cfs @ 3.54 fps )

## Summary for Pond CB12: Catch Basin 12



## Summary for Pond CB13: Catch Basin 13



Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 43.56' @ 12.13 hrs
Flood Elev= 47.53'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 42.25' | 16.0" Round Culvert |
|  |  |  | $\mathrm{L}=16.0$ ' CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 42.25' / 42.00' S=0.0156 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.40 sf |
| $\underbrace{\text { Primar }}_{1=C}$ | OutFlow lvert (O | 3 cfs trols 4 | 12.14 hrs HW=43.54' TW=43.12' (Dynamic Tailwater) cfs @ 3.93 fps ) |

## Summary for Pond CB14: Catch Basin 14

| Inflow Area = | 43,899 sf, 42.17\% Impervious, Inflow Depth > 3.14" for 10-Year event |  |  |
| :---: | :---: | :---: | :---: |
| Inflow | 2.9 cfs @ 12 | 18 hrs , Volume= | 11,495 cf |
| Outflow | 2.9 cfs @ 12 | 18 hrs , Volume= | $11,495 \mathrm{cf}$, Atten= 0\%, Lag $=0.0 \mathrm{~min}$ |
| Primary = Routed to Pond | $\begin{aligned} & 2.9 \mathrm{cfs} @ 12 \\ & \text { CB15: Catch } \end{aligned}$ | 18 hrs , Volume= asin 15 | 11,495 cf |
| Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$ Peak Elev= 41.93' @ 12.16 hrs <br> Flood Elev= 44.85' |  |  |  |
| Device Routing | Invert | Outlet Devices |  |
| \#1 Primary | 40.55' | 18.0" Round Culu L=28.0' CPP, s Inlet / Outlet Inve $n=0.013$ Corrug | vert <br> uare edge headwall, $\mathrm{Ke}=0.500$ <br> $t=40.40 ' / 40.55 ' \quad S=-0.0054$ '/' Cc= 0.900 <br> ted PE, smooth interior, Flow Area= 1.77 sf |
| Primary OutFlow Max=2.9 cfs @ 12.18 hrs HW=41.89' TW=41.76' (Dynamic Tailwater) <br> —1=Culvert (Inlet Controls 2.9 cfs @ 1.74 fps ) |  |  |  |

## Summary for Pond CB15: Catch Basin 15


$\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf
Primary OutFlow Max=5.4 cfs @ 12.16 hrs HW=41.79' TW=40.90' (Dynamic Tailwater)
—1=Culvert (Barrel Controls 5.4 cfs @ 4.31 fps )

## Summary for Pond CB16: Catch Basin 16



Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.75' @ 13.74 hrs
Flood Elev= 41.59'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 36.80' | 15.0" Round Culvert |
|  |  |  | $\mathrm{L}=16.0{ }^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert=36.80' / 36.60' S=0.0125 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| \#2 | Secondary | 40.02' | 20.0' long x 3.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .601 .802 .00 |
|  |  |  | 2.503 .003 .504 .004 .50 |
|  |  |  | Coef. (English) 2.442 .582 .682 .672 .6512 .6412 .6412 .682 .68 |
|  |  |  | 2.722 .812 .922 .973 .073 .32 |

Primary OutFlow Max=1.1 cfs @ 12.11 hrs HW=37.38' TW=37.13' (Dynamic Tailwater)
$L_{1=C u l v e r t ~(O u t l e t ~ C o n t r o l s ~}^{1.1}$ cfs @ 2.84 fps )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=36.80' TW=30.90' (Dynamic Tailwater)
-2=Broad-Crested Rectangular Weir ( Controls 0.0 cfs)

## Summary for Pond CB17: Catch Basin 17



Inlet / Outlet Invert= 36.40' / 34.50' S=0.0084 '/' Cc= 0.900 $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.9 cfs @ 12.13 hrs HW=37.13' TW=36.05' (Dynamic Tailwater)
$L_{1=C u l v e r t ~(O u t l e t ~ C o n t r o l s ~}^{1.9} \mathrm{cfs} @ 3.15 \mathrm{fps}$ )

## Summary for Pond CB18: Catch Basin 18

 Routed to Pond CB19 : Catch Basin 19

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.75' @ 13.75 hrs
Flood Elev= 38.35'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 34.80' | 15.0" Round Culvert |
|  |  |  | $\mathrm{L}=16.0^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert=34.80' / 34.70' S=0.0063 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.23 s |

Primary OutFlow Max=0.0 cfs @ 12.08 hrs HW=35.63' TW=35.76' (Dynamic Tailwater) —1=Culvert (Controls 0.0 cfs )

## Summary for Pond CB19: Catch Basin 19

| Inflow Area = | 58,669 | f, 51.13\% | pervious | Inflow Depth > | 3.46 " for | $0-Y e a r ~ e v e n t ~$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Inflow | 4.7 cfs @ | 12.12 hrs , | Volume= | 16,915 cf |  |  |
| Outflow | 4.7 cfs @ | 12.12 hrs , | Volume= | 16,915 cf, | Atten= 0\%, | Lag $=0.0 \mathrm{~min}$ |
| Primary | 4.7 cfs @ | 12.12 hrs , | Volume= | 16,915 cf |  |  | Routed to Pond MH12 : Manhole 12

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.75' @ 13.70 hrs
Flood Elev= 38.35'

| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- |
| $\# 1$ | Primary | $34.10^{\prime}$ | $24.0^{\prime \prime}$ Round Culvert |
|  |  | $\mathrm{L}=76.0^{\prime}$ CPP, square edge headwall, $\mathrm{Ke}=0.500$ |  |
|  |  | Inlet $/$ Outlet Invert= 34.10' $/ 33.70^{\prime} \mathrm{S}=0.0053^{\prime} / /^{\prime} \mathrm{Cc}=0.900$ |  |
|  |  | $\mathrm{n}=0.013$ Corrugated PE , smooth interior, Flow Area= 3.14 sf |  |

Primary OutFlow Max=4.7 cfs @ 12.12 hrs HW=36.01' TW=35.88' (Dynamic Tailwater)
—1 $^{\text {=Culvert }}$ (Outlet Controls 4.7 cfs @ 1.93 fps )

## Summary for Pond DI01: DI-01 DROP INLET

| Inflow Area = | 301,519 sf | f, 11.75\% Impervious | Inflow Depth > | 0.83" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 3.7 cfs @ | 12.22 hrs , Volume= | 20,895 cf |  |
| Outflow | 3.7 cfs @ | 12.22 hrs , Volume= | 20,894 cf, | Atten= 0\%, Lag= 0.0 min |
| Primary | 3.7 cfs @ | 12.22 hrs , Volume= | 20,894 cf |  |
| Routed to | PR02 : R-0 | 02 Reach |  |  |
| Secondary = | 0.0 cfs @ | 0.00 hrs , Volume= | 0 cf |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.21' @ 12.22 hrs Surf.Area= 4 sf Storage= 3 cf
Flood Elev=42.00' Surf.Area= 1,494 sf Storage= 690 cf
Plug-Flow detention time $=0.0 \mathrm{~min}$ calculated for $20,851 \mathrm{cf}$ ( $100 \%$ of inflow)
Center-of-Mass det. time $=0.0 \mathrm{~min}$ ( 913.4-913.4)

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | :--- |
| $\# 1$ | $36.45^{\prime}$ | 17 cf | 2.00 'W x 2.00'L $\times$ 4.29'H DI |
| $\# 2$ | $40.74^{\prime}$ | $4,796 \mathrm{cf}$ | Custom Stage Data (Irregular)Listed below (Recalc) |
|  |  | $4,813 \mathrm{cf}$ | Total Available Storage |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Perim. <br> (feet) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) | Wet.Area <br> (sq-ft) |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 40.74 | 4 | 8.0 | 0 | 0 | 4 |
| 41.00 | 103 | 73.6 | 11 | 11 | 430 |
| 42.00 | 1,490 | 260.3 | 662 | 673 | 5,394 |
| 43.00 | 4,704 | 454.5 | 2,947 | 3,620 | 16,446 |
| 43.25 | 4,704 | 454.5 | 1,176 | 4,796 | 16,560 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 36.45' | 15.0" Round Culvert X 2.00 |
|  |  |  | $\mathrm{L}=144.0$ ' CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 36.45' / 35.70' S=0.0052 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| \#2 | Secondary | 42.90' | 20.0' long x 20.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) 2.682 .702 .702 .642 .632 .642 .642 .63 |

Primary OutFlow Max=3.6 cfs @ 12.22 hrs HW=37.20' TW=35.31' (Dynamic Tailwater)
L-1=Culvert (Barrel Controls 3.6 cfs @ 3.41 fps )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=36.45' TW=38.05' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir ( Controls 0.0 cfs)

## Summary for Pond DI02: Drop Inlet \#2

| Inflow Area = | 394,562 sf, 8.81\% Impervious, Inflow Depth > 0.71" for 10-Year event |  |
| :---: | :---: | :---: |
| Inflow = | 2.9 cfs @ 12. | 51 hrs, Volume $=\quad 23,224 \mathrm{cf}$ |
| Outflow = | 2.9 cfs @ 12.5 | 51 hrs , Volume= $\quad 23,224 \mathrm{cf}$, Atten= $0 \%$, Lag= 0.0 min |
| Primary = Routed to Pond | 2.9 cfs @ 12 <br> MH11 : Manhol | 51 hrs , Volume $=\quad 23,224 \mathrm{cf}$ |
| Routing by Dyn-St <br> Peak Elev=47.17' <br> Flood Elev=49.50 | r-Ind method, @ 12.51 hrs | Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$ |
| Device Routing | Invert | Outlet Devices |
| \#1 Primary | 46.40' | 24.0" Round Culvert $\mathrm{L}=185.0^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ Inlet / Outlet Invert= 46.40' / 45.20' S=0.0065 '/' Cc= 0.900 $\mathrm{n}=0.013$ Corrugated PE , smooth interior, Flow Area= 3.14 sf |

Primary OutFlow Max=2.9 cfs @ 12.51 hrs HW=47.16' TW=45.83' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 2.9 cfs @ 3.95 fps )

## Summary for Pond GW01: Gravel Wetland \#1



| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Perim. <br> (feet) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) | Wet.Area <br> $(\mathrm{sq}-\mathrm{ft})$ |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 34.40 | 5,645 | 356.4 | 0 | 0 | 5,645 |
| 35.00 | 5,645 | 366.4 | 3,387 | 3,387 | 6,260 |


| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 35.00 | 5,557 | 362.7 | 0 | 0 | 5,557 |
| 37.00 | 4,441 | 398.5 | 9,977 | 9,977 | 7,855 |
| 37.33 | 8,971 | 437.5 | 2,170 | 12,147 | 10,453 |
| 38.00 | 9,858 | 450.1 | 6,305 | 18,452 | 11,392 |
| 38.25 | 11,021 | 492.1 | 2,609 | 21,061 | 14,543 |
| 39.00 | 11,021 | 492.1 | 8,266 | 29,326 | 14,912 |
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc. Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
| 34.40 | 5,388 | 380.7 | 0 | 0 | 5,388 |
| 35.00 | 5,388 | 380.7 | 3,233 | 3,233 | 5,616 |
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
| 35.00 | 5,388 | 380.7 | 0 | 0 | 5,388 |
| 38.00 | 9,069 | 437.3 | 21,447 | 21,447 | 9,271 |
| 38.25 | 10,225 | 483.0 | 2,410 | 23,858 | 12,620 |
| 39.00 | 10,225 | 483.0 | 7,669 | 31,526 | 12,982 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 34.40' | 18.0" Round Culvert |
|  |  |  | $\mathrm{L}=25.0^{\prime}$ CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 34.40' / 33.97' S=0.0172 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| \#2 | Device 1 | 34.40' | 0.5" Vert. Orifice $\mathrm{C}=0.600$ Limited to weir flow at low heads |
| \#3 | Device 1 | 35.75' | 2.0" Vert. Upper Orifice C=0.600 |
|  |  |  | Limited to weir flow at low heads |
| \#4 | Device 1 | 36.75' | 18.0" Horiz. Grate $\mathrm{C}=0.600$ Limited to weir flow at low heads |
| \#5 | Secondary | $37.50{ }^{\prime}$ | 12.0' long x 4.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | $\begin{array}{lllllllllllll}\text { Head (feet) } & 0.20 & 0.40 & 0.60 & 0.80 & 1.00 & 1.20 & 1.40 & 1.60 & 1.80 & 2.00\end{array}$ |
|  |  |  |  |
|  |  |  | Coef. (English) 2.382 .542 .692 .682 .672 .672 .6512 .662 .66 |
|  |  |  | $2.682 .722 .73 \quad 2.762 .792 .883 .073 .32$ |

Primary OutFlow Max=4.3 cfs @ 12.60 hrs HW=37.17' TW=33.66' (Dynamic Tailwater)
L1=Culvert (Passes 4.3 cfs of 12.1 cfs potential flow)
-2=Orifice (Orifice Controls 0.0 cfs @ 7.98 fps)
-3=Upper Orifice (Orifice Controls 0.1 cfs @ 5.56 fps )
-4=Grate (Weir Controls 4.2 cfs @ 2.11 fps )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=34.40' TW=33.50' (Dynamic Tailwater)
-5=Broad-Crested Rectangular Weir ( Controls 0.0 cfs)

## Summary for Pond INF1: Bioretention Area \#2



Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 44.23 @ 12.62 hrs Surf.Area= 4,787 sf Storage $=5,139$ cf
Plug-Flow detention time $=39.0$ min calculated for 34,075 cf ( $99 \%$ of inflow)
Center-of-Mass det. time $=35.0 \mathrm{~min}$ (940.1-905.1)

| Volume | Invert Avail.Storage |  | Storage Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| \#1 | 43.00' | 15,259 cf | Pond Area (Irre | Listed belo |  |
| Elevation (feet) | Surf.Area $(\mathrm{sq}-\mathrm{ft})$ | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
| 43.00 | 3,554 | 334.7 | 0 | 0 | 3,554 |
| 44.00 | 4,551 | 347.3 | 4,042 | 4,042 | 4,318 |
| 45.00 | 5,599 | 362.2 | 5,066 | 9,108 | 5,231 |
| 45.50 | 6,150 | 371.6 | 2,936 | 12,044 | 5,810 |
| 46.00 | 6,714 | 381.0 | 3,215 | 15,259 | 6,403 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 41.00' | 15.0" Round Culvert |
|  |  |  | L= 189.0' ${ }^{\text {CPP, }}$, projecting, no headwall, $\mathrm{Ke}=0.900$ |
|  |  |  | Inlet / Outlet Invert= 41.00' / 37.40' S= 0.0190 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| \#2 | Device 1 | 44.00' | 24.0" Horiz. Grate $\mathrm{C}=0.600$ Limited to weir flow at low heads |
| \#3 | Secondary | 45.00' | 10.0' long x 12.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) 2.572 .622 .702 .67 2.66 2.672 .662 .64 |
| \#4 | Discarded | 43.00' | $9.500 \mathrm{in} / \mathrm{hr}$ Exfiltration over Horizontal area Phase-In= 0.25 |

Discarded OutFlow Max=1.1 cfs @ 12.62 hrs HW=44.23' (Free Discharge)
L4=Exfiltration (Exfiltration Controls 1.1 cfs)
Primary OutFlow Max=2.3 cfs @ 12.62 hrs HW=44.23' TW=37.93' (Dynamic Tailwater)
L- $_{1=C u l v e r t ~(P a s s e s ~}^{2.3}$ cfs of 7.5 cfs potential flow)
$\mathcal{L}_{\mathbf{2}=\text { Grate }}$ (Weir Controls 2.3 cfs @ 1.58 fps )
Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=43.00' TW=37.50' (Dynamic Tailwater)
-3=Broad-Crested Rectangular Weir ( Controls 0.0 cfs)

## Summary for Pond MH01a: Manhole 01



Primary OutFlow Max=2.4 cfs @ 12.12 hrs HW=37.46' TW=37.06' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 2.4 cfs @ 2.87 fps )

## Summary for Pond MH01b: Manhole 01b



Primary OutFlow Max=5.7 cfs @ 12.13 hrs HW=37.08' TW=36.50' (Dynamic Tailwater)
—1=Culvert (Outlet Controls 5.7 cfs @ 3.82 fps )

## Summary for Pond MH03: Manhole 03



Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 44.02' @ 12.11 hrs
Flood Elev= 51.32'

| Device | Routing | Invert |
| :--- | :--- | :--- | Outlet Devices

## Summary for Pond MH05: Manhole 05


$\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 3.14 sf
Primary OutFlow Max=7.7 cfs @ 12.12 hrs HW=41.79' TW=41.10' (Dynamic Tailwater) —1=Culvert (Outlet Controls 7.7 cfs @ 4.28 fps )

## Summary for Pond MH06: Manhole 06

| Inflow Area | 97,187 | vious, | Inflow Depth > | 3.45 " for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 8.0 cfs @ | 12.12 hrs , Volume= | 27,950 cf |  |
| Outflow | 8.0 cfs @ | 12.12 hrs , Volume= | 27,950 cf, | Atten= 0\%, Lag $=0.0 \mathrm{~min}$ |
| Primary | 8.0 cfs @ | 12.12 hrs , Volume= | 27,950 cf |  | Routed to Pond MH07 : Manhole 07

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 41.12' @ 12.12 hrs
Flood Elev= 50.47'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 39.65' | 24.0" Round Culvert |
|  |  |  | $\mathrm{L}=129.0^{\prime}$ CPP, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 39.65' / 38.90' S=0.0058'/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 3.14 sf |

Primary OutFlow Max=7.8 cfs @ 12.12 hrs HW=41.10' TW=40.17' (Dynamic Tailwater) -1=Culvert (Outlet Controls 7.8 cfs @ 4.46 fps )

## Summary for Pond MH07: Manhole 07



Primary OutFlow Max=12.9 cfs @ 12.13 hrs HW=40.18' TW=38.43' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 12.9 cfs @ 5.23 fps )

## Summary for Pond MH08: Manhole 08

| Inflow Area = | 172,855 sf, | 39\% Imperviou | Inflow Depth > 3.39" for 10-Year event |
| :---: | :---: | :---: | :---: |
| Inflow = | 13.1 cfs @ 12. | . $13 \mathrm{hrs}, \mathrm{Volume=}$ | 48,801 cf |
| Outflow = | 13.1 cfs @ 12.1 | 13 hrs , Volume= | $48,801 \mathrm{cf}$, Atten $=0 \%, L a g=0.0 \mathrm{~min}$ |
| Primary = | 13.1 cfs @ 12. | 13 hrs , Volume= | 48,801 cf |
| Routed to Pond | GW01 : Gravel | Wetland \#1 |  |
| Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs $/ 3$ Peak Elev= 38.44' @ 12.13 hrs <br> Flood Elev= 40.95' |  |  |  |
| Device Routing | Invert | Outlet Devices |  |
| \#1 Primary | 36.85' | 30.0" Round C L= 176.0' CPP, Inlet / Outlet Inve $\mathrm{n}=0.013$ Corrug | vert <br> quare edge headwall, $\mathrm{Ke}=0.500$ <br> $t=36.85$ ' $35.65^{\prime} \quad S=0.0068$ '/' Cc= 0.900 <br> ted PE, smooth interior, Flow Area= 4.91 s |

Primary OutFlow Max=12.9 cfs @ 12.13 hrs HW=38.43' TW=36.25' (Dynamic Tailwater)
——1=Culvert (Barrel Controls 12.9 cfs @ 5.66 fps )

## Summary for Pond MH09: Manhole 09



## Summary for Pond MH10: Manhole 10

| Inflow Area = | 278,84 | 42.41\% Imperviou | Inflow | 1.19" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 1.5 cfs @ | 13.76 hrs, Volume= | 27,765 cf |  |
| Outflow | 1.5 cfs @ | 13.76 hrs, Volume= | 27,765 cf, | Atten=0\%, Lag= 0.0 min |
| Primary | 1.5 cfs @ | 13.76 hrs, Volume= | 27,765 cf |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 32.54' @ 13.76 hrs
Flood Elev= 41.09'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 32.15' | 24.0" Round Culvert X 2.00 |
|  |  |  | $\mathrm{L}=220.0^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ |
|  |  |  | Inlet / Outlet Invert= 32.15' / 31.00' S=0.0052 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 3.14 sf |

Primary OutFlow Max=1.5 cfs @ 13.76 hrs HW=32.54' TW=31.03' (Dynamic Tailwater)
L1=Culvert (Barrel Controls 1.5 cfs @ 2.58 fps )

## Summary for Pond MH11: Manhole 11

| Inflow Area = | 394,562 sf, 8.81\% Impervious, Inflow Depth > 0.71" for 10-Year event |  |
| :---: | :---: | :---: |
| Inflow | 2.9 cfs @ 12. | 51 hrs, Volume= $23,224 \mathrm{cf}$ |
| Outflow | 2.9 cfs @ 12. | 51 hrs , Volume $=\quad 23,224 \mathrm{cf}$, Atten= $0 \%$, Lag= 0.0 min |
| Primary = Routed to Pond | 2.9 cfs @ 12 <br> INF1: Bioreten | 51 hrs, Volume $=\quad 23,224 \mathrm{cf}$ tion Area \#2 |
| Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$ Peak Elev= 45.83' @ 12.51 hrs <br> Flood Elev= 49.50' |  |  |
| Device Routing | Invert | Outlet Devices |
| \#1 Primary | 45.10' | 24.0" Round Culvert <br> $\mathrm{L}=178.0^{\prime} \quad \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ <br> Inlet / Outlet Invert= 45.10' / 43.75' S=0.0076 '/' Cc= 0.900 $\mathrm{n}=0.013$ Corrugated PE , smooth interior, Flow Area= 3.14 sf |
| Primary OutFlow <br> L-CCulvert (Ba | Max=2.9 cfs @ <br> el Controls 2.9 | 12.51 hrs HW=45.83' TW=44.20' (Dynamic Tailwater) cfs @ 4.21 fps ) |

## Summary for Pond MH12: Manhole 12

 Routed to Pond BIO1 : Bioretention Area \#1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 37.75' @ 13.70 hrs
Flood Elev= 39.14'

$\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 3.14 sf
Primary OutFlow Max=4.6 cfs @ 12.12 hrs HW=35.88' TW=35.86' (Dynamic Tailwater) —1=Culvert (Inlet Controls 4.6 cfs @ 0.73 fps )

## Summary for Pond MH13: Manhole 13

| Inflow Are | 451,793 sf, | 9.76\% Impervious, | In | 0.15" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 2.3 cfs @ 1 | 12.62 hrs , Volume= | 5,692 cf |  |
| Outflow | 2.3 cfs @ 1 | 12.62 hrs , Volume= | 5,692 cf, | Atten $=0 \%$, Lag $=0.0 \mathrm{~min}$ |
| Primary | 2.3 cfs @ 1 | 12.62 hrs , Volume= | 5,692 cf |  |

Routed to Reach PR5 : R-03 Reach
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= $0.05 \mathrm{hrs} / 3$
Peak Elev= 37.94' @ 12.62 hrs
Flood Elev= 49.50'

| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- |
| $\# 1$ | Primary | $37.30^{\prime}$ | $24.0^{\prime \prime}$ Round Culvert |
|  |  | $\mathrm{L}=148.0^{\prime} \mathrm{CPP}$, square edge headwall, $\mathrm{Ke}=0.500$ |  |
|  |  | Inlet / Outlet Invert $=37.30^{\prime} / 33.50^{\prime} \mathrm{S}=0.0257^{\prime} / /^{\prime} \mathrm{Cc}=0.900$ |  |
|  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 3.14 sf |  |

Primary OutFlow Max=2.3 cfs @ 12.62 hrs HW=37.93' TW=33.62' (Dynamic Tailwater)
—1=Culvert (Inlet Controls 2.3 cfs @ 2.71 fps )

## Summary for Link EPol01: Ex Pol-01



Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol02: Ex Pol-02

| Infl | 1,302,728 sf, | 3.02\% Impervious, | 1.45" for 10-Year event |
| :---: | :---: | :---: | :---: |
| Inflow | 23.6 cfs @ 1 | 12.51 hrs , Volume= | 157,290 cf |
| Primary | 23.6 cfs @ 1 | 12.51 hrs, Volume= | 157,290 cf, Atten= 0\%, Lag= 0.0 min |

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol03: Ex Pol-03

| Inflow Area = | 469,882 sf, | 0.00\% Impervious | Wepth | 1.88" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 8.8 cfs @ | 12.90 hrs , Volume= | 73,712 cf |  |
| Primary | 8.8 cfs @ | 12.90 hrs , Volume= | 73,712 cf, | Atten=0\%, Lag $=0.0 \mathrm{~min}$ |

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol04: Ex Pol-04

| w | 668,692 sf, | , $1.33 \%$ Impervious | Depth | 0.64" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflo | 3.2 cfs @ 1 | 12.90 hrs , Volume= | 35,720 cf |  |
| Primary | 3.2 cfs @ 1 | 12.90 hrs , Volume= | 35,720 cf, | Atten= 0\%, Lag= 0.0 min |

Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link EPol05: Ex Pol-05



Primary outflow $=$ Inflow, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$

## Summary for Link EPol06: Ex Pol-06

| In | 3 | , 0.00\% Impervious | ow Depth > 1.51" for 10-Year event |
| :---: | :---: | :---: | :---: |
| Inflow | 2.7 cfs @ | 12.43 hrs , Volume= | 15,770 cf |
| Primary | 2.7 cfs @ | 12.43 hrs , Volume= | $15,770 \mathrm{cf}, \mathrm{Atten}=0 \%, \mathrm{Lag}=0.0 \mathrm{~min}$ |

Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link PPoi-01: Prop Pol-01

| Inflow Area = | 1,551,565 sf, 14.43\% Imperviou | nflow Depth > 1.10" for |
| :---: | :---: | :---: |
| Inflow | 18.2 cfs @ 12.59 hrs , Volume= | 141,937 cf |
| Primary | 18.2 cfs @ 12.59 hrs, Volume= | $141,937 \mathrm{cf}$, Atten= 0\%, Lag= 0.0 min |

Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link PPoi-02: POI



Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link PPoi-03: PO3

| In | 469,882 | perviou | D | 1.88" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 8.8 cfs @ | 12.90 hrs , Volume= | 73,712 cf |  |
| Primary | 8.8 cfs @ | 12.90 hrs , Volume= | 73,712 cf, | Atten $=0 \%$, Lag $=0.0 \mathrm{~min}$ |

Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link PPoi-04: Pr Pol-04

| Inflow Area = | 668,692 sf, | ous, | th > | 0.64" for 10-Year event |
| :---: | :---: | :---: | :---: | :---: |
| Inflo | 3.2 cfs @ | 12.90 hrs , Volume= | 35,720 cf |  |
| Primary | 3.2 cfs @ | 12.90 hrs , Volume= | 35,720 cf, | Atten= 0\%, Lag= 0.0 min |

Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link PPoi-05: Pr Pol-05



Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Summary for Link PPoi-06: Ex Pol-06



Primary outflow $=$ Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## APPENDIX F - BMP WORKSHEETS

(This Page Is Intentionally Blank)

Type/Node Name: Bioretention Area \#1 with ISR
Enter the node name in the drainage analysis if applicable.

| 5.11 ac | A = Area draining to the practice |
| :---: | :---: |
| 2.37 ac | $A_{l}=$ Impervious area draining to the practice |
| 0.46 decimal | $I=$ Percent impervious area draining to the practice, in decimal form |
| 0.47 unitless | $R v=$ Runoff coefficient $=0.05+(0.9 \times \mathrm{I})$ |
| 2.38 ac-in | WQV= $1^{\prime \prime} \times \mathrm{Rv} \times \mathrm{A}$ |
| 8,655 cf | WQV conversion (ac-in $\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12$ ') |
| 865 cf | 10\% x WQV (check calc for sediment forebay) |
| 2,164 cf | 25\% x WQV (check calc for water stored in saturated zone) |
| Forebay | Method of Pretreatment |
| 875 cf | If pretrt is sed forebay: $\mathrm{V}_{\text {SED }}$ (sediment forebay volume) $\geq 10 \% \mathrm{WQV}$ |
| 19,256 cf | Volume below lowest orifice ${ }^{1}$ |
| 4,053 cf | Water stored in voids of saturated zone $\geq \mathbf{2 6 \% W Q V}$ |
| 0.20 cfs | $2 \mathrm{Q}_{\mathrm{avg}}=2 * \mathrm{WQV} / 24 \mathrm{hrs}$ * (1hr / 3600 sec$)^{2}$ |
| 34.79 ft | $\mathrm{E}_{\text {WQV }}=$ Elevation of WQV (attach stage-storage table) |
| 0.05 cfs | $\mathrm{Q}_{\text {wQv }}=$ Discharge at the $\mathrm{E}_{\text {wQv }}$ (attach stage-discharge table) $<2 \mathrm{Q}_{\text {wQv }}$ |
| 96.16 hours | $\mathrm{T}_{\mathrm{ED}}=$ Drawdown time of extended detention $=2 \mathrm{WQV} / \mathrm{Q}_{\text {WQV }} \mathrm{l}$ |
| 18.00 in | Depth of Filter Media $\quad \geq 18^{\prime \prime}$ |
| 3.00 :1 | Pond side slopes $\quad \geq 3: 1$ |
|  | What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of $\leq 6$ ")? |
| 38.43 ft | Peak elevation of the 50-year storm event ( $\mathrm{E}_{50}$ ) |
| 39.50 ft | Berm elevation of the pond |
| YES | $\mathrm{E}_{50} \leq$ the berm elevation? $\leftarrow$ yes |

1. Volume stored above the wetland soil and below the high flow by-pass.

## Designer's Notes:

Storage Below First Pond InvertVol at $36.25=19,747$ - Vol. at Bottom of Pond $491 \mathrm{cf}=19,256 \mathrm{cf}$
WQV @ Elev. 34.79 ( $8,833 \mathrm{cf}$ ) - Vol. at Bottom of Pond (491 cf) = 8,342 cf

```
Water Stored in Saturated Zone
- Media Below Invert \(=32.65-31.50=1.05 \mathrm{ft} * 30 \%\) voids * \(3,635 \mathrm{sf}=1,145 \mathrm{cf}\)
- Crushed Stone Below Invert = (12"+9"+3") 2 ft * 40\% Voids * 3,635 sf = 2,908 cf
- Total of 4,053 cf
```

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Stage-Area-Storage for Pond BIO1: Bioretention Area \#1

|  | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \end{array}$ | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 32.55 | 0 | 33.08 | 785 | 33.61 | 2,910 |
|  | 32.56 | 11 | 33.09 | 822 | 33.62 | 2,953 |
|  | 32.57 | 22 | 33.10 | 860 | 33.63 | 2,996 |
|  | 32.58 | 33 | 33.11 | 897 | 33.64 | 3,040 |
|  | 32.59 | 44 | 33.12 | 935 | 33.65 | 3,083 |
|  | 32.60 | 55 | 33.13 | 972 | 33.66 | 3,127 |
|  | 32.61 | 65 | 33.14 | 1,010 | 33.67 | 3,171 |
|  | 32.62 | 76 | 33.15 | 1,048 | 33.68 | 3,214 |
|  | 32.63 | 87 | 33.16 | 1,086 | 33.69 | 3,258 |
|  | 32.64 | 98 | 33.17 | 1,124 | 33.70 | 3,302 |
|  | 32.65 | 109 | 33.18 | 1,162 | 33.71 | 3,346 |
|  | 32.66 | 120 | 33.19 | 1,201 | 33.72 | 3,391 |
|  | 32.67 | 131 | 33.20 | 1,239 | 33.73 | 3,435 |
|  | 32.68 | 142 | 33.21 | 1,278 | 33.74 | 3,480 |
|  | 32.69 | 153 | 33.22 | 1,316 | 33.75 | 3,524 |
|  | 32.70 | 164 | 33.23 | 1,355 | 33.76 | 3,569 |
|  | 32.71 | 174 | 33.24 | 1,394 | 33.77 | 3,614 |
|  | 32.72 | 185 | 33.25 | 1,433 | 33.78 | 3,659 |
|  | 32.73 | 196 | 33.26 | 1,472 | 33.79 | 3,704 |
|  | 32.74 | 207 | 33.27 | 1,511 | 33.80 | 3,749 |
|  | 32.75 | 218 | 33.28 | 1,550 | 33.81 | 3,795 |
|  | 32.76 | 229 | 33.29 | 1,590 | 33.82 | 3,840 |
|  | 32.77 | 240 | 33.30 | 1,629 | 33.83 | 3,886 |
|  | 32.78 | 251 | 33.31 | 1,669 | 33.84 | 3,931 |
|  | 32.79 | 262 | 33.32 | 1,709 | 33.85 | 3,977 |
|  | 32.80 | 273 | 33.33 | 1,749 | 33.86 | 4,023 |
|  | 32.81 | 284 | 33.34 | 1,789 | 33.87 | 4,069 |
|  | 32.82 | 294 | 33.35 | 1,829 | 33.88 | 4,115 |
|  | 32.83 | 305 | 33.36 | 1,869 | 33.89 | 4,161 |
|  | 32.84 | 316 | 33.37 | 1,909 | 33.90 | 4,208 |
|  | 32.85 | 327 | 33.38 | 1,950 | 33.91 | 4,254 |
|  | 32.86 | 338 | 33.39 | 1,990 | 33.92 | 4,301 |
|  | 32.87 | 349 | 33.40 | 2,031 | 33.93 | 4,348 |
|  | 32.88 | 360 | 33.41 | 2,071 | 33.94 | 4,395 |
|  | 32.89 | 371 | 33.42 | 2,112 | 33.95 | 4,442 |
|  | 32.90 | 382 | 33.43 | 2,153 | 33.96 | 4,489 |
|  | 32.91 | 393 | 33.44 | 2,194 | 33.97 | 4,536 |
|  | 32.92 | 403 | 33.45 | 2,236 | 33.98 | 4,583 |
|  | 32.93 | 414 | 33.46 | 2,277 | 33.99 | 4,631 |
|  | 32.94 | 425 | 33.47 | 2,318 | 34.00 | 4,678 |
|  | 32.95 | 436 | 33.48 | 2,360 | 34.01 | 4,726 |
|  | 32.96 | 447 | 33.49 | 2,401 | 34.02 | 4,774 |
|  | 32.97 | 458 | 33.50 | 2,443 | 34.03 | 4,822 |
|  | 32.98 | 469 | 33.51 | 2,485 | 34.04 | 4,870 |
|  | - 32.99 | 480 | 33.52 | 2,527 | 34.05 | 4,918 |
| Bot of | 33.00 | 491 | 33.53 | 2,569 | 34.06 | 4,967 |
| Basin | 33.01 | 527 | 33.54 | 2,611 | 34.07 | 5,015 |
|  | 33.02 | 564 | 33.55 | 2,654 | 34.08 | 5,064 |
|  | 33.03 | 600 | 33.56 | 2,696 | 34.09 | 5,112 |
|  | 33.04 | 637 | 33.57 | 2,739 | 34.10 | 5,161 |
|  | 33.05 | 674 | 33.58 | 2,781 | 34.11 | 5,210 |
|  | 33.06 | 711 | 33.59 | 2,824 | 34.12 | 5,259 |
|  | 33.07 | 748 | 33.60 | 2,867 | 34.13 | 5,308 |

Stage-Area-Storage for Pond BIO1: Bioretention Area \#1 (continued)

| Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 34.14 | 5,358 | 34.67 | 8,150 | 35.20 | 11,388 |  |
| 34.15 | 5,407 | 34.68 | 8,207 | 35.21 | 11,459 |  |
| 34.16 | 5,457 | 34.69 | 8,263 | 35.22 | 11,530 |  |
| 34.17 | 5,506 | 34.70 | 8,319 | 35.23 | 11,602 |  |
| 34.18 | 5,556 | 34.71 | 8,376 | 35.24 | 11,673 |  |
| 34.19 | 5,606 | 34.72 | 8,433 | 35.25 | 11,745 |  |
| 34.20 | 5,656 | 34.73 | 8,489 | 35.26 | 11,817 |  |
| 34.21 | 5,706 | 34.74 | 8,546 | 35.27 | 11,889 |  |
| 34.22 | 5,757 | 34.75 | 8,603 | 35.28 | 11,961 |  |
| 34.23 | 5,807 | 34.76 | 8,661 | 35.29 | 12,033 |  |
| 34.24 | 5,857 | 34.77 | 8,718 | 35.30 | 12,106 |  |
| 34.25 | 5,908 | 34.78 | 8,775 | 35.31 | 12,179 |  |
| 34.26 | 5,959 | 34.79 | 8,833 | 35.32 | 12,252 |  |
| 34.27 | 6,010 | 34.80 | 8,891 | 35.33 | 12,325 |  |
| 34.28 | 6,061 | 34.81 | 8,949 | 35.34 | 12,398 |  |
| 34.29 | 6,112 | 34.82 | 9,007 | 35.35 | 12,471 |  |
| 34.30 | 6,163 | 34.83 | 9,065 | 35.36 | 12,545 |  |
| 34.31 | 6,215 | 34.84 | 9,123 | 35.37 | 12,618 |  |
| 34.32 | 6,266 | 34.85 | 9,181 | 35.38 | 12,692 |  |
| 34.33 | 6,318 | 34.86 | 9,240 | 35.39 | 12,766 | 8,655 (WQV) + 491 |
| 34.34 | 6,370 | 34.87 | 9,299 | 35.40 | 12,040 | (Vol. at Bottom of |
| 34.35 | 6,422 | 34.88 | 9,358 | 35.41 | 12,915 | Basin) $=9,146 \mathrm{cf}$ |
| 34.36 | 6,474 | 34.89 | 9,416 | 35.42 | 12,989 | Basin) = 9,146 cf |
| 34.37 | 6,526 | 34.90 | 9,476 | 35.43 | 13,064 |  |
| 34.38 | 6,578 | 34.91 | 9,535 | 35.44 | 13,138 |  |
| 34.39 | 6,631 | 34.92 | 9,594 | 35.45 | 13,213 |  |
| 34.40 | 6,683 | 34.93 | 9,654 | 35.46 | 13,288 |  |
| 34.41 | 6,736 | 34.94 | 9,713 | 35.47 | 13,364 |  |
| 34.42 | 6,789 | 34.95 | 9,773 | 35.48 | 13,439 |  |
| 34.43 | 6,842 | 34.96 | 9,833 | 35.49 | 13,515 |  |
| 34.44 | 6,895 | 34.97 | 9,893 | 35.50 | 13,590 |  |
| 34.45 | 6,948 | 34.98 | 9,953 | 35.51 | 13,666 |  |
| 34.46 | 7,001 | 34.99 | 10,013 | 35.52 | 13,742 |  |
| 34.47 | 7,055 | 35.00 | 10,074 | 35.53 | 13,819 |  |
| 34.48 | 7,108 | 35.01 | 10,135 | 35.54 | 13,895 |  |
| 34.49 | 7,162 | 35.02 | 10,196 | 35.55 | 13,972 |  |
| 34.50 | 7,216 | 35.03 | 10,258 | 35.56 | 14,048 |  |
| 34.51 | 7,270 | 35.04 | 10,320 | 35.57 | 14,125 |  |
| 34.52 | 7,324 | 35.05 | 10,383 | 35.58 | 14,202 |  |
| 34.53 | 7,378 | 35.06 | 10,446 | 35.59 | 14,280 |  |
| 34.54 | 7,432 | 35.07 | 10,510 | 35.60 | 14,357 |  |
| 34.55 | 7,487 | 35.08 | 10,574 | 35.61 | 14,434 |  |
| 34.56 | 7,541 | 35.09 | 10,639 | 35.62 | 14,512 |  |
| 34.57 | 7,596 | 35.10 | 10,704 | 35.63 | 14,590 |  |
| 34.58 | 7,651 | 35.11 | 10,770 | 35.64 | 14,668 |  |
| 34.59 | 7,706 | 35.12 | 10,837 | 35.65 | 14,746 |  |
| 34.60 | 7,761 | 35.13 | 10,904 | 35.66 | 14,825 |  |
| 34.61 | 7,816 | 35.14 | 10,971 | 35.67 | 14,903 |  |
| 34.62 | 7,872 | 35.15 | 11,039 | 35.68 | 14,982 |  |
| 34.63 | 7,927 | 35.16 | 11,108 | 35.69 | 15,061 |  |
| 34.64 | 7,983 | 35.17 | 11,177 | 35.70 | 15,140 |  |
| 34.65 | 8,038 | 35.18 | 11,247 | 35.71 | 15,219 |  |
| 34.66 | 8,094 | 35.19 | 11,317 | 35.72 | 15,298 |  |

Stage-Area-Storage for Pond BIO1: Bioretention Area \#1 (continued)


Stage-Discharge for Pond BIO1: Bioretention Area \#1

| $\begin{array}{r} \begin{array}{r} \text { Elevation } \\ \text { (feet) } \end{array} \\ \hline \end{array}$ | $\begin{array}{r} \text { Discharge } \\ \text { (cfs) } \end{array}$ | $\begin{array}{r} \text { Primary } \\ \text { (cfs) } \end{array}$ | $\begin{array}{r} \text { Secondary } \\ \text { (cfs) } \end{array}$ | $\begin{array}{r} \begin{array}{r} \text { Elevation } \\ \text { (feet) } \end{array} \\ \hline \end{array}$ | $\begin{array}{r} \text { Discharge } \\ \text { (cfs) } \end{array}$ | Primary (cfs) | $\begin{array}{r} \text { Secondary } \\ \text { (cfs) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 32.55 | 0.00 | 0.00 | 0.00 | 33.08 | 0.02 | 0.02 | 0.00 |
| 32.56 | 0.00 | 0.00 | 0.00 | 33.09 | 0.02 | 0.02 | 0.00 |
| 32.57 | 0.00 | 0.00 | 0.00 | 33.10 | 0.02 | 0.02 | 0.00 |
| 32.58 | 0.00 | 0.00 | 0.00 | 33.11 | 0.02 | 0.02 | 0.00 |
| 32.59 | 0.00 | 0.00 | 0.00 | 33.12 | 0.02 | 0.02 | 0.00 |
| 32.60 | 0.00 | 0.00 | 0.00 | 33.13 | 0.02 | 0.02 | 0.00 |
| 32.61 | 0.00 | 0.00 | 0.00 | 33.14 | 0.03 | 0.03 | 0.00 |
| 32.62 | 0.00 | 0.00 | 0.00 | 33.15 | 0.03 | 0.03 | 0.00 |
| 32.63 | 0.00 | 0.00 | 0.00 | 33.16 | 0.03 | 0.03 | 0.00 |
| 32.64 | 0.00 | 0.00 | 0.00 | 33.17 | 0.03 | 0.03 | 0.00 |
| 32.65 | 0.00 | 0.00 | 0.00 | 33.18 | 0.03 | 0.03 | 0.00 |
| 32.66 | 0.00 | 0.00 | 0.00 | 33.19 | 0.03 | 0.03 | 0.00 |
| 32.67 | 0.00 | 0.00 | 0.00 | 33.20 | 0.03 | 0.03 | 0.00 |
| 32.68 | 0.00 | 0.00 | 0.00 | 33.21 | 0.03 | 0.03 | 0.00 |
| 32.69 | 0.00 | 0.00 | 0.00 | 33.22 | 0.03 | 0.03 | 0.00 |
| 32.70 | 0.00 | 0.00 | 0.00 | 33.23 | 0.03 | 0.03 | 0.00 |
| 32.71 | 0.00 | 0.00 | 0.00 | 33.24 | 0.03 | 0.03 | 0.00 |
| 32.72 | 0.01 | 0.01 | 0.00 | 33.25 | 0.03 | 0.03 | 0.00 |
| 32.73 | 0.01 | 0.01 | 0.00 | 33.26 | 0.03 | 0.03 | 0.00 |
| 32.74 | 0.01 | 0.01 | 0.00 | 33.27 | 0.03 | 0.03 | 0.00 |
| 32.75 | 0.01 | 0.01 | 0.00 | 33.28 | 0.03 | 0.03 | 0.00 |
| 32.76 | 0.01 | 0.01 | 0.00 | 33.29 | 0.03 | 0.03 | 0.00 |
| 32.77 | 0.01 | 0.01 | 0.00 | 33.30 | 0.03 | 0.03 | 0.00 |
| 32.78 | 0.01 | 0.01 | 0.00 | 33.31 | 0.03 | 0.03 | 0.00 |
| 32.79 | 0.01 | 0.01 | 0.00 | 33.32 | 0.03 | 0.03 | 0.00 |
| 32.80 | 0.01 | 0.01 | 0.00 | 33.33 | 0.03 | 0.03 | 0.00 |
| 32.81 | 0.01 | 0.01 | 0.00 | 33.34 | 0.03 | 0.03 | 0.00 |
| 32.82 | 0.01 | 0.01 | 0.00 | 33.35 | 0.03 | 0.03 | 0.00 |
| 32.83 | 0.01 | 0.01 | 0.00 | 33.36 | 0.03 | 0.03 | 0.00 |
| 32.84 | 0.01 | 0.01 | 0.00 | 33.37 | 0.03 | 0.03 | 0.00 |
| 32.85 | 0.01 | 0.01 | 0.00 | 33.38 | 0.03 | 0.03 | 0.00 |
| 32.86 | 0.02 | 0.02 | 0.00 | 33.39 | 0.03 | 0.03 | 0.00 |
| 32.87 | 0.02 | 0.02 | 0.00 | 33.40 | 0.03 | 0.03 | 0.00 |
| 32.88 | 0.02 | 0.02 | 0.00 | 33.41 | 0.03 | 0.03 | 0.00 |
| 32.89 | 0.02 | 0.02 | 0.00 | 33.42 | 0.03 | 0.03 | 0.00 |
| 32.90 | 0.02 | 0.02 | 0.00 | 33.43 | 0.03 | 0.03 | 0.00 |
| 32.91 | 0.02 | 0.02 | 0.00 | 33.44 | 0.03 | 0.03 | 0.00 |
| 32.92 | 0.02 | 0.02 | 0.00 | 33.45 | 0.03 | 0.03 | 0.00 |
| 32.93 | 0.02 | 0.02 | 0.00 | 33.46 | 0.03 | 0.03 | 0.00 |
| 32.94 | 0.02 | 0.02 | 0.00 | 33.47 | 0.03 | 0.03 | 0.00 |
| 32.95 | 0.02 | 0.02 | 0.00 | 33.48 | 0.03 | 0.03 | 0.00 |
| 32.96 | 0.02 | 0.02 | 0.00 | 33.49 | 0.03 | 0.03 | 0.00 |
| 32.97 | 0.02 | 0.02 | 0.00 | 33.50 | 0.03 | 0.03 | 0.00 |
| 32.98 | 0.02 | 0.02 | 0.00 | 33.51 | 0.03 | 0.03 | 0.00 |
| 32.99 | 0.02 | 0.02 | 0.00 | 33.52 | 0.03 | 0.03 | 0.00 |
| 33.00 | 0.02 | 0.02 | 0.00 | 33.53 | 0.03 | 0.03 | 0.00 |
| 33.01 | 0.02 | 0.02 | 0.00 | 33.54 | 0.03 | 0.03 | 0.00 |
| 33.02 | 0.02 | 0.02 | 0.00 | 33.55 | 0.03 | 0.03 | 0.00 |
| 33.03 | 0.02 | 0.02 | 0.00 | 33.56 | 0.04 | 0.04 | 0.00 |
| 33.04 | 0.02 | 0.02 | 0.00 | 33.57 | 0.04 | 0.04 | 0.00 |
| 33.05 | 0.02 | 0.02 | 0.00 | 33.58 | 0.04 | 0.04 | 0.00 |
| 33.06 | 0.02 | 0.02 | 0.00 | 33.59 | 0.04 | 0.04 | 0.00 |
| 33.07 | 0.02 | 0.02 | 0.00 | 33.60 | 0.04 | 0.04 | 0.00 |

Stage-Discharge for Pond BIO1: Bioretention Area \#1 (continued)

| Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary | Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 33.61 | 0.04 | 0.04 | 0.00 | 34.14 | 0.05 | 0.05 | 0.00 |
| 33.62 | 0.04 | 0.04 | 0.00 | 34.15 | 0.05 | 0.05 | 0.00 |
| 33.63 | 0.04 | 0.04 | 0.00 | 34.16 | 0.05 | 0.05 | 0.00 |
| 33.64 | 0.04 | 0.04 | 0.00 | 34.17 | 0.05 | 0.05 | 0.00 |
| 33.65 | 0.04 | 0.04 | 0.00 | 34.18 | 0.05 | 0.05 | 0.00 |
| 33.66 | 0.04 | 0.04 | 0.00 | 34.19 | 0.05 | 0.05 | 0.00 |
| 33.67 | 0.04 | 0.04 | 0.00 | 34.20 | 0.05 | 0.05 | 0.00 |
| 33.68 | 0.04 | 0.04 | 0.00 | 34.21 | 0.05 | 0.05 | 0.00 |
| 33.69 | 0.04 | 0.04 | 0.00 | 34.22 | 0.05 | 0.05 | 0.00 |
| 33.70 | 0.04 | 0.04 | 0.00 | 34.23 | 0.05 | 0.05 | 0.00 |
| 33.71 | 0.04 | 0.04 | 0.00 | 34.24 | 0.05 | 0.05 | 0.00 |
| 33.72 | 0.04 | 0.04 | 0.00 | 34.25 | 0.05 | 0.05 | 0.00 |
| 33.73 | 0.04 | 0.04 | 0.00 | 34.26 | 0.05 | 0.05 | 0.00 |
| 33.74 | 0.04 | 0.04 | 0.00 | 34.27 | 0.05 | 0.05 | 0.00 |
| 33.75 | 0.04 | 0.04 | 0.00 | 34.28 | 0.05 | 0.05 | 0.00 |
| 33.76 | 0.04 | 0.04 | 0.00 | 34.29 | 0.05 | 0.05 | 0.00 |
| 33.77 | 0.04 | 0.04 | 0.00 | 34.30 | 0.05 | 0.05 | 0.00 |
| 33.78 | 0.04 | 0.04 | 0.00 | 34.31 | 0.05 | 0.05 | 0.00 |
| 33.79 | 0.04 | 0.04 | 0.00 | 34.32 | 0.05 | 0.05 | 0.00 |
| 33.80 | 0.04 | 0.04 | 0.00 | 34.33 | 0.05 | 0.05 | 0.00 |
| 33.81 | 0.04 | 0.04 | 0.00 | 34.34 | 0.05 | 0.05 | 0.00 |
| 33.82 | 0.04 | 0.04 | 0.00 | 34.35 | 0.05 | 0.05 | 0.00 |
| 33.83 | 0.04 | 0.04 | 0.00 | 34.36 | 0.05 | 0.05 | 0.00 |
| 33.84 | 0.04 | 0.04 | 0.00 | 34.37 | 0.05 | 0.05 | 0.00 |
| 33.85 | 0.04 | 0.04 | 0.00 | 34.38 | 0.05 | 0.05 | 0.00 |
| 33.86 | 0.04 | 0.04 | 0.00 | 34.39 | 0.05 | 0.05 | 0.00 |
| 33.87 | 0.04 | 0.04 | 0.00 | 34.40 | 0.05 | 0.05 | 0.00 |
| 33.88 | 0.04 | 0.04 | 0.00 | 34.41 | 0.05 | 0.05 | 0.00 |
| 33.89 | 0.04 | 0.04 | 0.00 | 34.42 | 0.05 | 0.05 | 0.00 |
| 33.90 | 0.04 | 0.04 | 0.00 | 34.43 | 0.05 | 0.05 | 0.00 |
| 33.91 | 0.04 | 0.04 | 0.00 | 34.44 | 0.05 | 0.05 | 0.00 |
| 33.92 | 0.04 | 0.04 | 0.00 | 34.45 | 0.05 | 0.05 | 0.00 |
| 33.93 | 0.04 | 0.04 | 0.00 | 34.46 | 0.05 | 0.05 | 0.00 |
| 33.94 | 0.04 | 0.04 | 0.00 | 34.47 | 0.05 | 0.05 | 0.00 |
| 33.95 | 0.04 | 0.04 | 0.00 | 34.48 | 0.05 | 0.05 | 0.00 |
| 33.96 | 0.04 | 0.04 | 0.00 | 34.49 | 0.05 | 0.05 | 0.00 |
| 33.97 | 0.04 | 0.04 | 0.00 | 34.50 | 0.05 | 0.05 | 0.00 |
| 33.98 | 0.04 | 0.04 | 0.00 | 34.51 | 0.05 | 0.05 | 0.00 |
| 33.99 | 0.04 | 0.04 | 0.00 | 34.52 | 0.05 | 0.05 | 0.00 |
| 34.00 | 0.04 | 0.04 | 0.00 | 34.53 | 0.05 | 0.05 | 0.00 |
| 34.01 | 0.04 | 0.04 | 0.00 | 34.54 | 0.05 | 0.05 | 0.00 |
| 34.02 | 0.04 | 0.04 | 0.00 | 34.55 | 0.05 | 0.05 | 0.00 |
| 34.03 | 0.04 | 0.04 | 0.00 | 34.56 | 0.05 | 0.05 | 0.00 |
| 34.04 | 0.04 | 0.04 | 0.00 | 34.57 | 0.05 | 0.05 | 0.00 |
| 34.05 | 0.04 | 0.04 | 0.00 | 34.58 | 0.05 | 0.05 | 0.00 |
| 34.06 | 0.04 | 0.04 | 0.00 | 34.59 | 0.05 | 0.05 | 0.00 |
| 34.07 | 0.04 | 0.04 | 0.00 | 34.60 | 0.05 | 0.05 | 0.00 |
| 34.08 | 0.04 | 0.04 | 0.00 | 34.61 | 0.05 | 0.05 | 0.00 |
| 34.09 | 0.04 | 0.04 | 0.00 | 34.62 | 0.05 | 0.05 | 0.00 |
| 34.10 | 0.04 | 0.04 | 0.00 | 34.63 | 0.05 | 0.05 | 0.00 |
| 34.11 | 0.04 | 0.04 | 0.00 | 34.64 | 0.05 | 0.05 | 0.00 |
| 34.12 | 0.05 | 0.05 | 0.00 | 34.65 | 0.05 | 0.05 | 0.00 |
| 34.13 | 0.05 | 0.05 | 0.00 | 34.66 | 0.05 | 0.05 | 0.00 |

Stage-Discharge for Pond BIO1: Bioretention Area \#1 (continued)

|  | Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary <br> (cfs) | Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | $\begin{array}{r} \text { Secondary } \\ \text { (cfs) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 34.67 | 0.05 | 0.05 | 0.00 | 35.20 | 0.06 | 0.06 | 0.00 |
|  | 34.68 | 0.05 | 0.05 | 0.00 | 35.21 | 0.06 | 0.06 | 0.00 |
|  | 34.69 | 0.05 | 0.05 | 0.00 | 35.22 | 0.06 | 0.06 | 0.00 |
|  | 34.70 | 0.05 | 0.05 | 0.00 | 35.23 | 0.06 | 0.06 | 0.00 |
|  | 34.71 | 0.05 | 0.05 | 0.00 | 35.24 | 0.06 | 0.06 | 0.00 |
|  | 34.72 | 0.05 | 0.05 | 0.00 | 35.25 | 0.06 | 0.06 | 0.00 |
|  | 34.73 | 0.05 | 0.05 | 0.00 | 35.26 | 0.06 | 0.06 | 0.00 |
|  | 34.74 | 0.05 | 0.05 | 0.00 | 35.27 | 0.06 | 0.06 | 0.00 |
|  | 34.75 | 0.05 | 0.05 | 0.00 | 35.28 | 0.06 | 0.06 | 0.00 |
|  | 34.76 | 0.05 | 0.05 | 0.00 | 35.29 | 0.06 | 0.06 | 0.00 |
|  | 34.77 | 0.05 | 0.05 | 0.00 | 35.30 | 0.06 | 0.06 | 0.00 |
|  | 34.78 | 0.05 | 0.05 | 0.00 | 35.31 | 0.06 | 0.06 | 0.00 |
|  | 34.79 | 0.05 | 0.05 | 0.00 | 35.32 | 0.06 | 0.06 | 0.00 |
|  | 34.80 | 0.05 | 0.05 | 0.00 | 35.33 | 0.06 | 0.06 | 0.00 |
|  | 34.81 | 0.05 | 0.05 | 0.00 | 35.34 | 0.06 | 0.06 | 0.00 |
|  | 34.82 | 0.06 | 0.06 | 0.00 | 35.35 | 0.06 | 0.06 | 0.00 |
|  | 34.83 | 0.06 | 0.06 | 0.00 | 35.36 | 0.06 | 0.06 | 0.00 |
|  | 34.84 | 0.06 | 0.06 | 0.00 | 35.37 | 0.06 | 0.06 | 0.00 |
| Qwqv | $\checkmark 34.85$ | 0.06 | 0.06 | 0.00 | 35.38 | 0.06 | 0.06 | 0.00 |
|  | 34.86 | 0.06 | 0.06 | 0.00 | 35.39 | 0.06 | 0.06 | 0.00 |
|  | 34.87 | 0.06 | 0.06 | 0.00 | 35.40 | 0.06 | 0.06 | 0.00 |
|  | 34.88 | 0.06 | 0.06 | 0.00 | 35.41 | 0.06 | 0.06 | 0.00 |
|  | 34.89 | 0.06 | 0.06 | 0.00 | 35.42 | 0.06 | 0.06 | 0.00 |
|  | 34.90 | 0.06 | 0.06 | 0.00 | 35.43 | 0.06 | 0.06 | 0.00 |
|  | 34.91 | 0.06 | 0.06 | 0.00 | 35.44 | 0.06 | 0.06 | 0.00 |
|  | 34.92 | 0.06 | 0.06 | 0.00 | 35.45 | 0.06 | 0.06 | 0.00 |
|  | 34.93 | 0.06 | 0.06 | 0.00 | 35.46 | 0.06 | 0.06 | 0.00 |
|  | 34.94 | 0.06 | 0.06 | 0.00 | 35.47 | 0.06 | 0.06 | 0.00 |
|  | 34.95 | 0.06 | 0.06 | 0.00 | 35.48 | 0.06 | 0.06 | 0.00 |
|  | 34.96 | 0.06 | 0.06 | 0.00 | 35.49 | 0.06 | 0.06 | 0.00 |
|  | 34.97 | 0.06 | 0.06 | 0.00 | 35.50 | 0.06 | 0.06 | 0.00 |
|  | 34.98 | 0.06 | 0.06 | 0.00 | 35.51 | 0.06 | 0.06 | 0.00 |
|  | 34.99 | 0.06 | 0.06 | 0.00 | 35.52 | 0.06 | 0.06 | 0.00 |
|  | 35.00 | 0.06 | 0.06 | 0.00 | 35.53 | 0.06 | 0.06 | 0.00 |
|  | 35.01 | 0.06 | 0.06 | 0.00 | 35.54 | 0.06 | 0.06 | 0.00 |
|  | 35.02 | 0.06 | 0.06 | 0.00 | 35.55 | 0.06 | 0.06 | 0.00 |
|  | 35.03 | 0.06 | 0.06 | 0.00 | 35.56 | 0.06 | 0.06 | 0.00 |
|  | 35.04 | 0.06 | 0.06 | 0.00 | 35.57 | 0.06 | 0.06 | 0.00 |
|  | 35.05 | 0.06 | 0.06 | 0.00 | 35.58 | 0.06 | 0.06 | 0.00 |
|  | 35.06 | 0.06 | 0.06 | 0.00 | 35.59 | 0.06 | 0.06 | 0.00 |
|  | 35.07 | 0.06 | 0.06 | 0.00 | 35.60 | 0.06 | 0.06 | 0.00 |
|  | 35.08 | 0.06 | 0.06 | 0.00 | 35.61 | 0.06 | 0.06 | 0.00 |
|  | 35.09 | 0.06 | 0.06 | 0.00 | 35.62 | 0.06 | 0.06 | 0.00 |
|  | 35.10 | 0.06 | 0.06 | 0.00 | 35.63 | 0.06 | 0.06 | 0.00 |
|  | 35.11 | 0.06 | 0.06 | 0.00 | 35.64 | 0.06 | 0.06 | 0.00 |
|  | 35.12 | 0.06 | 0.06 | 0.00 | 35.65 | 0.06 | 0.06 | 0.00 |
|  | 35.13 | 0.06 | 0.06 | 0.00 | 35.66 | 0.07 | 0.07 | 0.00 |
|  | 35.14 | 0.06 | 0.06 | 0.00 | 35.67 | 0.07 | 0.07 | 0.00 |
|  | 35.15 | 0.06 | 0.06 | 0.00 | 35.68 | 0.07 | 0.07 | 0.00 |
|  | 35.16 | 0.06 | 0.06 | 0.00 | 35.69 | 0.07 | 0.07 | 0.00 |
|  | 35.17 | 0.06 | 0.06 | 0.00 | 35.70 | 0.07 | 0.07 | 0.00 |
|  | 35.18 | 0.06 | 0.06 | 0.00 | 35.71 | 0.07 | 0.07 | 0.00 |
|  | 35.19 | 0.06 | 0.06 | 0.00 | 35.72 | 0.07 | 0.07 | 0.00 |

Type/Node Name: Bioretention Area \#2 with ISR
Enter the node name in the drainage analysis if applicable.

| 1.60 ac | A = Area draining to the practice |
| :---: | :---: |
| 0.43 ac | $A_{1}=$ Impervious area draining to the practice |
| 0.27 decimal | $I=$ Percent impervious area draining to the practice, in decimal form |
| 0.29 unitless | $\mathrm{Rv}=$ Runoff coefficient $=0.05+(0.9 \times \mathrm{l})$ |
| 0.47 ac-in | WQV= $1^{\prime \prime} \times R v \times A$ |
| 1,706 cf | WQV conversion (ac-in $\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12$ ) |
| 171 cf | 10\% x WQV (check calc for sediment forebay) |
| 426 cf | 25\% x WQV (check calc for water stored in saturated zone) |
| Overland Flow | Method of Pretreatment |
| NA cf | If pretrt is sed forebay: $\mathrm{V}_{\text {SED }}$ (sediment forebay volume) $\geq 10 \% \mathrm{WQV}$ |
| 5,659 cf | Volume below lowest orifice ${ }^{1}$ |
| 5,574 cf | Water stored in voids of saturated zone $\geq \mathbf{2 6 \% W Q V}$ |
| 0.04 cfs | $2 \mathrm{Q}_{\mathrm{avg}}=2 * \mathrm{WQV} / 24 \mathrm{hrs}$ * (1hr / 3600 sec$)^{2}$ |
| 38.83 ft | $\mathrm{E}_{\text {WQV }}=$ Elevation of WQV (attach stage-storage table) |
| 0.01 cfs | $\mathrm{Q}_{\text {wQv }}=$ Discharge at the $\mathrm{E}_{\text {wav }}$ (attach stage-discharge table) $<2 \mathrm{Q}_{\text {wav }}$ |
| 94.77 hours | $\mathrm{T}_{\mathrm{ED}}=$ Drawdown time ot extended detention $=2 \mathrm{WQV} / \mathrm{Q}_{\text {WQV }} \mathrm{l}$ |
| 18.00 in | Depth of Filter Media $\quad \geq 18^{\prime \prime}$ |
| 3.00 :1 | Pond side slopes $\geq 3: 1$ |
|  | What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of $\leq 6^{\prime \prime}$ )? |
| 41.45 ft | Peak elevation of the 50-year storm event ( $\mathrm{E}_{50}$ ) |
| 41.50 ft | Berm elevation of the pond |
| YES | $\mathrm{E}_{50} \leq$ the berm elevation? $\quad \leftarrow$ yes |

1. Volume stored above the wetland soil and below the high flow by-pass.

## Designer's Notes:

```
Storage Below First Pond InvertVol at \(39.50=7,197-1,520 \mathrm{cf}\) (Vol. at Bottom of Pond) \(=5,659 \mathrm{cf}\)
1,706 (WQV) + 1,520 (Vol. at Bottom of Basin) = 3,226 -> Vol @ 38.83 = 3,258
```

Water Stored in Saturated Zone

- Media Below Invert $=39.00-38.00=1.00 \mathrm{ft} * 30 \%$ voids $* 5,068 \mathrm{sf}=1520 \mathrm{cf}$
- Crushed Stone Below Invert = (12"+9"+3") 2 ft * 40\% Voids * 5,068 sf = 4,054 cf
- Total of 5,574 cf
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Stage-Area-Storage for Pond BIO2: Bioretention Area \#2

| Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 37.50 | 0 | 38.03 | 806 | 38.56 | 1,827 |  |
| 37.51 | 15 | 38.04 | 821 | 38.57 | 1,878 |  |
| 37.52 | 30 | 38.05 | 836 | 38.58 | 1,930 |  |
| 37.53 | 46 | 38.06 | 851 | 38.59 | 1,981 |  |
| 37.54 | 61 | 38.07 | 867 | 38.60 | 2,033 |  |
| 37.55 | 76 | 38.08 | 882 | 38.61 | 2,085 |  |
| 37.56 | 91 | 38.09 | 897 | 38.62 | 2,137 |  |
| 37.57 | 106 | 38.10 | 912 | 38.63 | 2,189 |  |
| 37.58 | 122 | 38.11 | 927 | 38.64 | 2,242 |  |
| 37.59 | 137 | 38.12 | 943 | 38.65 | 2,294 |  |
| 37.60 | 152 | 38.13 | 958 | 38.66 | 2,347 |  |
| 37.61 | 167 | 38.14 | 973 | 38.67 | 2,399 |  |
| 37.62 | 182 | 38.15 | 988 | 38.68 | 2,452 |  |
| 37.63 | 198 | 38.16 | 1,003 | 38.69 | 2,505 |  |
| 37.64 | 213 | 38.17 | 1,019 | 38.70 | 2,558 |  |
| 37.65 | 228 | 38.18 | 1,034 | 38.71 | 2,611 |  |
| 37.66 | 243 | 38.19 | 1,049 | 38.72 | 2,664 |  |
| 37.67 | 258 | 38.20 | 1,064 | 38.73 | 2,718 |  |
| 37.68 | 274 | 38.21 | 1,079 | 38.74 | 2,771 |  |
| 37.69 | 289 | 38.22 | 1,095 | 38.75 | 2,825 |  |
| 37.70 | 304 | 38.23 | 1,110 | 38.76 | 2,879 |  |
| 37.71 | 319 | 38.24 | 1,125 | 38.77 | 2,932 |  |
| 37.72 | 334 | 38.25 | 1,140 | 38.78 | 2,986 |  |
| 37.73 | 350 | 38.26 | 1,156 | 38.79 | 3,041 |  |
| 37.74 | 365 | 38.27 | 1,171 | 38.80 | 3,095 |  |
| 37.75 | 380 | 38.28 | 1,186 | 38.81 | 3,149 |  |
| 37.76 | 395 | 38.29 | 1,201 | 38.82 | 3,204 | 1,706 (WQV) + 1,520 (Vol. |
| 37.77 | 411 | 38.30 | 1,216 | 38.83 | 3,258 | at Bottom of Basin) = |
| 37.78 | 426 | 38.31 | 1,232 | 38.84 | 3,313 | 3,226 |
| 37.79 | 441 | 38.32 | 1,247 | 38.85 | 3,368 | 3,226 |
| 37.80 | 456 | 38.33 | 1,262 | 38.86 | 3,423 |  |
| 37.81 | 471 | 38.34 | 1,277 | 38.87 | 3,478 |  |
| 37.82 | 487 | 38.35 | 1,292 | 38.88 | 3,533 |  |
| 37.83 | 502 | 38.36 | 1,308 | 38.89 | 3,588 |  |
| 37.84 | 517 | 38.37 | 1,323 | 38.90 | 3,644 |  |
| 37.85 | 532 | 38.38 | 1,338 | 38.91 | 3,700 |  |
| 37.86 | 547 | 38.39 | 1,353 | 38.92 | 3,755 |  |
| 37.87 | 563 | 38.40 | 1,368 | 38.93 | 3,811 |  |
| 37.88 | 578 | 38.41 | 1,384 | 38.94 | 3,867 |  |
| 37.89 | 593 | 38.42 | 1,399 | 38.95 | 3,923 |  |
| 37.90 | 608 | 38.43 | 1,414 | 38.96 | 3,979 |  |
| 37.91 | 623 | 38.44 | 1,429 | 38.97 | 4,036 |  |
| 37.92 | 639 | 38.45 | 1,444 | 38.98 | 4,092 |  |
| 37.93 | 654 | 38.46 | 1,460 | 38.99 | 4,149 |  |
| 37.94 | 669 | 38.47 | 1,475 | 39.00 | 4,205 |  |
| 37.95 | 684 | 38.48 | 1,490 | 39.01 | 4,262 |  |
| 37.96 | 699 | 38.49 | 1,505 | 39.02 | 4,319 |  |
| 37.97 | 715 | 38.50 | 1,520 | $\leftharpoonup 39.03$ | 4,376 | - Bottom of Basin |
| 37.98 | 730 | 38.51 | 1,571 | 39.04 | 4,434 |  |
| 37.99 | 745 | 38.52 | 1,622 | 39.05 | 4,491 |  |
| 38.00 | 760 | 38.53 | 1,673 | 39.06 | 4,548 |  |
| 38.01 | 775 | 38.54 | 1,724 | 39.07 | 4,606 |  |
| 38.02 | 791 | 38.55 | 1,775 | 39.08 | 4,664 |  |

Stage-Area-Storage for Pond BIO2: Bioretention Area \#2 (continued)

|  | Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 39.09 | 4,721 | 39.62 | 7,961 | 40.15 | 11,560 |
|  | 39.10 | 4,779 | 39.63 | 8,026 | 40.16 | 11,631 |
|  | 39.11 | 4,837 | 39.64 | 8,091 | 40.17 | 11,703 |
|  | 39.12 | 4,895 | 39.65 | 8,155 | 40.18 | 11,774 |
|  | 39.13 | 4,954 | 39.66 | 8,220 | 40.19 | 11,846 |
|  | 39.14 | 5,012 | 39.67 | 8,285 | 40.20 | 11,918 |
|  | 39.15 | 5,071 | 39.68 | 8,350 | 40.21 | 11,990 |
|  | 39.16 | 5,129 | 39.69 | 8,416 | 40.22 | 12,062 |
|  | 39.17 | 5,188 | 39.70 | 8,481 | 40.23 | 12,134 |
|  | 39.18 | 5,247 | 39.71 | 8,547 | 40.24 | 12,207 |
|  | 39.19 | 5,306 | 39.72 | 8,612 | 40.25 | 12,279 |
|  | 39.20 | 5,365 | 39.73 | 8,678 | 40.26 | 12,352 |
|  | 39.21 | 5,424 | 39.74 | 8,744 | 40.27 | 12,425 |
|  | 39.22 | 5,484 | 39.75 | 8,810 | 40.28 | 12,498 |
|  | 39.23 | 5,543 | 39.76 | 8,876 | 40.29 | 12,571 |
|  | 39.24 | 5,603 | 39.77 | 8,943 | 40.30 | 12,644 |
|  | 39.25 | 5,663 | 39.78 | 9,009 | 40.31 | 12,717 |
|  | 39.26 | 5,723 | 39.79 | 9,076 | 40.32 | 12,791 |
|  | 39.27 | 5,783 | 39.80 | 9,143 | 40.33 | 12,864 |
|  | 39.28 | 5,843 | 39.81 | 9,209 | 40.34 | 12,938 |
|  | 39.29 | 5,903 | 39.82 | 9,276 | 40.35 | 13,012 |
|  | 39.30 | 5,963 | 39.83 | 9,343 | 40.36 | 13,086 |
|  | 39.31 | 6,024 | 39.84 | 9,411 | 40.37 | 13,160 |
|  | 39.32 | 6,085 | 39.85 | 9,478 | 40.38 | 13,234 |
|  | 39.33 | 6,145 | 39.86 | 9,546 | 40.39 | 13,309 |
|  | 39.34 | 6,206 | 39.87 | 9,613 | 40.40 | 13,383 |
|  | 39.35 | 6,267 | 39.88 | 9,681 | 40.41 | 13,458 |
|  | 39.36 | 6,328 | 39.89 | 9,749 | 40.42 | 13,532 |
|  | 39.37 | 6,390 | 39.90 | 9,817 | 40.43 | 13,607 |
|  | 39.38 | 6,451 | 39.91 | 9,885 | 40.44 | 13,682 |
|  | 39.39 | 6,512 | 39.92 | 9,953 | 40.45 | 13,757 |
|  | 39.40 | 6,574 | 39.93 | 10,022 | 40.46 | 13,833 |
|  | 39.41 | 6,636 | 39.94 | 10,090 | 40.47 | 13,908 |
|  | 39.42 | 6,698 | 39.95 | 10,159 | 40.48 | 13,984 |
|  | 39.43 | 6,760 | 39.96 | 10,228 | 40.49 | 14,059 |
|  | 39.44 | 6,822 | 39.97 | 10,297 | 40.50 | 14,135 |
|  | 39.45 | 6,884 | 39.98 | 10,366 | 40.51 | 14,211 |
|  | 39.46 | 6,946 | 39.99 | 10,435 | 40.52 | 14,287 |
|  | 39.47 | 7,009 | 40.00 | 10,504 | 40.53 | 14,363 |
|  | 39.48 | 7,071 | 40.01 | 10,574 | 40.54 | 14,440 |
| Lowest | + 39.49 | 7,134 | 40.02 | 10,643 | 40.55 | 14,516 |
| Orifice | 39.50 | 7,197 | 40.03 | 10,713 | 40.56 | 14,593 |
| Orifice | 39.51 | 7,260 | 40.04 | 10,783 | 40.57 | 14,669 |
|  | 39.52 | 7,323 | 40.05 | 10,853 | 40.58 | 14,746 |
|  | 39.53 | 7,386 | 40.06 | 10,923 | 40.59 | 14,823 |
|  | 39.54 | 7,450 | 40.07 | 10,993 | 40.60 | 14,900 |
|  | 39.55 | 7,513 | 40.08 | 11,064 | 40.61 | 14,978 |
|  | 39.56 | 7,577 | 40.09 | 11,134 | 40.62 | 15,055 |
|  | 39.57 | 7,641 | 40.10 | 11,205 | 40.63 | 15,133 |
|  | 39.58 | 7,705 | 40.11 | 11,276 | 40.64 | 15,210 |
|  | 39.59 | 7,769 | 40.12 | 11,346 | 40.65 | 15,288 |
|  | 39.60 | 7,833 | 40.13 | 11,417 | 40.66 | 15,366 |
|  | 39.61 | 7,897 | 40.14 | 11,489 | 40.67 | 15,444 |

Stage-Area-Storage for Pond BIO2: Bioretention Area \#2 (continued)

| $\begin{array}{r} \text { Elevation } \\ \quad \text { feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ | Elevation (feet) | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 40.68 | 15,522 | 41.21 | 19,860 | 41.74 | 24,581 |
| 40.69 | 15,601 | 41.22 | 19,946 | 41.75 | 24,673 |
| 40.70 | 15,679 | 41.23 | 20,031 | 41.76 | 24,766 |
| 40.71 | 15,758 | 41.24 | 20,117 | 41.77 | 24,859 |
| 40.72 | 15,836 | 41.25 | 20,203 | 41.78 | 24,953 |
| 40.73 | 15,915 | 41.26 | 20,289 | 41.79 | 25,046 |
| 40.74 | 15,994 | 41.27 | 20,375 | 41.80 | 25,139 |
| 40.75 | 16,073 | 41.28 | 20,462 | 41.81 | 25,233 |
| 40.76 | 16,153 | 41.29 | 20,548 | 41.82 | 25,327 |
| 40.77 | 16,232 | 41.30 | 20,635 | 41.83 | 25,421 |
| 40.78 | 16,312 | 41.31 | 20,721 | 41.84 | 25,515 |
| 40.79 | 16,391 | 41.32 | 20,808 | 41.85 | 25,609 |
| 40.80 | 16,471 | 41.33 | 20,895 | 41.86 | 25,703 |
| 40.81 | 16,551 | 41.34 | 20,982 | 41.87 | 25,798 |
| 40.82 | 16,631 | 41.35 | 21,070 | 41.88 | 25,892 |
| 40.83 | 16,711 | 41.36 | 21,157 | 41.89 | 25,987 |
| 40.84 | 16,792 | 41.37 | 21,245 | 41.90 | 26,082 |
| 40.85 | 16,872 | 41.38 | 21,332 | 41.91 | 26,177 |
| 40.86 | 16,953 | 41.39 | 21,420 | 41.92 | 26,272 |
| 40.87 | 17,033 | 41.40 | 21,508 | 41.93 | 26,367 |
| 40.88 | 17,114 | 41.41 | 21,596 | 41.94 | 26,463 |
| 40.89 | 17,195 | 41.42 | 21,684 | 41.95 | 26,559 |
| 40.90 | 17,277 | 41.43 | 21,773 | 41.96 | 26,654 |
| 40.91 | 17,358 | 41.44 | 21,861 | 41.97 | 26,750 |
| 40.92 | 17,439 | 41.45 | 21,950 | 41.98 | 26,846 |
| 40.93 | 17,521 | 41.46 | 22,039 | 41.99 | 26,942 |
| 40.94 | 17,603 | 41.47 | 22,128 | 42.00 | 27,039 |
| 40.95 | 17,684 | 41.48 | 22,217 |  |  |
| 40.96 | 17,766 | 41.49 | 22,306 |  |  |
| 40.97 | 17,849 | 41.50 | 22,395 |  |  |
| 40.98 | 17,931 | 41.51 | 22,485 |  |  |
| 40.99 | 18,013 | 41.52 | 22,574 |  |  |
| 41.00 | 18,096 | 41.53 | 22,664 |  |  |
| 41.01 | 18,179 | 41.54 | 22,754 |  |  |
| 41.02 | 18,261 | 41.55 | 22,844 |  |  |
| 41.03 | 18,344 | 41.56 | 22,934 |  |  |
| 41.04 | 18,427 | 41.57 | 23,024 |  |  |
| 41.05 | 18,511 | 41.58 | 23,115 |  |  |
| 41.06 | 18,594 | 41.59 | 23,205 |  |  |
| 41.07 | 18,677 | 41.60 | 23,296 |  |  |
| 41.08 | 18,761 | 41.61 | 23,387 |  |  |
| 41.09 | 18,845 | 41.62 | 23,478 |  |  |
| 41.10 | 18,929 | 41.63 | 23,569 |  |  |
| 41.11 | 19,013 | 41.64 | 23,660 |  |  |
| 41.12 | 19,097 | 41.65 | 23,752 |  |  |
| 41.13 | 19,181 | 41.66 | 23,843 |  |  |
| 41.14 | 19,265 | 41.67 | 23,935 |  |  |
| 41.15 | 19,350 | 41.68 | 24,027 |  |  |
| 41.16 | 19,435 | 41.69 | 24,119 |  |  |
| 41.17 | 19,520 | 41.70 | 24,211 |  |  |
| 41.18 | 19,605 | 41.71 | 24,303 |  |  |
| 41.19 | 19,690 | 41.72 | 24,395 |  |  |
| 41.20 | 19,775 | 41.73 | 24,488 |  |  |

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8-19-21_47388-11_Pre-Post-Drainage
Type III 24-hr 50-Year Rainfall=8.54"
Prepared by \{enter your company name here\}
HydroCAD® 10.10-6a s/n 00866 © 2020 HydroCAD Software Solutions LLC
Stage-Discharge for Pond BIO2: Bioretention Area \#2

| $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | Discharge (cfs) | Primary (cfs) | Secondary (cfs) | Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | $\begin{array}{r} \text { Secondary } \\ \text { (cfs) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 37.50 | 0.00 | 0.00 | 0.00 | 38.03 | 0.00 | 0.00 | 0.00 |
| 37.51 | 0.00 | 0.00 | 0.00 | 38.04 | 0.00 | 0.00 | 0.00 |
| 37.52 | 0.00 | 0.00 | 0.00 | 38.05 | 0.00 | 0.00 | 0.00 |
| 37.53 | 0.00 | 0.00 | 0.00 | 38.06 | 0.00 | 0.00 | 0.00 |
| 37.54 | 0.00 | 0.00 | 0.00 | 38.07 | 0.00 | 0.00 | 0.00 |
| 37.55 | 0.00 | 0.00 | 0.00 | 38.08 | 0.00 | 0.00 | 0.00 |
| 37.56 | 0.00 | 0.00 | 0.00 | 38.09 | 0.00 | 0.00 | 0.00 |
| 37.57 | 0.00 | 0.00 | 0.00 | 38.10 | 0.00 | 0.00 | 0.00 |
| 37.58 | 0.00 | 0.00 | 0.00 | 38.11 | 0.01 | 0.01 | 0.00 |
| 37.59 | 0.00 | 0.00 | 0.00 | 38.12 | 0.01 | 0.01 | 0.00 |
| 37.60 | 0.00 | 0.00 | 0.00 | 38.13 | 0.01 | 0.01 | 0.00 |
| 37.61 | 0.00 | 0.00 | 0.00 | 38.14 | 0.01 | 0.01 | 0.00 |
| 37.62 | 0.00 | 0.00 | 0.00 | 38.15 | 0.01 | 0.01 | 0.00 |
| 37.63 | 0.00 | 0.00 | 0.00 | 38.16 | 0.01 | 0.01 | 0.00 |
| 37.64 | 0.00 | 0.00 | 0.00 | 38.17 | 0.01 | 0.01 | 0.00 |
| 37.65 | 0.00 | 0.00 | 0.00 | 38.18 | 0.01 | 0.01 | 0.00 |
| 37.66 | 0.00 | 0.00 | 0.00 | 38.19 | 0.01 | 0.01 | 0.00 |
| 37.67 | 0.00 | 0.00 | 0.00 | 38.20 | 0.01 | 0.01 | 0.00 |
| 37.68 | 0.00 | 0.00 | 0.00 | 38.21 | 0.01 | 0.01 | 0.00 |
| 37.69 | 0.00 | 0.00 | 0.00 | 38.22 | 0.01 | 0.01 | 0.00 |
| 37.70 | 0.00 | 0.00 | 0.00 | 38.23 | 0.01 | 0.01 | 0.00 |
| 37.71 | 0.00 | 0.00 | 0.00 | 38.24 | 0.01 | 0.01 | 0.00 |
| 37.72 | 0.00 | 0.00 | 0.00 | 38.25 | 0.01 | 0.01 | 0.00 |
| 37.73 | 0.00 | 0.00 | 0.00 | 38.26 | 0.01 | 0.01 | 0.00 |
| 37.74 | 0.00 | 0.00 | 0.00 | 38.27 | 0.01 | 0.01 | 0.00 |
| 37.75 | 0.00 | 0.00 | 0.00 | 38.28 | 0.01 | 0.01 | 0.00 |
| 37.76 | 0.00 | 0.00 | 0.00 | 38.29 | 0.01 | 0.01 | 0.00 |
| 37.77 | 0.00 | 0.00 | 0.00 | 38.30 | 0.01 | 0.01 | 0.00 |
| 37.78 | 0.00 | 0.00 | 0.00 | 38.31 | 0.01 | 0.01 | 0.00 |
| 37.79 | 0.00 | 0.00 | 0.00 | 38.32 | 0.01 | 0.01 | 0.00 |
| 37.80 | 0.00 | 0.00 | 0.00 | 38.33 | 0.01 | 0.01 | 0.00 |
| 37.81 | 0.00 | 0.00 | 0.00 | 38.34 | 0.01 | 0.01 | 0.00 |
| 37.82 | 0.00 | 0.00 | 0.00 | 38.35 | 0.01 | 0.01 | 0.00 |
| 37.83 | 0.00 | 0.00 | 0.00 | 38.36 | 0.01 | 0.01 | 0.00 |
| 37.84 | 0.00 | 0.00 | 0.00 | 38.37 | 0.01 | 0.01 | 0.00 |
| 37.85 | 0.00 | 0.00 | 0.00 | 38.38 | 0.01 | 0.01 | 0.00 |
| 37.86 | 0.00 | 0.00 | 0.00 | 38.39 | 0.01 | 0.01 | 0.00 |
| 37.87 | 0.00 | 0.00 | 0.00 | 38.40 | 0.01 | 0.01 | 0.00 |
| 37.88 | 0.00 | 0.00 | 0.00 | 38.41 | 0.01 | 0.01 | 0.00 |
| 37.89 | 0.00 | 0.00 | 0.00 | 38.42 | 0.01 | 0.01 | 0.00 |
| 37.90 | 0.00 | 0.00 | 0.00 | 38.43 | 0.01 | 0.01 | 0.00 |
| 37.91 | 0.00 | 0.00 | 0.00 | 38.44 | 0.01 | 0.01 | 0.00 |
| 37.92 | 0.00 | 0.00 | 0.00 | 38.45 | 0.01 | 0.01 | 0.00 |
| 37.93 | 0.00 | 0.00 | 0.00 | 38.46 | 0.01 | 0.01 | 0.00 |
| 37.94 | 0.00 | 0.00 | 0.00 | 38.47 | 0.01 | 0.01 | 0.00 |
| 37.95 | 0.00 | 0.00 | 0.00 | 38.48 | 0.01 | 0.01 | 0.00 |
| 37.96 | 0.00 | 0.00 | 0.00 | 38.49 | 0.01 | 0.01 | 0.00 |
| 37.97 | 0.00 | 0.00 | 0.00 | 38.50 | 0.01 | 0.01 | 0.00 |
| 37.98 | 0.00 | 0.00 | 0.00 | 38.51 | 0.01 | 0.01 | 0.00 |
| 37.99 | 0.00 | 0.00 | 0.00 | 38.52 | 0.01 | 0.01 | 0.00 |
| 38.00 | 0.00 | 0.00 | 0.00 | 38.53 | 0.01 | 0.01 | 0.00 |
| 38.01 | 0.00 | 0.00 | 0.00 | 38.54 | 0.01 | 0.01 | 0.00 |
| 38.02 | 0.00 | 0.00 | 0.00 | 38.55 | 0.01 | 0.01 | 0.00 |

8-19-21_47388-11_Pre-Post-Drainage

Stage-Discharge for Pond BIO2: Bioretention Area \#2 (continued)

|  | Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) | Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 38.56 | 0.01 | 0.01 | 0.00 | 39.09 | 0.01 | 0.01 | 0.00 |
|  | 38.57 | 0.01 | 0.01 | 0.00 | 39.10 | 0.01 | 0.01 | 0.00 |
|  | 38.58 | 0.01 | 0.01 | 0.00 | 39.11 | 0.01 | 0.01 | 0.00 |
|  | 38.59 | 0.01 | 0.01 | 0.00 | 39.12 | 0.01 | 0.01 | 0.00 |
|  | 38.60 | 0.01 | 0.01 | 0.00 | 39.13 | 0.01 | 0.01 | 0.00 |
|  | 38.61 | 0.01 | 0.01 | 0.00 | 39.14 | 0.01 | 0.01 | 0.00 |
|  | 38.62 | 0.01 | 0.01 | 0.00 | 39.15 | 0.01 | 0.01 | 0.00 |
|  | 38.63 | 0.01 | 0.01 | 0.00 | 39.16 | 0.01 | 0.01 | 0.00 |
|  | 38.64 | 0.01 | 0.01 | 0.00 | 39.17 | 0.01 | 0.01 | 0.00 |
|  | 38.65 | 0.01 | 0.01 | 0.00 | 39.18 | 0.01 | 0.01 | 0.00 |
|  | 38.66 | 0.01 | 0.01 | 0.00 | 39.19 | 0.01 | 0.01 | 0.00 |
|  | 38.67 | 0.01 | 0.01 | 0.00 | 39.20 | 0.01 | 0.01 | 0.00 |
|  | 38.68 | 0.01 | 0.01 | 0.00 | 39.21 | 0.01 | 0.01 | 0.00 |
|  | 38.69 | 0.01 | 0.01 | 0.00 | 39.22 | 0.01 | 0.01 | 0.00 |
|  | 38.70 | 0.01 | 0.01 | 0.00 | 39.23 | 0.01 | 0.01 | 0.00 |
|  | 38.71 | 0.01 | 0.01 | 0.00 | 39.24 | 0.01 | 0.01 | 0.00 |
|  | 38.72 | 0.01 | 0.01 | 0.00 | 39.25 | 0.01 | 0.01 | 0.00 |
|  | 38.73 | 0.01 | 0.01 | 0.00 | 39.26 | 0.01 | 0.01 | 0.00 |
|  | 38.74 | 0.01 | 0.01 | 0.00 | 39.27 | 0.01 | 0.01 | 0.00 |
|  | 38.75 | 0.01 | 0.01 | 0.00 | 39.28 | 0.01 | 0.01 | 0.00 |
|  | 38.76 | 0.01 | 0.01 | 0.00 | 39.29 | 0.01 | 0.01 | 0.00 |
|  | 38.77 | 0.01 | 0.01 | 0.00 | 39.30 | 0.01 | 0.01 | 0.00 |
|  | 38.78 | 0.01 | 0.01 | 0.00 | 39.31 | 0.01 | 0.01 | 0.00 |
|  | 38.79 | 0.01 | 0.01 | 0.00 | 39.32 | 0.01 | 0.01 | 0.00 |
|  | 38.80 | 0.01 | 0.01 | 0.00 | 39.33 | 0.01 | 0.01 | 0.00 |
|  | 38.81 | 0.01 | 0.01 | 0.00 | 39.34 | 0.01 | 0.01 | 0.00 |
|  | 38.82 | 0.01 | 0.01 | 0.00 | 39.35 | 0.01 | 0.01 | 0.00 |
| Qwqv | 38.83 | 0.01 | 0.01 | 0.00 | 39.36 | 0.01 | 0.01 | 0.00 |
|  | 38.84 | 0.01 | 0.01 | 0.00 | 39.37 | 0.01 | 0.01 | 0.00 |
|  | 38.85 | 0.01 | 0.01 | 0.00 | 39.38 | 0.01 | 0.01 | 0.00 |
|  | 38.86 | 0.01 | 0.01 | 0.00 | 39.39 | 0.01 | 0.01 | 0.00 |
|  | 38.87 | 0.01 | 0.01 | 0.00 | 39.40 | 0.01 | 0.01 | 0.00 |
|  | 38.88 | 0.01 | 0.01 | 0.00 | 39.41 | 0.01 | 0.01 | 0.00 |
|  | 38.89 | 0.01 | 0.01 | 0.00 | 39.42 | 0.01 | 0.01 | 0.00 |
|  | 38.90 | 0.01 | 0.01 | 0.00 | 39.43 | 0.01 | 0.01 | 0.00 |
|  | 38.91 | 0.01 | 0.01 | 0.00 | 39.44 | 0.01 | 0.01 | 0.00 |
|  | 38.92 | 0.01 | 0.01 | 0.00 | 39.45 | 0.01 | 0.01 | 0.00 |
|  | 38.93 | 0.01 | 0.01 | 0.00 | 39.46 | 0.01 | 0.01 | 0.00 |
|  | 38.94 | 0.01 | 0.01 | 0.00 | 39.47 | 0.01 | 0.01 | 0.00 |
|  | 38.95 | 0.01 | 0.01 | 0.00 | 39.48 | 0.01 | 0.01 | 0.00 |
|  | 38.96 | 0.01 | 0.01 | 0.00 | 39.49 | 0.01 | 0.01 | 0.00 |
|  | 38.97 | 0.01 | 0.01 | 0.00 | 39.50 | 0.01 | 0.01 | 0.00 |
|  | 38.98 | 0.01 | 0.01 | 0.00 | 39.51 | 0.01 | 0.01 | 0.00 |
|  | 38.99 | 0.01 | 0.01 | 0.00 | 39.52 | 0.01 | 0.01 | 0.00 |
|  | 39.00 | 0.01 | 0.01 | 0.00 | 39.53 | 0.01 | 0.01 | 0.00 |
|  | 39.01 | 0.01 | 0.01 | 0.00 | 39.54 | 0.01 | 0.01 | 0.00 |
|  | 39.02 | 0.01 | 0.01 | 0.00 | 39.55 | 0.02 | 0.02 | 0.00 |
|  | 39.03 | 0.01 | 0.01 | 0.00 | 39.56 | 0.02 | 0.02 | 0.00 |
|  | 39.04 | 0.01 | 0.01 | 0.00 | 39.57 | 0.02 | 0.02 | 0.00 |
|  | 39.05 | 0.01 | 0.01 | 0.00 | 39.58 | 0.03 | 0.03 | 0.00 |
|  | 39.06 | 0.01 | 0.01 | 0.00 | 39.59 | 0.03 | 0.03 | 0.00 |
|  | 39.07 | 0.01 | 0.01 | 0.00 | 39.60 | 0.04 | 0.04 | 0.00 |
|  | 39.08 | 0.01 | 0.01 | 0.00 | 39.61 | 0.05 | 0.05 | 0.00 |

Type/Node Name: Infiltration Basin \#1 (INF 1)
Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

|  | Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed? | $\leftarrow$ yes |
| :---: | :---: | :---: |
| 10.37 ac | $A=$ Area draining to the practice <br> $A_{l}=$ Impervious area draining to the practice |  |
| 0.21 ac |  |  |  |
| 0.02 decimal | $\mathrm{I}=$ Percent impervious area draining to the practice, in decimal form |  |
| 0.07 unitless | $\mathrm{Rv}=$ Runoff coefficient $=0.05+(0.9 \times \mathrm{I})$ |  |
| 0.71 ac-in | WQV $=1 \prime \times R v \times A$ |  |
| 2,583 cf | WQV conversion (ac-in $\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12^{\prime \prime}$ ) |  |
| 646 cf | $25 \%$ x WQV (check calc for sediment forebay volume) |  |
| Roof and Clean | Method of pretreatment? (not required for clean or roof runoff) |  |
| NA cf | $\mathrm{V}_{\text {SED }}=$ Sediment forebay volume, if used for pretreatment | $\geq 25 \% W Q V$ |
| 4,042 cf | $V=$ Volume ${ }^{1}$ (attach a stage-storage table) | $\geq$ WQV |
| 3,554 sf | $\mathrm{A}_{\text {SA }}=$ Surface area of the bottom of the pond |  |
| 9.50 iph | $\mathrm{Ksat}_{\text {DESIGN }}=$ Design infiltration rate ${ }^{2}$ |  |
| 0.9 hours | $\mathrm{I}_{\text {DRAIN }}=$ vrain tıme $=\mathrm{v} /\left(\mathrm{A}_{\text {SA }}{ }^{*} \mathrm{I}_{\text {desigs }}\right)$ | < 72-hrs |
| 43.00 feet | $\mathrm{E}_{\text {втм }}=$ Elevation of the bottom of the basin |  |
| 40.58 feet | $\mathrm{E}_{\text {SHWT }}=$ Elevation of SHWT (if none found, enter the lowest elevation of the test pit) |  |
| 34.25 feet | $\mathrm{E}_{\text {Rock }}=$ Elevation of bedrock (if none found, enter the lowest elevation of the test pit) |  |
| 2.42 feet | $\mathrm{D}_{\text {SHWT }}=$ Separation from SHWT | $\geq *^{3}$ |
| 8.8 feet | $\mathrm{D}_{\text {Rock }}=$ Separation from bedrock | $\geq *^{3}$ |
| NA ft | $D_{\text {amend }}=$ Depth of amended soil, if applicable due high infiltation rate | $\geq 24 "$ |
| NA ft | $\mathrm{D}_{\mathrm{T}}=$ Depth of trench, if trench proposed | 4-10 ft |
| NA Yes/No | If a trench or underground system is proposed, has observation well been provided? $\leftarrow$ yes |  |
| NA | If a trench is proposed, does materialmeet Env-Wq 1508.06(k)(2) requirements. ${ }^{4}{ }^{\text {a }}$ ( ${ }^{\text {a }}$ yes |  |
| Yes Yes/No | If a basin is proposed, Is the perimeter curvilinear, and basin floor flat? | $\leftarrow$ yes |
| 3.0 :1 | If a basin is proposed, pond side slopes. | $\geq 3: 1$ |
| 44.23 ft | Peak elevation of the 10-year storm event (infiltration can be used in analysis) |  |
| 45.24 | Peak elevation of the 50 -year storm event (infiltration can be used in analysis) |  |
| 45.50 ft | Elevation of the top of the practice (if a basin, this is the elevation of the berm) |  |
| YES | 10 peak elevation $\leq$ Elevation of the top of the trench? ${ }^{5}$ | $\leftarrow$ yes |
| YES | If a basin is proposed, 50 -year peak elevation $\leq$ Elevation of berm? | $\leftarrow$ yes |

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. Ksat ${ }_{\text {DESIGN }}$ includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs \& WSIPAs; \& 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

## Designer's Notes:

Impervious from Site: 9,338 sf roof runoff
Other impervious area is from offsite and is treated with overland flow.
Note, Only clean runoff or residential roof run off $>1 \mathrm{ft}$ separation
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Stage-Area-Storage for Pond INF1: Bioretention Area \#2

| Elevation (feet) | Surface (sq-ft) | Horizontal (sq-ft) | Storage (cubic-feet) |  |
| :---: | :---: | :---: | :---: | :---: |
| 43.00 | 3,554 | 3,554 | 0 | Bottom |
| 43.01 | 3,563 | 3,563 | 36 | of Basin |
| 43.02 | 3,573 | 3,573 | 71 |  |
| 43.03 | 3,582 | 3,582 | 107 |  |
| 43.04 | 3,592 | 3,592 | 143 |  |
| 43.05 | 3,601 | 3,601 | 179 |  |
| 43.06 | 3,610 | 3,610 | 215 |  |
| 43.07 | 3,620 | 3,620 | 251 |  |
| 43.08 | 3,629 | 3,629 | 287 |  |
| 43.09 | 3,639 | 3,639 | 324 |  |
| 43.10 | 3,648 | 3,648 | 360 |  |
| 43.11 | 3,658 | 3,658 | 397 |  |
| 43.12 | 3,667 | 3,667 | 433 |  |
| 43.13 | 3,677 | 3,677 | 470 |  |
| 43.14 | 3,686 | 3,686 | 507 |  |
| 43.15 | 3,696 | 3,696 | 544 |  |
| 43.16 | 3,705 | 3,705 | 581 |  |
| 43.17 | 3,715 | 3,715 | 618 |  |
| 43.18 | 3,724 | 3,724 | 655 |  |
| 43.19 | 3,734 | 3,734 | 692 |  |
| 43.20 | 3,744 | 3,744 | 730 |  |
| 43.21 | 3,753 | 3,753 | 767 |  |
| 43.22 | 3,763 | 3,763 | 805 |  |
| 43.23 | 3,772 | 3,772 | 842 |  |
| 43.24 | 3,782 | 3,782 | 880 |  |
| 43.25 | 3,792 | 3,792 | 918 |  |
| 43.26 | 3,801 | 3,801 | 956 |  |
| 43.27 | 3,811 | 3,811 | 994 |  |
| 43.28 | 3,821 | 3,821 | 1,032 |  |
| 43.29 | 3,830 | 3,830 | 1,070 |  |
| 43.30 | 3,840 | 3,840 | 1,109 |  |
| 43.31 | 3,850 | 3,850 | 1,147 |  |
| 43.32 | 3,860 | 3,860 | 1,186 |  |
| 43.33 | 3,869 | 3,869 | 1,224 |  |
| 43.34 | 3,879 | 3,879 | 1,263 |  |
| 43.35 | 3,889 | 3,889 | 1,302 |  |
| 43.36 | 3,899 | 3,899 | 1,341 |  |
| 43.37 | 3,909 | 3,909 | 1,380 |  |
| 43.38 | 3,918 | 3,918 | 1,419 |  |
| 43.39 | 3,928 | 3,928 | 1,458 |  |
| 43.40 | 3,938 | 3,938 | 1,498 |  |
| 43.41 | 3,948 | 3,948 | 1,537 |  |
| 43.42 | 3,958 | 3,958 | 1,577 |  |
| 43.43 | 3,968 | 3,968 | 1,616 |  |
| 43.44 | 3,978 | 3,978 | 1,656 |  |
| 43.45 | 3,987 | 3,987 | 1,696 |  |
| 43.46 | 3,997 | 3,997 | 1,736 |  |
| 43.47 | 4,007 | 4,007 | 1,776 |  |
| 43.48 | 4,017 | 4,017 | 1,816 |  |
| 43.49 | 4,027 | 4,027 | 1,856 |  |
| 43.50 | 4,037 | 4,037 | 1,896 |  |
| 43.51 | 4,047 | 4,047 | 1,937 |  |
| 43.52 | 4,057 | 4,057 | 1,977 |  |

Stage-Area-Storage for Pond INF1: Bioretention Area \#2 (continued)

| Elevation (feet) | Surface (sq-ft) | Horizontal (sq-ft) | Storage (cubic-feet) |  |
| :---: | :---: | :---: | :---: | :---: |
| 43.53 | 4,067 | 4,067 | 2,018 |  |
| 43.54 | 4,077 | 4,077 | 2,059 |  |
| 43.55 | 4,087 | 4,087 | 2,100 |  |
| 43.56 | 4,097 | 4,097 | 2,141 |  |
| 43.57 | 4,107 | 4,107 | 2,182 |  |
| 43.58 | 4,117 | 4,117 | 2,223 |  |
| 43.59 | 4,127 | 4,127 | 2,264 |  |
| 43.60 | 4,137 | 4,137 | 2,305 |  |
| 43.61 | 4,148 | 4,148 | 2,347 |  |
| 43.62 | 4,158 | 4,158 | 2,388 |  |
| 43.63 | 4,168 | 4,168 | 2,430 |  |
| 43.64 | 4,178 | 4,178 | 2,472 |  |
| 43.65 | 4,188 | 4,188 | 2,513 |  |
| 43.66 | 4,198 | 4,198 | 2,555 |  |
| 43.67 | 4,208 | 4,208 | 2,597 |  |
| 43.68 | 4,219 | 4,219 | 2,639 |  |
| 43.69 | 4,229 | 4,229 | 2,682 |  |
| 43.70 | 4,239 | 4,239 | 2,724 |  |
| 43.71 | 4,249 | 4,249 | 2,766 |  |
| 43.72 | 4,259 | 4,259 | 2,809 |  |
| 43.73 | 4,270 | 4,270 | 2,852 |  |
| 43.74 | 4,280 | 4,280 | 2,894 |  |
| 43.75 | 4,290 | 4,290 | 2,937 |  |
| 43.76 | 4,300 | 4,300 | 2,980 |  |
| 43.77 | 4,311 | 4,311 | 3,023 |  |
| 43.78 | 4,321 | 4,321 | 3,066 |  |
| 43.79 | 4,331 | 4,331 | 3,110 |  |
| 43.80 | 4,342 | 4,342 | 3,153 |  |
| 43.81 | 4,352 | 4,352 | 3,197 |  |
| 43.82 | 4,362 | 4,362 | 3,240 |  |
| 43.83 | 4,373 | 4,373 | 3,284 |  |
| 43.84 | 4,383 | 4,383 | 3,328 |  |
| 43.85 | 4,394 | 4,394 | 3,371 |  |
| 43.86 | 4,404 | 4,404 | 3,415 |  |
| 43.87 | 4,414 | 4,414 | 3,460 |  |
| 43.88 | 4,425 | 4,425 | 3,504 |  |
| 43.89 | 4,435 | 4,435 | 3,548 |  |
| 43.90 | 4,446 | 4,446 | 3,592 |  |
| 43.91 | 4,456 | 4,456 | 3,637 |  |
| 43.92 | 4,467 | 4,467 | 3,682 |  |
| 43.93 | 4,477 | 4,477 | 3,726 |  |
| 43.94 | 4,488 | 4,488 | 3,771 |  |
| 43.95 | 4,498 | 4,498 | 3,816 |  |
| 43.96 | 4,509 | 4,509 | 3,861 |  |
| 43.97 | 4,519 | 4,519 | 3,906 |  |
| 43.98 | 4,530 | 4,530 | 3,951 |  |
| 43.99 | 4,540 | 4,540 | 3,997 | Lowest |
| 44.00 | 4,551 | 4,551 | 4,042 |  |
| 44.01 | 4,561 | 4,561 | 4,088 | Orifice |
| 44.02 | 4,571 | 4,571 | 4,133 |  |
| 44.03 | 4,581 | 4,581 | 4,179 |  |
| 44.04 | 4,591 | 4,591 | 4,225 |  |
| 44.05 | 4,601 | 4,601 | 4,271 |  |

Stage-Area-Storage for Pond INF1: Bioretention Area \#2 (continued)

| $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \end{array}$ | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | $\begin{array}{r} \text { Horizontal } \\ (\mathrm{sq}-\mathrm{ft}) \\ \hline \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ |
| :---: | :---: | :---: | :---: |
| 44.06 | 4,611 | 4,611 | 4,317 |
| 44.07 | 4,621 | 4,621 | 4,363 |
| 44.08 | 4,631 | 4,631 | 4,410 |
| 44.09 | 4,641 | 4,641 | 4,456 |
| 44.10 | 4,651 | 4,651 | 4,502 |
| 44.11 | 4,661 | 4,661 | 4,549 |
| 44.12 | 4,671 | 4,671 | 4,596 |
| 44.13 | 4,681 | 4,681 | 4,642 |
| 44.14 | 4,691 | 4,691 | 4,689 |
| 44.15 | 4,701 | 4,701 | 4,736 |
| 44.16 | 4,711 | 4,711 | 4,783 |
| 44.17 | 4,722 | 4,722 | 4,830 |
| 44.18 | 4,732 | 4,732 | 4,878 |
| 44.19 | 4,742 | 4,742 | 4,925 |
| 44.20 | 4,752 | 4,752 | 4,972 |
| 44.21 | 4,762 | 4,762 | 5,020 |
| 44.22 | 4,772 | 4,772 | 5,068 |
| 44.23 | 4,782 | 4,782 | 5,115 |
| 44.24 | 4,793 | 4,793 | 5,163 |
| 44.25 | 4,803 | 4,803 | 5,211 |
| 44.26 | 4,813 | 4,813 | 5,259 |
| 44.27 | 4,823 | 4,823 | 5,308 |
| 44.28 | 4,834 | 4,834 | 5,356 |
| 44.29 | 4,844 | 4,844 | 5,404 |
| 44.30 | 4,854 | 4,854 | 5,453 |
| 44.31 | 4,864 | 4,864 | 5,501 |
| 44.32 | 4,875 | 4,875 | 5,550 |
| 44.33 | 4,885 | 4,885 | 5,599 |
| 44.34 | 4,895 | 4,895 | 5,648 |
| 44.35 | 4,905 | 4,905 | 5,697 |
| 44.36 | 4,916 | 4,916 | 5,746 |
| 44.37 | 4,926 | 4,926 | 5,795 |
| 44.38 | 4,936 | 4,936 | 5,844 |
| 44.39 | 4,947 | 4,947 | 5,894 |
| 44.40 | 4,957 | 4,957 | 5,943 |
| 44.41 | 4,968 | 4,968 | 5,993 |
| 44.42 | 4,978 | 4,978 | 6,043 |
| 44.43 | 4,988 | 4,988 | 6,092 |
| 44.44 | 4,999 | 4,999 | 6,142 |
| 44.45 | 5,009 | 5,009 | 6,192 |
| 44.46 | 5,020 | 5,020 | 6,243 |
| 44.47 | 5,030 | 5,030 | 6,293 |
| 44.48 | 5,040 | 5,040 | 6,343 |
| 44.49 | 5,051 | 5,051 | 6,394 |
| 44.50 | 5,061 | 5,061 | 6,444 |
| 44.51 | 5,072 | 5,072 | 6,495 |
| 44.52 | 5,082 | 5,082 | 6,546 |
| 44.53 | 5,093 | 5,093 | 6,597 |
| 44.54 | 5,103 | 5,103 | 6,648 |
| 44.55 | 5,114 | 5,114 | 6,699 |
| 44.56 | 5,125 | 5,125 | 6,750 |
| 44.57 | 5,135 | 5,135 | 6,801 |
| 44.58 | 5,146 | 5,146 | 6,852 |

Stage-Area-Storage for Pond INF1: Bioretention Area \#2 (continued)

| Elevation (feet) | Surface (sq-ft) | Horizontal (sq-ft) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: |
| 44.59 | 5,156 | 5,156 | 6,904 |
| 44.60 | 5,167 | 5,167 | 6,956 |
| 44.61 | 5,177 | 5,177 | 7,007 |
| 44.62 | 5,188 | 5,188 | 7,059 |
| 44.63 | 5,199 | 5,199 | 7,111 |
| 44.64 | 5,209 | 5,209 | 7,163 |
| 44.65 | 5,220 | 5,220 | 7,215 |
| 44.66 | 5,231 | 5,231 | 7,268 |
| 44.67 | 5,241 | 5,241 | 7,320 |
| 44.68 | 5,252 | 5,252 | 7,372 |
| 44.69 | 5,263 | 5,263 | 7,425 |
| 44.70 | 5,273 | 5,273 | 7,478 |
| 44.71 | 5,284 | 5,284 | 7,530 |
| 44.72 | 5,295 | 5,295 | 7,583 |
| 44.73 | 5,305 | 5,305 | 7,636 |
| 44.74 | 5,316 | 5,316 | 7,689 |
| 44.75 | 5,327 | 5,327 | 7,743 |
| 44.76 | 5,338 | 5,338 | 7,796 |
| 44.77 | 5,348 | 5,348 | 7,849 |
| 44.78 | 5,359 | 5,359 | 7,903 |
| 44.79 | 5,370 | 5,370 | 7,957 |
| 44.80 | 5,381 | 5,381 | 8,010 |
| 44.81 | 5,392 | 5,392 | 8,064 |
| 44.82 | 5,402 | 5,402 | 8,118 |
| 44.83 | 5,413 | 5,413 | 8,172 |
| 44.84 | 5,424 | 5,424 | 8,226 |
| 44.85 | 5,435 | 5,435 | 8,281 |
| 44.86 | 5,446 | 5,446 | 8,335 |
| 44.87 | 5,457 | 5,457 | 8,390 |
| 44.88 | 5,468 | 5,468 | 8,444 |
| 44.89 | 5,478 | 5,478 | 8,499 |
| 44.90 | 5,489 | 5,489 | 8,554 |
| 44.91 | 5,500 | 5,500 | 8,609 |
| 44.92 | 5,511 | 5,511 | 8,664 |
| 44.93 | 5,522 | 5,522 | 8,719 |
| 44.94 | 5,533 | 5,533 | 8,774 |
| 44.95 | 5,544 | 5,544 | 8,830 |
| 44.96 | 5,555 | 5,555 | 8,885 |
| 44.97 | 5,566 | 5,566 | 8,941 |
| 44.98 | 5,577 | 5,577 | 8,996 |
| 44.99 | 5,588 | 5,588 | 9,052 |
| 45.00 | 5,599 | 5,599 | 9,108 |
| 45.01 | 5,610 | 5,610 | 9,164 |
| 45.02 | 5,621 | 5,621 | 9,220 |
| 45.03 | 5,631 | 5,631 | 9,277 |
| 45.04 | 5,642 | 5,642 | 9,333 |
| 45.05 | 5,653 | 5,653 | 9,389 |
| 45.06 | 5,664 | 5,664 | 9,446 |
| 45.07 | 5,675 | 5,675 | 9,503 |
| 45.08 | 5,685 | 5,685 | 9,560 |
| 45.09 | 5,696 | 5,696 | 9,616 |
| 45.10 | 5,707 | 5,707 | 9,673 |
| 45.11 | 5,718 | 5,718 | 9,731 |

Stage-Area-Storage for Pond INF1: Bioretention Area \#2 (continued)

| Elevation (feet) | Surface <br> (sq-ft) | Horizontal (sq-ft) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: |
| 45.12 | 5,729 | 5,729 | 9,788 |
| 45.13 | 5,740 | 5,740 | 9,845 |
| 45.14 | 5,751 | 5,751 | 9,903 |
| 45.15 | 5,762 | 5,762 | 9,960 |
| 45.16 | 5,773 | 5,773 | 10,018 |
| 45.17 | 5,783 | 5,783 | 10,076 |
| 45.18 | 5,794 | 5,794 | 10,134 |
| 45.19 | 5,805 | 5,805 | 10,192 |
| 45.20 | 5,816 | 5,816 | 10,250 |
| 45.21 | 5,827 | 5,827 | 10,308 |
| 45.22 | 5,838 | 5,838 | 10,366 |
| 45.23 | 5,849 | 5,849 | 10,425 |
| 45.24 | 5,860 | 5,860 | 10,483 |
| 45.25 | 5,871 | 5,871 | 10,542 |
| 45.26 | 5,882 | 5,882 | 10,601 |
| 45.27 | 5,893 | 5,893 | 10,659 |
| 45.28 | 5,904 | 5,904 | 10,718 |
| 45.29 | 5,915 | 5,915 | 10,778 |
| 45.30 | 5,926 | 5,926 | 10,837 |
| 45.31 | 5,938 | 5,938 | 10,896 |
| 45.32 | 5,949 | 5,949 | 10,956 |
| 45.33 | 5,960 | 5,960 | 11,015 |
| 45.34 | 5,971 | 5,971 | 11,075 |
| 45.35 | 5,982 | 5,982 | 11,135 |
| 45.36 | 5,993 | 5,993 | 11,194 |
| 45.37 | 6,004 | 6,004 | 11,254 |
| 45.38 | 6,015 | 6,015 | 11,314 |
| 45.39 | 6,027 | 6,027 | 11,375 |
| 45.40 | 6,038 | 6,038 | 11,435 |
| 45.41 | 6,049 | 6,049 | 11,495 |
| 45.42 | 6,060 | 6,060 | 11,556 |
| 45.43 | 6,071 | 6,071 | 11,617 |
| 45.44 | 6,083 | 6,083 | 11,677 |
| 45.45 | 6,094 | 6,094 | 11,738 |
| 45.46 | 6,105 | 6,105 | 11,799 |
| 45.47 | 6,116 | 6,116 | 11,860 |
| 45.48 | 6,127 | 6,127 | 11,922 |
| 45.49 | 6,139 | 6,139 | 11,983 |
| 45.50 | 6,150 | 6,150 | 12,044 |
| 45.51 | 6,161 | 6,161 | 12,106 |
| 45.52 | 6,172 | 6,172 | 12,168 |
| 45.53 | 6,183 | 6,183 | 12,229 |
| 45.54 | 6,194 | 6,194 | 12,291 |
| 45.55 | 6,205 | 6,205 | 12,353 |
| 45.56 | 6,216 | 6,216 | 12,415 |
| 45.57 | 6,227 | 6,227 | 12,478 |
| 45.58 | 6,239 | 6,239 | 12,540 |
| 45.59 | 6,250 | 6,250 | 12,602 |
| 45.60 | 6,261 | 6,261 | 12,665 |
| 45.61 | 6,272 | 6,272 | 12,728 |
| 45.62 | 6,283 | 6,283 | 12,790 |
| 45.63 | 6,294 | 6,294 | 12,853 |
| 45.64 | 6,305 | 6,305 | 12,916 |

Stage-Area-Storage for Pond INF1: Bioretention Area \#2 (continued)

| Elevation <br> (feet) | Surface <br> (sa-ft) | Horizontal <br> (sq-ft) | Storage <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 45.65 | 6,317 | 6,317 | 12,979 |
| 45.66 | 6,328 | 6,328 | 13,043 |
| 45.67 | 6,339 | 6,339 | 13,106 |
| 45.68 | 6,350 | 6,350 | 13,069 |
| 45.69 | 6,361 | 6,361 | 13,233 |
| 45.70 | 6,373 | 6,373 | 13,297 |
| 45.71 | 6,384 | 6,384 | 13,360 |
| 45.72 | 6,395 | 6,395 | 13,424 |
| 45.73 | 6,406 | 6,406 | 13,488 |
| 45.74 | 6,418 | 6,418 | 13,552 |
| 45.75 | 6,429 | 6,429 | 13,617 |
| 45.76 | 6,440 | 6,440 | 13,681 |
| 45.77 | 6,451 | 6,451 | 13,745 |
| 45.78 | 6,463 | 6,463 | 13,810 |
| 45.79 | 6,474 | 6,474 | 13,875 |
| 45.80 | 6,485 | 6,485 | 13,939 |
| 45.81 | 6,497 | 6,497 | 14,004 |
| 45.82 | 6,508 | 6,508 | 14,069 |
| 45.83 | 6,519 | 6,519 | 14,35 |
| 45.84 | 6,531 | 6,531 | 14,200 |
| 45.85 | 6,542 | 6,542 | 14,265 |
| 45.86 | 6,554 | 6,554 | 14,331 |
| 45.87 | 6,565 | 6,565 | 14,996 |
| 45.88 | 6,576 | 6,576 | 14,462 |
| 45.89 | 6,588 | 6,588 | 14,528 |
| 45.90 | 6,599 | 6,599 | 14,594 |
| 45.91 | 6,611 | 6,611 | 14,660 |
| 45.92 | 6,622 | 6,622 | 14,726 |
| 45.93 | 6,634 | 6,634 | 14,792 |
| 45.94 | 6,645 | 6,645 | 14,859 |
| 45.95 | 6,656 | 6,656 | 14,925 |
| 45.96 | 6,668 | 6,668 | 14,992 |
| 45.97 | 6,679 | 6,679 | 15,058 |
| 45.98 | 6,691 | 6,691 | 15,125 |
| 45.99 | 6,702 | 6,702 | 15,192 |
| 46.00 | 6,714 | 6,714 | 15,259 |
|  |  |  |  |

# GRAVEL WETLAND DESIGN CRITERIA <br> (Env-Wq 1508.05) 

Type/Node Name: Subsurface Gravel Wetland \#1
Enter the node name in the drainage analysis if applicable.

| 5.51 ac | A = Area draining to the practice <br> $A_{1}=$ Impervious area draining to the practice |  |
| :---: | :---: | :---: |
| 1.96 ac |  |  |
| 0.36 decimal | $I=$ Percent impervious area draining to the practice, in decimal form |  |
| 0.37 unitless | $\mathrm{Rv}=$ Runoff coefficient $=0.05+(0.9 \times \mathrm{I})$ |  |
| 2.04 ac-in | $W Q V=1^{\prime \prime} \times R v \times A$ |  |
| 7,404 cf | WQV conversion (ac-in $\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12^{\prime \prime}$ ) |  |
| 740 cf | $10 \% \times$ WQV (check calc for sediment forebay) |  |
| 3,332 cf | $45 \% \times$ WQV (check calc for gravel wetland treatment bay volume) |  |
| 818 cf | $\mathrm{V}_{\text {SED }}=$ Sediment forebay volume | $\geq 10 \% W Q V$ |
| 4,004 cf | $\mathrm{V}_{\text {TB1 }}=$ Volume of treatment bay $1^{1}$ | $\geq 45 \% W Q V$ |
| 4,349 cf | $\mathrm{V}_{\text {TB2 }}=$ Volume of treatment bay $2^{2}$ | $\geq 45 \% W Q V$ |
| 0.17 cfs | $2 \mathrm{Q}_{\text {avg }}=2 * \mathrm{WQV} / 24 \mathrm{hrs}$ * (1hr / 3600 sec$)^{2}$ |  |
| 35.67 ft | $\mathrm{E}_{\text {WQV }}=$ Elevation of WQV (attach stage-storage table) |  |
| 0.01 cfs | $\mathrm{Q}_{\text {WQV }}=$ Discharge at the $\mathrm{E}_{\text {WQV }}$ (attach stage-discharge table) | $<2 \mathrm{Qavg}^{\text {a }}$ |
| 411.34 hours | $\mathrm{T}_{\mathrm{ED}}=$ Drawdown time of extended detention $=2 \mathrm{WQV} / \mathrm{Q}_{\mathrm{WQV}}$ | $\geq$ 24-hrs |
| 3.00 :1 | Pond side slopes | $\geq 3: 1$ |
| 34.16 ft | Elevation of SHWT |  |
| 32.16 ft | SHWT-2 feet |  |
| 34.40 ft | $\begin{array}{ll}\text { Epp = Elevation of the permanent pool (elevation of lowest orifice) }{ }^{3} & \leq E_{\text {SHWT }}-\mathbf{2 ~ f t} \\ \text { Length of the flow path between the inlet and outlet in each cell } & \geq \mathbf{1 5 ~ f t}\end{array}$ What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of $\leq 6^{\prime \prime}$ )? |  |
| 86.00 ft |  |  |
| Trash Rack |  |  |
| 37.84 ft | Peak elevation of the 50-year storm event ( $\mathrm{E}_{50}$ ) |  |
| 38.25 ft | Berm elevation of the pond |  |
| YES | $\mathrm{E}_{50} \leq$ the berm elevation? | $\leftarrow$ yes |
| Qualified profession Name, Profession: | that developed the planting plan Michael Kraseminski |  |

1. Volume stored above the wetland soil and below the high flow by-pass.
2. To ensure orifice is sized so that WQV is released at a relatively stable rate.
3. 4 " to 8 " below the wetland soil. If lowest orifice is higher than (SHWT-2 feet), and saturated hydraulic conductivity (Ksat) is greater than $0.015 \mathrm{in} / \mathrm{hr}$, the system must be lined.

## Designer's Notes:

High Flow By Bass at 35.75 - Bay 1 Vol $=4,004$, Bay $2=4,349$
7,404 cf (WQV) + 1,324 cf (Vol at Basin Bottom) $=8,728$
(This Page Is Intentionally Blank)

| Elevation (feet) | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ | Elevation (feet) | Storage (cubic-feet) | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \end{array}$ | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 34.40 | 0 | 34.93 | 1,169 | 35.46 | 6,412 |
| 34.41 | 22 | 34.94 | 1,192 | 35.47 | 6,523 |
| 34.42 | 44 | 34.95 | 1,214 | 35.48 | 6,635 |
| 34.43 | 66 | 34.96 | 1,236 | 35.49 | 6,747 |
| 34.44 | 88 | 34.97 | 1,258 | 35.50 | 6,859 |
| 34.45 | 110 | 34.98 | 1,280 | 35.51 | 6,971 |
| 34.46 | 132 | 34.99 | 1,302 | 35.52 | 7,083 |
| 34.47 | 154 | 35.00 | 1,324 | 35.53 | 7,195 |
| 34.48 | 177 | 35.01 | 1,433 | 35.54 | 7,308 |
| 34.49 | 199 | 35.02 | 1,543 | 35.55 | 7,420 |
| 34.50 | 221 | 35.03 | 1,653 | 35.56 | 7,532 |
| 34.51 | 243 | 35.04 | 1,762 | 35.57 | 7,645 |
| 34.52 | 265 | 35.05 | 1,872 | 35.58 | 7,757 |
| 34.53 | 287 | 35.06 | 1,982 | 35.59 | 7,870 |
| 34.54 | 309 | 35.07 | 2,091 | 35.60 | 7,982 |
| 34.55 | 331 | 35.08 | 2,201 | 35.61 | 8,095 |
| 34.56 | 353 | 35.09 | 2,311 | 35.62 | 8,207 |
| 34.57 | 375 | 35.10 | 2,421 | 35.63 | 8,320 |
| 34.58 | 397 | 35.11 | 2,531 | 35.64 | 8,433 |
| 34.59 | 419 | 35.12 | 2,641 | 35.65 | 8,546 |
| 34.60 | 441 | 35.13 | 2,751 | 35.66 | 8,659 |
| 34.61 | 463 | 35.14 | 2,861 | 35.67 | 8,771 |
| 34.62 | 485 | 35.15 | 2,971 | 35.68 | 8,884 |
| 34.63 | 508 | 35.16 | 3,081 | 35.69 | 8,998 |
| 34.64 | 530 | 35.17 | 3,192 | 35.70 | 9,111 |
| 34.65 | 552 | 35.18 | 3,302 | 35.71 | 9,224 |
| 34.66 | 574 | 35.19 | 3,412 | 35.72 | 9,337 |
| 34.67 | 596 | 35.20 | 3,523 | 35.73 | 9,450 |
| 34.68 | 618 | 35.21 | 3,633 | 35.74 | 9,564 |
| 34.69 | 640 | 35.22 | 3,744 | 35.75 | 9,677 |
| 34.70 | 662 | 35.23 | 3,854 | 35.76 | 9,791 |
| 34.71 | 684 | 35.24 | 3,965 | 35.77 | 9,904 |
| 34.72 | 706 | 35.25 | 4,076 | 35.78 | 10,018 |
| 34.73 | 728 | 35.26 | 4,186 | 35.79 | 10,131 |
| 34.74 | 750 | 35.27 | 4,297 | 35.80 | 10,245 |
| 34.75 | 772 | 35.28 | 4,408 | 35.81 | 10,359 |
| 34.76 | 794 | 35.29 | 4,519 | 35.82 | 10,472 |
| 34.77 | 816 | 35.30 | 4,630 | 35.83 | 10,586 |
| 34.78 | 839 | 35.31 | 4,741 | 35.84 | 10,700 |
| 34.79 | 861 | 35.32 | 4,852 | 35.85 | 10,814 |
| 34.80 | 883 | 35.33 | 4,963 | 35.86 | 10,928 |
| 34.81 | 905 | 35.34 | 5,074 | 35.87 | 11,042 |
| 34.82 | 927 | 35.35 | 5,185 | 35.88 | 11,157 |
| 34.83 | 949 | 35.36 | 5,296 | 35.89 | 11,271 |
| 34.84 | 971 | 35.37 | 5,408 | 35.90 | 11,385 |
| 34.85 | 993 | 35.38 | 5,519 | 35.91 | 11,499 |
| 34.86 | 1,015 | 35.39 | 5,630 | 35.92 | 11,614 |
| 34.87 | 1,037 | 35.40 | 5,742 | 35.93 | 11,728 |
| 34.88 | 1,059 | 35.41 | 5,853 | 35.94 | 11,843 |
| 34.89 | 1,081 | 35.42 | 5,965 | 35.95 | 11,957 |
| 34.90 | 1,103 | 35.43 | 6,076 | 35.96 | 12,072 |
| 34.91 | 1,125 | 35.44 | 6,188 | 35.97 | 12,187 |
| 34.92 | 1,147 | 35.45 | 6,300 | 35.98 | 12,302 |

Stage-Area-Storage for Pond GW01: Gravel Wetland \#1 (continued)

| Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) | Elevation (feet) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 35.99 | 12,416 | 36.52 | 18,594 | 37.05 | 24,980 |
| 36.00 | 12,531 | 36.53 | 18,712 | 37.06 | 25,109 |
| 36.01 | 12,646 | 36.54 | 18,831 | 37.07 | 25,239 |
| 36.02 | 12,761 | 36.55 | 18,949 | 37.08 | 25,370 |
| 36.03 | 12,876 | 36.56 | 19,068 | 37.09 | 25,503 |
| 36.04 | 12,991 | 36.57 | 19,186 | 37.10 | 25,638 |
| 36.05 | 13,107 | 36.58 | 19,305 | 37.11 | 25,774 |
| 36.06 | 13,222 | 36.59 | 19,424 | 37.12 | 25,911 |
| 36.07 | 13,337 | 36.60 | 19,543 | 37.13 | 26,050 |
| 36.08 | 13,453 | 36.61 | 19,662 | 37.14 | 26,190 |
| 36.09 | 13,568 | 36.62 | 19,780 | 37.15 | 26,331 |
| 36.10 | 13,684 | 36.63 | 19,900 | 37.16 | 26,474 |
| 36.11 | 13,799 | 36.64 | 20,019 | 37.17 | 26,619 |
| 36.12 | 13,915 | 36.65 | 20,138 | 37.18 | 26,765 |
| 36.13 | 14,031 | 36.66 | 20,257 | 37.19 | 26,913 |
| 36.14 | 14,146 | 36.67 | 20,376 | 37.20 | 27,062 |
| 36.15 | 14,262 | 36.68 | 20,496 | 37.21 | 27,213 |
| 36.16 | 14,378 | 36.69 | 20,615 | 37.22 | 27,365 |
| 36.17 | 14,494 | 36.70 | 20,735 | 37.23 | 27,519 |
| 36.18 | 14,610 | 36.71 | 20,854 | 37.24 | 27,674 |
| 36.19 | 14,726 | 36.72 | 20,974 | 37.25 | 27,831 |
| 36.20 | 14,842 | 36.73 | 21,094 | 37.26 | 27,990 |
| 36.21 | 14,959 | 36.74 | 21,214 | 37.27 | 28,150 |
| 36.22 | 15,075 | 36.75 | 21,334 | 37.28 | 28,312 |
| 36.23 | 15,191 | 36.76 | 21,454 | 37.29 | 28,476 |
| 36.24 | 15,308 | 36.77 | 21,574 | 37.30 | 28,641 |
| 36.25 | 15,424 | 36.78 | 21,694 | 37.31 | 28,808 |
| 36.26 | 15,541 | 36.79 | 21,814 | 37.32 | 28,977 |
| 36.27 | 15,657 | 36.80 | 21,934 | 37.33 | 29,148 |
| 36.28 | 15,774 | 36.81 | 22,054 | 37.34 | 29,319 |
| 36.29 | 15,891 | 36.82 | 22,175 | 37.35 | 29,491 |
| 36.30 | 16,007 | 36.83 | 22,295 | 37.36 | 29,663 |
| 36.31 | 16,124 | 36.84 | 22,416 | 37.37 | 29,835 |
| 36.32 | 16,241 | 36.85 | 22,536 | 37.38 | 30,008 |
| 36.33 | 16,358 | 36.86 | 22,657 | 37.39 | 30,180 |
| 36.34 | 16,475 | 36.87 | 22,778 | 37.40 | 30,353 |
| 36.35 | 16,592 | 36.88 | 22,899 | 37.41 | 30,527 |
| 36.36 | 16,710 | 36.89 | 23,020 | 37.42 | 30,700 |
| 36.37 | 16,827 | 36.90 | 23,141 | 37.43 | 30,874 |
| 36.38 | 16,944 | 36.91 | 23,262 | 37.44 | 31,048 |
| 36.39 | 17,062 | 36.92 | 23,383 | 37.45 | 31,223 |
| 36.40 | 17,179 | 36.93 | 23,504 | 37.46 | 31,397 |
| 36.41 | 17,297 | 36.94 | 23,625 | 37.47 | 31,572 |
| 36.42 | 17,414 | 36.95 | 23,747 | 37.48 | 31,747 |
| 36.43 | 17,532 | 36.96 | 23,868 | 37.49 | 31,923 |
| 36.44 | 17,650 | 36.97 | 23,990 | 37.50 | 32,098 |
| 36.45 | 17,767 | 36.98 | 24,111 | 37.51 | 32,274 |
| 36.46 | 17,885 | 36.99 | 24,233 | 37.52 | 32,451 |
| 36.47 | 18,003 | 37.00 | 24,355 | 37.53 | 32,627 |
| 36.48 | 18,121 | 37.01 | 24,477 | 37.54 | 32,804 |
| 36.49 | 18,239 | 37.02 | 24,601 | 37.55 | 32,981 |
| 36.50 | 18,357 | 37.03 | 24,726 | 37.56 | 33,158 |
| 36.51 | 18,476 | 37.04 | 24,852 | 37.57 | 33,336 |

Stage-Area-Storage for Pond GW01: Gravel Wetland \#1 (continued)

| $\begin{array}{r} \text { Elevation } \\ \quad \text { feet) } \\ \hline \end{array}$ | Storage (cubic-feet) | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 37.58 | 33,513 | 38.11 | 43,360 | 38.64 | 54,528 |
| 37.59 | 33,691 | 38.12 | 43,560 | 38.65 | 54,741 |
| 37.60 | 33,870 | 38.13 | 43,761 | 38.66 | 54,953 |
| 37.61 | 34,048 | 38.14 | 43,962 | 38.67 | 55,166 |
| 37.62 | 34,227 | 38.15 | 44,165 | 38.68 | 55,378 |
| 37.63 | 34,406 | 38.16 | 44,368 | 38.69 | 55,590 |
| 37.64 | 34,586 | 38.17 | 44,573 | 38.70 | 55,803 |
| 37.65 | 34,765 | 38.18 | 44,778 | 38.71 | 56,015 |
| 37.66 | 34,945 | 38.19 | 44,985 | 38.72 | 56,228 |
| 37.67 | 35,126 | 38.20 | 45,192 | 38.73 | 56,440 |
| 37.68 | 35,306 | 38.21 | 45,400 | 38.74 | 56,653 |
| 37.69 | 35,487 | 38.22 | 45,609 | 38.75 | 56,865 |
| 37.70 | 35,668 | 38.23 | 45,819 | 38.76 | 57,078 |
| 37.71 | 35,849 | 38.24 | 46,030 | 38.77 | 57,290 |
| 37.72 | 36,031 | 38.25 | 46,242 | 38.78 | 57,503 |
| 37.73 | 36,212 | 38.26 | 46,455 | 38.79 | 57,715 |
| 37.74 | 36,394 | 38.27 | 46,667 | 38.80 | 57,928 |
| 37.75 | 36,577 | 38.28 | 46,880 | 38.81 | 58,140 |
| 37.76 | 36,759 | 38.29 | 47,092 | 38.82 | 58,352 |
| 37.77 | 36,942 | 38.30 | 47,305 | 38.83 | 58,565 |
| 37.78 | 37,125 | 38.31 | 47,517 | 38.84 | 58,777 |
| 37.79 | 37,309 | 38.32 | 47,729 | 38.85 | 58,990 |
| 37.80 | 37,493 | 38.33 | 47,942 | 38.86 | 59,202 |
| 37.81 | 37,677 | 38.34 | 48,154 | 38.87 | 59,415 |
| 37.82 | 37,861 | 38.35 | 48,367 | 38.88 | 59,627 |
| 37.83 | 38,045 | 38.36 | 48,579 | 38.89 | 59,840 |
| 37.84 | 38,230 | 38.37 | 48,792 | 38.90 | 60,052 |
| 37.85 | 38,415 | 38.38 | 49,004 | 38.91 | 60,265 |
| 37.86 | 38,600 | 38.39 | 49,217 | 38.92 | 60,477 |
| 37.87 | 38,786 | 38.40 | 49,429 | 38.93 | 60,690 |
| 37.88 | 38,972 | 38.41 | 49,642 | 38.94 | 60,902 |
| 37.89 | 39,158 | 38.42 | 49,854 | 38.95 | 61,114 |
| 37.90 | 39,344 | 38.43 | 50,067 | 38.96 | 61,327 |
| 37.91 | 39,531 | 38.44 | 50,279 | 38.97 | 61,539 |
| 37.92 | 39,718 | 38.45 | 50,491 | 38.98 | 61,752 |
| 37.93 | 39,905 | 38.46 | 50,704 | 38.99 | 61,964 |
| 37.94 | 40,093 | 38.47 | 50,916 | 39.00 | 62,177 |
| 37.95 | 40,280 | 38.48 | 51,129 |  |  |
| 37.96 | 40,469 | 38.49 | 51,341 |  |  |
| 37.97 | 40,657 | 38.50 | 51,554 |  |  |
| 37.98 | 40,845 | 38.51 | 51,766 |  |  |
| 37.99 | 41,034 | 38.52 | 51,979 |  |  |
| 38.00 | 41,223 | 38.53 | 52,191 |  |  |
| 38.01 | 41,413 | 38.54 | 52,404 |  |  |
| 38.02 | 41,604 | 38.55 | 52,616 |  |  |
| 38.03 | 41,795 | 38.56 | 52,828 |  |  |
| 38.04 | 41,988 | 38.57 | 53,041 |  |  |
| 38.05 | 42,181 | 38.58 | 53,253 |  |  |
| 38.06 | 42,375 | 38.59 | 53,466 |  |  |
| 38.07 | 42,570 | 38.60 | 53,678 |  |  |
| 38.08 | 42,767 | 38.61 | 53,891 |  |  |
| 38.09 | 42,964 | 38.62 | 54,103 |  |  |
| 38.10 | 43,162 | 38.63 | 54,316 |  |  |

Stage-Discharge for Pond GW01: Gravel Wetland \#1

| Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) | Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 34.40 | 0.00 | 0.00 | 0.00 | 34.93 | 0.00 | 0.00 | 0.00 |
| 34.41 | 0.00 | 0.00 | 0.00 | 34.94 | 0.00 | 0.00 | 0.00 |
| 34.42 | 0.00 | 0.00 | 0.00 | 34.95 | 0.00 | 0.00 | 0.00 |
| 34.43 | 0.00 | 0.00 | 0.00 | 34.96 | 0.00 | 0.00 | 0.00 |
| 34.44 | 0.00 | 0.00 | 0.00 | 34.97 | 0.00 | 0.00 | 0.00 |
| 34.45 | 0.00 | 0.00 | 0.00 | 34.98 | 0.00 | 0.00 | 0.00 |
| 34.46 | 0.00 | 0.00 | 0.00 | 34.99 | 0.00 | 0.00 | 0.00 |
| 34.47 | 0.00 | 0.00 | 0.00 | 35.00 | 0.00 | 0.00 | 0.00 |
| 34.48 | 0.00 | 0.00 | 0.00 | 35.01 | 0.00 | 0.00 | 0.00 |
| 34.49 | 0.00 | 0.00 | 0.00 | 35.02 | 0.00 | 0.00 | 0.00 |
| 34.50 | 0.00 | 0.00 | 0.00 | 35.03 | 0.00 | 0.00 | 0.00 |
| 34.51 | 0.00 | 0.00 | 0.00 | 35.04 | 0.00 | 0.00 | 0.00 |
| 34.52 | 0.00 | 0.00 | 0.00 | 35.05 | 0.00 | 0.00 | 0.00 |
| 34.53 | 0.00 | 0.00 | 0.00 | 35.06 | 0.00 | 0.00 | 0.00 |
| 34.54 | 0.00 | 0.00 | 0.00 | 35.07 | 0.00 | 0.00 | 0.00 |
| 34.55 | 0.00 | 0.00 | 0.00 | 35.08 | 0.00 | 0.00 | 0.00 |
| 34.56 | 0.00 | 0.00 | 0.00 | 35.09 | 0.00 | 0.00 | 0.00 |
| 34.57 | 0.00 | 0.00 | 0.00 | 35.10 | 0.00 | 0.00 | 0.00 |
| 34.58 | 0.00 | 0.00 | 0.00 | 35.11 | 0.00 | 0.00 | 0.00 |
| 34.59 | 0.00 | 0.00 | 0.00 | 35.12 | 0.00 | 0.00 | 0.00 |
| 34.60 | 0.00 | 0.00 | 0.00 | 35.13 | 0.00 | 0.00 | 0.00 |
| 34.61 | 0.00 | 0.00 | 0.00 | 35.14 | 0.00 | 0.00 | 0.00 |
| 34.62 | 0.00 | 0.00 | 0.00 | 35.15 | 0.00 | 0.00 | 0.00 |
| 34.63 | 0.00 | 0.00 | 0.00 | 35.16 | 0.00 | 0.00 | 0.00 |
| 34.64 | 0.00 | 0.00 | 0.00 | 35.17 | 0.00 | 0.00 | 0.00 |
| 34.65 | 0.00 | 0.00 | 0.00 | 35.18 | 0.00 | 0.00 | 0.00 |
| 34.66 | 0.00 | 0.00 | 0.00 | 35.19 | 0.00 | 0.00 | 0.00 |
| 34.67 | 0.00 | 0.00 | 0.00 | 35.20 | 0.00 | 0.00 | 0.00 |
| 34.68 | 0.00 | 0.00 | 0.00 | 35.21 | 0.00 | 0.00 | 0.00 |
| 34.69 | 0.00 | 0.00 | 0.00 | 35.22 | 0.00 | 0.00 | 0.00 |
| 34.70 | 0.00 | 0.00 | 0.00 | 35.23 | 0.00 | 0.00 | 0.00 |
| 34.71 | 0.00 | 0.00 | 0.00 | 35.24 | 0.00 | 0.00 | 0.00 |
| 34.72 | 0.00 | 0.00 | 0.00 | 35.25 | 0.00 | 0.00 | 0.00 |
| 34.73 | 0.00 | 0.00 | 0.00 | 35.26 | 0.00 | 0.00 | 0.00 |
| 34.74 | 0.00 | 0.00 | 0.00 | 35.27 | 0.00 | 0.00 | 0.00 |
| 34.75 | 0.00 | 0.00 | 0.00 | 35.28 | 0.00 | 0.00 | 0.00 |
| 34.76 | 0.00 | 0.00 | 0.00 | 35.29 | 0.00 | 0.00 | 0.00 |
| 34.77 | 0.00 | 0.00 | 0.00 | 35.30 | 0.00 | 0.00 | 0.00 |
| 34.78 | 0.00 | 0.00 | 0.00 | 35.31 | 0.00 | 0.00 | 0.00 |
| 34.79 | 0.00 | 0.00 | 0.00 | 35.32 | 0.00 | 0.00 | 0.00 |
| 34.80 | 0.00 | 0.00 | 0.00 | 35.33 | 0.00 | 0.00 | 0.00 |
| 34.81 | 0.00 | 0.00 | 0.00 | 35.34 | 0.00 | 0.00 | 0.00 |
| 34.82 | 0.00 | 0.00 | 0.00 | 35.35 | 0.00 | 0.00 | 0.00 |
| 34.83 | 0.00 | 0.00 | 0.00 | 35.36 | 0.00 | 0.00 | 0.00 |
| 34.84 | 0.00 | 0.00 | 0.00 | 35.37 | 0.00 | 0.00 | 0.00 |
| 34.85 | 0.00 | 0.00 | 0.00 | 35.38 | 0.00 | 0.00 | 0.00 |
| 34.86 | 0.00 | 0.00 | 0.00 | 35.39 | 0.00 | 0.00 | 0.00 |
| 34.87 | 0.00 | 0.00 | 0.00 | 35.40 | 0.00 | 0.00 | 0.00 |
| 34.88 | 0.00 | 0.00 | 0.00 | 35.41 | 0.00 | 0.00 | 0.00 |
| 34.89 | 0.00 | 0.00 | 0.00 | 35.42 | 0.00 | 0.00 | 0.00 |
| 34.90 | 0.00 | 0.00 | 0.00 | 35.43 | 0.00 | 0.00 | 0.00 |
| 34.91 | 0.00 | 0.00 | 0.00 | 35.44 | 0.00 | 0.00 | 0.00 |
| 34.92 | 0.00 | 0.00 | 0.00 | 35.45 | 0.00 | 0.00 | 0.00 |

Stage-Discharge for Pond GW01: Gravel Wetland \#1 (continued)

| Elevation (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) | Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary <br> (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 35.46 | 0.00 | 0.00 | 0.00 | 35.99 | 0.04 | 0.04 | 0.00 |
| 35.47 | 0.00 | 0.00 | 0.00 | 36.00 | 0.04 | 0.04 | 0.00 |
| 35.48 | 0.00 | 0.00 | 0.00 | 36.01 | 0.05 | 0.05 | 0.00 |
| 35.49 | 0.00 | 0.00 | 0.00 | 36.02 | 0.05 | 0.05 | 0.00 |
| 35.50 | 0.00 | 0.00 | 0.00 | 36.03 | 0.05 | 0.05 | 0.00 |
| 35.51 | 0.00 | 0.00 | 0.00 | 36.04 | 0.05 | 0.05 | 0.00 |
| 35.52 | 0.00 | 0.00 | 0.00 | 36.05 | 0.05 | 0.05 | 0.00 |
| 35.53 | 0.00 | 0.00 | 0.00 | 36.06 | 0.05 | 0.05 | 0.00 |
| 35.54 | 0.00 | 0.00 | 0.00 | 36.07 | 0.05 | 0.05 | 0.00 |
| 35.55 | 0.00 | 0.00 | 0.00 | 36.08 | 0.05 | 0.05 | 0.00 |
| 35.56 | 0.00 | 0.00 | 0.00 | 36.09 | 0.05 | 0.05 | 0.00 |
| 35.57 | 0.00 | 0.00 | 0.00 | 36.10 | 0.06 | 0.06 | 0.00 |
| 35.58 | 0.00 | 0.00 | 0.00 | 36.11 | 0.06 | 0.06 | 0.00 |
| 35.59 | 0.00 | 0.00 | 0.00 | 36.12 | 0.06 | 0.06 | 0.00 |
| 35.60 | 0.00 | 0.00 | 0.00 | 36.13 | 0.06 | 0.06 | 0.00 |
| 35.61 | 0.00 | 0.00 | 0.00 | 36.14 | 0.06 | 0.06 | 0.00 |
| 35.62 | 0.00 | 0.00 | 0.00 | 36.15 | 0.06 | 0.06 | 0.00 |
| 35.63 | 0.00 | 0.00 | 0.00 | 36.16 | 0.06 | 0.06 | 0.00 |
| 35.64 | 0.00 | 0.00 | 0.00 | 36.17 | 0.06 | 0.06 | 0.00 |
| 35.65 | 0.00 | 0.00 | 0.00 | 36.18 | 0.06 | 0.06 | 0.00 |
| 35.66 | 0.00 | 0.00 | 0.00 | 36.19 | 0.06 | 0.06 | 0.00 |
| 35.67 | 0.00 | 0.00 | 0.00 | 36.20 | 0.07 | 0.07 | 0.00 |
| 35.68 | 0.00 | 0.00 | 0.00 | 36.21 | 0.07 | 0.07 | 0.00 |
| 35.69 | 0.00 | 0.00 | 0.00 | 36.22 | 0.07 | 0.07 | 0.00 |
| 35.70 | 0.00 | 0.00 | 0.00 | 36.23 | 0.07 | 0.07 | 0.00 |
| 35.71 | 0.00 | 0.00 | 0.00 | 36.24 | 0.07 | 0.07 | 0.00 |
| 35.72 | 0.00 | 0.00 | 0.00 | 36.25 | 0.07 | 0.07 | 0.00 |
| 35.73 | 0.00 | 0.00 | 0.00 | 36.26 | 0.07 | 0.07 | 0.00 |
| 35.74 | 0.00 | 0.00 | 0.00 | 36.27 | 0.07 | 0.07 | 0.00 |
| 35.75 | 0.00 | 0.00 | 0.00 | 36.28 | 0.07 | 0.07 | 0.00 |
| 35.76 | 0.00 | 0.00 | 0.00 | 36.29 | 0.07 | 0.07 | 0.00 |
| 35.77 | 0.00 | 0.00 | 0.00 | 36.30 | 0.07 | 0.07 | 0.00 |
| 35.78 | 0.00 | 0.00 | 0.00 | 36.31 | 0.07 | 0.07 | 0.00 |
| 35.79 | 0.00 | 0.00 | 0.00 | 36.32 | 0.07 | 0.07 | 0.00 |
| 35.80 | 0.01 | 0.01 | 0.00 | 36.33 | 0.08 | 0.08 | 0.00 |
| 35.81 | 0.01 | 0.01 | 0.00 | 36.34 | 0.08 | 0.08 | 0.00 |
| 35.82 | 0.01 | 0.01 | 0.00 | 36.35 | 0.08 | 0.08 | 0.00 |
| 35.83 | 0.01 | 0.01 | 0.00 | 36.36 | 0.08 | 0.08 | 0.00 |
| 35.84 | 0.01 | 0.01 | 0.00 | 36.37 | 0.08 | 0.08 | 0.00 |
| 35.85 | 0.02 | 0.02 | 0.00 | 36.38 | 0.08 | 0.08 | 0.00 |
| 35.86 | 0.02 | 0.02 | 0.00 | 36.39 | 0.08 | 0.08 | 0.00 |
| 35.87 | 0.02 | 0.02 | 0.00 | 36.40 | 0.08 | 0.08 | 0.00 |
| 35.88 | 0.02 | 0.02 | 0.00 | 36.41 | 0.08 | 0.08 | 0.00 |
| 35.89 | 0.03 | 0.03 | 0.00 | 36.42 | 0.08 | 0.08 | 0.00 |
| 35.90 | 0.03 | 0.03 | 0.00 | 36.43 | 0.08 | 0.08 | 0.00 |
| 35.91 | 0.03 | 0.03 | 0.00 | 36.44 | 0.08 | 0.08 | 0.00 |
| 35.92 | 0.03 | 0.03 | 0.00 | 36.45 | 0.08 | 0.08 | 0.00 |
| 35.93 | 0.03 | 0.03 | 0.00 | 36.46 | 0.08 | 0.08 | 0.00 |
| 35.94 | 0.04 | 0.04 | 0.00 | 36.47 | 0.09 | 0.09 | 0.00 |
| 35.95 | 0.04 | 0.04 | 0.00 | 36.48 | 0.09 | 0.09 | 0.00 |
| 35.96 | 0.04 | 0.04 | 0.00 | 36.49 | 0.09 | 0.09 | 0.00 |
| 35.97 | 0.04 | 0.04 | 0.00 | 36.50 | 0.09 | 0.09 | 0.00 |
| 35.98 | 0.04 | 0.04 | 0.00 | 36.51 | 0.09 | 0.09 | 0.00 |

Stage-Discharge for Pond GW01: Gravel Wetland \#1 (continued)

| Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary <br> (cfs) | Elevation <br> (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 36.52 | 0.09 | 0.09 | 0.00 | 37.05 | 2.65 | 2.65 | 0.00 |
| 36.53 | 0.09 | 0.09 | 0.00 | 37.06 | 2.78 | 2.78 | 0.00 |
| 36.54 | 0.09 | 0.09 | 0.00 | 37.07 | 2.91 | 2.91 | 0.00 |
| 36.55 | 0.09 | 0.09 | 0.00 | 37.08 | 3.04 | 3.04 | 0.00 |
| 36.56 | 0.09 | 0.09 | 0.00 | 37.09 | 3.17 | 3.17 | 0.00 |
| 36.57 | 0.09 | 0.09 | 0.00 | 37.10 | 3.31 | 3.31 | 0.00 |
| 36.58 | 0.09 | 0.09 | 0.00 | 37.11 | 3.45 | 3.45 | 0.00 |
| 36.59 | 0.09 | 0.09 | 0.00 | 37.12 | 3.59 | 3.59 | 0.00 |
| 36.60 | 0.09 | 0.09 | 0.00 | 37.13 | 3.73 | 3.73 | 0.00 |
| 36.61 | 0.09 | 0.09 | 0.00 | 37.14 | 3.87 | 3.87 | 0.00 |
| 36.62 | 0.09 | 0.09 | 0.00 | 37.15 | 4.02 | 4.02 | 0.00 |
| 36.63 | 0.10 | 0.10 | 0.00 | 37.16 | 4.17 | 4.17 | 0.00 |
| 36.64 | 0.10 | 0.10 | 0.00 | 37.17 | 4.32 | 4.32 | 0.00 |
| 36.65 | 0.10 | 0.10 | 0.00 | 37.18 | 4.47 | 4.47 | 0.00 |
| 36.66 | 0.10 | 0.10 | 0.00 | 37.19 | 4.62 | 4.62 | 0.00 |
| 36.67 | 0.10 | 0.10 | 0.00 | 37.20 | 4.78 | 4.78 | 0.00 |
| 36.68 | 0.10 | 0.10 | 0.00 | 37.21 | 4.93 | 4.93 | 0.00 |
| 36.69 | 0.10 | 0.10 | 0.00 | 37.22 | 5.09 | 5.09 | 0.00 |
| 36.70 | 0.10 | 0.10 | 0.00 | 37.23 | 5.25 | 5.25 | 0.00 |
| 36.71 | 0.10 | 0.10 | 0.00 | 37.24 | 5.41 | 5.41 | 0.00 |
| 36.72 | 0.10 | 0.10 | 0.00 | 37.25 | 5.57 | 5.57 | 0.00 |
| 36.73 | 0.10 | 0.10 | 0.00 | 37.26 | 5.74 | 5.74 | 0.00 |
| 36.74 | 0.10 | 0.10 | 0.00 | 37.27 | 5.91 | 5.91 | 0.00 |
| 36.75 | 0.10 | 0.10 | 0.00 | 37.28 | 6.07 | 6.07 | 0.00 |
| 36.76 | 0.12 | 0.12 | 0.00 | 37.29 | 6.24 | 6.24 | 0.00 |
| 36.77 | 0.15 | 0.15 | 0.00 | 37.30 | 6.41 | 6.41 | 0.00 |
| 36.78 | 0.18 | 0.18 | 0.00 | 37.31 | 6.50 | 6.50 | 0.00 |
| 36.79 | 0.23 | 0.23 | 0.00 | 37.32 | 6.55 | 6.55 | 0.00 |
| 36.80 | 0.28 | 0.28 | 0.00 | 37.33 | 6.61 | 6.61 | 0.00 |
| 36.81 | 0.33 | 0.33 | 0.00 | 37.34 | 6.67 | 6.67 | 0.00 |
| 36.82 | 0.39 | 0.39 | 0.00 | 37.35 | 6.72 | 6.72 | 0.00 |
| 36.83 | 0.46 | 0.46 | 0.00 | 37.36 | 6.78 | 6.78 | 0.00 |
| 36.84 | 0.52 | 0.52 | 0.00 | 37.37 | 6.83 | 6.83 | 0.00 |
| 36.85 | 0.59 | 0.59 | 0.00 | 37.38 | 6.89 | 6.89 | 0.00 |
| 36.86 | 0.67 | 0.67 | 0.00 | 37.39 | 6.94 | 6.94 | 0.00 |
| 36.87 | 0.75 | 0.75 | 0.00 | 37.40 | 6.99 | 6.99 | 0.00 |
| 36.88 | 0.83 | 0.83 | 0.00 | 37.41 | 7.05 | 7.05 | 0.00 |
| 36.89 | 0.92 | 0.92 | 0.00 | 37.42 | 7.10 | 7.10 | 0.00 |
| 36.90 | 1.01 | 1.01 | 0.00 | 37.43 | 7.15 | 7.15 | 0.00 |
| 36.91 | 1.10 | 1.10 | 0.00 | 37.44 | 7.20 | 7.20 | 0.00 |
| 36.92 | 1.19 | 1.19 | 0.00 | 37.45 | 7.25 | 7.25 | 0.00 |
| 36.93 | 1.29 | 1.29 | 0.00 | 37.46 | 7.31 | 7.31 | 0.00 |
| 36.94 | 1.39 | 1.39 | 0.00 | 37.47 | 7.36 | 7.36 | 0.00 |
| 36.95 | 1.49 | 1.49 | 0.00 | 37.48 | 7.41 | 7.41 | 0.00 |
| 36.96 | 1.60 | 1.60 | 0.00 | 37.49 | 7.46 | 7.46 | 0.00 |
| 36.97 | 1.70 | 1.70 | 0.00 | 37.50 | 7.51 | 7.51 | 0.00 |
| 36.98 | 1.81 | 1.81 | 0.00 | 37.51 | 7.58 | 7.56 | 0.03 |
| 36.99 | 1.93 | 1.93 | 0.00 | 37.52 | 7.69 | 7.60 | 0.08 |
| 37.00 | 2.04 | 2.04 | 0.00 | 37.53 | 7.80 | 7.65 | 0.15 |
| 37.01 | 2.16 | 2.16 | 0.00 | 37.54 | 7.93 | 7.70 | 0.23 |
| 37.02 | 2.28 | 2.28 | 0.00 | 37.55 | 8.07 | 7.75 | 0.32 |
| 37.03 | 2.40 | 2.40 | 0.00 | 37.56 | 8.22 | 7.80 | 0.42 |
| 37.04 | 2.52 | 2.52 | 0.00 | 37.57 | 8.37 | 7.85 | 0.53 |

Stage-Discharge for Pond GW01: Gravel Wetland \#1 (continued)

| Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary <br> (cfs) | Elevation <br> (feet) | Discharge (cfs) | Primary <br> (cfs) | Secondary (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 37.58 | 8.54 | 7.89 | 0.65 | 38.11 | 25.46 | 10.08 | 15.38 |
| 37.59 | 8.71 | 7.94 | 0.77 | 38.12 | 25.87 | 10.12 | 15.75 |
| 37.60 | 8.89 | 7.99 | 0.90 | 38.13 | 26.29 | 10.16 | 16.13 |
| 37.61 | 9.07 | 8.03 | 1.04 | 38.14 | 26.71 | 10.19 | 16.52 |
| 37.62 | 9.27 | 8.08 | 1.19 | 38.15 | 27.13 | 10.23 | 16.90 |
| 37.63 | 9.46 | 8.12 | 1.34 | 38.16 | 27.55 | 10.27 | 17.29 |
| 37.64 | 9.67 | 8.17 | 1.50 | 38.17 | 27.98 | 10.30 | 17.68 |
| 37.65 | 9.87 | 8.22 | 1.66 | 38.18 | 28.41 | 10.34 | 18.07 |
| 37.66 | 10.09 | 8.26 | 1.83 | 38.19 | 28.84 | 10.37 | 18.47 |
| 37.67 | 10.31 | 8.31 | 2.00 | 38.20 | 29.28 | 10.41 | 18.87 |
| 37.68 | 10.53 | 8.35 | 2.18 | 38.21 | 29.72 | 10.45 | 19.27 |
| 37.69 | 10.76 | 8.39 | 2.37 | 38.22 | 30.16 | 10.48 | 19.68 |
| 37.70 | 10.99 | 8.44 | 2.55 | 38.23 | 30.60 | 10.52 | 20.08 |
| 37.71 | 11.24 | 8.48 | 2.76 | 38.24 | 31.05 | 10.55 | 20.50 |
| 37.72 | 11.49 | 8.53 | 2.97 | 38.25 | 31.49 | 10.59 | 20.91 |
| 37.73 | 11.75 | 8.57 | 3.18 | 38.26 | 31.95 | 10.62 | 21.32 |
| 37.74 | 12.02 | 8.61 | 3.40 | 38.27 | 32.40 | 10.66 | 21.74 |
| 37.75 | 12.29 | 8.66 | 3.63 | 38.28 | 32.85 | 10.69 | 22.16 |
| 37.76 | 12.56 | 8.70 | 3.86 | 38.29 | 33.31 | 10.73 | 22.59 |
| 37.77 | 12.84 | 8.74 | 4.10 | 38.30 | 33.77 | 10.76 | 23.01 |
| 37.78 | 13.13 | 8.78 | 4.35 | 38.31 | 34.24 | 10.79 | 23.44 |
| 37.79 | 13.42 | 8.83 | 4.60 | 38.32 | 34.70 | 10.83 | 23.87 |
| 37.80 | 13.72 | 8.87 | 4.85 | 38.33 | 35.17 | 10.86 | 24.30 |
| 37.81 | 14.02 | 8.91 | 5.11 | 38.34 | 35.64 | 10.90 | 24.74 |
| 37.82 | 14.33 | 8.95 | 5.38 | 38.35 | 36.11 | 10.93 | 25.18 |
| 37.83 | 14.64 | 8.99 | 5.65 | 38.36 | 36.59 | 10.97 | 25.62 |
| 37.84 | 14.96 | 9.03 | 5.93 | 38.37 | 37.06 | 11.00 | 26.06 |
| 37.85 | 15.29 | 9.08 | 6.21 | 38.38 | 37.54 | 11.03 | 26.51 |
| 37.86 | 15.62 | 9.12 | 6.50 | 38.39 | 38.02 | 11.07 | 26.96 |
| 37.87 | 15.95 | 9.16 | 6.80 | 38.40 | 38.51 | 11.10 | 27.41 |
| 37.88 | 16.29 | 9.20 | 7.09 | 38.41 | 38.99 | 11.13 | 27.86 |
| 37.89 | 16.64 | 9.24 | 7.40 | 38.42 | 39.48 | 11.17 | 28.32 |
| 37.90 | 16.99 | 9.28 | 7.71 | 38.43 | 39.97 | 11.20 | 28.77 |
| 37.91 | 17.34 | 9.32 | 8.03 | 38.44 | 40.47 | 11.23 | 29.23 |
| 37.92 | 17.70 | 9.36 | 8.35 | 38.45 | 40.96 | 11.27 | 29.70 |
| 37.93 | 18.07 | 9.40 | 8.67 | 38.46 | 41.46 | 11.30 | 30.16 |
| 37.94 | 18.44 | 9.44 | 9.00 | 38.47 | 41.96 | 11.33 | 30.63 |
| 37.95 | 18.81 | 9.48 | 9.34 | 38.48 | 42.46 | 11.36 | 31.10 |
| 37.96 | 19.19 | 9.51 | 9.68 | 38.49 | 42.96 | 11.40 | 31.57 |
| 37.97 | 19.58 | 9.55 | 10.02 | 38.50 | 43.47 | 11.43 | 32.04 |
| 37.98 | 19.97 | 9.59 | 10.38 | 38.51 | 43.98 | 11.46 | 32.52 |
| 37.99 | 20.36 | 9.63 | 10.73 | 38.52 | 44.50 | 11.49 | 33.01 |
| 38.00 | 20.76 | 9.67 | 11.09 | 38.53 | 45.02 | 11.53 | 33.49 |
| 38.01 | 21.17 | 9.71 | 11.46 | 38.54 | 45.54 | 11.56 | 33.98 |
| 38.02 | 21.58 | 9.75 | 11.83 | 38.55 | 46.06 | 11.59 | 34.47 |
| 38.03 | 22.00 | 9.78 | 12.21 | 38.56 | 46.59 | 11.62 | 34.97 |
| 38.04 | 22.42 | 9.82 | 12.59 | 38.57 | 47.12 | 11.65 | 35.46 |
| 38.05 | 22.84 | 9.86 | 12.98 | 38.58 | 47.65 | 11.69 | 35.96 |
| 38.06 | 23.27 | 9.90 | 13.38 | 38.59 | 48.18 | 11.72 | 36.46 |
| 38.07 | 23.71 | 9.93 | 13.78 | 38.60 | 48.71 | 11.75 | 36.96 |
| 38.08 | 24.15 | 9.97 | 14.18 | 38.61 | 49.25 | 11.78 | 37.47 |
| 38.09 | 24.60 | 10.01 | 14.59 | 38.62 | 49.79 | 11.81 | 37.98 |
| 38.10 | 25.05 | 10.05 | 15.00 | 38.63 | 50.33 | 11.84 | 38.49 |

Stage-Discharge for Pond GW01: Gravel Wetland \#1 (continued)

| Elevation <br> (feet) | Discharge <br> (cfs) | Primary <br> (cfs) | Secondary <br> (cfs) |
| ---: | ---: | ---: | ---: |
| 38.64 | 50.87 | 11.88 | 39.00 |
| 38.65 | 51.42 | 11.91 | 39.51 |
| 38.66 | 51.97 | 11.94 | 40.03 |
| 38.67 | 52.52 | 11.97 | 40.55 |
| 38.68 | 53.07 | 12.00 | 41.07 |
| 38.69 | 53.62 | 12.03 | 41.59 |
| 38.70 | 54.18 | 12.06 | 42.12 |
| 38.71 | 54.72 | 12.09 | 42.63 |
| 38.72 | 55.27 | 12.12 | 43.14 |
| 38.73 | 55.81 | 12.15 | 43.66 |
| 38.74 | 56.36 | 12.18 | 44.17 |
| 38.75 | 56.91 | 12.21 | 44.69 |
| 38.76 | 57.46 | 12.25 | 45.21 |
| 38.77 | 58.01 | 12.28 | 45.74 |
| 38.78 | 58.57 | 12.31 | 46.26 |
| 38.79 | 59.12 | 12.34 | 46.79 |
| 38.80 | 59.68 | 12.37 | 47.31 |
| 38.81 | 60.24 | 12.40 | 47.84 |
| 38.82 | 60.80 | 12.43 | 48.37 |
| 38.83 | 61.36 | 12.46 | 48.90 |
| 38.84 | 61.92 | 12.49 | 49.44 |
| 38.85 | 62.49 | 12.52 | 49.97 |
| 38.86 | 63.06 | 12.54 | 50.51 |
| 38.87 | 63.62 | 12.57 | 51.05 |
| 38.88 | 64.19 | 12.60 | 51.59 |
| 38.89 | 64.77 | 12.63 | 52.13 |
| 38.90 | 65.34 | 12.66 | 52.68 |
| 38.91 | 6594 | 12.69 | 53.25 |
| 38.92 | 66.55 | 12.72 | 53.83 |
| 38.93 | 67.16 | 12.75 | 54.41 |
| 38.94 | 67.77 | 12.78 | 54.99 |
| 38.95 | 68.38 | 12.81 | 55.58 |
| 38.96 | 69.00 | 12.84 | 56.16 |
| 38.97 | 69.62 | 12.87 | 56.75 |
| 38.98 | 70.24 | 12.89 | 57.34 |
| 3899 | 70.86 | 12.92 | 57.94 |
| 39.00 | $\mathbf{7 1 . 4 8}$ | 12.95 | 58.53 |
|  |  |  |  |

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Stage-Area-Storage for Pond 4P: Gravel Wetland \#1 - Bay 1

| $\begin{array}{r} \text { Elevation } \\ \quad \text { feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 35.00 | 5,557 | 0 | 35.53 | 5,249 | 2,863 |
| 35.01 | 5,551 | 56 | 35.54 | 5,243 | 2,916 |
| 35.02 | 5,545 | 111 | 35.55 | 5,238 | 2,968 |
| 35.03 | 5,539 | 166 | 35.56 | 5,232 | 3,020 |
| 35.04 | 5,533 | 222 | 35.57 | 5,226 | 3,073 |
| 35.05 | 5,528 | 277 | 35.58 | 5,220 | 3,125 |
| 35.06 | 5,522 | 332 | 35.59 | 5,215 | 3,177 |
| 35.07 | 5,516 | 388 | 35.60 | 5,209 | 3,229 |
| 35.08 | 5,510 | 443 | 35.61 | 5,203 | 3,281 |
| 35.09 | 5,504 | 498 | 35.62 | 5,198 | 3,333 |
| 35.10 | 5,498 | 553 | 35.63 | 5,192 | 3,385 |
| 35.11 | 5,492 | 608 | 35.64 | 5,186 | 3,437 |
| 35.12 | 5,487 | 663 | 35.65 | 5,181 | 3,489 |
| 35.13 | 5,481 | 717 | 35.66 | 5,175 | 3,541 |
| 35.14 | 5,475 | 772 | 35.67 | 5,169 | 3,593 |
| 35.15 | 5,469 | 827 | 35.68 | 5,164 | 3,644 |
| 35.16 | 5,463 | 882 | 35.69 | 5,158 | 3,696 |
| 35.17 | 5,457 | 936 | 35.70 | 5,152 | 3,747 |
| 35.18 | 5,451 | 991 | 35.71 | 5,147 | 3,799 |
| 35.19 | 5,446 | 1,045 | 35.72 | 5,141 | 3,850 |
| 35.20 | 5,440 | 1,100 | 35.73 | 5,135 | 3,902 |
| 35.21 | 5,434 | 1,154 | 35.74 | 5,130 | 3,953 |
| 35.22 | 5,428 | 1,208 | 35.75 | 5,124 | 4,004 |
| 35.23 | 5,422 | 1,263 | 35.76 | 5,118 | 4,055 |
| 35.24 | 5,416 | 1,317 | 35.77 | 5,113 | 4,107 |
| 35.25 | 5,411 | 1,371 | 35.78 | 5,107 | 4,158 |
| 35.26 | 5,405 | 1,425 | 35.79 | 5,101 | 4,209 |
| 35.27 | 5,399 | 1,479 | 35.80 | 5,096 | 4,260 |
| 35.28 | 5,393 | 1,533 | 35.81 | 5,090 | 4,311 |
| 35.29 | 5,387 | 1,587 | 35.82 | 5,084 | 4,362 |
| 35.30 | 5,382 | 1,641 | 35.83 | 5,079 | 4,412 |
| 35.31 | 5,376 | 1,695 | 35.84 | 5,073 | 4,463 |
| 35.32 | 5,370 | 1,748 | 35.85 | 5,067 | 4,514 |
| 35.33 | 5,364 | 1,802 | 35.86 | 5,062 | 4,564 |
| 35.34 | 5,358 | 1,856 | 35.87 | 5,056 | 4,615 |
| 35.35 | 5,353 | 1,909 | 35.88 | 5,051 | 4,666 |
| 35.36 | 5,347 | 1,963 | 35.89 | 5,045 | 4,716 |
| 35.37 | 5,341 | 2,016 | 35.90 | 5,039 | 4,766 |
| 35.38 | 5,335 | 2,069 | 35.91 | 5,034 | 4,817 |
| 35.39 | 5,330 | 2,123 | 35.92 | 5,028 | 4,867 |
| 35.40 | 5,324 | 2,176 | 35.93 | 5,023 | 4,917 |
| 35.41 | 5,318 | 2,229 | 35.94 | 5,017 | 4,968 |
| 35.42 | 5,312 | 2,282 | 35.95 | 5,011 | 5,018 |
| 35.43 | 5,307 | 2,335 | 35.96 | 5,006 | 5,068 |
| 35.44 | 5,301 | 2,388 | 35.97 | 5,000 | 5,118 |
| 35.45 | 5,295 | 2,441 | 35.98 | 4,995 | 5,168 |
| 35.46 | 5,289 | 2,494 | 35.99 | 4,989 | 5,218 |
| 35.47 | 5,284 | 2,547 | 36.00 | 4,983 | 5,268 |
| 35.48 | 5,278 | 2,600 | 36.01 | 4,978 | 5,317 |
| 35.49 | 5,272 | 2,653 | 36.02 | 4,972 | 5,367 |
| 35.50 | 5,266 | 2,705 | 36.03 | 4,967 | 5,417 |
| 35.51 | 5,261 | 2,758 | 36.04 | 4,961 | 5,466 |
| 35.52 | 5,255 | 2,811 | 36.05 | 4,956 | 5,516 |

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Stage-Area-Storage for Pond 6P: Gravel Wetland \#1 - Bay 2

| $\begin{array}{r} \begin{array}{r} \text { Elevation } \\ (\text { feet }) \end{array} \\ \hline \end{array}$ | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | Storage (cubic-feet) | $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 35.00 | 5,388 | 0 | 35.53 | 5,969 | 3,008 |
| 35.01 | 5,399 | 54 | 35.54 | 5,980 | 3,068 |
| 35.02 | 5,409 | 108 | 35.55 | 5,992 | 3,128 |
| 35.03 | 5,420 | 162 | 35.56 | 6,003 | 3,188 |
| 35.04 | 5,431 | 216 | 35.57 | 6,014 | 3,248 |
| 35.05 | 5,442 | 271 | 35.58 | 6,025 | 3,308 |
| 35.06 | 5,452 | 325 | 35.59 | 6,037 | 3,368 |
| 35.07 | 5,463 | 380 | 35.60 | 6,048 | 3,429 |
| 35.08 | 5,474 | 434 | 35.61 | 6,059 | 3,489 |
| 35.09 | 5,485 | 489 | 35.62 | 6,071 | 3,550 |
| 35.10 | 5,495 | 544 | 35.63 | 6,082 | 3,611 |
| 35.11 | 5,506 | 599 | 35.64 | 6,093 | 3,672 |
| 35.12 | 5,517 | 654 | 35.65 | 6,105 | 3,733 |
| 35.13 | 5,528 | 710 | 35.66 | 6,116 | 3,794 |
| 35.14 | 5,539 | 765 | 35.67 | 6,127 | 3,855 |
| 35.15 | 5,549 | 820 | 35.68 | 6,139 | 3,916 |
| 35.16 | 5,560 | 876 | 35.69 | 6,150 | 3,978 |
| 35.17 | 5,571 | 931 | 35.70 | 6,162 | 4,039 |
| 35.18 | 5,582 | 987 | 35.71 | 6,173 | 4,101 |
| 35.19 | 5,593 | 1,043 | 35.72 | 6,185 | 4,163 |
| 35.20 | 5,604 | 1,099 | 35.73 | 6,196 | 4,225 |
| 35.21 | 5,615 | 1,155 | 35.74 | 6,207 | 4,287 |
| 35.22 | 5,626 | 1,211 | 35.75 | 6,219 | 4,349 |
| 35.23 | 5,636 | 1,268 | 35.76 | 6,230 | 4,411 |
| 35.24 | 5,647 | 1,324 | 35.77 | 6,242 | 4,473 |
| 35.25 | 5,658 | 1,381 | 35.78 | 6,253 | 4,536 |
| 35.26 | 5,669 | 1,437 | 35.79 | 6,265 | 4,599 |
| 35.27 | 5,680 | 1,494 | 35.80 | 6,276 | 4,661 |
| 35.28 | 5,691 | 1,551 | 35.81 | 6,288 | 4,724 |
| 35.29 | 5,702 | 1,608 | 35.82 | 6,300 | 4,787 |
| 35.30 | 5,713 | 1,665 | 35.83 | 6,311 | 4,850 |
| 35.31 | 5,724 | 1,722 | 35.84 | 6,323 | 4,913 |
| 35.32 | 5,735 | 1,779 | 35.85 | 6,334 | 4,977 |
| 35.33 | 5,746 | 1,837 | 35.86 | 6,346 | 5,040 |
| 35.34 | 5,757 | 1,894 | 35.87 | 6,357 | 5,103 |
| 35.35 | 5,768 | 1,952 | 35.88 | 6,369 | 5,167 |
| 35.36 | 5,779 | 2,010 | 35.89 | 6,381 | 5,231 |
| 35.37 | 5,790 | 2,068 | 35.90 | 6,392 | 5,295 |
| 35.38 | 5,802 | 2,126 | 35.91 | 6,404 | 5,359 |
| 35.39 | 5,813 | 2,184 | 35.92 | 6,416 | 5,423 |
| 35.40 | 5,824 | 2,242 | 35.93 | 6,427 | 5,487 |
| 35.41 | 5,835 | 2,300 | 35.94 | 6,439 | 5,551 |
| 35.42 | 5,846 | 2,358 | 35.95 | 6,451 | 5,616 |
| 35.43 | 5,857 | 2,417 | 35.96 | 6,462 | 5,680 |
| 35.44 | 5,868 | 2,476 | 35.97 | 6,474 | 5,745 |
| 35.45 | 5,879 | 2,534 | 35.98 | 6,486 | 5,810 |
| 35.46 | 5,891 | 2,593 | 35.99 | 6,497 | 5,875 |
| 35.47 | 5,902 | 2,652 | 36.00 | 6,509 | 5,940 |
| 35.48 | 5,913 | 2,711 | 36.01 | 6,521 | 6,005 |
| 35.49 | 5,924 | 2,770 | 36.02 | 6,533 | 6,070 |
| 35.50 | 5,935 | 2,830 | 36.03 | 6,544 | 6,136 |
| 35.51 | 5,947 | 2,889 | 36.04 | 6,556 | 6,201 |
| 35.52 | 5,958 | 2,949 | 36.05 | 6,568 | 6,267 |

Stage-Area-Storage for Pond 6P: Gravel Wetland \#1 - Bay 2 (continued)

| $\begin{array}{r} \text { Elevation } \\ \text { (feet) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | Storage (cubic-feet) | Elevation (feet) | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | $\begin{array}{r} \text { Storage } \\ \text { (cubic-feet) } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 36.06 | 6,580 | 6,332 | 36.59 | 7,220 | 9,988 |
| 36.07 | 6,592 | 6,398 | 36.60 | 7,233 | 10,060 |
| 36.08 | 6,603 | 6,464 | 36.61 | 7,245 | 10,133 |
| 36.09 | 6,615 | 6,530 | 36.62 | 7,257 | 10,205 |
| 36.10 | 6,627 | 6,597 | 36.63 | 7,270 | 10,278 |
| 36.11 | 6,639 | 6,663 | 36.64 | 7,282 | 10,351 |
| 36.12 | 6,651 | 6,729 | 36.65 | 7,295 | 10,424 |
| 36.13 | 6,663 | 6,796 | 36.66 | 7,307 | 10,497 |
| 36.14 | 6,675 | 6,863 | 36.67 | 7,320 | 10,570 |
| 36.15 | 6,686 | 6,929 | 36.68 | 7,332 | 10,643 |
| 36.16 | 6,698 | 6,996 | 36.69 | 7,344 | 10,716 |
| 36.17 | 6,710 | 7,063 | 36.70 | 7,357 | 10,790 |
| 36.18 | 6,722 | 7,130 | 36.71 | 7,369 | 10,863 |
| 36.19 | 6,734 | 7,198 | 36.72 | 7,382 | 10,937 |
| 36.20 | 6,746 | 7,265 | 36.73 | 7,394 | 11,011 |
| 36.21 | 6,758 | 7,333 | 36.74 | 7,407 | 11,085 |
| 36.22 | 6,770 | 7,400 | 36.75 | 7,419 | 11,159 |
| 36.23 | 6,782 | 7,468 | 36.76 | 7,432 | 11,233 |
| 36.24 | 6,794 | 7,536 | 36.77 | 7,445 | 11,308 |
| 36.25 | 6,806 | 7,604 | 36.78 | 7,457 | 11,382 |
| 36.26 | 6,818 | 7,672 | 36.79 | 7,470 | 11,457 |
| 36.27 | 6,830 | 7,740 | 36.80 | 7,482 | 11,532 |
| 36.28 | 6,842 | 7,809 | 36.81 | 7,495 | 11,607 |
| 36.29 | 6,854 | 7,877 | 36.82 | 7,507 | 11,682 |
| 36.30 | 6,866 | 7,946 | 36.83 | 7,520 | 11,757 |
| 36.31 | 6,878 | 8,015 | 36.84 | 7,533 | 11,832 |
| 36.32 | 6,890 | 8,083 | 36.85 | 7,545 | 11,907 |
| 36.33 | 6,902 | 8,152 | 36.86 | 7,558 | 11,983 |
| 36.34 | 6,914 | 8,221 | 36.87 | 7,571 | 12,059 |
| 36.35 | 6,927 | 8,291 | 36.88 | 7,583 | 12,134 |
| 36.36 | 6,939 | 8,360 | 36.89 | 7,596 | 12,210 |
| 36.37 | 6,951 | 8,429 | 36.90 | 7,609 | 12,286 |
| 36.38 | 6,963 | 8,499 | 36.91 | 7,621 | 12,362 |
| 36.39 | 6,975 | 8,569 | 36.92 | 7,634 | 12,439 |
| 36.40 | 6,987 | 8,638 | 36.93 | 7,647 | 12,515 |
| 36.41 | 6,999 | 8,708 | 36.94 | 7,660 | 12,592 |
| 36.42 | 7,012 | 8,778 | 36.95 | 7,672 | 12,668 |
| 36.43 | 7,024 | 8,849 | 36.96 | 7,685 | 12,745 |
| 36.44 | 7,036 | 8,919 | 36.97 | 7,698 | 12,822 |
| 36.45 | 7,048 | 8,989 | 36.98 | 7,711 | 12,899 |
| 36.46 | 7,060 | 9,060 | 36.99 | 7,723 | 12,976 |
| 36.47 | 7,073 | 9,131 | 37.00 | 7,736 | 13,054 |
| 36.48 | 7,085 | 9,201 | 37.01 | 7,749 | 13,131 |
| 36.49 | 7,097 | 9,272 | 37.02 | 7,762 | 13,209 |
| 36.50 | 7,109 | 9,343 | 37.03 | 7,775 | 13,286 |
| 36.51 | 7,122 | 9,414 | 37.04 | 7,787 | 13,364 |
| 36.52 | 7,134 | 9,486 | 37.05 | 7,800 | 13,442 |
| 36.53 | 7,146 | 9,557 | 37.06 | 7,813 | 13,520 |
| 36.54 | 7,159 | 9,629 | 37.07 | 7,826 | 13,598 |
| 36.55 | 7,171 | 9,700 | 37.08 | 7,839 | 13,677 |
| 36.56 | 7,183 | 9,772 | 37.09 | 7,852 | 13,755 |
| 36.57 | 7,196 | 9,844 | 37.10 | 7,865 | 13,834 |
| 36.58 | 7,208 | 9,916 | 37.11 | 7,878 | 13,912 |

Stage-Area-Storage for Pond 6P: Gravel Wetland \#1 - Bay 2 (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 37.12 | 7,890 | 13,991 | 37.65 | 8,590 | 18,357 |
| 37.13 | 7,903 | 14,070 | 37.66 | 8,604 | 18,443 |
| 37.14 | 7,916 | 14,149 | 37.67 | 8,617 | 18,529 |
| 37.15 | 7,929 | 14,228 | 37.68 | 8,631 | 18,616 |
| 37.16 | 7,942 | 14,308 | 37.69 | 8,644 | 18,702 |
| 37.17 | 7,955 | 14,387 | 37.70 | 8,658 | 18,788 |
| 37.18 | 7,968 | 14,467 | 37.71 | 8,672 | 18,875 |
| 37.19 | 7,981 | 14,547 | 37.72 | 8,685 | 18,962 |
| 37.20 | 7,994 | 14,626 | 37.73 | 8,699 | 19,049 |
| 37.21 | 8,007 | 14,706 | 37.74 | 8,712 | 19,136 |
| 37.22 | 8,020 | 14,787 | 37.75 | 8,726 | 19,223 |
| 37.23 | 8,033 | 14,867 | 37.76 | 8,739 | 19,310 |
| 37.24 | 8,046 | 14,947 | 37.77 | 8,753 | 19,398 |
| 37.25 | 8,059 | 15,028 | 37.78 | 8,767 | 19,485 |
| 37.26 | 8,072 | 15,108 | 37.79 | 8,780 | 19,573 |
| 37.27 | 8,086 | 15,189 | 37.80 | 8,794 | 19,661 |
| 37.28 | 8,099 | 15,270 | 37.81 | 8,808 | 19,749 |
| 37.29 | 8,112 | 15,351 | 37.82 | 8,821 | 19,837 |
| 37.30 | 8,125 | 15,432 | 37.83 | 8,835 | 19,925 |
| 37.31 | 8,138 | 15,514 | 37.84 | 8,849 | 20,014 |
| 37.32 | 8,151 | 15,595 | 37.85 | 8,862 | 20,102 |
| 37.33 | 8,164 | 15,677 | 37.86 | 8,876 | 20,191 |
| 37.34 | 8,177 | 15,758 | 37.87 | 8,890 | 20,280 |
| 37.35 | 8,191 | 15,840 | 37.88 | 8,903 | 20,369 |
| 37.36 | 8,204 | 15,922 | 37.89 | 8,917 | 20,458 |
| 37.37 | 8,217 | 16,004 | 37.90 | 8,931 | 20,547 |
| 37.38 | 8,230 | 16,087 | 37.91 | 8,945 | 20,637 |
| 37.39 | 8,243 | 16,169 | 37.92 | 8,958 | 20,726 |
| 37.40 | 8,257 | 16,251 | 37.93 | 8,972 | 20,816 |
| 37.41 | 8,270 | 16,334 | 37.94 | 8,986 | 20,906 |
| 37.42 | 8,283 | 16,417 | 37.95 | 9,000 | 20,996 |
| 37.43 | 8,296 | 16,500 | 37.96 | 9,014 | 21,086 |
| 37.44 | 8,310 | 16,583 | 37.97 | 9,027 | 21,176 |
| 37.45 | 8,323 | 16,666 | 37.98 | 9,041 | 21,266 |
| 37.46 | 8,336 | 16,749 | 37.99 | 9,055 | 21,357 |
| 37.47 | 8,349 | 16,833 | 38.00 | 9,069 | 21,447 |
| 37.48 | 8,363 | 16,916 | 38.01 | 9,114 | 21,538 |
| 37.49 | 8,376 | 17,000 | 38.02 | 9,159 | 21,630 |
| 37.50 | 8,389 | 17,084 | 38.03 | 9,204 | 21,721 |
| 37.51 | 8,403 | 17,168 | 38.04 | 9,249 | 21,814 |
| 37.52 | 8,416 | 17,252 | 38.05 | 9,295 | 21,906 |
| 37.53 | 8,429 | 17,336 | 38.06 | 9,340 | 22,000 |
| 37.54 | 8,443 | 17,420 | 38.07 | 9,386 | 22,093 |
| 37.55 | 8,456 | 17,505 | 38.08 | 9,431 | 22,187 |
| 37.56 | 8,469 | 17,590 | 38.09 | 9,477 | 22,282 |
| 37.57 | 8,483 | 17,674 | 38.10 | 9,523 | 22,377 |
| 37.58 | 8,496 | 17,759 | 38.11 | 9,569 | 22,472 |
| 37.59 | 8,510 | 17,844 | 38.12 | 9,615 | 22,568 |
| 37.60 | 8,523 | 17,929 | 38.13 | 9,661 | 22,665 |
| 37.61 | 8,537 | 18,015 | 38.14 | 9,708 | 22,761 |
| 37.62 | 8,550 | 18,100 | 38.15 | 9,754 | 22,859 |
| 37.63 | 8,563 | 18,186 | 38.16 | 9,801 | 22,956 |
| 37.64 | 8,577 | 18,271 | 38.17 | 9,848 | 23,055 |

Stage-Area-Storage for Pond 6P: Gravel Wetland \#1 - Bay 2 (continued)

| $\begin{array}{r} \begin{array}{r} \text { Elevation } \\ \text { (feet) } \end{array} \\ \hline \end{array}$ | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | $\begin{array}{r} \text { Surface } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 38.18 | 9,894 | 23,153 | 38.71 | 10,225 | 28,561 |
| 38.19 | 9,941 | 23,253 | 38.72 | 10,225 | 28,663 |
| 38.20 | 9,988 | 23,352 | 38.73 | 10,225 | 28,766 |
| 38.21 | 10,035 | 23,452 | 38.74 | 10,225 | 28,868 |
| 38.22 | 10,083 | 23,553 | 38.75 | 10,225 | 28,970 |
| 38.23 | 10,130 | 23,654 | 38.76 | 10,225 | 29,072 |
| 38.24 | 10,177 | 23,756 | 38.77 | 10,225 | 29,175 |
| 38.25 | 10,225 | 23,858 | 38.78 | 10,225 | 29,277 |
| 38.26 | 10,225 | 23,960 | 38.79 | 10,225 | 29,379 |
| 38.27 | 10,225 | 24,062 | 38.80 | 10,225 | 29,481 |
| 38.28 | 10,225 | 24,164 | 38.81 | 10,225 | 29,584 |
| 38.29 | 10,225 | 24,267 | 38.82 | 10,225 | 29,686 |
| 38.30 | 10,225 | 24,369 | 38.83 | 10,225 | 29,788 |
| 38.31 | 10,225 | 24,471 | 38.84 | 10,225 | 29,890 |
| 38.32 | 10,225 | 24,573 | 38.85 | 10,225 | 29,993 |
| 38.33 | 10,225 | 24,676 | 38.86 | 10,225 | 30,095 |
| 38.34 | 10,225 | 24,778 | 38.87 | 10,225 | 30,197 |
| 38.35 | 10,225 | 24,880 | 38.88 | 10,225 | 30,299 |
| 38.36 | 10,225 | 24,982 | 38.89 | 10,225 | 30,402 |
| 38.37 | 10,225 | 25,085 | 38.90 | 10,225 | 30,504 |
| 38.38 | 10,225 | 25,187 | 38.91 | 10,225 | 30,606 |
| 38.39 | 10,225 | 25,289 | 38.92 | 10,225 | 30,708 |
| 38.40 | 10,225 | 25,391 | 38.93 | 10,225 | 30,811 |
| 38.41 | 10,225 | 25,494 | 38.94 | 10,225 | 30,913 |
| 38.42 | 10,225 | 25,596 | 38.95 | 10,225 | 31,015 |
| 38.43 | 10,225 | 25,698 | 38.96 | 10,225 | 31,117 |
| 38.44 | 10,225 | 25,800 | 38.97 | 10,225 | 31,220 |
| 38.45 | 10,225 | 25,903 | 38.98 | 10,225 | 31,322 |
| 38.46 | 10,225 | 26,005 | 38.99 | 10,225 | 31,424 |
| 38.47 | 10,225 | 26,107 | 39.00 | 10,225 | 31,526 |
| 38.48 | 10,225 | 26,209 |  |  |  |
| 38.49 | 10,225 | 26,312 |  |  |  |
| 38.50 | 10,225 | 26,414 |  |  |  |
| 38.51 | 10,225 | 26,516 |  |  |  |
| 38.52 | 10,225 | 26,618 |  |  |  |
| 38.53 | 10,225 | 26,721 |  |  |  |
| 38.54 | 10,225 | 26,823 |  |  |  |
| 38.55 | 10,225 | 26,925 |  |  |  |
| 38.56 | 10,225 | 27,027 |  |  |  |
| 38.57 | 10,225 | 27,130 |  |  |  |
| 38.58 | 10,225 | 27,232 |  |  |  |
| 38.59 | 10,225 | 27,334 |  |  |  |
| 38.60 | 10,225 | 27,436 |  |  |  |
| 38.61 | 10,225 | 27,539 |  |  |  |
| 38.62 | 10,225 | 27,641 |  |  |  |
| 38.63 | 10,225 | 27,743 |  |  |  |
| 38.64 | 10,225 | 27,845 |  |  |  |
| 38.65 | 10,225 | 27,948 |  |  |  |
| 38.66 | 10,225 | 28,050 |  |  |  |
| 38.67 | 10,225 | 28,152 |  |  |  |
| 38.68 | 10,225 | 28,254 |  |  |  |
| 38.69 | 10,225 | 28,357 |  |  |  |
| 38.70 | 10,225 | 28,459 |  |  |  |

## GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION

 (Env-Wq 1507.04)| 1.01 | ac | Area of HSG A soil that was replaced by impervious cover | $0.40 "$ |
| :---: | :---: | :--- | ---: |
| 4.61 | ac | Area of HSG B soil that was replaced by impervious cover | $0.25^{\prime \prime}$ |
|  | ac | Area of HSG C soil that was replaced by impervious cover | $0.10^{\prime \prime}$ |
|  | ac | Area of HSG D soil or impervious cover that was replaced by impervious cover | $0.0^{\prime \prime}$ |
| 0.28 inches | $R d=$ Weighted groundwater recharge depth |  |  |
| 1.5561 ac-in | $\mathrm{GRV}=\mathrm{Al}{ }^{*} \mathrm{Rd}$ |  |  |
| 5,649 cf | GRV conversion (ac-in $\left.\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12^{\prime \prime}\right)$ |  |  |

Provide calculations below showing that the project meets the groundwater recharge requirements (EnvWq 1507.04):

Infiltration Pond \#1-2yr Storm (Exfiltration) = 9,275 cf
9,275 cf >5,649 cf
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$ $\longrightarrow$
$\qquad$
$\qquad$ $\longrightarrow$
$\qquad$
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## APPENDIX G - RIPRAP CALCULATIONS

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## RIPRAP OUTLET PROTECTION

Location: FES \#1 - (CB-02) Outlet From CB \#2

| Design Flow $=$ | $\mathrm{Q}=$ | 1.5 |
| :---: | :---: | :---: |
| Tailwater = | Tw = | 0.666667 |
| Pipe Dia.= | Do = | 1 |

$$
\mathrm{TW}>=1 / 2 \mathrm{Do}->\mathrm{La}=\text { Length }=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=4.5 \text { feet }
$$

$$
\begin{array}{rlll}
W_{1}=\text { Width }=3 D o+(0.4)(\mathrm{La})= & 5.0 & \text { feet } & \text { (or Width of Channel) } \\
W_{2}=\text { Width }=3 D o= & 3.0 & \text { feet } \\
D=\text { Depth }=(1.5)(d 50)= & 9 & \text { inches (or Min. } 9 " \text { ) } \\
d_{50}=(0.02 / \mathrm{TW})(Q / D o)^{\wedge}(4 / 3) & & 6.00 \text { inches (or Min. 6") }
\end{array}
$$

## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size

| 100 |  | 9.00 | - | 12.00 |
| ---: | :---: | :---: | :---: | :---: |
| 55 | 7.80 | - | 10.80 |  |
| 50 | (See Last Page of Calculations | 6.00 | - | 9.00 |
| 15 | for 25-Year Flows) | 1.80 | - | 3.00 |

Size of stone (inches)

100
85
50
15

See Last Page of Calculations for 25-Year Flows)
1.80 - 3.00

## RIPRAP OUTLET PROTECTION

Location: FES\#2 - (DI-01) Outlet from Drop Inlet \#1
Design Flow = Tailwater =
Pipe Dia.=

| $\mathrm{Q}=$ | 8.7 |
| :--- | ---: |
| Cfs |  |
| $\mathrm{Tw}=$ |  |
| $\mathrm{Do}=$ | 0.833333 |
| feet |  |
|  | 1.25 |
| feet |  |

$\mathrm{TW}>=1 / 2 \mathrm{Do}->\mathrm{La}=$ Length $=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=23.5$ feet

```
W
        W
    D = Depth = (1.5)(d50)= 9 inches (or Min. 9")
    d
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size

| 100 |  | 9.00 | - | 12.00 |
| ---: | :---: | :---: | :---: | :---: |
| 85 |  | 7.80 | - | 10.80 |
| 50 | 6.00 | - | 9.00 |  |
| 15 | (See Last Page of Calculations | 1.80 | - | 3.00 |

Size of stone (inches)
1.80

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## RIPRAP OUTLET PROTECTION

Location: FES\#3 - (CB09)From CB \#9 Into Forebay Design Flow = Tailwater = Pipe Dia.=

| $\mathrm{Q}=$ | 9.9 |
| :--- | ---: |
| Cfs |  |
| $\mathrm{Tw}=$ |  |
| $\mathrm{Do}=$ | 1.333333 |
| feet |  |
| 2 | feet |

$$
\text { TW }>=1 / 2 \mathrm{Do}->\mathrm{La}=\text { Length }=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=21.0 \text { feet }
$$

```
\(W_{1}=\) Width \(=3 \mathrm{Do}+(0.4)(\mathrm{La})=14.5\) feet \(\quad\) (or Width of Channel)
        \(\mathrm{W}_{2}=\) Width \(=3 \mathrm{Do}=\mathbf{6 . 0}\) feet
    \(D=\) Depth \(=(1.5)(d 50)=9\) inches (or Min. \(9^{\prime \prime}\) )
    \(d_{50}=(0.02 / T w)(Q / D o)^{\wedge(4 / 3)}=6.00\) inches (or Min. 6")
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size
100
85
50
15

85
50
15

| Size of stone (inches) |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
|  | 9.00 | - | 12.00 |
| (See Last Page of Calculations | 7.80 | - | 10.80 |
| for 25-Year Flows) | 6.00 | - | 9.00 |
|  | 1.80 | - | 3.00 |

MSC Civil Engineers Land Surveyors, Inc.

## RIPRAP OUTLET PROTECTION

Location: FES\#4 - (CB19)From CB \#19 Into Forebay

| Design Flow = | $\mathrm{Q}=$ | 6.5 |
| :---: | :---: | :---: |
| Tailwater = | Tw = | 0.666667 |
| Pipe Dia. $=$ | Do = | 1 |

$$
\text { TW }>=1 / 2 \mathrm{Do}->\mathrm{La}=\text { Length }=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=19.5 \text { feet }
$$

$$
\begin{aligned}
& W_{1}=\text { Width }=3 \mathrm{Do}+(0.4)(\mathrm{La})=11.0 \text { feet } \quad \text { (or Width of Channel) } \\
& W_{2}=\text { Width }=3 D o=3.0 \text { feet } \\
& D=\text { Depth }=(1.5)(d 50)=9 \text { inches (or Min. 9") } \\
& d_{50}=(0.02 / T w)(Q / D o)^{\wedge(4 / 3)}=6.00 \text { inches (or Min. 6") }
\end{aligned}
$$

## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size

|  | 9.00 | - | 12.00 |
| :---: | :---: | :---: | :---: |
|  | 7.80 | - | 10.80 |
| (See Last Page of Calculations | 6.00 | - | 9.00 |
| for 25-Year Flows) | 1.80 | - | 3.00 |

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## RIPRAP OUTLET PROTECTION

Location: FES\#5 - (MH10) From Bioretention Area \#1 \&2
Design Flow =
Tailwater =
$\mathrm{Q}=$
$\mathrm{Tw}=$

| 7.6 | cfs |
| ---: | ---: |
|  | feet |
| 233333 | feet |

$\mathrm{TW}>=1 / 2 \mathrm{Do}->$ La $=$ Length $=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=16.0$ feet

```
W
        W
    D = Depth = (1.5)(d50)= 9 inches (or Min. 9')
    d
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size

| 100 | 9.00 | - | 12.00 |
| ---: | :--- | :--- | :--- |
|  | 85 | 7.80 | - |

Size of stone (inches)

MSC Civil Engineers Land Surveyors, Inc.

## RIPRAP OUTLET PROTECTION

Location: FES\#6 - (MH13) From Infiltration Basin \#1

|  |  |  |
| :--- | :--- | ---: |
| Design Flow $=$ | $\mathrm{Q}=$ |  |
| Tailwater $=$ | $\mathrm{Tw}=$ | 7.6 |
| cfs |  |  |
| Pipe Dia. $=$ | Do $=$ |  |

$$
\text { TW }>=1 / 2 \mathrm{Do}->\mathrm{La}=\text { Length }=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=16.0 \text { feet }
$$

```
W
        W
    D = Depth = (1.5)(d50)= 9 inches (or Min. 9')
    d
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size

|  | 100 | 9.00 | - |
| ---: | ---: | ---: | :---: |
| 85 | 7.80 | - | 12.00 |
| MSC Civil Engineers Land Surveyors, Inc. | 15 | 6.00 | - |

Size of stone (inches)

MSC Civil Engineers Land Surveyors, Inc.

## RIPRAP OUTLET PROTECTION

Location: FES \#7 - (MH-11) From Drain MH \#11

| Design Flow = | $\mathrm{Q}=$ | 7.2 |
| :---: | :---: | :---: |
| Tailwater = | Tw = | 1.333333 |
| Pipe Dia.= | Do = | 2 |

$$
\text { TW }>=1 / 2 \mathrm{Do}->\mathrm{La}=\text { Length }=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=15.5 \text { feet }
$$

```
W
        W}\mp@subsup{W}{2}{}=\mathrm{ Width = 3Do= 6.0 feet
    D = Depth = (1.5)(d50)= 9 inches (or Min. 9")
    d
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size
100
85
50
1
100
85
50
15
15
MSC Civil Engineers Land Surveyors, Inc.

Size of stone (inches)

| 100 | 9.00 | - | 12.00 |
| ---: | ---: | ---: | :---: |
| 85 | 7.80 | - | 10.80 |
| MSC Civil Engineers Land Surveyors, Inc. | 50 | 6.00 | - |

## RIPRAP OUTLET PROTECTION

Location: FES \#8 - (MH-08) From Drain MH \#8 into Forebay

| Design Flow $=$ | $\mathrm{Q}=$ |  |
| :--- | :--- | ---: |
| Tailwater $=$ | Tw $=$ | 18.3 |
| cfs |  |  |
| Pipe Dia. $=$ | Do $=$ | 2.66667 |
| feet |  |  |
| feet |  |  |

$$
\text { TW>=1/2Do -> La = Length = 3.0Q/Do^(3/2) + 7Do = } 34.5 \text { feet }
$$

```
W
        W
    D = Depth = (1.5)(d50)= 9 inches (or Min. 9")
    d
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size
100
85
50
15
85
50
15

Size of stone (inches)

|  | 100 | 9.00 | - |
| ---: | ---: | ---: | :---: |
|  | 85 | 7.80 | - |
| MSC Civil Engineers Land Surveyors, Inc. | 50 | 6.00 | - |

MSC Civil Engineers Land Surveyors, Inc.

## RIPRAP OUTLET PROTECTION

Location: FES \#9 - (GW01) Outlet From Subsurface Gravel Wetland \#1

| Design Flow = | Q = | 7.9 |
| :---: | :---: | :---: |
| Tailwater = | Tw = | 1 |
| Pipe Dia.= | Do = | 1.5 |

$$
\text { TW }>=1 / 2 \mathrm{Do}->\mathrm{La}=\text { Length }=3.0 \mathrm{Q} / \mathrm{Do}^{\wedge}(3 / 2)+7 \mathrm{Do}=19.5 \text { feet }
$$

```
W
        W
    D = Depth = (1.5)(d50)= 9 inches (or Min. 9')
    d
```


## Rock Riprap Gradation

\% by weight passing given the $\mathrm{D}_{50}$ Size
100
85
50
1
100
85
50
15
15

Size of stone (inches)

MSC Civil Engineers Land Surveyors, Inc.

Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method


## APPENDIX H - NRCS WEB SOIL SURVEY

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United States Department of Agriculture


Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rockingham County, New Hampshire


## Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.
Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/ portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/? cid=nrcs142p2_053951).
Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.
Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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## How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil
scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.
Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.
Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

## Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


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## MAP LEGEND

| Area of Interest (AOI) |  |
| :--- | :--- |
| $\square$ | Area of Interest (AOI) |
| $\square$ | Soil Map Unit Polygons |
| $\square$ | Soil Map Unit Lines |
| $\square$ | Soil Map Unit Points |

Special Point Features
(0) Blowout

B Borrow Pit
粠 Clay Spot
$\checkmark$ Closed Depression
Gravel Pit
$\therefore$ Gravelly Spot
(4) Landfill
A. Lava Flow

Marsh or swamp
© Mine or Quarry
(-) Miscellaneous Water

- Perennial Water
- Rock Outcrop
+ Saline Spot
$\because \quad$ Sandy Spot
- Severely Eroded Spot
- Sinkhole

3) Slide or Slip
(6) Sodic Spot

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

Source of Map: Natural Resources Conservation Service Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)
Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Rockingham County, New Hampshire Survey Area Data: Version 22, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Jun 14, 2017

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

# Map Unit Legend 

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
| :---: | :---: | :---: | :---: |
| 33A | Scitico silt loam, 0 to 5 percent slopes | 15.6 | 17.7\% |
| 38A | Eldridge fine sandy loam, 0 to 3 percent slopes | 11.0 | 12.5\% |
| 134 | Maybid silt loam | 3.0 | 3.4\% |
| 140C | Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky | 6.1 | 6.9\% |
| 313A | Deerfield loamy fine sand, 0 to 3 percent slopes | 6.1 | 6.9\% |
| 460C | Pennichuck channery very fine sandy loam, 8 to 15 percent slopes | 8.6 | 9.7\% |
| 495 | Natchaug mucky peat, 0 to 2 percent slopes | 1.0 | 1.1\% |
| 510A | Hoosic gravelly fine sandy loam, 0 to 3 percent slopes | 0.7 | 0.8\% |
| 510B | Hoosic gravelly fine sandy loam, 3 to 8 percent slopes | 29.4 | 33.4\% |
| 510C | Hoosic gravelly fine sandy loam, 8 to 15 percent slopes | 5.2 | 5.9\% |
| 538A | Squamscott fine sandy loam, 0 to 5 percent slopes | 1.5 | 1.7\% |
| Totals for Area of Interest |  | 88.0 | 100.0\% |

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.
The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.
Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.
A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.
An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion
of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.
Some surveys include miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Rockingham County, New Hampshire

## 33A-Scitico silt loam, 0 to 5 percent slopes

## Map Unit Setting

National map unit symbol: 9cn6
Elevation: 0 to 180 feet
Mean annual precipitation: 47 to 49 inches
Mean annual air temperature: 48 degrees F
Frost-free period: 155 to 165 days
Farmland classification: Farmland of local importance

## Map Unit Composition

Scitico and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Scitico

## Setting

Landform: Marine terraces

## Typical profile

H1-0 to 6 inches: silt loam
H2-6 to 12 inches: silty clay loam
H3-12 to 60 inches: silty clay
Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately
high ( 0.00 to $0.20 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.9 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY019NH - Wet Lake Plain
Hydric soil rating: Yes

## Minor Components

## Squamscott

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes
Maybid
Percent of map unit: 5 percent
Landform: Marine terraces

Hydric soil rating: Yes

## Boxford

Percent of map unit: 5 percent
Hydric soil rating: No

## 38A—Eldridge fine sandy loam, 0 to 3 percent slopes

## Map Unit Setting

National map unit symbol: 9cn9
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 120 to 180 days
Farmland classification: All areas are prime farmland

## Map Unit Composition

Eldridge and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Eldridge

## Setting

Parent material: Outwash over glaciolacustrine

## Typical profile

H1-0 to 8 inches: fine sandy loam
H2-8 to 23 inches: loamy fine sand
H3-23 to 62 inches: loamy very fine sand

## Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high ( 0.06 to $0.60 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.9 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2 w
Hydrologic Soil Group: C/D
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

## Minor Components

## Squamscott

Percent of map unit: 10 percent
Landform: Marine terraces
Hydric soil rating: Yes
Scitico
Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

## Well drained inclusion

Percent of map unit: 5 percent
Hydric soil rating: No

## 134—Maybid silt loam

## Map Unit Setting

National map unit symbol: 9cmg
Elevation: 0 to 180 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 degrees $F$
Frost-free period: 155 to 165 days
Farmland classification: Not prime farmland

## Map Unit Composition

Maybid and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Maybid

## Setting

Landform: Marine terraces
Parent material: Silty and clayey marine deposits

## Typical profile

H1-0 to 9 inches: silt loam
H2-9 to 26 inches: silty clay loam
H3-26 to 63 inches: silty clay
Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high ( 0.00 to $0.20 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: About 0 to 6 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Available water capacity: Moderate (about 8.8 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F144AY020MA - Very Wet Coastal Lake Plain
Hydric soil rating: Yes

## Minor Components

## Ossipee

Percent of map unit: 10 percent
Landform: Swamps
Hydric soil rating: Yes
Scitico
Percent of map unit: 10 percent
Landform: Marine terraces
Hydric soil rating: Yes

## Not named wet

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

## 140C—Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky

## Map Unit Setting

National map unit symbol: 2w82s
Elevation: 0 to 980 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

## Map Unit Composition

Chatfield, very stony, and similar soils: 35 percent
Canton, very stony, and similar soils: 25 percent
Hollis, very stony, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Chatfield, Very Stony

## Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit Landform position (three-dimensional): Crest, side slope, nose slope Down-slope shape: Convex

Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

## Typical profile

Oi-0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
$B w-2$ to 30 inches: gravelly fine sandy loam
$2 R-30$ to 40 inches: bedrock

## Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low ( 0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline ( 0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.3 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

## Description of Hollis, Very Stony

## Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

## Typical profile

Oi -0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
$B w-7$ to 16 inches: gravelly fine sandy loam
$2 R-16$ to 26 inches: bedrock

## Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low ( 0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches

## Custom Soil Resource Report

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline ( 0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.7 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

## Description of Canton, Very Stony

## Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

## Typical profile

Oi-0 to 2 inches: slightly decomposed plant material
A-2 to 5 inches: fine sandy loam
Bw1-5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C-22 to 67 inches: gravelly loamy sand

## Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high ( 0.14 to $14.17 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline ( 0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.4 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

## Minor Components

## Freetown

Percent of map unit: 5 percent
Landform: Bogs, marshes, depressions, kettles, swamps

Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

## Newfields, very stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines, moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

## Scarboro, very stony

Percent of map unit: 3 percent
Landform: Depressions, drainageways, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave, linear
Hydric soil rating: Yes

## Rock outcrop

Percent of map unit: 2 percent
Landform: Ridges, hills
Hydric soil rating: Unranked

## 313A—Deerfield loamy fine sand, 0 to 3 percent slopes

## Map Unit Setting

National map unit symbol: $2 x f g 8$
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of local importance

## Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Deerfield

Setting
Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear, convex

Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

## Typical profile

Ap-0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg-33 to 60 inches: sand

## Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high ( 1.42 to $99.90 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline ( 0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water capacity: Moderate (about 6.5 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2 w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

## Minor Components

## Windsor

Percent of map unit: 7 percent
Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

## Wareham

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

## Sudbury

Percent of map unit: 2 percent
Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

## Ninigret

Percent of map unit: 1 percent
Landform: Outwash plains, kame terraces, outwash terraces
Landform position (three-dimensional): Tread

Down-slope shape: Convex, linear Across-slope shape: Convex, concave Hydric soil rating: No

## 460C—Pennichuck channery very fine sandy loam, 8 to 15 percent slopes

## Map Unit Setting

National map unit symbol: 9cp0
Elevation: 0 to 1,000 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of statewide importance

## Map Unit Composition

Pennichuck and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Pennichuck

## Setting

Parent material: Till

## Typical profile

H1-0 to 11 inches: channery very fine sandy loam
H2-11 to 25 inches: very channery fine sandy loam
H3-25 to 36 inches: very channery loamy coarse sand
$R$ - 36 to 40 inches: unweathered bedrock

## Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high ( 0.01 to $2.00 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

## Minor Components

## Not named

Percent of map unit: 10 percent
Hydric soil rating: No
Scitico
Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes
Squamscott
Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes
Eldridge
Percent of map unit: 5 percent
Hydric soil rating: No

## 495-Natchaug mucky peat, 0 to 2 percent slopes

## Map Unit Setting

National map unit symbol: 2w691
Elevation: 0 to 910 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

## Map Unit Composition

Natchaug and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Natchaug

## Setting

Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Moderately decomposed organic material over loamy glaciofluvial
deposits and/or loamy glaciolacustrine deposits and/or loamy till
Typical profile
Oe1-0 to 12 inches: mucky peat
Oe2-12 to 31 inches: mucky peat
2Cg1-31 to 39 inches: silt loam
2Cg2 - 39 to 79 inches: fine sandy loam

## Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
( 0.01 to $14.17 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline ( 0.0 to $1.9 \mathrm{mmhos} / \mathrm{cm}$ )
Available water capacity: Very high (about 14.4 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY042NY - Semi-Rich Organic Wetlands
Hydric soil rating: Yes

## Minor Components

## Scarboro

Percent of map unit: 4 percent
Landform: Depressions, drainageways, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

## Walpole

Percent of map unit: 4 percent
Landform: Outwash plains, depressions, depressions, deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

## Maybid

Percent of map unit: 2 percent
Landform: Depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

## 510A-Hoosic gravelly fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9cp3

Elevation: 100 to 1,100 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 190 days
Farmland classification: Farmland of statewide importance

## Map Unit Composition

Hoosic and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Hoosic

## Setting

Parent material: Outwash

## Typical profile

H1-0 to 8 inches: gravelly fine sandy loam
H2-8 to 15 inches: very gravelly fine sandy loam
H3-15 to 60 inches: very gravelly coarse sand
Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to $20.00 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.6 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

## Minor Components

Not named
Percent of map unit: 10 percent
Hydric soil rating: No

## 510B—Hoosic gravelly fine sandy loam, 3 to 8 percent slopes

## Map Unit Setting

National map unit symbol: 9cp4
Elevation: 100 to 1,100 feet

Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 190 days
Farmland classification: Farmland of statewide importance

## Map Unit Composition

Hoosic and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Hoosic

## Setting

Parent material: Outwash

## Typical profile

H1-0 to 8 inches: gravelly fine sandy loam
H2-8 to 15 inches: very gravelly fine sandy loam
H3-15 to 60 inches: very gravelly coarse sand

## Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00
to $20.00 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.6 inches)

## Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

## Minor Components

Not named
Percent of map unit: 10 percent
Hydric soil rating: No

## 510C—Hoosic gravelly fine sandy loam, 8 to 15 percent slopes

## Map Unit Setting

National map unit symbol: 9cp5
Elevation: 100 to 1,100 feet
Mean annual precipitation: 30 to 50 inches

Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 190 days
Farmland classification: Not prime farmland

## Map Unit Composition

Hoosic and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Hoosic

## Setting

Parent material: Outwash

## Typical profile

H1-0 to 8 inches: gravelly fine sandy loam
H2-8 to 15 inches: very gravelly fine sandy loam
H3-15 to 60 inches: very gravelly coarse sand
Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to $20.00 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.6 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

## Minor Components

## Not named

Percent of map unit: 5 percent
Hydric soil rating: No

## 538A—Squamscott fine sandy loam, 0 to 5 percent slopes

## Map Unit Setting

National map unit symbol: 9cp9
Elevation: 0 to 1,000 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 45 to 54 degrees F

Frost-free period: 120 to 180 days
Farmland classification: Farmland of local importance

## Map Unit Composition

Squamscott and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

## Description of Squamscott

## Setting

Landform: Marine terraces

## Typical profile

H1-0 to 4 inches: fine sandy loam
H2-4 to 12 inches: loamy sand
H3-12 to 19 inches: fine sand
H4-19 to 65 inches: silt loam

## Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high ( 0.06 to $0.60 \mathrm{in} / \mathrm{hr}$ )
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)
Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY019NH - Wet Lake Plain
Hydric soil rating: Yes

## Minor Components

## Scitico

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

## Maybid

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes
Eldridge
Percent of map unit: 5 percent
Hydric soil rating: No

## Soil Information for All Uses

## Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

## Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

## Hydrologic Soil Group (Peverly NCRS Soils Report)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.


## MAP LEGEND



## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)
Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Rockingham County, New Hampshire Survey Area Data: Version 22, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Jun
14,2017 14, 2017

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

Table—Hydrologic Soil Group (Peverly NCRS Soils Report)

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
| :---: | :---: | :---: | :---: | :---: |
| 33A | Scitico silt loam, 0 to 5 percent slopes | C/D | 15.6 | 17.7\% |
| 38A | Eldridge fine sandy loam, 0 to 3 percent slopes | C/D | 11.0 | 12.5\% |
| 134 | Maybid silt loam | C/D | 3.0 | 3.4\% |
| 140C | Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky | B | 6.1 | 6.9\% |
| 313A | Deerfield loamy fine sand, 0 to 3 percent slopes | A | 6.1 | 6.9\% |
| 460C | Pennichuck channery very fine sandy loam, 8 to 15 percent slopes | C | 8.6 | 9.7\% |
| 495 | Natchaug mucky peat, 0 to 2 percent slopes | B/D | 1.0 | 1.1\% |
| 510A | Hoosic gravelly fine sandy loam, 0 to 3 percent slopes | A | 0.7 | 0.8\% |
| 510B | Hoosic gravelly fine sandy loam, 3 to 8 percent slopes | A | 29.4 | 33.4\% |
| 510C | Hoosic gravelly fine sandy loam, 8 to 15 percent slopes | A | 5.2 | 5.9\% |
| 538A | Squamscott fine sandy loam, 0 to 5 percent slopes | C/D | 1.5 | 1.7\% |
| Totals for Area of Interest |  |  | 88.0 | 100.0\% |

## Rating Options-Hydrologic Soil Group (Peverly NCRS Soils Report)

## Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified
Tie-break Rule: Higher

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## Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: "National Soil Survey Handbook."

## ABC soil

A soil having an $A, a B$, and a $C$ horizon.

## Ablation till

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

## AC soil

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

## Aeration, soil

The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

## Aggregate, soil

Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

## Alkali (sodic) soil

A soil having so high a degree of alkalinity ( pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

## Alluvial cone

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

## Alluvial fan

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

## Alluvium

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

## Alpha,alpha-dipyridyl

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

## Animal unit month (AUM)

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

## Aquic conditions

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

## Argillic horizon

A subsoil horizon characterized by an accumulation of illuvial clay.

## Arroyo

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

## Aspect

The direction toward which a slope faces. Also called slope aspect.

## Association, soil

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

## Available water capacity (available moisture capacity)

The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low: 0 to 3
Low: 3 to 6
Moderate: 6 to 9
High: 9 to 12
Very high: More than 12

## Backslope

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

## Backswamp

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

## Badland

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

## Bajada

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

## Basal area

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

## Base saturation

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of $\mathrm{Ca}, \mathrm{Mg}, \mathrm{Na}$, and K ), expressed as a percentage of the total cation-exchange capacity.

## Base slope (geomorphology)

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

## Bedding plane

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology)
from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

## Bedding system

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

## Bedrock

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

## Bedrock-controlled topography

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

## Bench terrace

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

## Bisequum

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

## Blowout (map symbol)

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

## Borrow pit (map symbol)

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

## Bottom land

An informal term loosely applied to various portions of a flood plain.

## Boulders

Rock fragments larger than 2 feet ( 60 centimeters) in diameter.

## Breaks

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

## Breast height

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

## Brush management

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

## Butte

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

## Cable yarding

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

## Calcareous soil

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

## Caliche

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

## California bearing ratio (CBR)

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

## Canopy

The leafy crown of trees or shrubs. (See Crown.)

## Canyon

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

## Capillary water

Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

## Catena

A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

## Cation

An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

## Cation-exchange capacity

The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality $(\mathrm{pH}$ 7.0 ) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

## Catsteps

See Terracettes.

## Cement rock

Shaly limestone used in the manufacture of cement.

## Channery soil material

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

## Chemical treatment

Control of unwanted vegetation through the use of chemicals.

## Chiseling

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

## Cirque

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

## Clay

As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

## Clay depletions

See Redoximorphic features.

## Clay film

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

## Clay spot (map symbol)

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

## Claypan

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

## Climax plant community

The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

## Coarse textured soil

Sand or loamy sand.

## Cobble (or cobblestone)

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

## Cobbly soil material

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches ( 7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

## COLE (coefficient of linear extensibility)

See Linear extensibility.

## Colluvium

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

## Complex slope

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

## Complex, soil

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

## Concretions

See Redoximorphic features.

## Conglomerate

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

## Conservation cropping system

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

## Conservation tillage

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

## Consistence, soil

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

## Contour stripcropping

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

## Control section

The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

## Coprogenous earth (sedimentary peat)

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

## Corrosion (geomorphology)

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

## Corrosion (soil survey interpretations)

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

## Cover crop

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

## Crop residue management

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

## Cropping system

Growing crops according to a planned system of rotation and management practices.

## Cross-slope farming

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

## Crown

The upper part of a tree or shrub, including the living branches and their foliage.

## Cryoturbate

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

## Cuesta

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

## Culmination of the mean annual increment (CMAI)

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

## Cutbanks cave

The walls of excavations tend to cave in or slough.

## Decreasers

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

## Deferred grazing

Postponing grazing or resting grazing land for a prescribed period.

## Delta

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

## Dense layer

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

## Depression, closed (map symbol)

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

## Depth, soil

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

## Desert pavement

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

## Diatomaceous earth

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

## Dip slope

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

## Diversion (or diversion terrace)

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

## Divided-slope farming

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

## Drainage class (natural)

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

## Drainage, surface

Runoff, or surface flow of water, from an area.

## Drainageway

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

## Draw

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

## Drift

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

## Drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

## Duff

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

## Dune

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

## Earthy fill

See Mine spoil.

## Ecological site

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

## Eluviation

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

## Endosaturation

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

## Eolian deposit

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

## Ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

## Episaturation

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

## Erosion

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

## Erosion (accelerated)

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

## Erosion (geologic)

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

## Erosion pavement

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

## Erosion surface

A land surface shaped by the action of erosion, especially by running water.

## Escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

## Escarpment, bedrock (map symbol)

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces.
Exposed material is hard or soft bedrock.

## Escarpment, nonbedrock (map symbol)

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

## Esker

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left
behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

## Extrusive rock

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

## Fallow

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

## Fan remnant

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

## Fertility, soil

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

## Fibric soil material (peat)

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

## Field moisture capacity

The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

## Fill slope

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

## Fine textured soil

Sandy clay, silty clay, or clay.

## Firebreak

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

## First bottom

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

## Flaggy soil material

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

## Flagstone

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches ( 15 to 38 centimeters) long.

## Flood plain

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

## Flood-plain landforms

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

## Flood-plain splay

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

## Flood-plain step

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

## Fluvial

Of or pertaining to rivers or streams; produced by stream or river action.

## Foothills

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet ( 300 meters).

## Footslope

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

## Forb

Any herbaceous plant not a grass or a sedge.

## Forest cover

All trees and other woody plants (underbrush) covering the ground in a forest.

## Forest type

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

## Fragipan

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

## Genesis, soil

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

## Gilgai

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

## Glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

## Glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

## Gleyed soil

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

## Graded stripcropping

Growing crops in strips that grade toward a protected waterway.

## Grassed waterway

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

## Gravel

Rounded or angular fragments of rock as much as 3 inches ( 2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

## Gravel pit (map symbol)

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

## Gravelly soil material

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches ( 7.6 centimeters) in diameter.

## Gravelly spot (map symbol)

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

## Green manure crop (agronomy)

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

## Ground water

Water filling all the unblocked pores of the material below the water table.

## Gully (map symbol)

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

## Hard bedrock

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

## Hard to reclaim

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

## Hardpan

A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

## Head slope (geomorphology)

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

## Hemic soil material (mucky peat)

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

## High-residue crops

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill
A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

## Hillslope

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

## Horizon, soil

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon: An organic layer of fresh and decaying plant residue.
L horizon: A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.
A horizon: The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
E horizon: The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
$B$ horizon: The mineral horizon below an $A$ horizon. The $B$ horizon is in part a layer of transition from the overlying $A$ to the underlying $C$ horizon. The $B$ horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
C horizon: The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
Cr horizon: Soft, consolidated bedrock beneath the soil.
$R$ layer: Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.
$M$ layer: A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.
W layer: A layer of water within or beneath the soil.

## Humus

The well decomposed, more or less stable part of the organic matter in mineral soils.

## Hydrologic soil groups

Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

## Igneous rock

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

## Illuviation

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

## Impervious soil

A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

## Increasers

Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

## Infiltration

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

## Infiltration capacity

The maximum rate at which water can infiltrate into a soil under a given set of conditions.

## Infiltration rate

The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

## Intake rate

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Very low: Less than 0.2
Low: 0.2 to 0.4
Moderately low: 0.4 to 0.75
Moderate: 0.75 to 1.25
Moderately high: 1.25 to 1.75
High: 1.75 to 2.5
Very high: More than 2.5

## Interfluve

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

## Interfluve (geomorphology)

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

## Intermittent stream

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

## Invaders

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

## Iron depletions

See Redoximorphic features.

## Irrigation

Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin: Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Border: Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Controlled flooding: Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation: Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction. Drip (or trickle): Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow: Water is applied in small ditches made by cultivation implements.
Furrows are used for tree and row crops.
Sprinkler: Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation: Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding: Water, released at high points, is allowed to flow onto an area without controlled distribution.

## Kame

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

## Karst (topography)

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

## Knoll

A small, low, rounded hill rising above adjacent landforms.

## Ksat

See Saturated hydraulic conductivity.

## Lacustrine deposit

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

## Lake plain

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

## Lake terrace

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

## Landfill (map symbol)

An area of accumulated waste products of human habitation, either above or below natural ground level.

## Landslide

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

## Large stones

Rock fragments 3 inches ( 7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

## Lava flow (map symbol)

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

## Leaching

The removal of soluble material from soil or other material by percolating water.

## Levee (map symbol)

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

## Linear extensibility

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $1 / 3$ - or $1 / 10$-bar tension ( 33 kPa or 10 kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

## Liquid limit

The moisture content at which the soil passes from a plastic to a liquid state.

## Loam

Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

## Loess

Material transported and deposited by wind and consisting dominantly of siltsized particles.

## Low strength

The soil is not strong enough to support loads.

## Low-residue crops

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

## Marl

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

## Marsh or swamp (map symbol)

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

## Mass movement

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

## Masses

See Redoximorphic features.

## Meander belt

The zone within which migration of a meandering channel occurs; the floodplain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

## Meander scar

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

## Meander scroll

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

## Mechanical treatment

Use of mechanical equipment for seeding, brush management, and other management practices.

## Medium textured soil

Very fine sandy loam, loam, silt loam, or silt.

## Mesa

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

## Metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

## Mine or quarry (map symbol)

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

## Mine spoil

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

## Mineral soil

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

## Minimum tillage

Only the tillage essential to crop production and prevention of soil damage.

## Miscellaneous area

A kind of map unit that has little or no natural soil and supports little or no vegetation.

## Miscellaneous water (map symbol)

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

## Moderately coarse textured soil

Coarse sandy loam, sandy loam, or fine sandy loam.

## Moderately fine textured soil

Clay loam, sandy clay loam, or silty clay loam.

## Mollic epipedon

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

## Moraine

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

## Morphology, soil

The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

## Mottling, soil

Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance-few, common, and many; size-fine, medium, and coarse; and contrast-faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch ); and coarse, more than 15 millimeters (about 0.6 inch).

## Mountain

A generic term for an elevated area of the land surface, rising more than 1,000 feet ( 300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can
occur as a single, isolated mass or in a group forming a chain or range.
Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

## Muck

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

## Mucky peat

See Hemic soil material.

## Mudstone

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

## Munsell notation

A designation of color by degrees of three simple variables-hue, value, and chroma. For example, a notation of $10 \mathrm{YR} 6 / 4$ is a color with hue of 10 YR , value of 6 , and chroma of 4 .

## Natric horizon

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

## Neutral soil

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

## Nodules

See Redoximorphic features.

## Nose slope (geomorphology)

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

## Nutrient, plant

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

## Organic matter

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low: Less than 0.5 percent
Low: 0.5 to 1.0 percent
Moderately low: 1.0 to 2.0 percent
Moderate: 2.0 to 4.0 percent
High: 4.0 to 8.0 percent
Very high: More than 8.0 percent

## Outwash

Stratified and sorted sediments (chiefly sand and gravel) removed or "washed out" from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

## Outwash plain

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

## Paleoterrace

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

## Pan

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, hardpan, fragipan, claypan, plowpan, and traffic pan.

## Parent material

The unconsolidated organic and mineral material in which soil forms.

## Peat

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

## Ped

An individual natural soil aggregate, such as a granule, a prism, or a block.

## Pedisediment

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

## Pedon

The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet ( 1 square meter to 10 square meters), depending on the variability of the soil.

## Percolation

The movement of water through the soil.

## Perennial water (map symbol)

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

## Permafrost

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

## pH value

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

## Phase, soil

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

## Piping

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

## Pitting

Pits caused by melting around ice. They form on the soil after plant cover is removed.

## Plastic limit

The moisture content at which a soil changes from semisolid to plastic.

## Plasticity index

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

## Plateau (geomorphology)

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

## Playa

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

## Plinthite

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

## Plowpan

A compacted layer formed in the soil directly below the plowed layer.

## Ponding

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

## Poorly graded

Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

## Pore linings

See Redoximorphic features.

## Potential native plant community

See Climax plant community.

## Potential rooting depth (effective rooting depth)

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

## Prescribed burning

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

## Productivity, soil

The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil
A vertical section of the soil extending through all its horizons and into the parent material.

## Proper grazing use

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and
promotes the accumulation of litter and mulch necessary to conserve soil and water.

## Rangeland

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

## Reaction, soil

A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid: Less than 3.5
Extremely acid: 3.5 to 4.4
Very strongly acid: 4.5 to 5.0
Strongly acid: 5.1 to 5.5
Moderately acid: 5.6 to 6.0
Slightly acid: 6.1 to 6.5
Neutral: 6.6 to 7.3
Slightly alkaline: 7.4 to 7.8
Moderately alkaline: 7.9 to 8.4
Strongly alkaline: 8.5 to 9.0
Very strongly alkaline: 9.1 and higher

## Red beds

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

## Redoximorphic concentrations

See Redoximorphic features.

## Redoximorphic depletions

See Redoximorphic features.

## Redoximorphic features

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.-These are zones of apparent accumulation of iron-manganese oxides, including:
A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; and
B. Masses, which are noncemented concentrations of substances within the soil matrix; and
C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.-These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; and
B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.-This is a soil matrix that has low chroma in situ but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

## Reduced matrix

See Redoximorphic features.

## Regolith

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

## Relief

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

## Residuum (residual soil material)

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

## Rill

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

## Riser

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

## Road cut

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

## Rock fragments

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

## Rock outcrop (map symbol)

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "Rock outcrop" is a named component of the map unit.

## Root zone

The part of the soil that can be penetrated by plant roots.

## Runoff

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

## Saline soil

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

## Saline spot (map symbol)

An area where the surface layer has an electrical conductivity of $8 \mathrm{mmhos} / \mathrm{cm}$ more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

## Sand

As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

## Sandstone

Sedimentary rock containing dominantly sand-sized particles.

## Sandy spot (map symbol)

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

## Sapric soil material (muck)

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

## Saturated hydraulic conductivity (Ksat)

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

Very high: 100 or more micrometers per second (14.17 or more inches per hour)
High: 10 to 100 micrometers per second (1.417 to 14.17 inches per hour) Moderately high: 1 to 10 micrometers per second ( 0.1417 inch to 1.417 inches per hour)
Moderately low: 0.1 to 1 micrometer per second ( 0.01417 to 0.1417 inch per hour)
Low: 0.01 to 0.1 micrometer per second ( 0.001417 to 0.01417 inch per hour) Very low: Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417 .

## Saturation

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

## Scarification

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

## Sedimentary rock

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

## Sequum

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

## Series, soil

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

## Severely eroded spot (map symbol)

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which "severely eroded," "very severely eroded," or "gullied" is part of the map unit name.

## Shale

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

## Sheet erosion

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

## Short, steep slope (map symbol)

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

## Shoulder

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

## Shrink-swell

The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

## Shrub-coppice dune

A small, streamlined dune that forms around brush and clump vegetation.

## Side slope (geomorphology)

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

## Silica

A combination of silicon and oxygen. The mineral form is called quartz.

## Silica-sesquioxide ratio

The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

## Silt

As a soil separate, individual mineral particles that range in diameter from the upper limit of clay ( 0.002 millimeter) to the lower limit of very fine sand ( 0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

## Siltstone

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

## Similar soils

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

## Sinkhole (map symbol)

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

## Site index

A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 .

## Slickensides (pedogenic)

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

## Slide or slip (map symbol)

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

## Slope

The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

## Slope alluvium

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

## Slow refill

The slow filling of ponds, resulting from restricted water transmission in the soil.

## Slow water movement

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

## Sodic (alkali) soil

A soil having so high a degree of alkalinity ( pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

## Sodic spot (map symbol)

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

## Sodicity

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of $\mathrm{Na}^{+}$to $\mathrm{Ca}^{++}+\mathrm{Mg}^{++}$. The degrees of sodicity and their respective ratios are:

Slight: Less than 13:1
Moderate: 13-30:1
Strong: More than 30:1

## Sodium adsorption ratio (SAR)

A measure of the amount of sodium ( Na ) relative to calcium $(\mathrm{Ca})$ and magnesium $(\mathrm{Mg})$ in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the $\mathrm{Ca}+\mathrm{Mg}$ concentration.

## Soft bedrock

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

## Soil

A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

## Soil separates

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:
Very coarse sand: 2.0 to 1.0
Coarse sand: 1.0 to 0.5
Medium sand: 0.5 to 0.25
Fine sand: 0.25 to 0.10
Very fine sand: 0.10 to 0.05
Silt: 0.05 to 0.002
Clay: Less than 0.002

## Solum

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

## Spoil area (map symbol)

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

## Stone line

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobblesized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

## Stones

Rock fragments 10 to 24 inches ( 25 to 60 centimeters) in diameter if rounded or 15 to 24 inches ( 38 to 60 centimeters) in length if flat.

## Stony

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

## Stony spot (map symbol)

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

## Strath terrace

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

## Stream terrace

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

## Stripcropping

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

## Structure, soil

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy: Flat and laminated
Prismatic: Vertically elongated and having flat tops
Columnar: Vertically elongated and having rounded tops
Angular blocky: Having faces that intersect at sharp angles (planes)
Subangular blocky: Having subrounded and planar faces (no sharp angles)
Granular: Small structural units with curved or very irregular faces
Structureless soil horizons are defined as follows:
Single grained: Entirely noncoherent (each grain by itself), as in loose sand Massive: Occurring as a coherent mass

## Stubble mulch

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

## Subsoil

Technically, the B horizon; roughly, the part of the solum below plow depth.

## Subsoiling

Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

## Substratum

The part of the soil below the solum.

## Subsurface layer

Any surface soil horizon ( $\mathrm{A}, \mathrm{E}, \mathrm{AB}$, or EB ) below the surface layer.

## Summer fallow

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

## Summit

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

## Surface layer

The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches ( 10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

## Surface soil

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

## Talus

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

## Taxadjuncts

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

## Terminal moraine

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

## Terrace (conservation)

An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field
generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

## Terrace (geomorphology)

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

## Terracettes

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

## Texture, soil

The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

## Thin layer

Otherwise suitable soil material that is too thin for the specified use.

## Till

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

## Till plain

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil
The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

## Toeslope

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

## Topsoil

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

## Trace elements

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

## Tread

The flat to gently sloping, topmost, laterally extensive slope of terraces, floodplain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

## Tuff

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

## Upland

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

## Valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

## Variegation

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

## Varve

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

## Very stony spot (map symbol)

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

## Water bars

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

## Weathering

All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

## Well graded

Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

## Wet spot (map symbol)

A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

## Wilting point (or permanent wilting point)

The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

## Windthrow

The uprooting and tipping over of trees by the wind.
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## APPENDIX I - SITE SPECIFIC SOIL MAP \& TEST PIT LOGS

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## TEST PIT DATA

| Project | Peverly Hill Road, Portsmouth, NH <br> Client | Green and Company |
| :--- | :--- | :--- |
| GES Project No. | 2019211 |  |
| MM/DD/YY Staff | $11-19-2020$ |  |
|  |  |  |
| Test Pit No. | $\mathbf{6 0 1}$ |  |
| ESHWT: | $49 "$ |  |
| Termination @ | $95 "$ |  |
| Refusal: | No CSS\# 004 |  |
| Obs. Water: | None |  |


| Depth | Color | Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| ---: | :---: | :---: | :---: | :---: | :---: |
| $0-7 "$ | 10YR3/3 | GRLS | GR | FR | NONE |
| $7-49 "$ | 10YR4/6 | GRLS | GR | FR | NONE |
| $49-95 "$ | $10 Y R 4 / 4$ | GRS | OM | FR | 10YR2/1, C/P |

GR (TEXTURE) = GRAVELLY
LS = LOAMY SAND
S = SAND
FSL = FINE SANDY LOAM
SL = SANDY LOAM
SIL = SILT LOAM
SICL = SILTY CLAY

SICL = SILTY CLAY
$\mathrm{GR}=\mathrm{GRANULAR}$
$\mathrm{OM}=\mathrm{MASSIVE}$
$\mathrm{PL}=\mathrm{PLATY}$
$\mathrm{BK}=\mathrm{BLOCKY}$

VF (TEXTURE) = VERY FINE

Test Pit No. 602
ESHWT: 44"
Termination @ 96"
Refusal: No
Obs. Water: None

| Depth | Color | Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| ---: | :---: | :---: | :---: | :---: | :---: |
| $0-9 "$ | $10 Y R 3 / 3$ | GRLS | GR | FR | NONE |
| $9-44 "$ | $10 Y R 4 / 6$ | GRLS | GR | FR | NONE |
| $44-96 "$ | $10 Y R 4 / 4$ | GRS | OM | FR | 7.5YR5/8, C/P |

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:
Depth
$0-12 "$
$12-36^{\prime \prime}$
$36-$
$10 \mathrm{YR} 3 / 2$
$109 \mathrm{YR} 4 / 6$

603
36"
109"
No
None
Texture
GRSL
GRSL
GRLS

604
Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color |
| :---: | :---: |
| $0-14 "$ | 10YR3/3 |
| $14-55 "$ | $10 \mathrm{YR} 4 / 6$ |
| $55-95 "$ | $2.5 \mathrm{Y} 5 / 4$ |

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color |
| :---: | :---: |
| $0-7 "$ | 10YR3/3 |
| $7-37 "$ | $10 Y R 5 / 6$ |
| $37-$ | $2.5 Y 5 / 3$ |
| $102 "$ |  |

605
37"
102"
No
None

| Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| :---: | :---: | :---: | :---: |
| LS | GR | FR | NONE |
| LS | GR | FR | NONE |
| S | OM | FR | $7.5 Y R 5 / 8, \mathrm{C} / \mathrm{P}$ |

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:
Depth
$0-10^{\prime \prime}$
$10-30^{\prime \prime}$
Color
$30-97 "$

606
30"
97"
No
None
Texture
LS
LS
S
Structure
GR
GR
OM
Consistence
FR
FR
FR
REDOX; Quantity/Contrast
NONE
NONE
7.5YR5/8, C/P

607
Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:
Depth
$0-9 "$
$9-30 "$
$30-90^{\prime \prime}$

30"
$96 "$
No
None
Texture
LS
LS
S
Structure
GR
GR
OM
Consistence
FR
FR
FR
REDOX; Quantity/Contrast NONE
NONE
2.5Y6/6, C/D

608
23 "
97"
No
None

| Depth | Color | Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| ---: | :---: | :---: | :---: | :---: | :---: |
| $0-8 "$ | 10YR3/3 | LS | GR | FR | NONE |
| $8-23 "$ | $10 Y R 4 / 6$ | LS | GR | FR | NONE |
| $23-97 "$ | $2.5 Y 5 / 3$ | S | OM | FR | 7.5YR5/8, C/P |


| Test Pit No. | $\mathbf{6 0 9}$ |
| :--- | :--- |
| ESHWT: | $35 "$ |
| Termination @ | 111 " |
| Refusal: | No |
| Obs. Water: | None |


| Depth | Color |
| ---: | :---: |
| $0-12 "$ | 10YR3/3 |
| $12-35 "$ | $10 Y R 4 / 6$ |
| $35-$ | $2.5 Y 5 / 3$ |
| $111 "$ |  | 111"

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color |
| ---: | :---: |
| $0-12 "$ | 10YR3/3 |
| $12-30 "$ | 10YR5/6 |
| $30-$ | $2.5 \mathrm{Y} 5 / 4$ |
| $107 "$ |  |

610
30"
107"
No
None
Texture
GRSL
GRSL
VFS

611
Test Pit No.
ESHWT:
Termination@
Refusal:
Obs. Water:

| Depth | Color | Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| ---: | :---: | :---: | :---: | :---: | :---: |
| $0-12 "$ | 10YR3/2 | GRFSL | GR | FR | NONE |
| $12-29 "$ | $10 Y R 4 / 6$ | GRLS | GR | FR | NONE |
| $29-$ | $2.5 Y 5 / 4$ | VFS | OM | FR | 7.5YR5/8, C/P |
| $105 "$ |  |  |  |  |  |


| Test Pit No. | $\mathbf{6 1 2}$ |
| :--- | :--- |
| ESHWT: | $38^{\prime \prime}$ |
| Termination @ | $92 "$ |
| Refusal: | No |
| Obs. Water: | None |


| Depth | Color |
| :---: | :---: |
| $0-12 "$ | $10 Y R 3 / 2$ |
| $12-38 "$ | $10 Y R 5 / 6$ |
| $38-92 "$ | $2.5 Y 5 / 4$ |

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color |
| ---: | :---: |
| $0-12 "$ | $10 Y R 3 / 2$ |
| $12-33 "$ | $10 Y R 4 / 6$ |
| $33-$ | $2.5 Y 5 / 3$ |
| $110 "$ |  |

613
33"
110"
No
None
Texture
GRSL
GRSL
GRFSL

614
Test Pit No.
ESHWT:
Termination@
Refusal:
Obs. Water:

| Depth | Color | Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| ---: | :---: | :---: | :---: | :---: | :---: |
| $0-12 "$ | $10 Y R 3 / 2$ | FSL | GR | FR | NONE |
| $12-40 "$ | $2.5 y 5 / 2$ | SIL | PL | FI | $7.5 \mathrm{YR} 5 / 8, \mathrm{C} / \mathrm{P}$ |
| $40-73 "$ | $10 Y R 5 / 6$ | FS | OM | FR | $7.5 \mathrm{YR} 5 / 8, \mathrm{C} / \mathrm{P}$ |
| $73-$ | $2.5 Y 4 / 2$ | GRFSL | PL | FI | $2.5 \mathrm{Y} 6 / 6, \mathrm{C} / \mathrm{D}$ |
| $105 "$ |  |  |  |  |  |

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color |
| :---: | :---: |
| $0-8 "$ | $10 Y R 3 / 2$ |
| $8-17 "$ | $10 Y R 4 / 6$ |
| $17-44 "$ | $2.5 Y 5 / 2$ |
| $44-66 "$ | $10 Y R 4 / 4$ |
| $66-$ | $2.5 Y 3 / 3$ |
| $108 "$ |  |
| $108 "-$ BEDROCK |  |

615
$17 "$
$108 "$
108"
None

| Texture | Structure | Consistence | REDOX; Quantity/Contrast |
| :---: | :---: | :---: | :---: |
| FSL | GR | FR | NONE |
| FSL | GR | FR | NONE |
| SIL | PL | FI | $7.5 Y R 5 / 8, \mathrm{C} / \mathrm{P}$ |
| FS | OM | FR | $7.5 \mathrm{YR5} 5,8, \mathrm{C} / \mathrm{P}$ |
| GRFSL | PL | FI | $2.5 Y 6 / 6, \mathrm{C} / \mathrm{D}$ |

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth |
| :--- |
| $0-9 "$ |
| $9-26 "$ |
| 26-80" |$\quad$| Color |
| :--- |
|  |$\quad 20 \mathrm{YR} 3 / 2$

616
26"
80"
No
None
Texture
FSL
FSL
GRFSL
Structure
GR
GR
PL
Consistence
FR
FR
FI
REDOX; Quantity/Contrast
NONE
NONE
7.5YR5/8, C/P

Test Pit No. 617
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color |
| ---: | :---: |
| $0-9 "$ | 10YR3/3 |
| $9-35 "$ | $10 \mathrm{YR} 4 / 6$ |
| $35-80 "$ | $2.5 \mathrm{Y} 5 / 4$ |

35"
80"
$80 "$
None
Texture
GRFSL
GRFSL
GRFSL

| Structure | Consistence | REDOX; Quantity/Contrast |
| :---: | :---: | :---: |
| GR | FR | NONE |
| GR | FR | NONE |
| PL | FI | $7.5 \mathrm{YR} 5 / 8, \mathrm{C} / \mathrm{P}$ |

$80^{\prime \prime}=$ BEDROCK

Test Pit No.
ESHWT:
Termination @
Refusal:
Obs. Water:

| Depth | Color | Texture |
| ---: | :---: | :---: |
| $0-12 "$ | $10 \mathrm{YR} 3 / 2$ | GRFSL |
| $12-22 "$ | $10 \mathrm{YR} 4 / 6$ | GRFSL |
| $22-57 "$ | $2.5 \mathrm{Y} 5 / 4$ | GRFSL |

57" = BEDROCK

22"
57"
57"
None
Texture
GRFSL
GRFSL

Structure
GR
GR
PL

Consistence FR FR FI

REDOX; Quantity/Contrast NONE
NONE
7.5YR5/8, C/P
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## APPENDIX J - NHDES ONE STOP DATAMAPPER

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## 83 Perverly Road



## Legend

* Remediation Sites
.3. Coastal and Great Bay Regi Communities
Designated Rivers Quarterr Buffer
- Public Water Supply Wells Groundwater Classification GA1
Groundwater Classification GA2
Water Supply Intake Protect Areas
$\square$ Wellhead Protection Areas
目 Class A Lakes with a Quarte Buffer
Class A - All Features
$\square$ All Lakes, with a Quarter Mil Buffer
$\triangle$ Outstanding Resource Wate Watersheds
Surface Waters with Impairn 2016 with Quarter Mile Buffe
$\square$ Watersheds with Chloride Impairments 2016
Parcels
Parcel Polygons
Attributes for Additional Lines


## Map Scale

1: 12,988
© NH DES, http://des.nh.gov
Map Generated: 4/19/2021

## Notes

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## APPENDIX K - PRE AND POST-DEVELOPMENT DRAINAGE PLANS

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## APPENDIX L - OPERATION AND MAINTENANCE MANUAL

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# STORMWATER MANAGEMENT SYSTEM OPERATION \& MAINENANCE MANUAL 

F O R

## The Peverly Hill Road Condominiums

86 Peverly Hill Road Portsmouth, New Hampshire Rockingham County

Tax Map 242, Lot 4

## Month August 25, 2021

Revised September 29, 2021

Prepared By:

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Inspection and Maintenance Checklist Requirements ..... 3-8
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Owner's Certification ..... 10
Attachment 1 - Inspection and Maintenance Log
Attachment 2 - Deicing Log
Appendix A - Stormwater Operation \& Maintenance Plan
Appendix B - UNHSC Regular Inspection and Maintenance Guidelines for Bioretention Systems
Appendix C - UNHSC Regular Inspection and Maintenance Guidelines for Subsurface Gravel Wetlands
Appendix D - UNHSC Checklist for Inspection of Bioretention System
Appendix E - UNHSC Checklist for Inspection of Subsurface Gravel Wetlands
Appendix F - Control of Invasive Plants
Appendix G - Chloride Management Plan
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## Maintenance of Property

TFMoran, Inc., has prepared the following Stormwater Management System Operation \& Maintenance Plan for Parson Woods Condominium, LCC at 83 Peverly Hill Road, Portsmouth, New Hampshire. The intent of this plan is to provide the owner, and future property managers/owners of the site with a list of procedures that document the inspection and maintenance requirements of the Stormwater Management System for this development. This includes all temporary and permanent stormwater and erosion control measure during and post construction.

## Plans

Refer to the Site Development Plans prepared by MSC a divisions TFMoran, Inc. for Tax Map 242 Lot 4, Parson Woods Condominium, LLC, 83 Peverly Hill Road, Portsmouth, New Hampshire, dated April 19, 2021 and last revised on August 25, 2021. See Appendix A for the "Stormwater Operation and Maintenance Plan" identifying locations of stormwater practices described hereon.

## Owner Responsibility

The owner shall be responsible for the following inspection and maintenance program which is necessary in order to keep the Stormwater Management System functioning properly. These measures will help greatly to reduce potential environmental impacts. By following the enclosed procedures, Parson Woods Condominium, LLC and its successors will be able to maintain the functional design of the Stormwater Management System and maximize its ability to remove sediment and other contaminants from site-generated stormwater runoff.

The owner and future owners are the responsible party for the following record keeping activities further identified in this Operation \& Maintenance Manual:

- Conduct reporting, inspection, and maintenance activities in accordance with the "Inspection and Maintenance Checklist Requirements" and if applicable "Regular Inspection and Maintenance Guidance" provided by University of New Hampshire Stormwater Center (UNHSC);
- Document each inspection and maintenance activity with the "Inspection and Maintenance Log" and if applicable "Checklist for Inspection" provided by University of New Hampshire Stormwater Center (UNHSC);
- Photograph each practice that is subject to the "Inspection and Maintenance Checklist Requirements" at each inspection of that stormwater practice;
- Document actions taken if invasive species begin to grow in the stormwater management system; and
- Document each application of deicing material applied to the site with the "Deicing Log"

All record keeping required by the Operation \& Maintenance Manual shall be maintained by the responsible party and be made available to the applicable regulatory agencies (i.e. NHDES AoT Bureau, City of Portsmouth, etc.) upon request. Logs and reports required by this Operation \& Maintenance Manual should be prepared by a qualified inspector with working knowledge of the site. This manual and
associated records shall be transferred to any future owners. All current and future owners must comply with RSA 485-A:17, Env-Wq 1500, the permit, and all conditions contained in the permit.

The following inspection and maintenance program is necessary in order to keep the Stormwater Management System functioning properly. These measures will greatly help to reduce potential environmental impacts. By following the enclosed procedures, Parson Woods Condominium, LLC and its successors will be able to maintain the functional design of the Stormwater Management System and maximize its ability to remove sediment and other contaminants from site-generated stormwater runoff.

## General Inspection and Maintenance Requirements

Temporary stormwater, sediment and erosion control measures that require maintenance on the site during construction include, but are not limited, to the following:
o Stabilized construction entrance;
o Silt sock barriers;
o Inlet protection; and
o Construction dumpster area, if used.
Permanent stormwater, sediment and erosion control measures that require maintenance on the site include, but are not limited, to the following:
o Litter/trash removal;
o Dumpster area maintenance;
o Pavement sweeping;
o Surface maintenance related to deicing/plowing;
o Rip-rap protection;
o Gravel wetlands;
o Bioretention systems;
o Infiltration basins;
o Forebays;
o Outlet control structures;
o Emergency spillway;
o Stone berm level spreader;
o Catch basins, drop inlets, and/or drain manholes;
o Drip line stone trench; and
o Culvert pipes.

## Inspection and Maintenance Checklist Requirements

By implementing the following procedures, current owners will be able to maintain the functional design of the Stormwater Management System and maximize the systems ability to remove sediment and other contaminants from site-generated stormwater runoff. The owner shall conduct inspection and maintenance activities in accordance with the following checklist:

|  | Frequency | Inspect | Action |
| :---: | :---: | :---: | :---: |
| Temporary Controls |  |  |  |
| Stabilized Construction Entrance | Weekly | - Inspect adjacent roadway for sediment tracking <br> - Inspect stone for sediment accumulation | - Sweep adjacent roadways as soon as sediment is tracked <br> - Top dress with additional stone when necessary to prevent tracking |
| Litter/Trash Removal | Routinely | - Inspect site especially construction areas | - Remove debris and clean areas as necessary |
| Construction Dumpster Area Maintenance (if used) | Routinely | - Dumpster Areas | - Remove any accumulated debris and dispose of properly |
| Silt Sock Barrier | Weekly | - Inspect accumulated sediment level, rips and tears | - Repair or replace damaged lengths <br> - Remove and dispose accumulated sediment once level reaches $1 / 3$ of barrier |
| Gravel | Spring and Fall | - Inspect gravel for ruts and depth | - Replace gravel as necessary, regrade as necessary to maintain design grades, remove any accumulated gravel washed from roadway |


|  | Frequency | Inspect | Action |
| :--- | :--- | :--- | :--- |
| Permanent Controls |  |  |  |
| Rip Rap Outlet <br> Protection | Spring and Fall <br> and after <br> rainstorms <br> exceeding 2.5 <br> inches in 24 hrs | • Inspect for <br> damage or <br> displaced stones | • Repair and replace <br> stone and / or fabric <br> immediately |
| • Inspect for torn or |  |  |  |
| visible fabric |  |  |  |$\quad$| • Remove accumulated |
| :--- |
| sediment, trash and |
| blocking materials |


|  | Frequency | Inspect | Action |
| :---: | :---: | :---: | :---: |
| Permanent Controls |  |  |  |
| Infiltration Basin | Spring and Fall and after rainstorms exceeding 2.5 inches in 24 hrs | - Inspect level of accumulated sediment <br> - Inspect for debris <br> - Inspect outlet structures <br> - Inspect vegetative cover <br> - Inspect embankments and spillways <br> - Inspect infiltration function within 72hrs following a rainfall event | - Remove accumulated sediment <br> - Remove debris from inlet and outlets <br> - Repair as necessary <br> - Mow embankments and removed woody vegetation <br> - Repair embankments and spillways as necessary <br> - Restore infiltration by removing accumulated sediments and reconstruction of the infiltration basin if deemed necessary |
| Landscape (not including Bioretention Systems) | Spring | - Mulch: Inspect mulch areas for trash and debris and thickness of mulch | - Remove weeds and debris. Top dress with new mulch when necessary |
|  | Spring | - Trees and Shrubs: Inspect for broken, weak or diseased branches and debris | - Prune to maintain shape to avoid splitting, remove broken, weak or diseased branches, replace as necessary |
|  | As necessary | - Lawn | - Mow as required |
|  | Spring and Fall | - Inspect landscaped areas for debris and litter | - Remove debris and litter as necessary |
| Bioretention System | 1st few months when rainfall exceeds 2.5 " in a 24 hr period | - Inspect drawdown time: required to drawdown in 72 hrs or the standing water covers more than $15 \%$ of the surface after 48 hrs | - Remove the top few inches of discolored material and rake or till the remaining material as needed |



|  | Frequency | Inspect | Action |
| :---: | :---: | :---: | :---: |
| Permanent Controls |  |  |  |
| Gravel Wetland | 4 times per year for the $1^{\text {st }}$ year | - Inspect for animal burrows and short circuits <br> - Inspect for depth of sediment in the sedimentation chamber is $<12^{\prime \prime}$ or $10 \%$ of the pretreatment volume <br> - Inspect draw down time | - Repair soil erosion, fill holes and lightly compact <br> - Remove material with rakes to avoid compaction <br> - When drawdown >36 hrs - remove material with rakes to avoid compaction of the gravel wetland surface |
|  | Spring and Fall following the $1^{\text {st }}$ year | - Inspect for animal burrows and short circuits <br> - Inspect for depth of sediment in the sedimentation chamber is $<12^{\prime \prime}$ or $10 \%$ of the pretreatment volume <br> - Inspect draw down time |  |
|  | Annually | - Inspection outlet control devices and high-flow bypass for erosion <br> - Inspect vegetation cover | - Repair and Replace as necessary <br> - If $50 \%$ cover is not established in two years, reinforcement planting should be performed |
|  | Every 3 years | - Inspection growth of vegetation | - Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance |


|  | Frequency | Inspect | Action |
| :---: | :---: | :---: | :---: |
| Permanent Controls |  |  |  |
|  | Additionally, refer to the most currently available documents from UNHSC (attached for reference): "Regular Inspection Maintenance Guidance" and "Checklist for Inspection". If there are discrepancies between the UNHSC documents and this Manual's checklist requirements, the stricter requirements shall override. |  |  |
| Forebay | Annually | - Inspect for debris and accumulated sediment <br> - Inspect for damage or displaced stones | - Remove debris and accumulated sediment as necessary <br> - Repair and replace stones as needed |
| Drainage (Catch Basins / Drop Inlets) | Spring and Fall | - Inspect for sediment <br> - Inspect for hydrocarbons <br> - Inspect Hoods | - If sump is more than half full of sediment, remove sediment as necessary <br> - Remove and dispose of properly <br> - Repair and replace as necessary |
| Drip Line Stone Trench | Spring and Fall | - Inspect for debris and vegetation | - Clean and remove debris and vegetation as necessary |
| Drain Manholes and Yard Drains | Spring and Fall | - Inspect for accumulated sediment and debris | - Clean any material upon inspection and deposit of properly |
| Inlet Protection (temporary during construction) | During construction and after measurable rainfall | - Inspect for accumulated sediment | - Empty sediment bag if more than $1 / 2$ filled with sediment or debris. Replace bag if torn or punctured to $1 / 2^{\prime \prime}$ diameter or greater on the lower half of the bag |
| Culvert Pipe | Spring and Fall | - Inspect for obstructions | - Remove and dispose of debris properly, Remove upstream debris to prevent future clogging <br> - Repair/replace if pipe becomes crushed or deteriorated |


|  | Frequency | Inspect | Action |
| :---: | :---: | :---: | :---: |
| Permanent Controls |  |  |  |
| Stone Berm Level Spreader | Annually | - Inspect for sediment accumulation, debris or signs of erosion | - Remove debris <br> - Remove sediment when accumulation exceeds $25 \%$ of spreader channel depth <br> - Mow annually at a min. <br> - Repair erosion and regrade or replace stone berm material |
| Emergency Spillway | Spring and Fall | - Inspect for erosion, sediment accumulation, stone loss, and presence of invasive species | - Remove debris and accumulated sediment (sediment accumulation should not exceed 3 ") <br> - Repair eroded areas <br> - Remove invasive species and vegetation <br> - Replace stone as necessary |
| Outlet Control Structure | Annually | - Inspection for debris or sediment buildup <br> - Inspect structure | - Remove sediment and debris as necessary <br> - Remove debris covering orifice or $v$ notch <br> - Repair as necessary |

## Inspection and Maintenance Records

A detailed, written record of all logs, reports, photographs required by this Operation \& Maintenance Manual must be kept by the owner. The property owner shall submit records to the City of Portsmouth Department of Public Works and Planning Department yearly. Addresses listed below:

| Planning Director | Director of Public Works <br> Portsmouth Planning Department <br> Department of Public Works |
| :--- | :--- |
| 1 Junkins Avenue | 680 Peverly Hill Road |
| Portsmouth, NH 03801 | Portsmouth, NH 03801 |

The attached forms are provided to assist the property manager with the inspection and maintenance of the Stormwater Management System. The "Inspection and Maintenance Log" (Attachment 1) and "Deicing Log" (Attachment 2) on the following pages are a blank copies to aid in record keeping required by this Operation \& Maintenance Manual.

Supplement the "Inspection and Maintenance Log" with the most currently available "Checklist for Inspections" from UNHSC (attached to this Manual for reference). Each inspection or maintenance activity shall include photographs of each practice that is subject to the "Inspection and Maintenance Checklist Requirements" at each inspection of that stormwater practice. Log actions taken if invasive species begin to grow in the stormwater management system as required per the attached "Control of Invasive Plants".

For all surface maintenance related activities related to deicing/plowing, complete the "Deicing Log" to track the amount and type of deicing materials applied to the site. Snow shall be stored in designated snow storage areas which have been designed to drain on-site and receive treatment via the stormwater management system prior to infiltration or discharge. At the request of Portsmouth Conservation Commission, the subject property is subject to chloride impairment; maintenance related to snow and ice shall adhere to the Chloride Management Plan (attached to this Manual for reference).
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## Owner's Certification

Contact Information
Owner: Parson Woods Condominium, LLC
Contact Person Rick Green
11 Lafayette Road
North Hampton, NH 03868
(603) 964-7572
grousewing1@gmail.com
I have reviewed this document and understand the responsibilities contained. I agree to perform the required maintenance on the stormwater management system.

Owner's Signature (future owner's and successors, if applicable)

Print Name

Title

Date

Any inquiries in regards to the design, function, and/or maintenance of any one of the above mentioned facilities or tasks shall be directed to the project engineer:

TFMoran, Inc., Seacoast Division
170 Commerce Way, Suite 102
Portsmouth, NH 03801
(603) 431-2222
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## ATTACHMENT 1

Inspection and Maintenance Log
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## Attachment 1

Inspection and Maintenance Log

| BMP/System <br> Component | Date <br> Inspected | Inspector | Cleaning/Repair Needed <br> (list items/comments) | Date of <br> Cleaning/Repair | Performed <br> By |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
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## ATTACHMENT 2

Deicing Log
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Attachment 2
Deicing Log

| Deicing Material Used | Amount of Deicing Material Applied | Date of <br> Application | Logged By |
| :--- | :--- | :--- | :--- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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## APPENDIX A

## Stormwater Operation \& Maintenance Plan

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## APPENDIX B

UNHSC Regular Inspection and Maintenance Guidelines for Bioretention Systems
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## Regular Inspection and Maintenance Guidance for <br> Bioretention Systems / Tree Filters

Maintenance of bioretention systems and tree filters can typically be performed as part of standard landscaping. Regular inspection and maintenance is critical to the effective operation of bioretention systems and tree filters to insure they remain clear of leaves and debris and free draining. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less frequent maintenance needs depending on a variety of factors including but not limited to: the occurrence of large storm events, overly wet or dry periods, regional hydrologic conditions, and the upstream land use.

## ACTIVITIES

The most common maintenance activity is the removal of sediment and organic debris from the system and bypass structures. Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system, including infiltration rate and nutrient uptake. Vegetation care is important to system productivity and health.

| ACTIVITY | FREQUENCY |
| :--- | :--- |

## CLOGGING AND SYSTEM PERFORMANCE

A record should be kept of the time to drain for the system completely after a storm event. The system should drain completely within 72 hours.
Check to insure the filter surface remains well draining after storm events.
Remedy: If filter bed is clogged, draining poorly, or standing water covers more than $50 \%$ of the surface 48 hours after a precipitation event, then remove top few inches of discolored material. Till, or rake remaining material as needed.
Check inlets and outlets for leaves and debris.
Remedy: Rake in and around the system to clear it of debris. Also, clear the inlet and overflow if obstructed.
Check for animal burrows and short-circuiting in the system.
Remedy: Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted

Quarterly initially, annually as a minimum thereafter. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning.
Remedy: Repair or replace any damaged structural parts, inlets, outlets, sidewalls.

## VEGETATION

Check for robust vegetation coverage throughout the system and dead or dying plants.
Remedy: Vegetation should cover $>75 \%$ of the system and should be cared for as needed.

After every major storm in the first few months, then annually at minimum.

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## APPENDIX C

UNHSC Regular Inspection and Maintenance Guidelines for Subsurface Gravel Wetlands
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## Regular Inspection and Maintenance Guidance for The Subsurface Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Subsurface Gravel Wetland (SGW) systems. It is the responsibility of the owner to maintain the SGW in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including but not limited to: the occurrence of large storm events, overly wet or dry periods, regional hydrologic conditions, and the upstream land use.

## ACTIVITIES

The most common maintenance activity is the removal of sediment and organic debris from the system and bypass structures. Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system. A SGW system is a subsurface horizontal filtration system and does not rely on surface soil infiltration capacity for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of a hydraulic inlet. It is important to ensure these inlets are performing properly.

| ACTIVITY | FREQUENCY |
| :--- | :--- |

## CLOGGING AND SYSTEM PERFORMANCE

Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning.
Remedy: Repair or replace any damaged structural parts, inlets and outlets. Clear or remove debris or restrictions.
Check for internal erosion, evidence of short circuiting, and animal burrows.
Remedy: Soil erosion from short-circuiting or animal boroughs should be repaired when they occur.
Check that the system is fully draining within a 24-48 hour period after rain events

Remedy: Repair or restore hydraulic inlet or outlet function.

## VEGETATION

Check for robust vegetation coverage throughout the system and dead or dying plants.

Remedy: Vegetation should cover $>75 \%$ of the system and should be reseeded and cared for as needed.
Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance.

Remedy: The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.

Annually, more frequently in the first year of operation

| VEGETATION |  |
| :--- | :--- |
| Check for robust vegetation coverage throughout the system and dead or dying <br> plants. <br> Remedy: Vegetation should cover > 75\% of the system and should be <br> reseeded and cared for as needed. | Annually or as <br> needed |
| Cut and remove vegetation from the Gravel Wetland System and forebay in <br> order to maintain nitrogen removal performance. <br> Remedy: The vegetation should be cut and removed from the system to <br> prevent nitrogen from cycling back into the system. | Once every 3 years |

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## APPENDIX D

UNHSC Checklist for Inspection of Bioretention System
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## CHECKLIST FOR INSPECTION OF BIORETENTION SYSTEM / TREE FILTERS

Location:
Inspector:
Date:
Time:
Site Conditions:
Days Since Last Rain Event:

| Inspection Items | Satisfactory (S) or Unsatisfactory (U) | Comments/Corrective Action |
| :---: | :---: | :---: |
| 1. Initial Inspection After Planting |  |  |
| Plants are stable, roots not exposed | S U |  |
| Surface is at design level, no evidence of preferential flow/shoving | S U |  |
| Inlet and outlet/bypass are functional | S U |  |
| 2. Debris Cleanup (1 time/year minimum, Spring/Fall) |  |  |
| Litter, leaves, and dead vegetation removed from the system | S U |  |
| Prune/mow vegetation | S U |  |
| 3. Standing Water (1 time/year and/or after large storm events) |  |  |
| No evidence of standing water after 24-48 hours since rainfall | S U |  |
| 4. Vegetation Condition and Coverage |  |  |
| Vegetation condition good with good coverage (typically > 75\%) | S U |  |
| 5. Other Issues |  |  |
| Note any additional issues not previously covered. | S U |  |
| Corrective Action Needed |  | Due Date |
| 1. |  |  |
| 2. |  |  |
| 3. |  |  |
| Inspector Signature |  | Date |
|  |  |  |

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## APPENDIX E

UNHSC Checklist for Inspection of Subsurface Gravel Wetlands
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## CHECKLIST FOR INSPECTION OF SUBSURFACE GRAVEL WETLAND SYSTEMS

Location:
Inspector:
Date:
Time:
Site Conditions:
Days Since Last Rain Event:

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## APPENDIX F

Control of Invasive Plants
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## CONTROL OF INVASIVE PLANTS

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

## Background:

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.


# Methods for Disposing Non-Native Invasive Plants 

Prepared by the Invasives Species Outreach Group, volunteers interested in helping people control invasive plants. Assistance provided by the Piscataquog Land Conservancy and the NH Invasives Species Committee. Edited by Karen Bennett, Extension Forestry Professor and Specialist.


Tatarian honeysuckle
Lonicera tatarica
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 3: 282.

Non-native invasive plants crowd out natives in natural and managed landscapes. They cost taxpayers billions of dollars each year from lost agricultural and forest crops, decreased biodiversity, impacts to natural resources and the environment, and the cost to control and eradicate them.

Invasive plants grow well even in less than desirable conditions such as sandy soils along roadsides, shaded wooded areas, and in wetlands. In ideal conditions, they grow and spread even faster. There are many ways to remove these nonnative invasives, but once removed, care is needed to dispose the removed plant material so the plants don't grow where disposed.

Knowing how a particular plant reproduces indicates its method of spread and helps determine the appropriate disposal method. Most are spread by seed and are dispersed by wind, water, animals, or people. Some reproduce by vegetative means from pieces of stems or roots forming new plants. Others spread through both seed and vegetative means.

Because movement and disposal of viable plant parts is restricted (see NH Regulations), viable invasive parts can't be brought to most transfer stations in the state. Check with your transfer station to see if there is an approved, designated area for invasives disposal. This fact sheet gives recommendations for rendering plant parts nonviable.

Control of invasives is beyond the scope of this fact sheet. For information about control visit www.nhinvasives.org or contact your UNH Cooperative Extension office.

## New Hampshire Regulations

Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1 of the New Hampshire prohibited invasive species list. (Agr 3802.01)

## How and When to Dispose of Invasives?

To prevent seed from spreading remove invasive plants before seeds are set (produced). Some plants continue to grow, flower and set seed even after pulling or cutting. Seeds can remain viable in the ground for many years. If the plant has flowers or seeds, place the flowers and seeds in a heavy plastic bag "head first" at the weeding site and transport to the disposal site. The following are general descriptions of disposal methods. See the chart for recommendations by species.

Burning: Large woody branches and trunks can be used as firewood or burned in piles. For outside burning, a written fire permit from the local forest fire warden is required unless the ground is covered in snow. Brush larger than 5 inches in diameter can't be burned. Invasive plants with easily airborne seeds like black swallow-wort with mature seed pods (indicated by their brown color) shouldn't be burned as the seeds may disperse by the hot air created by the fire.

Bagging (solarization): Use this technique with softertissue plants. Use heavy black or clear plastic bags (contractor grade), making sure that no parts of the plants poke through. Allow the bags to sit in the sun for several weeks and on dark pavement for the best effect.

Tarping and Drying: Pile material on a sheet of plastic


Japanese knotweed Polygonum cuspidatum USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 1: 676. and cover with a tarp, fastening the tarp to the ground and monitoring it for escapes. Let the material dry for several weeks, or until it is clearly nonviable.

Chipping: Use this method for woody plants that don't reproduce vegetatively.
Burying: This is risky, but can be done with watchful diligence. Lay thick plastic in a deep pit before placing the cut up plant material in the hole. Place the material away from the edge of the plastic before covering it with more heavy plastic. Eliminate as much air as possible and toss in soil to weight down the material in the pit. Note that the top of the buried material should be at least three feet underground. Japanese knotweed should be at least 5 feet underground!

Drowning: Fill a large barrel with water and place soft-tissue plants in the water. Check after a few weeks and look for rotted plant material (roots, stems, leaves, flowers). Wellrotted plant material may be composted. A word of caution- seeds may still be viable after using this method. Do this before seeds are set. This method isn't used often. Be prepared for an awful stink!

Composting: Invasive plants can take root in compost. Don't compost any invasives unless you know there is no viable (living) plant material left. Use one of the above techniques (bagging, tarping, drying, chipping, or drowning) to render the plants nonviable before composting. Closely examine the plant before composting and avoid composting seeds.

## Suggested Disposal Methods for Non-Native Invasive Plants

This table provides information concerning the disposal of removed invasive plant material. If the infestation is treated with herbicide and left in place, these guidelines don't apply. Don't bring invasives to a local transfer station, unless there is a designated area for their disposal, or they have been rendered non-viable. This listing includes wetland and upland plants from the New Hampshire Prohibited Invasive Species List. The disposal of aquatic plants isn't addressed.

| Woody Plants | Method of Reproducing | Methods of Disposal |
| :---: | :---: | :---: |
| Norway maple <br> (Acer platanoides) <br> European barberry <br> (Berberis vulgaris) Japanese barberry <br> (Berberis thunbergii) autumn olive <br> (Elaeagnus umbellata) burning bush <br> (Euonymus alatus) <br> Morrow's honeysuckle <br> (Lonicera morrowii) <br> Tatarian honeysuckle <br> (Lonicera tatarica) showy bush honeysuckle <br> (Lonicera x bella) common buckthorn <br> (Rhamnus cathartica) glossy buckthorn <br> (Frangula alnus) | Fruit and Seeds | Prior to fruit/seed ripening <br> Seedlings and small plants <br> - Pull or cut and leave on site with roots exposed. No special care needed. <br> Larger plants <br> - Use as firewood. <br> - Make a brush pile. <br> - Chip. <br> - Burn. <br> After fruit/seed is ripe <br> Don't remove from site. <br> - Burn. <br> - Make a covered brush pile. <br> - Chip once all fruit has dropped from branches. <br> - Leave resulting chips on site and monitor. |
| oriental bittersweet <br> (Celastrus orbiculatus) multiflora rose <br> (Rosa multiflora) | Fruits, Seeds, Plant Fragments | Prior to fruit/seed ripening <br> Seedlings and small plants <br> - Pull or cut and leave on site with roots exposed. No special care needed. <br> Larger plants <br> - Make a brush pile. <br> - Burn. <br> After fruit/seed is ripe <br> Don't remove from site. <br> - Burn. <br> - Make a covered brush pile. <br> - Chip - only after material has fully dried (1 year) and all fruit has dropped from branches. Leave resulting chips on site and monitor |


| Non-Woody Plants | Method of Reproducing | Methods of Disposal |
| :---: | :---: | :---: |
| garlic mustard <br> (Alliaria petiolata) spotted knapweed <br> (Centaurea maculosa) <br> - Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling. <br> black swallow-wort <br> (Cynanchum nigrum) <br> - May cause skin rash. Wear gloves and long sleeves when handling. <br> pale swallow-wort <br> (Cynanchum rossicum) giant hogweed <br> (Heracleum mantegazzianum) <br> - Can cause major skin rash. Wear gloves and long sleeves when handling. dame's rocket <br> (Hesperis matronalis) perennial pepperweed <br> (Lepidium latifolium) purple loosestrife <br> (Lythrum salicaria) Japanese stilt grass <br> (Microstegium vimineum) mile-a-minute weed (Polygonum perfoliatum) | Fruits and Seeds | Prior to flowering <br> Depends on scale of infestation <br> Small infestation <br> - Pull or cut plant and leave on site with roots exposed. <br> Large infestation <br> - Pull or cut plant and pile. (You can pile onto or cover with plastic sheeting). <br> - Monitor. Remove any re-sprouting material. <br> During and following flowering <br> Do nothing until the following year or remove flowering heads and bag and let rot. <br> Small infestation <br> - Pull or cut plant and leave on site with roots exposed. <br> Large infestation <br> - Pull or cut plant and pile remaining material. (You can pile onto plastic or cover with plastic sheeting). <br> - Monitor. Remove any re-sprouting material. |
| common reed <br> (Phragmites australis) <br> Japanese knotweed <br> (Polygonum cuspidatum) <br> Bohemian knotweed <br> (Polygonum x bohemicum) | Fruits, Seeds, Plant Fragments <br> Primary means of spread in these species is by plant parts. Although all care should be given to preventing the dispersal of seed during control activities, the presence of seed doesn't materially influence disposal activities. | Small infestation <br> - Bag all plant material and let rot. <br> - Never pile and use resulting material as compost. <br> - Burn. <br> Large infestation <br> - Remove material to unsuitable habitat (dry, hot and sunny or dry and shaded location) and scatter or pile. <br> - Monitor and remove any sprouting material. <br> - Pile, let dry, and burn. |

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## APPENDIX G

Chloride Management Plan
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# CHLORIDE MANAGEMENT PLAN 

FOR

## The Peverly Hill Road Condominiums

86 Peverly Hill Road Portsmouth, NH Rockingham County

Tax Map 00, Lot 00

August 25, 2021


## Introduction/Background

TFMoran, Inc., has prepared the following Chloride Management Plan for Parson Woods Condominiums, LLC at 83 Peverly Hill Road, Portsmouth, New Hampshire. The subject property is not located within a chloride-impaired watershed per NHDES One Stop Data Mapper, but a Chloride Management Plan was requested by the Portsmouth Conservation Commission. The intent of this plan is to provide the owner, and future property managers/owners of the site with proper de-icing application procedures and techniques during winter snow and ice management. The contractor in charge of winter storm management shall refer to this document when developing a Winter Maintenance Plan.

Elevated chloride levels are harmful to aquatic life, plants, drinking water and groundwater, infrastructure, automobiles, etc. The use of salt in this area should be reduced in order to meet water quality standards. Salt is often over applied to reduce liability. Property owners or managers who hire Commercial Salt Applicators certified by NHDES under RSA 489-C are granted limited liability protection against damages arising from snow and ice conditions.

## Development Area Description

The project includes the development of a 56-Unit PUD on lot show as Tax Map 242 Lot 6 on the Portsmouth Tax Map and is approximately 4,604,509 sf / 105.7 Acres and currently contains one residential building. Associated improvements include and are not limited to access, grading, utilities, stormwater management system, lighting, and landscaping. The project proposes 56 buildings and a roadway total 2,932 linear feet of roadway with sidewalk. It will disturb approximately 732,290 sf / 16.8 acres to facilitate the development. Aside from the 16.8 acres of disturbance, the approximately 88.9 remaining acreage is to be undeveloped. A pedestrian/bike path is to be constructed connecting the neighborhood with the existing bike path that is under development along the Boston and Main Railroad Tracks. The majority of this path is to be constructed along an existing access drive that runs along the northern edge of the property. Refer to the "Stormwater Operation and Maintenance Plan" for site layout.

The post-development condition is characterized by one watershed divided into many subcatchment areas. Post-development subcatchment areas are depicted on the plan entitled "Stormwater Operation and Maintenance Plan".

Some of the stormwater runoff from the site infiltrates into the well-drained soils, the remaining stormwater is treated and attenuated prior to being discharged towards the wetland along the south edge of the property (POI-1, POI-2 and POI-3).

## Operational Guidelines

The owner shall be responsible for inspection and maintenance program specified in the Stormwater Management System Operation \& Maintenance Manual and the
following minimum specifications for de-icing, anti-icing and pretreatment practices, and equipment. These measures will help greatly to reduce potential environmental impacts. By following the enclosed procedures, Parson Woods Condominium Home Owner's Association and its successors will be able to reduce chloride from sitegenerated stormwater runoff.

Winter Operator Certification Requirements: All employees or contractors responsible for winter maintenance shall be a NH Certified Salt Applicator. Certified Salt Applicators must attend the NH Green SnowPro Training offered by the University of New Hampshire Technology Transfer Center, pass the exam, and apply and renew certifications annually. The NH Green SnowPro Training course focuses on efficient, more environmentally friendly winter maintenance practices that do not compromise road, parking lot and sidewalk safety. For training information, visit the UNH Technology Transfer Center webpage at: http://t2.unh.edu/green-snowpro-trainingand-nhdes-certification.

Weather Monitoring: Weather monitoring will be the responsibility of the contractor in charge of winter storm management. Contractors should be proactive for storm events and develop a communication plan identifying key personal responsible for weather monitoring and activating the Winter Maintenance Plan.

Equipment Calibration Requirements: Calibrating equipment is the most important aspect to achieving salt use reductions, typically by $25 \%$. Calibration should be performed annually or after a spreader is serviced. Calibration for spreading machines shall be done using the techniques detailed per the following NHDES links:

- Hydraulic Spreader Calibration:
https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-hydro-calib.pdf
- Pony Motor-Run Spreader Calibration: https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-pm-calib.pdf

Mechanical Removal: The contractor shall clear all parking and sidewalk areas and store snow in designated snow storage areas, per the Stormwater Operation \& Management Plan. Snow removal frequency shall be conducted at the contractors' discretion with respect to site safety and weather conditions. Excess snow shall be transported off-site for disposal in accordance with NHDES regulations. If snow is stored within parking areas, keep catch basins clear. Plow snow before applying deicers or sand.

De-Icing and Sand Application \& Storage: Reduced used of sodium chloride (road salt) may be used for deicing. Alternative uses to road salt are de-icing materials such as calcium magnesium acetate (CMA) and limited use of abrasives (sand, sawdust, cat litter). Learn about the deicer ingredients and use the appropriate one for the condition, pre-wetting and brine practices, and appropriate application rate and locations. Do not apply sodium chloride for pavement temperatures below $15^{\circ} \mathrm{F}$ nor deicers for pavement temperatures under $-10^{\circ} \mathrm{F}$. Use deicers appropriately prior
to the storm. Separate salt and sand and store and contain appropriately. Use salt or deicers for melting; use sand for traction. Sand shall be swept and properly disposed of. The following techniques for sanding and de-icing application are detailed per the following NHDES website links:

- Road Salt Techniques: https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-salt-works.pdf
- Anti-Icing Techniques: https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-anti-icing.pdf
- Brine Making for Road Salt: https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-brine.pdf
- Pre-Wetting Anti-Icing Agents:
https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-pre-wet.pdf
- Material Storage and Housekeeping https://www.des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/documents/bmp-housekeep.pdf


## Salt Usage Evaluation and Monitoring

The contractor shall document usage and application of calcium chloride and deicers with "Smart De-Icing Practices Checklist" (Attachment 1) and "De-Icing Application \& Equipment Calibration Log" (Attachment 2). These documents shall be kept to monitor salt usage and application procedures in order to improve salt minimization methods and materials, reduce de-icing materials quantities and cost, and planning for future storms.

The Chloride Management Plan is a living document and shall be updated annually shortly following the winter season. Procedures should be updated as necessary to incorporate technology improvements or and BMP's, town regulations, or changes to state or federal permit conditions that result in private developers or contractors to alter practices. To make sure the most recent version of the Salt Minimization Plan is being utilized the contractor shall keep a log of amendments made to the plan.

## ATTACHMENT 1

Smart Salting Practices
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## Smart Salting Practices

| Recommended practice | Check which response applies to current practices and anticipated <br> site maintenance activities for job site. |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | Already do | Will do | Might do | Will not do | If "will not do"... <br> why not? |
| Use an application rate chart. |  |  |  |  |  |
| Calibrate equipment each year. |  |  |  |  |  |
| Learn about the deicer ingredients <br> and use the appropriate one for the <br> condition. |  |  |  |  |  |
| Look for reasons if and why materials <br> are leaking or spilling from vehicles <br> and fix them (e.g. gaps, overfilling, |  |  |  |  |  |
| atol |  |  |  |  |  |
| Develop a comprehensive winter <br> maintenance policy. Follow your |  |  |  |  |  |
| Measure and use <br> pavement temperatures. |  |  |  |  |  |
| Use anti-icing appropriately prior to the <br> storm. |  |  |  |  |  |
| Plow before applying deicers. |  |  |  |  |  |
| Use wet materials (pre-wet or <br> pre- treated). |  |  |  |  |  |
| Don't apply sodium chloride (road salt) <br> for pavement temperatures below 150F. |  |  |  |  |  |
| Don't apply deicers for pavement temps <br> under -10º. It's too cold. |  |  |  |  |  |
| Separate salt and sand. Use salt <br> for melting. Use sand for traction. |  |  |  |  |  |
| Apply deicers in the center of the <br> road or on the high side of the curve. |  |  |  |  |  |
| Store the salt in a building or <br> under secure cover. |  |  |  |  |  |
| Store salt away from water flow and <br> direct the water away from storage area. |  |  |  |  |  |
| Store snow away from lakes, ponds <br> and wetlands. |  |  |  |  |  |
| Sweep up sand, dispose of properly. |  |  |  |  |  |
| For each event, document what you <br> did and how well it worked. Use this <br> information to make improvements. |  |  |  |  |  |

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## ATTACHMENT 2 <br> Deicing Log

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Deicing Log

| Deicing Material Used | Amount of Deicing Material Applied | Date of <br> Application | Logged By |
| :--- | :--- | :--- | :--- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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## APPENDIX A

## Stormwater Operation \& Maintenance Plan

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Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects

Scientists

August 25, 2021

August 25, 2021

Juliet Walker, Planning Director
Portsmouth Planning Board
1 Junkins Avenue
Portsmouth, NH 03801

## Re: Open Space Planned Unit Development, 83 Peverly Hill Road - Section 7 of the Site Plan Regulations TFMoran Project: 47388.11

Dear Juliet:

This letter concerns over Section 7 of the Portsmouth Site Plan Review Regulations dealing with Stormwater Management. Below are the areas listed in the regulations and how the project conforms to those.

Section 7.10 - Low Impact Development (LIP)

- This project uses a combination of two bioretention areas with internal storage reservoirs, a subsurface gravel wetland and an infiltration basin as best management practices (BMP's) to treat and attenuate post development flows. These BMP's help maintain pre-development hydrology. The roadway was narrowed to $26^{\prime}$ from the beginning of the roadway to the first intersection. It was narrowed down to $22^{\prime}$ for the loop area of the roadway. This helped decrease the amount of new impervious area being constructed on this site. In addition to this, the project uses the City's PUD ordinance to limit the impact on the lot, further decreasing the footprint and leaving the majority of the lot undisturbed.

Section 7.2 - General Water Quality and Stormwater Manage Provisions

- $\quad$ This stormwater system was set to treat the Water Quality Volume (WQV) for the impervious area that is on this site.
- The project was designed to limit the impact to the abutting wetland. Special effort was made, including the installation of retaining walls along the roadway, to limit impact. There is no impact to wetlands or wetland buffers from this project. Handling of Hazardous Material is included in the Erosion Control Notes. City, state and federal regulations concerning stormwater management have been incorporated into this project and there will be no adverse impacts on abutting properties.
- There are no 20,0000 gallon per day on-site water systems proposed or existing. The BMP's used on this project, bioretention areas with internal storage reservoirs and the subsurface gravel wetlands, have some of the highest nitrogen removal efficiencies according the NH Stormwater Manual, Appendix F.
- This project does not propose conveying stormwater into the City's infrastructure.

August 25, 2021

## Section 7.3 Wellhead Protection Areas

- The site is located in a wellhead protection zone. Only one infiltration practice is proposed, this treats a large are of lawn and some roof run-off. No roadway runoff is directed to this BMP.

Section 7.4 Stormwater Management and Erosion Control Plan (SMECP)

- A Stormwater Management and Erosion Control Plan was submitted with the plans. The drainage analysis, Existing Conditions, Erosion Control Plans, Erosion Control Notes and the Grading and Drainage Plans include the items listed in section 7.4. Note, though no impairments showed on the NHDES One Stop Data Mapper, Sagamore Creek is near the project. It has a 5-P rating, which included nitrogen impairments. Three of the four BMP's used have the highest nitrogen removal efficiencies.

Section 7.6.1 - Post-Construction Stormwater Management Standards

- A Stormwater Management and Erosion Control Plan was included with the submittal to the Planning Board.

Section 7.6.2 - Enhanced Stormwater Treatment Standards for New and Redevelopment Disturbing More than 15,000 square feet of Area

- Not applicable to this submission.

Section 7.6.3 - Additional Pollutant Tracking and Accounting Program (PTAP) Submittal Requirements

- $\quad$ This is to be submitted subsequent to the Planning Board Approval.

Section 7.6.4 Responsibility for Installation and Construction

- The responsibility is noted and the developer plans to meet the requirements as set forth. The developers name and contact information is listed on the Cover Sheet and in the operation and maintenance manual.
Section 7.6.5 Inspection and Maintenance Plans
- An Inspection and Maintenance Plan or Operation and Maintenance Plan is included in the drainage report. This includes the Owner's / Operator's responsibilities and steps required in the annual maintenance. A Developers agreement shall be agreed upon between the Developer and the City prior to the commencement of work on the property.

This project meets the requirements as set out in Section 7 of the Site Plan Review Regulations and will pose no adverse impact to the abutting properties and wetlands.

Sincerely,
TFMoran, Inc.

cc: Rick Green, Michael Green and Jenna Green

Juliet Walker, Planning Director
August 25, 2021

TFMoran, Inc.

| To: | Juliet Walker |
| :--- | :--- |
| From: | Jack McTigue |
| CC: | Rick Green, Michael Green and Jenna Green |
| Date: | $9 / 8 / 21$ |

Re: Inlet Capacity

In response to comment \#4 of your items to address prior to Planning Board review, we off the following:

The addition of double grates and two catchbasins were added to address the concerns of sufficient capacity.

The inlet capacity was modelled using the grate capacity and specification of a NEENAH R-5730 Type A grate. Attached is a chart provided by the supplier.

For catchbasins on grade, the Transverse Gutter Slope (slope along the road) was used in combination with the Longitudinal Gutter Stope (cross slope of the road) to determine the K-Value of the gutter. This was then used to calculate the capacity of each gutter on grade.

For the catchbasins in the vertical sags of the road, the orifice flow and the weir flow were both calculated; then the more conservative of these two numbers was used to determine the capacity of the grate.

Several of the catchbasins were designated to utilize double grates. These will increase the flows and allow less ponding in the roadway during heavier storm events.

In section 7.2(A) of the Portsmouth Subdivision Rules and Regulations, the design storm frequency for storm sewers is the 10 -year 24 -hour storm event. For a more conservative approach, the catchbasins are configured to handle the 25 -year storm event. A spreadsheet is provided showing the design flows versus the stormwater inflow to each basin.
CAT. NO. - R-3570
DESCRIPTION - TYPE A
COMP. CODE - 3570-0002

$S_{T}=$ TRANSVERSE GUTTER SLOPE
$S_{L}=$ LONGITUDINAL GUTTER SLOPE
$K=$ GRATE INLET COEFFICIENT

CAT. NO.-R-3574


$S_{T}=$ TRANSVERSE GUTTER SLOPE
$S_{L}=$ LONGITUDINAL GUTTER SLOPE
$K=$ GRATE INLET COEFFICIENT

CAT. NO.-R-3573
DESCRIPTION-DIAGONAL REVERSIBLE COMP CODE-3573-0002
$\lambda$

Project Name: Parson Woods Condominiu

Date: 9/8/2021 Project Number: 47388.10

| 11' Roadway |  |  | 13' Roadway |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Spread = | 8 | Ft | Spread $=$ | 10 | Ft |
| Depth at | 0.24 | Ft |  | 0.28 | Ft |
| Curb (D) = 0.24 Ft |  |  |  |  |  |
| D=0.02*Spread+1" |  |  |  |  |  |
| Grate - Neennea R-3570-Type A |  |  |  |  |  |
| $K=$ Based on Neenah Charts Using $L_{T}$ and $L_{L}$ |  |  |  |  | Double Grate |
| Open Area $(\mathrm{A})=$ |  |  |  |  | 4.8 |
| Peritmeter $(\mathrm{P})=$ |  |  |  |  | 10.9 |

For Sag Curves - Use Weir Calculation - $\left.Q=3.3^{*} P^{*} D^{\wedge} 5 / 3\right)$
For Non Sag Curves, Use the lesser of the Orifice ( $\mathrm{Q}=0.6^{*}(\mathrm{~A})^{*}\left(2 * 32.12^{*} \mathrm{H}\right)^{\wedge}(1 / 2)$ ) or
Weir ( $Q=K$ * $D(\text { depth })^{\wedge}(5 / 3)$ ) calculation.
$\mathrm{Q}_{\text {calc }}$ - $\quad$ Calculate Maximum Inlet Flow Based on Grate
A - Open Area - Based on Manufacture's Specifications
P - Perimeter of Grate - Based on Manufacture's Specifications
D - Depth of Flow at Gutter
$\mathrm{S}_{\mathrm{T}}$ - $\quad$ Slope from Center Line to Curb (Tangental)
$S_{L}-\quad$ Slope along roadway (Longitudinal)

|  | Double <br> Grate | $\mathrm{Q}_{10}$ | $\mathrm{Q}_{25}$ | D | Contributing Subcatchment | $\begin{gathered} \text { Slope }\left(S_{L}\right) \\ \text { or Sag }{ }^{*} \end{gathered}$ | $K^{* *}$ | $\mathrm{Q}_{\text {calc }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CB-01 |  | 0.6 | 1.1 | 0.28 | PS-10 | Sag | NA | 3.6 |
| CB-02 |  | 0.3 | 0.5 | 0.28 | PS-11 | Sag | NA | 3.6 |
| CB-05 | X | 2.1 | 3.1 | 0.28 | PS-13 | Sag | NA | 5.3 |
| CB-06 |  | 0.6 | 0.8 | 0.28 | PS-15 | Sag | NA | 3.6 |
| CB-07 | $X$ | 1.7 | 2.4 | 0.28 | PS-14B | 2.8 | 21 | 5.0 |
| CB-08 | X | 1.5 | 2.3 | 0.28 | PS-14B | 1.2 | 25 | 6.0 |
| CB-09 |  | 1.2 | 1.6 | 0.28 | PS-17 | 2.8 | 21 | 2.5 |
| CB-10 |  | 1.1 | 1.5 | 0.24 | PS-22 | 3.32 | 20 | 1.9 |
| CB-11A |  | 0.6 | 0.9 | 0.24 | PS-16 | 3.32 | 20 | 1.9 |
| CB-11B |  | 1.4 | 1.4 | 0.24 | PS-24A | 2.0 | 23 | 2.2 |
| CB-12 |  | 2.1 | 2.8 | 0.24 | PS-23 | Sag | NA | 2.9 |
| CB-13 | $X$ | 3.1 | 4.3 | 0.24 | PS-24B | Sag | NA | 4.3 |
| CB-14 | $X$ | 2.9 | 4.2 | 0.24 | PS-30 | Sag | NA | 4.3 |
| CB-15 | X | 2.6 | 3.6 | 0.24 | PS-29 | Sag | NA | 4.3 |
| CB-16 |  | 1.1 | 1.5 | 0.24 | PS-28 | 1.75 | 24 | 2.3 |
| CB-17 |  | 1.1 | 1.4 | 0.24 | PS-27 | 1.75 | 24 | 2.3 |
| CB-18 |  | 1.2 | 1.5 | 0.24 | PS-19 | Sag | NA | 2.9 |
| CB-19 |  | 1.6 | 2.3 | 0.24 | PS-18 | Sag | NA | 2.9 |
|  |  | $\mathrm{E}_{10}$ | $\mathrm{E}_{25}$ | $\mathrm{E}_{50}$ |  |  |  |  |Behive Grates, Pond Situation -DI-01$37.2 \quad 37.7$

39.4 Rim $=40.75$Top of Ponding Area $=42.90$Behive Grates, Pond Situation -
DI-02
46.446.947.6 Rim = 48.50Top of Ponding Area $=49.50$
*Enter "Sag" if the CB is located at the Vertical Sag${ }^{* *} K$ - Based on Neenah Chart using $L_{L}$ and $L_{T}$

Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
CB-01 SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth>1.52" Flow Length=164' Tc=8.7 min CN=58 Runoff=0.6 cfs $2,332 \mathrm{cf}$

CB-02 SubcatchmentPS11: PS-11 Road Entrance Runoff Area=3,232 sf $78.99 \%$ Impervious Runoff Depth $>4.05^{\prime \prime}$ Flow Length=131' Tc=5.0 min CN=86 Runoff=0.3 cfs $1,090 \mathrm{cf}$

CB-05 SubcatchmentPS13: PS-13 Road

CB-08 SubcatchmentPS14A: PS-14 Road

CB-07 SubcatchmentPS14B: PS-14 Road

CB-06 SubcatchmentPS15: PS-15 Road

CB-11A SubcatchmentPS16: PS-16 Road

CB-09 SubcatchmentPS17: PS-17 Road

CB-19 SubcatchmentPS18: PS-18 Road

CB-18 SubcatchmentPS19: PS-19 Road

CB-10 SubcatchmentPS22: PS-22 Road

CB-12
SubcatchmentPS23: PS-23 Road Flow Length=333' Slope=0.0200 '/' Tc=6.1 min CN=82 Runoff=2.1 cfs 6,633 cf

CB-11B SubcatchmentPS24A: PS-24A Road

CB-13 SubcatchmentPS24B: PS-24 Road

CB-17 SubcatchmentPS27: PS-27 Road

CB-16
SubcatchmentPS28: PS-28 Road
Runoff Area $=16,638$ sf $51.33 \%$ Impervious Runoff Depth $>3.44$ " Flow Length=236' Tc=8.7 min CN=80 Runoff=1.4 cfs $4,763 \mathrm{cf}$

Runoff Area $=39,059$ sf $48.48 \%$ Impervious Runoff Depth $>3.43^{\prime \prime}$ Flow Length=197' Tc=9.8 min CN=80 Runoff=3.1 cfs 11,180 cf

Runoff Area=12,543 sf $56.40 \%$ Impervious Runoff Depth $>3.63^{\prime \prime}$ Flow Length=378' Tc=10.1 min CN=82 Runoff=1.1 cfs $3,798 \mathrm{cf}$

Runoff Area=13,299 sf $49.44 \%$ Impervious Runoff Depth $>3.34$ " Flow Length=364' Tc=7.9 min CN=79 Runoff=1.1 cfs $3,700 \mathrm{cf}$

CB-15 SubcatchmentPS29: PS-29 Road

CB-14 SubcatchmentPS30: PS-30 Road

Runoff Area=31,769 sf 53.29\% Impervious Runoff Depth>3.53" Flow Length=355' Tc=9.6 min CN=81 Runoff=2.6 cfs 9,355 cf

Runoff Area $=43,899$ sf $42.17 \%$ Impervious Runoff Depth $>3.14$ " Flow Length=446' Tc=13.0 min CN=77 Runoff=2.9 cfs $11,495 \mathrm{cf}$

Total Runoff Area $=349,046$ sf Runoff Volume $=94,011$ cf Average Runoff Depth $=3.23^{\prime \prime}$ $48.97 \%$ Pervious $=170,925$ sf $51.03 \%$ Impervious $=178,121$ sf

Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
CB-01 SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth>2.49" Flow Length=164' Tc=8.7 min CN=58 Runoff=1.1 cfs $3,821 \mathrm{cf}$

CB-02 SubcatchmentPS11: PS-11 Road Entrance Runoff Area=3,232 sf 78.99\% Impervious Runoff Depth>5.49" Flow Length=131' Tc=5.0 min CN=86 Runoff=0.5 cfs $1,478 \mathrm{cf}$

CB-05 SubcatchmentPS13: PS-13 Road

CB-08 SubcatchmentPS14A: PS-14 Road

CB-07 SubcatchmentPS14B: PS-14 Road

CB-06 SubcatchmentPS15: PS-15 Road

CB-11ASubcatchmentPS16: PS-16 Road

CB-09 SubcatchmentPS17: PS-17 Road

CB-19 SubcatchmentPS18: PS-18 Road

CB-18 SubcatchmentPS19: PS-19 Road

CB-10 SubcatchmentPS22: PS-22 Road

CB-12
SubcatchmentPS23: PS-23 Road Flow Length=333'

Runoff Area=31,258 sf $59.25 \%$ Impervious Runoff Depth>4.15" Flow Length=242' Tc=9.0 min CN=74 Runoff=3.1 cfs 10,809 cf

Runoff Area=24,151 sf $53.38 \%$ Impervious Runoff Depth $>3.93$ " Flow Length=197' Tc=8.8 min CN=72 Runoff=2.3 cfs $7,918 \mathrm{cf}$

Runoff Area=22,525 sf $47.35 \%$ Impervious Runoff Depth $>4.59$ " Flow Length=283' Tc=9.4 $\mathrm{min} \quad \mathrm{CN}=78$ Runoff= $2.4 \mathrm{cfs} 8,609 \mathrm{cf}$

Runoff Area=5,529 sf $78.57 \%$ Impervious Runoff Depth>5.37"
Flow Length=207' Tc=5.0 min CN=85 Runoff=0.8 cfs $2,476 \mathrm{cf}$
Runoff Area=6,627 sf $55.82 \%$ Impervious Runoff Depth $>5.04$ " Flow Length=177' Tc=5.0 min CN=82 Runoff=0.9 cfs $2,781 \mathrm{cf}$

Runoff Area=12,439 sf $58.98 \%$ Impervious Runoff Depth $>4.92$ " Flow Length $=362^{\prime}$ Tc=5.7 min CN=81 Runoff=1.6 cfs $5,103 \mathrm{cf}$

Runoff Area=21,966 sf $41.08 \%$ Impervious Runoff Depth $>4.48$ " Flow Length=290' Tc=10.5 min CN=77 Runoff=2.3 cfs 8,192 cf

Runoff Area=10,861 sf $67.42 \%$ Impervious Runoff Depth $>5.49$ " Flow Length=239' Tc=5.3 min CN=86 Runoff=1.5 cfs $4,967 \mathrm{cf}$

Runoff Area $=12,972$ sf $53.89 \%$ Impervious Runoff Depth $>4.92$ " Flow Length=215' Tc=9.5 min CN=81 Runoff=1.5 cfs $5,318 \mathrm{cf}$

Runoff Area $=21,891$ sf $55.57 \%$ Impervious Runoff Depth $>5.03$ " Slope=0.0200 '/' Tc=6.1 min CN=82 Runoff=2.8 cfs 9,184 cf

Runoff Area $=16,638$ sf $51.33 \%$ Impervious Runoff Depth $>4.81$ " Flow Length=236' Tc=8.7 min CN=80 Runoff=1.9 cfs $6,667 \mathrm{cf}$

Runoff Area $=39,059$ sf $48.48 \%$ Impervious Runoff Depth $>4.81$ " Flow Length=197' Tc=9.8 min CN=80 Runoff=4.3 cfs 15,648 cf

Runoff Area $=12,543$ sf $56.40 \%$ Impervious Runoff Depth $>5.03$ " Flow Length=378' Tc=10.1 $\mathrm{min} \quad \mathrm{CN}=82$ Runoff $=1.4 \mathrm{cfs} 5,258 \mathrm{cf}$

Runoff Area=13,299 sf $49.44 \%$ Impervious Runoff Depth $>4.70$ " Flow Length=364' Tc=7.9 min CN=79 Runoff=1.5 cfs $5,207 \mathrm{cf}$

CB-15 SubcatchmentPS29: PS-29 Road

CB-14 SubcatchmentPS30: PS-30 Road

Runoff Area=31,769 sf $53.29 \%$ Impervious Runoff Depth>4.92" Flow Length=355' Tc=9.6 min CN=81 Runoff=3.6 cfs 13,023 cf

Runoff Area=43,899 sf $42.17 \%$ Impervious Runoff Depth>4.47" Flow Length=446' Tc=13.0 min CN=77 Runoff=4.2 cfs $16,364 \mathrm{cf}$

Total Runoff Area $=349,046$ sf Runoff Volume $=132,819$ cf Average Runoff Depth $=4.57$ " $48.97 \%$ Pervious $=170,925$ sf $51.03 \%$ Impervious $=178,121$ sf

Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
CB-01 SubcatchmentPS10: PS-10 Road Entrance Runoff Area=18,388 sf $32.87 \%$ Impervious Runoff Depth $>3.50$ " Flow Length=164' Tc=8.7 min CN=58 Runoff=1.5 cfs $5,368 \mathrm{cf}$

CB-02 SubcatchmentPS11: PS-11 Road Entrance Runoff Area=3,232 sf 78.99\% Impervious Runoff Depth>6.85" Flow Length=131' Tc=5.0 min CN=86 Runoff=0.6 cfs $1,845 \mathrm{cf}$

CB-05 SubcatchmentPS13: PS-13 Road

CB-08 SubcatchmentPS14A: PS-14 Road

CB-07 SubcatchmentPS14B: PS-14 Road

CB-06 SubcatchmentPS15: PS-15 Road

CB-11A SubcatchmentPS16: PS-16 Road

CB-09 SubcatchmentPS17: PS-17 Road

CB-19 SubcatchmentPS18: PS-18 Road

CB-18 SubcatchmentPS19: PS-19 Road

CB-10 SubcatchmentPS22: PS-22 Road

CB-12 SubcatchmentPS23: PS-23 Road Flow Length=333'

CB-11B SubcatchmentPS24A: PS-24A Road

CB-13 SubcatchmentPS24B: PS-24 Road

CB-17 SubcatchmentPS27: PS-27 Road

CB-16 SubcatchmentPS28: PS-28 Road

Runoff Area=31,258 sf $59.25 \%$ Impervious Runoff Depth>5.40" Flow Length=242' Tc=9.0 min CN=74 Runoff=4.0 cfs 14,076 cf

Runoff Area $=24,151$ sf $53.38 \%$ Impervious Runoff Depth $>5.1^{\prime \prime}$ Flow Length=197' Tc=8.8 min CN=72 Runoff=3.0 cfs $10,393 \mathrm{cf}$

Runoff Area=22,525 sf $47.35 \%$ Impervious Runoff Depth $>5.88$ " Flow Length=283' Tc=9.4 min CN=78 Runoff=3.1 cfs $11,045 \mathrm{cf}$

Runoff Area=5,529 sf 78.57\% Impervious Runoff Depth>6.73"
Flow Length=207' Tc=5.0 min CN=85 Runoff=1.0 cfs $3,102 \mathrm{cf}$
Runoff Area $=6,627$ sf $55.82 \%$ Impervious Runoff Depth>6.37" Flow Length=177' Tc=5.0 min CN=82 Runoff=1.1 cfs $3,518 \mathrm{cf}$

Runoff Area $=12,439$ sf $58.98 \%$ Impervious Runoff Depth $>6.25{ }^{\prime \prime}$ Flow Length $=362^{\prime}$ Tc=5.7 min CN=81 Runoff=2.0 cfs $6,478 \mathrm{cf}$

Runoff Area=21,966 sf $41.08 \%$ Impervious Runoff Depth $>5.76$ " Flow Length=290' Tc=10.5 min CN=77 Runoff=2.9 cfs $10,548 \mathrm{cf}$

Runoff Area $=10,861$ sf $67.42 \%$ Impervious Runoff Depth $>6.85$ " Flow Length=239' Tc=5.3 min CN=86 Runoff=1.9 cfs $6,201 \mathrm{cf}$

Runoff Area $=12,972$ sf $53.89 \%$ Impervious Runoff Depth $>6.24$ " Flow Length=215' Tc=9.5 min CN=81 Runoff=1.9 cfs $6,751 \mathrm{cf}$

Runoff Area=21,891 sf $55.57 \%$ Impervious Runoff Depth>6.37" Slope=0.0200 '/' Tc=6.1 min CN=82 Runoff=3.6 cfs $11,619 \mathrm{cf}$

Runoff Area=16,638 sf $51.33 \%$ Impervious Runoff Depth>6.13" Flow Length=236' Tc=8.7 min CN=80 Runoff=2.4 cfs $8,493 \mathrm{cf}$

Runoff Area=39,059 sf $48.48 \%$ Impervious Runoff Depth $>6.12$ " Flow Length=197' Tc=9.8 min CN=80 Runoff $=5.5$ cfs 19,934 cf

Runoff Area=12,543 sf $56.40 \%$ Impervious Runoff Depth $>6.36^{\prime \prime}$ Flow Length=378' Tc=10.1 $\mathrm{min} \mathrm{CN}=82$ Runoff $=1.8 \mathrm{cfs} 6,653 \mathrm{cf}$

Runoff Area=13,299 sf $49.44 \%$ Impervious Runoff Depth $>6.01$ " Flow Length=364' Tc=7.9 min CN=79 Runoff=2.0 cfs $6,656 \mathrm{cf}$

CB-15 SubcatchmentPS29: PS-29 Road

CB-14 SubcatchmentPS30: PS-30 Road

Runoff Area=31,769 sf $53.29 \%$ Impervious Runoff Depth>6.24" Flow Length=355' Tc=9.6 min CN=81 Runoff=4.6 cfs 16,533 cf

Runoff Area $=43,899$ sf $42.17 \%$ Impervious Runoff Depth $>5.76$ " Flow Length=446' Tc=13.0 min CN=77 Runoff=5.3 cfs $21,071 \mathrm{cf}$

Total Runoff Area $=\mathbf{3 4 9}, 046$ sf Runoff Volume $=170,283$ cf Average Runoff Depth $=5.85$ " $48.97 \%$ Pervious $=170,925 \mathbf{s f} \quad 51.03 \%$ Impervious $=178,121 \mathbf{s f}$

## TFMoran, Inc.

To: Juliet Walker
From: Jack McTigue
CC: $\quad$ Rick Green, Michael Green and Jenna Green
Date: 9/8/21
Re: Pipe Sizing

In response to comment \#3 of your items to address prior to Planning Board review, we off the following:

The pipes in this project were modeled as culvert outlets from ponds. This allows for a more complete analysis of flow conditions, including inlet loss, headwater, and tailwater effects. For clarifications, we have provided the manning calculations for each of the pipes flowing full (see the attached work sheet). These results were compared to the HydroCAD analysis of the peak flows coming from each of the pipes.

Items to note: the inflow coming to the BMP will be higher than the outflows which shows that the Best Management Practices (BMP's) are working correctly, attenuating the stormwater flows. In section 7.2(A) of the Portsmouth Subdivision Rules and Regulations, the design storm frequency for storm sewers is the 10-year 24 -hour storm event. All the pipes clearly show that this criterion was met in the following spreadsheet.

The 25-year and 50-year 24-hour storm events were also analyzed. With a few exceptions, the calculations (even when the flows were greater than the calculated Manning flow) show the outflow of the pipes stay the same as the inflow. The drop inlets also showed some decrease in outflow; however, the water levels never exceeded the rim of the structures, even in the 50-year storm event (rim elevations for these structures are noted on the HydroCAD calculations for grate capacities).

| Project Na |  | Parson | oods Co | miniu |  |  |  | Date: |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Project Nu |  | 47388.1 |  |  |  |  |  |  |  |  |
| $\mathrm{Q}=1 / \mathrm{n} * \mathrm{R}^{\wedge}$ | )SQR |  | (Mannin | Equati |  |  |  |  |  |  |
| Pipe Leaving |  |  |  |  |  |  |  |  |  |  |
| Structure | $D($ in) | $\mathrm{S}(\mathrm{ft} / \mathrm{ft})$ | n | A | P | R | $\mathrm{Q}_{\text {full }}$ | $\mathrm{Q}_{10}$ | $\mathrm{Q}_{25}$ | $\mathrm{Q}_{50}$ |
| BIO-1 | 18 | 0.0077 | 0.013 | 1.77 | 4.71 | 0.38 | 9.2 | 1.4 | 7.2 | 13.9 |
| BIO-2 | 18 | 0.0463 | 0.013 | 1.77 | 4.71 | 0.38 | 22.7 | 0.2 | 0.5 | 0.9 |
| CB-01 | 12 | 0.0075 | 0.013 | 0.79 | 3.14 | 0.25 | 3.1 | 0.6 | 1.1 | 1.5 |
| CB-02 | 12 | 0.0050 | 0.013 | 0.79 | 3.14 | 0.25 | 2.5 | 0.9 | 1.5 | 2.0 |
| CB-05 | 12 | 0.0075 | 0.013 | 0.79 | 3.14 | 0.25 | 3.1 | 2.1 | 3.1 | 4.0 |
| CB-06 | 18 | 0.0050 | 0.013 | 1.77 | 4.71 | 0.38 | 7.4 | 2.6 | 3.8 | 4.9 |
| CB-07 | 15 | 0.0091 | 0.013 | 1.23 | 3.93 | 0.31 | 6.2 | 3.3 | 4.7 | 6.9 |
| CB-08 | 12 | 0.0139 | 0.013 | 0.79 | 3.14 | 0.25 | 4.2 | 1.7 | 2.4 | 3.1 |
| CB-09 | 24 | 0.0063 | 0.013 | 3.14 | 6.28 | 0.50 | 18.0 | 7.0 | 10.0 | 12.9 |
| CB-10 | 15 | 0.0063 | 0.013 | 1.23 | 3.93 | 0.31 | 5.1 | 1.1 | 1.5 | 1.9 |
| CB-11A | 15 | 0.0069 | 0.013 | 1.23 | 3.93 | 0.31 | 5.4 | 1.7 | 2.3 | 2.9 |
| CB-11B | 12 | 0.0182 | 0.013 | 0.79 | 3.14 | 0.25 | 4.8 | 1.4 | 1.9 | 2.4 |
| CB-12 | 24 | 0.0058 | 0.013 | 3.14 | 6.28 | 0.50 | 17.3 | 8.1 | 11.2 | 14.1 |
| CB-13 | 18 | 0.0156 | 0.013 | 1.77 | 4.71 | 0.38 | 13.2 | 3.1 | 4.3 | 5.5 |
| CB-14 | 18 | 0.0094 | 0.013 | 1.77 | 4.71 | 0.38 | 10.2 | 2.9 | 4.2 | 5.3 |
| CB-15 | 18 | 0.0057 | 0.013 | 1.77 | 4.71 | 0.38 | 8.0 | 5.5 | 7.7 | 9.8 |
| CB-16 | 15 | 0.0125 | 0.013 | 1.23 | 3.93 | 0.31 | 7.2 | 1.1 | 1.5 | 2.0 |
| CB-17 | 18 | 0.0840 | 0.013 | 1.77 | 4.71 | 0.38 | 30.5 | 2.1 | 3.0 | 3.7 |
| CB-18 | 15 | 0.0062 | 0.013 | 1.23 | 3.93 | 0.31 | 5.1 | 1.2 | 1.5 | 1.9 |
| CB-19 | 24 | 0.0053 | 0.013 | 3.14 | 6.28 | 0.50 | 16.5 | 1.2 | 6.5 | 8.2 |
| DI-01 | 15 | 0.0052 | 0.013 | 1.23 | 3.93 | 0.31 | 4.7 | 4.7 | 8.7 | 14.2 |
| DI-02 | 24 | 0.0055 | 0.013 | 3.14 | 6.28 | 0.50 | 16.8 | 3.7 | 7.2 | 12.2 |
| GW-01 | 18 | 0.0172 | 0.013 | 1.77 | 4.71 | 0.38 | 13.8 | 2.9 | 7.9 | 9.1 |
| INF-1 | 15 | 0.0190 | 0.013 | 1.23 | 3.93 | 0.31 | 8.9 | 4.4 | 7.6 | 9.1 |
| MH-01a | 18 | 0.0058 | 0.013 | 1.77 | 4.71 | 0.38 | 8.0 | 2.6 | 3.8 | 4.9 |
| MH-01b | 18 | 0.0057 | 0.013 | 1.77 | 4.71 | 0.38 | 8.0 | 2.6 | 3.8 | 4.9 |
| MH-01c | 24 | 0.0059 | 0.013 | 3.14 | 6.28 | 0.50 | 17.4 | 5.9 | 8.5 | 11.0 |
| MH-02 | 18 | 0.0056 | 0.013 | 1.77 | 4.71 | 0.38 | 7.9 | 1.7 | 2.3 | 2.9 |
| MH-03 | 18 | 0.0052 | 0.013 | 1.77 | 4.71 | 0.38 | 7.6 | 3.0 | 4.2 | 5.3 |
| MH-04 | 24 | 0.0061 | 0.013 | 3.14 | 6.28 | 0.50 | 17.7 | 8.1 | 11.2 | 14.1 |
| MH-05 | 24 | 0.0068 | 0.013 | 3.14 | 6.28 | 0.50 | 18.7 | 8.1 | 11.2 | 14.1 |
| MH-06 | 24 | 0.0058 | 0.013 | 3.14 | 6.28 | 0.50 | 17.3 | 8.1 | 11.2 | 14.1 |
| MH-07 | 30 | 0.0054 | 0.013 | 4.91 | 7.85 | 0.63 | 30.2 | 13.3 | 18.5 | 23.3 |
| MH-08 | 30 | 0.0068 | 0.013 | 4.91 | 7.85 | 0.63 | 33.9 | 13.3 | 18.5 | 23.3 |
| MH-09 | 24 | 0.0052 | 0.013 | 3.14 | 6.28 | 0.50 | 16.4 | 5.5 | 7.7 | 9.8 |
| MH-10 | 24 | 0.0052 | 0.013 | 3.14 | 6.28 | 0.50 | 16.4 | 1.5 | 7.6 | 14.6 |
| MH-11 | 24 | 0.0076 | 0.013 | 3.14 | 6.28 | 0.50 | 19.8 | 2.9 | 7.2 | 12.2 |
| MH-12 | 24 | 0.0051 | 0.013 | 3.14 | 6.28 | 0.50 | 16.2 | 4.7 | 6.5 | 8.2 |
| MH-13 | 24 | 0.0257 | 0.013 | 3.14 | 6.28 | 0.50 | 36.4 | 2.3 | 7.6 | 8.9 |

Pipe Listing (selected nodes)

| Line\# | Node <br> Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope <br> (ft/ft) | n | $\begin{array}{r} \text { Width } \\ \text { (inches) } \end{array}$ | Diam/Height (inches) | Inside-Fill (inches) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | BIO1 | 32.65 | 32.35 | 39.0 | 0.0077 | 0.013 | 0.0 | 18.0 | 0.0 |
| 2 | BIO2 | 37.00 | 34.50 | 54.0 | 0.0463 | 0.013 | 0.0 | 18.0 | 0.0 |
| 3 | CB01 | 36.65 | 36.50 | 20.0 | 0.0075 | 0.013 | 0.0 | 12.0 | 0.0 |
| 4 | CB02 | 36.40 | 36.10 | 60.0 | 0.0050 | 0.013 | 0.0 | 12.0 | 0.0 |
| 5 | CB05 | 38.05 | 37.90 | 20.0 | 0.0075 | 0.013 | 0.0 | 12.0 | 0.0 |
| 6 | CB06 | 37.50 | 36.60 | 180.0 | 0.0050 | 0.013 | 0.0 | 18.0 | 0.0 |
| 7 | CB07 | 38.30 | 38.10 | 22.0 | 0.0091 | 0.013 | 0.0 | 15.0 | 0.0 |
| 8 | CB08 | 40.15 | 38.40 | 126.0 | 0.0139 | 0.013 | 0.0 | 12.0 | 0.0 |
| 9 | CB09 | 35.00 | 33.95 | 167.0 | 0.0063 | 0.013 | 0.0 | 24.0 | 0.0 |
| 10 | CB10 | 45.10 | 45.00 | 16.0 | 0.0063 | 0.013 | 0.0 | 15.0 | 0.0 |
| 11 | CB11A | 44.90 | 43.45 | 209.0 | 0.0069 | 0.013 | 0.0 | 15.0 | 0.0 |
| 12 | CB11B | 44.40 | 44.20 | 11.0 | 0.0182 | 0.013 | 0.0 | 12.0 | 0.0 |
| 13 | CB12 | 41.60 | 41.00 | 104.0 | 0.0058 | 0.013 | 0.0 | 24.0 | 0.0 |
| 14 | CB13 | 42.85 | 42.60 | 16.0 | 0.0156 | 0.013 | 0.0 | 18.0 | 0.0 |
| 15 | CB14 | 40.70 | 40.55 | 16.0 | 0.0094 | 0.013 | 0.0 | 18.0 | 0.0 |
| 16 | CB15 | 40.45 | 40.05 | 70.0 | 0.0057 | 0.013 | 0.0 | 18.0 | 0.0 |
| 17 | CB16 | 36.80 | 36.60 | 16.0 | 0.0125 | 0.013 | 0.0 | 15.0 | 0.0 |
| 18 | CB17 | 36.40 | 34.50 | 225.0 | 0.0084 | 0.013 | 0.0 | 18.0 | 0.0 |
| 19 | CB18 | 34.80 | 34.70 | 16.0 | 0.0062 | 0.013 | 0.0 | 15.0 | 0.0 |
| 20 | CB19 | 34.10 | 33.70 | 76.0 | 0.0053 | 0.013 | 0.0 | 24.0 | 0.0 |
| 21 | DI01 | 36.40 | 35.70 | 139.0 | 0.0050 | 0.013 | 0.0 | 15.0 | 0.0 |
| 22 | DI02 | 45.21 | 44.31 | 165.0 | 0.0055 | 0.013 | 0.0 | 24.0 | 0.0 |
| 23 | GW01 | 34.40 | 33.97 | 25.0 | 0.0172 | 0.013 | 0.0 | 18.0 | 0.0 |
| 24 | INF1 | 41.00 | 37.40 | 189.0 | 0.0190 | 0.013 | 0.0 | 15.0 | 0.0 |
| 25 | MH01a | 36.50 | 36.20 | 52.0 | 0.0058 | 0.013 | 0.0 | 18.0 | 0.0 |
| 26 | MH01b | 36.10 | 35.80 | 53.0 | 0.0057 | 0.013 | 0.0 | 18.0 | 0.0 |
| 27 | MH01C | 35.40 | 35.10 | 51.0 | 0.0059 | 0.013 | 0.0 | 24.0 | 0.0 |
| 28 | MH02 | 43.20 | 42.65 | 99.0 | 0.0056 | 0.013 | 0.0 | 18.0 | 0.0 |
| 29 | MH03 | 42.55 | 42.00 | 106.0 | 0.0052 | 0.013 | 0.0 | 18.0 | 0.0 |
| 30 | MH04 | 40.90 | 40.40 | 82.0 | 0.0061 | 0.013 | 0.0 | 24.0 | 0.0 |
| 31 | MH05 | 40.30 | 39.75 | 81.0 | 0.0068 | 0.013 | 0.0 | 24.0 | 0.0 |
| 32 | MH06 | 39.65 | 38.90 | 129.0 | 0.0058 | 0.013 | 0.0 | 24.0 | 0.0 |
| 33 | MH07 | 38.50 | 36.95 | 285.0 | 0.0054 | 0.013 | 0.0 | 30.0 | 0.0 |
| 34 | MH08 | 36.85 | 35.65 | 176.0 | 0.0068 | 0.013 | 0.0 | 30.0 | 0.0 |
| 35 | MH09 | 39.65 | 38.90 | 143.0 | 0.0052 | 0.013 | 0.0 | 24.0 | 0.0 |
| 36 | MH10 | 32.15 | 31.00 | 220.0 | 0.0052 | 0.013 | 0.0 | 24.0 | 0.0 |
| 37 | MH11 | 45.10 | 43.75 | 178.0 | 0.0076 | 0.013 | 0.0 | 24.0 | 0.0 |
| 38 | MH12 | 33.60 | 33.37 | 45.0 | 0.0051 | 0.013 | 0.0 | 24.0 | 0.0 |
| 39 | MH13 | 37.30 | 33.50 | 148.0 | 0.0257 | 0.013 | 0.0 | 24.0 | 0.0 |

Post-Development Storm Pipe Sizing

Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method


Pond BIO2: Bioretention Area \#2 Peak Elev=39.76' Storage=8,904 cf Inflow=4.1 cfs 12,994 cf Primary $=0.2$ cfs 4,906 cf Secondary $=0.0$ cfs 0 cf Outflow=0.2 cfs 4,906 cf

| Pond CB01: Catch Basin 01 | Primary=0.6 cfs 2,332 cf | Peak Elev=37.15' Inflow=0.6 cfs Secondary $=0.0$ cfs 0 cf Outflow=0.6 cfs | $\begin{aligned} & 2,332 \mathrm{cf} \\ & 2,332 \mathrm{cf} \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Pond CB02: Catch Basin 02 |  | Peak Elev=36.98' Inflow=0.9 cfs | 3,422 cf |
|  | Primary $=0.9 \mathrm{cfs} 3,422 \mathrm{cf}$ | Secondary=0.0 cfs 0 cf Outflow=0.9 cfs | $3,422 \mathrm{cf}$ |
| Pond CB05: Catch Basin 05 |  | Peak Elev=39.00' Inflow=2.1 cfs | 7,459 cf |
|  | 12.0" Round Culvert n=0.01 | 13 L=20.0' S=0.0075 '/' Outflow=2.1 cfs | 7,459 cf |
| Pond CB06: Catch Basin 04 |  | Peak Elev=38.40' Inflow=2.6 cfs | 9,276 cf |
|  | Primary=2.6 cfs 9,276 cf | Secondary=0.0 cfs 0 cf Outflow=2.6 cfs | 9,276 cf |
| Pond CB07: Catch Basin 07 |  | Peak Elev=39.37' Inflow=3.3 cfs | 11,478 cf |
|  | 15.0" Round Culvert n=0.013 | L=22.0' S=0.0091'/' Outfow=3.3 cfs | $11,478 \mathrm{cf}$ |
| Pond CB08: Catch Basin 08 |  | Peak Elev=40.86' Inflow=1.7 cfs | 6,082 cf |
|  | 12.0" Round Culvert n=0.013 | L=126.0' S=0.0139 '/' Outflow=1.7 cfs | 6,082 cf |
| Pond CB09: Catch Basin 09 |  | Peak Elev=37.75' Inflow=7.0 cfs | 24,420 cf |
|  | 24.0" Round Culvert n=0.013 | L=167.0' S=0.0063 '/' Outflow=7.0 cfs | 24,419 cf |
| Pond CB10: Catch Basin 10 |  | Peak Elev=45.74' Inflow=1.1 cfs | $3,820 \mathrm{cf}$ |
|  | 15.0" Round Culvert n=0.0 | 13 L=16.0' S=0.0063 '/' Outflow=1 | $3,820 \mathrm{cf}$ |

## Pond CB11A: Catch Basin 11A

Peak Elev=45.56' Inflow=1.7 cfs 5,829 cf 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=209.0^{\prime} \mathrm{S}=0.0069$ '/' Outflow=1.7 cfs $5,829 \mathrm{cf}$

Pond CB11B: Catch Basin 11B Peak Elev=45.06' Inflow=1.4 cfs 4,763 cf 12.0" Round Culvert n=0.013 L=11.0' S=0.0182 '/' Outflow=1.4 cfs $4,763 \mathrm{cf}$

Pond CB12: Catch Basin 12
Peak Elev=43.18' Inflow=8.1 cfs 28,405 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=104.0$ ' $\mathrm{S}=0.0058$ '//' Outflow=8.1 cfs $28,405 \mathrm{cf}$

Pond CB13: Catch Basin 13

Pond CB14: Catch Basin 14

Pond CB15: Catch Basin 15

Peak Elev=43.74' Inflow=3.1 cfs 11,180 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=16.0$ ' $\mathrm{S}=0.0156$ '//' Outflow=3.1 cfs $11,180 \mathrm{cf}$

Peak Elev=41.97' Inflow=2.9 cfs 11,495 cf 18.0" Round Culvert n=0.013 L=16.0' S=0.0094 '/' Outflow=2.9 cfs 11,495 cf

Peak Elev=41.80' Inflow=5.5 cfs 20,850 cf 18.0" Round Culvert n=0.013 L=70.0' S=0.0057 '/' Outflow=5.5 cfs 20,850 cf

Post-Development Storm Pipe Sizing


Pond DI01: DI-01 DROP INLET RIM = 40.74 Peak Elev=37.16' Storage=3 cf Inflow=3.7 cfs 20,895 cf Primary $=3.7$ cfs 20,895 cf Secondary $=0.0$ cfs 0 cf Outflow=3.7 cfs 20,895 cf

RIM $=48.77 \quad$ Peak Elev=46.40' Storage=0 cf Inflow=2.9 cfs 23,224 cf Primary=2.9 cfs 23,224 cf Secondary $=0.0$ cfs 0 cf Outflow=2.9 cfs 23,224 cf

Pond GW01: Gravel Wetland \#1
Peak Elev=37.18' Storage=26,716 cf Inflow=14.1 cfs 57,348 cf Primary $=4.4$ cfs $35,533 \mathrm{cf}$ Secondary=0.0 cfs 0 cf Outflow=4.4 cfs $35,533 \mathrm{cf}$

## Pond INF1: Bioretention Area \#2

Peak Elev=44.23' Storage=5,139 cf Inflow=4.0 cfs 34,337 cf Discarded=1.1 cfs 28,383 cf Primary=2.3 cfs 5,692 cf Secondary=0.0 cfs 0 cf Outflow=3.4 cfs 34,075 cf

## Pond MH01a: Manhole 01a

Pond MH01b: Manhole 01b

Pond MH01C: Manhole 01c

## Pond MH02: Manhole 02

Pond MH03: Manhole 03

Pond MH04: Manhole 04

Pond MH05: Manhole 05

Pond MH06: Manhole 06

Pond MH07: Manhole 07

Peak Elev=37.76' Inflow=2.6 cfs 9,276 cf 18.0" Round Culvert n=0.013 L=52.0' S=0.0058 '// Outflow=2.6 cfs 9,276 cf

Peak Elev=37.76' Inflow=2.6 cfs 9,276 cf 18.0" Round Culvert n=0.013 L=53.0' $\mathrm{S}=0.0057$ '//' Outflow=2.6 cfs 9,276 cf

Peak Elev=37.76' Inflow=5.9 cfs 20,754 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=51 . \mathbf{O}^{\prime} \mathrm{S}=0.0059$ '/' Outflow=5.9 cfs 20,754 cf

Peak Elev=43.99' Inflow=1.7 cfs 5,829 cf 18.0" Round Culvert $n=0.013$ L=99.0' $\mathrm{S}=0.0056$ '//' Outflow=1.7 cfs 5,829 cf

Peak Elev=43.64' Inflow=3.0 cfs 10,592 cf 18.0" Round Culvert n=0.013 L=106.0' $\mathrm{S}=0.0052$ '/' Outflow=3.0 cfs 10,592 cf

Peak Elev=42.47' Inflow=8.1 cfs 28,405 cf 24.0" Round Culvert n=0.013 L=82.0' S=0.0061 '/' Outflow=8.1 cfs 28,405 cf

Peak Elev=41.83' Inflow=8.1 cfs 28,405 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=81.0$ ' $\mathrm{S}=0.0068$ '//' Outflow=8.1 cfs $28,405 \mathrm{cf}$

Peak Elev=41.14' Inflow=8.1 cfs 28,405 cf 24.0" Round Culvert n=0.013 L=129.0' S=0.0058 '/' Outflow=8.1 cfs 28,405 cf

Peak Elev=40.21' Inflow=13.3 cfs 49,255 cf 30.0" Round Culvert n=0.013 L=285.0' S=0.0054 '/' Outflow=13.3 cfs 49,255 cf


Post-Development Storm Pipe Sizing

Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond BIO2: Bioretention Area \#2 Peak Elev=40.02' Storage=10,674 cf Inflow=6.0 cfs 18,946 cf Primary $=0.5$ cfs 10,693 cf Secondary $=0.0$ cfs 0 cf Outflow=0.5 cfs 10,693 cf


Pond CB10: Catch Basin 10
Peak Elev=45.90' Inflow=1.5 cfs $5,318 \mathrm{cf}$ 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=16.0$ ' $\mathrm{S}=0.0063$ '//' Outflow=1.5 cfs $5,318 \mathrm{cf}$

Pond CB11A: Catch Basin 11A
Peak Elev=45.71' Inflow=2.3 cfs 8,098 cf 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=209.0^{\prime} \mathrm{S}=0.0069$ '//' Outflow=2.3 cfs $8,098 \mathrm{cf}$

Pond CB11B: Catch Basin 11B Peak Elev=45.22' Inflow=1.9 cfs 6,667 cf 12.0" Round Culvert n=0.013 L=11.0' S=0.0182 '/' Outflow=1.9 cfs 6,667 cf

Pond CB12: Catch Basin 12 Peak Elev=43.62' Inflow=11.2 cfs 39,596 cf 24.0" Round Culvert n=0.013 L=104.0' S=0.0058 '// Outflow=11.2 cfs 39,596 cf

Pond CB13: Catch Basin 13

Pond CB14: Catch Basin 14

Pond CB15: Catch Basin 15

Peak Elev=44.03' Inflow=4.3 cfs 15,648 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=16 . \mathbf{0}^{\prime} \mathrm{S}=0.0156$ '//' Outflow=4.3 cfs $15,648 \mathrm{cf}$

Peak Elev=42.45' Inflow=4.2 cfs 16,364 cf 18.0" Round Culvert n=0.013 L=16.0' S=0.0094 '//' Outflow=4.2 cfs 16,364 cf

Peak Elev=42.22' Inflow=7.7 cfs 29,386 cf 18.0" Round Culvert n=0.013 L=70.0' S=0.0057 '/' Oufflow=7.7 cfs 29,386 cf

Post-Development Storm Pipe Sizing

| Pond CB16: Catch Basin 16 | Primary=1.5 cfs 5,207 cf | Peak Elev=38.14' Inflow=1.5 cfs Secondary= 0.0 cfs 0 cf Outflow=1.5 cfs | $\begin{aligned} & 5,207 \mathrm{cf} \\ & 5,207 \mathrm{cf} \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Pond CB17: Catch Basin 17 |  | Peak Elev=38.13' Inflow=3.0 cfs | 10,465 cf |
|  | 18.0" Round Culvert n=0.013 | L=225.0' S=0.0084 '/' Outflow=3.0 cfs | 10,465 cf |
| Pond CB18: Catch Basin 18 |  | Peak Elev=38.11' Inflow=1.5 cfs | 4,967 cf |
|  | 15.0" Round Culvert n=0.01 | 13 L=16.0' S=0.0062 '/' Outfow=1.5 cfs | 4,964 cf |
| Pond CB19: Catch Basin 19 |  | Peak Elev=38.12' Inflow=6.5 cfs | 23,621 cf |
|  | 24.0" Round Culvert n=0.013 | L=76.0' S=0.0053 '/' Outflow=6.5 cfs | 23,620 cf |

Pond DI01: DI-01 DROP INLET RIM = 40.74 Peak Elev=37.74' Storage=5 cf Inflow=8.7 cfs 39,060 cf Primary $=8.7$ cfs 39,059 cf Secondary $=0.0$ cfs 0 cf Outflow $=8.7$ cfs 39,059 cf

Pond DI02: Drop Inlet \#2
RIM =48.77 Peak Elev=46.90' Storage=2 cf Inflow=7.2 cfs $45,144 \mathrm{cf}$ Primary=7.2 cfs 45,144 cf Secondary=0.0 cfs 0 cf Outflow=7.2 cfs 45,144 cf

Pond GW01: Gravel Wetland \#1
Peak Elev=37.58' Storage=33,539 cf Inflow=20.1 cfs 82,386 cf Primary=7.9 cfs 59,882 cf Secondary $=0.7$ cfs 504 cf Outflow=8.6 cfs 60,385 cf

Pond INF1: Bioretention Area \#2
Peak Elev=44.52' Storage=6,527 cf Inflow=9.1 cfs 61,894 cf Discarded=1.1 cfs 36,709 cf Primary=7.6 cfs 24,775 cf Secondary=0.0 cfs 0 cf Outflow=8.7 cfs 61,485 cf

## Pond MH01a: Manhole 01a

Pond MH01b: Manhole 01b

Pond MH01C: Manhole 01c

## Pond MH02: Manhole 02

Pond MH03: Manhole 03

Pond MH04: Manhole 04

Pond MH05: Manhole 05

Pond MH06: Manhole 06

Pond MH07: Manhole 07

Peak Elev=38.25' Inflow=3.8 cfs 13,285 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=52.0$ ' $\mathrm{S}=0.0058$ '//' Outflow=3.8 cfs $13,285 \mathrm{cf}$

Peak Elev=38.20' Inflow=3.8 cfs 13,285 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=53.0$ ' $\mathrm{S}=0.0057$ '/' Outflow=3.8 cfs $13,285 \mathrm{cf}$

Peak Elev=38.21' Inflow=8.5 cfs 29,812 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=51.0$ ' $\mathrm{S}=0.0059$ '//' Outflow=8.5 cfs $29,812 \mathrm{cf}$

Peak Elev=44.26' Inflow=2.3 cfs 8,098 cf 18.0" Round Culvert $n=0.013$ L=99.0' $\mathrm{S}=0.0056$ '/' Outflow=2.3 cfs $8,098 \mathrm{cf}$

Peak Elev=44.02' Inflow=4.2 cfs 14,765 cf 18.0" Round Culvert n=0.013 L=106.0' $\mathrm{S}=0.0052$ '/' Outflow=4.2 cfs $14,765 \mathrm{cf}$

Peak Elev=42.91' Inflow=11.2 cfs 39,596 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=82.0$ ' $\mathrm{S}=0.0061$ '/' Outflow=11.2 cfs $39,596 \mathrm{cf}$

Peak Elev=42.26' Inflow=11.2 cfs 39,596 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=81.0^{\prime} \mathrm{S}=0.0068$ '/' Outflow=11.2 cfs $39,596 \mathrm{cf}$

Peak Elev=41.56' Inflow=11.2 cfs 39,596 cf 24.0" Round Culvert n=0.013 L=129.0' S=0.0058 '//' Outflow=11.2 cfs 39,596 cf

Peak Elev=40.62' Inflow=18.5 cfs 68,983 cf 30.0" Round Culvert n=0.013 L=285.0' S=0.0054 '/' Outflow=18.5 cfs 68,983 cf


Time span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
Pond BIO1: Bioretention Area \#1
Peak Elev=38.43' Storage=43,505 cf Inflow=30.1 cfs 104,448 cf Primary=13.9 cfs $70,489 \mathrm{cf}$ Secondary= 0.0 cfs 0 cf Outflow=13.9 cfs $70,489 \mathrm{cf}$

Pond BIO2: Bioretention Area \#2 Peak Elev=40.73' Storage=15,912 cf Inflow=7.8 cfs 27,356 cf Primary $=0.9$ cfs 18,956 cf Secondary $=0.0$ cfs 0 cf Outflow $=0.9$ cfs 18,956 cf

Pond CB01: Catch Basin 01

Pond CB02: Catch Basin 02

Pond CB05: Catch Basin 05

Pond CB06: Catch Basin 04

Pond CB07: Catch Basin 07

Pond CB08: Catch Basin 08

Pond CB09: Catch Basin 09

Pond CB10: Catch Basin 10

Pond CB11A: Catch Basin 11A
Peak Elev=45.89' Inflow=2.9 cfs 10,269 cf 15.0" Round Culvert n=0.013 L=209.0' $\mathrm{S}=0.0069$ '/' Outflow=2.9 cfs 10,269 cf

## Pond CB11B: Catch Basin 11B

Peak Elev=45.36' Inflow=2.4 cfs 8,493 cf 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=11.0^{\prime} \mathrm{S}=0.0182$ '/' Outflow=2.4 cfs $8,493 \mathrm{cf}$

Pond CB12: Catch Basin 12
24.0" Round Culvert n=0.013 L=104.0' S=0.0058 '/' Outflow=14.1 cfs 50,314 cf

Pond CB13: Catch Basin 13

Pond CB14: Catch Basin 14

Pond CB15: Catch Basin 15

Peak Elev=38.89' Inflow=12.9 cfs 45,093 cf
24.0" Round Culvert n=0.013 L=167.0' S=0.0063 '/' Outflow=12.9 cfs $45,093 \mathrm{cf}$
15.0" Round Culvert n=0.013 L=16.0' $\mathrm{S}=0.0063$ '/' Outflow=1.9 cfs 6.751 cf

Peak Elev=37.57' Inflow=1.5 cfs 5,368 cf Primary $=1.5$ cfs 5,368 cf Secondary= 0.0 cfs 0 cf Outflow=1.5 cfs 5,368 cf

Peak Elev=37.35' Inflow=2.0 cfs 7,213 cf Primary $=2.0$ cfs $7,213 \mathrm{cf}$ Secondary= 0.0 cfs 0 cf Outflow=2.0 cfs $7,213 \mathrm{cf}$

Peak Elev=40.85' Inflow=4.0 cfs 14,076 cf 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=20.0$ ' $\mathrm{S}=0.0075$ '/' Outflow=4.0 cfs $14,076 \mathrm{cf}$

Peak Elev=40.24' Inflow=4.9 cfs 17,178 cf Primary=4.9 cfs 17,178 cf Secondary=0.0 cfs 0 cf Outflow=4.9 cfs 17,178 cf

Peak Elev=40.13' Inflow=6.1 cfs 21,438 cf 15.0" Round Culvert n=0.013 L=22.0' $\mathrm{S}=0.0091$ '//' Outflow=6.1 cfs $21,438 \mathrm{cf}$

Peak Elev=41.34' Inflow=3.1 cfs 11,045 cf 12.0" Round Culvert $n=0.013$ L=126.0' $S=0.0139$ '// Outflow=3.1 cfs $11,045 \mathrm{cf}$

Peak Elev=46.05' Inflow=1.9 cfs 6,751 cf 15.0" Round Culvert n=0.013 L=16.0' S=0.0063 '/' Outflow=1.9 cfs 6,751 cf

Pond CB11A: Catch Basin 11A Peak Elev=45.89 Inflow=2.9 cfs 10,269 cf 24.0 " Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=104.0$ ' $\mathrm{S}=0.0058$ '/' Outfow $=14.1 \mathrm{cfs} 50.314 \mathrm{cf}$

Peak Elev=44.73' Inflow=5.5 cfs 19,934 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=16.0^{\prime} \mathrm{S}=0.0156$ '/' Outflow=5.5 cfs $19,934 \mathrm{cf}$

Peak Elev=43.37' Inflow=5.3 cfs 21,071 cf 18.0" Round Culvert n=0.013 L=16.0' S=0.0094 '/' Oufflow=5.3 cfs 21,071 cf

Peak Elev=42.98' Inflow=9.8 cfs 37,604 cf 18.0" Round Culvert n=0.013 L=70.0' S=0.0057 '/' Outflow=9.8 cfs 37,604 cf

Post-Development Storm Pipe Sizing

| Pond CB16: Catch Basin 16 | Primary=2.0 cfs 6,656 cf | Peak Elev=38.65' Inflow=2.0 cfs Secondary= 0.0 cfs 0 cf Outflow= 2.0 cfs | $\begin{aligned} & 6,656 \mathrm{cf} \\ & 6,656 \mathrm{cf} \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Pond CB17: Catch Basin 17 |  | Peak Elev=38.60' ${ }^{\prime}$ Inflow=3.7 cfs | 13,309 cf |
|  | 18.0" Round Culvert n=0.013 | L=225.0' S=0.0084 '/' Outflow=3.7 cfs | 13,309 cf |
| Pond CB18: Catch Basin 18 |  | Peak Elev=38.52' Inflow=1.9 cfs | 6,201 cf |
|  | 15.0" Round Culvert n=0.01 | $13 \mathrm{~L}=16.0$ ' S=0.0062 '/' Outflow=1.9 cfs | 6,198 cf |
| Pond CB19: Catch Basin 19 |  | Peak Elev=38.54' Inflow=8.2 cfs | 30,055 cf |
|  | 24.0" Round Culvert n=0.013 | L=76.0' S=0.0053 '/' Outflow=8.2 cfs | 30,054 cf |

Pond DI01: DI-01 DROP INLET RIM = 40.74 Peak Elev=39.42' Storage=12 cf Inflow=14.2 cfs 59,145 cf Primary=14.2 cfs 59,145 cf Secondary=0.0 cfs 0 cf Outflow=14.2 cfs 59,145 cf

Pond DI02: Drop Inlet \#2
RIM =48.77 Peak Elev=47.64' Storage=5 cf Inflow=12.2 cfs 69,797 cf Primary=12.2 cfs 69,797 cf Secondary=0.0 cfs 0 cf Outflow=12.2 cfs 69,797 cf

Pond GW01: Gravel Wetland\#1 Peak Elev=37.85' Storage=38,416 cf Inflow=25.8 cfs 106,868 cf Primary=9.1 cfs 76,095 cf Secondary $=6.2$ cfs 8,619 cf Outflow=15.3 cfs 84,714 cf

Pond INF1: Bioretention Area \#2 Peak Elev=45.24' Storage=10,467 cf Inflow=14.8 cfs 92,157 cf Discarded=1.3 cfs 43,089 cf Primary= 8.9 cfs 45,927 cf Secondary $=3.0 \mathrm{cfs} 2,587$ cf Outflow=13.1 cfs 91,603 cf

Pond MH01a: Manhole 01a

Pond MH01b: Manhole 01b

Pond MH01C: Manhole 01c

## Pond MH02: Manhole 02

Pond MH03: Manhole 03

Pond MH04: Manhole 04

Pond MH05: Manhole 05

Pond MH06: Manhole 06

Pond MH07: Manhole 07

Peak Elev=39.71' Inflow=4.9 cfs 17,178 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=52.0^{\prime} \mathrm{S}=0.0058$ '/' Outflow=4.9 cfs $17,178 \mathrm{cf}$

Peak Elev=39.27' Inflow=4.9 cfs 17,178 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=53.0$ ' $\mathrm{S}=0.0057$ '//' Outflow=4.9 cfs $17,178 \mathrm{cf}$

Peak Elev=39.35' Inflow=11.0 cfs 38,616 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=51.0^{\prime} \mathrm{S}=0.0059$ '/' Outflow=11.0 cfs $38,616 \mathrm{cf}$

Peak Elev=44.81' Inflow=2.9 cfs 10,269 cf 18.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=99.0$ ' $\mathrm{S}=0.0056$ '/' Outflow=2.9 cfs $10,269 \mathrm{cf}$

Peak Elev=44.74' Inflow=5.3 cfs 18,762 cf 18.0" Round Culvert n=0.013 L=106.0' $\mathrm{S}=0.0052$ '/' Outflow=5.3 cfs 18,762 cf

Peak Elev=43.54' Inflow=14.1 cfs 50,314 cf 24.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=82.0$ ' $\mathrm{S}=0.0061$ '/' Outflow=14.1 cfs $50,314 \mathrm{cf}$

Peak Elev=42.80' Inflow=14.1 cfs $50,314 \mathrm{cf}$ 24.0" Round Culvert $n=0.013$ L=81.0' $\mathrm{S}=0.0068$ '//' Outflow=14.1 cfs $50,314 \mathrm{cf}$

Peak Elev=42.01' Inflow=14.1 cfs 50,314 cf 24.0" Round Culvert n=0.013 L=129.0' S=0.0058 '// Outflow=14.1 cfs $50,314 \mathrm{cf}$

Peak Elev=41.04' Inflow=23.3 cfs 87,918 cf 30.0" Round Culvert n=0.013 L=285.0' S=0.0054 '/' Outflow=23.3 cfs 87,918 cf

Post-Development Storm Pipe Sizing


## NHDES

## Application for Sewer Connection Permit

F O R<br>Peverly Hill Road<br>Development

## Peverly Road

Portsmouth, New Hampshire Rockingham County

Tax Map 242, Lot 04

## April 19, 2021

Last Revised August 25, 2021

Prepared By:


Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists
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August 25, 2021

TFM Project No: 47388.11

Dennis Greene, PE
NHDES WWEB
PO Box 95
Concord, NH 03302-0095

## Re: Sewer Connection Permit - Peverly Hill Road Portsmouth, NH - Tax Map 242 Lot 4 Peverly Hill Road Development TFM PIN: 47388.11

## Dear Mr. Greene:

On behalf of Green and Company Building and Development Corp., we respectfully submit an Application for Sewer Connection Permit relative to the above referenced project. The following materials are included in this submission:

- Application for Sewer Connection Permit;
- Check for the amount of $\$ 2,760.00$ for the Sewer Connection Permit;
- Table 1008-1, Unit Design Flow from Pages 47-49 from the NH Code of Administrative Rules, ENV-Wq 1000;
- Calculated Design Sewer Flow
- Full Flow and Approximate Partial Flow Calculations for gravity sewer, Dated April 19, 2021;
- Environmental One Corporation Pressure Sewer Design Analysis for Peverly Hill Road Development;
- Cover Sheet, Existing Conditions, Utility Plans, Sewer Profile and Details of the Site Plan Set titled, "Peverly Hill Road Condominiums; Peverly Hill Road; Tax Map 242, Lot 4; 83 Peverly Hill Road; Portsmouth, New Hampshire; County of Rockingham; Prepared for Green and Company Real Estate. dated April 19, 2021" prepared by TFMoran, Inc."

This project consists of 56 single unit homes. The homes are serviced by a combination of low-pressure sewers and gravity sewers. 20 of the low-pressure systems discharges into Sewer Manhole 15, after which the flow

becomes gravity. 3 of the low-pressure systems discharges into Sewer Manhole 5, subsequently the flow becomes gravity. The remaining 33 residences are gravity flow.

The proposed project consists of 800 linear feet 2" low-pressure SDR 11 line, 270 linear feet of 1-1/2" low-pressure SDR11 line, 1,789 linear feet of 8 " SDR 35 gravity sewer main, 15 proposed sewer manholes and 2 cleanouts for the low-pressure lines.

The City of Portsmouth concurrently reviewing this application. Any revisions based on their comments will be circled on the plans and forwarded to you.

On behalf of our client, we respectfully request review of the application package for approval.

Sincerely,
MSC a division of TFMoran, Inc.

Jack McTigue, PE, CPESC
Project Manager
cc: Rick Green (Green and Company), Michael Green (Green and Company), Jenna Green (Green and Company), and Juliet Walker (City of Portsmouth)

# APPLICATION FOR SEWER CONNECTION PERMIT <br> Water Division/Wastewater Engineering Bureau Design Review Section 

RSA/Rule: RSA 485-A:37 / Env-Wq 703.07

## TYPE OR PRINT CLEARLY

Use this application for Sewer Connection Permit to request NHDES review/approval for any proposed sewerage design. Under RSAs 485 and 485-A, design plans for new sewerage facilities - whether publicly or privately owned, and regardless of design flow - must be submitted to NHDES for review/approval action at least 30 days prior to construction. Pursuant to Env-Wq 703, design submittals must include 1 set of engineering plans/specifications, pertinent design calculations, the required fee, and a Municipal Certification (signed by an authorized municipal official, see page 2).

| 1. Engineer of Record - Contact Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Engineer / Contact: Jack McTigue, PE |  |  | Company: TFMoran, Inc. |
| Mailing Address: 170 Commerce Way |  |  |  |
| Town/City: Portsmouth |  |  | State: NH $\quad$ IIP: 03801 |
| Phone Number: (603) 431-2222 |  |  | Email: jmctigue@TFMoran.com |
| 2. Description of Proposed Work (check all that apply) |  |  |  |
|  | An extension of a collector or interceptor; |  |  |
|  | A sewage pumping station greater than 50 gpm or serving more than one building; |  |  |
|  | A proposed sewer that serves more than one building or that requires a manhole at the connection. |  |  |
| Project Name or Description: 56 3-bedroom single family unit resdiential condominium |  |  |  |
| Project Location - Street Address: 83 Peverly Hill Road |  |  |  |
| Project Location - Town / City: Portsmouth, NH |  |  |  |
| Name Of Receiving WWTF: Sewer Division of the Portsmouth NH Department of Public Works |  |  |  |
| Average Design Flow (ADF, gal/day): 25,200 GPD |  |  |  |
| Proposed Sewer Length (Linear ft) |  | Pipe Diameter (inches) | Pipe Material |
| 256 |  | 1-1/2" Pressure Sewer Services | HDPE SDR-11 |
| 856 |  | 2" Pressure Sewer Main | HDPE SDR-11 |
| 1,750 |  | 8" Gravity Sewer | SDR-35 |
| 3. Required Fee |  |  |  |
| 区 | Sewer connection design submittals must be accompanied by a review fee payment based on the project's average design flow - $\$ 0.10$ per gal/day ("a dime a gallon") for design flows up to 10,000 gal/day, plus $\$ 0.05$ per gal/day for any flows in excess thereof. |  |  |
| $\square$ | A fee of $\$ 200$ per plan sheet shall be paid for review of modifications to privately owned pump stations, force mains, interceptors, and wastewater treatment facilities which are not associated with an increase in wastewater flow. |  |  |
| $\square$ | Fees are not required of municipalities for municipal projects. |  |  |
| Fee Enclosed: \$2760.00 |  | Please make checks payable to "Treasurer State of NH". |  |


| 4. Municipal Certification |  |  |  |
| :--- | :--- | :---: | :---: |
| On behalf of Parson Woods Condominium LLC,the Town or City of Portsmouth hereby provides <br> the following municipal certification. |  |  |  |
| The municipal sewage collection system and wastewater treatment facilities have been demonstrated, pursuant to <br> Env-Wq 703.07(d), to have adequate processing capability for the proposed added hydraulic flow and organic flow at <br> the time of connection. The proposed sewer connection and/or sewerage design meet with the approval of the local <br> jurisdictional authority. |  |  |  |
| Name Of Municipal Official (Project Location): | Title: |  |  |
|  |  |  |  |
| Signature: | Date: |  |  |
|  |  |  |  |
| When the Receiving WWTF is in a different Municipality from that of the Project Location, the following additional <br> certification is required. |  |  |  |
| Name Of WWTF Official (Host Community): | Title: |  |  |
| Signature: | Date: |  |  |
| Email Address: |  |  |  |

## Submit completed application package to:

NHDES Wastewater Engineering Bureau Design Review Section<br>29 Hazen Drive<br>P.O. Box 95<br>Concord, NH 03302-0095

NOTE: A Separate INDUSTRIAL WASTEWATER INDIRECT DISCHARGE REQUEST (IDR) May be Required For Industrial Waste Contributions, Depending On Quantity And Quality. For Further Information, Contact The Industrial Pretreatment Supervisor Of The Wastewater Engineering Bureau At (603)-271-2052.

Italics indicate items are optional. www.des.nh.gov
29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
(603) 271-3503 • TDD Access: Relay NH 1-800-735-2964

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## NEW HAMPSHIRE CODE OF ADMINISTRATIVE RULES

(2) Metered water readings for uses that are as similar as possible to the proposed use, taking into consideration factors such as occupancy and frequency of use, determined as specified in (d), below.
(d) Design flows based on metered water readings shall be calculated:
(1) By finding the average of water meter readings over a period of time that is representative of the volume of water used and multiplying the average by a minimum peaking factor of 2 for commercial light flow or a maximum peaking factor of 3 for commercial heavy flow; or
(2) By measuring not less than 6 months of consecutive daily meter readings, including the month(s) of heaviest use for uses that are seasonal in nature, and using the highest daily flow without application of a peaking factor;
(e) The unit design flow figures referenced in (b) and (c), above, shall be as listed in Table 1008-1, below, subject to (f), below:

Table 1008-1: Unit Design Flow Figures

| Use | Unit Design Flow |
| :---: | :---: |
| AIRPORTS | $5 \mathrm{GPD} /$ Transient plus $10 \mathrm{GPD} /$ Employee |
| APARTMENTS | See Dwellings |
| BARS, LOUNGES | See Food Service |
| BED \& BREAKFAST | $60 \mathrm{GPD} /$ Guest, based on the greater of 2 guests per room or the actual number of guests the room is designed to accommodate, plus 10 GPD/Employee |
| BUNKHOUSE | 60 GPD/Person |
| CAMPS: |  |
| Campground with Central Comfort Station | $45 \mathrm{GPD} / \mathrm{site}$, plus $20 \mathrm{GPD} /$ Site for the dump station |
| Recreational Campgrounds with 3-way hookups | $60 \mathrm{GPD} /$ Site |
| Construction Camps | $50 \mathrm{GPD} /$ Person |
| Day Camps (not including meals) | 15 GPD/Person |
| Dining Facility | 3 GPD/Person/meal |
| Residential Youth Recreation Camps | $25 \mathrm{GPD} /$ Person plus $3 \mathrm{GPD} / \mathrm{Person/meal}$ |
| CATERERS - Function Rooms | $12 \mathrm{GPD} / \mathrm{patron}$ |
| CHURCHES: |  |
| Sanctuary Seating | 3 GPD/Seat |
| Church Suppers | $12 \mathrm{GPD} /$ Seat |
| COUNTRY CLUBS - PRIVATE |  |
| Dining Room | 10 GPD/Seat |
| Snack Bar | $10 \mathrm{GPD} /$ Seat |
| Locker \& Showers | 20 GPD/Locker |
| DAY CARE CENTERS | 10 GPD/Person |
| DENTISTS | 10 GPD/Chair plus 35 GPD/Staff Member |
| DOCTOR'S OFFICES | 250 GPD/Doctor |
| DOG KENNELS | $50 \mathrm{GPD} / \mathrm{Kennel}$, with one dog per kennel |
| DWELLINGS: |  |
| Apartment - Studio or One-Bedroom | 225 GPD |
| Apartment - 2 or More Bedrooms | 150 GPD/Bedroom |
| Residence - Single-Family | 300 GPD plus 150 GPD for each bedroom over 2 |
| Residence - Duplex | 300 GPD plus 150 GPD for each bedroom over 2 for each unit |
| Rooming House - With Meals | 60 GPD/Person |
| Rooming House - Without Meals | $40 \mathrm{GPD} / \mathrm{Person}$ |
| Senior Housing | See Senior Housing |

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| $P_{f}$ | 6 | Peak Factor |  |
| :---: | :---: | :--- | :---: |
| $I / I$ | 300 | gpd/in/mile | $5.28 \mathrm{E}-07 \mathrm{cfs}$ |
| $\mathrm{n}_{\mathrm{f}}$ | 0.010 | Manning |  |
| k | 1.485 | Converstion Factor |  |

0.0009 cfs
0.0056 cfs

TABLE 1 - FULL FLOW AND APPROXIMATE PARTIAL FLOW CALCULATIONS

| From | To | Length <br> (ft) |  |  | $\begin{aligned} & \hline \text { Slope } \\ & \hline(\mathrm{ft} / \mathrm{ft}) \end{aligned}$ | Dia |  | Full Flow |  | $\mathrm{K}_{\mathrm{h}}$ |  | ¢ |  | Y | A |  | Partial Flow |  |  |  | Notes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Inverts |  |  |  |  | $\frac{V_{\text {full }}}{f \mathrm{fps}}$ | $\frac{Q_{\text {full }}}{c f s}$ |  |  |  | y/Y |  |  | Units | Q (cfs) |  |  | $\frac{\mathrm{V}_{\text {cal1 }}}{\mathrm{fps}}$ |  |
|  |  |  | Out | In |  | (in) | (ft) |  |  |  | rad. | rad. |  | ft | sf | \# | $\mathrm{Q}_{\text {per-use }}$ | $\mathrm{O}_{\text {inf }}$ | $\mathrm{Q}_{\text {needed }}$ |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pressure Sewer \#1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.02 | 22.00 | 0.123 | 0.0000 | 0.123 | NA | Units 22-32, 45-55 |
| PSMH-14 | PSMH-13 | 83 | 43.50 | 43.05 | 0.005 | 8 | 0.67 | 3.31 | 1.16 | 0.033 | 1.99 | 1.99 | 0.23 | 0.15 | 0.06 | 0.00 | 0.000 | 0.0004 | 0.123 | 2.07 |  |
| PSMH-13 | PSMH-12 | 83 | 42.95 | 42.50 | 0.005 | 8 | 0.67 | 3.31 | 1.16 | 0.033 | 1.99 | 1.99 | 0.23 | 0.15 | 0.06 | 0.00 | 0.000 | 0.0004 | 0.123 | 2.07 |  |
| PSMH-12 | PSMH-11 | 83 | 42.40 | 41.65 | 0.009 | 8 | 0.67 | 4.28 | 1.49 | 0.029 | 1.92 | 1.92 | 0.21 | 0.14 | 0.05 | 3.00 | 0.017 | 0.0004 | 0.140 | 2.56 | Units 20-21 \& 44 |
| PSMH-11 | PSMH-10 | 83 | 41.55 | 40.90 | 0.008 | 8 | 0.67 | 3.98 | 1.39 | 0.033 | 1.98 | 1.98 | 0.23 | 0.15 | 0.06 | 1.00 | 0.006 | 0.0004 | 0.146 | 2.48 | Unit 19 |
| PSMH-10 | PSMH-9 | 244 | 40.80 | 39.55 | 0.005 | 8 | 0.67 | 3.22 | 1.12 | 0.053 | 2.25 | 2.25 | 0.28 | 0.19 | 0.08 | 8.00 | 0.045 | 0.0010 | 0.192 | 2.35 | Units 15-18 \& 40-43 |
| PSMH-9 | PSMH-8 | 108 | 39.45 | 38.90 | 0.005 | 8 | 0.67 | 3.21 | 1.12 | 0.057 | 2.29 | 2.29 | 0.29 | 0.20 | 0.09 | 2.00 | 0.011 | 0.0005 | 0.203 | 2.39 | Units 14 \& 39 |
| PSMH-8 | PSMH-7 | 222 | 38.80 | 37.70 | 0.005 | 8 | 0.67 | 3.17 | 1.11 | 0.069 | 2.41 | 2.41 | 0.32 | 0.21 | 0.10 | 7.00 | 0.039 | 0.0009 | 0.243 | 2.51 | Units 10-13 \& 36-38 |
| PSMH-7 | PSMH-6 | 78 | 37.60 | 36.95 | 0.008 | 8 | 0.67 | 4.11 | 1.43 | 0.054 | 2.26 | 2.26 | 0.29 | 0.19 | 0.08 | 1.00 | 0.006 | 0.0003 | 0.249 | 3.01 | Unit 35 |
| PSMH-6 | PSMH-4 | 99 | 36.85 | 36.05 | 0.008 | 8 | 0.67 | 4.04 | 1.41 | 0.058 | 2.30 | 2.30 | 0.30 | 0.20 | 0.09 | 2.00 | 0.011 | 0.0004 | 0.261 | 3.03 | Units 8-9 |
| Pressure Sewer \#2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3.00 | 0.017 | 0.0000 | 0.278 | NA | Units 56 and 33-34 |
| PSMH-4 | PSMH-3 | 90 | 35.95 | 35.55 | 0.004 | 8 | 0.67 | 3.00 | 1.05 | 0.084 | 2.56 | 2.56 | 0.36 | 0.24 | 0.11 | 1.00 | 0.006 | 0.0004 | 0.283 | 2.54 | Unit 7 |
| PSMH-3 | PSMH-2 | 75 | 35.45 | 35.10 | 0.005 | 8 | 0.67 | 3.07 | 1.07 | 0.084 | 2.56 | 2.56 | 0.36 | 0.24 | 0.11 | 1.00 | 0.006 | 0.0003 | 0.289 | 2.60 | Unit 6 |
| PSMH-2 | PSMH-1 | 286 | 35.00 | 33.80 | 0.004 | 8 | 0.67 | 2.91 | 1.02 | 0.096 | 2.66 | 2.66 | 0.38 | 0.25 | 0.12 | 4.00 | 0.022 | 0.0012 | 0.313 | 2.57 | Units 2-5 |
| PSMH-1 | SMH-E1 | 212 | 33.70 | 32.80 | 0.004 | 8 | 0.67 | 2.93 | 1.02 | 0.097 | 2.67 | 2.67 | 0.38 | 0.26 | 0.12 | 1.00 | 0.006 | 0.0009 | 0.319 | 2.60 | Unit 1 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Environment One Corporation

## Pressure Sewer Preliminary

 Cost and Design AnalysisFor

# Peverly Hill Road Condominiums Peverly Hill Road 

[^10]
# Peverly Hill Road Condominiums <br> Peverly Hill Road 

Prepared by : Jack McTigue
On: August 25, 2021

## Notes :

Two Zones
Zone 1 - Units Units 22-32, 45-55 - Connecting to MH-14
Zone 2 - Units 56 and 33-34-Connecting to MH-04

# PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS 

Prepared By:
Peverly Hill Road Condominiums
Jack McTigue
Peverly Hill Road
August 25, 2021

| $\begin{gathered} \text { Zone } \\ \text { Number } \end{gathered}$ | Connects to Zone | Number of Pumps in Zone | Accum Pumps in Zone | Gals/day per Pump | Max Flow Per Pump (gpm) | $\begin{gathered} \text { Max } \\ \text { Sim Ops } \end{gathered}$ | $\begin{aligned} & \text { Max Flow } \\ & \text { (GPM) } \end{aligned}$ | Pipe Size (inches) | Max <br> Velocity <br> (FPS) | Length of Main this Zone | Friction Loss Factor $(\mathrm{ft} / 100 \mathrm{ft})$ | Friction Loss This Zone | Accum Fric Loss (feet) | Max Main Elevation | Minimum Pump Elevation | Static Head (feet) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| This spreadsheet was calculated using pipe diameters for: SDR11HDPE |  |  |  |  |  |  |  |  |  | Friction loss calculations were based on a Constant for inside roughness "C" of: 150 |  |  |  |  |  |  |  |
| 1.00 | 1.00 | 20 | 20 | 450 | 11.90 | 5 | 59.50 | 2.00 | 6.44 | 856.00 | 7.51 | 64.25 | 64.25 | 43.50 | 34.00 | 9.50 | 73.75 |
| 2.00 | 2.00 | 3 | 3 | 450 | 14.00 | 2 | 28.00 | 1.50 | 4.74 | 256.00 | 5.51 | 14.11 | 14.11 | 37.05 | 34.00 | 3.05 | 17.16 |

Page 1
Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

## F:\MSC Projects\47388-Peverly Hill Rd - Portsmouth\47388-11 Green and Co - 83 Peverly Rd_Condo Project\Documents\UtilitiesIWaste Water\E-One-Calcs.EOne

# PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR) 

Peverly Hill Road Condominiums
Peverly Hill Road


Page 1
Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One
F: $\backslash$ MSC Projects $\backslash 47388$ - Peverly Hill Rd - Portsmouth $\backslash 47388$-11 Green and Co - 83 Peverly Rd_Condo Project\Documents $\backslash$ Utilities $\backslash$ Waste Water C -One-Calcs.EOne

## ElONE SPD PUMP PERFORMANCE CURVE


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Figure 2
Relationship of GP Storage Capacity to Power Outage Experience

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## General Features



Patent Numbers: 5,752,315
5,562,254 5,439,180

The model DH071 or DR071 grinder pump station is a complete unit that includes: the grinder pump, check valve, HDPE (high density polyethylene) tank, controls, and alarm panel. A single DH071 or DR071 is a popular choice for one, average single-family home

- Rated for flows of 700 gpd (2650 lpd)
- 70 gallons ( 265 liters) of capacity
- Indoor or outdoor installation
- Standard outdoor heights range from 61 inches to 160 inches

The DH071 is the "hardwired," or "wired," model where a cable connects the motor controls to the level controls through watertight penetrations.

The DR071 is the "radio frequency identification" (RFID), or "wireless," model that uses wireless technology to communicate between the level controls and the motor controls.

## Operational Information

Motor
$1 \mathrm{hp}, 1,725 \mathrm{rpm}$, high torque, capacitor start, thermally protected, 120/240V, 60 Hz, 1 phase

## Inlet Connections

4-inch inlet grommet standard for DWV pipe. Other inlet configurations available from the factory.

## Discharge Connections

Pump discharge terminates in 1.25-inch NPT female thread. Can easily be adapted to 1.25 -inch PVC pipe or any other material required by local codes.

## Discharge

15 gpm at $0 \mathrm{psig}(0.95 \mathrm{lps}$ at 0 m$)$
11 gpm at $40 \mathrm{psig}(0.69 \mathrm{lps}$ at 28 m$)$
7.8 gpm at 80 psig ( 0.49 lps at 56 m )

## Accessories

E/One requires that the Uni-Lateral, E/One's own stainless steel check valve, be installed between the grinder pump station and the street main for added protection against backflow.

Alarm panels are available with a variety of options, from basic monitoring to advanced notice of service requirements.

The Remote Sentry is ideal for installations where the alarm panel may be hidden from view.

# E/One Sentrymu 

## Alarm Panel - Basic Package

## Description



The E/One Sentry panels are custom designed for use with Environment One grinder pump stations. They can be configured to meet the needs of your application, from basic alarm indication to advanced warning of pending service requirements.
E/One Sentry panels are supplied with audible and visual high level alarms. They are easily installed in accordance with relevant national and local codes. Standard panels are approved by UL, CSA, CE and NSF to ensure high quality and safety.

The panel features a corrosion-proof, NEMA 4X-rated, thermoplastic enclosure. A padlock is provided to prevent unauthorized entry (safety front).

## Standard Features

Circuit breakers, 240 or 120 VAC service
Terminal blocks and ground lugs
Audible alarm with manual silence
Manual run feature and run indicator
Redundant "Start" function with high level alarm
Conformal-coated alarm board (both sides)
Alarm board overload protection

## Optional Features

Contact group (dry, powered and Remote Sentry)
Inner cover (dead front)
Hour meter
Generator receptacle with auto transfer
GFCl
Main service disconnect
Brownout protection

Please consult factory for special applications.

## SIMPLEX <br> SENTRY

REDUNDANT RUN (HIGH LEVEL)
XTERNAL VISUAL \& AUDIBLE ALARM -XTERNAL LATCHING MANUAL SILENCE MANUAL RUN
PUMP RUN INDICATOR CONFORMAL COATED CIRCUIT BOARD PADLOCK NEMA 4X ENCLOSURE ASSEMBLY CORROSION PROOF THERMOPLASTIC POLYESTER APPROVED BY UL FOR ELECTRICAL CONTROL ENCLOSURE

OPTIONS:

$\square$
ALARM CONTACTS
$\square$ HOUR METER



## SIMPLEX

SENTRY
REDUNDANT RUN (HIGH LEVEL)
EXTERNAL VISUAL \& AUDIBLE ALARM EXTERNAL LATCHING MANUAL SILENCE MANUAL RUN
PUMP RUN INDICATOR
CONFORMAL COATED CIRCUIT BOARD PADLOCK
NEMA 4X ENCLOSURE ASSEMBLY CORROSION PROOF THERMOPLASTIC POLYESTER APPROVED BY UL FOR ELECTRICAL CONTROL ENCLOSURE

OPTIONS:
$\square$ ALARM CONTACTS
$\square$ HOUR METER






Add Sunroom Foundation









### 934.126 GL Aurelia



|  | Main | Future | Apt | Main + Future | Main + Apt | All |
| ---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Living Area | 2302 SF | 0 SF | 0 SF | 2302 SF | 2302 SF | 2302 SF |
| Bedrooms | 3 | 1 | 0 | 4 | 3 | 4 |
| Baths | 2.5 | 0.0 | 0.0 | 2.5 | 2.5 | 2.5 |

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© 2017 Art Form Architecture, Inc. ALL RIGHTS RESERVED.
You may not build this Design without purchasing a License to Build (as defined in our Terms). Unauthorized changes are not permitted and violate copyright laws, which provide substantial penalties for infringement.

## Dear Builders and Home Buyers,

In addition to our Terms and Conditions (the "Terms"), please be aware of the following:

This design may not yet have Construction Drawings (as defined in the Terms), and is, therefore, only available as a Design Drawing (as defined in the Terms and together with Construction Drawings, "Drawings'). It is possible that during the conversion of a Design Drawing to a final Construction Drawing, changes may be necessary including, but not limited to, dimensional changes. Please see Plan Data Explained on www.ArtformHomePlans.com to understand room sizes, dimensions and other data provided. We are not responsible for typographical errors.

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### 934.126 GL Aurelia

First Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1049 SF | 0 | 0.5 |
| Future | 0 SF | 1 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 0 4 9} \mathbf{~ S F}$ | $\mathbf{1}$ | $\mathbf{0 . 5}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | :---: |
| Shown $9^{\prime}-0 "$ |  |
| Possible* $8^{\prime \prime}-0 "$ |  |

* See Major Change information on plan page for cost


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### 934.126 GL Aurelia

## Second Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1253 SF | 3 | 2 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 2 5 3} \mathbf{~ S F}$ | $\mathbf{3}$ | $\mathbf{2}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | ---: |
| Shown | $8^{\prime}-0 "$ |
| Possible* $8^{\prime}-01$ |  |

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### 934.126 GL Aurelia

## Basement Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 0 SF | 0 | 0 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{0}$ SF | $\mathbf{0}$ | $\mathbf{0}$ |
|  |  | Ceiling Height |  |
|  | Shown | 7'-8" |  |
|  | Possible* | $9^{\prime}-0 "$ |  |



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## Front Elevation



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## Rear Elevation



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### 934.126 GL Aurelia

## Left Elevation



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### 1016.124 GL Carter



|  | Main | Future | Apt | Main + Future | Main + Apt | All |
| ---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Living Area | 2670 SF | 0 SF | 0 SF | 2670 SF | 2670 SF | 2670 SF |
| Bedrooms | 3 | 0 | 0 | 3 | 3 | 3 |
| Baths | 2.5 | 0.0 | 0.0 | 2.5 | 2.5 | 2.5 |

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### 1016.124 GL Carter

## First Floor

|  | Area | Beds | Baths |  |  |
| ---: | :---: | :---: | :---: | :---: | :---: |
| Main | 1363 SF | 0 | 0.5 |  |  |
| Future | 0 SF | 0 | 0 |  |  |
| Apt | 0 SF | 0 | 0 |  |  |
| Total | $\mathbf{1 3 6 3 ~ S F}$ | $\mathbf{0}$ | $\mathbf{0 . 5}$ |  |  |
|  | Ceiling Height |  |  |  |  |
|  | Shown |  |  |  | $9^{\prime}-0 "$ |
|  | Possible* | $9^{\prime \prime}-0 "$ |  |  |  |

* See Major Change information on plan page for cost

AR Artform Home Plans


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## Second Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1307 SF | 3 | 2 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 3 0 7} \mathbf{~ S F}$ | $\mathbf{3}$ | $\mathbf{2}$ |

Ceiling Height

| Ceiling Height |
| ---: |
| Shown $8^{\prime}-0^{\prime \prime}$ |
| Possible* $8^{\prime}-0^{\prime \prime}$ |

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Basement Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 0 SF | 0 | 0 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{0 ~ S F}$ | $\mathbf{0}$ | $\mathbf{0}$ |
|  |  | Ceiling Height |  |
|  | Shown |  |  |
| 7'8" |  |  |  |
|  | Possible* | $8^{\prime}-4 "$ |  |



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## Artform Home Plans

## Front Elevation



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Right Elevation


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Rear Elevation


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## AR Artform Home Plans

## Left Elevation



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### 1016.124 GL Carter

## Rear Render



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## Iop of Carriage (B)



Top of Carriage (C) Scale: 1" = 1'-0"



 and
Wartform Home Plans
Arfform Home Plans


6





6 Cross Section @ Sun Room


Deck Ledger Attachment Detail for Step Down
e: $112^{" 1}=1-0^{-1}$


7 Cross Section@ Bath



隹 Arrform Home Plans
Arfform Home Plans







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## BeamPocke



## Iypical Basement Pos


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Foundation Plan Structure designed for
Snow Lood of 55 psf now Load of 55 psf

↔




 Arfform Home Plans





4 Line of Stair Clearance



Method PFG: Portal frame at garage door openings shall be constructed in accordance with Figur R602.10.6.3. Note this method is allowed on either side of garage door openings


Method CS-PF: Continuously sheathe portal frame shall be constructed in accordance with Figure 602.10.6.4. The numbe
shall not exceed four.


Oux Ress woon



FIGURE R507.2.3(1)
DECK ATTACHMENT FOR LATERAL LOADS


## Deck Ledger Attachment Detail for Step Down

## $\underset{\substack{\text { Shear Wall Details } \\ \text { Notosale }}}{ }$

Notes:

- See plans for locations where shear panels are required.

- If the method at atetis is sed at $G$ Garages where width of panel is 20 "


architect to oraditional dosigng.
If the method at eteft is used











### 481.124.v10 KR Sweet Cherry Pie



|  | Main | Future | Apt | Main + Future | Main + Apt | All |
| ---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Living Area | 2404 SF | 0 SF | 0 SF | 2404 SF | 2404 SF | 2404 SF |
| Bedrooms | 3 | 1 | 0 | 4 | 3 | 4 |
| Baths | 2.5 | 0.0 | 0.0 | 2.5 | 2.5 | 2.5 |

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AR Artform Home Plans

First Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 977 SF | 0 | 0.5 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{9 7 7} \mathbf{~ S F}$ | $\mathbf{0}$ | $\mathbf{0 . 5}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | ---: |
| Shown $9^{\prime}-0 "$ |  |
| Possible* $8^{\prime}-0 "$ |  |

* See Major Change information on plan page for cost


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Second Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1427 SF | 3 | 2 |
| Future | 0 SF | 1 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 4 2 7} \mathbf{~ S F}$ | $\mathbf{4}$ | $\mathbf{2}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | :--- |
| Shown $8^{\prime}-0 "$ |  |
| Possible* $9^{\prime \prime}-0 "$ |  |

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Basement Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 0 SF | 0 | 0 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{0 ~ S F}$ | $\mathbf{0}$ | $\mathbf{0}$ |
|  |  | Ceiling Height |  |
|  | Shown |  |  |
| 7'-8" |  |  |  |
|  | Possible* | $9^{\prime}-01$ |  |

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### 1032.124 GL Sinclair



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### 1032.124 GL Sinclair

First Floor

|  | Area | Beds | Baths |
| :---: | :---: | :---: | :---: |
| Main | 1250 SF | 0 | 0.5 |
| Future | 0 SF | 1 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | 1250 SF | 1 | 0.5 |
| Ceiling Height |  |  |  |
| Shown 9'0" |  |  |  |
| Possible* 8'0" |  |  |  |



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### 1032.124 GL Sinclair

Second Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1636 SF | 4 | 3 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 6 3 6}$ SF | $\mathbf{4}$ | $\mathbf{3}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | ---: |
| Shown $8^{\prime}-0 "$ |  |
| Possible* $8^{\prime \prime}-0 "$ |  |

* See Major Change information on plan page for cost


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### 1032.124 GL Sinclair

## Basement Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 0 SF | 0 | 0 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{0 ~ S F}$ | $\mathbf{0}$ | $\mathbf{0}$ |
|  |  | Ceiling Height |  |
| Shown |  |  |  |
| 7'-8" |  |  |  |
|  | Possible* | $9^{\prime}-0$ " |  |

* See Major Change information on plan page for cost


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### 1032.124 GL Sinclair

 AR Artform Home Plans
## Front Elevation



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Right Elevation


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Rear Elevation


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### 1032.124 GL Sinclair

## Left Elevation



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### 405.124.v2 KR Stephanie



## Dear Builders and Home Buyers,

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- Increasing ceiling heights usually requires adjustments to window sizes and other exterior elements.


## Floor plan layout and/ or Structural Changes:

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### 405.124.v2 KR Stephanie

First Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 777 SF | 0 | 0.5 |
| Future | 0 SF | 1 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{7 7 7 ~ S F}$ | $\mathbf{1}$ | $\mathbf{0 . 5}$ |
|  | Ceiling Height |  |  |
|  | Shown | $8^{\prime}-01$ |  |
|  | Possible* | $8^{\prime}-8 "$ |  |

* See Major Change information on plan page for cost



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### 405.124.v2 KR Stephanie

Second Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1020 SF | 3 | 2 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 0 2 0} \mathbf{~ S F}$ | $\mathbf{3}$ | $\mathbf{2}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | :---: |
| Shown $8^{\prime}-0^{\prime \prime}$ |  |
| Possible* $9^{\prime}-0 "$ |  |

* See Major Change information on plan page for cost



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### 405.124.v2 KR Stephanie

## Basement Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: | :---: |
| Main | 0 SF | 0 | 0 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{0 ~ S F}$ | $\mathbf{0}$ | $\mathbf{0}$ |
|  |  | Ceiling Height |  |
|  | Shown | 7'-8" |  |
|  | Possible* | $9{ }^{\prime}-0^{\prime \prime}$ |  |

* See Major Change information on plan page for cost


WEB 405.124.v2 Stephanie

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## Front Elevation



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### 405.124.v2 KR Stephanie

## Right Elevation



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### 405.124.v2 KR Stephanie

Rear Elevation


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### 405.124.v2 KR Stephanie

Left Elevation


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### 148.124.v6 KR Sweet Liberty



|  | Main | Future | Apt | Main + Future | Main + Apt | All |
| ---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Living Area | 2413 SF | 0 SF | 0 SF | 2413 SF | 2413 SF | 2413 SF |
| Bedrooms | 3 | 0 | 0 | 3 | 3 | 3 |
| Baths | 2.5 | 0.0 | 0.0 | 2.5 | 2.5 | 2.5 |

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## Dear Builders and Home Buyers,

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## Facade Changes:

- To maintain design integrity, we pay particular attention to features on the front facade, including but not limited to door surrounds, window casings, finished porch column sizes, and roof friezes. While we may allow builders to add their own flare to aesthetic elements, we don't allow our designs to be stripped of critical details. Any such alterations require the express written consent of Artform.
- Increasing ceiling heights usually requires adjustments to window sizes and other exterior elements.


## Floor plan layout and/ or Structural Changes:

- Structural changes always require the express written consent of Artform
- If you wish to move or remove walls or structural elements (such as removal of posts, increases in house size, ceiling height changes, addition of dormers, etc), please do not assume it can be done without other additional changes (even if the builder or lumber yard says you can).


### 148.124.v6 KR Sweet Liberty

## R Artform Home Plans

First Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1086 SF | 0 | 0.5 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 0 8 6}$ SF | $\mathbf{0}$ | $\mathbf{0 . 5}$ |
|  | Ceiling Height |  |  |
|  | Shown | $9^{\prime}-0^{\prime \prime}$ |  |
|  | Possible* | $8^{\prime}-0^{\prime \prime}$ |  |

* See Major Change information on plan page for cost


## Notes This Design:

Side entry garage will require some structural redesign a beam to transfer load from that post.


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### 148.124.v6 KR Sweet Liberty

 AR Artform Home Plans
## Second Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 1327 SF | 3 | 2 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{1 3 2 7} \mathbf{~ S F}$ | $\mathbf{3}$ | $\mathbf{2}$ |

Ceiling Height

| Ceiling Height |  |
| ---: | :--- |
| Shown | $8^{\prime}-0 "$ |
| Possible* $9^{\prime}-0 "$ |  |

* See Major Change information on plan page for cost


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### 148.124.v6 KR Sweet Liberty

## Basement Floor

|  | Area | Beds | Baths |
| ---: | :---: | :---: | :---: |
| Main | 0 SF | 0 | 0 |
| Future | 0 SF | 0 | 0 |
| Apt | 0 SF | 0 | 0 |
| Total | $\mathbf{0 ~ S F}$ | $\mathbf{0}$ | $\mathbf{0}$ |
|  |  | Ceiling Height |  |
|  | Shown | 7'-8" |  |
| Possible* |  |  |  |
|  | $9^{\prime}-0 "$ |  |  |

* See Major Change information on plan page for cost


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## Front Elevation



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Artform Home Plans

## Right Elevation



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Rear Elevation


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## Left Elevation



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Typical Basement Post













givitutu











Ranesumbier



Red
uilluvingmes. MAY Nor epaces singe




Perspective View of Detail C







Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects

Scientists

September 8, 2021

TFMoran Project: 47388.11

Juliet Walker, Planning Director
Portsmouth Planning Board
1 Junkins Avenue
Portsmouth, NH 03801

## Re: Open Space Planned Unit Development, 83 Peverly Hill Road - Section 7 of the Site Plan Regulations

Dear Juliet:

The outline below addresses how we complied with Section 7 of the Portsmouth Site Plan Review Regulations dealing with Stormwater Management. Below are the areas listed in the regulations and how the project conforms to those.

Section 7.1 - Low Impact Development (LIP)

- This project uses a combination of two bioretention areas with internal storage reservoirs, a subsurface gravel wetland and an infiltration basin as best management practices (BMP's) to treat and attenuate post development flows. These BMP's help maintain pre-development hydrology. The roadway was narrowed to $26^{\prime}$ from the beginning of the roadway to the first intersection. It was narrowed down to $22^{\prime}$ for the loop area of the roadway. This helped decrease the amount of new impervious area being constructed on this site. In addition to this, the project uses the City's PUD ordinance to limit the impact on the lot, further decreasing the footprint and leaving the majority of the lot undisturbed.

Section 7.2 - General Water Quality and Stormwater Manage Provisions

- This stormwater system was designed to treat the Water Quality Volume (WQV) for the impervious area proposed on this site.
- The project was designed to limit the impact to the abutting wetland. Special effort was made, including the installation of retaining walls along the roadway, to limit impact. There is no impact to wetlands or wetland buffers from this project. Handling of Hazardous Material is included in the Erosion Control Notes. City, state, and federal regulations concerning stormwater management have been incorporated into this project and there will be no adverse impacts on abutting properties.
- There are no 20,000 gallon per day on-site water systems proposed or existing. The BMP's used on this project, bioretention areas with internal storage reservoirs and the subsurface gravel wetlands, have some of the highest nitrogen removal efficiencies according to the NH Stormwater Manual, Appendix B.
- This project does not propose conveying stormwater into the City's infrastructure.

Section 7.3 Wellhead Protection Areas

- The site is located in a wellhead protection zone. Only one infiltration practice is proposed which treats a large area of lawn and some roof run-off. No roadway runoff is directed to this BMP.

Section 7.4 Stormwater Management and Erosion Control Plan (SMECP)

- A Stormwater Management and Erosion Control Plan is included with the plans. The drainage analysis, Existing Conditions, Erosion Control Plans, Erosion Control Notes and the Grading and Drainage Plans include the items listed in section 7.4. Note, though no impairments showed on the NHDES One Stop Data Mapper, Sagamore Creek is near the project. It has a 5-P rating, which included nitrogen impairments. Three of the four BMP's used have the highest nitrogen removal efficiencies.

Section 7.5 Construction Erosion Control Design Standards

- The selection, sizing, installation and maintenance of all erosion and sediment control measures is consistent with design guidance set forth in the NH Stormwater Manual.
- Natural vegetation is retained within the $100^{\prime}$ wetland buffer and on $2 / 3$ of the property to be preserved via a conservation easement. The vegetated area to remain will be marked with signage along the $100^{\prime}$ wetland buffer to notify homeowners and the public that this area is protected.
- There is no soil disturbance proposed within the 100' wetland buffer.
- This disturbed area has been minimized utilizing the provisions of Planned Unit Developments contained in Article 7 of the Portsmouth zoning ordinance. This type of development allows the clustering of residential units which preserves natural features and creates a significant amount of open space for the homeowners and general public.
- The construction will not be phased, however, careful consideration has been made and described on sheet C-44, Erosion Control notes, to ensure that disturbed areas prevent erosion and sediment transportation.

Section 7.6.1 - Post-Construction Stormwater Management Standards

- A Drainage Analysis and set of Erosion Control Plans were included with the submittal to the Planning Board that describes the post-construction stormwater management practices contained in this section.

Section 7.6.2 - Enhanced Stormwater Treatment Standards for New and Redevelopment Disturbing More than 15,000 square feet of Area

- Storm water from the developed site is retained and treated. There are no increased postconstruction flows for the 2-year, 10-year, 25-year, and 50-year 24-hour storm events analyzed in the drainage analysis.
- This project uses a combination of two bioretention areas with internal storage reservoirs, a subsurface gravel wetland and an infiltration basin as best management practices (BMP's) to treat and attenuate post development flows.
- The efficiencies of the three types of BMP's used are based on the NH Stormwater Manual, Appendix B.

0 The bioretention area and filtration practices are listed as having a 90\% efficiency for removing Total Suspended Solids (TSS) and 65\% efficiencies in removing Total Nitrogen (TN) and Total Phosphorous (TP). Based on UNHSC data, the (Hybrid) bioretention systems with internal storage systems offer further denitrification of the stormwater, showing approximately a $30 \%$ increase in removal of TP and an additional 20\% removal for TN.
0 Gravel Wetlands have a 95\% efficiency for removing Total Suspended Solids (TSS), 85\% efficiencies in removing Total Nitrogen (TN) and 64\% efficiency for removing total Phosphorous (TP).
o Infiltration Basins have a 90\% efficiency for removing Total Suspended Solids (TSS), 60\% efficiencies in removing Total Nitrogen (TN) and 65\% efficiency for removing total Phosphorous (TP).
o All three of these treatments exceed the Enhanced Stormwater Treatment standards by removing $80 \%$ of the average annual TSS, and $50 \%$ of the average TN.

The BMP Worksheets in the Drainage Analysis include the sizes of the treatments and the calculations showing that they fully treat the Water Quality Volume (WQV).
This development is not discharging into impaired water.
According to Env-WQ 1700:
o Water quality will be adequate to fully protect existing uses-

- This project does not impair the current uses of the wetland it discharges into. The large track of land being offered as a conservation easement help to minimize future impacts to this water body.
- The identified uses of this water body are:
- Wildlife and plant life
o We have reached out to the New Hampshire Heritage Bureau. They did not feel our project would have detrimental impact to any endangered wildlife or plant life in the area.
- Stormwater treatment from public roadways
o Post-development flows have been kept the same or less than predevelopment flows.
- BMP's are being proposed to treat and attenuate stormwater flows.
o The highest statutory and regulatory requirements will be achieved for all new and existing point sources;
- This project meets all City, State and Federal requirements in the treatment of the stormwater.
o All cost effective and reasonable best management practices for nonpoint source control will be implemented;
- The BMP's proposed are more than adequate to treat the stormwater from the development that flows off this property.
A winter maintenance plan has been set forth in the Condominium Documents. The plan discusses the limitations of the use of salt in deicing applications.

Section 7.6.2 (2) - Not applicable to this submission.
Section 7.6.3 - Additional Pollutant Tracking and Accounting Program (PTAP) Submittal Requirements

- This is to be submitted subsequent to the Planning Board Approval.

Section 7.6.4 Responsibility for Installation and Construction

- The responsibility is noted and the developer plans to meet the requirements as set forth. The developers name and contact information is listed on the Cover Sheet and in the operation and maintenance manual.


## Section 7.6.5 Inspection and Maintenance Plans

- An Operation and Maintenance Plan is included in the drainage analysis. This includes the Owner's / Operator's responsibilities and steps required in the annual maintenance. A developers agreement shall be agreed upon between the developer and the City prior to the commencement of work on the property.

In summary, we maintain this project meets the requirements as set out in Section 7 of the Site Plan Review Regulations and will pose no adverse impact to the abutting properties and wetlands.

Sincerely,
TFMoran, Inc.

cc: Rick Green, Michael Green and Jenna Green

# JONES\&BEACH <br> ENGINEERS INC. <br> 85 Portsmouth Avenue, PO Box 219, Stratham, NH 03885 603.772.4746 - JonesandBeach.com 

September 29, 2021

Portsmouth Planning Board
Attn: Dexter Legg
1 Junkins Avenue, Suite $3{ }^{\text {rd }}$ Floor
Portsmouth, NH 03801

## RE: Submission for Planning Board 3400 Lafayette Road, Portsmouth, NH <br> Tax Map 297, Lot 11 <br> JBE Project No. 20737

Dear Mr. Legg,
Jones \& Beach Engineers, Inc., on behalf of the applicant, Green \& Company Building \& Development Corp, are submitting the following revised plans per conversations with the City for this project as well as reading through the Staff Report. We do not have any concerns over the proposed conditions outlined in the Staff Report.

The following changes have been made to the plans:

- We have added additional crosswalks and pedestrian walkways around the property to link all the units to the walkway network. This allows us to comply with the pedestrian walkway requirement.
- A water pressure booster location has been added near unit \#1.
- Public access will be provided to the proposed 10.3 acre conservation easement from Coach Road. The easement is contiguous with City owned land.

The following is provided in support of this letter:

1. One (1) Full Size Plan Set.
2. Draft Conservation Easement Language
3. Revised Building Architecturals

Thank you very much for your time. If you have any questions, or need further assistance, please contact our office.



## City of Portsmouth，New Hampshire Site Plan Application Checklist

This site plan application checklist is a tool designed to assist the applicant in the planning process and for preparing the application for Planning Board review．A pre－application conference with a member of the planning department is strongly encouraged as additional project information may be required depending on the size and scope．The applicant is cautioned that this checklist is onlv a guide and is not intended to be a complete list of all site plan review requirements．Please refer to the Site Plan review regulations for full details．

Applicant Responsibilities（Section 2．5．2）：Applicable fees are due upon application submittal along with required attachments．The application shall be complete as submitted and provide adequate information for evaluation of the proposed site development．Waiver requests must be submitted in writing with appropriate justification．

Name of Owner／Applicant：Green \＆Company
Date Submitted：5／14／2021
Phone Number：603－964－7572
E－mail：
mgreen＠greenandcompany．com
Site Address：Lafayette Road．Map： 297 Lot：． 11
Zoning District：Gateway Corridor（GI）
Lot area：1，931，721 sq．ft．

| Application Requirements |  |  |  |
| :---: | :--- | :---: | :---: |
| V | Required Items for Submittal | Item Location <br> （e．g．Page or <br> Plan Sheet／Note \＃） | Waiver <br> Requested |
| X | Fully executed and signed Application form． <br> （2．5．2．3） | N／A <br> All application documents，plans，supporting documentation and <br> other materials provided in digital Portable Document Format（PDF）． <br> （2．5．2．8） |  |


| Site Plan Review Application Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| $\square$ | Statement that lists and describes＂green＂building components and systems． (2.5.3.1A) |  |  |
| 区 | Gross floor area and dimensions of all buildings and statement of uses and floor area for each floor． (2.5.3.1B) | Architectural Plans | N／A |
| 区 | Tax map and lot number，and current zoning of all parcels under Site Plan Review． (2.5.3.1C) | Existing Conditions | N／A |
| 区 | Owner＇s name，address，telephone number，and signature．Name， address，and telephone number of applicant if different from owner． (2.5.3.1D) | Cover Sheet | N／A |

Site Plan Review Application Required Information

| Site Plan Review Application Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location fe．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| 区 | Names and addresses（including Tax Map and Lot number and zoning districts）of all direct abutting property owners（including properties located across abutting streets）and holders of existing conservation，preservation or agricultural preservation restrictions affecting the subject property． (2.5.3.1E) | EX OVR | N／A |
| 区 | Names，addresses and telephone numbers of all professionals involved in the site plan design． (2.5.3.1F) | Cover Sheet | N／A |
| 区 | List of reference plans． (2.5.3.1G) | C1 | N／A |
| 区 | List of names and contact information of all public or private utilities servicing the site． (2.5.3.1H) | Cover Sheet | N／A |


| Site Plan Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| 区 | Full size plans shall not be larger than 22 inches by 34 inches with match lines as required，unless approved by the Planning Director． Submittals shall be a minimum of 11 inches by 17 inches as specified by Planning Dept．staff．（2．5．4．1A） | Required on all pian sheets | N／A |
| 区 | Scale：Not less than 1 inch $=60$ feet and a graphic bar scale shall be included on all plans． (2.5.4.1B) | Required on all plan sheets | N／A |
| 区 | GIS data should be referenced to the coordinate system New Hampshire State Plane，NAD83（1996），with units in feet． (2.5.4.1C) | Note on C1 | N／A |
| 区 | Plans shall be drawn to scale． (2.5.4.1D) | Required on all plan sheets | N／A |
| 区 | Plans shall be prepared and stamped by a NH licensed civil engineer． (2.5.4.1D) | All Sheets | N／A |
| 区 | Wetlands shall be delineated by a NH certified wetlands scientist and so stamped．（2．5．4．1E） | C1 \＆EX OVR | N／A |
| 区 | Title（name of development project），north point，scale，legend． （2．5．4．2A） | All Sheets | N／A |
| 区 | Date plans first submitted，date and explanation of revisions． （2．5．4．2B） | All Sheets | N／A |
| 8 | Individual plan sheet title that clearly describes the information that is displayed． (2.5.4.2C) | Required on all plan sheets | N／A |
| 区 | Source and date of data displayed on the plan． (2.5.4.2D) | C2 | N／A |


| Site Plan Specifications |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
| 区 | A note shall be provided on the Site Plan stating: "All conditions on this Plan shall remain in effect in perpetuity pursuant to the requirements of the Site Plan Review Regulations." (2.5.4.2E) | C2 | N/A |
| X | Plan sheets submitted for recording shall include the following notes: <br> a. "This Site Plan shall be recorded in the Rockingham County Registry of Deeds." <br> b. "All improvements shown on this Site Plan shall be constructed and maintained in accordance with the Plan by the property owner and all future property owners. No changes shall be made to this Site Plan without the express approval of the Portsmouth Planning Director." <br> (2.13.3) | C2 | N/A |
| [] | Plan sheets showing landscaping and screening shall also include the following additional notes. <br> a. "The property owner and all future property owners shall be responsible for the maintenance, repair and replacement of all required screening and landscape materiais." <br> b. "All required plant materials shall be tended and maintained in a healthy growing condition, replaced when necessary, and kept free of refuse and debris. All required fences and walls shall be maintained in good repair." <br> c. "The property owner shall be responsible to remove and replace dead or diseased plant materials immediately with the same type, size and quantity of plant materials as originally installed, unless alternative plantings are requested, justified and approved by the Planning Board or Planning Director." <br> (2.13.4) | Landscaping Plans | N/A |


| Site Plan Specifications－Required Exhibits and Data |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
|  | 1．Existing Conditions：（2．5．4．3A） |  |  |
| 区 | a．Surveyed plan of site showing existing natural and built features； | C1 |  |
| X］ | b．Zoning boundaries； | C1 |  |
| X | c．Dimensional Regulations； | C2 |  |
| ［］ | d．Wetland delineation，wetland function and value assessment； | C1 |  |
| $\square$ | e．SFHA，100－year flood elevation line and BFE data． | N／A |  |
|  | 2．Buildings and Structures：（2．5．4．3B） |  |  |
| X | a．Plan view：Use，size，dimensions，fcotings，overhangs，1st fl． elevation； | Architectural Plans |  |
| 区 | b．Elevations：Height，massing，placernent，materials，lighting， façade treatments； | Architectural Plans |  |
| 区 | c．Total Floor Area； | Architectural Plans |  |
| 区 | d．Number of Usable Floors； | Architectural Plans |  |
| X | e．Gross floor area by floor and use． | Architectural Plans |  |
|  | 3．Access and Circulation：（2．5．4．3C） |  |  |
| W | a．Location／width of access ways within site； | C2 |  |
| X | b．Location of curbing，right of ways，edge of pavement and sidewalks； | C2 |  |
| 区 | c．Location，type，size and design of traffic signing（pavement markings）； | C2 |  |
| 区 | d．Names／layout of existing abutting streets； | OVR |  |
| 区 | e．Driveway curb cuts for abutting prop．and public roads； | OVR |  |
| $\square$ | f．If subdivision；Names of all roads，right of way lines and easements noted； | N／A |  |
| 区 | g．AASHTO truck turning templates，description of minimum vehicle allowed being a WB－50（unless otherwise approved by TAC）． | T1 |  |
|  | 4．Parking and Loading：（2．5．4．3D） |  |  |
| 区 | a．Location of off street parking／loading areas，landscaped areas／buffers； | C2 |  |
| 团 | b．Parking Calculations（\＃required and the \＃provided）． | C2 |  |
|  | 5．Water Infrastructure：（2．5－4．3E） |  |  |
| X | a．Size，type and location of water mains，shut－offs，hydrants \＆ Engineering data； | C4 |  |
| $\square$ | b．Location of wells and monitoring wells（include protective radii）． | N／A |  |
|  | 6．Sewer Infrastructure：（2．5．4．3F） |  |  |
| X | a．Size，type and location of sanitary sewage facilities \＆Engineering data． | C4－C5 |  |
|  | 7．Utilities：（2，5．4．3G） |  |  |
| 区 | a．The size，type and location of all above \＆below ground utilities； | C4 |  |
| 区 | b．Size type and location of generator pads，transformers and other fixtures． | C4 |  |


| Site Plan Specifications－Required Exhibits and Data |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| $\square$ | 8．Solid Waste Facilities：（2．5．4．3H） | N／A |  |
| $\square$ | a．The size，type and location of solid waste facilities． | N／A |  |
|  | 9．Storm water Management：（2．5．4．3I） |  |  |
| 8 | a．The location，elevation and layout of all storm－water drainage． | C3 |  |
|  | 10．Outdoor Lighting：（2．5．4．3J） |  |  |
| Q | a．Type and placement of all lighting（exterior of building， parking iot and any other areas of the site）and； <br> b．photometric plan． | L1 |  |
| 区 | 11．Indicate where dark sky friendly lighting measures have been implemented．（10．1） | L1 |  |
|  | 12．Landscaping：（2．5．4．3K） |  |  |
| X | a．Identify all undisturbed area，existing vegetation and that which is to be retained； | Landscaping Plan |  |
| 回 | b．Location of any irrigation system and water source． | Landscaping Plan |  |
|  | 13．Contours and Elevation：（2．5．4．3L） |  |  |
| 区 | a．Existing／Proposed contours（2 foot minimum）and finished grade elevations． | C3 |  |
|  | 14．Open Space：（2．5．4．3M） |  |  |
| 区 | a．Type，extent and location of all existing／proposed open space． | C2 |  |
| $\square$ | 15．All easements，deed restrictions and non－public rights of ways．（2．5．4．3N） |  |  |
| 区 | 16．Location of snow storage areas and／or off－site snow removal．（2．5．4．30） | C2 |  |
| $\square$ | 17．Character／Civic District（All following information shall be included）：（2．5．4．3Q） | N／A |  |
|  | a．Applicable Building Height（10．5A21．20 \＆10．5A43．30）； | N／A |  |
|  | b．Applicable Special Requirements（10．5A21．30）； | N／A |  |
|  | c．Proposed building form／type（10．5A43）； | N／A |  |
|  | d．Proposed community space（10．5A46）． | N／A |  |


| Other Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| 区 | Traffic Impact Study or Trip Generation Report，as required． （Four（4）hardcopies of the full study／report and Six（6）summaries to be submitted with the Site Plan Application）（3．2．1－2） |  |  |
| 区 | Indicate where Low Impact Development Design practices have been incorporated．（7．1） | C3 |  |
| $\square$ | Indicate whether the proposed development is located in a wellhead protection or aquifer protection area．Such determination shall be approved by the Director of the Dept．of Public Works．（7．3．1） | N／A |  |
| $\square$ | Indicate where measures to minimize impervious surfaces have been implemented．（7．4．3） |  |  |
| 区 | Caiculation of the maximum effective impervious surface as a percentage of the site．（7．4．3．2） | C2 |  |
| 区 | Stormwater Management and Erosion Control Plan． <br> （Four（4）hardicopies of the full plan／report and Six（6）summaries to be submitted with the Site Plan Application）（7．4．4．1） | W Sheets |  |


| Final Site Plan Approval Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| 区 | All local approvals，permits，easements and licenses required， including but not limited to： <br> a．Waivers； <br> b．Driveway permits； <br> c．Special exceptions； <br> d．Variances granted； <br> e．Easements； <br> f．Licenses． <br> （2．5．3．2A） |  |  |
| 区 | Exhibits，data，reports or studies that may have been required as part of the approval process，including but not limited to： <br> a．Calculations relating to stormwater runoff； <br> b．Information on composition and quantity of water demand and wastewater generated； <br> c．Information on air，water or land pollutants to be discharged，including standards，quantity，treatment and／or controls； <br> d．Estimates of traffic generation and counts pre－and post－ construction； <br> e．Estimates of noise generation； <br> f．A Stormwater Management and Erosion Control Plan； <br> g．Endangered species and archaeological／historical studies； <br> h．Wetland and water body（coastal and inland）delineations； <br> i．Environmental impact studies． <br> （2．5．3．2B） |  |  |

Final Site Plan Approval Required Information

| Final Site Plan Approval Required Information |  |  |  |
| :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Waiver Requested |
| 区 | A document from each of the required private utility service providers indicating approval of the proposed site plan and indicating an ability to provide all required private utilities to the site. (2.5.3.2D) | Pending |  |
|  | A list of any required state and federal permit applications required for the project and the status of same. <br> (2.5.3.2E) | Pending |  |
|  | nt's Signature: | $114 / 21$ |  |

## Letter of Authorization

IWe, Ricci Construction Co. Inc., John E. Ricci, President of $\underline{225}$ Banfield Road, Portsmouth, NH 03801, as owner of certain real property situated Portsmouth, NH further described as 45.25 acres +/- of land on Lafayette Road, Portsmouth, New Hampshire, as shown on Tax Assessors Map 297 Lot 11, and further defined by legal description found at the Rockingham County Registry of Deeds Book 1930, Page 0229, recorded on September 16, 1968, do hereby authorize Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers to act on my/our behalf and to appear before the zoning board of adjustment and/or the planning board of said city/town and/or any of its boards or commissions, in my/our behalf for the purpose of seeking any regulatory relief that may be requested by the person I/we have above authorized, including variances, special exceptions, dimensional waivers, site plan approval, lot line adjustment approval and development/subdivision approval, hereby ratifying any actions taken by him/her/them to obtain any such relief. I/We authorize Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers to act in my/our behalf in all matters concerning the development and approval process, without limitation, for the above stated property, to include any required signatures.

IN shall cooperate fully with Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers in seeking timely public approvals and for the completion of the sale contemplated herein. I/We agree to use my/our good faith efforts to provide any assistance $1 / w e$ reasonably can to Green \& Company Building and Development Corp. and its Affiliates, Agents, Assigns and Engineers throughout the development process, including but not limited to signing permit applications as needed.



Owner: John. Riccio, President
Ricci Construction Co. Inc.

Owner:


### 1930.230

Heirs of Charles Main, Helxs of Ezra H. Winchestar, and of any other partien Whom it may concern or who may have an interest fin the premices.
2. This decxee shall be recorded in Roelfngham County, Registry of Deeds.

Dated At Exeter, New Hantoshire, this 13th day of September ;
1068:
 Presiding Justice
r, सaerody:
friothess' Whereof 1 have hereunto set my hand and affixed the seal. of the Supentor Court this thirteenth day of Scptember, A.D. 1968.


| E \# 20066947 |  |  |  |
| :---: | :---: | :---: | :---: |
| Book 6201 Page 886 |  |  |  |
| Register of Deeds, Rockingham County |  |  |  |
| Cathy Aun Seacey |  |  |  |
|  |  |  |  |
| O |  |  |  |
| LCHIP |  | ROA530574 | 25.00 |
| RECORDING |  |  | 14.00 |
| SURCHARGE |  |  | 2.00 |

## QUITCLAIM DEED

KNOW ALL MEN BY THESE PRESENTS, that I, Joanne M. Grasso, an unmarried person having an address of 14 Nixon Park, Portsmouth, NH 03801, grant to Ricci Construction Co., Inc., a New Hampshire corporation having an address of 225 Banfield Road, Portsmouth, New Hampshire 03801 for no consideration and with QUITCLAIM COVENANTS, the following property:

Two certain parcels of land situate on the northwesterly side of Lafayette Road in Portsmouth, County of Rockingham and State of New Hampshire, and being bounded and described as follows:

Parcel No 1. Beginning at the northerly corner of Lot No. 5 on Portsmouth Assessor's Plan No. 216, which said point is 635 feet, more or less, northwesterly from Lafayette Road, and thence running southwesterly by said Lot No. 5, a distance of 295 feet to a corner; thence turning and running northwesterly by said Lot No. 5 and by land of owners unknown, 580 feet to a corner; thence turning and running northerly 153 feet to a corner; thence turning and running northeasterly 166 feet to Lot No. 3 on said Assessor's Plan; thence turning and running southeasterly by said Lot No. 3, a distance of 670 feet to the point of beginning.

Parcel No. 2. Beginning on the northwesterly side of Lafayette Road, so-called at the easterly corner of Lot No. 5 on Portsmouth Assessor's Plan No. 216, and thence running northwesterly by said Lot No. 5 a distance of 635 feet, and continuing in the same direction by Lot No. 4 a distance of 670 feet to a corner; thence turning and running northeasterly 141 feet to Lot No. 2 on said Assessor's Plan; thence turning and running southeasterly by said Lot No. 2 a distance of 1278 feet to said Lafayette Road, thence turning and running southwesterly by said Lafayette Road, 66 feet to the point of beginning.

Meaning and intending to describe and convey all of my right, title and interest in the aforementioned property obtained by be through the Estate of Erminio A. Ricci who deceased on January 12, 1982 (see Rockingham County Probate Court Docket Number 55880. See also Decree dated September 13, 1968 and recorded at the Rockingham County Registry of Deeds at Book 1930, Page 229.

## THIS IS A NON-CONTRACTUAL TRANSFER. THIS IS NOT HOMESTEȦD PROPERTY.

Witness my hand this $\qquad$ day of November 2020.


STATE OF NEW HAMPSHIRE COUNTY OF ROCKINGHAM

November 18 , 2020

Personally appeared before me, the above named Joanne M. Grasso, known to me to be the person whose name is subscribed to the within instrument and acknowledged that she executed same for the purposes therein contained. In witness whereof I hereunto set my hand and official seal.


## CONSERVATION EASEMENT DEED

## NOW COMES GREEN \& COMPANY BUILDING \& RESTORATION

 CORP., a Massachusetts corporation having principal office address of 11 Lafayette Road, North Hampton, New Hampshire 03862 (the "Grantor"), for consideration paid, grants to THE CITY OF PORTSMOUTH, a municipality whose address is 1 Junkins Way, Portsmouth, New Hampshire 03801 (the "Grantee"), with Quitclaim Covenants:A CONSERVATION EASEMENT over certain land of the Grantor in Portsmouth, County of Rockingham, State of New Hampshire, said easement areas being shown on a plan (the "Plan") prepared by Jones \& Beach Engineers, Inc., entitled, "Residential Condominiums, Tax Map 297 Lot 11, 3400 Lafayette Road, Portsmouth, New Hampshire, County of Rockingham, Owned By Ricci Construction Co., Inc." dated _ 2021, and recorded at the Rockingham County Registry of Deeds as Plan _ . The "Easement Area" is depicted as "Conservation Easement Area " on the Plan, and are more particularly bounded and described on the Plan as follows:

## Conservation Easement Area :

This easement area contains 10.31 acres, more or less

This CONSERVATION EASEMENT is granted to the City of Portsmouth and the public, for the purpose of preserving and protecting in perpetuity the natural vegetation, soils, hydrology, natural habitat and scenic and aesthetic character of the Property so that the Property retains its natural qualities and functions.

This easement shall run with the land and shall be binding upon the Grantor and the Grantee and their respective heirs, successors and assigns.

For reference to the Grantor's title, see $\qquad$ .

Signed this $\qquad$ day of $\qquad$ 2021.

Green \& Company Building \& Restoration Corp.

By:
Richard W. Green, President

## STATE OF NEW HAMPSHIRE

COUNTY OF ROCKINGHAM
The foregoing instrument was acknowledged before me on by Richard W. Green, President of Green \& Company Building \& Restoration Corp.

Before me,

Notary Public
My commission expires:

## DRAINAGE ANALYSIS

## SEDIMENT AND EROSION CONTROL PLAN

Prepared for:
Residential Condominiums
Tax Map 297, Lot 11
3400 LaFayette Road
Portsmouth, NH 03801


May 14, 2021
Revised May 27, 2021

## 1. EXECUTIVE SUMMARY

Green and Company proposes to construct a 50 -unit multi-family residential development on a $\pm 45.25$ acre parcel of land located on the west side of Lafayette Road (Route 1) in Portsmouth, NH. A drainage analysis of the entire site and its offsite contributing watershed areas was conducted for the purpose of estimating the peak rate of stormwater runoff and to subsequently design adequate drainage structures. Two models were compiled, one for the area in its existing (pre-construction) condition, and a second for its proposed (post-construction) condition. A summary of the existing and proposed conditions peak rates of runoff is as follows:

| COMPONENT | PEAK DISCHARGE COMPARISON |  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2 Year |  | 10 Year |  | 25 Year |  | 50 Year |  |
|  | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| Analysis Point \#1 | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 |
| Analysis Point \#2 | 2.04 | 0.72 | 7.53 | 4.14 | 13.00 | 8.43 | 18.65 | 13.18 |

The drainage design intent for this site is to maintain the post-development peak flow to the predevelopment peak flow conditions to the extent practicable and to effectively treat stormwater from the development of this site. This has been accomplished through the use of a wet pond with a forebay, a bioretention area and roof drip edges to maintain the peak discharge and effectively treat stormwater exiting the site.

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## SITE COORDINATES: $43^{\circ} 01^{\prime} 22^{\prime \prime} \mathrm{N}, 70^{\circ} 47^{\prime} 57^{\prime \prime} \mathrm{W}$ GRAPHIC SCALE


( IN FEET )
1 inch $=2000 \mathrm{ft}$.

| Drawing Name: | USGS |
| :--- | :--- |
| Project: RESIDENTIAL CONDOMINIUMS |  |
| RICCI CONSTRUCTION CO., INC. |  |
| Owner of Record: 225 BANFIELD ROAD, PORTSMOUTH, NH |  |

Soil Map-Rockingham County, New Hampshire


## Map Unit Legend

| Map Unit Symbol |  | Map Unit Name | Acres in AOI |
| :--- | :--- | ---: | ---: |
| 26B | Windsor loamy sand, 3 to 8 <br> percent slopes | 1.6 | Percent of AOI |
| 299 | Udorthents, smoothed | 10.7 | $7.1 \%$ |
| 510 B | Hoosic gravelly fine sandy <br> loam, 3 to 8 percent slopes | 2.7 | $48.3 \%$ |
| 538A | Squamscott fine sandy loam, 0 <br> to 5 percent slopes | 5.0 | $12.2 \%$ |
| 699 | Urban land | 2.1 | $22.8 \%$ |
| Totals for Area of Interest |  | 22.1 | $9.7 \%$ |

## 4. DRAINAGE ANALYSIS

### 4.1 METHODOLOGY

This drainage report includes an existing conditions analysis of the area involved in the proposed development, as well as a proposed condition, or post-construction analysis, of the same location. These analyses were accomplished using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. The curve numbers were developed using the SCS TR-55 Runoff Curve numbers for Urban Areas. A Type III SCS 24-hour rainfall distribution was utilized in analyzing the data for the 2 Year - 24 Hour (3.74"), 10 Year - 24 Hour (5.67"), 25 Year - 24 Hour (7.19") and 50 Year -24 Hour ( 8.61 "). This data was taken from the Extreme Precipitation Tables developed by the Northeast Regional Climate Center (NRCC), and the values have been increased by $15 \%$ due to the project being within the Coastal/Great Bay Region.

### 4.2 EXISTING CONDITIONS ANALYSIS

The study area consists of the subject property and upstream contributing area. The study area contains 8.387 acres including offsite contributing areas. The existing site is currently used for logging operations and has a gravel access drive and cleared areas. The existing site is fairly flat with a small portion in the northeast corner draining to a low spot near Lafayette Road and the remainder draining to the rear of the property into a large wetland complex, resulting in two (2) Analysis Points.

The majority of the soils for this site are described as Hydrological Soils "A" and "B", with a smaller section of "C", and an even smaller section of "D" soil.

Two (2) Analysis Points (AP's) were defined for this project.
Analysis Point \#1 is defined as an existing catch basin (CB 2177) located to the southwest adjacent to Lafayette Road. Runoff drains to a low point in the northeast corner of the property near Lafayette Road. This low point then drains to AP \#1 once the water level reaches the height of the catch basin rim. Due to the existing area available for detention at the low point coupled with the relatively small drainage area, runoff from the site does not reach AP \#1 under all analyzed storm events.

Analysis Point \#2 is defined as a large wetland complex located in the western portion of the site. Flow from portions of the existing abutter buildings located between this site and Lafayette Road along with the site runoff makes its way across the site and into the large wetland complex.

### 4.3 PROPOSED CONDITIONS ANALYSIS

The proposed site includes the construction of a 50 -unit multi-family residential development with associated parking, utilities, and drainage.

Drainage from the first $30^{\prime}$ of the entrance drive will drain to Analysis Point 1, along with a portion of the area draining to this point in the existing conditions. As in the existing condition, due to the large existing area available for detention at the low point coupled with the relatively small drainage area, runoff from the site does not reach AP \#1 under all analyzed storm events.

Drainage along the entrance drive, from station $0+30$ to station $4+50$, sheet flows to a curb break at the low point station $1+45$ which discharges to a proposed wet pond (20P). Drainage along the entrance
drive, from station $4+50$ to station $7+50$, is collected in a closed drainage system, including deep sump hooded catch basins, is directed to the same wet pond (20P). Discharge from the proposed wet pond enters the existing wetland system (AP 2).

Drainage along the entrance drive, from Station $7+50$ to Sta $8+00$, including a portion of the proposed loop road, to deep sump hooded catch basins located at loop road Sta. $2+30.5$, and main road Sta. $9+00$. This catch basin discharges to a proposed bioretention area located behind the units that are at the end of the roadway. This bioretention area drains to Analysis Point 2.

The rear half of all roof areas will be directed to drip edges located adjacent to the units. The proposed drip edges will be 3 ' wide by 4 ' deep.

### 4.4 CONCLUSION

This proposed site development will have minimal effect on abutting infrastructures or properties by way of stormwater runoff or siltation. Peak runoff rate from the proposed site has been maintained to the existing conditions peak rate to the extent practicable. Treatment is obtained through the use of deep sump hooded catch basins, a wet basin with forebay, and a bioretention pond with forebay as described above.

The area of disturbance is greater than 100,000 square feet and will require an NHDES Alteration of Terrain Permit.

## Respectfully Submitted,

JONES \& BEACH ENGINEERS, INC.


Michael Kerivan, P.E.
Project Engineer

# 4.5 EXISTING CONDITIONS ANALYSIS APPENDIX I 

2 Year - 24 Hour Summary
10 Year - 24 Hour Complete
25 Year - 24 Hour Summary
50 Year - 24 Hour Summary


## Subcatchment 1S

Analysis Point \#1


2R

Analysis Point \#2


## Area Listing (all nodes)

| Area <br> (acres) | CN | Description <br> (subcatchment-numbers) |
| ---: | :--- | :--- |
| 1.112 | 39 | $>75 \%$ Grass cover, Good, HSG A (1S, 2S) |
| 0.644 | 61 | $>75 \%$ Grass cover, Good, HSG B (1S, 2S) |
| 0.095 | 74 | $>75 \%$ Grass cove, Good, HSG C (2S) |
| 0.026 | 80 | $>75 \%$ Grass cover, Good, HSG D (2S) |
| 0.113 | 96 | Gravel surface, HSG A (2S) |
| 0.421 | 96 | Gravel surface, HSG B (1S, 2S) |
| 0.003 | 96 | Gravel surface, HSG D (2S) |
| 0.639 | 98 | Paved roads w/curbs \& sewers, HSG B (1S, 2S) |
| 0.004 | 98 | Roofs, HSG A (2S) |
| 0.222 | 98 | Roofs, HSG B (1S, 2S) |
| 1.673 | 30 | Woods, Good, HSG A (1S, 2S) |
| 2.656 | 55 | Woods, Good, HSG B (1S, 2S) |
| 0.663 | 70 | Woods, Good, HSG C (2S) |
| 0.115 | 77 | Woods, Good, HSG D (2S) |
| 8.387 | 57 | TOTAL AREA |

## 20737_EX CONDITION

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## Soil Listing (all nodes)

| Area <br> (acres) | Soil <br> Group | Subcatchment <br> Numbers |
| ---: | :--- | :--- |
| 2.903 | HSG A | $1 \mathrm{~S}, 2 \mathrm{~S}$ |
| 4.582 | HSG B | $1 \mathrm{~S}, 2 \mathrm{~S}$ |
| 0.758 | HSG C | 2S |
| 0.144 | HSG D | 2S |
| 0.000 | Other |  |
| 8.387 |  | TOTAL AREA |

Time span $=0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
Subcatchment 1S: Subcatchment 1S
Runoff Area $=49,203$ sf $3.67 \%$ Impervious Runoff Depth $>0.35{ }^{\text {" }}$ Flow Length $=340^{\circ}$ Tc=21.1 min $\mathrm{CN}=53$ Runoff $=0.16 \mathrm{cfs} 0.033$ af

Subcatchment 2S: Subcatchment 2S Runoff Area=316,130 sf $11.36 \%$ Impervious Runoff Depth $>0.55^{\prime \prime}$ Flow Length=565' Slope=0.0200 '/f Tc=23.5 min CN=58 Runoff=2.04 cfs 0.330 af

Reach 1R: Analysis Point \#1

Reach 2R: Analysis Point \#2
Inflow=2.04 cfs 0.330 af Outflow=2.04 cfs 0.330 af

Pond 1P: Front depression
Peak Elev=52.23' Storage=1,449 cf Inflow=0.16 cfs 0.033 af Outflow $=0.00 \mathrm{cfs} 0.000$ af

Total Runoff Area $=8.387$ ac Runoff Volume $=0.364$ af Average Runoff Depth $=0.52^{\prime \prime}$ $89.68 \%$ Pervious $=7.521$ ac $10.32 \%$ Impervious $=0.866$ ac

Time span $=0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
Subcatchment 1S: Subcatchment 1S Runoff Area=49,203 sf $3.67 \%$ Impervious Runoff Depth $>1.18$ " Flow Length=340' $\mathrm{Tc}=21.1 \mathrm{~min} \mathrm{CN}=53$ Runoff $=0.85 \mathrm{cfs} 0.111$ af

Subcatchment 2S: Subcatchment 2S Runoff Area=316,130 sf $11.36 \%$ Impervious Runoff Depth $>1.54$ " Flow Length=565' Slope=0.0200 '/ Tc=23.5 min CN=58 Runoff=7.53 cfs 0.934 af

Reach 1R: Analysis Point \#1

Reach 2R: Analysis Point \#2

Pond 1P: Front depression
Peak Elev=52.64' Storage=4,843 cf Inflow=0.85 cfs 0.111 af Outflow=0.00 cfs 0.000 af

Total Runoff Area $=8.387$ ac Runoff Volume $=1.045$ af Average Runoff Depth $=1.50^{\prime \prime}$
$89.68 \%$ Pervious $=7.521$ ac $10.32 \%$ Impervious $=0.866$ ac

## Summary for Subcatchment 1S: Subcatchment 1S

Runoff $=0.85 \mathrm{cfs} @ 12.35 \mathrm{hrs}$, Volume= $\quad 0.111$ af, Depth> $1.18^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"


## Summary for Subcatchment 2S: Subcatchment 2S

Runoff $=\quad 7.53 \mathrm{cfs} @ 12.37$ hrs, Volume= 0.934 af, Depth> 1.54"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN D | Description |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 26,803 | 98 P | Paved roads w/curbs \& sewers, HSG B |  |  |  |
| 4,917 | 96 | Gravel surface, HSG A |  |  |  |
| 15,867 | 96 G | Gravel surface, HSG B |  |  |  |
| 134 | 96 | Gravel surface, HSG D |  |  |  |
| 191 | 98 R | Roofs, HSG A |  |  |  |
| 8,903 | 98 R | Roofs, HSG B |  |  |  |
| 47,092 | $39>$ | >75\% Grass cover, Good, HSG A |  |  |  |
| 21,243 | $61>$ | >75\% Grass cover, Good, HSG B |  |  |  |
| 4,130 | $74>$ | >75\% Grass cover, Good, HSG C |  |  |  |
| 1,130 | $80>$ | >75\% Grass cover, Good, HSG D |  |  |  |
| 60,710 | 30 | Woods, Good, HSG A |  |  |  |
| 91,089 | 55 | Woods, Good, HSG B |  |  |  |
| 28,895 | 70 | Woods, Good, HSG C |  |  |  |
| 5,026 | 77 | Woods, Good, HSG D |  |  |  |
| $\begin{array}{r} 316,130 \\ 280,233 \\ 35,897 \end{array}$ | 58 | Weighted Average 88.64\% Pervious Area 11.36\% Impervious Area |  |  |  |
| Tc Length (min) (feet) | Slope (ftfft) | Velocity (ft/sec) | Capacity (cfs) | Description |  |
| 11.450 | 0.0200 | 0.07 |  | Sheet Flow, |  |
| 12.1515 | 0.0200 | - 0.71 |  | Woods: Light underbrush n= 0.400 Shallow Concentrated Flow, Woodland $\mathrm{Kv}=5.0 \mathrm{fps}$ | $\mathrm{P} 2=3.74{ }^{\prime \prime}$ |
| 23.5565 | Total |  |  |  |  |

## Summary for Reach 1R: Analysis Point \#1

[40] Hint: Not Described (Outflow=inflow)

| Inflow Area $=$ | 1.130 ac, | $3.67 \%$ Impervious, Inflow Depth $=0.00 "$ for $10-$ YR STORM event |  |
| :--- | :--- | :--- | :--- |
| Inflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ |
| Outflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ |
|  |  | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= $0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}$

## Summary for Reach 2R: Analysis Point \#2

[40] Hint: Not Described (Outflow=Inflow)

| Inflow Area $=$ | $7.257 \mathrm{ac}, 11.36 \%$ Impervious, Inflow Depth $>1.54 "$ for $10-Y R ~ S T O R M ~ e v e n t ~$ |  |  |
| :--- | :--- | :--- | :--- |
| Inflow | $=$ | 7.53 cfs @ 12.37 hrs , Volume= | 0.934 af |
| Outflow | $=$ | $7.53 \mathrm{cfs} @ 12.37 \mathrm{hrs}$, Volume $=$ | 0.934 af , Atten= $0 \%$, Lag $=0.0 \mathrm{~min}$ |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, $\mathrm{dt}=0.05 \mathrm{hrs}$

## Summary for Pond 1P: Front depression

| Inflow Area $=$ | 1.130 ac, | $3.67 \%$ | Impervious, Inflow Depth > $1.18 "$ | for $10-$ YR STORM event |
| :--- | :--- | :--- | :--- | :--- |
| Inflow | $=$ | $0.85 \mathrm{cfs} @$ | 12.35 hrs , Volume $=$ | 0.111 af |
| Outflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ | 0.000 af , Atten= $=100 \%$, Lag $=0.0 \mathrm{~min}$ |
| Primary | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ | 0.000 af |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev=52.64' @ 24.00 hrs Surf.Area= 9,431 sf Storage $=4,843$ cf
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time $=$ (not calculated: no outflow)


Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=52.00' TW=0.00' (Dynamic Tailwater)
廿1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

Time span $=0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
Subcatchment 1S: Subcatchment 1S
Runoff Area=49,203 sf $3.67 \%$ Impervious Runoff Depth>2.04" Flow Length $=340^{\prime} \quad \mathrm{Tc}=21.1 \mathrm{~min} \mathrm{CN}=53$ Runoff=1.64 cfs 0.192 af

Subcatchment 2S: Subcatchment 2 S
Runoff Area=316,130 sf $11.36 \%$ Impervious Runoff Depth $>2.52^{\prime \prime}$ Flow Length=565' Slope=0.0200 '/ Tc=23.5 $\mathrm{min} \quad \mathrm{CN}=58$ Runoff=13.00 cfs 1.527 af

Reach 1R: Analysis Point \#1

Reach 2R: Analysis Point \#2
Inflow $=0.00 \mathrm{cfs} 0.000$ af Outflow=0.00 cfs 0.000 af

Inflow=13.00 cfs 1.527 af Outflow=13.00 cfs 1.527 af

Pond 1P: Front depression
Peak Elev=52.98' Storage $=8,370 \mathrm{cf}$ Inflow=1.64 cfs 0.192 af Outflow=0.00 cfs 0.000 af

Total Runoff Area $=8.387$ ac Runoff Volume $=1.719$ af Average Runoff Depth $=2.46$ " $89.68 \%$ Pervious $=7.521$ ac $10.32 \%$ Impervious $=0.866$ ac

Time span= $=0.00-24.00 \mathrm{hrs}, \mathrm{dt}=0.05 \mathrm{hrs}, 481$ points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment 1 S
Runoff Area=49,203 sf $3.67 \%$ Impervious Runoff Depth $>2.96$ " Flow Length=340' $\mathrm{Tc}=21.1 \mathrm{~min} \mathrm{CN}=53$ Runoff= 2.47 cfs 0.279 af

## Subcatchment 2S: Subcatchment 2S

Flow Length=565'
Reach 1R: Analysis Point \#1

Reach 2R: Analysis Point \#2

Pond 1P: Front depression

Runoff Area=316,130 sf $11.36 \%$ Impervious Runoff Depth $>3.54$ " Slope $=0.0200 \mathrm{l} /$ ' Tc=23.5 $\mathrm{min} \quad \mathrm{CN}=58$ Runoff=18.65 cfs 2.142 af

Inflow $=0.00 \mathrm{cfs} 0.000$ af Outflow=0.00 cfs 0.000 af

Inflow=18.65 cfs 2.142 af Outflow $=18.65 \mathrm{cfs} 2.142$ af

Peak Elev=53.27' Storage=12,134 cf Inflow=2.47 cfs 0.279 af Outflow $=0.00$ cfs 0.000 af

Total Runoff Area $=8.387$ ac Runoff Volume $=2.421$ af Average Runoff Depth $=3.46^{\prime \prime}$
89.68\% Pervious $=7.521$ ac $10.32 \%$ Impervious $=0.866$ ac

# 4.6 PROPOSED CONDITIONS ANALYSIS APPENDIX II 

2 Year - 24 Hour Summary
10 Year - 24 Hour Complete
25 Year - 24 Hour Summary
50 Year - 24 Hour Summary


## Area Listing (all nodes)

| $\begin{array}{r} \text { Area } \\ \text { (acres) } \end{array}$ | CN | Description (subcatchment-numbers) |
| :---: | :---: | :---: |
| 1.715 | 39 | >75\% Grass cover, Good, HSG A (10S, 22S, 24S, 25S, $26 \mathrm{~S}, 27 \mathrm{~S}$ ) |
| 1.553 | 61 | >75\% Grass cover, Good, HSG B ( $10 \mathrm{~S}, 20 \mathrm{~S}, 21 \mathrm{~S}, 22 \mathrm{~S}, 24 \mathrm{~S}, 27 \mathrm{~S}$ ) |
| 0.317 | 74 | >75\% Grass cover, Good, HSG C (21S, 25S, 26S, 27S) |
| 0.024 | 80 | >75\% Grass cover, Good, HSG D (22S, 27S) |
| 0.309 | 98 | Paved roads w/curbs \& sewers, HSG A (22S, 24S, 25S, 26S, 27S) |
| 1.461 | 98 | Paved roads w/curbs \& sewers, HSG B (10S, 20S, 21S, 22S, 23S, 24S, 25S) |
| 0.320 | 98 | Paved roads w/curbs \& sewers, HSG C (24S, 25S, 26S) |
| 0.003 | 98 | Paved roads w/curbs \& sewers, HSG D (27S) |
| 0.181 | 98 | Roofs, HSG A (1_2S, 3_5S, 12_15S, 16_19S, 20_22S, 22S, 24S, 25S, 26S) |
| 0.767 | 98 | Roofs, HSG B ( $6 \_11 \mathrm{~S}, 10 \mathrm{~S}, 12 \_15 \mathrm{~S}, 20 \mathrm{~S}, 21 \mathrm{~S}, 22 \mathrm{~S}, 23 \mathrm{~S}, 24 \mathrm{~S}, 25 \mathrm{~S}, 27 \_30 \mathrm{~S}$, 31_35S, 36_38S, 39_44S, 45_50S) |
| 0.112 | 98 | Roofs, HSG C (20_22S, 23_26S, 24S, 25S, 26S) |
| 0.008 | 98 | Roofs, HSG D (3_5S, 22S) |
| 0.068 | 98 | Water Surface, HSG A (1_2S, 3_5S, 12_15S, 16_19S, 20_22S, 22S) |
| 0.050 | 98 | Water Surface, HSG B (6_11S, 12_15S, 22S, 27_30S, 31_35S, 36_38S, 39_44S, 45_50S) |
| 0.009 | 98 | Water Surface, HSG C (20_22S, 23_26S) |
| 0.001 | 98 | Water Surface, HSG D (3_5S) |
| 0.630 | 30 | Woods, Good, HSG A (10S, 22S, 27S) |
| 0.751 | 55 | Woods, Good, HSG B (10S, 27S) |
| 0.108 | 77 | Woods, Good, HSG D (21S, 27S) |
| 8.387 | 69 | TOTAL AREA |

## Soil Listing (all nodes)

| $\begin{array}{r} \text { Area } \\ \text { (acres) } \\ \hline \end{array}$ | Soil Group | Subcatchment Numbers |
| :---: | :---: | :---: |
| 2.903 | HSG A | 1_2S, 3_5S, 10S, 12_15S, 16_19S, 20_22S, 22S, 24S, 25S, 26S, 27 S |
| 4.582 | HSG B | $\begin{aligned} & \text { 6_11S, 10S, 12_15S, 20S, 21S, 22S, 23S, 24S, 25S, 27S, 27_30S, 31_35S, } \\ & 36 \_38 \mathrm{~S}, 39 \_44 \mathrm{~S}, 45 \_50 \mathrm{~S} \end{aligned}$ |
| 0.758 | HSG C | 20_22S, 21S, 23_26S, $24 \mathrm{~S}, 25 \mathrm{~S}, 26 \mathrm{~S}, 27 \mathrm{~S}$ |
| 0.144 | HSG D | 3_5S, 21S, 22S, 27 S |
| 0.000 | Other |  |
| 8.387 |  | TOTAL AREA |

Time span $=0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}, 3001$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method
Subcatchment 1_2S: Roof 1_2
Subcatchment 3_5S: Roof 3_5
Subcatchment 6_11S: Roof 6_11
Subcatchment 10S: Subcatchment 10S
Flow Length $=280^{\circ}$

Subcatchment 12_15S: Roof 12_15

Subcatchment 16_19S: Roof 16_18

Subcatchment 20S: Subcatchment 20S

Subcatchment 20_22S: Roof 20_22

Subcatchment 21S: Subcatchment 21S

Subcatchment 22S: Subcatchment 22S

Subcatchment 23S: Subcatchment 23S

Subcatchment 23_26S: Roof 23_26

Subcatchment 24S: Subcatchment 24 S

Subcatchment 25S: Subcatchment $26 S$

Subcatchment 26S: Subcatchment $26 S$

Subcatchment 27S: Subcatchment 27 S

Runoff Area $=776$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.06 \mathrm{cfs} 0.005$ af

Runoff Area $=1,224$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.10 \mathrm{cfs} 0.008$ af

Runoff Area=2,904 sf $100.00 \%$ Impervious Runoff Depth $=3.51$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.24 \mathrm{cfs} 0.019$ af

Runoff Area $=29,654$ sf $6.99 \%$ Impervious Runoff Depth=0.59" Slope $=0.0100$ ' $/$ ' Tc=22.8 $\mathrm{min} \quad \mathrm{CN}=59$ Runoff $=0.22 \mathrm{cfs} 0.034$ af

Runoff Area $=1,932$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{1 "}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.16 \mathrm{cfs} 0.013$ af

Runoff Area=2,040 sf $100.00 \%$ Impervious Runoff Depth=3.51" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.17 \mathrm{cfs} 0.014$ af

Runoff Area=18,078 sf 20.06\% Impervious Runoff Depth=1.04" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=68$ Runoff $=0.46 \mathrm{cfs} 0.036$ af

Runoff Area $=1,440$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{1 "}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.12 \mathrm{cfs} 0.010$ af

Runoff Area=61,821 sf $49.16 \%$ Impervious Runoff Depth $=1.90^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=81$ Runoff $=3.17 \mathrm{cfs} 0.225$ af

Runoff Area=42,220 sf $50.92 \%$ Impervious Runoff Depth=1.34" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=73$ Runoff=1.47 cfs 0.109 af

Runoff Area=12,524 sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=1.05 cfs 0.084 af

Runoff Area $=1,920$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{1 "}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.16 \mathrm{cfs} 0.013$ af

Runoff Area $=31,941$ sf $82.12 \%$ Impervious Runoff Depth $=2.67$ " $\mathrm{T}=6.0 \mathrm{~min} \quad \mathrm{CN}=90$ Runoff $=2.26 \mathrm{cfs} 0.163$ af

Runoff Area=15,080 sf $71.23 \%$ Impervious Runoff Depth $=2.67{ }^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=90$ Runoff $=1.07 \mathrm{cfs} 0.077$ af

Runoff Area $=14,100$ sf $88.87 \%$ Impervious Runoff Depth $=3.07^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=94$ Runoff $=1.10 \mathrm{cfs} 0.083$ af

Runoff Area $=117,023$ sf $0.62 \%$ Impervious Runoff Depth $=0.08$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=43$ Runoff=0.03 cfs 0.019 af

Subcatchment 27_30S: Roof 27_30

Subcatchment 31_35S: Roof 31_35

Subcatchment 36_38S: Roof 36_38

Subcatchment 39_44S: Roof 39_44

Subcatchment 45_50S: Roof 45_50

Reach 1R: Analysis Point \#1

## Reach 2R: Analysis Point \#2

## Reach 10R: HW 1

Avg. Flow Depth $=0.29^{\prime}$ Max Vel $=2.45 \mathrm{fps}$ Inflow=0.46 cfs 0.036 af
$12.0^{\prime \prime}$ Round Pipe $n=0.013 \mathrm{~L}=40.0^{\prime} \quad \mathrm{S}=0.0050$ '/' Capacity $=2.52 \mathrm{cfs}$ Outflow=0.46 cfs 0.036 af

## Pond 1P: DMH 1

Pond 1_2P: Roof 1_2
Peak Elev=53.44' Storage=56 cf Inflow=0.06 cfs 0.005 af Discarded $=0.02 \mathrm{cfs} 0.005$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.02 \mathrm{cfs} 0.005 \mathrm{af}$

## Pond 2P: BIORETENTION 1

Peak Elev=49.94' Storage=1,680 cf Inflow=2.17 cfs 0.160 af Discarded $=0.78$ cfs 0.170 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.78 \mathrm{cfs} 0.170$ af

Pond 11P: CB 2

Runoff Area $=1,932$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.16 \mathrm{cfs} 0.013$ af

Runoff Area $=2,424$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\text {" }}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.20 \mathrm{cfs} 0.016$ af

Runoff Area $=1,464$ sf $100.00 \%$ Impervious Runoff Depth $=3.51$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.12 \mathrm{cfs} 0.010$ af

Runoff Area $=2,412$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.20 \mathrm{cfs} 0.016$ af

Runoff Area $=2,412$ sf $100.00 \%$ Impervious Runoff Depth $=3.51^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.20 \mathrm{cfs} 0.016$ af Inflow=0.00 cfs 0.000 af Outflow $=0.00 \mathrm{cfs} 0.000$ af

Inflow $=0.72 \mathrm{cfs} 0.405$ af Outflow= 0.72 cfs 0.405 af

Peak Elev=55.03' Inflow=2.71 cfs 0.199 af 12.0" Round Culvert $n=0.013$ L=60.0' $\mathrm{S}=0.0272$ ' $/$ Outflow=2.71 cfs 0.199 af
Discarded $=0.78$ cfs 0.170 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow=0.78 cfs 0.170 af

Pond 3P: Front depression

Pond 3_5P: Roof 3_5

Pond 4P: DMH 4

Pond 5P: DMH 5

Pond 6_11P: Roof 6_11

Peak Elev=54.16' Storage=213 cf Inflow=0.24 cfs 0.019 af Discarded $=0.05 \mathrm{cfs} 0.019$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.05 \mathrm{cfs} 0.019$ af

Peak Elev=52.23' Storage=1,468 cf Inflow=0.22 cfs 0.034 af Outflow $=0.00 \mathrm{cfs} 0.000$ af

Peak Elev=52.96' Storage=79 cf Inflow=0.10 cfs 0.008 af Discarded $=0.03$ cfs 0.008 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.008$ af

Peak Elev=52.33' Inflow=1.05 cfs 0.084 af 12.0" Round Culvert $n=0.013 \mathrm{~L}=142.0^{\prime} \mathrm{S}=0.0050$ '/' Outflow=1.05 cfs 0.084 af

Peak Elev=51.99' Inflow=2.71 cfs 0.199 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=40.0^{\prime} \mathrm{S}=0.0050 \mathrm{f} \%$ Outflow=2.71 cfs 0.199 af

Peak Elev=52.76' Inflow=1.05 cfs 0.084 af 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=58.0$ ' $\mathrm{S}=0.0050$ ' $/$ ' Outflow=1.05 cfs 0.084 af

Peak Elev=55.34' Inflow=2.26 cfs 0.163 af 15.0" Round Culvert $n=0.013 \mathrm{~L}=176.0^{\prime} \quad \mathrm{S}=0.0050$ '// Outflow=2.26 cfs 0.163 af

Peak Elev=57.29' Storage=156 cf Inflow=0.16 cfs 0.013 af Discarded $=0.03 \mathrm{cfs} 0.013$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow= 0.03 cfs 0.013 af

Peak Elev=52.77' Inflow=2.71 cfs 0.199 af 15.0" Round Culvert $n=0.013 \mathrm{~L}=136.0^{\prime} \mathrm{S}=0.0050 \mathrm{l} /$ ' Outflow=2.71 cfs 0.199 af Pond 16_19P: Roof 16_19

Peak Elev=57.32' Storage=166 cf Inflow=0.17 cfs 0.014 af Discarded $=0.03$ cfs 0.014 af Primary= 0.00 cfs 0.000 af Outflow= 0.03 cfs 0.014 af

## Pond 20P: WET POND 1

Peak Elev=51.88' Storage=16,759 cf Inflow=5.23 cfs 0.392 af Outflow= 0.71 cfs 0.387 af

Pond 20_22P: Roof 20_22
Peak Elev=57.35' Storage=118 cf Inflow=0.12 cfs 0.010 af Discarded $=0.02 \mathrm{cfs} 0.010$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.02 \mathrm{cfs} 0.010$ af

Peak Elev=57.36' Storage=158 cf Inflow=0.16 cfs 0.013 af Discarded $=0.03$ cfs 0.013 af Primary $=0.00$ cfs 0.000 af Outflow $=0.03 \mathrm{cfs} 0.013$ af

Peak Elev=57.29' Storage=156 cf Inflow=0.16 cfs 0.013 af Discarded $=0.03$ cfs 0.013 af Primary $=0.00$ cfs 0.000 af Outflow=0.03 cfs 0.013 af

Peak Elev=58.27' Storage=197 cf Inflow=0.20 cfs 0.016 af Discarded $=0.03$ cfs 0.016 af Primary $=0.00$ cfs 0.000 af Outflow=0.03 cfs 0.016 af
Pond 36_38P: Roof 36_38

Peak Elev=56.88' Storage=105 cf Inflow=0.12 cfs 0.010 af Discarded $=0.02$ cfs 0.010 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.02 \mathrm{cfs} 0.010$ af

Peak Elev=55.70' Storage=205 cf Inflow=0.20 cfs 0.016 af Discarded $=0.03 \mathrm{cfs} 0.016$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.016$ af

## Pond 40P: LOW POINT

Peak Elev=53.45' Storage=9,813 cf Inflow=3.17 cfs 0.225 af 15.0" Round Culvert n=0.013 L=93.0' S=0.0049 '/' Oufflow=0.00 cfs 0.000 af

Peak Elev=55.70' Storage=205 cf Inflow=0.20 cfs 0.016 af Discarded $=0.03$ cfs 0.016 af Primary $=0.00$ cfs 0.000 af Outflow $=0.03$ cfs 0.016 af

Pond CB 1: CB 1

Pond CB1A: CB 1A

Pond CB1B: CB 1B

Pond DMH2: DMH 2

Peak Elev=52.84' Inflow=2.17 cfs 0.160 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=22.0^{\prime} \mathrm{S}=0.0050 \mathrm{l} / \mathrm{O}$ Outflow=2.17 cfs 0.160 af

Peak Elev=54.07' Inflow=1.07 cfs 0.077 af 15.0" Round Culvert $n=0.013 \mathrm{~L}=110.0^{\prime} \mathrm{S}=0.0050 \mathrm{l} /$ ' Outflow=1.07 cfs 0.077 af

Peak Elev=53.46' Inflow=1.07 cfs 0.077 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=165.0^{\prime} \mathrm{S}=0.0050$ '/' Outflow=1.07 cfs 0.077 af

Peak Elev=54.04' Inflow=0.00 cfs 0.000 af 15.0" Round Culvert n=0.013 L=94.0' S=0.0050 '/' Outflow=0.00 cfs 0.000 af

> Total Runoff Area $=8.387$ ac Runoff Volume $=0.983$ af Average Runoff Depth $=1.41 "$
> $60.80 \%$ Pervious $=5.099$ ac $39.20 \%$ Impervious $=3.288$ ac

Time span $=0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}, 3001$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1_2S: Roof 1_2

Subcatchment 3_5S: Roof 3_5

Subcatchment 6_11S: Roof 6_11

Subcatchment 10S: Subcatchment 10S
Flow Length=280'

Subcatchment 16_19S: Roof 16_18

Subcatchment 20S: Subcatchment 20S

Subcatchment 20_22S: Roof 20_22

Subcatchment 21S: Subcatchment 21S

Subcatchment 22S: Subcatchment 22S

Subcatchment 23S: Subcatchment 23S

Subcatchment 23_26S: Roof 23_26

Subcatchment 24S: Subcatchment 24S

Subcatchment 25S: Subcatchment 26 S

Subcatchment 26S: Subcatchment 265

Subcatchment 27S: Subcatchment 27S

Runoff Area=776 sf $100.00 \%$ Impervious Runoff Depth $=5.43^{\text {" }}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.10 \mathrm{cfs} 0.008$ af

Runoff Area $=1,224$ sf $100.00 \%$ Impervious Runoff Depth $=5.43^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.16 \mathrm{cfs} 0.013 \mathrm{af}$

Runoff Area=2,904 sf $100.00 \%$ Impervious Runoff Depth=5.43" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.37 \mathrm{cfs} 0.030$ af

Runoff Area $=29,654$ sf $6.99 \%$ Impervious Runoff Depth=1.63" Slope=0.0100 '/' Tc=22.8 min CN=59 Runoff=0.76 cfs 0.093 af

Runoff Area $=1,932$ sf $100.00 \%$ Impervious Runoff Depth $=5.43^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.25 \mathrm{cfs} 0.020$ af

Runoff Area=2,040 sf $100.00 \%$ Impervious Runoff Depth $=5.43^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.26 \mathrm{cfs} 0.021$ af

Runoff Area=18,078 sf $20.06 \%$ Impervious Runoff Depth $=2.37^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=68$ Runoff=1.14 cfs 0.082 af

Runoff Area=1,440 sf 100.00\% Impervious Runoff Depth=5.43" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.18 \mathrm{cfs} 0.015$ af

Runoff Area=61,821 sf 49.16\% Impervious Runoff Depth=3.58" Tc=6.0 min CN=81 Runoff=5.94 cfs 0.424 af

Runoff Area=42,220 sf $50.92 \%$ Impervious Runoff Depth=2.82" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=73$ Runoff=$=3.20$ cfs 0.228 af

Runoff Area=12,524 sf $100.00 \%$ Impervious Runoff Depth=5.43" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=$=1.60 \mathrm{cfs} 0.130$ af

Runoff Area=1,920 sf $100.00 \%$ Impervious Runoff Depth $=5.43$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.24 \mathrm{cfs} 0.020$ af

Runoff Area $=31,941$ sf $82.12 \%$ Impervious Runoff Depth=4.52" Tc=6.0 min CN=90 Runoff=3.72 cfs 0.276 af

Runoff Area $=15,080$ sf $71.23 \%$ Impervious Runoff Depth $=4.52$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=90$ Runoff=1.76 cfs 0.131 af

Runoff Area=14,100 sf $88.87 \%$ Impervious Runoff Depth=4.97" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=94$ Runoff=1.74 cfs 0.134 af

Runoff Area $=117,023$ sf $0.62 \%$ Impervious Runoff Depth $=0.56$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=43$ Runoff $=0.72 \mathrm{cfs} 0.125 \mathrm{af}$

Subcatchment 27_30S: Roof 27_30

Subcatchment 31_35S: Roof 31_35

Subcatchment 36_38S: Roof 36_38

Subcatchment 39_44S: Roof 39_44

Subcatchment 45_50S: Roof 45_50

Reach 1R: Analysis Point \#1

Reach 2R: Analysis Point \#2

Runoff Area=1,932 sf $100.00 \%$ Impervious Runoff Depth=5.43"
$\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.25 \mathrm{cfs} 0.020$ af
Runoff Area $=2,424$ sf $100.00 \%$ Impervious Runoff Depth $=5.43^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.31 \mathrm{cfs} 0.025 \mathrm{af}$

Runoff Area $=1,464$ sf $100.00 \%$ Impervious Runoff Depth $=5.43^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.19 \mathrm{cfs} 0.015$ af

Runoff Area=2,412 sf $100.00 \%$ Impervious Runoff Depth=5.43" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.31 \mathrm{cfs} 0.025$ af

Runoff Area $=2,412$ sf $100.00 \%$ Impervious Runoff Depth $=5.43$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.31 \mathrm{cfs} 0.025$ af

Avg. Flow Depth=0.47' Max Vel=3.12 fps Inflow=1.14 cfs 0.082 af $\mathrm{L}=40.0$ ' $\mathrm{S}=0.0050 \mathrm{l} / \mathrm{Capacity=} 2.52 \mathrm{cfs} \quad$ Outflow=1.14 cfs 0.082 af

Pond 1P: DMH 1
Peak Elev=56.91' Inflow=4.85 cfs 0.358 af 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=60.0$ ' $\mathrm{S}=0.0272$ ' $\%$ Outflow=4.85 cfs 0.358 af

## Pond 1_2P: Roof 1_2

Peak Elev=54.48' Storage=96 cf Inflow=0.10 cfs 0.008 af Discarded $=0.02$ cfs 0.008 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.02 \mathrm{cfs} 0.008$ af

Pond 2P: BIORETENTION 1
Peak Elev=51.28' Storage=2,761 cf Inflow=3.50 cfs 0.265 af Discarded $=1.22$ cfs 0.274 af Primary= 0.00 cfs 0.000 af Outflow=1.22 cfs 0.274 af

Pond 3P: Front depression

Pond 3_5P: Roof 3_5
Peak Elev=52.55' Storage=4,032 cf Inflow=0.76 cfs 0.093 af Outflow=0.00 cfs 0.000 af

Peak Elev=53.70' Storage=139 cf Inflow=0.16 cfs 0.013 af Discarded $=0.04$ cfs 0.013 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.04 \mathrm{cfs} 0.013$ af

Pond 4P: DMH 4

Pond 5P: DMH 5

Pond 6_11P: Roof 6_11

Peak Elev=52.65' Inflow=1.60 cfs 0.130 af 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=142.0^{\prime} \mathrm{S}=0.0050 \mathrm{I} /$ ' Outflow=1.60 cfs 0.130 af

Peak Elev=53.11' Inflow=4.85 cfs 0.358 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=40.0^{\prime} \mathrm{S}=0.0050 \mathrm{l} /{ }^{\prime}$ Outflow=4.85 cfs 0.358 af

Peak Elev=55.07' Storage=379 cf Inflow=0.37 cfs 0.030 af Discarded $=0.07$ cfs 0.030 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.07 \mathrm{cfs} 0.030$ af

Pond 11P: CB 2
Peak Elev=53.03' Inflow=1.60 cfs 0.130 af 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=58.0$ ' $\mathrm{S}=0.0050 \mathrm{I} \%$ Outflow=1.60 cfs 0.130 af

## Pond 12P: CB 3

Peak Elev=57.75' Inflow=3.72 cfs 0.276 af 15.0" Round Culvert $n=0.013 \mathrm{~L}=176.0^{\prime} \mathrm{S}=0.0050$ ' $/$ Outflow $=3.72 \mathrm{cfs} 0.276$ af

Peak Elev=58.32' Storage=280 cf Inflow=0.25 cfs 0.020 af Discarded $=0.03 \mathrm{cfs} 0.020$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.020$ af

## Pond 13P: CB 4

Peak Elev=54.32' Inflow=4.85 cfs 0.358 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=136.0^{\prime} \mathrm{S}=0.0050$ \% $/$ Outflow=4.85 cfs 0.358 af

## Pond 16_19P: Roof 16_19

Peak Elev=58.37' Storage=297 cf Inflow=0.26 cfs 0.021 af Discarded $=0.03 \mathrm{cfs} 0.021$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.021$ af
Pond 20P: WET POND 1

Peak Elev=52.42' Storage=20,632 cf Inflow=9.64 cfs 0.716 af Outflow $=3.45 \mathrm{cfs} 0.710$ af
Pond 20_22P: Roof 20_22 Peak Elev=58.42' Storage=211 cf Inflow=0.18 cfs 0.015 af
Discarded $=0.02$ cfs 0.015 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.02 \mathrm{cfs} 0.015$ af

Pond 23_26P: Roof 23_26

Peak Elev=58.44' Storage=282 cf Inflow=0.24 cfs 0.020 af Discarded $=0.03$ cfs 0.020 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.020$ af

Pond 27_30P: Roof 27_30
Peak Elev=58.32' Storage=280 cf Inflow=0.25 cfs 0.020 af Discarded $=0.03$ cfs 0.020 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.020$ af
Pond 31_35P: Roof 31_35

Peak Elev=59.30' Storage=355 cf Inflow=0.31 cfs 0.025 af Discarded $=0.04 \mathrm{cfs} 0.025$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.04 \mathrm{cfs} 0.025$ af
Pond 36_38P: Roof 36_38

Peak Elev=57.64' Storage=194 cf Inflow=0.19 cfs 0.015 af Discarded $=0.03 \mathrm{cfs} 0.015$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.015$ af
Pond 39_44P: Roof 39_44

Peak Elev=56.98' Storage=359 cf Inflow=0.31 cfs 0.025 af Discarded $=0.04$ cfs 0.025 af Primary $=0.00$ cfs 0.000 af Outflow $=0.04 \mathrm{cfs} 0.025$ af
Pond 40P: LOW POINT

Peak Elev=53.94' Storage=18,465 cf Inflow=5.94 cfs 0.424 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=93.0$ ' $\mathrm{S}=0.0049$ ' $\%$ Outflow=0.00 cfs 0.000 af
Pond 45_50P: Roof 45_50

Peak Elev=56.98' Storage=359 cf Inflow=0.31 cfs 0.025 af Discarded $=0.04 \mathrm{cfs} 0.025$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.04 \mathrm{cfs} 0.025$ af

## Pond CB 1: CB 1

Pond CB1A: CB 1A

Pond CB1B: CB 1B

Pond DMH2: DMH 2

Peak Elev=53.18' Inflow=3.50 cfs 0.265 af 15.0" Round Culvert $n=0.013$ L=22.0' $\mathrm{S}=0.0050$ ' $/$ ' Outflow $=3.50 \mathrm{cfs} 0.265$ af

Peak Elev=54.30' Inflow=1.76 cfs 0.131 af 15.0" Round Culvert $n=0.013 \mathrm{~L}=110.0^{\prime} \mathrm{S}=0.0050$ '/' Outflow=1.76 cfs 0.131 af

Peak Elev=53.73' Inflow=1.76 cfs 0.131 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=165.0^{\prime} \mathrm{S}=0.0050$ '/' Outflow=1.76 cfs 0.131 af

Peak Elev=54.28' Inflow=0.00 cfs 0.000 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=94.0$ ' $\mathrm{S}=0.0050$ ' $/$ ' Outflow=0.00 cfs 0.000 af

> Total Runoff Area $=8.387$ ac Runoff Volume $=1.860$ af Average Runoff Depth $=2.66 "$ $60.80 \%$ Pervious $=5.099$ ac $39.20 \%$ Impervious $=3.288 \mathrm{ac}$

## Summary for Subcatchment 1_2S: Roof 1_2

Runoff $=0.10 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= $\quad 0.008 \mathrm{af}$, Depth= $5.43^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}$, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | rea (sf) | CN | Roofs, HSG A Water Surface, HSG A |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 680 \\ 96 \end{array}$ | $\begin{aligned} & 98 \\ & 98 \end{aligned}$ |  |  |  |
|  | $\begin{aligned} & 776 \\ & 776 \end{aligned}$ | 98 | Weighted Average 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ (\mathrm{cfs}) \end{array}$ | Description |
| 6.0 |  |  |  |  | Direct Entry |

Summary for Subcatchment 3_5S: Roof 3_5
Runoff $=0.16 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.013$ af, Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 745 | 98 |  |  |  |
|  | 139 | 98 | Water Surface, HSG A |  |  |
|  | 275 | 98 | Roofs, HSG D |  |  |
|  | 65 | 98 | Water Surface, HSG D |  |  |
|  | 1,224 | 98 | Weighted Average |  |  |
|  | 1,224 |  | 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry |


| Summary for Subcatchment 6_11S: Roof 6_11 |  |  |  |
| :---: | :---: | :---: | :---: |
| Runoff $=\quad 0.37 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.030$ af, Depth= $5.43^{\prime \prime}$ |  |  |  |

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN | Description |
| ---: | ---: | :--- |
| 2,448 | 98 | Roofs, HSG B |
| 456 | 98 | Water Surface, HSG B |
| 2,904 | 98 | Weighted Average |
| 2,904 |  | $100.00 \%$ Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> (feet) | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- |

## Summary for Subcatchment 10S: Subcatchment 105

Runoff $=0.76$ cfs @ 12.34 hrs , Volume $=0.093$ af, Depth= $1.63^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}$, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"


## Summary for Subcatchment 12_15S: Roof 12_15

Runoff $=0.25 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.020$ af, Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN D | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 429 | 98 R | Roofs, HSG A |  |  |
|  | 87 | 98 V | Water Surface, HSG A |  |  |
|  | 1,203 | 98 R | Roofs, HSG B |  |  |
|  | 213 | 98 V | Water Surface, HSG B |  |  |
|  | 1,932 | 98 | Weighted Average |  |  |
|  | 1,932 |  | 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment 16_19S: Roof 16_18

Runoff = $0.26 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= 0.021 af, Depth= 5.43"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN D | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 1,728 \\ 312 \end{array}$ | $\begin{array}{ll} 98 & R \\ 98 & W \end{array}$ | Roofs, HSG A Water Surface, HSG A |  |  |
|  | $\begin{aligned} & 2,040 \\ & 2,040 \end{aligned}$ | 98 | Weighted Average 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment 20S: Subcatchment 20 S

Runoff $=1.14 \mathrm{cfs} @ 12.09 \mathrm{hrs}$, Volume $=\quad 0.082 \mathrm{af}$, Depth= $2.37^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN | Description |  |
| ---: | ---: | :--- | :---: |
| 1,853 | 98 | Paved roads w/curbs \& sewers, HSG B |  |
| 1,774 | 98 | Roofs, HSG B |  |
| 14,451 | 61 | >75\% Grass cover, Good, HSG B |  |
| 18,078 | 68 | Weighted Average |  |
| 14,451 |  | 79.94\% Pervious Area |  |
| 3,627 | $20.06 \%$ Impervious Area |  |  |
| Tc | Length | Slope |  |
| (melocity | Capacity | Description |  |
| (min) | (feet) | (ft/ft) |  |
| 6.0 | (ft/sec) | (cfs) |  |

## Summary for Subcatchment 20_22S: Roof 20_22

Runoff $=0.18 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.015$ af, Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}$, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

| Prepare HydroCA | ared by Mic CAD® 10.00 | osoft $20 \sin 11$ | $10589 \text { © } 20$ | $17 \text { HydroCAD }$ | Software Solutions LLC | $\begin{array}{r} \text { Printed } 8 / 25 / 2021 \\ \text { Page } 15 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Area (sf) | CN D | Description |  |  |  |
|  | 553 | 98 R | Roofs, HSG |  |  |  |
|  | 130 | 98 | Water Surf | Ace, HSG A |  |  |
|  | 670 | 98 R | Roofs, HSG |  |  |  |
|  | 87 | 98 V | Water Surf | ce, HSG C |  |  |
|  | 1,440 | 98 | Weighted A | verage |  |  |
|  | 1,440 |  | 100.00\% Im | pervious Ar |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Tc Length <br> in) (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |  |
|  | 6.0 |  |  |  | Direct Entry, |  |

## Summary for Subcatchment 21S: Subcatchment $21 S$

Runoff $=5.94$ cfs @ 12.09 hrs, Volume $=0.424$ af, Depth= $3.58^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN D | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 24,950 | 98 P | Paved roads w/curbs \& sewers, HSG B |  |  |
|  | 5,442 | 98 R | Roofs, HSG B |  |  |
|  | 23,567 | $61>$ | >75\% Grass cover, Good, HSG B |  |  |
|  | 3,353 | $74>$ | >75\% Grass cover, Good, HSG C |  |  |
|  | 4,509 | 77 W | Woods, Good, HSG D |  |  |
|  | 61,821 | 81 | Weighted Average |  |  |
|  | 31,429 |  | 50.84\% Pervious Area |  |  |
|  | 30,392 |  | 49.16\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{tt})$ | Velocity (ft/sec) | Capacity $\qquad$ | Description |
| 6.0 |  |  |  |  | Direct Entry, |

## Summary for Subcatchment 22S: Subcatchment 22S

Runoff $=3.20 \mathrm{cfs} @ 12.09 \mathrm{hrs}$, Volume= 0.228 af, Depth= 2.82"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"


## Summary for Subcatchment 23S: Subcatchment $23 S$

Runoff $=1.60 \mathrm{cfs}$ @ 12.08 hrs , Volume= $\quad 0.130 \mathrm{af}$, Depth= $5.43^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN | Description |
| ---: | ---: | :--- | :--- |
| 8,444 | 98 | Paved roads w/curbs \& sewers, HSG B |
| 4,080 | 98 | Roofs, HSG B |

Summary for Subcatchment 23_26S: Roof 23_26
Runoff $=0.24 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.020$ af, Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN | Description |
| ---: | ---: | :--- |
| 1,632 | 98 | Roofs, HSG C |
| 288 | 98 | Water Surface, HSG C |
| 1,920 | 98 | Weighted Average |
| 1,920 |  | $100.00 \%$ Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- |

## Summary for Subcatchment 24S: Subcatchment 24S

Runoff $=3.72$ cfs @ 12.08 hrs, Volume $=0.276$ af, Depth= 4.52"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"


Summary for Subcatchment 25S: Subcatchment $26 S$
Runoff $=\quad 1.76$ cfs @ 12.08 hrs, Volume $=\quad 0.131$ af, Depth= 4.52"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN | Description |
| ---: | ---: | :--- |
| 1,677 | 98 | Paved roads w/curbs \& sewers, HSG A |
| 485 | 98 | Paved roads w/curbs \& sewers, HSG B |
| 6,545 | 98 | Paved roads w/curbs \& sewers, HSG C |
| 692 | 98 | Roofs, HSG A |
| 1,090 | 98 | Roofs, HSG B |
| 253 | 98 | Roofs, HSG C |
| 442 | 39 | $>75 \%$ Grass cover, Good, HSG A |
| 3,896 | 74 | $>75 \%$ Grass cover, Good, HSG C |
| 15,080 | 90 | Weighted Average |
| 4,338 |  | $28.77 \%$ Pervious Area |
| 10,742 |  | $71.23 \%$ Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> $($ feet $)$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- |

## Summary for Subcatchment 26S: Subcatchment 26S

Runoff $=1.74 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.134$ af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"


Summary for Subcatchment 27S: Subcatchment $27 S$
Runoff $=0.72 \mathrm{cfs}$ @ 12.27 hrs , Volume $=\quad 0.125 \mathrm{af}$, Depth $=0.56^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

| Area (sf) | CN | Description |
| ---: | ---: | :--- |
| 601 | 98 | Paved roads w/curbs \& sewers, HSG A |
| 120 | 98 | Paved roads w/curbs \& sewers, HSG D |
| 60,280 | 39 | $>75 \%$ Grass cover, Good, HSG A |
| 8,297 | 61 | $>75 \%$ Grass cover, Good, HSG B |
| 5,432 | 74 | $>75 \%$ Grass cover, Good, HSG C |
| 975 | 80 | $>75 \%$ Grass cover, Good, HSG D |
| 26,377 | 30 | Woods, Good, HSG A |
| 14,750 | 55 | Woods, Good, HSG B |
| 191 | 77 | Woods, Good, HSG D |
| 117,023 | 43 | Weighted Average |
| 116,302 |  | $99.38 \%$ Pervious Area |
| 721 |  | $0.62 \%$ Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> (feet) | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- |

Runoff $=0.25 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.020 \mathrm{af}$, Depth $=5.43^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $\mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"


## Summary for Subcatchment 31_35S: Roof 31_35

Runoff $=0.31 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= 0.025 af , Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN D | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 2,040 \\ 384 \end{array}$ | $\begin{array}{ll} \hline 98 & R \\ 98 & W \end{array}$ |  |  |  |
|  | $\begin{aligned} & \hline 2,424 \\ & 2,424 \end{aligned}$ | 98 | Weighted Average |  |  |
| $\begin{gathered} \mathrm{Tc} \\ (\mathrm{~min}) \end{gathered}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry, |

## Summary for Subcatchment 36_38S: Roof 36_38

Runoff $=\quad 0.19 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= $\quad 0.015 \mathrm{af}$, Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 1,170 \\ 294 \end{array}$ | $\begin{aligned} & 98 \\ & 98 \end{aligned}$ | Roofs, HSG B Water Surface, HSG B |  |  |
|  | $\begin{aligned} & 1,464 \\ & 1,464 \end{aligned}$ | 98 | Weighted Average 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity <br> (ft/sec) | Capacity $\qquad$ | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment 39_44S: Roof 39_44

Runoff $=0.31 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.025 \mathrm{af}$, Depth= $5.43^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN D | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 2,184 \\ 228 \\ \hline \end{array}$ | $\begin{aligned} & 98 \\ & 98 \\ & \hline \end{aligned}$ | Roofs, HSG B <br> Water Surface, HSG B |  |  |
|  | $\begin{aligned} & 2,412 \\ & 2,412 \end{aligned}$ | 98 | Weighted Average 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity <br> (cfs) | Description |

Summary for Subcatchment 45_50S: Roof 45_50
Runoff = $0.31 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= 0.025 af , Depth= $5.43^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 10-YR STORM Rainfall=5.67"

|  | Area (sf) | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 2,184 \\ 228 \end{array}$ | $\begin{aligned} & 98 \\ & 98 \end{aligned}$ | Roofs, HSG B Water Surface, HSG B |  |  |
|  | $\begin{aligned} & 2,412 \\ & 2,412 \end{aligned}$ | 98 | Weighted Average 100.00\% Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Reach 1R: Analysis Point \#1

[40] Hint: Not Described (Outflow=Inflow)

| Inflow Area $=$ | 0.681 ac, | $6.99 \%$ Impervious, Inflow Depth $=0.00^{\prime \prime}$ | for $10-Y R ~ S T O R M ~ e v e n t ~$ |  |
| :--- | :--- | :--- | :--- | :--- |
| Inflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ | 0.000 af |
| Outflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ | 0.000 af , Atten $=0 \%$, Lag $=0.0 \mathrm{~min}$ |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$

## Summary for Reach 2R: Analysis Point \#2

[40] Hint: Not Described (Outflow=Inflow)


Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$

## Summary for Reach 10R: HW 1

[52] Hint: Inlet/Outlet conditions not evaluated


Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity= 3.12 fps , Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=1.18 \mathrm{fps}$, Avg. Travel Time $=0.6 \mathrm{~min}$
Peak Storage= 15 cf @ 12.09 hrs
Average Depth at Peak Storage $=0.47^{\prime}$
Bank-Full Depth= 1.00 ' Flow Area= 0.8 sf , Capacity= 2.52 cfs
12.0" Round Pipe
$\mathrm{n}=0.013$ Corrugated PE , smooth interior
Length= 40.0 ' Slope $=0.0050$ '/'
Inlet Invert=54.00', Outlet Invert= 53.80'


## Summary for Pond 1P: DMH 1

[63] Warning: Exceeded Reach 10R INLET depth by 2.44' @ 12.09 hrs
[80] Warning: Exceeded Pond 12P by 1.01' @ 24.25 hrs (2.68 cfs 0.381 af)


## Summary for Pond 1_2P: Roof 1_2

| Inflow Area = | $0.018 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 5.43" for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 0.10 cfs @ | 12.08 hrs , Volume= | 0.008 af |  |
| Outflow | 0.02 cfs @ | 12.47 hrs , Volume= | 0.008 af , At | Atten $=76 \%$, Lag $=22.9 \mathrm{~min}$ |
| Discarded = | 0.02 cfs @ | 12.47 hrs , Volume= | 0.008 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs $/ 3$
Peak Elev=54.48' @ 12.47 hrs Surf.Area= 96 sf Storage= 96 cf
Plug-Flow detention time $=31.4 \mathrm{~min}$ calculated for 0.008 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=31.4 \mathrm{~min}(777.4-746.0)$

| Volume | $\begin{aligned} & \text { Invert Ave } \\ & \hline 51.99^{\prime} \end{aligned}$ | Storage | Storage Desc |  |
| :---: | :---: | :---: | :---: | :---: |
| \#1 |  | 251 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |  |
| Elevation (feet) | $\begin{array}{r} \text { Surf.Area } \\ (\mathrm{sq}-\mathrm{ft}) \\ \hline \end{array}$ | Voids <br> (\%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 51.99 | 96 | 0.0 | 0 | 0 |
| 52.00 | -96 | 40.0 | 0 | 0 |
| 55.99 | -96 | 40.0 | 153 | 154 |
| 56.00 | -96 | 100.0 | 1 | 155 |
| 57.00 | - 96 | 100.0 | 96 | 251 |
| Device R | Invert Outlet Devices |  |  |  |
| \#1 P | 56.00' 40 |  | $40.0^{\prime}$ long $\times 0.5$ ' breadth Broad-Crested Rectangular Weir Head (feet) $0.20 \quad 0.40 \quad 0.60 \quad 0.80 \quad 1.00$ |  |

\#2 Discarded
51.99' $3.000 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area

Conductivity to Groundwater Elevation $=51.00$ Phase-In= 0.01'
Discarded OutFlow Max=0.02 cfs @ 12.47 hrs HW=54.48' (Free Discharge)
$L_{\mathbf{2}=\text { Exfiltration (Controls } 0.02 \mathrm{cfs} \text { ) }}$
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.99' TW=0.00' (Dynamic Tailwater)
-1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 2P: BIORETENTION 1

| Inflow Area = | $2.089 \mathrm{ac}, 58.97 \%$ Impervious, Inflow Depth $=1.52$ " for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 3.50 cfs @ | 12.08 hrs , Volume= | 0.265 af |  |
| Outflow | 1.22 cfs @ | 12.35 hrs , Volume= | 0.274 af, | Atten $=65 \%, L a g=16.0 \mathrm{~min}$ |
| Discarded = | 1.22 cfs @ | 12.35 hrs , Volume= | 0.274 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs} / 3$
Starting Elev=48.50' Surf.Area= 3,030 sf Storage $=412 \mathrm{cf}$
Peak Elev= $51.28^{\prime} @ 12.35 \mathrm{hrs}$ Surf.Area= 3,293 sf Storage= $2,761 \mathrm{cf}$ ( $2,349 \mathrm{cf}$ above start)
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)


```
Discarded OutFlow Max=1.22 cfs @ 12.35 hrs HW=51.28' (Free Discharge)
<3=Exfiltration (Controls 1.22 cfs)
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=48.50' TW=0.00' (Dynamic Tailwater)
-1=Culvert (Controls 0.00 cfs)
    2=Orifice/Grate (Controls 0.00 cfs)
```


## Summary for Pond 3P: Front depression



Routing by Dyn-Stor-Ind method, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs} / 3$
Peak Elev=52.55' @ 25.29 hrs Surf.Area=8,879 sf Storage= 4,032 cf
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time=(not calculated: no outflow)

| Volume | Invert Avai | orage | Storage Descrip |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| \#1 | $52.00{ }^{\prime}$ | ,350 cf | Custom Stage Data (Irregular) Listed below (Recalc) |  |  |
| $\begin{array}{r} \text { Elevation } \\ \quad \text { feet) } \end{array}$ | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | $\begin{array}{r} \text { Wet.Area } \\ (\mathrm{sq}-\mathrm{ft}) \end{array}$ |
| 52.00 | 5,815 | 434.1 | 0 | 0 | 5,815 |
| 54.00 | 19,963 | 845.8 | 24,368 | 24,368 | 47,767 |
| 54.50 | 19,963 | 845.8 | 9,982 | 34,350 | 48,190 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | $54.00{ }^{\prime}$ | 40.0' long x $0.5^{\prime}$ breadth Broad-Crested Rectangular Weir Head (feet) $0.20 \quad 0.40 \quad 0.60 \quad 0.80 \quad 1.00$ <br> Coef. (English) $2.80 \quad 2.92 \quad 3.08 \quad 3.30 \quad 3.32$ |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=52.00' TW=0.00' (Dynamic Tailwater)
—1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 3_5P: Roof 3_5

Inflow Area $=0.028 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=5.43^{\prime \prime}$ for 10-YR STORM event
Inflow $=0.16$ cfs @ 12.08 hrs , Volume= 0.013 af
Outflow = $0.04 \mathrm{cfs} @ 12.45 \mathrm{hrs}$, Volume $=0.013 \mathrm{af}$, Atten= $75 \%$, Lag= 22.3 min
Discarded $=\quad 0.04 \mathrm{cfs}$ @ 12.45 hrs, Volume= $\quad 0.013 \mathrm{af}$
Primary $=0.00 \mathrm{cfs} @ 0.00 \mathrm{hrs}$, Volume= 0.000 af
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 53.70' @ 12.45 hrs Surf.Area= 204 sf Storage= 139 cf
Plug-Flow detention time $=24.9 \mathrm{~min}$ calculated for 0.013 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=24.9 \mathrm{~min}$ ( $770.9-746.0$ )


Discarded OutFlow Max=0.04 cfs @ 12.45 hrs HW=53.70' (Free Discharge)
L2=Exfiltration (Controls 0.04 cfs )
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.99' TW=0.00' (Dynamic Tailwater)
—1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 4P: DMH 4



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=52.65' @ 12.11 hrs
Flood Elev= 55.00'


## Summary for Pond 5P: DMH 5

| Inflow Area = | $1.204 \mathrm{ac}, 61.55 \%$ Impervious, Inflow Depth = 3.57" for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow = | 4.85 cfs @ 12 | .09 hrs , Volume= | 0.358 af |  |
| Outflow | 4.85 cfs @ 12. | . $09 \mathrm{hrs}$, , Volume= | 0.358 af, At | Atten $=0 \%$, Lag $=0.0 \mathrm{~min}$ |
| Primary | 4.85 cfs @ 12 | .09 hrs , Volume= | 0.358 af |  |
| Routing by Dyn-S <br> Peak Elev= 53.11 <br> Flood Elev= 56.69 | r-Ind method, @ 12.10 hrs | ime Span= 0.00-30 | $\mathrm{dt}=0.01 \mathrm{hrs}$ |  |
| Device Routing | Invert | Outlet Devices |  |  |
| \#1 Primary | 50.94' | 15.0" Round Cul L=40.0' CPP, pr Inlet / Outlet Inver $n=0.013$ Corruga | no headwal $4^{\prime} / 50.74^{\prime}$ S , smooth inte | $\begin{aligned} & \text { all, } \mathrm{Ke}=0.900 \\ & S=0.00501 / / \quad \mathrm{Cc}=0.900 \end{aligned}$ $\text { erior, Flow Area= } 1.23 \mathrm{sf}$ |

Primary OutFlow Max=4.84 cfs @ 12.09 hrs HW=53.07' TW=52.00' (Dynamic Tailwater)
_1=Culvert (Inlet Controls 4.84 cfs @ 3.95 fps )

## Summary for Pond 6_11P: Roof 6_11

| Inflow Area $=$ | $0.067 \mathrm{ac}, 100.00 \%$ | Impervious, Inflow Depth $=5.43 "$ | for $10-\mathrm{YR}$ STORM event |  |
| :--- | :--- | :--- | :--- | :--- |
| Inflow | $=$ | $0.37 \mathrm{cfs} @$ | 12.08 hrs, Volume $=$ | 0.030 af |
| Outflow $=$ | $0.07 \mathrm{cfs} @$ | 12.53 hrs, Volume $=$ | 0.030 af, Atten= $82 \%$, Lag= 26.9 min |  |
| Discarded $=$ | $0.07 \mathrm{cfs} @$ | 12.53 hrs , Volume $=$ | 0.030 af |  |
| Primary $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 55.07 @ 12.53 hrs Surf.Area= 456 sf Storage= 379 cf
Plug-Flow detention time $=39.9 \mathrm{~min}$ calculated for 0.030 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=39.9 \min (785.9-746.0)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $52.99^{\prime}$ | $1,190 \mathrm{cf}$ | Custom Stage Data (Prismatic) Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Voids <br> (\%) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: | ---: |
| 52.99 | 465 | 0.0 | 0 | 0 |
| 53.00 | 456 | 40.0 | 2 | 2 |
| 56.99 | 456 | 40.0 | 728 | 730 |
| 57.00 | 456 | 100.0 | 5 | 734 |
| 58.00 | 456 | 100.0 | 456 | 1,190 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- |
| \#1 | Primary | $57.00^{\prime}$ | 40.0' long $\times 0.5$ ' breadth Broad-Crested Rectangular Weir <br>  |
|  |  | Head (feet) $0.20 \quad 0.400 .60 \quad 0.801 .00$ <br> Coef. (English) $2.80 \quad 2.923 .083 .303 .32$ |  |
| \#2 | Discarded | $52.99^{\prime}$ | 3.000 in/hr Exfiltration over Surface area <br> Conductivity to Groundwater Elevation $=51.00^{\prime} \quad$ Phase-In= $0.01 '$ |

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=52.99' TW=0.00' (Dynamic Tailwater)
—1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 11P: CB 2

| Inflow Area | $0.288 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 5.43" for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 1.60 cfs @ | 12.08 hrs, Volume= | 0.130 af |  |
| Outflow | 1.60 cfs @ | 12.08 hrs , Volume= | 0.130 af , | Atten= 0\%, Lag $=0.0 \mathrm{~min}$ |
| Primary | 1.60 cfs @ | 12.08 hrs, Volume= | 0.130 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 53.03' @ 12.09 hrs
Flood Elev=55.50'

| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- |
| $\# 1$ | Primary | $52.0^{\prime}$ | $12.0^{\prime \prime}$ Round Culvert |
|  |  | $\mathrm{L}=58.0^{\prime} \mathrm{CPP}$, projecting, no headwall, $\mathrm{Ke}=0.900$ |  |
|  |  | Inlet $/$ Outlet Invert $=52.10^{\prime} / 51.81^{\prime} \mathrm{S}=0.0050 \mathrm{Cc}=0.900$ |  |
|  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 0.79 sf |  |

Primary OutFlow Max=1.59 cfs @ 12.08 hrs HW=53.02' TW=52.63' (Dynamic Tailwater)
—1=Culvert (Outlet Controls $1.59 \mathrm{cfs} @ 2.75 \mathrm{fps}$ )

## Summary for Pond 12P: CB 3

[58] Hint: Peaked 1.80' above defined flood level

| Inflow Area | $0.733 \mathrm{ac}, 82.12 \%$ Impervious, Inflow Depth $=4.52$ " for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 3.72 cfs @ | 12.08 hrs , Volume= | 0.276 af |  |
| Outflow | 3.72 cfs @ | 12.08 hrs , Volume= | 0.276 af, A | Atten= 0\%, Lag= 0.0 min |
| Primary | 3.72 cfs @ | 12.08 hrs , Volume= | 0.276 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 57.75' @ 12.09 hrs
Flood Elev= 55.95'


Summary for Pond 12_15P: Roof 27_30

| Inflow Area | $0.044 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 5.43' for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 0.25 cfs @ | 12.08 hrs , Volume= | 0.020 af |  |
| Outflow | 0.03 cfs @ | 12.63 hrs , Volume= | 0.020 af, A | Atten= 88\%, Lag= 32.8 min |
| Discarded = | 0.03 cfs @ | 12.63 hrs , Volume= | 0.020 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=58.32' @ 12.63 hrs Surf.Area= 300 sf Storage= 280 cf
Plug-Flow detention time $=64.0 \mathrm{~min}$ calculated for 0.020 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=64.0 \mathrm{~min}(810.0-746.0)$


Discarded OutFlow Max=0.03 cfs @ 12.63 hrs HW=58.32' (Free Discharge)
$\Psi_{2}=$ Exfiltration (Controls 0.03 cfs )
Primary OutFlow Max=0.00 cfs @ $0.00 \mathrm{hrs} \mathrm{HW}=55.99^{\prime}$ TW=0.00' (Dynamic Tailwater)


## Summary for Pond 13P: CB 4

| Inflow Area = | 1.204 ac, 61.55\% Impervious, In | pth $=3.57^{\prime \prime}$ for $10-Y \mathrm{R}$ STORM event |
| :---: | :---: | :---: |
| Inflow | 4.85 cfs @ 12.09 hrs, Volume= | 0.358 af |
| Outtlow | 4.85 cfs @ 12.09 hrs , Volume= | 0.358 af , Atten= 0\%, Lag $=0.0 \mathrm{~min}$ |
| Primary | 4.85 cfs @ 12.09 hrs , Volume= | 0.358 af |
| Routing by Dyn-St <br> Peak Elev= 54.32 <br> Flood Elev=56.69 | or-Ind method, Time Span= 0.00-30 @ 12.09 hrs | $\text { , dt= } 0.01 \mathrm{hrs} / 3$ |
| Device Routing | Invert Outlet Devices |  |
| \#1 Primary | 51.72' 15.0" Round Culv |  |

$\mathrm{L}=136.0^{\prime}$ CPP, projecting, no headwall, $\mathrm{Ke}=0.900$
Inlet / Outlet Invert= 51.72' / 51.04' S=0.0050 //' Cc= 0.900
$\mathrm{n}=0.013$ Corrugated PE , smooth interior, Flow Area= 1.23 sf
Primary OutFlow Max=4.84 cfs @ 12.09 hrs HW=54.30' TW=53.07' (Dynamic Tailwater)
L1=Culvert (Outlet Controls 4.84 cfs @ 3.95 fps )

## Summary for Pond 16_19P: Roof 16_19

| Inflow Area = | $0.047 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 5.43" for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 0.26 cfs @ | 12.08 hrs , Volume= | 0.021 af |  |
| Outflow | 0.03 cfs @ | 12.63 hrs , Volume= | 0.021 af, | Atten $=88 \%$, Lag $=33.1 \mathrm{~min}$ |
| Discarded = | 0.03 cfs @ | 12.63 hrs , Volume= | 0.021 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=58.37' @ 12.63 hrs Surf.Area= 312 sf Storage= 297 cf
Plug-Flow detention time $=65.3 \mathrm{~min}$ calculated for 0.021 af ( $100 \%$ of inflow )
Center-of-Mass det. time $=65.3 \mathrm{~min}(811.3-746.0)$


## Summary for Pond 20P: WET POND 1



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Starting Elev=50.50' Surf.Area=4,388 sf Storage= 9,548 cf
Peak Elev= 52.42' @ 12.37 hrs Surf.Area= 7,885 sf Storage= 20,632 cf (11,084 cf above start)
Plug-Flow detention time $=307.6$ min calculated for 0.491 af ( $69 \%$ of inflow)
Center-of-Mass det. time $=116.1 \mathrm{~min}(917.2-801.0)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $46.50^{\prime}$ | $35,335 \mathrm{cf}$ | Custom Stage Data (Irregular) Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Perim. <br> (feet) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) | Wet.Area <br> (sq-ft) |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 46.50 | 693 | 243.2 | 0 | 0 | 693 |
| 47.00 | 1,065 | 252.6 | 436 | 436 | 1,084 |
| 48.00 | 1,870 | 279.6 | 1,449 | 1,885 | 2,258 |
| 49.00 | 2,782 | 314.3 | 2,311 | 4,196 | 3,925 |
| 50.00 | 3,840 | 360.2 | 3,297 | 7,493 | 6,411 |
| 50.50 | 4,388 | 369.6 | 2,055 | 9,548 | 6,987 |
| 51.00 | 4,983 | 385.1 | 2,341 | 11,889 | 7,937 |
| 51.99 | 6,207 | 411.2 | 5,528 | 17,417 | 9,637 |
| 52.00 | 7,208 | 541.0 | 67 | 17,484 | 19,472 |
| 53.00 | 8,880 | 569.0 | 8,029 | 25,514 | 22,007 |
| 54.00 | 10,793 | 605.7 | 9,821 | 35,335 | 25,488 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 50.50' | 18.0" Round Culvert |
|  |  |  | $\mathrm{L}=30.0^{\prime}$ CPP, projecting, no headwall, $\mathrm{Ke}=0.900$ |
|  |  |  | Inlet / Outlet Invert= 50.50' / 49.00' S=0.0500'/' $\mathrm{Cc}=0.900$ |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| \#2 | Device 1 | 50.50' | 5.0" Vert. Orifice/Grate $\mathrm{C}=0.600$ |
| \#3 | Device 1 | $52.00^{\prime}$ | 36.0" W x 12.0" H Vert. Orifice/Grate C= 0.600 |
| \#4 | Device 1 | 53.00' | $48.0^{\prime \prime} \times 48.0^{\prime \prime}$ Horiz. Orifice/Grate $\mathrm{C}=0.600$ |
|  |  |  | Limited to weir flow at low heads |
| \#5 | Primary | $53.50{ }^{\prime}$ | 5.0' long x 4.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) $0.200 .400 .600 .801 .001 .201 .401 .601 .80 \quad 2.00$ |
|  |  |  | 2.503 .003 .504 .004 .505 .005 .50 |
|  |  |  | Coef. (English) 2.382 .542 .692 .682 .672 .6712 .6512 .662 .66 |
|  |  |  | 2.682 .722 .732 .762 .792 .883 .073 .32 |

```
Primary OutFlow Max=3.45 cfs @ 12.37 hrs HW=52.42' TW=0.00' (Dynamic Tailwater)
- \(1=\) Culvert (Passes 3.45 cfs of 7.26 cfs potential flow)
    -2=Orifice/Grate (Orifice Controls 0.86 cfs @ 6.29 fps )
    -3=Orifice/Grate (Orifice Controls 2.60 cfs @ 2.07 fps )
    \(4=\) Orifice/Grate (Controls 0.00 cfs )
    \(5=\) Broad-Crested Rectangular Weir (Controls 0.00 cfs )
```


## Summary for Pond 20_22P: Roof 20_22

| Inflow Area = | $0.033 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=5.43$ ' for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 0.18 cfs @ | 12.08 hrs , Volume= | 0.015 af |  |
| Outflow | 0.02 cfs @ | 12.64 hrs , Volume= | 0.015 af , | Atten $=88 \%, L a g=33.4 \mathrm{~min}$ |
| Discarded = | 0.02 cfs @ | 12.64 hrs , Volume= | 0.015 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 58.42' @ 12.64 hrs Surf.Area= 217 sf Storage= 211 cf
Plug-Flow detention time $=66.5 \mathrm{~min}$ calculated for 0.015 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=66.5 \mathrm{~min}(812.5-746.0)$

| Volume | $\begin{aligned} & \text { Invert } \quad \text { Ava } \\ & \hline 55.99^{\prime} \end{aligned}$ | Storage | Storage Desc |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| \#1 |  | 566 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Voids (\%) | Inc. Store (cubic-feet) | Cum.Store (cubic-feet) |  |
| 55.99 | 217 | 0.0 | 0 | 0 |  |
| 56.00 | 217 | 40.0 | 1 |  |  |
| 59.99 | 217 | 40.0 | 346 | 347 |  |
| 60.00 | 217 | 100.0 | 2 | 349 |  |
| 61.00 | 217 | 100.0 | 217 | 566 |  |
| Device | Routing In | Invert Outlet Devices |  |  |  |
| \#1 | Primary 60 | 60.00' 96. | $\mathbf{}^{6.0^{\prime}}$ long $\times 0.5^{\prime}$ breadth Broad-Crested Rectangular Weir Head (feet) $0.20 \quad 0.40 \quad 0.60 \quad 0.80 \quad 1.00$ |  |  |
| \#2 | 55.99' 3.0 |  | $3.000 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area |  |  |
| Discarded OutFlow Max=0.02 cfs @ 12.64 hrs HW=58.42' (Free Discharge) L2=Exfiltration (Controls 0.02 cfs ) |  |  |  |  |  |
| Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=55.99' TW=0.00' (Dynamic Tailwater) L1=Broad-Crested Rectangular Weir (Controls 0.00 cfs ) |  |  |  |  |  |

## Summary for Pond 23_26P: Roof 23_26

| low Area = | $0.044 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 5.43" for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 0.24 cfs @ | 12.08 hrs, Volume= | 0.020 af |  |
| Outflow | 0.03 cfs @ | 12.64 hrs , Volume= | 0.020 af , | Atten= 88\%, Lag $=33.5 \mathrm{~min}$ |
| Discarded = | 0.03 cfs @ | 12.64 hrs, Volume= | 0.020 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 58.44' @ 12.64 hrs Surf.Area= 288 sf Storage= 282 cf
Plug-Flow detention time $=66.9$ min calculated for 0.020 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=66.9 \mathrm{~min}(812.9-746.0)$

| Volume | Invert | Avail.Storage |  |  | Storage Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#1 | 55.99 | ' 752 cf |  |  | Custom Stage Data (Prismatic) Listed below (Recalc) |  |  |
| Elevation (feet) |  | Surf.Area (sq-ft) | Void (\% |  | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |  |
| 55.99 |  | 288 | 0.0 |  | 0 | 0 |  |
| 56.00 |  | 288 | 40.0 |  | 1 | 1 |  |
| 59.99 |  | 288 | 40.0 |  | 460 | 461 |  |
| 60.00 |  | 288 | 100.0 |  | 3 | 464 |  |
| 61.00 |  | 288 | 100.0 |  | 288 | 752 |  |
| Device | Routing | Invert Outlet Devices |  |  |  |  |  |
| \#1 | Primary | $60.00{ }^{\prime}$ |  | 96.0' long $\times 0.5$ ' breadth Broad-Crested Rectangular Weir Head (feet) $0.20 \quad 0.40 \quad 0.60 \quad 0.80 \quad 1.00$ |  |  |  |
| \#2 | Discarded | d 55.99' |  | $3.000 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area |  |  | Phase-In |

Discarded OutFlow Max=0.03 cfs @ 12.64 hrs HW=58.44' (Free Discharge)
L2=Exfiltration (Controls 0.03 cfs )
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=55.99' TW=0.00' (Dynamic Tailwater)
—1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 27_30P: Roof 27_30

Inflow Area $=0.044 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=5.43^{\prime \prime}$ for 10-YR STORM event
Inflow = 0.25 cfs @ 12.08 hrs , Volume= 0.020 af
Outflow = 0.03 cfs @ 12.63 hrs , Volume $=0.020 \mathrm{af}$, Atten= $88 \%$, Lag= 32.8 min
Discarded = 0.03 cfs @ 12.63 hrs , Volume= 0.020 af
Primary $=0.00 \mathrm{cfs} @ 0.00 \mathrm{hrs}$, Volume $=0.000 \mathrm{af}$
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=58.32 @ 12.63 hrs Surf.Area= 300 sf Storage= 280 cf
Plug-Flow detention time $=64.0 \mathrm{~min}$ calculated for 0.020 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=64.0 \mathrm{~min}(810.0-746.0)$


| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :---: | :--- | :--- |
| \#1 | Primary | $61.00^{\prime}$ | 123.0' long $\times 0.5 '$ breadth Broad-Crested Rectangular Weir <br> Head (feet) 0.200 .400 .600 .801 .00 |
|  |  |  | Coef. (English) 2.802 .923 .083 .303 .32 |
| \#2 | Discarded | $56.99^{\prime}$ | 3.000 in/hr Exfiltration over Surface area <br> Conductivity to Groundwater Elevation $=50.50^{\prime} \quad$ Phase-In $=0.01^{\prime}$ |

Discarded OutFlow Max=0.04 cfs @ 12.67 hrs HW=59.30' (Free Discharge)
—2=Exfiltration (Controls 0.04 cfs )
Primary OutFlow Max=0.00 cfs @ $0.00 \mathrm{hrs} \mathrm{HW}=56.99^{\prime}$ TW=0.00' (Dynamic Tailwater)
-1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )
Summary for Pond 36_38P: Roof 36_38


Discarded OutFlow Max=0.03 cfs @ 12.58 hrs HW=57.64' (Free Discharge)
$L_{2}=$ Exfiltration (Controls 0.03 cfs )
Primary OutFlow Max=0.00 cfs @ $0.00 \mathrm{hrs} \mathrm{HW}=55.99^{\prime}$ TW=0.00' (Dynamic Tailwater)
L-1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 39_44P: Roof 39_44



| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | $58.00{ }^{\prime}$ | $\mathbf{7 2 . 0}^{\prime}$ long $\times 0.5^{\prime}$ breadth Broad-Crested Rectangular Weir Head (feet) $0.20 \quad 0.40 \quad 0.60 \quad 0.80 \quad 1.00$ |
|  |  |  | Coef. (English) 2.802 .923 .083 .303 .32 |
| \#2 | Discarded | 53.99' |  |

Discarded OutFlow Max=0.04 cfs @ 12.59 hrs HW=56.98' (Free Discharge)
L2=Exfiltration (Controls 0.04 cfs )
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.99' TW=54.00' (Dynamic Tailwater)
—1=Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond 40P: LOW POINT

| Area $=$ | 1.419 ac , 49.16\% Impervious, Inflow Depth = 3.58" for 10-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 5.94 cfs @ | 12.09 hrs , Volume= | 0.424 af |  |
| Outflow | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af , | Atten $=100 \%, L a g=0.0 \mathrm{~min}$ |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=53.94' @ 24.34 hrs Surf.Area= 21,405 sf Storage= 18,465 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 | $52.00{ }^{\prime}$ | 45,022 cf | Custom Stage D | regular) Lis | ow (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
| 52.00 | 1,480 | 195.4 | 0 | 0 | 1,480 |
| 54.00 | 22,343 | 662.6 | 19,716 | 19,716 | 33,391 |
| 55.00 | 28,390 | 704.3 | 25,306 | 45,022 | 37,978 |



Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=52.00' TW=54.04' (Dynamic Tailwater) L1=Culvert (Controls 0.00 cfs )

Summary for Pond 45_50P: Roof 45_50

| Inflow Area $=$ | $0.055 \mathrm{ac}, 100.00 \%$ | Impervious, Inflow Depth $=5.43^{\prime \prime}$ | for $10-\mathrm{YR}$ STORM event |
| :--- | :--- | :--- | :--- | :--- |
| Inflow $=$ | $0.31 \mathrm{cfs} @$ | 12.08 hrs, Volume $=$ | 0.025 af |
| Outflow $=$ | $0.04 \mathrm{cfs} @$ | 12.59 hrs, Volume $=$ | 0.025 af , Atten= $86 \%$, Lag $=30.6 \mathrm{~min}$ |
| Discarded $=$ | $0.04 \mathrm{cfs} @$ | 12.59 hrs , Volume $=$ | 0.025 af |
| Primary $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs, Volume $=$ | 0.000 af |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=56.98' @ 12.59 hrs Surf.Area= 300 sf Storage= 359 cf
Plug-Flow detention time $=65.7 \mathrm{~min}$ calculated for 0.025 af ( $100 \%$ of inflow)
Center-of-Mass det. time $=65.7 \mathrm{~min}(811.7-746.0)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $53.99^{\prime}$ | 783 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Voids <br> $(\%)$ | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: | ---: |
| 53.99 | 300 | 0.0 | 0 | 0 |
| 54.00 | 300 | 40.0 | 1 | 1 |
| 57.99 | 300 | 40.0 | 479 | 480 |
| 58.00 | 300 | 100.0 | 3 | 483 |
| 59.00 | 300 | 100.0 | 300 | 783 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- | :--- |
| \#1 | Primary | $58.00^{\prime}$ | 72.0' long $\times 0.5 '$ breadth Broad-Crested Rectangular Weir <br> Head (feet) 0.200 .400 .600 .801 .00 |
|  |  |  | Coef. (English) 2.802 .923 .083 .303 .32 |
| \#2 | Discarded | $53.99^{\prime}$ | 3.000 in/hr Exfiltration over Surface area <br> Conductivity to Groundwater Elevation $=51.00^{\prime} \quad$ Phase-In= $0.01^{\prime}$ |

Discarded OutFlow Max=0.04 cfs @ 12.59 hrs HW=56.98' (Free Discharge)
L2=Exfiltration (Controls 0.04 cfs )
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.99' TW=50.50' (Dynamic Tailwater)
L-Broad-Crested Rectangular Weir (Controls 0.00 cfs )

## Summary for Pond CB 1: CB 1

Inflow Area $=2.089 \mathrm{ac}, 58.97 \%$ Impervious, Inflow Depth $=1.52^{\prime \prime}$ for 10 -YR STORM event
Inflow $=3.50 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume= $\quad 0.265 \mathrm{af}$

Outflow $=3.50 \mathrm{cfs}$ @ 12.08 hrs , Volume $=0.265 \mathrm{af}$, Atten= $0 \%$, Lag= 0.0 min
Primary $=3.50 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=0.265 \mathrm{af}$
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=53.18' @ 12.08 hrs
Flood Elev= 55.41

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 51.90' | 15.0" Round Culvert $\mathrm{L}=22.0^{\prime} \mathrm{CPP}$, projecting, no headwall, $\mathrm{Ke}=0.900$ Inlet / Outlet Invert=51.90' $51.79^{\prime} \mathrm{S}=0.0050$ '/' $\mathrm{Cc}=0.900$ $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area $=1.23 \mathrm{sf}$ |
| Primary OutFlow Max=3.49 cfs @ 12.08 hrs HW=53.17' TW=51.02' (Dynamic Tailwater) Ł1=Culvert (Barrel Controls 3.49 cfs @ 3.47 fps ) |  |  |  |

## Summary for Pond CB1A: CB 1A

[80] Warning: Exceeded Pond DMH2 by 0.04' @ 12.11 hrs ( 0.05 cfs 0.000 af)


Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=54.30' @ 12.08 hrs
Flood Elev= 56.91'

| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | $53.47{ }^{\prime}$ | 15.0" Round Culvert |
|  |  |  | $\mathrm{L}=110.0$ ' CPP, projecting, no headwall, $\mathrm{Ke}=0.900$ |
|  |  |  | Inlet / Outlet Invert= 53.47' / 52.92' S=0.0050 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE, smooth interior, Flow Area= 1.23 sf |

Primary OutFlow Max=1.75 cfs @ 12.08 hrs HW=54.30' TW=53.73' (Dynamic Tailwater)
—1=Culvert (Outlet Controls 1.75 cfs @ 2.87 fps )

## Summary for Pond CB1B: CB 1B



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=53.73' @ 12.08 hrs
Flood Elev= 56.90'


## Summary for Pond DMH2: DMH 2

| Inflow Area $=$ | $1.419 \mathrm{ac}, 49.16 \%$ Impervious, Inflow Depth $=0.00 "$ for $10-$ YR STORM event |  |  |
| :--- | :--- | :--- | :--- |
| Inflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ |
| Outflow | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ |
| Primary | $=$ | $0.00 \mathrm{cfs} @$ | 0.00 hrs , Volume $=$ |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=54.28' @ 12.07 hrs
Flood Elev= 58.01'

| Device | Routing | Invert | Outlet Devices |
| :---: | :--- | :--- | :--- |
| \#1 | Primary | $54.04^{\prime}$ | $15.0^{\prime \prime}$ Round Culvert |

$\mathrm{L}=94.0^{\prime}$ CPP, projecting, no headwall, $\mathrm{Ke}=0.900$
Inlet / Outlet Invert=54.04' / 53.57' S=0.0050 '/' Cc= 0.900
$n=0.013$ Corrugated PE , smooth interior, Flow Area= 1.23 sf
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=54.04' TW=53.47' (Dynamic Tailwater)
L-1=Culvert (Controls 0.00 cfs )

Time span $=0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}, 3001$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1_2S: Roof 1_2

Subcatchment 3_5S: Roof 3_5

Subcatchment 6_11S: Roof 6_11

Subcatchment 10S: Subcatchment 10S
Flow Length $=280^{\prime}$

Runoff Area=776 sf $100.00 \%$ Impervious Runoff Depth $=6.95$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=$=0.13 \mathrm{cfs} 0.010$ af

Runoff Area $=1,224$ sf $100.00 \%$ Impervious Runoff Depth $=6.95^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.20 \mathrm{cfs} 0.016$ af

Runoff Area $=2,904$ sf $100.00 \%$ Impervious Runoff Depth $=6.95$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.47 \mathrm{cfs} 0.039 \mathrm{af}$

Runoff Area=29,654 sf $6.99 \%$ Impervious Runoff Depth=2.64" Slope=0.0100 $\% \quad \mathrm{Tc}=22.8 \mathrm{~min} \quad \mathrm{CN}=59$ Runoff $=1.30 \mathrm{cfs} 0.150$ af

Runoff Area $=1,932$ sf $100.00 \%$ Impervious Runoff Depth $=6.95^{\text {" }}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.31 \mathrm{cfs} 0.026$ af

Runoff Area $=2,040$ sf $100.00 \%$ Impervious Runoff Depth $=6.95$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.33 \mathrm{cfs} 0.027 \mathrm{af}$

Runoff Area $=18,078$ sf $20.06 \%$ Impervious Runoff Depth $=3.56$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=68$ Runoff=1.73 cfs 0.123 af

Runoff Area $=1,440$ sf $100.00 \%$ Impervious Runoff Depth $=6.95$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.23 \mathrm{cfs} 0.019$ af

Runoff Area=61,821 sf $49.16 \%$ Impervious Runoff Depth=4.98" Tc=6.0 min CN=81 Runoff=8.18 cfs 0.589 af

Runoff Area $=42,220$ sf $50.92 \%$ Impervious Runoff Depth=4.10" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=73$ Runoff=4.66 cfs 0.331 af

Subcatchment 23S: Subcatchment 23S

Subcatchment 23_26S: Roof 23_26

Subcatchment 24S: Subcatchment 24S

Subcatchment 25S: Subcatchment 26S

Subcatchment 26S: Subcatchment 26S

Subcatchment 27S: Subcatchment $27 S$

Runoff Area=12,524 sf $100.00 \%$ Impervious Runoff Depth $=6.95$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=2.03 \mathrm{cfs} 0.167 \mathrm{af}$

Runoff Area $=1,920$ sf $100.00 \%$ Impervious Runoff Depth $=6.95$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.31 \mathrm{cfs} 0.026$ af

Runoff Area=31,941 sf $82.12 \%$ Impervious Runoff Depth=6.01" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=90$ Runoff=4.86 cfs 0.367 af

Runoff Area $=15,080$ sf $71.23 \%$ Impervious Runoff Depth $=6.01^{1 "}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=90$ Runoff $=2.30 \mathrm{cfs} 0.173$ af

Runoff Area $=14,100$ sf $88.87 \%$ Impervious Runoff Depth $=6.48^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=94$ Runoff $=2.23 \mathrm{cfs} 0.175 \mathrm{af}$

Runoff Area $=117,023$ sf $0.62 \%$ Impervious Runoff Depth $=1.16^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=43$ Runoff $=2.58 \mathrm{cfs} 0.259$ af
Subcatchment 27_30S: Roof 27_30 Runoff Area $=1,932$ sf $100.00 \%$ Impervious Runoff Depth $=6.95$ "$\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.31 \mathrm{cfs} 0.026$ af
Subcatchment 31_35S: Roof 31_35
Runoff Area $=2,424$ sf $100.00 \%$ Impervious Runoff Depth $=6.95^{\prime \prime}$$\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=0.39 cfs 0.032 af
Subcatchment 36_38S: Roof 36_38
Subcatchment 39_44S: Roof 39_44
Subcatchment 45_50S: Roof 45_50
Reach 1R: Analysis Point \#1
Reach 2R: Analysis Point \#2
Reach 10R: HW 1Avg. Flow Depth=0.61' Max Vel=3.46 fps Inflow=1.73 cfs 0.123 af$12.0^{\prime \prime}$ Round Pipe $n=0.013 \quad \mathrm{~L}=40.0^{\prime} \quad \mathrm{S}=0.0050^{\prime} /{ }^{\prime}$ Capacity $=2.52 \mathrm{cfs}$ Outflow=1.73 cfs 0.123 af
Pond 1P: DMH 1Peak Elev=61.51' Inflow=6.59 cfs 0.491 af12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=60.0$ ' $\mathrm{S}=0.0272 \mathrm{l} / \mathrm{\prime}$ Outflow=6.59 cfs 0.491 af
Pond 1_2P: Roof 1_2 Peak Elev=55.34' Storage=129 cf Inflow=0.13 cfs 0.010 af Discarded $=0.03 \mathrm{cfs} 0.010$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.010$ af
Pond 2P: BIORETENTION 1 Peak Elev=51.62' Storage $=3,928$ cf Inflow=4.53 cfs 0.348 af Discarded $=1.36$ cfs 0.358 af Primary= 0.00 cfs 0.000 af Outflow=1.36 cfs 0.358 af
Pond 3P: Front depression Peak Elev=52.81' Storage=6,521 cf Inflow=1.30 cfs 0.150 af
Outflow $=0.00$ cfs 0.000 af
Pond 3_5P: Roof 3_5Peak Elev=54.31' Storage=189 cf Inflow=0.20 cfs 0.016 afDiscarded $=0.05 \mathrm{cfs} 0.016$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.05 \mathrm{cfs} 0.016$ af
Pond 4P: DMH 412.0" Round Culvert $n=0.013 \mathrm{~L}=142.0$ ' $\mathrm{S}=0.0050$ '/' Outflow=2.03 cfs 0.167 afPond 5P: DMH 5
Pond 6_11P: Roof 6_11
Peak Elev=54.43' Inflow=6.59 cfs 0.491 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=40.0$ ' $\mathrm{S}=0.0050$ '/' Outflow=6.59 cfs 0.491 af
Peak Elev=55.83' Storage=518 cf Inflow=0.47 cfs 0.039 af Discarded $=0.08$ cfs 0.039 af Primary $=0.00$ cfs 0.000 af Outflow $=0.08$ cfs 0.039 af
Peak Elev=53.55' Inflow=2.03 cfs 0.167 af 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=58.0$ ' $\mathrm{S}=0.0050$ '/' Outflow=2.03 cfs 0.167 af

Peak Elev=62.95' Inflow=4.86 cfs 0.367 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=176.0^{\prime} \quad \mathrm{S}=0.0050$ '/' Outtlow=4.86 cfs 0.367 af

Pond 12_15P: Roof 27_30

Peak Elev=59.20' Storage=385 cf Inflow=0.31 cfs 0.026 af Discarded $=0.03$ cfs 0.026 af Primary $=0.00$ cfs 0.000 af Outflow $=0.03$ cfs 0.026 af

Pond 13P: CB 4

Peak Elev=56.69' Inflow=6.59 cfs 0.491 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=136.0^{\prime} \mathrm{S}=0.0050 \mathrm{I} /$ Outflow=6.59 cfs 0.491 af

Pond 16_19P: Roof 16_19
Peak Elev=59.27' Storage=409 cf Inflow=0.33 cfs 0.027 af Discarded $=0.04$ cfs 0.027 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.04 \mathrm{cfs} 0.027$ af

Pond 20P: WET POND 1
Peak Elev=52.70' Storage=22,910 cf Inflow=13.27 cfs 0.988 af Outflow=6.54 cfs 0.982 af

Pond 20_22P: Roof 20_22
Peak Elev=59.33' Storage=290 cf Inflow=0.23 cfs 0.019 af Discarded $=0.03$ cfs 0.019 af Primary $=0.00$ cfs 0.000 af Outflow=0.03 cfs 0.019 af


Peak Elev=59.35' Storage=387 cf Inflow=0.31 cfs 0.026 af Discarded $=0.03$ cfs 0.026 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow=0.03 cfs 0.026 af

Pond 27_30P: Roof 27_30 Peak Elev=59.20' Storage=385 cf Inflow=0.31 cfs 0.026 af Discarded $=0.03 \mathrm{cfs} 0.026$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03 \mathrm{cfs} 0.026$ af

Pond 31_35P: Roof 31_35
Peak Elev=60.18' Storage=490 cf Inflow=0.39 cfs 0.032 af Discarded $=0.04$ cfs 0.032 af Primary $=0.00$ cfs 0.000 af Outflow $=0.04$ cfs 0.032 af

Pond 36_38P: Roof 36_38
Peak Elev=58.28' Storage=270 cf Inflow=0.24 cfs 0.019 af Discarded $=0.03$ cfs 0.019 af Primary $=0.00$ cfs 0.000 af Outflow=0.03 cfs 0.019 af

Pond 39_44P: Roof 39_44 Peak Elev=58.00' Storage=484 cf Inflow=0.39 cfs 0.032 af Discarded $=0.05 \mathrm{cfs} 0.032$ af Primary $=0.03 \mathrm{cfs} 0.000$ af Outflow $=0.08 \mathrm{cfs} 0.032$ af

Pond 40P: LOW POINT Peak Elev=54.26' Storage=25,666 cf Inflow=8.18 cfs 0.589 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=93.0$ ' $\mathrm{S}=0.0049$ ' $/$ ' Outflow= $=0.00 \mathrm{cfs} 0.000$ af

Pond 45_50P: Roof 45_50 Discarded $=0.05$ cfs 0.032 af Primary $=0.03$ cfs 0.000 af Outflow $=0.08$ cfs 0.032 af

Peak Elev=53.49' Inflow=4.53 cfs 0.348 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=22.0$ ' $\mathrm{S}=0.0050$ ' $/ \mathrm{l}$ ' Outflow=4.53 cfs 0.348 af

Peak Elev=54.50' Inflow=2.30 cfs 0.173 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=110.0$ ' $\mathrm{S}=0.0050$ '/' Outflow=2.30 cfs 0.173 af

Peak Elev=53.98' Inflow=2.30 cfs 0.173 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=165.0^{\prime} \mathrm{S}=0.0050$ '/ Outflow=2.30 cfs 0.173 af

Peak Elev=54.48' Inflow=0.00 cfs 0.000 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=94.0$ ' $\mathrm{S}=0.0050 \mathrm{l} /$ ' Outflow=0.00 cfs 0.000 af

Total Runoff Area $=8.387$ ac $\quad$ Runoff Volume $=2.639$ af $\quad$ Average Runoff Depth $=3.78 "$
$60.80 \%$ Pervious $=5.099 \mathrm{ac} \quad 39.20 \%$ Impervious $=3.288 \mathrm{ac}$

Time span $=0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}, 3001$ points $\times 3$
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1_2S: Roof 1_2

Subcatchment 3_5S: Roof 3_5

Subcatchment 6_11S: Roof 6_11

Subcatchment 10S: Subcatchment 10 S
Flow Length=280'

Subcatchment 16_19S: Roof 16_18

Subcatchment 20S: Subcatchment 20S

Subcatchment 20_22S: Roof 20_22

Subcatchment 21S: Subcatchment 21 S

Subcatchment 22S: Subcatchment 22S

Subcatchment 23S: Subcatchment 23S

Subcatchment 23_26S: Roof 23_26

Subcatchment 24S: Subcatchment 24S

Subcatchment 25S: Subcatchment 265

Subcatchment 26S: Subcatchment 26S

Subcatchment 27S: Subcatchment 27S

Runoff Area=776 sf $100.00 \%$ Impervious Runoff Depth=8.37"
$\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.15 \mathrm{cfs} 0.012$ af
Runoff Area=1,224 sf 100.00\% Impervious Runoff Depth=8.37" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.24 \mathrm{cfs} 0.020$ af

Runoff Area $=2,904$ sf $100.00 \%$ Impervious Runoff Depth=8.37" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.56$ cfs 0.046 af

Runoff Area=29,654 sf $6.99 \%$ Impervious Runoff Depth=3.68" Slope $=0.0100 \%$ Tc=22.8 min CN=59 Runoff=1.84 cfs 0.209 af

Runoff Area=1,932 sf 100.00\% Impervious Runoff Depth=8.37" Tc=6.0 $\mathrm{min} \mathrm{CN}=98$ Runoff $=0.38 \mathrm{cfs} 0.031$ af

Runoff Area $=2,040$ sf $100.00 \%$ Impervious Runoff Depth $=8.37^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.40 \mathrm{cfs} 0.033 \mathrm{af}$

Runoff Area $=18,078$ sf $20.06 \%$ Impervious Runoff Depth $=4.75$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=68$ Runoff=$=2.31 \mathrm{cfs} 0.164 \mathrm{af}$

Runoff Area $=1,440$ sf $100.00 \%$ Impervious Runoff Depth $=8.37$ " $\mathrm{T}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.28 \mathrm{cfs} 0.023$ af

Runoff Area=61,821 sf 49.16\% Impervious Runoff Depth=6.32" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=81$ Runoff=10.27 cfs 0.747 af

Runoff Area=42,220 sf $50.92 \%$ Impervious Runoff Depth=5.35" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=73$ Runoff=6.07 cfs 0.432 af

Runoff Area=12,524 sf $100.00 \%$ Impervious Runoff Depth=8.37" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=2.43 \mathrm{cfs} 0.201$ af

Runoff Area $=1,920$ sf $100.00 \%$ Impervious Runoff Depth $=8.37$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.37 \mathrm{cfs} 0.031$ af

Runoff Area=31,941 sf 82.12\% Impervious Runoff Depth=7.41" Tc=6.0 $\mathrm{min} \mathrm{CN}=90$ Runoff $=5.92 \mathrm{cfs} 0.453$ af

Runoff Area=15,080 sf 71.23\% Impervious Runoff Depth=7.41" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=90$ Runoff=2.80 cfs 0.214 af

Runoff Area=14,100 sf $88.87 \%$ Impervious Runoff Depth=7.89" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=94$ Runoff $=2.69 \mathrm{cfs} 0.213$ af

Runoff Area $=117,023$ sf $0.62 \%$ Impervious Runoff Depth $=1.85$ " $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=43$ Runoff=4.86 cfs 0.414 af
Subcatchment 27_30S: Roof 27 _30
Subcatchment 31_35S: Roof 31_35
Subcatchment 36_38S: Roof 36_38
Subcatchment 39_44S: Roof 39_44
Subcatchment 45_50S: Roof 45_50
Reach 1R: Analysis Point \#1
Reach 2R: Analysis Point \#2
Reach 10R: HW 1

Pond 1P: DMH 1

Pond 1_2P: Roof 1_2

Runoff Area=1,932 sf $100.00 \%$ Impervious Runoff Depth=8.37" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=0.38 cfs 0.031 af

Runoff Area $=2,424$ sf $100.00 \%$ Impervious Runoff Depth $=8.37^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=$=0.47 \mathrm{cfs} 0.039$ af

Runoff Area=1,464 sf 100.00\% Impervious Runoff Depth=8.37" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff=0.28 cfs 0.023 af

Runoff Area=2,412 sf $100.00 \%$ Impervious Runoff Depth=8.37" $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff= 0.47 cfs 0.039 af

Runoff Area $=2,412$ sf $100.00 \%$ Impervious Runoff Depth $=8.37^{\prime \prime}$ $\mathrm{Tc}=6.0 \mathrm{~min} \mathrm{CN}=98$ Runoff $=0.47 \mathrm{cfs} 0.039$ af

Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Inflow=13.18 cfs 1.666 af Outflow=13.18 cfs 1.666 af

Avg. Flow Depth=0.75' Max Vel=3.64 fps Inflow=2.31 cfs 0.168 af


Pond 1P: DMH 1 Peak Elev=66.92' Inflow=8.23 cfs 0.620 af
12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=60.0$ ' $\mathrm{S}=0.0272 \mathrm{l} / \mathrm{\prime}$ Outflow=8.23 cfs 0.620 af

Peak Elev=56.00' Storage=155 cf. Inflow=0.15 cfs 0.012 af Discarded $=0.03$ cfs 0.012 af Primary $=0.02$ cfs 0.000 af Outlow $=0.06$ cfs 0.012 af

Pond 2P: BIORETENTION 1
Peak Elev=51.92' Storage=5,072 cf Inflow=5.49 cfs 0.426 af Discarded $=1.48 \mathrm{cfs} 0.436$ af Primary=$=0.00 \mathrm{cfs} 0.000$ af Outflow=1.48 cfs 0.436 af

Pond 3P: Front depression Peak Elev=53.04' Storage=9,092 cf Inflow=1.84 cfs 0.209 af Outflow= 0.00 cfs 0.000 af

Pond 3_5P: Roof 3_5
Peak Elev=54.90' Storage=237 cf Inflow=0.24 cfs 0.020 af Discarded $=0.06$ cfs 0.020 af Primary $=0.00$ cfs 0.000 af Outflow=0.06 cfs 0.020 af

Pond 4P: DMH 4<br>Peak Elev=53.68' Inflow=2.43 cfs 0.201 af

Pond 5P: DMH 5

Pond 6_11P: Roof 6_11 12.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=142.0$ ' $\mathrm{S}=0.0050$ '/' Outflow=2.43 cfs 0.201 af
15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=40.0^{\prime} \mathrm{S}=0.0050 \mathrm{~m}$ Outflow $=8.23 \mathrm{cfs} 0.620 \mathrm{af}$

Peak Elev=56.57' Storage=654 cf Inflow=0.56 cfs 0.046 af Discarded $=0.09 \mathrm{cfs} 0.046$ af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.09 \mathrm{cfs} 0.046$ af

Peak Elev=54.33' Inflow=2.43 cfs 0.201 af 12.0" Round Culvert $n=0.013 \mathrm{~L}=58.0^{\prime} \mathrm{S}=0.0050 \mathrm{l} / \mathrm{\prime}$ Outflow=2.43 cfs 0.201 af

## Pond 12P: CB 3

Peak Elev=69.06' Inflow=5.92 cfs 0.453 af 15.0" Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=176.0^{\prime} \mathrm{S}=0.0050 \mathrm{I} /$ Outflow=5.92 cfs 0.453 af

Pond 12_15P: Roof 27_30

Peak Elev=60.00' Storage=484 cf Inflow=0.38 cfs 0.031 af Discarded $=0.04$ cfs 0.031 af Primary $=0.02$ cfs 0.000 af Outflow $=0.06$ cfs 0.031 af

## Pond 13P: CB 4

Peak Elev=59.37' Inflow=8.23 cfs 0.620 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=136.0^{\prime} \mathrm{S}=0.0050 \mathrm{I} / \mathrm{l}$ Outflow=8.23 cfs 0.620 af

Pond 16_19P: Roof 16_19

Peak Elev=60.00' Storage=503 cf Inflow=0.40 cfs 0.033 af Discarded $=0.04$ cfs 0.032 af Primary $=0.05 \mathrm{cfs} 0.000$ af Outflow $=0.09 \mathrm{cfs} 0.033$ af

## Pond 20P: WET POND 1

Peak Elev=52.97' Storage=25,207 cf Inflow=16.72 cfs 1.257 af Outflow=8.80 cfs 1.250 af

## Pond 20_22P: Roof 20_22

Peak Elev=60.00' Storage $=350$ cf Inflow=0.28 cfs 0.023 af Discarded $=0.03$ cfs 0.023 af Primary $=0.06$ cfs 0.000 af Outflow $=0.08$ cfs 0.023 af
Pond 23_26P: Roof 23_26

Peak Elev=60.00' Storage=465 cf Inflow=0.37 cfs 0.031 af Discarded $=0.04$ cfs 0.030 af Primary $=0.07 \mathrm{cfs} 0.001$ af Outflow= 0.11 cfs 0.031 af
Pond 27_30P: Roof 27_30

Peak Elev=60.00' Storage=484 cf Inflow=0.38 cfs 0.031 af
Discarded $=0.04 \mathrm{cfs} 0.031$ af Primary $=0.02 \mathrm{cfs} 0.000$ af Outflow=0.06 cfs 0.031 af
Pond 31_35P: Roof 31_35

Peak Elev=61.00' Storage=619 cf Inflow=0.47 cfs 0.039 af Discarded $=0.04 \mathrm{cfs} 0.039$ af Primary $=0.02$ cfs 0.000 af Outflow $=0.06$ cfs 0.039 af
Pond 36_38P: Roof 36_38

Peak Elev=58.91' Storage=344 cf Inflow=0.28 cfs 0.023 af Discarded $=0.03$ cfs 0.023 af Primary $=0.00 \mathrm{cfs} 0.000$ af Outflow $=0.03$ cfs 0.023 af

Pond 39_44P: Roof 39_44
Peak Elev=58.01' Storage=486 cf Inflow=0.47 cfs 0.039 af Discarded $=0.05$ cfs 0.035 af Primary $=0.21$ cfs 0.003 af Outflow $=0.26$ cfs 0.039 af

## Pond 40P: LOW POINT

Peak Elev=54.54' Storage=32,558 cf Inflow=10.27 cfs 0.747 af
$15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=93.0^{\prime} \mathrm{S}=0.0049 \mathrm{I} / \mathrm{\prime}$ Outflow=0.00 cfs 0.000 af

Peak Elev=58.01' Storage=486 cf Inflow=0.47 cfs 0.039 af Discarded $=0.05 \mathrm{cfs} 0.035$ af Primary $=0.21 \mathrm{cfs} 0.003$ af Outflow $=0.26 \mathrm{cfs} 0.039$ af

## Pond CB 1: CB 1 <br> Peak Elev=53.91' Inflow=5.49 cfs 0.426 af

15.0" Round Culvert $n=0.013 \mathrm{~L}=22.0^{\prime} \mathrm{S}=0.0050 \mathrm{f} / \mathrm{f}$ Outflow=5.49 cfs 0.426 af

Pond CB1A: CB 1A
Peak Elev=54.78' Inflow=2.80 cfs 0.214 af 15.0" Round Culvert n=0.013 L=110.0' $\mathrm{S}=0.0050$ '/' Outflow=2.80 cfs 0.214 af

## Pond CB1B: CB 1B

Pond DMH2: DMH 2
Peak Elev=54.35' Inflow=2.80 cfs 0.214 af $15.0^{\prime \prime}$ Round Culvert $n=0.013 \mathrm{~L}=165.0^{\prime} \mathrm{S}=0.0050 \mathrm{I} /{ }^{\prime}$ Outflow=2.80 cfs 0.214 af

Peak Elev=54.75' Inflow=0.00 cfs 0.000 af $15.0^{\prime \prime}$ Round Culvert $\mathrm{n}=0.013 \mathrm{~L}=94.0^{\prime} \mathrm{S}=0.0050 \mathrm{l} / \mathrm{l}$ Outflow=0.00 cfs 0.000 af

# Total Runoff Area $=8.387$ ac $\quad$ Runoff Volume $=3.413$ af Average Runoff Depth $=4.88^{\prime \prime}$ $60.80 \%$ Pervious $=5.099$ ac $39.20 \%$ Impervious $=3.288$ ac 

| Select Product? |
| :---: |
| Extreme Precipitation <br> Tables $=$ HTML? |
| Extreme Precipitation <br> Tables - Text/CSV |
| Partial Duration Series - <br> by Point? |
| Partial Duration Series - <br> by Station |
| Distribution Curves - |
| Graphical |

Select Location ${ }^{\text {? }}$ Double-click the map to place a marker, or enter address or latitude/longitude.

iJap dat, ©2021 Imagery ©2021, CNES / Airbus, Maine GeoLibrary, MassGIS, Commonwealth of Massachusetts EOEA, Maxar Technologies,
Select Options?

| Smoothing ${ }^{\text {? }}$ |
| :---: |
| Yes $\checkmark$ |$\quad$$\quad$ Delivery ${ }^{?}$

$\square$
Submit

## Extreme Precipitation Tables

## Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

| Smoothing | Yes |
| :---: | :--- |
| State | New Hampshire |
| Location |  |
| Longitude | 70.797 degrees West |
| Latitude | 43.022 degrees North |
| Elevation | 0 feet |
| Date/Time | Mon, 08 Mar 2021 11:43:51 -0500 |

## Extreme Precipitation Estimates

|  | 5min | 10min | 15 min | 30 min | 60 min | 120min |  | 1 hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr |  | 1day | 2day | 4day | 7day | 10day |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 yr | 0.26 | 0.40 | 0.50 | 0.66 | 0.82 | 1.04 | 1 yr | 0.71 | 0.98 | 1.22 | 1.57 | 2.05 | 2.69 | 2.96 | 1yr | 2.38 | 2.84 | 3.26 | 3.98 | 4.61 | r |
| 2 yr | 0.32 | 0.50 | 0.62 | 0.82 | 1.03 | 1.30 | 2yr | 0.89 | 1.19 | 1.52 | 1.95 | 2.51 | 3.25 | 3.61 | 2 yr | 2.87 | 3.47 | 3.98 | 4.73 | 5.38 | 2 F |
| 5 yr | 0.37 | 0.58 | 0.73 | 0.98 | 1.25 | 1.61 | 5 yr | 1.08 | 1.47 | 1.90 | 2.45 | 3.17 | 4.12 | 4.64 | $5 y r$ | 3.64 | 4.46 | 5.11 | 6.01 | 6.78 | 5 yr |
| 10yr | 0.41 | 0.65 | 0.82 | 1.12 | 1.46 | 1.90 | 10yr | 1.26 | 1.73 | 2.25 | 2.92 | 3.79 | 4.93 | 5.60 | 10yr | 4.36 | 5.39 | 6.17 | 7.20 | 8.08 | 10y |
| 25 yr | 0.48 | 0.77 | 0.98 | 1.35 | 1.79 | 2.36 | 25yr | 1.54 | 2.16 | 2.80 | 3.67 | 4.79 | 6.25 | 7.20 | 25yr | 5.54 | 6.92 | 7.93 | 9.16 | 10.19 | 25 yr |
| 50 yr | 0.54 | 0.87 | 1.11 | 1.55 | 2.09 | 2.78 | 50 yr | 1.80 | 2.54 | 3.32 | 4.37 | 5.73 | 7.49 | 8.70 | 50 yr | 6.63 | 8.37 | 9.59 | 10.99 | 12.14 | 50 yr |
| 100yr | 0.60 | 0.98 | 1.26 | 1.79 | 2.44 | 3.29 | 100 yr | 2.11 | 3.00 | 3.95 | 5.22 | 6.86 | 8.98 | 10.53 | 100 yr | 7.95 | 10.12 | 11.60 | 13.19 | 14.48 | 100 yr |
| 200 yr | 0.68 | 1.11 | 1.44 | 2.07 | 2.86 | 3.88 | 200 yr | 2.47 | 3.55 | 4.67 | 6.21 | 8.19 | 10.77 | 12.74 | 200 yr | 9.53 | 12.25 | 14.04 | 15.83 | 17.28 | 200 yr |
| 500 yr | 0.81 | 1.33 | 1.74 | 2.52 | 3.52 | 4.83 | 500 yr | 3.04 | 4.42 | 5.84 | 7.81 | 10.37 | 13.70 | 16.39 | 500 yr | 12.12 | 15.76 | 18.07 | 20.17 | 21.84 | 500 yr |

Lower Confidence Limits

|  | 5 min | 10 min | 15min | 30 min | 60 min | 120 mi |  | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48 |  | 1day | 2day | 4day | 7day | 10day |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1Yr' | 0.2 | 0.36 | 0.4 | 0.59 | 0.7 | 0.8 | 1 | 0.6 | 0.87 | 0.92 | 1.33 | 1.6 | 2.26 | 2.59 | 1 | 2.00 | 2.50 | 2.90 | 3. | 3.95 | 1 yr |
| 2y | 0.32 | 0.49 | 0.6 | 0.8 | 1.00 | 1. | 2 yr | 0.8 | 1.1 | 1. | 1. | 2. | 3. | 3. | 2 y | 4 | 3.37 | 3.88 | 4.61 | 5.14 | 2 yr |
| 5 yr | 0.3 | 0.5 | 0.67 | 0.93 | 1.18 | 1.41 | Syr | 1. | 1.38 | 1.6 | 2.12 | 2.73 | 3.85 | 4.28 | 5 yr | 3.41 | 4.12 | 4.79 | 5. | 6.36 | 5y |
| 10 yr | 0.39 | 0.60 | 0.74 | 1.0 | 1.3 | 1.6 | 10 | 1. | 1.5 | 1. | 2. | 3. | 4. | 4 | 10yr | 4 | 4.80 | 5.59 | 6.56 | 7.35 |  |
| 25 | 0.4 | 0. | 0.84 | 1.20 | 1. | 1.91 | $25 y$ | 1. | 1. | 2. | 2.75 | 3.53 | 4.80 | 6.08 | $25 y \mathrm{r}$ | 4.24 | 5.85 | 6.89 | 8. | 0 | 25yr |
| 50yr | 0.4 | 0.75 | 0.93 | 1.34 | 1. | 2. | 50 yr | 1.5 | 2.14 | 2.36 | 3.07 | 3.9 | 5 | 7. | $50 y \mathrm{r}$ | 4.81 | 6.78 | 8. | 9. | 0 | 50yr |
| 100 yr | 0.5 | 0.8 | 1. | 1. | 2.0 | 2. | 10 | 1.77 | 2.44 | 2.64 | 3.4 | 4.35 | 6.12 | 8.19 | 100 yr | 5.42 | 7.87 | 9.45 | 10.93 | 11.91 | 100yr |
| 200 yr | 0.61 | 0.91 | 1.16 | 1.68 | 2.34 | 2.85 | 200 yr | 2.02 | 2.78 | 2.95 | 3.77 | 4.8 | 6.88 | 9.50 | 200yr | 6.09 | 9.13 | 11.09 | 12.77 | 13.80 | 200 yr |
| 500yr | 0.71 | 1.06 | 1.36 | 1.97 | 2.80 | 3.41 | 500 yr | 2.42 | 3.33 | 3.44 | 4.29 | 5.48 | 8.03 | 11.56 | 500yr | 7.11 | 11.12 | 13.71 | 15.72 | 16.75 | 500 yr |

## Upper Confidence Limits

|  | 5 min | 10 min | 15min | 30 min | 60 min | 120min |  | 1 hr | $\mathbf{2 h r}$ | 3hr | 6hr | 12hr | 24hr | 48hr |  | 1day | 2day | 4day | 7day | 10day |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1yr | 0.29 | 0.44 | 0.54 | 0.73 | 0.89 | 1.09 | 1yr | 0.77 | 1.06 | 1.27 | 1.74 | 2.20 | 3.02 | 3.17 | $1{ }^{1}$ | 2.68 | 3.05 | 3.63 | 4.41 | 5.11 | 1 yr |
| 2 yr | 0.34 | 0.52 | 0.64 | 0.87 | 1.07 | 1.27 | 2yr | 0.92 | 1.24 | 1.48 | 1.96 | 2.51 | 3.46 | 3.73 | 2 yr | 3.06 | 3.58 | 4.11 | 4.87 | 5.69 | 2 yr |
| 5yr | 0.40 | 0.62 | 0.77 | 1.05 | 1.34 | 1.63 | 5 yr | 1.16 | 1.59 | 1.88 | 2.53 | 3.24 | 4.38 | 4.98 | 5yr | 3.88 | 4.79 | 5.43 | 6.40 | 7.19 | 5 yr |
| 1.0 yr | 0.47 | 0.72 | 0.90 | 1.25 | 1.62 | 1.98 | 10 yr | 1.40 | 1.94 | 2.28 | 3.10 | 3.94 | 5.3 | 6.20 | 10 yr | 4.77 | 5.97 | 6.81 | 7.87 | 8.78 | 10 yr |
| 25 yr | 0.58 | 0.88 | 1.10 | 1.57 | 2.06 | 2.58 | 25 yr | 1.78 | 2.52 | 2.95 | 4.06 | 5.12 | 7.86 | 8.31 | 25yr | 6.96 | 7.99 | 9.08 | 10.36 | 11.43 | $25 y r$ |
| 50 yr | 0.67 | 1.03 | 1.28 | 1.84 | 2.48 | 3.15 | 50 yr | 2.14 | 3.08 | 3.59 | 4.99 | 6.28 | 9.84 | 10.38 | 50 yr | 8.71 | 9.98 | 11.31 | 12.73 | 13.96 | 50 yr |
| 100 yr | 0.79 | 1.20 | 1.50 | 2.17 | 2.98 | 3.83 | 100 yr | 2.57 | 3.75 | 4.37 | 6.14 | 7.71 | 12.31 | 12.97 | 100 yr | 10.89 | 12.47 | 14.07 | 15.68 | 17.07 | 100 yr |
| 200 yr | 0.93 | 1.40 | 1.77 | 2.57 | 3.58 | 4.68 | 200yr | 3.09 | 4.57 | 5.33 | 7.56 | 9.46 | 15.43 | 16.22 | 200yr | 13.66 | 15.59 | 17.52 | 19.29 | 20.88 | 200yr |
| 500 yr | 1.15 | 1.72 | 2.21 | 3.21 | 4.56 | 6.08 | 500 yr | 3.94 | 5.94 | 6.92 | 9.99 | 12.43 | 20.83 | 21.79 | 500 yr | 18.43 | 20.96 | 23.41 | 25.38 | 27.25 | 500yr |

## Nameratil

[^11]


## SITE-SPECIFIC SOIL MAPPING REPORT

## 3400 Lafayette Road <br> Tax Map 297, Lot 11 <br> Portsmouth, New Hampshire

April 2021
File No. 04.0191186.00


PREPARED FOR:
John O'Neil
Dover, New Hampshire

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Known iorexcellence
Built an trust


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wawgra.com

## VIA EMAIL

April 1, 2021
File No. 04.0191186 .00

Mr. John O'Neil
42J Dover Point Road
Dover, New Hampshire 03820
Re: $\quad$ Site Specific Soil Map Report
3400 Lafayette Road, Tax Map 297, Lot 11
Portsmouth, New Hampshire

Dear Mr. O'Neil:

This report presents the findings of Site-Specific Soil Mapping conducted at 3400 Lafayette Road Portsmouth, New Hampshire, New Hampshire Tax Map 297, Lot 11 (ie., the Site). This report summarizes the results of the field work completed in January and March 2021 to identify Site soils and develop mapping.

Should you have any questions, please feel free to contact Lindsey White at 603-232-8753 or lindsey.white@gza.com.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.


LEW/DMZ/TLT

Attachment: Site-Specific Soil Mapping Report

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### 1.0 INTRODUCTION

This report presents the findings of Site-Specific Soil Mapping conducted by GZA GeoEnvironmental, Inc. (GZA) during January and March 2021. GZA completed test pit observations on January 9, 2021 and hand dug test pits on March 12, 2021. GZA understands the parcel is approximately 45 acres and is proposed to be developed as a condominium association. The Site is primarily undeveloped and forested, and a portion of the Site closest to Lafayette Road currently serves as headquarters for Cornerstone Tree Care. The Site is bordered to the east by Lafayette Road, to the south by Coach Road, to the west by City of Portsmouth owned, and to the north by Ocean Road and Nathanial Drive.

GZA understands that the proposed development is planned to be located in the upland area on the eastern side of the Site. GZA further understands a site-specific soil map is required to support the potential development of the Site and Alteration of Terrain permitting through the New Hampshire Department of Environmental Services (NHDES) to be completed by Jones and Beach Engineers. This report is subject to the Limitations in Appendix A.

### 2.0 METHODOLOGY

The soil mapping of the Site was conducted in accordance with the standards set forth in the Society of Soil Scientists of Northern New England (SSSNNE) Publication No. 3 "Site-Specific Soil Mapping Standards for New Hampshire and Vermont, Version 5.0" dated December 2017 by New Hampshire Certified Soil Scientists (CSS) James H. Long (CSS \#15). The Site-Specific Standards are based on a universally recognized taxonomic system of soil classification and are supported by national soil mapping standards established by the USDA National Cooperative Soil Survey.

This investigation has been prepared based on a combination of publicly available databases and site-specific data collected by on-site observations. This report provides soil information including soil drainage classification, physical characteristics, and depth to bedrock (if encountered). Soil characteristics on the property were assessed through the evaluation of 13 test pits evaluated on January 9, 2021. On March 12, 2021, additional hand dug test pits were conducted to complete the site-specific soil identification. The hand dug holes were completed with a tile spade and soil auger used to reach depths of 40 inches or more to examine and identify the soils' characteristics. Locations were selected when changes in slope, vegetation or soil surface were observed. Where changes were noted from one hole to the next involving soil drainage or parent material, a soil boundary was placed on the map between the holes to reflect the transition between the soils as it occurs on the landscape. The slopes of the soil map units were measured in the field using a clinometer and augmented by the topography shown on the Existing Conditions Plan dated 3/3/2021 prepared and provided by Jones \& Beach Engineers, Inc. (see Figure 1 - Site Specific Soil Map). For purposes of this report, GZA considered the minimum size of a SiteSpecific Soil Survey map units as 2,000 square feet, with the exception being poorly or very poorly drained soil areas that are jurisdictional wetlands. Wetland delineations on the Site were previously conducted by GZA in January 2021.

GZA used the following resources during data collection to support on-site observations:

- Natural Resource Conservation Service (NRCS) Web Soil Survey ${ }^{1}$;
- New Hampshire Statewide Geographic Information System Clearinghouse (NH GRANIT) ${ }^{2}$.

The Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS). Use of the online resource NH GRANIT LiDAR- Based Bare Earth Hillshade of the project area provided imagery to assist in soil unit delineation.

### 3.0 RESULTS

### 3.1 SITE DESCRIPTION

The on-site observations were conducted on January 9 and March 12, 2021 using a base plan with a 1:40 scale and 2-foot topography. No snow cover present during sail mapping field work on March 12, 2021.

Results of our observations indicate the Site is underlain by sandy glaciofluvial deposits, organic deposits and human disturbed soils.

According to the WSS, a very large portion of the Site is mapped as sandy glaciofluvial deposits and organic deposits in the low-lying swales and human disturbed soils west of the proposed development. GZA understands that this area area is a reclaimed sand and gravel pit that is now a mix of a man-made pond and scrub-shrub wetlands (pers. comm. John O'Neill, see Appendix B - Photo Log). According to the WSS, a significant portion of the Site is underlain by a stratified drift aquifer and glaciofluvial deposits. GZA observed broad sandy glaciofluvial deposits with uniform smooth surfaces adjacent Lafayette Road. Most of the forest land is undisturbed with a large portion classified as wetlands (see Figure 1 - Site-Specific Soil Map).

In accordance with the Site-Specific Soil Mapping standards, the identified individual soil map units have been correlated to the New Hampshire State-Wide Numerical Soils Legend maintained by the New Hampshire State office of the NRCS. Soil characteristics for each of these units comply with the Range in Characteristics described in the Official Series Descriptions for each map unit. The human disturbed soil map units are labelled in accordance with the "Site-Specific Soil Mapping Standards for New Hampshire and Vermont, Version 5.0" dated December 2017-Disturbed Soil Mapping Unit Supplement for New Hampshire DES AoT Site Specific Soil Maps (see Appendix C - Disturbed Soil Mapping Unit Supplement for DES AOT). The disturbed soil map unit Denominators provide additional information on Drainage Class, Parent Material, Restrictive/Impervious Layers, Estimated Ksat, and Hydrologic Soil Group.

[^12]
### 3.2 SOIL MAP UNIT DESCRIPTIONS

Individual soil map units are summarized in the table below:

| Soil ID | Soil Type |
| :---: | :---: |
| 26 | Windsor (excessively drained) |
| 199 | Dumps, bark chips and organic matter |
| 313 | Deerfield (moderately drained) |
| 350 | Udipsamments, wet substratum (moderately well <br> drained to somewhat poorly drained |
| 393 | Timakwa (muck) |
| 448 | Scituate (moderately well drained) |
| 538 | Squamscott (poorly drained) |
| 900 | Endoaquents, sandy or gravelly |

## 26A - Windsor (excessively drained), loamy sand, 0 to 3 percent slopes

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown loamy very fine sand about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown sand and coarse sand.

Included with this mapping are small areas of slopes greater than 3 percent; and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 26B - Windsor (excessively drained), loamy sand, 3 to 8 percent slopes

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown loamy very fine sand about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown sand and coarse sand.

Included with this mapping are small areas of slopes less than 3 percent and greater than 8 percent; and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 26D - Windsor (excessively drained), loamy sand, 15 to 25 percent slopes

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown loamy very fine sand about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown sand and coarse sand.

Included with this mapping are small areas of slopes less than 15 percent and greater than 25 percent; and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 26E - Windsor (excessively drained), loamy sand, 25 to 50 percent slopes

This map unit consists of excessively drained soils that formed in sandy glaciofluvial deposits. It occurs on the knolls in the undisturbed uplands.

Typically, the surface layer is very dark brown to dark brown loamy very fine sand about 4 inches thick. The subsoil is dark brown, strong brown, dark yellowish brown to yellowish brown loamy sand, sand and coarse sand about 24 inches thick. The substratum, to a depth of 40 inches or more, is yellowish brown, light yellowish gray, light olive brown sand and coarse sand.

Included with this mapping are small areas of slopes less than 25 percent and greater than 50 percent; and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 199E - Dumps, bark chips, and organic matter, 25 to 50 percent slopes

This map unit consists of loamy sand fill materials with stumps and woody debris. Undisturbed material is at a depth of more than 40 inches. There are no identifiable diagnostic horizons at a depth within 40 inches.

## 313A -Deerfield loamy sand, 0 to 3 percent slopes

This map unit consists of moderately well drained soils that formed in sandy glaciofluvial deposits. It occurs at the swales adjacent to the Windsor soils.

Typically, the surface layer is black, very dark brown to dark brown loamy fine sand about 4 inches thick. The subsoil is brown, strong brown, dark yellowish brown, yellowish brown to light olive brown fine sand and sand about 20 inches thick. The substratum, to a depth of 40 inches or more, is light brownish gray to light olive brown sand, and coarse sand.

Included with this mapping are small areas of slopes greater than 3 percent. These inclusions make up as much as 15 percent of the map unit.

## 313C -Deerfield loamy sand, 8 to 15 percent slopes

This map unit consists of moderately well drained soils that formed in sandy glaciofluvial deposits. It occurs at the swales adjacent to the Windsor soils.

Typically, the surface layer is black, very dark brown to dark brown loamy fine sand about 4 inches thick. The subsoil is brown, strong brown, dark yellowish brown, yellowish brown to light olive brown fine sand and sand about 20 inches thick. The substratum, to a depth of 40 inches or more, is light brownish gray to light olive brown sand, and coarse sand.

Included with this mapping are small areas of slopes less than 8 percent and greater than 15 percent. These inclusions make up as much as 15 percent of the map unit.

## 350 C - Udipsamments, wet substratum, 8 to 15 percent slopes

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the entire particlesize class control section. Saturated hydraulic conductivity (Ksat) is high or very high. Drainage class is moderately well drained.

Included with this mapping are small areas of slopes less than 8 percent and greater than 15 percent; and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 350D - Udipsamments, wet substratum, 15 to 25 percent slopes

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the entire particlesize class control section. Saturated hydraulic conductivity (Ksat) is high or very high. Drainage class is moderately well drained.

Included with this mapping are small areas of slopes less than 15 percent and greater than 25 percent; and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 393A -Timakwa muck, 0 to 3 percent slopes

This map unit consists of very poorly drained soils that formed in muck over sandy glaciofluvial deposits. The very poorly drained Timakwa soils have mucky surfaces that 16 to 51 inches thick over sands. It occurs in low lying areas within the mapping area.

Typically, the surface layer is black muck about 30 inches thick. The subsoil and substratum, to a depth of 40 inches or more, is light brownish gray, light olive gray to gray very fine sand, fine sand and sand.

Included with this mapping are small areas of poorly drained Squamscott soils along the margins, sandy alluvial deposits and very deep organic deposits, Catden soils, greater than 51 inches thick. Included with this mapping are small areas of slopes greater than 3 percent. These inclusions make up as much as 20 percent of the map unit.

## 448A -Scituate fine sandy loam, 0 to 3 percent slopes

This map unit consists of well drained soils that formed in loamy sand compact glacial till. It occurs on the upland areas within the mapping area.

Typically, the surface layer is black very fine sandy loam about 4 inches thick. The subsoil is brown, strong brown, dark yellowish brown, yellowish brown and light olive brown sandy loam, loamy fine sand and loamy sand about 30 inches thick. The substratum, to a depth of 40 inches or more, is light olive brown, olive and light yellowish brown loamy fine sand, loamy sand, loamy coarse sand, and gravelly loamy sand. Note that refusal was noted between 42-50" in the map unit.

Included with this mapping are small areas of slopes greater than 3 percent, and moderately well drained Deerfield soils. These inclusions make up as much as 15 percent of the map unit.

## 538A - Squamscott, poorly drained, 0 to 3 percent slopes

This map unit consists of poorly drained soils that formed in sandy material over loamy sediments. These soils are typically located on marine plains or terraces.

Typically, the surface layer is black loamy very fine sand about 4 inches thick. The E horizon is light brownish gray, loamy fine sand, approximately 2 inches thick. The subsoil is dark reddish brown loamy sand to a depth to about 24 inches. The substratum to a depth greater than 40 inches is gray, silt loam.

Included in this map unit are small areas of slopes greater than 3 percent, and very poorly drained Timakwa soils. These inclusions make up as much as 15 percent of the map unit.

## 900A - Endoaquents, sandy or gravelly, 0 to 3 percent slopes

This map unit consists of poorly drained soils that formed in excavated sandy glaciofluvial deposits. It occurs in the ponded area of the old sand and gravel pit. The soils range from fine sand to sand and their gravelly analogs.

Included with this mapping are small areas of slopes greater than 3 percent. These inclusions make up as much as 10 percent of the map unit.

### 3.3 HYDROLOGIC SOIL GROUP CORRELATION

In order to correlate the soil map units identified, as part of this soil survey, to the appropriate hydrologic soil group, we referenced the Society of Soil Scientists of Northern New England "Ksat Values for New Hampshire Soils, Special Publication No. 5, September 2009"3. Below is the correlation of the identified soil map units to the appropriate hydrologic soil group.

| Soil ID | Soil Type | Hydrologic Soil Group |
| :---: | :---: | :---: |
| 26 | Windsor (excessively drained) | A |
| 199 | Dumps, bark chips and organic matter | No Group |
| 313 | Deerfield(moderately well drained) | B |
| 350 | Udipsamments, nearly level (moderately well <br> drained) | D |
| 393 | Timakwa (very poorly drained) | D |

[^13]| 448 | Scituate (moderately well drained) | C |
| :--- | :---: | :---: |
| 538 | Squamscott (poorly drained) | D |
| 900 | Endoaquents, sandy or gravelly (poorly drained) | D |

### 4.0 FINDINGS AND CONCLUSIONS

GZA has completed Site-Specific Soil Mapping on the Site in support of proposed development of the Site. The following is a summary of our findings and conclusions:

- The Site consists of a mix of primarily sandy glaciofluvial deposits and loamy sand compact glacial till, with areas of sandy alluvial deposits, organic deposits, and human disturbed soils.
- The WSS shows a very large portion of the Site is mapped as sandy glaciofluvial deposits and organic deposits in the low-lying swales and human disturbed soils west of the proposed development. This area contains a reclaimed sand and gravel pit that is now a mix of a man-made pond and scrub-shrub wetlands.
- The Site currently is used as the headquarters for Cornerstone Tree Care. Associated with this use, there are some mulch piles and logs stored on Site.


Figure 1 - Site Specific Soil Map




## Appendix A - Natural Resource Limitations

## USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of Mr. John $\mathrm{O}^{\prime}$ Neil ("Client") for the stated purpose(s) and location(s) identified in the report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's risk, and without any liability to GZA.

## STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the data gathered and observations made during the course of our work. Conditions other than described in this report may be found at the subject location(s).
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

## LIMITS TO OBSERVATIONS

4. Natural resource characteristics are inherently variable. Biological community composition and diversity can be affected by seasonal, annual or anthropogenic influences. In addition, soil conditions are reflective of subsurface geologic materials, the composition and distribution of which vary spatially.
5. The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by GZA reflect the conditions that could be reasonably observed based upon the visual observations of surface conditions and/or a limited observation of subsurface conditions at the specific time of observation. Such conditions are subject to environmental and circumstantial alteration and may not reflect conditions observable at another time.
6. The conclusions and recommendations contained in this report are based upon the data obtained from a limited number of surveys performed during the course of our work on the site, as described in the Report. There may be variations between these surveys and other past or future surveys due to inherent environmental and circumstantial variability.

## RELIANCE ON INFORMATION FROM OTHERS

7. Preparation of this Report may have relied upon information made available by Federal, state and local authorities; and/or work products prepared by other professionals as specified in the report. Unless specifically stated, GZA did not attempt to independently verify the accuracy or completeness of that information.

## COMPLIANCE WITH REGULATIONS AND CODES

8. GZA's services were performed to render an opinion on the presence and/or condition of natural resources as described in the Report. Standards used to identify or assess these resources as well as regulatory jurisdiction, if any, are stated in the Report. Standards for identification of jurisdictional resources and regulatory control
over them may vary between governmental agencies at Federal, state and local levels and are subject to change over time which may affect the conclusions and findings of this report.

## NEW INFORMATION

9. In the event that the Client or others authorized to use this report obtain information on environmental regulatory compliance issues at the site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this work, may modify the conclusions stated in this report.

## ADDITIONAL SERVICES

10. GZA recommends that we be retained to provide further investigation, if necessary, which would allow GZA to (1) observe compliance with the concepts and recommendations contained herein; (2) evaluate whether the manner of implementation creates a potential new finding; and (3) evaluate whether the manner of implementation affects or changes the conditions on which our opinions were made.


## Appendix B - Photo Log

PHOTO LOG
Lafayette Road

## Portsmouth, New Hampshire

Photos Taken: January 9 \& 20,2021


Photograph No. 1: Looking at the pond on Site. GZA understands this is a man-made pond.


Photograph No. 2: Looking at portion of the Site proposed to be developed. This portion of the Site consists of Deerfield loamy sand with 0 to 3 percent slopes (Soil Unit 313A).

# PHOTO LOG <br> Lafayette Road <br> Portsmouth, New Hampshire 

Photos Taken: January 9 \& 20, 2021


Photograph No. 3: Looking at portion of the Site proposed to be developed. This portion of the Site consists of Scituate fine sandy loam with 0 to 3 percent slopes (Soil Unit 448A).


Photograph No. 4: Looking westerly into an emergent wetland on Site near wetland flag B-45. This area consists of Endoaquents, sandy or gravelly with 0 to 3 percent slopes (Soil Unit 900A)


Appendix C - Disturbed Soil Mapping Unit Supplement for DES AOT

## Supplemental Symbols

The five components of the Disturbed Soil Mapping Unit Supplement are as follows:

```
Symbol 1: Drainage Class
a - Excessively Drained
b - Somewhat Excessively Drained
c- Well Drained
d - Moderately Well Drained
e - Somewhat Poorly Drained
f-Poorly Drained
g - Very Poorly Drained
h - Not Determined
```

Symbol 2: Parent Material (of naturally formed soil only, if present)
a - No natural soil within 60"
b-Glaciofluvial Deposits (outwash/terraces of sand or sand and gravel)
c - Glacial Till Material (active ice)
d - Glaciolacustrine very fine sand and silt deposits (glacial lakes)
e-Loamy/sandy over Silt/Clay deposits
f-Marine Silt and Clay deposits (ocean waters)
g - Alluvial Deposits (floodplains)
h - Organic Materials-Fresh water Bogs, etc.
j - Organic Materials-Tidal Marsh

## Symbol 3: Restrictive/Impervious Layers

a-None
b - Bouldery surface with more than $15 \%$ of the surface covered with boulders
c- Mineral restrictive layer(s) are present in the soil profile less than 40 inches below the
soil surface such as hard pan, platy structure or clayey texture with consistence of at least firm (i.e. more than 20 newtons). For other examples of soil characteristics that qualify for restrictive layers, see "Soil Manual for
Site evaluations in $\mathrm{NH}^{\prime \prime}$ 2nd Ed., (page 3-17, figure 3-14)
d-Bedrock in the soil profile; 0-20 inches
e-Bedrock in the soil profile; 20-60 inches
f - Areas where depth to bedrock is so variable that a single soil type cannot be applied, will be mapped as a complex of soil types
g - Subject to Flooding
h - Man-made impervious surface including pavement, concrete, or built-up surfaces
(i.e. buildings) with no morphological restrictive layer within control section

```
Symbol 4: Estimated Ksat* (most limiting layer excluding symbol 3h above).
a-High.
b - Moderate
c - Low
d - Not determined
*See "Guidelines for Ksat Class Placement" in Chapter 3 of the Soil Survey Manual, USDA
```


## Symbol 5: Hydrologic Soil Group*

a - Group A
b - Group B
c-Group C
d-Group D
e - Not determined
*excluding man-made surface impervious/restrictive layers


GZA GeoEnvironmental, Inc.

## GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION (Env-Wq 1507.04)

| 0.38 | ac | Area of HSG A soil that was replaced by impervious cover | $0.40^{\prime \prime}$ |
| :---: | :--- | :--- | ---: |
| 0.95 | ac | Area of HSG B soil that was replaced by impervious cover | $0.25^{\prime \prime}$ |
| 0.43 | ac | Area of HSG C soil that was replaced by impervious cover | $0.10^{\prime \prime}$ |
| 0.01 | ac | Area of HSG D soil or impervious cover that was replaced by impervious cover | $0.0^{\prime \prime}$ |
| 0.24 inches | Rd = Weighted groundwater recharge depth |  |  |
| 0.4314 ac-in | GRV = AI ${ }^{*}$ Rd |  |  |
| 1,566 cf | GRV conversion (ac-in $\left.\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12^{\prime \prime}\right)$ |  |  |

Provide calculations below showing that the project meets the groundwater recharge requirements (EnvWq 1507.04):
The combined storage volume of the voids in the infiltration drip edges is approximately $5,688 \mathrm{CF}$, exceeding the requirement of $1,566 \mathrm{CF}$.

# TEST PIT EVALUATION REPORT 

Lafayette Road, Tax Map 297, Lot 11
Portsmouth, New Hampshire

File No. $\quad 04.0191186 .00$


| Estimated Seasonal High Water Table @ | 22 | inches | Observed Water Table @ | 48 | inches |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | 72 | inches | Roots @ | 22 | inches |
| Refusal @ | 60 | inches |  |  |  |

Test Pit No. 2 NOTES:
Depth (inches) Description


## TEST PIT EVALUATION REPORT

Lafayette Road, Tax Map 297, Lot 11
Portsmouth, New Hampshire

File No. $\quad 04.0191186 .00$
Evaluated by: James H. Long, CSS Designer: 988 Witnessed by: None Date: 1/9/21

Test Pit No. 3
NOTES:

Depth (inches) Description

0-12 10YR3/3 Dark brown, loamy very fine sand, granular, friable
12-16 7.5YR4/6 Strong brown, loamy fine sand, granular, friable
16-28 10YR5/4 Light Yellowish brown, loamy sand, granular, friable
28-46 2.5Y5/4 Light olive brown, sand, single grain, loose
46-96 5Y3/2 Dark olive gray, cobbly gravelly coarse sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

| Estimated Seasonal High Water Table @ | 46 | inches | Observed Water Table @ | none | inches |  |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | none | inches |  |  |  |  |
| Refusal @ | none | inches | 46 |  |  |  |
| inches |  |  |  |  |  |  |

Test Pit No. 4
NOTES:

Depth (inches) Description

0-6 10YR3/3 Dark brown, very fine loamy sand, granular, friable
6-14 $\quad 10 Y R 5 / 6$ Yellowish brown, loamy fine sand, granular, friable
14-26 10YR5/4 Yellowish brown, loamy sand, granular, friable
26-40 2.5Y5/4 Light olive brown, sand, single grain, loose
40-96 5Y5/3 Olive, coarse gravelly sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

| Estimated Seasonal High Water Table @ | 40 | inches | Observed Water Table @ | none | inches |  |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | none | inches |  |  |  |  |
| Refusal @ | noots @ | inches |  |  |  |  |
| inches |  |  |  |  |  |  |

## TEST PIT EVALUATION REPORT

Lafayette Road, Tax Map 297, Lot 11
Portsmouth, New Hampshire

File No. 04.0191186 .00
Evaluated by: James H. Long, CSS Designer: 988 Witnessed by: None Date: 1/9/21

Test Pit No. 5
NOTES:

Depth (inches) Description

2-0 Forest Mat
0-10 10YR3/3 Dark brown, loamy very fine sand, granular, friable
10-14 10YR5/6 Yellowish brown, loamy fine sand, granular, friable
14-24 10YR5/4 Yellowish brown, loamy sand, granular, friable
24-46 2.5Y4/3 Olive brown, sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

46-60
2.5Y4/3 Olive brown, coarse gravelly sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

| Estimated Seasonal High Water Table @ | 24 | inches | Observed Water Table @ | 46 | inches |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | none | inches |  |  |  |
| Refusal @ | none | inches | 30 | inches |  |

Test Pit No. 6
NOTES:

Depth (inches) Description
^0-12 10YR4/3 Brown, loamy very fine sand, granular, friable (fill)
12-16 10YR5/6 Yellowish brown, loamy fine sand, granular, friable
16-32 10YR5/4 Yellowish brown, loamy sand, granular, friable
32-60 2.5Y4/3 Olive brown, sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

60-77 2.5Y5/2 Grayish brown, cobbly gravelly coarse sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

| Estimated Seasonal High Water Table @ | 32 | inches | Observed Water Table @ | 56 | inches |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | none | inches | Roots @ | 32 | inches |
| Refusal @ | none | inches |  |  |  |

File No. 04.0191186 .00


Test Pit No. 8
NOTES:

Depth (inches) Description

| 0-12 | 10YR3/3 Dark brown, loamy very fine sand, granular, friable |
| :--- | :--- |
| 12-16 | 10YR5/6 Yellowish brown, loamy fine sand, granular, friable |
| 16-32 | 10YR5/4 Yellowish brown, sand, single grain, loose |
| 32-84 | 2.5Y4/3 Olive brown, sand, single grain, loose |
|  | 2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features |


| Estimated Seasonal High Water Table @ | 32 | inches | Observed Water Table @ | 48 | inches |
| ---: | :---: | :---: | ---: | ---: | ---: | ---: |
| Restrictive @ | none | inches |  |  |  |
| Refusal @ | none | inches | 24 | inches |  |

File No. 04.0191186 .00


Test Pit No. 10

Depth (inches) Description

| $2-0$ | Forest Mat |
| :--- | :--- |
| $0-10$ | 10YR3/3 Dark brown, very fine sandy loam, granular, friable |
| $10-16$ | $10 \mathrm{YR5} / 6$ Yellowish brown, fine sandy loam, granular, friable |
| $16-32$ | $10 \mathrm{YR5} / 4$ Yellowish brown, fine sandy loam, granular, friable |
| $32-42$ | $2.5 \mathrm{Y} 5 / 3$ Light olive brown, gravelly loamy sand, massive, firm |
|  | $2.5 \mathrm{Y} 6 / 2$ Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features |


| Estimated Seasonal High Water Table @ | 32 | inches | Observed Water Table @ | None | inches |  |
| ---: | :---: | :--- | :--- | ---: | :--- | :--- |
| Restrictive @ | 32 | inches |  |  |  |  |
| Refusal @ | none | inches | 32 | inches |  |  |

## TEST PIT EVALUATION REPORT

Lafayette Road, Tax Map 297, Lot 11
Portsmouth, New Hampshire

File No. $\quad \mathbf{0 4 . 0 1 9 1 1 8 6 . 0 0}$


Test Pit No. 12 NOTES:
$\qquad$

| 0-10 | 10YR4/3 Brown, loamy very fine sand, granular, friable |
| :--- | :--- |
| 10-16 | 7.5YR4/3 Brown, loamy fine sand, granular, friable |
| 16-36 | 7.5YR5/4 Brown, sand, single grain, loose |
| 36-72 | 10YR5/3 Brown, sand, single grain, loose |
| 72-108 | $2.5 Y 6 / 3$ Light yellowish brown, sand, single grain, loose |


| Estimated Seasonal $H$ High Water Table @ | $>72$ | inches | Observed Water Table @ | 108 | inches |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | none | inches | Roots @ | 30 | inches |
| Refusal @ | none | inches |  |  |  |

TEST PIT EVALUATION REPORT
Lafayette Road, Tax Map 297, Lot 11
Portsmouth, New Hampshire

File No. 04.0191186 .00

| Evaluated by: | James H. Long, CSS | Designer: $988 \quad$ Witnessed by: None |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Test Pit No. 13 |  |  |  |
| NOTES: Test pit in landscape yard |  |  |  |
| Depth (inches) |  |  |  |

${ }^{\wedge} 0-16 \quad$ 2.5Y2.5/1 Black, loamy very fine sand, granular, friable (fill)
16-26 7.5YR4/6 Strong brown, loamy fine sand, granular, friable

26-72 2.5Y5/4 Light olive brown, sand, single grain, loose
72-108 2.5Y5/3 Light olive brown, sand, single grain, loose
2.5Y6/2 Light brownish gray and 7.5YR4/6 Strong brown redoximorphic features

| Estimated Seasonal High Water Table @ | 72 | inches | Observed Water Table @ | 96 | inches |
| ---: | :---: | :--- | :--- | :--- | :--- | :--- |
| Restrictive @ | 30 | inches | Roots @ | 30 | inches |
| Refusal @ | 50 | inches |  |  |  |

Env-Wq 1508.03

Type/Node Name: Wet Pond \#1 - Pond 20P
Enter the type of stormwater pond (e.g., Wet Pond) and the node name in the drainage analysis, if applicable.

| 2.52 ac | $\mathrm{A}=$ Area draining to the practice |
| :---: | :---: |
| 1.58 ac | $A_{1}=$ Impervious area draining to the practice |
| 0.63 decimal | 1 = Percent impervious area draining to the practice, in decimal form |
| 0.61 unitless | $\mathrm{Rv}=$ Runoff coefficient $=0.05+(0.9 \times \mathrm{l})$ |
| 1.55 ac-in | WQV= $1^{\prime \prime} \times \mathrm{Rv} \times \mathrm{A}$ |
| 5,609 cf | WQV conversion (ac-in $\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12^{\prime \prime}$ ) |
| 561 cf | $10 \% \times$ WQV (check calc for sediment forebay and micropool volume) |
| 2,804 cf | 50\% x WQV (check calc for extended detention volume) |
| 726 cf | $\mathrm{V}_{\text {SED }}=$ Sediment forebay volume |
| 9,548 cf | $V_{\text {PP }}=$ Permanent pool volume (volume below the lowest invert of the outlet structure) Attach stage-storage table. |
| no cf | Extended Detention? $\mathrm{V}_{\mathrm{ED}}=$ Volume of extended detention (if "yes" is given in box above) |
|  | $E_{E D}=$ Elevation of WQV if "yes" is given in box above ${ }^{2}$ |
| cfs | $2 \mathrm{Q}_{\text {avg }}=2 * \mathrm{~V}_{\mathrm{ED}} / 24 \mathrm{hrs} *(1 \mathrm{hr} / 3600 \mathrm{sec})$ (used to check against $\mathrm{Q}_{\text {EDmax }}$ below) |
| cfs |  |
| hours | $\mathrm{T}_{\mathrm{ED}}=$ Drawdown time of extended detention $=2 \mathrm{~V}_{\text {ED }} / \mathrm{Q}_{\mathrm{ED} \max } \quad \geq \mathbf{2 4 - h r s}$ |
| 3.00 :1 | Pond side slopes $\quad \geq 3: 1$ |
| 51.70 ft | Elevation of seasonal high water table |
| 50.50 ft | Elevation of lowest pond outlet |
| 46.70 ft | Max floor = Maximum elevation of pond bottom (ft) |
| 42.50 ft | Minimum floor (to maintain depth at less than $8^{\prime}$ ) $\leq 8 \mathrm{ft}$ |
| 46.50 ft | Elevation of pond floor ${ }^{3} \quad$ ¢ ${ }^{\text {Max floor and }>\text { Min }}$ |
| 240.00 ft | Length of the flow path between the inlet and outlet at mid-depth |
| 38.00 ft | Average width ([average of the top width + average bottom width]/2) |
| 6.32:1 | Length to average width ratio $\quad \geq 3: 1$ |
| Yes Yes/No | Is the perimeter curvilinear. $\leftarrow$ Yes |
| Yes Yes/No | Are the inlet and outlet located as far apart as possible. $\quad \leftarrow$ Yes |
| No Yes/No | Is there a manually-controlled drain to dewater the pond over a 24 hr period? |
| If no state why | Existing ground elevation too high. |
| N/A | What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of < $6^{\prime \prime}$ )? |
| 52.97 ft | Peak elevation of the 50-year storm event |
| 54.00 ft | Berm elevation of the pond |
| YES | 50 peak elevation $\leq$ the berm elevation? $\leftarrow$ yes |

1. If the entire WQV is stored in the perm. pool, there is no extended det., and the following five lines do not apply.
2. This is the elevation of WQV if the hydrologic analysis is set up to include the permanent pool storage in the node description.
3. If the pond floor elevation is above the max floor elev., a hydrologic budget must be submitted to demonstrate that a minimum depth of 3 feet can be maintained. (First check whether a revised "lowest pond outlet" elev. will resolve the issue.)
Designer's Notes:

## Stage-Area-Storage for Pond 20P: WET POND 1

| Elevation $\qquad$ | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 46.50 | 693 |  | 51.70 | 5,835 | 15,672 |
| 46.60 | 761 | 73 | 51.80 | 5,962 | 16,261 |
| 46.70 | 832 | 152 | 51.90 | 6,090 | 16,864 |
| 46.80 | 907 | 239 | 52.00 | 7,208 | 17,484 |
| 46.90 | 984 | 334 | 52.10 | 7,367 | 18,213 |
| 47.00 | 1,065 | 436 | 52.20 | 7,528 | 18,958 |
| 47.10 | 1,135 | 546 | 52.30 | 7,691 | 19,719 |
| 47.20 | 1,208 | 663 | 52.40 | 7,856 | 20,496 |
| 47.30 | 1,283 | 788 | 52.50 | 8,022 | 21,290 |
| 47.40 | 1,360 | 920 | 52.60 | 8,190 | 22,101 |
| 47.50 | 1,439 | 1,060 | 52.70 | 8,360 | 22,928 |
| 47.60 | 1,521 | 1,208 | 52.80 | 8,532 | 23,773 |
| 47.70 | 1,605 | 1,364 | 52.90 | 8,705 | 24,635 |
| 47.80 | 1,691 | 1,529 | 53.00 | 8,880 | 25,514 |
| 47.90 | 1,779 | 1,702 | 53.10 | 9,063 | 26,411 |
| 48.00 | 1,870 | 1,885 | 53.20 | 9,248 | 27,326 |
| 48.10 | 1,953 | 2,076 | 53.30 | 9,434 | 28,261 |
| 48.20 | 2,038 | 2,276 | 53.40 | 9,623 | 29,213 |
| 48.30 | 2,125 | 2,484 | 53.50 | 9,813 | 30,185 |
| 48.40 | 2,213 | 2,701 | 53.60 | 10,005 | 31,176 |
| 48.50 | 2,303 | 2,926 | 53.70 | 10,200 | 32,186 |
| 48.60 | 2,396 | 3,161 | 53.80 | 10,395 | 33,216 |
| 48.70 | 2,489 | 3,406 | 53.90 | 10,593 | 34,265 |
| 48.80 | 2,585 | 3,659 | 54.00 | 10,793 | 35,335 |
| 48.90 | 2,683 | 3,923 |  |  |  |
| 49.00 | 2,782 | 4,196 |  |  |  |
| 49.10 | 2,880 | 4,479 |  |  |  |
| 49.20 | 2,980 | 4,772 |  |  |  |
| 49.30 | 3,082 | 5,075 |  |  |  |
| 49.40 | 3,185 | 5,388 |  |  |  |
| 49.50 | 3,290 | 5,712 |  |  |  |
| 49.60 | 3,396 | 6,046 |  |  |  |
| 49.70 | 3,505 | 6,391 |  |  |  |
| 49.80 | 3,615 | 6,747 |  |  |  |
| 49.90 | 3,727 | 7,114 |  |  |  |
| 50.00 | 3,840 | 7,493 |  |  |  |
| 50.10 | 3,947 | 7,882 |  |  |  |
| 50.20 | 4,055 | 8,282 |  |  |  |
| 50.30 | 4,164 | 8,693 |  |  |  |
| 50.40 | 4,275 | 9,115 |  |  |  |
| 50.50 | 4,388 | 9,548 |  |  |  |
| 50.60 | 4,504 | 9,993 |  |  |  |
| 50.70 | 4,621 | 10,449 |  |  |  |
| 50.80 | 4,740 | 10,917 |  |  |  |
| 50.90 | 4,861 | 11,397 |  |  |  |
| 51.00 | 4,983 | 11,889 |  |  |  |
| 51.10 | 5,101 | 12,394 |  |  |  |
| 51.20 | 5,219 | 12,910 |  |  |  |
| 51.30 | 5,340 | 13,437 |  |  |  |
| 51.40 | 5,461 | 13,977 |  |  |  |
| 51.50 | 5,584 | 14,530 |  |  |  |
| 51.60 | 5,709 | 15,094 |  |  |  |

## Summary for Pond 20P: WET POND 1

| Inflow A | $2.516 \mathrm{ac}, 62.69 \%$ Impervious, Inflow Depth = 5.99' for 50-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 16.72 cfs @ | 12.09 hrs , Volume= | 1.257 af |  |
| Outflow | 8.80 cfs @ | 12.23 hrs , Volume= | 1.250 af, | Atten= $47 \%, L a g=8.7 \mathrm{~min}$ |
| Primary | 8.80 cfs @ | 12.23 hrs , Volume= | 1.250 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Starting Elev=50.50' Surf.Area=4,388 sf Storage= $9,548 \mathrm{cf}$
Peak Elev= 52.97 @ 12.23 hrs Surf.Area= 8,819 sf Storage $=25,207 \mathrm{cf}$ ( $15,659 \mathrm{cf}$ above start)
Plug-Flow detention time $=212.1$ min calculated for 1.030 af ( $82 \%$ of inflow)
Center-of-Mass det. time $=92.0 \mathrm{~min}(881.4-789.4$ )


Primary OutFlow Max=8.80 cfs @ 12.23 hrs HW=52.97' TW=0.00' (Dynamic Tailwater)
$1=$ Culvert (Inlet Controls 8.80 cfs @ 4.98 fps )
-2=Orifice/Grate (Passes < 0.99 cfs potential flow)
-3=Orifice/Grate (Passes < 9.13 cfs potential flow)
$4=$ Orifice/Grate (Controls 0.00 cfs )
$5=$ Broad-Crested Rectangular Weir (Controls 0.00 cfs )

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

| Yes | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a). |
| :---: | :---: |
| 2.09 ac | $A=$ Area draining to the practice |
| 1.23 ac | $A_{1}$ = Impervious area draining to the practice |
| 0.59 decimal | I = Percent impervious area draining to the practice, in decimal form |
| 0.58 unitless | Rv $=$ Runoff coefficient $=0.05+(0.9 \times \mathrm{I})$ |
| 1.21 ac-in | WQV $=1^{\prime \prime} \times \operatorname{Rv} \times \mathrm{A}$ |
| 4,404 cf | WQV conversion (ac-in $\times 43,560 \mathrm{sf} / \mathrm{ac} \times 1 \mathrm{ft} / 12^{\prime \prime}$ ) |
| 1,101 cf | 25\% x WQV (check calc for sediment forebay volume) |
| 3,303 cf | $75 \% \times$ WQV (check calc for surface sand filter volume) |
| Forebay | Method of Pretreatment? (not required for clean or roof runoff) |
| 1,187 cf | $V_{\text {SED }}=$ Sediment forebay volume, if used for pretreatment $\geq 25 \% \mathrm{WQV}$ |
| Calculate time to drain if system IS NOT underdrained: |  |
| sf | $A_{S A}=$ Surface area of the practice |
| iph | Ksat $_{\text {DESIGN }}=$ Design infiltration rate ${ }^{1}$ <br> If K sat (prior to factor of safety) is $<0.50 \mathrm{iph}$, has an underdrain been provided? |
| Yes/No | (Use the calculations below) |
| hours |  |
| Calculate time to drain if system IS underdrained: |  |
| 51.75 ft | $\mathrm{E}_{\text {wQV }}=$ Elevation of WQV (attach stage-storage table) |
| 1.41 cfs | $\mathrm{Q}_{\text {wov }}=$ Discharge at the $\mathrm{E}_{\text {wav }}$ (attach stage-discharge table) |
| 1.74 hours |  |
| 49.50 feet | $\mathrm{E}_{\mathrm{FC}}=$ Elevation of the bottom of the filter course material ${ }^{2}$ |
| N/A feet | $\mathrm{E}_{\text {UD }}=$ Invert elevation of the underdrain (UD), if applicable |
| 47.50 feet | $\mathrm{E}_{\text {SHWT }}=$ Elevation of SHWT (if none found, enter the lowest elevation of the test pit) |
| 44.50 feet | $\mathrm{E}_{\text {Rock }}=$ Elevation of bedrock (if none found, enter the lowest elevation of the test pit) |
| \#VALUE! feet | $D_{\text {FC to UD }}=$ Depth to UD from the bottom of the filter course ${ }^{\text {a }}$ |
| 5.00 feet | $\mathrm{D}_{\mathrm{FC} \text { to ROCK }}=$ Depth to bedrock from the bottom of the filter course |
| 2.00 feet | $\mathrm{D}_{\text {FC to SHWT }}=$ Depth to SHWT from the bottom of the filter course ${ }^{\text {a }}$ |
| 51.92 ft | Peak elevation of the 50 -year storm event (infiltration can be used in analysis) |
| 53.00 ft | Elevation of the top of the practice |
| YES | 50 peak elevation $\leq$ Elevation of the top of the practice $\quad \leftarrow$ yes |
| If a surface sand filter or underground sand filter is proposed: |  |
| YES ac | Drainage Area check. <10 ac |
| cf | $V=$ Volume of storage ${ }^{3}$ (attach a stage-storage table) $\quad \geq 75 \% \mathrm{WQV}$ |
| inches | $\mathrm{D}_{\mathrm{FC}}=$ Filter course thickness $\quad 1 \begin{aligned} & \text { 18, or } 24 \text { " if } \\ & \text { within GPA }\end{aligned}$ |
| Sheet $\overline{\text { Yes/No }}$ | Note what sheet in the plan set contains the filter course specification. Access grate provided? |



1. Rate of the limiting layer (either the filter course or the underlying soil). Ksat ${ }_{\text {design }}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34,40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

## Designer's Notes:

$\qquad$

## Stage-Area-Storage for Pond 2P: BIORETENTION 1

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 48.16 | 3,030 | 0 | 50.76 | 3,030 | 1,804 |
| 48.21 | 3,030 | 61 | 50.81 | 3,030 | 1,812 |
| 48.26 | 3,030 | 121 | 50.86 | 3,030 | 1,820 |
| 48.31 | 3,030 | 182 | 50.91 | 3,030 | 1,827 |
| 48.36 | 3,030 | 242 | 50.96 | 3,030 | 1,835 |
| 48.41 | 3,030 | 303 | 51.01 | 3,039 | 1,900 |
| 48.46 | 3,030 | 364 | 51.06 | 3,085 | 2,053 |
| 48.51 | 3,030 | 424 | 51.11 | 3,131 | 2,208 |
| 48.56 | 3,030 | 485 | 51.16 | 3,178 | 2,366 |
| 48.61 | 3,030 | 545 | 51.21 | 3,224 | 2,526 |
| 48.66 | 3,030 | 606 | 51.26 | 3,272 | 2,689 |
| 48.71 | 3,030 | 667 | 51.31 | 3,319 | 2,853 |
| 48.76 | 3,030 | 727 | 51.36 | 3,367 | 3,020 |
| 48.81 | 3,030 | 788 | 51.41 | 3,415 | 3,190 |
| 48.86 | 3,030 | 848 | 51.46 | 3,464 | 3,362 |
| 48.91 | 3,030 | 909 | 51.51 | 3,513 | 3,536 |
| 48.96 | 3,030 | 970 | 51.56 | 3,562 | 3,713 |
| 49.01 | 3,030 | 1,030 | 51.61 | 3,611 | 3,893 |
| 49.06 | 3,030 | 1,091 | 51.66 | 3,661 | 4,074 |
| 49.11 | 3,030 | 1,151 | 51.71 | 53,712 | 4 4,259 |
| 49.16 | 3,030 | 1,212 | 51.76 | 3,762 | 4,446 |
| 49.21 | 3,030 | 1,273 | 51.81 | 3,813 | 4,635 |
| 49.26 | 3,030 | 1,333 | 51.86 | 3,865 | 4,827 |
| 49.31 | 3,030 | 1,394 | 51.91 | 3,916 | 5,021 |
| 49.36 | 3,030 | 1,454 | 51.96 | 3,968 | 5,219 |
| 49.41 | 3,030 | 1,515 | 52.01 | 4,020 | 5,418 |
| 49.46 | 3,030 | 1,576 | 52.06 | 4,069 | 5,620 |
| 49.51 | 3,030 | 1,615 | 52.11 | 4,119 | 5,825 |
| 49.56 | 3,030 | 1,623 | 52.16 | 4,168 | 6,032 |
| 49.61 | 3,030 | 1,630 | 52.21 | 4,218 | 6,242 |
| 49.66 | 3,030 | 1,638 | 52.26 | 4,269 | 6,454 |
| 49.71 | 3,030 | 1,645 | 52.31 | 4,320 | 6,669 |
| 49.76 | 3,030 | 1,653 | 52.36 | 4,371 | 6,886 |
| 49.81 | 3,030 | 1,660 | 52.41 | 4,422 | 7,106 |
| 49.86 | 3,030 | 1,668 | 52.46 | 4,474 | 7,328 |
| 49.91 | 3,030 | 1,676 | 52.51 | 4,525 | 7,553 |
| 49.96 | 3,030 | 1,683 | 52.56 | 4,578 | 7,781 |
| 50.01 | 3,030 | 1,691 | 52.61 | 4,630 | 8,011 |
| 50.06 | 3,030 | 1,698 | 52.66 | 4,683 | 8,244 |
| 50.11 | 3,030 | 1,706 | 52.71 | 4,736 | 8,479 |
| 50.16 | 3,030 | 1,713 | 52.76 | 4,789 | 8,718 |
| 50.21 | 3,030 | 1,721 | 52.81 | 4,843 | 8,958 |
| 50.26 | 3,030 | 1,729 | 52.86 | 4,897 | 9,202 |
| 50.31 | 3,030 | 1,736 | 52.91 | 4,951 | 9,448 |
| 50.36 | 3,030 | 1,744 | 52.96 | 5,006 | 9,697 |
| 50.41 | 3,030 | 1,751 |  |  |  |
| 50.46 | 3,030 | 1,759 |  |  |  |
| 50.51 | 3,030 | 1,766 |  |  |  |
| 50.56 | 3,030 | 1,774 |  |  |  |
| 50.61 | 3,030 | 1,782 |  |  |  |
| 50.66 | 3,030 | 1,789 |  |  |  |
| 50.71 | 3,030 | 1,797 |  |  |  |

Stage-Discharge for Pond 2P: BIORETENTION 1

| Elevation (feet) | $\begin{array}{r} \text { Discharge } \\ \text { (cfs) } \end{array}$ | $\begin{array}{r} \text { Discarded } \\ \text { (cfs) } \\ \hline \end{array}$ | $\begin{array}{r} \text { Primary } \\ (\mathrm{cfs}) \end{array}$ | Elevation (feet) | Discharge (cfs) | Discarded (cfs) | Primary (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 48.16 | 0.00 | 0.00 | 0.00 | 50.76 | 1.04 | 1.04 | 0.00 |
| 48.21 | 0.11 | 0.11 | 0.00 | 50.81 | 1.06 | 1.06 | 0.00 |
| 48.26 | 0.24 | 0.24 | 0.00 | 50.86 | 1.07 | 1.07 | 0.00 |
| 48.31 | 0.26 | 0.26 | 0.00 | 50.91 | 1.09 | 1.09 | 0.00 |
| 48.36 | 0.27 | 0.27 | 0.00 | 50.96 | 1.10 | 1.10 | 0.00 |
| 48.41 | 0.29 | 0.29 | 0.00 | 51.01 | 1.12 | 1.12 | 0.00 |
| 48.46 | 0.31 | 0.31 | 0.00 | 51.06 | 1.14 | 1.14 | 0.00 |
| 48.51 | 0.32 | 0.32 | 0.00 | 51.11 | 1.16 | 1.16 | 0.00 |
| 48.56 | 0.34 | 0.34 | 0.00 | 51.16 | 1.18 | 1.18 | 0.00 |
| 48.61 | 0.35 | 0.35 | 0.00 | 51.21 | 1.20 | 1.20 | 0.00 |
| 48.66 | 0.37 | 0.37 | 0.00 | 51.26 | 1.22 | 1.22 | 0.00 |
| 48.71 | 0.39 | 0.39 | 0.00 | 51.31 | 1.24 | 1.24 | 0.00 |
| 48.76 | 0.40 | 0.40 | 0.00 | 51.36 | 1.26 | 1.26 | 0.00 |
| 48.81 | 0.42 | 0.42 | 0.00 | 51.41 | 1.27 | 1.27 | 0.00 |
| 48.86 | 0.43 | 0.43 | 0.00 | 51.46 | 1.29 | 1.29 | 0.00 |
| 48.91 | 0.45 | 0.45 | 0.00 | 51.51 | 1.31 | 1.31 | 0.00 |
| 48.96 | 0.47 | 0.47 | 0.00 | 51.56 | 1.33 | 1.33 | 0.00 |
| 49.01 | 0.48 | 0.48 | 0.00 | 51.61 | 1.35 | 1.35 | 0.00 |
| 49.06 | 0.50 | 0.50 | 0.00 | 51.66 | 1.37 | 1.37 | 0.00 |
| 49.11 | 0.51 | 0.51 | 0.00 | 51.71 | $7-1.39$ | 411.39 | 0.00 |
| 49.16 | 0.53 | 0.53 | 0.00 | 51.76 | . 71.41 | . 41.41 | 0.00 |
| 49.21 | 0.55 | 0.55 | 0.00 | 51.81 | 1.43 | 1.43 | 0.00 |
| 49.26 | 0.56 | 0.56 | 0.00 | 51.86 | 1.45 | 1.45 | 0.00 |
| 49.31 | 0.58 | 0.58 | 0.00 | 51.91 | 1.47 | 1.47 | 0.00 |
| 49.36 | 0.59 | 0.59 | 0.00 | 51.96 | 1.49 | 1.49 | 0.00 |
| 49.41 | 0.61 | 0.61 | 0.00 | 52.01 | 1.54 | 1.51 | 0.03 |
| 49.46 | 0.62 | 0.62 | 0.00 | 52.06 | 1.91 | 1.54 | 0.38 |
| 49.51 | 0.64 | 0.64 | 0.00 | 52.11 | 2.49 | 1.56 | 0.94 |
| 49.56 | 0.66 | 0.66 | 0.00 | 52.16 | 3.22 | 1.58 | 1.64 |
| 49.61 | 0.67 | 0.67 | 0.00 | 52.21 | 4.07 | 1.60 | 2.47 |
| 49.66 | 0.69 | 0.69 | 0.00 | 52.26 | 5.02 | 1.62 | 3.40 |
| 49.71 | 0.70 | 0.70 | 0.00 | 52.31 | 6.07 | 1.64 | 4.43 |
| 49.76 | 0.72 | 0.72 | 0.00 | 52.36 | 6.24 | 1.66 | 4.59 |
| 49.81 | 0.74 | 0.74 | 0.00 | 52.41 | 6.31 | 1.68 | 4.63 |
| 49.86 | 0.75 | 0.75 | 0.00 | 52.46 | 6.38 | 1.70 | 4.68 |
| 49.91 | 0.77 | 0.77 | 0.00 | 52.51 | 6.45 | 1.72 | 4.73 |
| 49.96 | 0.78 | 0.78 | 0.00 | 52.56 | 6.52 | 1.74 | 4.78 |
| 50.01 | 0.80 | 0.80 | 0.00 | 52.61 | 6.58 | 1.76 | 4.82 |
| 50.06 | 0.82 | 0.82 | 0.00 | 52.66 | 6.65 | 1.78 | 4.87 |
| 50.11 | 0.83 | 0.83 | 0.00 | 52.71 | 6.72 | 1.80 | 4.91 |
| 50.16 | 0.85 | 0.85 | 0.00 | 52.76 | 6.78 | 1.82 | 4.96 |
| 50.21 | 0.86 | 0.86 | 0.00 | 52.81 | 6.85 | 1.85 | 5.00 |
| 50.26 | 0.88 | 0.88 | 0.00 | 52.86 | 6.92 | 1.87 | 5.05 |
| 50.31 | 0.90 | 0.90 | 0.00 | 52.91 | 6.98 | 1.89 | 5.09 |
| 50.36 | 0.91 | 0.91 | 0.00 | 52.96 | 7.05 | 1.91 | 5.14 |
| 50.41 | 0.93 | 0.93 | 0.00 |  |  |  |  |
| 50.46 | 0.94 | 0.94 | 0.00 |  |  |  |  |
| 50.51 | 0.96 | 0.96 | 0.00 |  |  |  |  |
| 50.56 | 0.98 | 0.98 | 0.00 |  |  |  |  |
| 50.61 | 0.99 | 0.99 | 0.00 |  |  |  |  |
| 50.66 | 1.01 | 1.01 | 0.00 |  |  |  |  |
| 50.71 | 1.02 | 1.02 | 0.00 |  |  |  |  |

## Summary for Pond 2P: BIORETENTION 1

| Inflow Area = | $2.089 \mathrm{ac}, 58.97 \%$ Impervious, Inflow Depth $=2.45{ }^{\prime \prime}$ for 50-YR STORM event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 5.49 cfs @ | 12.08 hrs , Volume= | 0.426 af |  |
| Outflow | 1.48 cfs @ | 12.43 hrs , Volume= | 0.436 af , At | Atten $=73 \%$, Lag $=21.0 \mathrm{~min}$ |
| Discarded | 1.48 cfs @ | 12.43 hrs , Volume= | 0.436 af |  |
| Primary | 0.00 cfs @ | 0.00 hrs , Volume= | 0.000 af |  |

Routing by Dyn-Stor-Ind method, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs} / 3$
Starting Elev=48.50' Surf.Area=3,030 sf Storage= 412 cf
Peak Elev= 51.92' @ 12.43 hrs Surf.Area= 3,930 sf Storage= $5,072 \mathrm{cf}$ (4,660 cf above start)
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=13.7 \mathrm{~min}(780.4-766.8)$

| Volume | Invert Ava | Storage | Storag | cription |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#1 | 48.16' | 9,898 cf | Custom Stage Data (Irregular) Listed below (Recalc) |  |  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Voids (\%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
| 48.16 | 3,030 | 146.5 | 0.0 | 0 | 0 | 3,030 |
| 48.17 | 3,030 | 146.5 | 40.0 | 12 | 12 | 3,031 |
| 48.50 | 3,030 | 146.5 | 40.0 | 400 | 412 | 3,080 |
| 49.49 | 3,030 | 146.5 | 40.0 | 1,200 | 1,612 | 3,225 |
| 49.50 | 3,030 | 146.5 | 5.0 | 2 | 1,613 | 3,226 |
| 50.99 | 3,030 | 146.5 | 5.0 | 226 | 1,839 | 3,445 |
| 51.00 | 3,030 | 146.5 | 100.0 | 30 | 1,870 | 3,446 |
| 52.00 | 4,010 | 185.6 | 100.0 | 3,509 | 5,378 | 4,493 |
| 53.00 | 5,050 | 204.4 | 100.0 | 4,520 | 9,898 | 5,108 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Primary | 49.50' | 12.0" Round Culvert |
|  |  |  | $\mathrm{L}=25.0^{\prime} \mathrm{CPP}$, projecting, no headwall, $\mathrm{Ke}=0.900$ |
|  |  |  | Inlet / Outlet Invert=49.50' / 49.00' S=0.0200 '/' Cc= 0.900 |
|  |  |  | $\mathrm{n}=0.013$ Corrugated PE , smooth interior, Flow Area= 0.79 sf |
| \#2 | Device 1 | 52.00' | 30.0" Horiz. Orifice/Grate $\mathrm{C}=0.600$ |
|  |  |  | Limited to weir flow at low heads |
| \#3 | Discarded | 48.16' | $3.000 \mathrm{in} / \mathrm{hr} \mathrm{Exfiltration} \mathrm{over} \mathrm{Surface} \mathrm{area}$ |
|  |  |  | Conductivity to Groundwater Elevation =47.50' Phase-In=0.10' |

Discarded OutFlow Max=1.48 cfs @ 12.43 hrs HW=51.92' (Free Discharge)
$\leftarrow_{3=\text { Exfiltration ( Controls } 1.48 \mathrm{cfs} \text { ) }}$
Primary OutFlow Max=0.00 cfs @ $0.00 \mathrm{hrs} \mathrm{HW}=48.50^{\prime}$ TW=0.00' (Dynamic Tailwater)
$\angle_{1}=$ Culvert (Controls 0.00 cfs )
$\leftarrow_{2}=$ Orifice/Grate (Controls 0.00 cfs )

85 Portsmouth Avenue, PO Box 219, Statham, NH 03885
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# STORMWATER MANAGEMENT INSPECTION AND MAINTENANCE MANUAL 

## Prepared for:

Residential Condominiums<br>Tax Map 297, Lot 11<br>3400 LaFayette Road<br>Portsmouth, NH 03801

Prepared by:
Jones \& Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219

Stratham, NH 03885
Phone: (603) 772-4746
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May 14, 2021
JBE Project No. 20737

## Inspection and Maintenance of Facilities and Property

## A. Maintenance of Common Facilities or Property

Green and Company/ future owners and assigns are responsible for maintenance of all stormwater infrastructure associated with the facility and the property. This includes all temporary and permanent stormwater and erosion control facilities, roadways, and parking areas both during and after construction. During the construction period, inspections shall be conducted at least once every seven (7) calendar days or once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inch or greater. Permanent Stormwater BMPs shall be inspected annually following postconstruction and shall be performed by a qualified inspector by December 31st of each year. Green and Company/ future owners and assigns are required to keep inspection reports filed on-site in a location easily accessible to the City Engineer. Green and Company/ future owners and assigns shall consent to inspections by the Planning Board or its designee for compliance with City regulations. Green and Company/ future owners and assigns shall be open to working with the City to achieve the stormwater goals promulgated by the EPA as they become applicable. This manual is assignable to any future owners and condominium association. Should ownership of the property change, the current owner(s) shall continue to be responsible until the succeeding owner(s) notifies the Town that said succeeding owner(s) has assumed such responsibility. Upon subsequent transfers, the responsibility shall continue to be that of the transferring owner until the transferee owner notifies the Town of assumption of responsibility.

## C. General Inspection and Maintenance Requirements

1. Permanent stormwater and sediment and erosion control facilities to be maintained on the site include, but are not limited to, the following:
a. Catch basins and drain manholes
b. Culverts
c. Swales
d. Vegetation and landscaping
e. Parking lots and roadways
f. Riprap inlet and outlet protection aprons
g. Rain Gardens (Bio-retention systems)
h. Wet Pond
i. Roof Drip Edges
2. Maintenance of permanent measures shall follow the following schedule:
a. Normal winter roadway and parking lot maintenance including plowing and snow removal. Snow removal contractors shall be NH Certified Green SnowPro.
b. Road and parking lot sweeping at the end of every winter, preferably at the start of the spring rain season.
c. Inspection of culvert inlets and outlets at least once per month during the rainy season (March to November). Any debris is to be removed and disposed of properly.
d. Annual inspection of the site for erosion, destabilization, settling, and sloughing. Any needed repairs are to be conducted immediately.
e. Annual inspection of site's vegetation and landscaping. Any areas that are bare shall be reseeded and mulched with hay or, if the case is extreme, loamed and seeded or sodded to ensure adequate vegetative cover. Landscape specimens shall be replaced in kind, if they are found to be dead or dying.
f. Annual inspection of catch basins and drain manholes to determine if they need to be cleaned. Catch basins are to be cleaned if the depth of deposits is greater than one-half the depth from the basin bottom to the invert of the lowest pipe or opening into or out of the basin. If a catch basin significantly exceeds the one-half depth standard during the inspection, then it should be cleaned more frequently. If woody debris or trash accumulates in a catch basin, then it should be cleaned on a weekly basis. Manholes should be cleaned of any material upon inspection. Catch basins and manholes can be cleaned either manually or by specially designed equipment including, but not limited to, bucket loaders and vacuum pumps. Before any materials can be disposed, it is necessary to perform a detailed chemical analysis to determine if the materials meet the EPA criteria for hazardous waste. This will help determine how the materials should be stored, treated, and disposed. Grease hoods are to be wiped clean and the rags disposed of properly. Debris obscuring the grate inlet should also be removed.
g. Permanent stone check dams should be inspected annually in order to ensure that they are in good condition. Any sediment accumulated behind them shall be removed if it is deeper than six inches.
h. Rock riprap should be inspected annually and after every major storm event in order to ensure that it has not been displaced, undermined, or otherwise damaged. Displaced rock should be replaced, or additional rock added in order to maintain the structure(s) in their undamaged state. Woody vegetation should not be allowed to become established in riprap areas, and/or any debris removed from the void spaces between the rocks. If the riprap is adjacent to a stream or other waterbody, the water should be kept clear of obstructions, debris, and sediment deposits.
i. Raingarden - Bioretention Cells:

- Visually inspect monthly and repair erosion. Use small stones to stabilize erosion along drainage paths.
- Check the pH once or twice a year. Apply an alkaline product, such as limestone, if needed.
- Re-mulch any void areas by hand as needed.
- Every 6 months, in the spring and fall, add a fresh mulch layer.
- Once every 2 to 3 years, in the spring, remove old mulch layer before applying new one.
- Immediately after the completion of cell construction, water plant material for 14 consecutive days unless there is sufficient natural rainfall.
- When trees have taken root, or at least by 6 months, remove stakes and wires.
- Once a month (more frequently in the summer), visually inspect vegetation for disease or pest problems.
- If treatment is warranted, use the least toxic approach.
- Twice a year, from March 15th to April 30th and October 1st to November 30th, remove and replace all dead and diseased vegetation considered beyond treatment.
- During times of extended drought, look for physical features of stress (unrevived wilting, yellow, spotted or brown leaves, loss of leaves, etc.). Water in the early morning as needed.
- Weed regularly, if needed.
- Prune excess growth annually or more often, if desired. Trimmed materials may be recycled back in with replenished mulch or land filled if there is a concern of heavy metals accumulation.
- After rainstorms, inspect the cell and make sure that drainage paths are clear and that ponding water dissipates over 4-6 hours. (Water may pond for longer times during the winter and early spring.)
- KEEP IN MIND, THE BIORETENTION CELL IS NOT A POND. IT SHOULD NOT PROVIDE A BREEDING GROUND FOR MOSQUITOES. MOSQUITOES NEED AT LEAST FOUR (4) DAYS OF STANDING WATER TO DEVELOP AS LARVA.

Cleaning Criteria for all Sedimentation Forebays: Sediment should be removed from the sedimentation chamber (forebay) when it accumulates to a depth of more than 12 inches ( 30 cm ) or 10 percent of the pretreatment volume. The sedimentation forebay should be cleaned of vegetation if persistent standing water and wetland vegetation becomes dominant. The cleaning interval is once every year. A dry sedimentation forebay is the optimal condition while in practice this condition is rarely achieved. The sedimentation chamber, forebay, and treatment cell outlet devices should be cleaned when drawdown times exceed 60 to 72 hours. Materials can be removed with heavy construction equipment; however this equipment should not track on the wetland surface. Revegetation of disturbed areas as necessary. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.
j. Wet ponds are to be inspected after every major storm event for the first six months of operation and on an annual basis thereafter. Inspections and maintenance shall include the following:
i. Inspection of the water levels to ensure proper drainage.
ii. Inspection of the inlets and outlets to ensure that flow areas are not blocked by debris. If required, debris is to be removed and located to an area that can handle such debris.
iii. Inspection of side slopes and embankment for rodent burrows, erosion, destabilization, settling, and other signs of structural failure. Areas showing signs of erosion or thin or dying vegetation should be repaired immediately by whatever means necessary, with the exception of fertilizer. Rodent burrows are to be repaired immediately and the suspect animals apprehended with non-lethal traps if the problem persists.
iv. Pond berms should be mowed at least once annually so as to prevent the establishment of woody vegetation - trees should never be allowed to grow on a pond berm, as they may destabilize the structure and increase the potential for failure.
v . Inspection of the riprap outlet protection aprons, emergency spillways, forebays, and check dams. Dislodged stone is to be replaced, and any sediment deposits and woody growth removed. If necessary, check dams shall be repaired in order to ensure proper height and level lip elevations.
vi. Maintenance dredging: wet ponds may lose some of their volume annually due to sediment accumulation. Dredging is required when accumulated volume loss reaches $15 \%$, or approximately every 15-20 years. This operation should be done with a vacuum
truck once the sediment has reached a level one-foot above the pond bottom. All sediment removed must be disposed of in an approved manner.
vii. Every five years, the services of a professional engineer should be retained to perform a thorough inspection of all the aspects of the pond and its infrastructure.
k. House Roof Drip Edge System:

The following recommendations will help assure that the roof drip edge system is maintained to preserve its effectiveness.

- In the spring and fall, visually inspect the area around the system and repair any erosion. Use small stones to stabilize erosion along drainage paths. Re-mulch any void areas by hand as needed. Also inspect the roof collection and piping and clean and repair as necessary.
- Do not plant deep rooted trees and shrubs within 5' of the system.

Keep heavy vehicles from driving or parking over the system.
See attached sample forms as a guideline.
Any inquiries in regards to the design, function, and/or maintenance of any one of the above mentioned facilities or tasks shall be directed to the project engineer:

Jones \& Beach Engineers, Inc.

85 Portsmouth Avenue
P.O. Box 219

Stratham, NH 03885
T\#: (603) 772-4746
F\#: (603) 772-0227

## Commitment to maintenance requirements

I agree to complete and/or observe all of the required maintenance practices and their respective schedules as outlined above.

Signature

## Print Name

Title

Date

## Annual Operations and Maintenance Report

Green and Company/ future owners and assigns are responsible to perform the maintenance obligations and hire a Professional Engineer to review the site on an annual basis for maintenance and certification of the stormwater system. Green and Company/ future owners and assigns shall keep receipts and records of all maintenance companies hired throughout the year to submit along with the following form. Green and Company/ future owners and assigns are required to keep inspection reports filed on-site in a location easily accessible to the City Engineer.

| Construction <br> Activity | Date of <br> Inspection | Who <br> Inspected | Findings of Inspector/ <br> Responsible Party for Maintenance (if req'd) and <br> Date of Maintenance |
| :--- | :--- | :--- | :--- |
| Vegetation and <br> landscaping <br> (Annual Inspection) |  |  |  |
| Parking lots and <br> roadways |  |  |  |
| Date Vacuumed: <br> (Attach Receipts) |  |  |  |
| Culverts |  |  |  |
| (Annual Inspection) |  |  |  |


| Catch basins and <br> drain manholes <br> (Annual Inspection) |  |  |  |
| :--- | :--- | :--- | :--- |
| (Annual Inspection) |  |  |  |
| Bio-retention system |  |  |  |
| Wet pond |  |  |  |
| Annual Inspection) |  |  |  |
| Roof drip edges |  |  |  |


| Other: |  |  |  |
| :--- | :--- | :--- | :--- |

Deicing Log

| Date Applied | Type of Deicing Material | Amount Applied |
| :--- | :--- | :--- |
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## Regular Inspection and Maintenance Guidance for Bioretention Systems / Tree Filters

Maintenance of bioretention systems and tree filters can typically be performed as part of standard landscaping. Regular inspection and maintenance is critical to the effective operation of bioretention systems and tree filters to insure they remain clear of leaves and debris and free draining. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and the upstream land use.

## ACTIVITIES

The most common maintenance activity is the removal of leaves from the system and bypass structure. Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Mulch and/or vegetation coverage is integral to the performance of the system, including infiltration rate and nutrient uptake. Vegetation care is important to system productivity and health.

| ACTIVITY | FREQUENCY |
| :--- | :--- |

A record should be kept of the time to drain for the system completely after a storm event. The system should drain completely within 72 hours.

Check to insure the filter surface remains well draining after storm event.
Remedy: If filter bed is clogged, draining poorly, or standing water covers more than $15 \%$ of the surface 48 hours after a precipitation event, then remove top few inches of discolored material. Till or rake remaining material as needed.

Check inlets and outlets for leaves and debris.
Remedy: Rake in and around the system to clear it of debris. Also, clear the inlet and overflow if obstructed.

Check for animal burrows and short circuiting in the system
Remedy: Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted.

Check to insure the filter bed does not contain more than 2 inches accumulated material

Remedy: Remove sediment as necessary. If 2 inches or more of filter bed has been removed, replace media with either mulch or a (50\% sand, $20 \%$ woodchips, $20 \%$ compost, $10 \%$ soil) mixture.

During extended periods without rainfall, inspect plants for signs of distress.
Remedy: Plants should be watered until established (typical only for first few months) or as needed thereafter.

Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning.
Remedy: Repair or replace any damaged structural parts, inlets, outlets, sidewalls.

Check for robust vegetation coverage throughout the system.
Remedy: If at least $50 \%$ vegetation coverage is not established after 2 years, reinforcement planting should be performed.

Check for dead or dying plants, and general long term plant health.
Remedy: This vegetation should be cut and removed from the system. If woody vegetation is present, care should be taken to remove dead or decaying plant Material. Separation of Herbaceous vegetation rootstock should occur when overcrowding is observed.

After every major storm in the first few months, then biannually.

Quarterly initially, biannually, frequency adjusted as needed after 3 inspections

## Annually

As needed

## CHECKLIST FOR INSPECTION OF BIORETENTION SYSTEM / TREE FILTERS

Location:
Date:
Date Since Last Rain Event:

| Inspection Items | Satis Unsa | (S) or (U) | Comments/Corrective Action |
| :---: | :---: | :---: | :---: |
| 1. Initial Inspection After Planting and Mulching |  |  |  |
| Plants are stable, roots not exposed | S | U |  |
| Surface is at design level, typically 4 " below overpass | S | U |  |
| Overflow bypass / inlet ( if available) is functional | S | U |  |
| 2. Debris Cleanup (2 times a year minimum, Spring \& Fall) |  |  |  |
| Litter, leaves, and dead vegetation removed from the system | S | U |  |
| Prune perennial vegetation | S | U |  |
| 3. Standing Water (1 time a year, After large storm events) |  |  |  |
| No evidence of standing water after 72 hours | S | U |  |
| 4. Short Circuiting \& Erosion (1 time a year, After large storm events) |  |  |  |
| No evidence of animal burrows or other holes | 5 | U |  |
| No evidence of erosion | S | U |  |
| 5. Drought Conditions (As needed) |  |  |  |
| Water plants as needed | S | U |  |
| Dead or dying plants |  |  |  |
| 6. Overflow Bypass / Inlet Inspection (1 time a year, After large storm events) |  |  |  |
| No evidence of blockage or accumulated leaves | S | U |  |
| Good condition, no need for repair | S | U |  |
| 7. Vegetation Coverage (once a year) |  |  |  |
| 50\% coverage established throughout system by first year | S | U |  |
| Robust coverage by year 2 or later | S | U |  |
| 8. Mulch Depth (if applicable)(once every 2 years) |  |  |  |
| Mulch at original design depth after tilling or replacement | S | U |  |
| 9. Vegetation Health (once every 3 years) |  |  |  |
| Dead or decaying plants removed from the system | 5 | U |  |
| 10. Tree Pruning (once every 3 years) |  |  |  |
| Prune dead, diseased, or crossing branches | S | U |  |
| Corrective Action Needed |  |  | Due Date |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |

## CONTROL OF INVASIVE PLANTS

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

## Background:

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and resisting control except by hazardous chemical.

U University of New Hampshire Methods for Disposing COOPERATIVE EXTENSION Non-Native Invasive Plants

Prepared by the Invasives Species Outreach Group, volunteers interested in helping people control invasive plants. Assistance provided by the Piscataquog Land Conservancy and the NH Invasives Species Committee. Edited by Karen Bennett, Extension Forestry Professor and Specialist.


Non-native invasive plants crowd out natives in natural and managed landscapes. They cost taxpayers billions of dollars each year from lost agricultural and forest crops, decreased biodiversity, impacts to natural resources and the environment, and the cost to control and eradicate them.

Invasive plants grow well even in less than desirable conditions such as sandy soils along roadsides, shaded wooded areas, and in wetlands. In ideal conditions, they grow and spread even faster. There are many ways to remove these nonnative invasives, but once removed, care is needed to dispose the removed plant material so the plants don't grow where disposed.

Knowing how a particular plant reproduces indicates its method of spread and helps determine
the appropriate disposal method. Most are spread by seed and are dispersed by wind, water, animals, or people. Some reproduce by vegetative means from pieces of stems or roots forming new plants. Others spread through both seed and vegetative means.

Because movement and disposal of viable plant parts is restricted (see NH Regulations), viable invasive parts can't be brought to most transfer stations in the state. Check with your transfer station to see if there is an approved, designated area for invasives disposal. This fact sheet gives recommendations for rendering plant parts nonviable.

Control of invasives is beyond the scope of this fact sheet. For information about control visit www.nhinvasives.org or contact your UNH Cooperative Extension office.

## New Hampshire Regulations

Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1 of the New Hampshire prohibited invasive species list. (Agr 3802.01)

## How and When to Dispose of Invasives?

To prevent seed from spreading remove invasive plants before seeds are set (produced). Some plants continue to grow, flower and set seed even after pulling or cutting. Seeds can remain viable in the ground for many years. If the plant has flowers or seeds, place the flowers and seeds in a heavy plastic bag "head first" at the weeding site and transport to the disposal site. The following are general descriptions of disposal methods. See the chart for recommendations by species.

Burning: Large woody branches and trunks can be used as firewood or burned in piles. For outside burning, a written fire permit from the local forest fire warden is required unless the ground is covered in snow. Brush larger than 5 inches in diameter can't be burned. Invasive plants with easily airborne seeds like black swallow-wort with mature seed pods (indicated by their brown color) shouldn't be burned as the seeds may disperse by the hot air created by the fire.

Bagging (solarization): Use this technique with softertissue plants. Use heavy black or clear plastic bags (contractor grade), making sure that no parts of the plants poke through. Allow the bags to sit in the sun for several weeks and on dark pavement for the best effect.

Tarping and Drying: Pile material on a sheet of plastic


Japanese knotweed Polygonum cuspidatum USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 1: 676. and cover with a tarp, fastening the tarp to the ground and monitoring it for escapes. Let the material dry for several weeks, or until it is clearly nonviable.

Chipping: Use this method for woody plants that don't reproduce vegetatively.
Burying: This is risky, but can be done with watchful diligence. Lay thick plastic in a deep pit before placing the cut up plant material in the hole. Place the material away from the edge of the plastic before covering it with more heavy plastic. Eliminate as much air as possible and toss in soil to weight down the material in the pit. Note that the top of the buried material should be at least three feet underground. Japanese knotweed should be at least 5 feet underground!

Drowning: Fill a large barrel with water and place soft-tissue plants in the water. Check after a few weeks and look for rotted plant material (roots, stems, leaves, flowers). Wellrotted plant material may be composted. A word of caution- seeds may still be viable after using this method. Do this before seeds are set. This method isn't used often. Be prepared for an awful stink!

Composting: Invasive plants can take root in compost. Don't compost any invasives unless you know there is no viable (living) plant material left. Use one of the above techniques (bagging, tarping, drying, chipping, or drowning) to render the plants nonviable before composting. Closely examine the plant before composting and avoid composting seeds.

## Suggested Disposal Methods for Non-Native Invasive Plants

This table provides information concerning the disposal of removed invasive plant material. If the infestation is treated with herbicide and left in place, these guidelines don't apply. Don't bring invasives to a local transfer station, unless there is a designated area for their disposal, or they have been rendered non-viable. This listing includes wetland and upland plants from the New Hampshire Prohibited Invasive Species List. The disposal of aquatic plants isn't addressed.

| Woody Plants | Method of <br> Reproducing | Methods of Disposal |
| :--- | :---: | :---: |


| Non-Woody Plants | Method of Reproducing | Methods of Disposal |
| :---: | :---: | :---: |
| garlic mustard <br> (Alliaria petiolata) spotted knapweed <br> (Centaurea maculosa) <br> - Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling. <br> black swallow-wort <br> (Cynanchum nigrum) <br> - May cause skin rash. Wear gloves and long sleeves when handling. <br> pale swallow-wort <br> (Cynanchum rossicum) giant hogweed <br> (Heracleum mantegazzianum) <br> - Can cause major skin rash. Wear gloves and long sleeves when handling. dame's rocket <br> (Hesperis matronalis) perennial pepperweed <br> (Lepidium latifolium) purple loosestrife <br> (Lythrum salicaria) Japanese stilt grass <br> (Microstegium vimineum) mile-a-minute weed (Polygonum perfoliatum) | Fruits and Seeds | Prior to flowering <br> Depends on scale of infestation <br> Small infestation <br> - Pull or cut plant and leave on site with roots exposed. <br> Large infestation <br> - Pull or cut plant and pile. (You can pile onto or cover with plastic sheeting). <br> - Monitor. Remove any re-sprouting material. <br> During and following flowering <br> Do nothing until the following year or remove flowering heads and bag and let rot. <br> Small infestation <br> - Pull or cut plant and leave on site with roots exposed. <br> Large infestation <br> - Pull or cut plant and pile remaining material. (You can pile onto plastic or cover with plastic sheeting). <br> - Monitor. Remove any re-sprouting material. |
| common reed <br> (Phragmites australis) <br> Japanese knotweed <br> (Polygonum cuspidatum) <br> Bohemian knotweed <br> (Polygonum $x$ bohemicum) | Fruits, Seeds, Plant Fragments <br> Primary means of spread in these species is by plant parts. Although all care should be given to preventing the dispersal of seed during control activities, the presence of seed doesn't materially influence disposal activities. | Small infestation <br> - Bag all plant material and let rot. <br> - Never pile and use resulting material as compost. <br> - Burn. <br> Large infestation <br> - Remove material to unsuitable habitat (dry, hot and sunny or dry and shaded location) and scatter or pile. <br> - Monitor and remove any sprouting material. <br> - Pile, let dry, and burn. |

January 2010

[^14]


## MEMORANDUM

Ref: 2105A
To: Michael Green
Green \& Company
From: Stephen G. Pernaw, P.E., PTOE
Subject: Proposed Residential Development
Portsmouth, New Hampshire
Date: May 17, 2021

As requested, Pernaw \& Company, Inc. has prepared this "Trip Generation" memorandum regarding your proposed residential development project located at 3400 Lafayette Road in Portsmouth, New Hampshire. The purpose of this memorandum is to summarize our research of available traffic count data and the results of our trip generation analyses. To summarize:

Proposed Development - The plan entitled: "Site Plan" prepared by Jones \& Beach Engineers, Inc., Drawing Number C2, Sheet 7 of 25 , dated $3 / 3 / 21$ (revised $5 / 5 / 21$ ) shows the location of the subject site, the proposed residential townhouse condominiums, and the internal roadway layout (see Attachment 1). The proposed residential development involves the construction of 50 multifamily dwelling units in 13 separate buildings. Vehicular access to the residential development is proposed via a two-way site access road that will intersect the west side of Lafayette Road approximately 150 -feet south of the Weatherstone Condominium driveway.

Existing Conditions - Lafayette Road extends in a general north-south direction along the site frontage and provides access to Rye and Hampton to the south, and Maine to the north. This roadway provides one travel lane in each direction with a center turn lane. The speed limit is posted at 45 mph in this area.

Existing Traffic Volumes - According to a short-term NHDOT traffic count conducted on Lafayette Road (at Rye Townline) in August 2020, this roadway section carried an estimated Annual Average Daily Traffic (AADT) volume of approximately 15,268 vehicles per day (vpd) in 2020, down from 18,297 vpd in 2019. This count station is located approximately 0.4 mile south of the subject site.

The hourly data indicates that weekday volumes typically reached peak levels from 3:00 to 4:00 PM, 4:00 to 5:00 PM or 5:00 to 6:00 PM. The diagrams on Page 2 summarize the daily and hourly variations in traffic demand over several years $(2014,2017$ and 2020) at this location (see Attachments 2-5). When compared with previous count data, it is obvious that the 2020 traffic levels on Lafayette Road have been affected by the COVID-19 pandemic.

Stephen G. Pernaw \& Company, Inc.

DAILY TRAFFIC VARIATIONS



HOUR BEGINNING

Trip Generation - To estimate the quantity of vehicle-trips that will be produced by the proposed residential development, the standard trip generation rates and equations published by the Institute of Transportation Engineers ${ }^{1}$ (ITE) were considered. More specifically, the trip generation equations for Land Use Code 221 - Multifamily Housing (Mid-Rise) were utilized, and the number of dwelling units was used as the independent variable.

${ }^{1}$ LUC 221-Multifamily Housing (M id-Rise) - Trip Equation M ethod
Based upon ITE Land Use Code 221, the overall development is expected to generate approximately 17 vehicle-trips ( 4 arrivals, 13 departures) during the AM peak hour period, and 23 vehicle-trips ( 14 arrivals, 9 departures) during the PM peak hour period, on an average weekday basis (see Attachment 6).

[^15]
## Findings \& Conclusions

1. The NHDOT count station that is located on Lafayette Road approximately 0.4 miles south of the subject site (at Rye Townline) revealed that this section of Lafayette Road carried an estimated Annual Average Daily Traffic volume of approximately 15,268 vehicles per day in 2020, down from 18,297 vehicles per day in 2019. The highest hourly traffic volumes typically occurred in the early evening from 3:00 to 4:00 PM, 4:00 to 5:00 PM or 5:00 to 6:00 PM on weekdays. When compared to previous count data, it is obvious that the current traffic levels on Lafayette Road have been affected by the COVID-19 pandemic.
2. The proposed residential development is expected to generate approximately 17 vehicle-trips ( 4 arrivals, 13 departures) during the morning peak hour, and 23 vehicle-trips ( 14 arrivals, 9 departures) during the evening peak hour, on an average weekday basis.
3. Development sites that generate fewer than 500 vehicle-trips per day are generally considered to be "low" traffic generators. Based on the daily estimate of 272 vehicle-trips per day (see Table 1), the proposed development is not considered to be a major traffic generator.

The trip generation estimates contained herein are not of sufficient magnitude to significantly alter the prevailing traffic operations on nearby roads and intersections. In fact, random traffic flow from one day to the next accounts for more variability than will result from the proposed residential development. In terms of recommendations, the proposed site access road approach to US1 should operate under stop sign control (MUTCD R1-1), and be delineated with a 12-24inch white stop line. A short section of 4 -inch double-yellow centerline on access road to separate inbound and outbound vehicles is considered optional, but desirable. The design of this intersection should be compatible with a Single-Unit Design Vehicle and local fire apparatus. Clear sight distance triangles should be established looking left and looking right from the access road approach to US1 for safety reasons.

## Attachments



Stephen G. Pernaw \& Company, Inc.

## ATTACHMENTS

Attachment 1

(2) M/E

Transportation Data Management System


Directions: 2-WAY NB SB 9

| AADT () |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Year | AADT | DHV-30 | K \% | D \% | PA | BC | Src |
|  | 2020 | 15,268 | 1,462 | 10 | 51 | $14,192(93 \%)$ | $1,076(7 \%)$ |  |
|  | 2019 | $18,297^{3}$ |  | 10 | 51 | $16,759(92 \%)$ | $1,538(8 \%)$ | Grown <br> from 2018 |
|  | 2018 | $18,080^{3}$ |  | 10 | 51 | $16,671(92 \%)$ | $1,409(8 \%)$ | Grown <br> from 2017 |
|  | 2017 | 17,725 | 1,741 | 10 | 51 | $16,448(93 \%)$ | $1,277(7 \%)$ |  |
|  | 2016 | $22,063^{3}$ |  |  |  | $20,122(91 \%)$ | $1,941(9 \%)$ | Grown <br> from 2015 |
| $1 \ll$ | $<$ | $>$ | $\gg 1$ | $1-5$ of 15 |  |  |  |  |

Travel Demand Model

|  | Model Year | Model AADT | AM PHV |  | AM PPV | MD PHV | MD PPV | PM PHV | PM PPV | NT PHV | NT PPV |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VOLUME COUNT |  |  |  |  |  |  | VOLUME TREND (?) |  |  |  |  |
|  | Date |  |  |  | nt | Total | Year | Annual Growth |  |  |  |
| * | Thu 8/13/2020 |  |  | 60 | 60 | 17,905 | 2020 | -17\% |  |  |  |
| * | Wed 8/12/2020 |  |  | 60 | 6 | 17,749 | 2019 | 1\% |  |  |  |
| $\cdots$ | Tue 8/11/2020 |  |  |  | 0 | 17,330 | 2018 | 2\% |  |  |  |
| + | Thu 8/31/2017 |  |  |  | 0 | 19,847 | 2017 | -20\% |  |  |  |
| 4* | Wed 8/30/2017 |  |  |  | 0 | 21,222 | 2016 | 2\% |  |  |  |
| tor | Tue 8/29/2017 |  |  |  | 0 | 19,987 | 2015 | 3\% |  |  |  |
| - | Fri 8/1/2014 |  |  |  | 0 | 25,642 |  | 7\% |  |  |  |
| * | Thu 7/31/2014 |  |  |  | 0 | 25,355 | 2014 |  |  |  |  |
| t | Wed 7/30/2014 |  |  |  | 0 | 25,063 | 2011 | 6\% |  |  |  |
| * | Tue 7/29/2014 |  |  | 60 | 0 | 24,508 | 2009 | -4\% |  |  |  |

Excel Version

| Weekly Volume Report |  |  |  |
| ---: | :--- | ---: | :--- |
| Location ID: | 82379021 | Type: | SPOT |
| Located On: | Lafayette Rd | $:$ |  |
| Direction: | 2-WAY |  |  |
| Community: | PORTSMOUTH | Period: | Mon 8/10/2020 - Sun 8/16/2020 |
| AADT: | 15268 |  |  |




## Excel Version

Weekly Volume Report

| Location ID: | 82379021 | Type: | SPOT |
| ---: | :--- | ---: | :--- |
| Located On: | Lafayette Rd | $:$ |  |
| Direction: | 2-WAY |  |  |
| Community: | PORTSMOUTH | Period: | Mon $8 / 28 / 2017$ - Sun $9 / 3 / 2017$ |
| AADT: | 17725 |  |  |




Excel Version

| Weekly Volume Report |  |  |  |
| ---: | :--- | ---: | :--- |
| Location ID: | 82379021 | Type: | SPOT |
| Located On: | Lafayette Rd | $:$ |  |
| Direction: | 2-WAY |  |  |
| Community: | PORTSMOUTH | Period: | Mon 7/28/2014 - Sun 8/3/2014 |
| AADT: | 21000 |  |  |


| Start Time | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Avg | Graph |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 12:00 AM | 73 | 91 | 94 | 106 | 121 |  |  | 97 | - | 0.4\% |
| 1:00 AM | 47 | 55 | 86 | 58 | 74 |  |  | 64 |  | 0.3\% |
| 2:00 AM | 44 | 40 | 41 | 60 | 43 |  |  | 46 |  | 0.2\% |
| 3:00 AM | 33 | 60 | 55 | 35 | 56 |  |  | 48 |  | 0.2\% |
| 4:00 AM | 122 | 100 | 85 | 113 | 113 |  |  | 107 | - | 0.4\% |
| 5:00 AM | 288 | 306 | 318 | 293 | 291 |  |  | 299 | $\square$ | 1.2\% |
| 6:00 AM | 656 | 688 | 733 | 701 | 659 |  |  | 687 | $\square$ | 2.8\% |
| 7:00 AM | 1147 | 1158 | 1198 | 1228 | 1210 |  |  | 1,188 | $\square$ | 4.8\% |
| 8:00 AM | 1321 | 1427 | 1436 | 1505 | 1378 |  |  | 1,413 | $\square$ | 5.7\% |
| 9:00 AM | 1340 | 1326 | 1354 | 1314 | 1397 |  |  | 1,346 | $\square$ | 5.5\% |
| 10:00 AM | 1266 | 1463 | 1414 | 1471 | 1579 |  |  | 1,439 | $\square$ | 5.8\% |
| 11:00 AM | 1477 | 1607 | 1616 | 1587 | 1617 |  |  | 1,581 | $\square$ | 6.4\% |
| 12:00 PM | 1642 | 1636 | 1671 | 1644 | 1753 |  |  | 1,669 | $\square$ | 6.8\% |
| 1:00 PM | 1664 | 1649 | 1705 | 1773 | 1788 |  |  | 1,716 | $\square$ | 7.0\% |
| 2:00 PM | 1704 | 1705 | 1787 | 1850 | 1841 |  |  | 1,777 | $\square$ | 7.2\% |
| 3:00 PM | 1874 | 1919 | 1989 | 1989 | 1989 |  |  | 1,952 | $\square$ | 7.9\% |
| 4:00 PM | 1926 | 2058 | 2107 | 2160 | 2148 |  |  | 2,080 | - | 8.4\% |
| 5:00 PM | 1981 | 2182 | 2163 | 2285 | 2078 |  |  | 2,138 | $\square$ | 8.7\% |
| 6:00 PM | 1425 | 1580 | 1598 | 1570 | 1732 |  |  | 1,581 | $\square$ | 6.4\% |
| 7:00 PM | 917 | 1202 | 1267 | 1195 | 1204 |  |  | 1,157 | $\square$ | 4.7\% |
| 8:00 PM | 791 | 1004 | 982 | 1085 | 1052 |  |  | 983 | $\square$ | 4.0\% |
| 9:00 PM | 521 | 711 | 730 | 742 | 777 |  |  | 696 | $\square$ | 2.8\% |
| 10:00 PM | 257 | 367 | 417 | 350 | 467 |  |  | 372 | $\square$ | 1.5\% |
| 11:00 PM | 192 | 174 | 217 | 241 | 275 |  |  | 220 | $\square$ | 0.9\% |
| Total | 22,708 | 24,508 | 25,063 | 25,355 | 25,642 | 0 | 0 |  |  |  |
| 24hr Total | 22708 | 24508 | 25063 | 25355 | 25642 |  |  | 24,655 |  |  |
| AM Pk Hr | 11:00 | 11:00 | 11:00 | 11:00 | 11:00 |  |  |  |  |  |
| AM Peak | 1477 | 1607 | 1616 | 1587 | 1617 |  |  | 1,581 |  |  |
| PM Pk Hr | 5:00 | 5:00 | 5:00 | 5:00 | 4:00 |  |  |  |  |  |
| PM Peak | 1981 | 2182 | 2163 | 2285 | 2148 |  |  | 2,152 |  |  |
| \% Pk Hr | 8.72\% | 8.90\% | 8.63\% | 9.01\% | 8.38\% |  |  | 8.73\% |  |  |

Trip Generation Summary
Alternative: Alternative 1
Phase:
Project: 2105A Gen

|  | Weekday Average Daily Trips |  |  |  | Weekday AM Peak Hour of Adjacent Street Traffic |  |  |  | Weekday PM Peak Hour of Adjacent Street Traffic |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ITE Land Use | * | Enter | Exit | Total | * | Enter | Exit | Total | * | Enter | Exit | Total |
| 221 MID-RISE 1 |  | 136 | 135 | 271 |  | 4 | 13 | 17 |  | 14 | 9 | 23 |
| 50 Dwelling Units |  |  |  |  |  |  |  |  |  |  |  |  |
| Unadjusted Volume |  | 136 | 135 | 271 |  | 4 | 13 | 17 |  | 14 | 9 | 23 |
| Internal Capture Trips |  | 0 | 0 | 0 |  | 0 | 0 | 0 |  | 0 | 0 | 0 |
| Pass-By Trips |  | 0 | 0 | 0 |  | 0 | 0 | 0 |  | 0 | 0 | 0 |
| Volume Added to Adjacent Streets |  | 136 | 135 | 271 |  | 4 | 13 | 17 |  | 14 | 9 | 23 |

Total Weekday Average Daily Trips Internal Capture $=0$ Percent
Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture $=0$ Percent Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture $=0$ Percent








BULLDING \# 4






$\xlongequal{\text { BULLDING \# } 4}$












BULLDNG \# 10




BULLDING \# 13



| 10 | 9/27/21 | REVUSED UTLUTIES AND OFFSTIT EMPROVEMENTS | Laz |
| :---: | :---: | :---: | :---: |
| 9 | $97 / 21$ | ADDED FISH AND GAME NOTES |  |
| 8 | 82/52121 | REVSISONS PER CITY REVUEW | Laz |
|  | 720021 | Revsions Per cit revew |  |
| 6 | 6/22/21 | Revusions Per citr review | Laz |
| Rev. | date | Revision | BY |



| Nane: | BOUNDARY PLAN |
| :---: | :---: |
| Project | 3400 LAFAYETTE ROAD PORTSMOUTH, NH |
|  |  |





| Plan Name: | BOUNDARY PLAN |
| :---: | :---: |
| Project: | 3400 LAFAYETTE ROAD PORTSMOUTH, NH |




|  |  |  |  |  |  | ¢ B Jones \& Beach Engineers, Inc. |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | ${ }^{\text {8/2/2/21 }}$ | ADDED FISH AND GAME NOTES REVISIOSS PER OTTM REVIEW | Laz |  |  |  |  |  |
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|  |  | 6 | 6/22/21 | REVISIONS PRR CTIY REVEW | Laz |  |  |  |  |  |
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| Plan Name: | EXISTING CONDITIONS PLAN |
| :--- | :---: |
| Project: | 3400 LAFAYETTE ROAD |
| Owner of fecord |  |



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| :---: | :---: |
| Drawing Name: 200737-PANA.dwg |  |
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| Plan Name: | OVERVIEW SITE PLAN |
| :---: | :---: |
| Project: | 3400 LAFAYETTE ROAD PORTSMOUTH NH |
| Owner of Record ${ }_{225}$ BANFIELD ROAD, PORTSMOUTH, NH OOO8801 BK 1930 PG 0229 |  |





LIGHTING AND ELECTRICAL NOTES:










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| 10 | 9/27/21 | REVISED UTLTIES AND OfFSITE MPROVEMENTS | Laz |
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| 6 | 8/22/21 | Revisions Per cit review | LAZ |
| mev. | date | REVISION | BY |


| Plan Name: | LIGHTING PLAN |
| :--- | :---: |
| Project: | 3400 LAFAYETTE ROAD |
| Owner of Record. | PORTSMOUTH, NH |



| Plan Name: | PLAN AND PROFILE |
| :--- | :---: |
| Project: | 3400 LAFAYETTE ROAD <br> PORTMOUTH, NH |
| RICCI CONSTRUCTION CO. INC. |  |












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## SIGN CONSIDERATONS



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##  <br> 14449 HIGWAY A1 NORTH EVANSVILE, INDAAN 4772 $1-800-772-2040$

EROSION CONTROL BLANKET SLOPE INSTALLATION NORTH AMERICAN GREEN (800) 772-2040
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DRIP EDGE DETAIL
NOT TO SCALE

| Checked: JAC Scale: AS NOTED Project No.: 20 <br> Drawing Name: $20737-$ PLAN.dwg   |  |
| :---: | :---: |
|  |  |
| PERMISSION FROM JONES \& BEACH ENGINEERS, INC. (JBE). ANY ALTERATIONS, AUTHORIZED OR OTHERWISE, SHALL BE |  |
|  |  |



| 10 | 9/2721 | REVISED UTLLTES AND OFFSITE MPROVVEMENTS | LAz |
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| 6 | 6/22/21 | REVSIIONS PER CITY REVIEW | LAZ |
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| Plan Name: | DETAIL SHEET |
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| Project: | 3400 LAFAYETTE ROAD PORTSMOUTH, NH |
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## SEEDING SPECIFICATIONS








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| 10 | 9/27/21 | Revised ututie And offsite MProvements | Laz |
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| 9 | 97/21 | ADDED FISH AND GAME NOTES | ${ }_{\text {Laz }}$ |
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| Ev. | date | Revision | BY |









# Ross Engineering <br> Civil/Structural Engineering \& Surveying 

909 Islington Street
603-433-7560
Portsmouth, NH 03801
September 29, 2021
Portsmouth Planning Department
1 Junkins Ave
Portsmouth, NH 03801

## 910 Sagamore Avenue CONDITIONAL USE PERMIT

## RE: Karen Webb

910 Sagamore Ave
Portsmouth, NH 03801
Tax Map 223, Lot 26A
This project involves improvements to an existing single family residence. Currently there is a 10 ' $\mathrm{x} 15^{\prime}$ rear extension supported on posts. The owner would like to remove this extension and install a 16 ' $\times 32$ ' extension. Posts will support the structure and there will not be a full foundation, so minimal disturbance will occur. A conditional use permit is required as the work occurs within the 100 ' wetland buffer. No work occurs within the wetlands.

## Proposed site improvements include:

1. Currently an older septic system with a leach field serves the house. The leach field is very close to the wetlands and does not meet current standards. The old system will be disconnected and the house will be connected to a new City sewer line. This will greatly benefit the wetland buffer and wetland water quality.
2. At the edge of the wooded area there are invasive species. Invasive bittersweet poses a significant threat to native plants. As part of the site work an effort to remove the accessible bittersweet will occur.
3. The area below the proposed addition will be a stone infiltration area for roof drainage and will benefit the wetland buffer area by keeping stormwater detained and not flowing on surfaces. This stormwater measure will increase groundwater recharge and reduce stormwater surface pollutant loading to surface waters nearby.
4. Wetland buffer plantings will be installed along the wetland delineation, providing protection to the wetlands.
5. NOFA - Northeast Organic Farming Association land care practices for design and maintenance will be followed.
6. $2,350 \mathrm{SF}$ of non-tidal mowed grass area to be restored to a wetland area.

Sincerely,











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PLANTNG NOTES:



MAINTENANCE REQUIREMENTS



SEEDING AND STABLIZATION FOR LOAMED SITE:





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| TALL FESCUECREEPING RED FESCUERED CLOVER (ALSIKE)RED CLIO <br> TOTAL | $\begin{aligned} & 20 \\ & \frac{20}{48} \end{aligned}$ | ${ }^{0.45}$ |
| IME: AT 2 TONS PER ACRE OR 100 LBS PER 1,000 S.E <br> ERTILIZER 20 (NITROGEN, PHOSPHATE, POTASH AT 500\# PER ACRE <br> MULCH: HAY OR CLEAN STRAN; 2 TONS/ACRE OR 2 BALES/IOOO S. |  |  |
|  <br>  <br> SURFACE AND SEEPAGE WATER SHOULD BE DRAINED OR DIVERTED SUR FROM THE SITE TO PREVENT DROWNING OR WINTER KILLING OF THE PTANS: LIREER THAN FOUR INCHES AND TRASH SHOULD BE REMOVED. SOD SHOUD BE TLLED TO ADEPTH OF FOUR MCHES T PREEARR SEEDBED. FERTLIER \& LME SHOULD BE MXXD NTO THE SOLL <br>  ACROSS THE SLOPE MHEREVER PRACTICAL |  |  |
| * FROM: STORMWATER MANAGEMENT AND EROSION AND SEDIMENTATIONCONTROL HANDBOOK FOR URBAN AND DEVELOPING AREAS IN NEW HAMPSHIRE |  |  |
| SHORT TERM SEEDING <br> NEIL TO MODERATEGY WE DRAINED SOILS |  |  |
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|  | $\begin{aligned} & 40 \\ & 10 \end{aligned}$ | $25$ |
| -IME: AT I TON PER ACRE OR 100 LBS PER 1,000 S.F <br> FERTILIZER: 101010 (NITROGEN, PHOSPHATE, POTASH AT 50O\# PER ACRE MULCH: HAY OR CLEAN STRAN; 2 TONS/ACRE OR 2 BALES/IOOO S.F. |  |  |
| GRADING AND SHAPING: <br> SLOPES SHALL NOT BE STEEPER THAN 2 TO I. 3 TO I OR FLATTER SLOPES ARE PREFERRED |  |  |
| SEEDBED PREPARATION:SURFACE AND SEEPAGE WATER SHOULD BE DRAINED OR DIVERTED FROM THE SITE TO PREVENT DROWNING OR WINTER KILLING OF THE PLANT -1 IT STONES LARGER THAN FOUR INCHES AND TRASH SHOULD BE REMOVEDSOD SHOULD BE TILLED TO A DEPTH OF FOUR INCHES TO PREPARE THE SEEDBED SHOULD BE LEFT IN A REASONABLY FIRM AND SMOOTH CONDITION. THE LAST TILLAGE OPERATION SHACROSS THE SLOPE WHEREVER PRACTICAL. |  |  |
| * FROM: STORMWATER MANAGEMENT AND EROSION AND SEDIMENTATION CONTROL 2008 |  |  |
| NHEN PROPOSED FOR ALTERATION DURING CONSTRUCTION AS BEING INFESTED INVASIVE SPECIES SHALL BE MANAGED APPROPRIATELY USING THE DISPOSALPRACTICES IDENTIFIED IN "NHDOT - BEST MANAGEMENT PRACTICES FOR ROADSID INVASIVE PLANTS -2008" AND "METHODS FOR DPLANTS - UNH COOPERATIVE EXTENSION - 2010" |  |  |

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| $\begin{aligned} & \text { EROSION } \\ & \text { CONTROL } \end{aligned}$ |  |
| PLAN |  |
| 910 Sagamore ave. |  |
| PORTSMOUTH, NH O3801TAX MAP 223, LOT 264 |  |
|  |  |
| ${ }_{21}$ | ${ }_{4}$ |

# Ross Engineering <br> Civil / Structural Engineering 



Photo 1: Google Aerial of Site.


Photo 2: Zoomed In Google Aerial of Site.

## Ross Engineering <br> Civil / Structural Engineering



Photo 3: View of existing house looking towards the north. (August 9, 2021)


Photo 4: View of existing house looking towards the northeast. (August 9, 2021)

# Ross Engineering <br> Civil / Structural Engineering 



Photo 5: View of existing house looking to the southeast. (August 9, 2021)


Photo 6: View of existing house looking to the northwest. (August 9, 2021)

909 Islington Street

August 24, 2021

Planning Department
City of Portsmouth
Portsmouth, NH 03801
RE: 910 Sagamore Ave
Tax Map 223, Lot 26A
Portsmouth, NH 03801

Owner: Karen Butz Webb
910 Sagamore Ave
Portsmouth, NH 03801

Please be advised that Alex Ross of Ross Engineering is authorized to be my agent for the above application process. Should you have any questions, please contact me.

Sincerely,
karen butz webt
Karen Butz Webb
910 Sagamore Ave
Portsmouth, NH 03801

# JONES\&BEACH <br> 85 Porsmouth Avenue, PO Box 219, Stratham, NH 03885 <br> 603.772.4746 - JonesandBeach.com 

August 23, 2021

Portsmouth Planning Board<br>Attn: Dexter Legg<br>1 Junkins Avenue, Suite $3^{\text {rd }}$ Floor<br>Portsmouth, NH 03801

## RE: Subdivision \& Condo Site Plan Application 668 Middle Street, Portsmouth, NH <br> Tax Map 147, Lot 18 <br> JBE Project No. 20686

Dear Mr. Legg,
Jones \& Beach Engineers, Inc., respectfully submits a Subdivision Application on behalf of the applicant, Tuck Realty Corporation. The intent of this application is to subdivide Tax Map 147, Lot 18 into three proposed lots. The existing property has 2 structures on the lot. There is a front building situated along Middle Street that has 3 existing units in it. There is a rear carriage house that consists of 1 dwelling. Both of the existing buildings are staying on the property and will be converted into 2 condominiums, one condo as a single family and one condo as a 3 family. The carriage house has an existing garage in the rear that is accessed from Chevrolet Ave. There is an existing curb cut, fence and gate on Chevrolet that provides access to the carriage house garage.

Then we are proposing 2 frontage lots to be accessed from Chevrolet Avenue. These lots are more than double the required lot size and either meet or exceed the minimum frontage. We are not proposing any new roadway and the lots will just have driveways for access. We do need to extend the sewer to the site in order to provide connections for the 2 new lots. The existing units will already have services for utilities from Middle Street. We did receive variances for this development and the approval is attached.

The following items are provided in support of this Application:

1. Completed Subdivision Application (submitted online).
2. Letter of Authorization.
3. Current Deed.
4. Test Pits.
5. Variance Approval
6. Tax Maps
7. Tax Cards
8. Two (2) Full Size Plan Sets Folded.
9. One (1) Half Size Plan Set Folded.

If you have any questions or need any additional information, please feel free to contact our office. Thank you very much for your time.
V\&ry truly yours,
JONES \& BEACH ENGINEERS, INC.
cc: Michael Garrepy, Tuck Realty Corporation (via email)
Viee President

## City of Portsmouth, New Hampshire Subdivision Application Checklist

This subdivision application checklist is a tool designed to assist the applicant in the planning process and for preparing the application for Planning Board review. A pre-application conference with a member of the planning department is strongly encouraged as additional project information may be required depending on the size and scope. The applicant is cautioned that this checklist is only a guide and is not intended to be a complete list of all subdivision review requirements. Please refer to the Subdivision review regulations for full details.

Applicant Responsibilities (Section III.C): Applicable fees are due upon application submittal along with the Preliminary or final plat and supporting documents and studies submitted in PDF format with the online application. Please consult with Planning staff for submittal requirements.

Owner: Elizabeth B. Larsen Trust of 2012, Elizabeth Larsen $\quad$ Trustee Date Submitted: $8 / 23 / 21$
Applicant: Tuck Realty Corporation
Phone Number: 603-944-7530 E-mail: mgarrepy@gmail.com

Site Address 1: 668 Middle Street $\qquad$ Map: 147 $\qquad$
Site Address 2: $\qquad$ Map: $\qquad$ Lot: $\qquad$

| Application Requirements |  |  |  |
| :--- | :--- | :---: | :---: |
| 目 | Required Items for Submittal | Item Location <br> (e.g. Page or <br> Plan Sheet/Note \#) | Waiver <br> Requested |
| Q | Completed Application form submitted via View Point (the City's <br> web-based permitting program). <br> (III.C.2-3) | N/A <br> All application documents, plans, supporting documentation and <br> other materials uploaded to the application form in View Point in <br> digital Portable Document Format (PDF). One hard copy of all plans <br> and materials shall be submitted to the Planning Department by the <br> published deadline. <br> (III.C.4) | $\mathrm{N} / \mathrm{A}$ |


| Requirements for Preliminary/Final Plat |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| V | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Required for Preliminary / Final Plat | Waiver Requested |
| 区 | Name and address of record owner, any option holders, descriptive name of subdivision, engineer and/or surveyor or name of person who prepared the plat. (Section IV.1/V.1) |  | Preliminary Plat <br> Final Plat | N/A |


| Requirements for Preliminary／Final Plat |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\square$ | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Required for Preliminary／Final Plat | Waiver Requested |
| 줒 | Preliminary Plat <br> Names and addresses of all adjoining property owners．（Section IV．2） <br> Final Plat <br> Names and addresses of all abutting property owners，locations of buildings within one hundred（100）feet of the parcel，and any new house numbers within the subdivision． <br> （Section V．2） |  | $\square$ Preliminary Plat Final Plat | N／A |
| 匈 | North point，date，and bar scale． <br> （Section IV．3／V3） | Required on all Plan Sheets | $\square$ Preliminary Plat V Final Plat | N／A |
| 区 | Zoning classification and minimum yard dimensions required．（Section IV．4／V．4） |  | Preliminary Plat Final Plat | N／A |
| ⿴ | Preliminary Plat <br> Scale（not to be smaller than one hundred <br> （100）feet $=1$ inch）and location map（at a scale of $1^{\prime \prime}=1000^{\prime}$ ）．（Section IV．5） <br> Final Plat <br> Scale（not to be smaller than $1^{\prime \prime}=100^{\prime}$ ）， <br> Location map（at a scale of $1^{\prime \prime}=1,000^{\prime}$ ） <br> showing the property being subdivided and its relation to the surrounding area within a radius of 2,000 feet．Said location map shall delineate all streets and other major physical features that my either affect or be affected by the proposed development．（Section V．5） |  | V Preliminary Plat Final Plat | N／A |
| $\square$ | Location and approximate dimensions of all existing and proposed property lines including the entire area proposed to be subdivided， the areas of proposed lots，and any adjacent parcels in the same ownership．（Section IV．6） |  | $\begin{aligned} & \text { V Preliminary Plat } \\ & \nabla \text { Final Plat } \end{aligned}$ |  |
| 区 | Dimensions and areas of all lots and any and all property to be dedicated or reserved for schools，parks，playgrounds，or other public purpose．Dimensions shall include radii and length of all arcs and calculated bearing for all straight lines． <br> （Section V．6／IV．7） |  | $\checkmark$ Preliminary Plat $\checkmark$ Final Plat | N／A |
|  | Location，names，and present widths of all adjacent streets，with a designation as to whether public or private and approximate location of existing utilities to be used．Curbs and sidewalks shall be shown． <br> （Section IV．8／V．7） |  | V Preliminary Plat Final Plat |  |


| Requirements for Preliminary/Final Plat |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| ■ | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Required for Preliminary / Final Plat | Waiver Requested |
| 区 | Location of significant physical features, including bodies of water, watercourses, wetlands, railroads, important vegetation, stone walls and soils types that my influence the design of the subdivision. <br> (Section IV.9/V.8) |  | $\square$ Preliminary Plat Final Plat |  |
| ® | Preliminary Plat <br> Proposed locations, widths and other dimensions of all new streets and utilities, including water mains, storm and sanitary sewer mains, catch basins and culverts, street lights, fire hydrants, sewerage pump stations, etc. (Section IV.10) <br> Final Plat <br> Proposed locations and profiles of all proposed streets and utilities, including water mains, storm and sanitary sewer mains, catchbasins and culverts, together with typical cross sections. Profiles shall be drawn to a horizontal scale of $1^{\prime \prime}=50^{\prime}$ and a vertical scale of $1^{\prime \prime}=5^{\prime}$, showing existing centerline grade, existing left and right sideline grades, and proposed centerline grade. <br> (Section V.9) | Sheet C1 \& C2 <br> No new streets proposed | Preliminary Plat Final Plat |  |
| - | When required by the Board, the plat shall be accompanied by profiles of proposed street grades, including extensions for a reasonable distance beyond the subject land; also grades and sizes of proposed utilities. <br> (Section IV.10) | N/A - No new streets proposed | V Preliminary Plat Final Plat |  |
| $\square$ | Base flood elevation (BFE) for subdivisions involving greater than five (5) acres or fifty (50) lots. <br> (Section IV.11) | N/A - not in flood plain | Preliminary Plat Final Plat |  |
| 囚 | For subdivisions of five (5) lots or more, or at the discretion of the Board otherwise, the preliminary plat shall show contours at intervals no greater than two (2) feet. Contours shall be shown in dotted lines for existing natural surface and in solid lines for proposed final grade, together with the final grade elevations shown in figures at all lot corners. If existing grades are not to be changed, then the contours in these areas shall be solid lines. <br> (Section IV.12/ V.12) | Sheets Cl \& C2 | $\square$ Preliminary Plat $\square$ Final Plat |  |


| Requirements for Preliminary/Final Plat |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\square$ | Required Items for Submittal | Item Location (e.g. Page/line or Plan Sheet/Note \#) | Required for Preliminary / Final Plat | Waiver Requested |
| $\square$ | Dates and permit numbers of all necessary permits from governmental agencies from which approval is required by Federal or State law. <br> (Section V.10) | N/A - no state permits | Preliminary Plat च Final Plat |  |
| $\square$ | For subdivisions involving greater than five (5) acres or fifty (50) lots, the final plat shall show hazard zones and shall include elevation data for flood hazard zones. <br> (Section V.11) | N/A - not in flood zone | Preliminary Plat Final Plat |  |
| 区 | Location of all permanent monuments. (Section V.12) |  | Preliminary Plat V Final Plat |  |


| General Requirements ${ }^{1}$ |  |  |  |
| :---: | :---: | :---: | :---: |
| $\square$ | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver <br> Requested |
| $\begin{aligned} & \square \\ & \square \\ & \boxed{X} \\ & \mathbb{X} \\ & \mathbb{X} \\ & \square \end{aligned}$ | 1．Basic Requirements：（VI．1） <br> a．Conformity to Official Plan or Map <br> b．Hazards <br> c．Relation to Topography <br> d．Planned Unit Development |  |  |
| $\square$ $\square$ 区 区 $\square$ | 2．Lots：（VI．2） <br> a．Lot Arrangement <br> b．Lot sizes <br> c．Commercial and Industrial Lots |  |  |
|  | 3．Streets：（VI．3） <br> a．Relation to adjoining Street System <br> b．Street Rights－of－Way <br> c．Access <br> d．Parallel Service Roads <br> e．Street Intersection Angles <br> f．Merging Streets <br> g．Street Deflections and Vertical Alignment <br> h．Marginal Access Streets <br> i．Cul－de－Sacs <br> j．Rounding Street Corners <br> k．Street Name Signs <br> l．Street Names <br> m．Block Lengths <br> n．Block Widths <br> o．Grade of Streets <br> p．Grass Strips |  |  |
| $\square$ | 4．Curbing：（VI．4） |  |  |
| $\square$ | 5．Driveways：（VI．5） |  |  |
| $\square$ | 6．Drainage Improvements：（VI．6） |  |  |
| 区 | 7．Municipal Water Service：（VI．7） |  |  |
| 区 | 8．Municipal Sewer Service：（VI．8） |  |  |
| $\begin{aligned} & \text { 区 } \\ & \text { X } \\ & \square \end{aligned}$ | 9．Installation of Utilities：（VI．9） <br> a．All Districts <br> b．Indicator Tape |  |  |
| $\square$ | 10．On－Site Water Supply：（VI．10） |  |  |
| $\square$ | 11．On－Site Sewage Disposal Systems：（VI．11） |  |  |
| $\begin{aligned} & \square \\ & \square \\ & \square \\ & \square \\ & \square \end{aligned}$ | 12．Open Space：（VI．12） <br> a．Natural Features <br> b．Buffer Strips <br> c．Parks <br> d．Tree Planting |  |  |
| $\begin{aligned} & \square \\ & \square \\ & \square \\ & \square \\ & \square \end{aligned}$ | 13．Flood Hazard Areas：（VI．13） <br> a．Permits <br> b．Minimization of Flood Damage <br> c．Elevation and Flood－Proofing Records <br> d．Alteration of Watercourses |  |  |


| $\square$ | 14．Erosion and Sedimentation Control（VI．14） |  |  |
| :---: | :---: | :---: | :---: |
| 区 | Required Items for Submittal | Item Location （e．g．Page／line or Plan Sheet／Note \＃） | Waiver Requested |
| 图 区 $\square$ | 15．Easements（VI．15） <br> a．Utilities <br> b．Drainage |  |  |
| 区 | 16．Monuments：（VI．16） |  |  |
| 図 | 17．Benchmarks：（VI．17） |  |  |
| $\square$ | 18．House Numbers（VI．18） |  |  |


| Design Standards |  |  |  |
| :---: | :---: | :---: | :---: |
|  | Required Items for Submittal | Indicate compliance and／or provide explanation as to alternative design | Waiver Requested |
| $\square$ | 1．Streets have been designed according to the design standards required under Section（VII．1）． <br> a．Clearing <br> b．Excavation <br> c．Rough Grade and Preparation of Sub－Grade <br> d．Base Course <br> e．Street Paving <br> f．Side Slopes <br> g．Approval Specifications <br> h．Curbing <br> i．Sidewalks <br> j．Inspection and Methods | N／A |  |
| $\square$ | 2．Storm water Sewers and Other Drainage Appurtenances have been designed according to the design standards required under Section（VII．2）． <br> a．Design <br> b．Standards of Construction | N／A |  |
| 区 | 3．Sanitary Sewers have been designed according to the design standards required under Section（VII．3）． <br> a．Design <br> b．Lift Stations <br> c．Materials <br> d．Construction Standards |  |  |
| 区 | 4．Water Mains and Fire Hydrants have been designed according to the design standards required under Section（VII．4）． <br> a．Connections to Lots <br> b．Design and Construction <br> c．Materials <br> d．Notification Prior to Construction |  |  |

[^16]

Date:


Subdivision Application Checklist/September 2020

## FEE SCHEDULE Planning Department Effective 07/01/21 - 06/30/22

## Subdivision:

## PLANNING BOARD

## Subdivision

Residential ........................................... $\$ 500.00$ plus $\$ 200.00$ per lot TOTAL $=\$ 1,100.00$
Non-Residential .................................... $\$ 700.00$ plus $\$ 300.00$ per lot
Subdivision Amendment:
Administrative approval ........................ $\$ 200.00$
TAC or Planning Board approval .......... $\$ 500.00$
Lot line revision/verification......................... $\$ 250.00$
Lot Line Revision Amendment
Administrative approval ........................ $\$ 100.00$
TAC or Planning Board approval .......... $\$ 150.00$
Lot Consolidation - No Subdivision ............ $\$ 175.00$
Restoration of Involuntarily Merged Lots .... $\$ 250.00$
Preliminary Conceptual Consultation.......... $\$ 200.00$
Design Review ............................................ $\$ 500.00$

## Site Plan Review:

All developments
$\$ 500.00$
plus $\$ 5.00$ per $\$ 1,000$ of site costs only plus $\$ 10.00$ per 1,000 s.f. of site development area

Total fee not to exceed (cap) ................. $\$ 15,000.00$
Site Plan Minor Amendment:
Administrative approval ........................ $\$ 200.00$
Administrative approval after
work has been done........................ $\$ 500.00$
TAC or Planning Board approval .......... $\$ 800.00$
Preliminary Conceptual Consultation.......... $\$ 200.00$
Design Review ........................................... $\$ 500.00$
Wetlands Conditional Use Permit:
Area of disturbance in wetland or wetland buffer:
Up to 250 sq. ft. ..... $\$ 100.00$
Up to 1,000 sq. ft. ..... $\$ 500.00$
Greater than 1,000 sq. ft. ..... \$1,000.00
Conditional Use Permit (Non-Wetland)
Conditional Use Permit (Non-Wetland) ..... $\$ 200.00$
BOARD OF ADJUSTMENT
Residential Applications
1-2 dwelling units ..... $\$ 150.00$
3 and over $\$ 250.00$ plus $\$ 50.00$ for each unit over 4
Total fee not to exceed (cap) ..... \$3,000.00
Residential accessory structure only ..... $\$ 50.00$
Non-Residential Applications $\$ 300.00$ plus $\$ 5.00$ per $\$ 1,000$ of valuation of new construction
Total fee not to exceed (cap) ..... $\$ 3,000.00$
Signs ..... $\$ 200.00$
Appeal of Administrative Decision ..... $\$ 50.00$
HISTORIC DISTRICT COMMISSION
Work Session (prior to application for approval) $\$ 200.00$ per work session
Residential Applications
1 dwelling unit ..... \$100.00
2 dwelling units ..... \$100.00
3 dwelling units ..... $\$ 250.00$
4 dwelling units and over $\$ 400.00$ plus $\$ 100.00$ for each unit over 4
Total fee not to exceed (cap) ..... \$5,000.00Accessory structure, mechanical equipmentor replacement of doors/windows only.\$100.00
Non-Residential Applications $\$ 500.00$ plus $\$ 5.00$ per $\$ 1,000$ of valuationof new construction
Total fee not to exceed (cap) ..... $\$ 5,000.00$
Accessory structure, mechanical equipmentor replacement of doors/windows only................... $\$ 100.00$
Signs ..... $\$ 100.00$
Amendment to Certificate of Approval:
Administrative approval ..... $\$ 100.00$
Administrative approval after work has been done. ..... $\$ 500.00$
Commission approval ..... $\$ 800.00$
ZONING PERMITS
Certificate of conformity ..... $\$ 50.00$
Letter of interpretation ..... \$100.00

## AUTHORIZATION

The undersigned, Elizabeth B. Larsen, Trustee of the Elizabeth B. Larsen Trust of 2012("Trust"), owner of the property located at 668Middle Street, Portsmouth, New Hampshire and further identified as Portsmouth Tax Map 147, Lot 18 (the "Property"), hereby authorize Tuck Realty Corporation ("Tuck") and its advisors Jones \& Beach Engineers, Inc. and Hoefle, Phoenix, Gormley and Roberts, P.A., to file documents and appear before the Portsmouth Zoning Board of Adjustment, Planning Board, Technical Advisory Committee and/or Conservation Commission in all matters relating to applications by Tuck to the City of Portsmouth to permit the subdivision of and up to eight townhouses or similar structureson the Property.

Dated: January27, 2021
By:


Elizabeth B. Larsen, Trustee
Elizabeth B. Larsen Trust of 2012

## Letter of Authorization

I, W. Turner Porter, Tuck Realty Corporation, PO Box 190, Exeter, NH 03833, developer of property located in Portsmouth, NH, known as Tax Map 147, Lot 18, do hereby authorize Jones \& Beach Engineers, Inc., PO Box 219, Stratham, NH, to act on my behalf concerning the previously-mentioned property. The parcel is located on 668 Middle Street in Portsmouth, NH.

I hereby appoint Jones \& Beach Engineers, Inc., as my agent to act on my behalf in the review process, to include any required signatures.



## WARRANTY DEED

KNOW ALL MEN BY THESE PRESENTS that I, Elizabeth B. Larsen, unmarried, of 668 Middle Street, Portsmouth, Rockingham County, New Hampshire, 03801,
for consideration paid, grant to Elizabeth B. Larsen, Trustee of The Elizabeth B. Larsen Trust of $2012 \mathrm{u} / \mathrm{d} / \mathrm{t}$ dated December 11, 2012, of 668 Middle Street, Portsmouth, Rockingham County, New Hampshire, 03801,
with WARRANTY COVENANTS the following described real estate:
PARCEL I. A certain parcel of land with the buildings thereon, situate on Middle Street, in said Portsmouth, bounded and described as follows:

BEGINNING on Middle Street at land now or formerly of Blanche B. Lovell and running northwesterly by said Lovell's land seven (7) feet to an angle in the division line; thence turning and running North Eighty (80) degrees West by said Lovell's land, land now or formerly of William Conlon and Annie F. Pierce, land now or formerly of the Heirs of Ellen G. Walsh, land now or formerly of the Heirs of Victor Goss, and land now or formerly of Maurice J. and Elizabeth T. Ham, four hundred sixty-two (462) feet to the center of a stone post; thence turning and running North twenty-six (26) degrees West by land of the City of Portsmouth, formerly of the Frank Jones Brewing Company, one hundred six feet and six inches (106.6") to the center of a stone post; thence tuming and running North fifty-nine (59) degrees East by land now or formerly of Coleman and Taccetta, formerly of the Frank. Jones Brewing Company, two hundred twenty-seven and one half ( $2271 / 2$ ) feet to land now or formerly of Florence Laighton; thence turning and running Southeasterly in a direct line by said Laighton's land four hundred forty-two and one half ( $4421 / 2$ ) feet, more or less, to Middle Street; thence turning and running Southwesterly by said Street sixty-nine feet and ten inches ( 69 ft .10 in .) more or less, to the place of beginning.

Together with a right of way thirty (30) feet wide across the northwesterly side of land now or formerly of said Laighton, adjoining the land now or formerly of said Coleman and Taccetta, formerly of said Brewing Company, and subject to similar right of way in said Laighton, her heirs and assigns, thirty (30) feet wide across the northwesterly side of the land herein conveyed, adjoining land now or formerly of said Coleman and Taccetta. Said rights of way are more fully
limited and defined in deed of William J. Moat to G. Ralph Laighton, dated 10 May, 1980, recorded in Rockingham Registry of Deeds, Book 512, Page 429, and an agreement of G. Ralph Laighton and Harry E. Boynton, dated May 31, 1913 and recorded in said Rockingham Registry of Deeds, Book 674, Page 341, to which reference is hereby made for a more complete description.

Also, those certain parcels of land located on Forest, Central and Elm Streets, Portsmouth, County of Rockingham, State of New Hampshire, bounded and described as follows:

PARCEL 1. BEGINNING at a point in the northeasterly sideline of Forest Street at the northwesterly corner of land now or formerly of DeCoff, being Lot No. 263 on Plan of Jackson Farm and Buckminster Field drawn by John W. Durgin, CE dated February 1955, recorded in Rockingham County Registry of Deeds and running northwesterly by the northeasterly sideline of Forest Street about 256 feet to the southerly corner of Lot No. 267 on said plan; thence turning and running southwesterly about one hundred feet to the point where the southeasterly sideline of Lot 216 on said plan is intersected by the easterly sideline of the property now or formerly of the State of New Hampshire and being the approach to the high level Piscataqua River Bridge; thence turning and running northerly along the easterly sideline of the said bridge approach land now or formerly of the State of New Hampshire to land now or formerly of the Boston \& Maine Railroad; thence turning and running easterly by the right of way of the Boston \& Maine Railroad to the northwesterly comer of Lot No. 263; thence turning and running southerly by the westerly line of Lot 263 to the point of beginning, said parcel comprising those portions of Lots 216 and 267 not taken by the State of New Hampshire for the approach to the Piscataqua Bridge, together with Lots 264, 265 and 266, and the stub of land on Forest Street westerly of the westerly sideline of Central Street and the stub of Central Street northerly of the northerly sideline of forest.

PARCEL 2. BEGNNING at a point in the northwesterly sideline of Elm Street at the southwesterly corner of Lot No. 237, the property now or formerly of Zamarchi, being the northeasterly corner of the parcel herein described and running southwesterly by said Elm Street 130 feet to a corner at Lot 234, the properly now or formerly of the City of Portsmouth; thence turning and running northwesterly by said Lot 234 and Lot 221 , the property now or formerly of the City of Portsmouth, 160 feet to the southeasterly side of Central Street; thence turning and running northeasterly by Central Street 101 feet to a corner at Lot No. 218, the property now or formerly of the City of Portsmouth, thence turning and running southeasterly by Lot 218 and Lot 237 to Elm Street and the point of beginning. Comprising Lots 219, 220, 235 and 236 on said Plan of Jackson Farm and Buckminster Field.

PARCEL 3. All my right, title and interest in and to the following streets or portions of streets, namely:

Central Street from the easterly sideline of the Piscataqua River Bridge approach to the southerly sideline of Forest Street.

## BK 5390 PG 2801

That portion of Elm Street bounded northerly by Forest Street, southwesterly by land now or formerly of Zamarchi 200 feet, westerly by Elm Street, and northwesterly by Parcel 2 and land of Zamarchi 190 feet.

Forest Street from the westerly side of Guts Street westerly to a line between the easterly corner of Lot 216 and the southeasterly corner of Lot 217.

These parcels are subject to such rights as the abutting owners and others may have the use thereof for access to their respective properties.

These parcels are also subject to an Easement to Northern Utilities, Inc. dated March 4, 2004, and recorded at Rockingham County Registry of Deeds in Book 4470, Page 2003.

Included in this conveyance is any and all personal property contents of the real estate.
Being the same premises conveyed to the Grantor by deed of The Wyman P. Boynton Revocable Trust of $1994 \mathrm{u} / \mathrm{d} / \mathrm{t}$ dated September 1, 1994, recorded at Rockingham County Superior Court at Book 3980, Page 0209.

Dated this $11^{\text {th }}$ day of December, 2012.


Witness


State of New Hampshire
Rockingham, SS.
December 11, 2012
Personally appeared, before me, the above-named Elizabeth B. Larsen, known to me, or satisfactorily proven, to be the person whose name is subscribed to the foregoing instrument and acknowledged that she executed the same for the purposes therein contained.


Notary Pubtic/Justice of the Peace

# (4) $\square \rightarrow \Delta$ <br> ENVIRONMENTAL CONSULTANTS, LLC CLEAN WATER FOR TUE PRESENT AND FUTURE <br> 36 Stage Rd, Nottingham NH 03290 <br> 603.679.1860 C: 603.706.2521 <br> calbertenv@rnallicom <br> TEST PITS <br> 668 MIDDLE ROAD <br> PORTSMOUTH, NEW HAMPSHIRE JANUARY 14, 2021 

Performed by: Christopher Albert, SSD \#1085
TEST PIT \#1 - GRASS MAT

| $0^{\prime \prime}-9^{\prime \prime}$ | 10YR 3/4 | dark yellowish brown <br> fine sandy loam <br> common roots |
| :--- | :--- | :--- |
| $9 "-20^{\prime \prime}$ | 10YR $5 / 6$ | yellowish brown <br> fine sandy loam <br> common roots |
| $20^{\prime \prime}-38^{\prime \prime}$ | $2.5 Y 6 / 4$ | Light yellowish brown <br> fine sandy loam |
| Few stones |  |  |

No H2O observed
SHWT: 28"
Roots: 28"
Refusal: 38"
Perc Rate $=8 \mathrm{~min} / \mathrm{inch}$

## TEST PIT \#2 - GRASS MAT

| $0 "-7 "$ | 10YR 3/4 | dark yellowish brown <br> fine sandy loam to loamy sand <br> many roots |
| :--- | :--- | :--- |
| $7 "-20^{\prime \prime}$ | $10 Y R ~ 5 / 6$ | yellowish brown <br> fine sandy loam <br> few roots |
| $20^{\prime \prime}-46^{\prime \prime}$ | $2.5 Y 5 / 3$ | Light yellowish brown <br> fine sandy loam, few stones |



ENVIRONMENTAL CONSULTANTS, LLC
CLEAN WATER FOR THE PRESENT AND FUTURE
36 Stage Rd, Nottingham NH 03290
603.679.1866 C: 603.706.2521 calbertenvegmalicom

No H2O observed
SHWT: 32"
Roots: 32"
Refusal: 46"
Perc Rate $=8 \mathrm{~min} / \mathrm{inch}$
TEST PIT \#3 - GRASS MAT
Refusal: 12"
TEST PIT \#4 - GRASS MAT
$0^{\prime \prime}-9^{\prime \prime}$
$9 "-28^{\prime \prime}$
$28^{\prime \prime}-48^{\prime \prime}$

No H2O observed
SHWT: 28"
Roots: 28"
Refusal: 48"
Perc Rate $=8 \mathrm{~min} / \mathrm{inch}$

TEST PIT \#5-GRASS MAT
Refusal: 18"

10YR 3/4 dark yellowish brown fine sandy loam to loamy sand many roots

10YR 5/6 yellowish brown fine sandy loam few roots
2.5Y 5/3 Light yellowish brown fine sandy loam, few stones

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TEST PIT \#6 - FOREST MAT

$$
0^{\prime \prime}-12^{\prime \prime}
$$

$$
12^{\prime \prime}-36^{\prime \prime}
$$

$36^{\prime \prime}-50^{\prime \prime}$

No H2O observed
SHWT: 40"
Roots: $36^{\prime \prime}$
Refusal: 50"
Perc Rate $=8 \mathrm{~min} /$ inch
Test Pit \# 7 - GRASS MAT
$0^{\prime \prime}-12^{\prime \prime}$
$12 "-36^{\prime \prime}$
$36^{\prime \prime}-72^{\prime \prime}$

No H2O observed
SHWT: 36"
Roots: 36"
Refusal: 72"
Perc Rate $=8 \mathrm{~min} / \mathrm{inch}$

10YR 3/3 dark brown
fine sandy loam
few roots
10YR 4/6 yellowish brown
fine sandy loam
common roots
2.5Y 6/4 Light yellowish brown
fine sandy loam
Few stones

10YR 3/3 dark brown
fine sandy loam few roots

10YR 4/6 yellowish brown
fine sandy loam
common roots
2.5Y 5/4 Light Olive brown
fine sandy loam
Firm, Few stones


## TEST PIT \#8 - GRASS MAT

Refusal: 12"
TEST PIT \#9 - GRASS MAT
Refusal: 24"
TEST PIT \#10-GRASS MAT
$0^{\prime \prime}-10^{\prime \prime}$
Crushed Gravel (fill material)
Stabilization Fabric
$10^{\prime \prime}-24$
2.5Y 5/3 Light olive brown

Silty clay loam
Subangular blocky

Encountered 2" electrical conduit

No H2O observed
SHWT: 10"
Roots: none
Refusal: none
Perc Rate $=20 \mathrm{~min} /$ inch


TEST PIT \#11 - EDGE TREE LINE

$$
0^{\prime \prime}-20^{\prime \prime}
$$

10YR 2/2 Very dark brown, FSL
Few roots
$20^{\prime \prime}-84^{\prime \prime}$
$2.5 \mathrm{Y} 3 / 4$
Light olive brown
Silty clay loam
Subangular blocky

No H2O observed
SHWT: 20"
Roots: 20"
Refusal: none
Perc Rate $=20 \mathrm{~min} / \mathrm{inch}$


UI
Sunsurface Disposa


## 668 MIDDLE ST

| Location 668 MIDDLE ST | Mblu | 0147/0018/0000// |
| :---: | :--- | :--- | :--- |
| Acct\# 34521 | Owner | LARSEN ELIZABETH B TRUST |
|  |  | OF 2012 |
| PBN | Assessment | $\$ 2,207,100$ |
| Appraisal $\$ 2,207,100$ | PID 34521 |  |

Building Count 2

## Current Value

| Appraisal |  |  |  |
| :---: | :---: | :---: | :---: |
| Valuatlon Year | Improvements | Land | Total |
| 2020 | \$1,808,600 | \$398,500 | \$2,207,100 |
| Assessment |  |  |  |
| Valuation Year | Improvements | Land | Total |
| 2020 | \$1,808,600 | \$328,500 | \$2,207,100 |

## Owner of Record

| Owner | LARSEN ELIZABETH B TRUST OF 2012 | Sale Price | $\$ 0$ |
| :--- | :--- | :--- | :--- |
| Co-Owner | LARSEN ELIZABETH B TRUSTEE | Certificate |  |
| Address | 668 MIDDLE ST | Book \& Page | $5390 / 2799$ |
|  | PORTSMOUTH, NH 03801 | Sale Date | 12/20/2012 |
|  |  | Instrument |  |

## Ownership History

| Ownership History |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Owner | Sale Price | Certificate | Book \& Page | Instrument | Sale Date |
| LARSEN ELIZABETH B TRUST OF 2012 | \$0 |  | 5390/2799 |  | 12/20/2012 |
| LARSEN ELIZABETH B | \$0 |  | 3980/0209 |  | 01/21/2003 |

## Bullding Information

## Building 1 : Section 1

Year Built: 1892
Living Area: 3,840

| Replacement Cost: <br> Building Percent Good: <br> Replacement Cost <br> Less Depreciation: | \$1,365,826 |
| :---: | :---: |
|  | 79 |
|  |  |
|  | \$1,079,000 |
| Building Attributes |  |
| Field | Description |
| Style: | 3 Unit |
| Occupancy | 3 |
| Exterior Wall 2 |  |
| Interior Wall 2 |  |
| Interior Fly 2 | Ceram Clay Til |
| Model | Residential |
| Grade: | x - |
| Stories: | 2 |
| Exteriar Wall 1 | Clapboard |
| Roof Structure: | Gable/Hip |
| WB Fireplaces | 1 |
| Extra Openings | 3 |
| Root Cover | Slate |
| Interior Wall 1 | Plastered |
| Extra Openings | 0 |
| Bsmt Garage |  |
| Interior F\|r 1 | Hardwood |
| Heat Fuel | Gas |
| Heat Type: | Hot Water |
| AC Type: | None |
| Total Bedrooms: | 4 Bedrooms |
| Total Bthrms: | 4 |
| Total Half Baths: | 0 |
| Total Xtra Fixitrs: | 2 |
| Total Rooms: | 14 |
| Bath Style: | Avg Quality |
| Kitchen Style: | Avg Quality |
| Kitchen Gr | B |
| Metal Fireplaces | 0 |

## Building Photo



## Building Layout


(ParcelSketch.ashxipid=345218bid=34521)

| Building Sub-Areas (sq ft) |  |  | Legend |
| :---: | :---: | :---: | :---: |
| Code | Description | Gross <br> Area | Living Area |
| BAS | First Floor | 1.802 | 1,802 |
| FUS | Upper Story, Finished | 9,642 | 1,642 |
| FAT | Attic | 1,582 | 396 |


| FOP | Porch, Open | 338 | 0 |
| :--- | :--- | ---: | ---: |
| UBM | Basement, Unfinished | 1,802 | 0 |
| WDK | Deck, Wood | 202 | 0 |
|  |  | 7,368 | 3,840 |

## Building 2 : Section 1

| Year Built: | 1900 |
| :---: | :---: |
| Living Area: | 1,920 |
| Replacement Cost: | \$785,802 |
| Building Percent Good: | 89 |
| Replacement Cost |  |
| Less Depreciation: | \$699,400 |
| Building Attributes: Bldg 2 of 2 |  |
| Field | Description |
| Style: | 3 Unit |
| Occupancy | 3 |
| Exterior Wall 2 |  |
| Interior Wall 2 |  |
| Interior Flr 2 | Ceram Clay Til |
| Model | Residential |
| Grade: | A |
| Stories: | 2 |
| Exterior Wall 1 | Clapboard |
| Roof Structure: | Gable/Hip |
| WB Fireplaces | 1 |
| Extra Openings | 0 |
| Roof Cover | Asph/F Gls/Cmp |
| Interior Wall 1 | Plastered |
| Extra Openings | 0 |
| Bsmt Garage |  |
| Interior Fir 1 | Hardwood |
| Heal Fuel | Gas |
| Heat Type: | Hot Water |
| AC Type: | None |
| Total Bedrooms: | 3 Bedrooms |
| Total Bthrms: | 4 |
| Total Half Baths: | 0 |
| Total Xtra Fixtrs: | 1 |
| Total Rooms: | 8 |
| Bath Style: | Avg Quality |
| Kitchen Style: | Avg Quality |
| Kitchen Gr | B |

## Building Photo



Building Layout

(ParcelSketch.ashx7pid=34521\&bid=40101)

| Building Sub-Areas (sq ft)  <br> Code DescriptionGross <br> Area |  | Living <br> Area |  |
| :--- | :--- | :---: | :---: |
| BAS | First Floor |  | 960 |


| FUS | Upper Story, Finished | 960 | 960 |
| :--- | :--- | ---: | ---: |
| FEP | Porch, Enclosed | 114 | 0 |
| FGR | Garage, Attached | 506 | 0 |
| FSP | Porch, Screened | 432 | 0 |
| UBM | Basement, Unfinished | 960 | 0 |
| WDK | Deck, Wood | 96 | 0 |
|  |  | 4,028 | 1,920 |

## Extra Features

| Extra Features Legend |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Code | Description | Size | Value | Bldg \# |
| FBLA | FINISHED BSMNT | 480.00 S.F. | \$20,500 | 2 |

## Land

| Land Use |  | Land Line Valuation |  |
| :--- | :--- | :--- | :--- |
| Use Code | 1050 |  |  |
| Description | THREE FAM | Size (Acres) | 1.85 |
| Zone | GRA | Frontage |  |
| Neighborhood | 104 | Depth |  |
| Alt Land Appr | No | Assessed Value | $\$ 398,500$ |
| Category |  | Appralsed Value | $\$ 398,500$ |

## Outbuildings

| Outbuildings Legend |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Code | Description | Sub Code | Sub Description | Size | Value | Bldg \# |
| BRN9 | BARN |  |  | 432.00 S.F. | \$9,700 | 1 |

## Valuation History

| Appraisal |  |  |  |
| :---: | :---: | :---: | :---: |
| Valuation Year | Improvements | Land | Total |
| 2020 | \$1,808,600 | \$398,500 | \$2,207,100 |
| 2019 | \$1,808,100 | \$398,500 | \$2,206,600 |
| 2018 | \$1,643,600 | \$346,000 | \$1,989,800 |


| Assessment |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Valuation Year | Improvements | Land | Total |
| 2020 |  | \$1,808,600 | \$398,500 | \$2,207,100 |
| 2019 |  | \$1,808,100 | \$398,500 | \$2,206,600 |
| 2018 |  | \$1,643,600 | \$346,000 | \$1,989,600 |

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## CITY OF PORTSMOUTH

Planning Department
1 Junkins Avenue
Portsmouth, New
Hampshire 03801
(603) 610-7216

## ZONING BOARD OF ADJUSTMENT

August 2, 2021

Elizabeth Larsen, Trustee
Elizabeth Larsen Trust of 2012
668 Middle Street
Portsmouth, NH 03801

## RE: Board of Adjustment request for property located at 668 Middle Street

Dear Ms. Larsen:
The Zoning Board of Adjustment, at its regularly scheduled meeting of July 27, 2021, considered your application for subdivide lot into three lots which requires the following: 1) A Variance from Section 10.521 to allow 114' and 100' of frontage on a private way where 100 of frontage on a formally accepted street or other road approved by the Planning Board and constructed to City subdivision standards. 2) A Variance from Section 10.521 to allow 69.83 ' of frontage on Middle Street where 100 feet is required. 3) A Variance from Section 10.512 to allow construction of a structure on a lot with access to a private right of way. Said property is shown on Assessor Map 147 Lot 18 and lies within the General Residence A (GRA) District. As a result of said consideration, the Board voted to grant the variances for the petition as presented and advertised.

The Board's decision may be appealed up to thirty (30) days after the vote. Any action taken by the applicant pursuant to the Board's decision during this appeal period shall be at the applicant's risk. Please contact the Planning Department for more details about the appeals process.

Approvals may also be required from other City Commissions or Boards. Once all required approvals have been received, applicant is responsible for applying for and securing a building permit from the Inspection Department prior to starting any project work.

This approval shall expire unless a building permit is issued within a period of two (2) years from the date granted unless an extension is granted in accordance with Section 10.236 of the Zoning Ordinance.

The minutes and audio recording of this meeting are available by contacting the Planning Department.

Very truly yours,


David Rheaume, Chairman of the Zoning Board of Adjustment
cc: Robert Marsilia, Chief Building Inspector
Rosann Maurice-Lentz, City Assessor
R. Timothy Phoenix, Esq.

Mike Garrepy, Tuck Realty Group

# ABUTTERS LIST (200 FEET) AS OF <br> August 20, 2021 <br> FOR <br> 668 MIDDLE STREET, PORTSMOUTH, NH 03801 JBE PROJECT No. 20686 

## OWNER OF RECORD/APPLICANT:

TAX MAP 147/ LOT 18
ELIZABETH B LARSEN TRUST OF 2012
ELIZABETH B LARSEN TRUSTEE
668 MIDDLE ST
PORTSMOUTH, NH 03801
BK 5390/PG 2799 (12/20/12)

## APPLICANT:

TUCK REALTY CORPORATION
C/O MICHAEL GARREPY
PO BOX 190
EXETER, NH 03833

## ABUTTERS:

147/19
POLIZZOTTO CHRISTINA C REV. TR.
POLIZZOTTO CHRISTINA C AND LEONARD TTEES
660 MIDDLE STREET
PORTSMOUTH, NH 03801
147/22
270 CASS STREET LLC
161 HALEY RD
KITTERY, ME 03904
147/24
THEURER CAROL P REVOCABLE TRUST OF 2017
THEURER CAROL P TRUSTEE
24 FRIEND STREET
PORTSMOUTH, NH 03801

147/25
WISNER FAMILY IRREVOCABLE TRUST
WISNER ERIC D \& LUCAS N CO-TRUSTEES
34 FRIEND STREET
PORTSMOUTH, NH 03801
147/26 \& 147/30\& 147/26/1\&2
S\&G REALTY
33 OCEANVIEW AVE
RYE, NH 03870
148/27
HENNEQUIN DAVID AND PATRICIA 2019 REV TR
HENNEQUIN DAVID C AND PATRICIA TRUSTEES
47 ALDRICH RD
PORTSMOUTH, NH 03801
148/28
NEILSON PAUL S
P.O. BOX 382

NEW CASTLE, NH 03854
148/29
MYERS MICHAEL B
700 MIDDLE STREET
PORTSMOUTH, NH 03801
148/30
BUSSIERE EMILE R JR \& ALLISON K
15 NORTH STREET
MANCHESTER, NH 03104-3016
148/31
ANDREWS TIMOTHY J
56 THORNTON ST
PORTSMOUTH, NH 03801
148/33
GRUEN REVOCABLE TRUST OF 2019
GRUEN THOMAS W AND CAROL R TRUSTEES
673 MIDDLE STREET
PORTSMOUTH, NH 03801

148/34
ELLISON WILLIAM T
ELLISON ANNELISE
687 MIDDLE STREET
PORTSMOUTH, NH 03801
148/35
ALEXANDROPOULOS FRANK M
699 MIDDLE STREET
PORTSMOUTH, NH 03801
148/43
SMITH STEPHEN C REV TRUST 1998
SMITH STEPHEN C TRUSTEE
46 PARK STREET
PORTSMOUTH, NH 03801
148/44
BOGARDUS PATRICIA LIVING TRUST
BOGARDUS PATRICIA \& ROBERT W TRUSTEES
26 PARK STREET
PORSTMOUTH, NH 03801
148/32/1
CARR DANIEL J
659 MIDDLE ST \#1
PORTSMOUTH, NH 03801
148/32/2
POMERANCE JUSTIN
51 ISLINGTON ST UNIT 302
PORTSMOUTH NH 03801
153/36
PEKOWSKY DEBI L
121 ALDRICH RD
PORTSMOUTH, NH 03801
153/38
GAWRON DAVID
85 ALDRICH RD
PORTSMOUTH, NH 03801

153/39
LOMBARDI VINCENT C 75 ALDRICH RD
PORTSMOUTH NH 03801
153/40
MARKOVSKY DAVID G
30 ALDRICH CT
PORTSMOUTH, NH 03801
153/41
WALSH TERESA
27 WHITTON AVE
STRATHAM NH, 02043
153/42
JOHNSON RACHEL
31 ALDRICH CT
PORTSMOUTH NH, 03801
153/43
ZARICKI A
KARKOTA AJ AND KARKOTA G
25 ALDRICH CT
PORTSMOUTH, NH 03801
153/44
BELLAUD ANNE R LANDAU
55 ALDRICH RD
PORTSMOUTH, NH 03801
153/37/A
BOLDUC GREGORY P
101 ALDRICH ROAD
PORSMOUTH NH
153/37/B
EVANS JUDITH
99 ALDRICH RD
PORTSMOUTH NH 03801
146/27
MALT HOUSE EXCHANGE REALTY TRUST
DZIAMA GARY AND ZACHARY CO-TRUSTEES
95 BREWERY LANE
PORTSMOUTH NH 03801

146/18/1
LAS MAREAS LLC
31 E CONCORD ST
BOSTON, MA 02118
146/18/2
BALTER MATTHEW BERNARD
16 CHEVROLET AVE \#2
PORTSMOUTH NH 03801

146/18/3
WITHAM TROY A
16 CHEVROLET AVE \#3
PORTSMOUTH NH 03801
146/18
CHEVROLET AVENUE CONDOS
149 CASS STREET
PORTSMOUTH NH 03801
147/21
SWANSON DAVID E
300 CASS STREET
PORTSMOUTH NH 03801
148/32
MELUSINE CONDO MASTERCARD
659 MIDDLE ST
PORTSMOUTH NH 03801

153/37
ALDRICH RD CONDO MASTERCARD
99 ALDRICH RD
PORTSMOUTH NH 03801
148/35/1
DEBORAH S PESIK \& CHARLES PESIK TRUST
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669 MIDDLE STREET \#1
PORTSMOUTH NH 03801
148/35/2
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669 MIDDLE STREET \#2
PORTSMOUTH NH 03801

148/35/3
SINNOTT SUSAN H REVO TRUST
SINNOTT SUSAN H TRUSTEE
29 EMUS WAY
YORK ME 03909
147/21/1
HICKMAN SEAN
622 MIDDLE ST \#1
PORTSMOUTH NH 03801
147/51/2
SCHMITT BRENT
300 CASS ST \#2
PORTSMOUTH NH 03801
147/20
CYR RICHARD M REVOCABLE TRUST 1999
CYR RICHARD M TRUSTEE
640 MIDDLE ST
PORTSMOUTH NH 03801
154-2
PORTSMOUTH WEST END DEVELOPMENT LLC
3 PENSTOCK WAY
NEWMARKET NH 03857
147/19/1\&2
WHELAN CATHERINE R
P.O. BOX 235

NEW CASTLE NH 03854

## ENGINEERS/SURVEYORS:

JONES \& BEACH ENGINEERS, INC.
ATTN: JOSEPH CORONATI
PO BOX 219
STRATHAM, NH 03885

ELIZABETH B LARSEN TRUST OF 2012 ELIZABETH B LARSEN TRUSTEE 668 MIDDLE ST
PORTSMOUTH, NH 03801

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POLIZZOTTO CHRISTINA C REV. TR. POLIZZOTTO CHRISTINA C AND LEONARD TTEES
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33 OCEANVIEW AVE RYE, NH 03870

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## ALEXANDROPOULOS FRANK M 699 MIDDLE STREET PORTSMOUTH, NH 03801

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46 PARK STREET
PORTSMOUTH, NH 03801

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PORTSMOUTH NH 03801

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> ANDREWS TIMOTHY J 56 THORNTON ST PORTSMOUTH, NH 03801

GRUEN REVOCABLE TRUST OF 2019 GRUEN THOMAS W AND CAROL R TRUSTEES 673 MIDDLE STREET PORTSMOUTH, NH 03801

ELLISON WILLIAM T
ELLISON ANNELISE
687 MIDDLE STREET
PORTSMOUTH, NH 03801

> ALEXANDROPOULOS FRANK M 699 MIDDLE STREET
> PORTSMOUTH, NH 03801

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PORSTMOUTH, NH 03801

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PEKOWSKY DEBI L
121 ALDRICH RD
PORTSMOUTH, NH 03801

PEKOWSKY DEBI L
121 ALDRICH RD
PORTSMOUTH, NH 03801

GAWRON DAVID
85 ALDRICH RD
PORTSMOUTH, NH 03801
LOMBARDI VINCENT C
75 ALDRICH RD
PORTSMOUTH NH 03801

MARKOVSKY DAVID G
30 ALDRICH CT
PORTSMOUTH, NH 03801
MARKOVSKY DAVID G
30 ALDRICH CT
PORTSMOUTH, NH 03801

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PORTSMOUTH NH, 03801

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KARKOTA AJ AND KARKOTA G
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PORTSMOUTH, NH 03801

BELLAUD ANNE R LANDAU
55 ALDRICH RD
PORTSMOUTH, NH 03801

BOLDUC GREGORY P
101 ALDRICH ROAD
PORSMOUTH NH

EVANS JUDITH
99 ALDRICH RD
PORTSMOUTH NH 03801
GAWRON DAVID
85 ALDRICH RD
PORTSMOUTH, NH 03801

LOMBARDI VINCENT C<br>75 ALDRICH RD PORTSMOUTH NH 03801

## WALSH TERESA <br> 27 WHITTON AVE

STRATHAM NH, 02043

JOHNSON RACHEL
31 ALDRICH CT
PORTSMOUTH NH, 03801

ZARICKI A
KARKOTA AJ AND KARKOTA G 25 ALDRICH CT PORTSMOUTH, NH 03801

BELLAUD ANNE R LANDAU
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PORTSMOUTH, NH 03801

> BOLDUC GREGORY P 101 ALDRICH ROAD PORSMOUTH NH

EVANS JUDITH
99 ALDRICH RD PORTSMOUTH NH 03801

MALT HOUSE EXCHANGE REALTY TRUST

DZIAMA GARY AND ZACHARY COTRUSTEES
95 BREWERY LANE PORTSMOUTH NH 03801

GAWRON DAVID
85 ALDRICH RD PORTSMOUTH, NH 03801

## LOMBARDI VINCENT C

 75 ALDRICH RD PORTSMOUTH NH 03801
## MARKOVSKY DAVID G

30 ALDRICH CT
PORTSMOUTH, NH 03801

WALSH TERESA
27 WHITTON AVE
STRATHAM NH, 02043

JOHNSON RACHEL
31 ALDRICH CT PORTSMOUTH NH, 03801

ZARICKI A
KARKOTA AJ AND KARKOTA G
25 ALDRICH CT PORTSMOUTH, NH 03801

BELLAUD ANNE R LANDAU 55 ALDRICH RD PORTSMOUTH, NH 03801

BOLDUC GREGORY P 101 ALDRICH ROAD PORSMOUTH NH

EVANS JUDITH
99 ALDRICH RD PORTSMOUTH NH 03801

MALT HOUSE EXCHANGE REALTY TRUST DZIAMA GARY AND ZACHARY COTRUSTEES
95 BREWERY LANE
PORTSMOUTH NH 03801

MALT HOUSE EXCHANGE REALTY TRUST DZIAMA GARY AND ZACHARY COTRUSTEES
95 BREWERY LANE PORTSMOUTH NH 03801

LAS MAREAS LLC 31 E CONCORD ST BOSTON, MA 02118

BALTER MATTHEW BERNARD
16 CHEVROLET AVE \#2 PORTSMOUTH NH 03801

WITHAM TROY A 16 CHEVROLET AVE \#3 PORTSMOUTH NH 03801

CHEVROLET AVENUE CONDOS 149 CASS STREET PORTSMOUTH NH 03801

MELUSINE CONDO MASTERCARD 659 MIDDLE ST PORTSMOUTH NH 03801

## ALDRICH RD CONDO MASTERCARD

 99 ALDRICH RDPORTSMOUTH NH 03801

DEBORAH S PESIK \& CHARLES PESIK TRUST
PESIK DEBORAH \& CHARLES TRUSTEES 669 MIDDLE STREET \#1 PORTSMOUTH NH 03801

GRAY ALEXIS D 669 MIDDLE STREET \#2 PORTSMOUTH NH 03801

LAS MAREAS LLC
31 E CONCORD ST
BOSTON, MA 02118

BALTER MATTHEW BERNARD 16 CHEVROLET AVE \#2 PORTSMOUTH NH 03801

WITHAM TROY A 16 CHEVROLET AVE \#3 PORTSMOUTH NH 03801

CHEVROLET AVENUE CONDOS
149 CASS STREET
PORTSMOUTH NH 03801

SWANSON DAVID E
300 CASS STREET
PORTSMOUTH NH 03801

MELUSINE CONDO MASTERCARD 659 MIDDLE ST PORTSMOUTH NH 03801

## ALDRICH RD CONDO MASTERCARD

99 ALDRICH RD PORTSMOUTH NH 03801

DEBORAH S PESIK \& CHARLES PESIK TRUST
PESIK DEBORAH \& CHARLES TRUSTEES
669 MIDDLE STREET \#1 PORTSMOUTH NH 03801

GRAY ALEXIS D
669 MIDDLE STREET \#2
PORTSMOUTH NH 03801

SINNOTT SUSAN H REVO TRUST SINNOTT SUSAN H TRUSTEE 29 EMUS WAY YORK ME 03909

LAS MAREAS LLC 31 E CONCORD ST BOSTON, MA 02118

BALTER MATTHEW BERNARD 16 CHEVROLET AVE \#2 PORTSMOUTH NH 03801

WITHAM TROY A 16 CHEVROLET AVE \#3 PORTSMOUTH NH 03801

## CHEVROLET AVENUE CONDOS

149 CASS STREET
PORTSMOUTH NH 03801

SWANSON DAVID E 300 CASS STREET PORTSMOUTH NH 03801

MELUSINE CONDO MASTERCARD 659 MIDDLE ST PORTSMOUTH NH 03801

## ALDRICH RD CONDO MASTERCARD

99 ALDRICH RD
PORTSMOUTH NH 03801

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GRAY ALEXIS D
669 MIDDLE STREET \#2 PORTSMOUTH NH 03801

HICKMAN SEAN
622 MIDDLE ST \#1
PORTSMOUTH NH 03801

SCHMITT BRENT
300 CASS ST \#2
PORTSMOUTH NH 03801

## CYR RICHARD M REVOCABLE TRUST 1999 CYR RICHARD M TRUSTEE 640 MIDDLE ST PORTSMOUTH NH 03801

PORTSMOUTH WEST END DEVELOPMENT
LLC
3 PENSTOCK WAY NEWMARKET NH 03857

WHELAN CATHERINE R
P.O. BOX 235

NEW CASTLE NH 03854

JONES \& BEACH ENGINEERS, INC.
ATTN: JOSEPH CORONATI PO BOX 219
STRATHAM, NH 03885

HICKMAN SEAN
622 MIDDLE ST \#1
PORTSMOUTH NH 03801

SCHMITT BRENT
300 CASS ST \#2
PORTSMOUTH NH 03801

CYR RICHARD M REVOCABLE TRUST 1999
CYR RICHARD M TRUSTEE
640 MIDDLE ST
PORTSMOUTH NH 03801

PORTSMOUTH WEST END DEVELOPMENT LLC
3 PENSTOCK WAY NEWMARKET NH 03857

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## PORTSMOUTH WEST END DEVELOPMENT <br> LLC <br> 3 PENSTOCK WAY <br> NEWMARKET NH 03857

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P.O. BOX 235

NEW CASTLE NH 03854

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City of Portsmouth


# JONES\&BEACH <br> 85 Portsmouth Avenue, PO Box 219, Stratham, NH 03885 603.772.4746 - JonesandBeach.com 

September 30, 2021
Portsmouth Planning Board
Attn: Dexter Legg, Chair
1 Junkins Avenue, Suite $3^{\text {rd }}$ Floor
Portsmouth, NH 03801

RE: Response Letter<br>668 Middle Street, Portsmouth, NH<br>Tax Map 147, Lot 18<br>JBE Project No. 20686

Dear Mr. Legg,
We are in receipt of comments from Peter Britz, Interim Planning Director, dated September 23, 2021. We are also in receipt of comments from DPW, provided by Stefanie Casella. Review comments are listed below with our responses in bold.

## TAC COMMENTS:

1. In order to prevent segmentation from the Site Plan Review requirements, construction of a structure on either lot that will contain more than one dwelling unit shall require site plan approval.
RESPONSE: Note \#14 was added to sheet A1 to address this concern.
2. Fee simple transfer of the exclusive use area is highly recommended in order to minimize future land use conflicts between the effected lots.
RESPONSE: This was considered, but ultimately the current arrangement was determined to be preferable and is agreeable by the abutters.
3. The sewer line shall be reconfigured and approved by DPW (prior to Planning Board approval).
RESPONSE: Sewer line has been reconfigured and sent to DPW for review.
4. The sewer profile shall be added to the plan set.

RESPONSE: Sewer profile has been added to the plans set.
5. The right of way and utility easement over Chevrolet Ave (approximately 6 ' off the edge of pavement) shall be provided.
RESPONSE: Right-of-way and utility easement over Chevrolet Ave, has been added to the plans. We determined the location by going 25 ' off the centerline of the roadway.
6. Milling and overlay of the full road width for length of the disturbance area shall be required and, the sidewalk shall be repaired or replaced (as needed and determined by the DPW). Subject to DPW review and approval temporary pavement shall be required at time of construction. Such paving shall be to the existing pavement depth and, after a winter season the street shall receive a full mill and overlay.
RESPONSE: Milling and overlay of full road width for length of disturbance area and repair sidewalk as needed will be completed. Note \#15 was added to sheet A1 stating this.
7. Subject to DPW review and approval temporary pavement shall be required at time of construction. Such paving shall be to the existing pavement depth and, after a winter season the street shall receive a full mill and overlay.
RESPONSE: This has been added as Note \#16 on sheet A1.
Included with this response letter are the following:

1. One (1) Full Size Plan Set.









TAX MAP 147 LOT 19-
CATHERINE R. WHELA
PO BOX 235
NEW CASTLE, NH 03854
BK4798 PG 0125




Civil Site Planning Environmental Engineering<br>133 Court Street<br>Portsmouth, NH<br>03801-4413

September 30, 2021
Peter Britz, Interim Planning Director
City of Portsmouth Municipal Complex
1 Junkins Avenue
Portsmouth, New Hampshire 03801

## Re: Application for Subdivision "Watson's Landing" <br> Assessor's Map 209, Lot 33 <br> 1 Clark Drive <br> Altus Project No. 5090

## Dear Peter,

Enclosed please find materials for the amendment to the Watson's Landing subdivision. Pursuant to comments received from the Planning and Legal Departments, we have revised the previously approved plan to clearly depict the Watson's Landing private roadway as a separate parcel. Although this is now a five-lot subdivision, the layout is exactly the same as the prior approval and there are still only four residential house lots.

Please call me if you have any questions or need any additional information.

Sincerely,

## ALTUS ENGINEERING, INC.



Erik B. Saari
Vice President
ebs/5090-APP-PB-CovLtr-093021
Enclosures
eCopy: Robert Watson

## Letter of Authorization

I, Robert D. Watson, Trustee of the Frederick W. Watson Revocable Trust, hereby authorize Altus Engineering, Inc. of Portsmouth, NH to represent me as the Owner and Applicant in all matters concerning the engineering and related permitting of a residential subdivision on Portsmouth Tax Map 209, Lot 33 located at 1 Clark Drive, Portsmouth, New Hampshire. This authorization shall include any signatures required for Federal, State and Municipal permit applications.


Signature


Witness

Robert D. Watson


Print Name


Date
$\frac{11}{\text { Date }} 24 / 20$


## PLANNING BOARD

March 23, 2021

Robert Watson, Trustee
Frederick Watson Revocable Trust
53 Sleepy Hollow Drive
Greenland, NH 03840
RE: Conditional Use permit and Subdivision approval for property located at 1 Clark Drive
Dear Mr. Watson:
The Planning Board, at its regularly scheduled meeting of Thursday, March 18, 2021, considered your application for a Conditional Use Permit under Article 6 Section 10.674 of the Zoning Ordinance for construction of new residences in the Highway Noise Overlay District and Preliminary and Final Subdivision approval to subdivide a lot with an area of 137,176 s.f. and 75 ft . of continuous street frontage into four (4) lots and a proposed new road as follows: Proposed lot 1 with an area of 20,277 s.f. and 137.23 ft . of continuous street frontage; Proposed Lot 2 with an area of 17,103 s.f. and 100 ft . of continuous street frontage; Proposed Lot 3 with an area of 20,211 s.f. and 100 ft . of continuous street frontage; and Proposed Lot 4 with an area of 53,044 s.f. and 592.50 ft . of continuous street frontage. Said property is shown on Assessor Map 209 Lot 33 and lies within the Single Residence B (SRB) District. As a result of said consideration, the Board voted as follows:

## Highway Noise Overlay District Conditional Use Permit:

Voted to find that the applicable exterior and interior sound level standards shall be met as demonstrated by the noise analysis provided and to grant the conditional use permit as presented.

## Subdivision Approval

1) Voted to grant the requested waivers to the Subdivision Residential Street Standards requiring that the pavement width of a residential road by a minimum of 32' wide and Section VI.2.A Lot Arrangement requiring that lot lines shall be placed radial to curved street lines by finding that specific circumstances relative to the subdivision, or conditions of the land in such subdivision, indicate that the waiver will properly carry out the spirit and intent of the regulations
2) Voted to grant Preliminary and Final Subdivision Approval with the following stipulations: 2.1) Property owners shall provide an access easement to the City for water valve access and leak detection. The easement shall be reviewed and approved by the Planning and Legal Departments prior to acceptance by the City Council.
2.2) Neighboring parcel $209 / 32$ shall have full legal access to the new private road and utilities.
2.3) The current 6 " water connection in Cutts St shall be abandoned by the applicant entirely by removing the valve and bolting on a blind flange to the tee. This work must be completed no later than the end of May 2021 so that the final road pavement can be placed.
2.4) The Engineer of Record shall submit a written report (with photographs and engineer
stamp) certifying that the stormwater infrastructure was constructed according to the approved plans and specifications and will meet the design performance and confirm consistency with the Stormwater Maintenance and Operations Manual.
2.5) All of the new sewer laterals means, methods, materials and installation shall be approved and witnessed by DPW prior to backfilling.
2.6) Applicant shall enter into a maintenance agreement with the City of Portsmouth Water Division regarding hydrant flushing.
2.7) Lot numbers as determined by the Assessor shall be added to the final plat.
2.8) Property monuments shall be set as required by the Department of Public Works prior to the filing of the plat.
2.9) GIS data shall be provided to the Department of Public Works in the form as required by the City.
2.10) Homeowner Association documents shall be reviewed and approved by the Planning Department, DPW, and Legal Departments as appropriate prior to recording and should be consistent with the approved plans and the Stormwater Maintenance and Operations Manual.
2.11) The final plat and all easement deeds shall be recorded concurrently at the Registry of Deeds by the City or as deemed appropriate by the Planning Department.

The Board's decision may be appealed up to thirty (30) days after the vote. Any action taken by the applicant pursuant to the Board's decision during this appeal period shall be at the applicant's risk. Please contact the Planning Department for more details about the appeals process.

All stipulations of subdivision approval, including recording of the plat as required by the Planning Department, shall be completed within six (6) months of the date of approval, unless an extension is granted by the Planning Director or the Planning Board in accordance with Section III.D of the Subdivision Rules and Regulations. If all stipulations have not been completed within the required time period, the Planning Board's approval shall be deemed null and void.

This subdivision approval is not final until the Planning Director has certified that the applicant has complied with the conditions of approval imposed by the Planning Board.

The minutes and audio recording of this meeting are available by contacting the Planning Department.

Very truly yours,


Dexter R. Legg, Chairman of the Planning Board
cc: Roseann Maurice-Lentz, City Assessor

Erik Sari, PE, Altus Engineering

## PLANNING BOARD

March 23, 2021

Robert Watson, Trustee
Frederick Watson Revocable Trust
53 Sleepy Hollow Drive
Greenland, NH 03840
RE: Wetland Conditional Use permit for property located at 1 Clark Drive
Dear Mr. Watson:
The Planning Board, at its regularly scheduled meeting of Thursday, March 18, 2021, considered your application for a Wetland Conditional Use permit in accordance with Article 10 Section 10.1017 to demolish an existing home, driveway, and swimming pool and construct a new private road and create four new house lots with associated stormwater management infrastructure which will result in 15,500 square feet of impact in the 100 -foot wetland buffer. Said property is shown on Assessor Map 209 Lot 33 and lies within the Single Residence B (SRB) District. As a result of said consideration, the Board voted grant this request as presented with the following stipulations:

1) Instead of wetland boundary markers along the wetland buffer, the applicant shall install wetland boundary markers every twenty feet at the uphill edge of the rain garden within the wetland buffer or as recommended by the Planning Department.
2) The houses shall be constructed with drip edges and pre-treatment of roof run-off as recommended by the Planning Department and DPW.
3) Homeowner Association documents shall be reviewed and approved by the Planning Department to confirm that the relevant details related to organic fertilizer application practices (as referenced in note 18 on the plan set), related deed restriction, and stormwater maintenance are appropriately referenced and consistent with the plans approved.

The Board's decision may be appealed up to thirty (30) days after the vote. Any action taken by the applicant pursuant to the Board's decision during this appeal period shall be at the applicant's risk. Please contact the Planning Department for more details about the appeals process.

Unless otherwise indicated above, applicant is responsible for applying for and securing a building permit from the Inspection Department prior to starting any project work. All stipulations of approval must be completed prior to issuance of a building permit unless otherwise indicated above.

This approval shall expire one year after the date of approval by the Planning Board unless a building permit is issued prior to that date. The Planning Board may grant a one-year extension of a conditional use permit if the applicant submits a written request to the Planning Board prior to the expiration date.

The minutes and audio recording of this meeting are available by contacting the Planning Department.

Very truly yours,


Dexter R. Legg, Chairman of the Planning Board
cc: Robert Marsilia, Chief Building Inspector
Rosann Maurice-Lentz, City Assessor
Erik Saari, PE, Altus Engineering

# CITY OF PORTSMOUTH LEGAL DEPARTMENT MEMORANDUM 

DATE: OCTOBER 1,2021
TO: PETER BRITZ, INTERIM PLANNING DIRECTOR
$\begin{array}{ll}\text { FROM: } & \text { SUZANNE M. WOODLAND, ACTING DEPUTY CITY MANAGER } \\ & \text { ROBERT P. SULLIVAN, CITY ATTORNEY }\end{array}$
RE: BORTHWICK FOREST EASEMENTS


At its meeting of September 20, 2021, the City Council had for consideration and action four easements relative to the Approved Site Plan for Borthwick Forest. As you may recall, these easements will secure municipal rights to both new and existing public water lines as well as to public bicycle and pedestrian path infrastructure.

The City Council is requesting the Planning Board provide an updated recommendation relative to the four easements. Due to the substantial time that has passed from the date of initial site plan approval to the requested action of the City Council to accept easements, the Legal Department recommends that this referral for recommendation be noticed as a public hearing. As you know, the Legal Department is working with the Planning Department to avoid similar lags in time between approval and finalization of easements so this can be avoided in future.

For the Planning Board's convenience, the history of approvals is as follows:
Original Site Plan Approval : May 18, 2017
Administrative Approvals granted: September 7, 2017; November 9, 2017; February 20, 2018; and March14, 2019

Planning Board Approval of an Amended Site Plan for the conversion of a ground level parking garage to office and associate parking with stormwater improvements: June 20, 2019.

Attached for convenience are the previously approved plan pages showing the easements to be conveyed to the City as well as documentation of prior approvals for convenience.



D-42049 shect 4 of 6


D-42049 sheet bofb

## CITY OF PORTSMOUTH

## PLANNING DEPARTMENT

May 22, 2017

Borthwick Forest, LLC
210 Commerce Way, Suite 300
Portsmouth, NH 03801
RE: Site Plan Review for Property Located off Borthwick Avenue and WBBX Road
Dear Sir/Madam:
The Planning Board, at its regularly scheduled meeting of May 18, 2017, considered your Site Plan Review application requesting Site Plan Approval to construct a 50,000 s.f. office building with related paving, lighting, utilities, landscaping, drainage and associated site improvements. As a result of said consideration, the Board voted as follows:
A. Voted to determine that the application for Site Plan approval is complete according to the Site Plan Regulations and to accept it for consideration.
B. Voted to grant Site Plan Approval with the following stipulations:

Conditions Precedent (to be completed prior to the issuance of a building permit):

1. To address the recommended traffic mitigation measures at the intersection of Route $33 /$ Borthwick Avenue and pedestrian safety improvements at Greenland, Sherburne and Borthwick Avenue, the applicant shall provide a meaningful cost-sharing contribution, to be determined in consultation with the DPW and Planning Department, to advance the design development process for long-term intersection improvements, or for DPW's use to investigate the feasibility of realigning Borthwick Avenue as it approaches Route 33.
2. The Site Plans (C 102.1 and C 102.2), General Notes Sheets (G-101.1 and G-101.2), and Landscape Plans (C-105.1 and C-105.2) shall be recorded at the Registry of Deeds by the City or as determined appropriate by the Planning Department and shall include the following notes:

## Page two.

RE: Off Borthwick Avenue \& WBBX Road
Site Plan Review
May 22, 2017
" 1 . The Site Plan shall be recorded in the Rockingham County Registry of Deeds.
2. All improvements shown on the Site Plan shall be constructed and maintained in accordance with the Plan by the property owner and all future property owners. No changes shall be made to this Site Plan without the express approval of the Portsmouth Planning Director.
3. The property owner and all future property owners shall be responsible for the maintenance, repair and replacement of all required screening and landscape materials.
4. All required plant materials shall be tended and maintained in a healthy growing condition, replaced when necessary, and kept free of refuse and debris. All required fences and walls shall be maintained in good repair.
5. The property owner shall be responsible to remove and replace dead or diseased plant materials immediately with the same type, size and quantity of plant materials as originally installed, unless alternative plantings are requested, justified and approved by the Planning Board or Planning Director."
3. The applicant shall review the proposed best management practices of the mulch in Jandscaped areas with the Fire Department to confirm that potential fire hazards have been adequately addressed.

## Conditions Subsequent (to be completed prior to the final release of site plan security):

1. The property owner shall prepare a monitoring report for the intersection of Borthwick Avenue with Greenland Road and Sherburne Road within one year of the occupation of the proposed office building.

The Site Plan Review process is not complete until a Site Review Agreement has been fully executed and a Site Review bond (i.e. Irrevocable Letter of Credit, Surety Bond or cash) has been approved by the City.

The building/construction plans must be reviewed and approved by the Inspection Department prior to a Building Permit being issued.

As a reminder, digital as-built plans are required in a CAD or ESRI file format prior to the release of your Site Review Bond. Please refer to the Site Plan Review Regulations for special requirements.

Page three.
RE: Off Borthwick Avenue \& WBBX Road
Site Plan Review
May 22, 2017

The minutes and audio recording of this meeting are available through the Planning Department.
Very truly yours,


Juliet T.H. Walker, Planning Director for Dexter Legg, Chairman of the Planning Board JTHW:jms
cc: Robert Marsilia, Building Inspector
Rosann Maurice-Lentz, City Assessor
Patrick Crimmins, P. E., Tighe \& Bond
Robert D. Ciandella, Esq.

September 7, 2017
Borthwick Forest, LLC
210 Commerce Way Suite 300
Portsmouth, NH 03801

## RE: Administrative Approval for Site Plan Property located off Borthwick Ave and WBBX Road

## Dear Owners:

I hereby grant administrative approval for the following:

- To modify condition precedent \#1 of the Site Plan approval granted May 18, 2017, to take place no more than 6 months after issuance of a building permit.
- To modify the condition of approval \#3 of the Conditional Use Permit granted on May 18, 2017, to allow the restrictive covenant be approved by the city no more than 6 months after issuance of a building permit.

The above amendments are documented in the following document received by the Planning Department on August 28, 2017:

- Letter from Robert Ciandella, dated August 25, 2017.

This approval is granted subject to all stipulations as approved by the Planning Board on May 18, 2017.
Please contact me if you have any questions regarding this.
Sincerely,


Juliet T.H. Walker, AICP Planning Director

cc: Robert Ciandella, DTC Lawyers<br>Robert Marsilia, Chief Building Inspector<br>Peter H. Rice, Public Works Director

November 9, 2017
Borthwick Forest, LLC
210 Commerce Way Suite 300
Portsmouth, NH 03801

## RE: Administrative Approval for Site Plan Property located off Borthwick Ave and WBBX Road

Dear Owners:
I hereby grant administrative approval for the following:

- To modify stipulation \#8 to allow the property monuments to be set after the completion of the proposed road as they will be disturbed during construction. The installation of the monuments will be included in the site work bond as security that they get installed.
- To modify condition precedent \#2 to allow Borthwick to file the mylars of the most current site plans for the building with the caveat that the City will not record the same and will await the filing of finalized plans after Borthwick obtains its amended site plan approval.
The above amendments are documented in the following document received by the Planning Department on November 7, 2017:
- Letter from Robert Ciandella, dated November 7, 2017.

This approval is granted subject to all stipulations as approved by the Planning Board on May 18, 2017 and prior Administrative Approval dated September 7, 2017.

Please contact me if you have any questions regarding this.
Sincerely,


Juliet T.H. Walker, AICP
Planning Director
cc: Robert Ciandella, DTC Lawyers
Robert Marsilia, Chief Building Inspector
Peter H. Rice, Public Works Director

## CITY OF PORTSMOUTH

## PLANNING DEPARTMENT

February 20, 2018
Borthwick Forest, LLC
210 Commerce Way, Suite 300
Portsmouth, NH 03801

## RE: Amended Site Plan Application for Property Located off Proposed Subdivision Road to be Created off Borthwick Avenue

Dear Sir/Madam:
The Planning Board, at its regularly scheduled meeting of February 15, 2018, considered your Amended Site Plan Application to increase the height of the proposed office building (footprint of $16,700 \pm$ s.f.) from 3 stories to 4 stories (gross floor area of $66,800 \pm$ s.f.), with related paving, lighting, utilities, landscaping, drainage, multi-use path and associated site improvements. As a result of said consideration, the Board voted to grant Site Plan approval, with the following stipulations:

1. The Amended Site Plan (Sheet C102) shall be recorded at the Registry of Deeds by the City or as deemed appropriate by the Planning Department.
2. All conditions of original Planning Board approval as amended to remain in effect, with the exception of required recording of the Landscape Plans.
3. Off-site traffic mitigation for Borthwick Avenue/Greenland Road intersection shall include consideration of improvements to bicycle and/or pedestrian connections.

Three complete sets of revised Site Plans must be provided to the Planning Department, along with a pdf version.

The Site Plan Review process is not complete until a Site Review Agreement has been fully executed and a Site Review bond (i.e. Irrevocable Letter of Credit, Surety Bond or cash) has been approved by the City.

As a reminder, digital as-built plans are required in a CAD or ESRI file format prior to the release of your Site Review Bond. Please refer to the Site Plan Review Regulations for special requirements.

The City's Land Use Compliance Agent, Vincent Hayes, will be inspecting the work during construction.

## Page two.

RE: Borthwick Avenue
February 20, 2018

The minutes and audio recording of this meeting are available through the Planning Department.
Very truly yours,


Juliet T.H. Walker, Planning Director
for Dexter Legg, Chairman of the Planning Board JTHW:jms
cc: Robert Marsilia, Building Inspector
Rosann Maurice-Lentz, City Assessor
Patrick Crimmins, P. E., Tighe \& Bond
Robert Ciandella, Esq.

March 14, 2019
Borthwick Forest, LLC
210 Commerce Way Suite 300
Portsmouth, NH 03801

## RE: Administrative Approval for Site Plan Property located off Borthwick Ave and WBBX Road

Dear Owners:
I hereby grant administrative approval for the following:

- To replace Conditions \#2, \#3 and \#4 of the Planning Board Letter of Decision with the following: "The Planning Board approval of a public road is amended to require that the road be private, rather than public. The private road will be built in accordance with the City's road regulations and specifications and will be subject to review and approval by the third party oversight engineer hired by the City pursuant to condition \#6. Any easements required for maintenance, repair or operation of subterranean utilities and the easement for the 10 foot wide multi-use path shall be subject to final review and approval by the City. The applicant shall coordinate with DPW on such utility locations. The applicant shall be responsible for drainage maintenance and management and the applicant will coordinate with PanAm to refine the roadway design including geotechnical design, cross sections and drainage features."
- Raise the ground floor elevation by 2 feet to increase the basement level floor height and add additional parking spaces to meet the minimum parking requirements.

The above amendments are documented in the following document received by the Planning Department on February 7, 2019 and March 4, 2019:

- Letter from Robert Ciandella, dated February 5, 2019.
- Site Plan Set titled "Proposed Subdivision Road \& Office Building Development", prepared by Tighe \& Bond, Inc., dated March 20, 2017 and last revised March 4, 2019.
- Site Plan Amendments Exhibit prepared by Tighe \& Bond, Inc., dated March 4, 2019.
- Letter from Patrick Crimmins, P.E., dated March 4, 2019.

This approval is granted subject to all other stipulations of Planning Board approval on May 18, 2017 and all other prior Administrative Approvals dated September 7, 2017, November 9, 2017 and May 10, 2018.

Please contact me if you have any questions.

Sincerely,

Juliet T.H. Walker, AICP
Planning Director
cc: Robert Ciandella, DTC Lawyers
Patrick Crimmins, P.E., Tighe \& Bond
Robert Marsilia, Chief Building Inspector
Peter H. Rice, Public Works Director

Planning Department
1 Junkins Avenue
Portsmouth, New
Hampshire 03801
(603) 610-7216

## PLANNING BOARD

June 24, 2019

Borthwick Forest, LLC
210 Commerce Way, Suite 300
Portsmouth, NH 03801
RE: Amended Site Plan Application for properties located on Borthwick Avenue and Islington Street

Dear Applicant:
The Planning Board, at its regularly scheduled meeting of Thursday, June 20, 2019, considered your application for Amended Site Plan Review approval for the conversion of a ground level parking garage to office space and associated parking lot expansion and stormwater management improvements. Said property is shown on Assessor Map 241 Lots 25 \& 26 and lies within the Office Research District. As a result of said consideration, the Board voted to grant Amended Site Plan Review Approval with the following stipulations:

1) Prior to construction of the reserve parking area in the future, the plans shall be submitted to the Conservation Commission for review.
2) The required note referencing the stormwater maintenance plan and annual inspection and maintenance schedule shall be included on the recordable plan sheet.
3) The Stormwater Maintenance Plan shall be updated to revise Section 1.3 .3 to note that any updates to the plan (and deed) will require further review and approval as required by the Site Plan Review Regulations.
4) The site plan shall be reviewed for pre-approval by the Rockingham County Registry of Deeds and subsequently recorded, as deemed appropriate by the Planning Department.

The Board's decision may be appealed up to thirty (30) days after the vote. Any action taken by the applicant pursuant to the Board's decision during this appeal period shall be at the applicant's risk. Please contact the Planning Department for more details about the appeals process.

This site plan approval shall not be effective until a site plan agreement has been signed satisfying the requirements of Section 2.12 of the City's Site Review Approval Regulations.

Unless otherwise indicated above, applicant is responsible for applying for and securing a building permit from the Inspection Department prior to starting any project work.

The Planning Director must certify that all stipulations of approval have been completed prior to issuance of a building permit unless otherwise indicated above.

This site plan approval shall expire unless a building permit is issued within a period of one (1) year from the date granted by the Planning Board unless an extension is granted by the Planning Board in accordance with Section 2.14 of the Site Review Regulations.

The minutes and audio recording of this meeting are available by contacting the Planning Department.

Very truly yours,


Juliet T. H. Walker, AICP, Planning Director for Dexter Legg, Chairman of the Planning Board
cc:
Patrick Crimmins, PE, Tighe \& Bond
Rosann Maurice-Lentz, City Assessor
Robert Marsilia, Building Inspector
Peter Rice, Director of Public Works

AMBIT ENGINEERING, INC. civil enginerrs and land surveyors
200 Griffin Road, Unit 3, Portsmouth, NH 03801
Phone (603) 430-9282 Fax 436-2315
7 October 2021
Dexter Legg, Planning Board Chair
City of Portsmouth
1 Junkins Avenue
Portsmouth, NH 03801

## RE: Request for Design Review at 181 Hill Street, Proposed Housing Development

Dear Mr. Legg and Planning Board Members:
On behalf of Hill Hanover Group, LLC we are pleased to submit the attached plan set for Design Review for the above-mentioned project and request that we be placed on the agenda for your October 21, 2021 Planning Board Meeting. The project includes the demolition of three existing buildings and construction of a 3 story residential building containing 12 units with the associated and required site improvements. The Site Plans show the proposed future construction on the Deer Street Associates Lot 6 , for reference. Parking is provided on the Lot 6 property under a deeded right; this project plans to provide some parking in a basement level accessed from Autumn Street.
Site Specifics of Development:
Green Building: the new construction will comply with Green Building Requirements Stormwater Runoff: the design will not increase impervious surface areas from existing. The design will comply with the required stormwater treatment practices shall be adequately sized to treat the Water Quality Volume (WQV) or Water Quality Flow (WQF) in order to minimize pollutant discharges. Design will include in line roof leader treatment.
Utility Services: The project is surrounded by streets with public utilities.
Flood Hazard / Resource: the project is not in a flood hazard zone or in any resource buffer area.
Lighting: will be building mounted; subject to future design.
Solid Waste Management: will be handled internal to the building.

The following plans are included in our submission:

- Cover Sheet - This shows the Development Team, Legend, Site Location, and Site Zoning.
- Existing Conditions Plan C1 - This plan shows the existing site conditions in detail.
- Demolition Plan C2 - This plan shows the existing building which will be removed.
- Site Plan C3 - This plan shows the site development in detail with the associated Zoning Development Standards calculations.
- Utility Plan C5 - This plan shows the site utilities in detail.
- Erosion Control Notes and Details D1 - This plan shows sequence of construction and details.
- Detail Sheets D 2 - D 3 - These plans show associated details for construction.
- Exterior Elevation Plans - This plan shows the proposed building exterior elevations.

We look forward to the Planning Board's review of this submission and feedback on the proposed design.

Sincerely,

John Chagnon
John R. Chagnon, PE

CC: JPK Properties, CJ Architects




| CO4-L1: CHARACTER DISTRICT 4-L1 |  |  |  |
| :---: | :---: | :---: | :---: |
| BULLING PLACEMENT (PRINCPPAL): |  |  |  |
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| MV. Repr rapo: |  | ${ }^{26.0}$ | ${ }^{18, r^{\circ}}$ |
| rourt Lot lime | ${ }^{600}$ | 788 | ${ }^{89 \%}$ |
| BUILOING TMPES: |  |  |  |


|  <br>  |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| BUILING FORM: |  |  |  |
|  | Reoured | Stime | moses |
| max Structue hegrif | 40 fet |  | ${ }^{4} 0^{\circ}$ |
|  | 36 wehtes | ${ }^{38}$ | ${ }_{18}{ }^{\circ}$ |
|  | 13 fet |  | T80 |
| MN. SECOND SToer Meghr | N/4 | - | ${ }_{\text {T80 }}$ |
| (wnooun | 20\% ${ }^{\text {OTO\% }}$ | - | тво |
|  |  |  |  |
| Lot OcCupation: |  |  |  |
|  | Regured | Exstre | Popos |
|  |  |  |  |
| Mux Eulume coverace: |  |  |  |
| mx bulumg foorpmis | 2,500 S.F. | 2.3 S2 S. . | 9,760 S.F. |
| MIN. Lot meat | 3,000 S.F. | 18,127 s.f. | 16,127 S. |
| MN: Lot AEAOMELIMS | 3,000 s.f. | - | ${ }_{1,344}$ s. |
| MN. | 258 | ${ }_{628}$ | 13.7\% |

AMBIT ENGINEERING, INC ivil Engineers \& Land Surveyors




) Parcel is




Max Mum structure coiveace:

5) LOT AREA: 16,127 S.F, 0.3702 ACRESS.



RESIDENTIAL BUILDING HILL-HANOVER GROUP, LLC 181 HILL STREET PORTSMOUTH, N.H.



EROSION CONTROL NOTES

## CONSTRUCTION SEOUENEE





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 Rover cowe sit
 cosiswer oulume.
cowner unus






## GENERL Construction Notes






 Nome










$A$


## VEGETATVE PRACTICE










## MAITENANCE AND PROTECTION





 Lest



 WINTER NOTES







FILTREXX®

| A | SILTSOXX |  |
| :--- | :--- | :--- |
| C5 | (AS NEEDED) |  |

FODS TRACKOUT CONTROL SYSTEM

## 


ker notes:



OTES
TTHE CONTRACTOR SHALL NotITY DIG SAFE AT
 RVNATE PROPERTT




3) ConTRACTOR SHALL NSTAL AND MANTAN EROSION
CONTROL MEASURES I ACCORDANCE WTH THE NNEW
 SEIMENT Control. DURING CONSTRUCTON. (NHDELS
DECEMER 2008).





 . RAmo
 "SILT LOG" BARRIER $\frac{\text { AT CATCH BASIN INLET }}{\text { (AS NEEDED) }}$

## RESIDENTIAL BUILDING HILL-HANOVER GROUP, LLC 181 HILL STREET PORTSMOUTH, N.H. <br> 

B FODS (USE AS REQUIRED) NTS


| SCALE: AS SHOWN SEPTEMBER 2020 |  |
| :--- | :---: |
| EROSION PROTECTION <br> NOTES AND DETAILS | $\mathbf{D 1}$ |
| FB 265 PG 13 |  |




AUTHORIZATION
181 Hill Street, Portsmouth, New Hampshire
I, Jeff Sabin of JPK Properties, LLC - Owners Manager for Hill Hanover Group, LLC, (Owner), hereby authorize representatives of Ambit Engineering, Inc. and CJ Architects to represent our interests before land use boards of the City of Portsmouth and any other State and / or federal agency necessary to obtain permits from for the above referenced property, and to submit any and all applications and materials related thereto on our behalf.
puate $807 / 21$



[^0]:    

[^1]:    ${ }^{1}$ See City of Portsmouth, NH Subdivision Rules and Regulations for details.
    Subdivision Application Checklist/January 2018

[^2]:    Notary Public
    My commission expires:

[^3]:    ${ }^{1}$ Institute of Transportation Engineers, Trip Generation, $10^{\text {th }}$ Edition (Washington, D.C., 2017) 2047A

[^4]:    ${ }^{2}$ Transportation Research Board, Highway Capacity Manual (Washington, D.C., 2010).

[^5]:    Attachment
    cc: Michael Green, Jenna Green - Green and Company

[^6]:    ${ }^{1}$ HydroCAD version 10.00, HydroCAD Software Solutions LLC, Chocorua, NH, 2013.
    ${ }^{2}$ New Hampshire Stormwater Manual: Volume One - Stormwater and Antidegradation, December 2008; Volume Two - Post-Construction Best Management Practices Selection and Design, December 2008; Volume Three Erosion and Sediment Controls During Construction, December 2008.

[^7]:    ${ }^{3}$ New Hampshire Stormwater Manual: Volume One - Stormwater and Antidegradation, December 2008; Volume Two - Post-Construction Best Management Practices Selection and Design, December 2008; Volume Three Erosion and Sediment Controls During Construction, December 2008.

[^8]:    ${ }^{4}$ New Hampshire Stormwater Manual: Volume One - Stormwater and Antidegradation, December 2008; Volume Two - Post-Construction Best Management Practices Selection and Design, December 2008; Volume Three - Erosion and Sediment Controls During Construction, December 2008.

[^9]:    25.2 1,189 Total

[^10]:    Prepared For:
    TFMoran
    170 Commerce Way - Suite 102
    Portsmouth
    NH 03801
    Tel: (603) 431-2222
    Fax:
    Prepared By: Jack McTigue
    August 25, 2021

[^11]:    Northeest Pegion
    Climate Center

[^12]:    ${ }^{1}$ www.websoilsurvev.sc.egov.usda.gov/App/HomePage.htm
    ${ }^{2}$ https://granitview.unh.edu/

[^13]:    ${ }^{3}$ www.sssnne.org/publications.htm!

[^14]:    UNH Cooperative Extension programs and policies are consistent with pertinent Federal and State laws and regulations, and prohibits discrimination in its programs, activities and employment on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sex, sexual orientation, or veteran's, marital or family status. College of Life Sciences and Agriculture, County Governments, NH Dept. of Resources and Economic Development, Division of Forests and Lands, NH Fish and Game , and U.S. Dept. of Agriculture cooperating.

[^15]:    ${ }^{1}$ Institute of Transportation Engineers, Trip Generation, $10^{\text {th }}$ Edition (Washington, D.C., 2017)

[^16]:    ${ }^{1}$ See City of Portsmouth，NH Subdivision Rules and Regulations for details． Subdivision Application Checklist／September 2020

