Final Coastal Site Plan and Special Permit Coastal, PLPZ 2020 00184

Shirley and Hoacai Wen

To demolish an existing single family residence and to construct a new residence with indoor pool, to have an approximate volume of 193,498 cubic feet.

LOCATION: 2 Vista Drive
EXISTING ZONE: R-20 (20,000 sq.ft. minimum lot size) and COZ
FLOOD ZONE: VE-15, AE-14, X
PARCEL SIZE: 1.89-acres (82,328.4 sq.ft.) to mean high water and less excluded right-of-way
UTILITIES: Town Water and Septic

<table>
<thead>
<tr>
<th>EXISTING</th>
<th>ALLOWABLE</th>
<th>PROPOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROSS SQUARE FEET: +/- 5,500 sq.ft.</td>
<td>18,523.9 sq.ft.</td>
<td>11,343.8 sq.ft.</td>
</tr>
<tr>
<td>FLOOR AREA RATIO: 0.067</td>
<td>0.225</td>
<td>0.138</td>
</tr>
<tr>
<td>VOLUME: Not provided by the applicant</td>
<td>Over 150,000 cu.ft. needs a Special Permit</td>
<td>193,498 cu.ft.</td>
</tr>
<tr>
<td>GREEN AREA: 86.9% (10,804 sq.ft. total coverage)</td>
<td>62% (31,311 sq.ft total coverage)</td>
<td>80.1% (16,375 sq.ft. total coverage)</td>
</tr>
<tr>
<td>BUILDING HEIGHT: Not provided by the applicant</td>
<td>37' - 0 1/2&quot;</td>
<td>36' - 7 15/16&quot;</td>
</tr>
</tbody>
</table>

DWELLING SETBACKS (Min. Req./Prop.):
- Front Yard Setback: 128.51’ 40’ 109.26’
- Side Yard Setback: 47.4’ and 55.48’ (sum = 102.88’) 15’ sum of both not less than 35’ 26.59’ and >20’ (sum = >46.59’)
- Rear Yard Setback: >40’ 40’ >40’

APPLICATION SUMMARY:
Final Coastal Site Plan and Special Permit applications are submitted by the applicant to demolish an existing single-family residence, inground swimming pool and relates site improvements, and to then construct a new single-family residence, indoor pool and related site improvements. The proposed project is projected to have a volume of approximately 193,498 cubic feet, exceeding the 150,000 sq.ft. building volume threshold of Section 6-101(a) of the Town of Greenwich Building Zone Regulations (BZR), requiring a Special Permit. This proposed project is planned on the 1.89-acres property (to mean high water and less excluded right-of-way) located at 2 Vista Drive in the R-20 and COZ zones.

ISSUES/RECOMMENDATIONS:
2. The Zoning Enforcement Officer (ZEO) issued comments on 9/29/2020 and notes that the floor area of the stairs also needs to be counted on the attic level.
3. Revised FAR Plans. The applicant submitted revised FAR plans late 10/1/2020 to address the ZEO’s concerns. Revised comments are not yet available.
4. DPW Engineering Division issued comments on 9/29/2020 and requests the applicant resubmit prior to Zoning/Building Permit Approval.
5. Conservation issued comments on 7/28/2020 and lists their recommendations for the project in their memorandum. In general, Conservation is happy that the project designers were thoughtful
to the natural resources, lawn reduction, and creation of the right balance between the environment and human needs.

6. **DEEP** issued comments on 7/29/2020 and note no comments for the Commission’s consideration.

7. **Health Department** issued comments on 7/30/2020 noting that they approved a 5-bedroom septic system for the property but had concerns the plans showed 6 potential bedrooms. With revised architecture, on 8/4/2020 the department noted their approval of a 5-bedroom design.

8. **Side Yard Setback.** Applicant to confirm the distance of the dwelling from the northern property line to confirm it meets Section 6-205 of the BZR.

9. **Landscaping Plan.** A landscaping plan was provided by the applicant and shows twenty-eight (28) new, predominantly native, proposed trees. On a whole, the design calls for a sensitive restoration of the natural resources, lawn reduction, and creation of balance between the environment and human needs.

**PROPOSAL:**

The applicant is requesting Final Coastal Site Plan and Special Permit approval to demolish an existing single-family residence, inground swimming pool and relates site improvements. The existing dwelling is approximately 5,500 sq.ft. in size and was built in 1969.

The applicant is proposing to construct a new single-family residence, indoor pool and related site improvements. The dwelling will be located entirely in Flood Zone X.

The proposed design includes a new code compliant septic system designed for a 5-bedroom dwelling, with reserve area.

A steam and associated inland wetlands are on the property. The applicant was approved for an Inland Wetlands and Watercourse Agency permit, Permit #2020-047, on 4/27/2020.

This proposed project is planned on the 1.89-acres property (to mean high water and less excluded right-of-way) located at 2 Vista Drive in the R-20 and COZ zones.

A special permit is required for the following reason:

1) Per Section 6-101(a) of the BZR, the total volume of buildings on the property is more than 150,000 cubic feet.

**DEPARTMENT COMMENTS:**

- **IWWA** - see attached Permit #2020-047
- **ZEO** - see attached memo of 9/29/2020
- **Conservation** - see attached memo of 7/28/2020
- **DPW Engineering Division** - see attached memo of 9/29/2020
- **DEEP** - see attached memo of 7/29/2020
- **Health Dept.** - see attached memos from 7/30/2020 and 8/4/2020

**COASTAL RESOURCES AND STRUCTURES:** The site is a direct waterfront property on Long Island Sound and is within the Coastal Overlay Zone (COZ). This specific area of Long Island Sound is known as Smith Cove. The property is subject to all the provisions of Section 6-111 of the BZR. The site is within Flood Zones VE-15, AE-14 and X. An existing dock extends into the cove.

**DRAINAGE:** Proposed site improvements will increase impervious coverage from approximately 14,174 sq.ft. to 17,233 sq.ft. (+3,059 sq.ft.). With this increase of impervious coverage, measures are proposed during and after construction to manage stormwater runoff.

The site development plan incorporates Low-Impact Development (LID) and Best Management Practices (BMP’s) components that are both structural and non-structural. Site disturbance was noted to be limited
to the maximum extent possible by the engineer. The driveway and garage parking area will be constructed of porous asphalt. Rain gardens will collect and treat roof run-off. Enhanced wetlands, watercourses and buffer areas are also within the scope of this proposal.

**ZONING ENFORCEMENT:** The applicant needs to include the floor area of the stairs on the attic level in their FAR calculations to the satisfaction of the ZEO. The applicant submitted revised FAR drawings late 10/1/2020, and revised comments are not available at this time.

The proposed project is compliant with the site’s green area and setbacks per Section 6-205 of the BZR.

**CONSERVATION:** The proposed dwelling and site development will be located over the same area of the old house and driveway. Because of this, the impervious surface will be mitigated with the proposed in-ground infiltration systems and rain gardens.

Site grading that is proposed is limited to the rear of the residence and is needed to accommodate the new septic and drainage systems.

Eight trees will be lost to this project, and four of them are mature. The loss will be compensated by twenty-eight (28) new, predominantly native, trees.

On a whole, Conservation is happy that the project designers were thoughtful to the natural resources, lawn reduction, and creation of the right balance between the environment and human needs.

**APPLICABLE ZONING REGULATIONS:**

- Section 6-5 – Definitions
- Section 6-13 – Site Plan Approval Required by Planning and Zoning Commission
- Section 6-14 – [Site Plan] Procedure
- Section 6-15 – [Site Plan] Standards
- Section 6-16 – Site Plan Changes
- Section 6-17 – Special Permit Standards and Procedures
- Section 6-101(a) – Special Permit for Residential Zones
- Section 6-111 – Coastal Overlay Zone
- Section 6-139.1 – Flood Hazard Overlay Zone
- Section 6-144 – Accessory Buildings in Residential and Commercial Zones
- Section 6-158 – Customer or Patron Parking; Required Spaces
- Section 6-205 – Schedule of Required Open Spaces, Limiting Heights and Bulk of Bdgs.
MEMORANDUM

TO: Jacalyn Pruitt, Planner II

FROM: Aleksandra Moch, Environmental Analyst

DATE: July 28, 2020

RE: Shirley and Michael Wen, 2 Vista Drive, PLPZ 202000184

I have reviewed the above-referenced plans and visited the site. The following comments are offered for your consideration.

1. The proposed site development was reviewed and approved by the IWWA on April 27, 2020. During the review the Agency had considered all the potential impacts to the inland wetlands and watercourses and accepted the proposed mitigation measures. Since theses regulated areas have been covered, the comments below will focus on the impacts on the coastal and upland areas located outside of the IWWA jurisdiction.

2. The proposed site development consisting of a new residence and a driveway, will be located over the same area of the old house and the driveway. The increase of impervious surface will be mitigated with the proposed in-ground infiltration systems and rain gardens. Site grading will be limited to the rear of the residence and needed to accommodate the new septic and drainage systems.

3. Eight trees will be lost during the construction activates. Four of them are mature. The loss will be more than compensated by twenty-eight new, predominantly native, trees. The new trees will be accompanied by a variety of high quantity shrubs and herbaceous ground cover. The new plantings will provide a net benefit for the natural environment. Dominated by native species, the new landscaping will not only restore the inland wetlands and watercourses, but also enhance and restore the coastal buffer. The new rain gardens will be incorporated into the massive green space created to follow the property lines, offering a closed loop for movement and shelter to wildlife. Kudos to project designers for a sensitive restoration of the natural resources, lawn reduction, and creation of the right balance between the environmental and human needs.

cc: Conservation Commission
Ok for Zoning Permit Sign-off with the following revisions:

The floor area of the stairs need to be counted on the attic level also.

☐ Resubmit the following prior to Site Plan/ Subdivision approval:

☐ The subject site plan/subdivision meets the requirements of the Building Zone Regulations, excluding sections 6-15 and 6-17, and is Ok for Zoning Permit Sign-off.
Dygert, Bianca

From: Gaucher, John <John.Gaucher@ct.gov>
Sent: Wednesday, July 29, 2020 1:30 PM
To: Dygert, Bianca
Cc: ericaicp@verizon.net

Importance: Low

[EXTERNAL]

Bianca,

We have reviewed the above-referenced proposal for consistency with Connecticut Coastal Management Act (CCMA) [CGS Sections 22a-90 through 22a-112, inclusive] policies and have no comments for the Planning and Zoning Commission’s consideration. Please let me know if you have any questions or if you need any additional information.

John Gaucher
Environmental Analyst III
Land & Water Resources Division
Bureau of Water Protection and Land Reuse
79 Elm Street
Hartford, CT 06106

Phone 860.424.3660
fax 860.424.4054

From: Dygert, Bianca <bianca.dygert@greenwichct.org>
Sent: Tuesday, July 28, 2020 5:42 PM
To: Gaucher, John <John.Gaucher@ct.gov>
Subject: ROUTING - 2 Vista Drive - PLPZ 2020 00184 - Revised Eng.

Hello John,

Please see attached routing sheet and revisions for 2 Vista Drive at the link below.

2020-07-28 Revised Eng Plans

Thank you,
Bianca Dygert

Planner II

Town of Greenwich
Land Use - Planning & Zoning
101 Field Point Road
Greenwich, CT 06830-6463
Ph. (203) 622-7894
Office Fax. (203) 622-3795
Direct Fax. (203) 861-6113
Bianca.Dygert@greenwichct.org

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DEPARTMENT OF PUBLIC WORKS – ENGINEERING DIVISION
SITE DEVELOPMENT REVIEW

Engineering Project No. 20-5(20)  Department Project No. PLPZ202000184  Submittal Received Date: 9/21/2020

Submittal Reviewed For: Planning and Zoning  Traffic Review Requested: No  Review Type: Final Site Plan

PLANT SET INFORMATION

Plan Title: Shirley & Michael Wen  Project Address: 2 Vista Drive

Engineering Firm: S.E. Minor and Co., Inc.  Original Plan Date: 3/19/2020  Latest Plan Revision Date: 9/11/2020

DRAINAGE SUMMARY REPORT INFORMATION

Engineering Firm: S.E. Minor and Co., Inc.  Original Report Date: 3/19/2020  Latest Report Revision Date: 9/11/2020

Reviews provided by the Engineering Division are for compliance with the Town’s “Roadway Design Manual and Standard Construction Details” and “Drainage Manual” as amended. Reviews are based upon the information and plans provided. Comments pertaining to the Town’s manuals are not all encompassing. Other reviewing entities may provide additional comments regarding consistency with these manuals in accordance with their jurisdictions. Review of sanitary sewer and septic systems are not reviewed by the Engineering Division.

All New Submittals for Commission Meetings must be received by the Engineering Division four weeks before scheduled Commission Meeting.

All Revised Submittals for Commission Meetings must be received by the Engineering Division three weeks before scheduled Commission Meeting.

Reviewed and Approved by: Scott Marucci - Senior Civil Engineer  Date: 9/29/20

COMMENTS AND CONDITIONS OF APPROVAL: Resubmit Prior to Zoning/Building Permit Approval

1. A revised Form SC-100 needs to be submitted.
2. A revised Form SC-107 needs to be submitted.
3. The Drainage Summary Report is acceptable in concept. The following revisions and additional information need to be submitted:
   a. The existing conditions analysis needs to have the curve numbers revised to soil classification “B” to match the proposed conditions for the HydroCad analysis.
   b. Revise the summary table.
   c. The RRV computations need to be revised based on the correct soil classification for existing conditions.
   d. Review and revise all information and computations as needed.
4. The construction plan set needs to be revised as follows:
   a. Site Plan Sheets
      i. The upper driveway area must be directed to the porous pavement stormwater BMP (as required and shown in the Drainage Summary Report) and cannot discharge into the stream through a catch basin. The catch basin must discharge into the stone bed of the porous pavement system. The driveway grades may need to be revised to address this.
5. The draft Operations and Maintenance Plan Report needs to be revised as follows and submitted for review:
a. Exhibit A needs to have an item added for groundwater pumping.

**Standard Conditions of Approval**

1. The Operations and Maintenance Plan Report must include the following for the Certificate of Occupancy:
   b. The final completed Exhibit A, and B
   c. The Maintenance Declaration needs to be filed on the Town of Greenwich Land Records prior to a Certificate of Occupancy. A review of the documents above must be completed before filing on the Town of Greenwich Land Records.

2. The Town of Greenwich – Standard Construction Notes for Site and Subdivision Plans are conditions that must be met.

3. All requests for a Temporary Certificate of Occupancy (T.C.O.) or a Certificate of Occupancy (C.O.) shall be submitted one month before the T.C.O. or C.O. is required.

4. The submittal for a Temporary or Final Certificate of Occupancy must include the following:
   c. Field Inspection Record (All required photos) – Form SC-106 – Sealed and Signed by a Connecticut Licensed Professional Engineer.
   d. Bioretention Soil Testing Certification Sign-Off (as applicable with the bioretention soil gradation test and the phosphorous test for the mixed soil) – Form SC-104 – Sealed and Signed by a Connecticut Licensed Professional Engineer.
   h. A Letter discussing all the work that remains to be completed (Only for a Temporary Certificate of Occupancy Submittal).
RE: ROUTING - 2 Vista Drive - PLPZ 2020 00184

Long, Michael <Michael.Long@greenwichct.org>
Thu 7/30/2020 1:31 PM
To: Dygert, Bianca <bianca.dygert@greenwichct.org>
Cc: Donlin, Kristin <kristin.donlin@greenwichct.org>

This office has approved a 5 bedroom septic system for this property. The architectural plans indicate a potential bedroom (labelled Ping Pong Room in the drawings) that would be one bedroom in excess of what we have approved since there are 5 bedrooms proposed for the second floor. Either the septic system needs to be redesigned for 6 bedrooms or the plans need to be redesigned so there are only 5 bedrooms for this office to sign-off on the proposal.

Michael Long
Greenwich Health Department

From: Dygert, Bianca
Sent: Thursday, July 30, 2020 12:00 PM
To: Long, Michael <Michael.Long@greenwichct.org>
Subject: ROUTING - 2 Vista Drive - PLPZ 2020 00184

Hi Michael,

I did not realize this was on septic. Could you please provide comments for 2 Vista Drive? It is a proposed single family home on the water with a volume that exceeds the threshold of 150,000 cu. ft. and therefore requires a special permit application.

The link to the application materials is below.

[2 Vista Drive - PLPZ 2020 00184](#)

Thank you,

Bianca Dygert

Planner II

Town of Greenwich

Land Use – Planning & Zoning

101 Field Point Road

Greenwich, CT 06830-6463

Ph. (203) 622-7894

Office Fax. (203) 622-3795

Direct Fax. (203) 861-6113
RE: 2 Vista Drive - Wen: Revised sheets for Special Permit - ping pong room doorway

Donlin, Kristin <kristin.donlin@greenwichct.org>
Tue 8/4/2020 7:47 AM
To: Dygert, Bianca <bianca.dygert@greenwichct.org>; Long, Michael <Michael.Long@greenwichct.org>
The ping pong room now has a 5’ cased opening; therefore it will no be considered a bedroom.

Kristin

Kristin Donlin RS
Environmental Health Supervisor
Town of Greenwich
101 Field Point Road
Greenwich, CT 06830
203-622-3770
kdonlin@greenwichct.org

From: Dygert, Bianca
Sent: Monday, August 3, 2020 4:24 PM
To: Long, Michael <Michael.Long@greenwichct.org>; Donlin, Kristin <kristin.donlin@greenwichct.org>
Subject: 2 Vista Drive - Wen: Revised sheets for Special Permit - ping pong room doorway

Hello Michael and Kristin,

Could you please review the attached to see if this addressed the issue with the Ping Pong room for 2 Vista Drive as per previous comments?

Thank you,

Bianca Dygert
Planner II

Town of Greenwich
Land Use - Planning & Zoning
101 Field Point Road
Greenwich, CT 06830-6463
Ph. (203) 622-7894
Office Fax. (203) 622-3795
Direct Fax. (203) 861-6113
Bianca.Dygert@greenwichct.org

www.greenwichct.gov

From: Pruitt, Jacalyn
Sent: Friday, July 31, 2020 2:54 PM
To: Dygert, Bianca <bianca.dygert@greenwichct.org>
Subject: FW: Wen: Revised sheets for Special Permit - ping pong room doorway
Hi B -- Eric's team thinks they solved the Ping Pong Room issue noted by the Health Dept. Please forward the attached (also saved here: https://greenwichct-my.sharepoint.com:/f:/g/personal/katie_deluca_greenwichct_org/EtS-aryKQnFMvCV-aJaRFSMBVw4CKTVeKv6KUSiJKV4Hg?e=B5tEwf) to the Health Dept team. THANK YOU

Jacalyn Pruitt, Planner II
Town of Greenwich Planning & Zoning

From: ericaicp@verizon.net <ericaicp@verizon.net>
Sent: Friday, July 31, 2020 12:36 PM
To: Pruitt, Jacalyn <jacalyn.pruitt@greenwichct.org>
Subject: Fwd: Wen: Revised sheets for Special Permit - ping pong room doorway

[EXTERNAL]
hello jacalyn

please see 3 revised sheets that reflect the now proposed 5' wide cased opening for mike long to review

health has approved this design many times in the past so i am sure that it will be ok with him

best eric

-----Original Message-----
From: David Newcomb <dn@hiltonarchitects.com>
To: ericaicp@verizon.net <ericaicp@verizon.net>
Cc: Charles Hilton <ch@hiltonarchitects.com>
Sent: Fri, Jul 31, 2020 12:32 pm
Subject: Wen: Revised sheets for Special Permit

Revised sheets are attached.

David B. Newcomb, A.I.A.
Associate Partner
Charles Hilton Architects
ARCHITECTURE | INTERIORS | MASTER PLANNING
170 MASON STREET | GREENWICH, CONNECTICUT 06830
203 489 3800 | FAX 203 489 3801 | HILTONARCHITECTS.COM

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June 26, 2020

Ms. Katie DeLuca, AICP
Director – Town Planner
Planning and Zoning Commission
Greenwich, CT

RE: Special Permit – Coastal Area Management Site Plan Application – Wen Residence – 2 Vista Drive, Greenwich

Dear Katie,

Please find attached, in connection with the above referenced matter, the Application and all required supporting documents, exhibits and plans for a new single family residence on the subject property which fronts on Smith Cove.

The plans indicate the demolition of an existing single family residence of approximately 5,500 sq. ft. built in 1969 as well as an in ground swimming pool and related site improvements. A new residence, with an indoor pool, is proposed with a volume of approximately 193,498 cubic feet which requires a Special Permit. The new dwelling will be 11,343 sq. ft. in size with an FAR of .137 vs. the maximum 18,523 sq. ft. and .225 FAR limit. The proposed Green Area of 66,022 sq. ft. exceeds the required 51,086 sq. ft. of 62%.

The property contains a VE-15 Flood Zone along Smith Cove which then transitions to an AE-14 Zone and then to Zone X. The new dwelling will be located out of the Flood Zones and complies with all regulations. The new dwelling, driveway and patios will be generally on the existing developed footprint. An existing dock and float provides recreational access to the waters of Long Island Sound.

A new code compliant septic system, with reserve area, has been approved by the Health Department and will replace the existing system.

A small stream and associated inland wetlands cross the property. The Inland Wetlands and Watercourses Agency issued Permit # 2020-047 (copy attached) on April 27, 2020 for the proposed site developments and improvements.

The project complies with the Town Drainage Manual and includes BMP s for stormwater management including rain gardens, enhanced wetlands and watercourses and buffer areas. The adjacent coastal waters will benefit from the improved water quality.
The new owners of the property and the design team have been working with the Indian Harbor Association as well as the two adjacent property owners to develop an appropriate screening and landscaping plan which is included in the set of plans.

Please place this Application on the next available meeting of the Commission.

Sincerely,

Eric V.P. Brower, AICP
APPLICATION FOR REVIEW OF COASTAL SITE PLAN

Applicant's Name: Eric V.P. Brower, AICP
Date: 6-26-2020

Address: 81 Holly Hill Lane, Greenwich, CT 06830

Project Address or Locations: Wen Residence - 2 Vista Drive, Greenwich, CT 06830

The following information must be supplied by the applicant and submitted in addition to, and along with, any application, plans and data required for approval of the proposed project under the zoning and/or subdivision regulations of this municipality. Attach additional sheets if more space is required.

I. PLANS

A. Project Plan(s)
This application must be accompanied by a plan (or plans) of the entire project indicating 1) project location, 2) design of all existing and proposed buildings, structures, and uses, 3) all proposed site improvements or alterations, and 4) ownership and type of use on adjacent properties.

B. Coastal Resources
This application must be accompanied by a plan showing the location of all coastal resources (as defined in Section 22a-93(7) of the Connecticut Coastal Management Act) on and contiguous to the site.

II. WRITTEN INFORMATION

A. Description of the Proposed Project
Describe the entire project including types of buildings and structures, uses, methods and timing of construction, type and extend of development adjacent to the site. This information should supplement and/or clarify plans in I (A) above.

The subject and adjacent properties are located in a waterfront neighborhood which is fully developed and which over the years has been experiencing redevelopment of existing homes. The area is zoned R-20 permitting single family residences on a minimum lot size of 20,000 sf. The subject lot is oversized for the zone at 1.9 acres. The property is currently improved with a single family residence constructed in 1969, out door inground swimming pool, driveway, parking areas, terraces, patios, septic system and a dock and float on the waterfront along Smith Cove. A small stream, portions of which are piped, and associated inland wetlands cross the site.

The proposed plans indicate the demolition of the existing dwelling, pool and related site improvements. A new code compliant septic system will replace the existing system.

The new residence and related site improvements will be located generally on the existing developed footprint. An indoor swimming pool is proposed within the lower level of the new house.

Water quality of stormwater runoff will be improved with rain gardens, natural planted buffer areas and an enhanced wetland and watercourse prior to the runoff reaching the tidal waters of Smith Cove.

Construction duration estimated to be one year.
B. **Description of Coastal Resources**

Identify the coastal resources on and contiguous to the site (as shown on the coastal resources map) and describe their condition. This information should supplement and/or clarify the plan in I(3) above. The property is boarded on the west by Smith Cove which is a tidal inlet supporting tidal wetlands and mud flats. The western edge of the property is located in the VE-15 zone transitioning to an AE-14 and then X flood zone.

C. **Assessment of the Suitability of the Project for the Proposed Site and the Capability of the Resources to Accommodate the Proposed Use.**

1. Identify any and all coastal use policies (in Section 22a-92(10)(b)(1) of Connecticut Coastal Management Act) applicable to the proposed project.
   - Maintain water dependent uses and provide protection for development in Flood Hazarded zones.

2. Identify and all coastal resource policies (in Section 22a-92(10)(b)(2) of Connecticut Coastal Management Act) applicable to the proposed project.
   - Protection of coastal resources and not degrade water quality.

3. Describe how the proposed project is consistent with all of the coastal policies identified in C (1) and (2) above (i.e. describe the extent to which the project complies or conflicts with each policy). Note: If a project conflicts with any policy, the project should be modified to reduce or eliminate the conflict.
   - The existing use and neighborhood are developed as residences. The subject property contains a permitted dock and float providing opportunities for recreational use of Long Island Sound. All new construction will comply with the Flood Zone Regulations and the new dwelling will be entirely in the X zone.

D. **Evaluation of the Potential Beneficial and Adverse Impacts of the Project and Description of Proposed Methods to Mitigate Adverse Effects.**

1. Identify and describe the potential adverse impacts (as defined in Section 22a-93(15) of Connecticut Coastal Management Act and potential beneficial impacts of the project on coastal resources.
   - Adjacent coastal resources will benefit from improved stormwater runoff quality by way of enhanced wetlands and buffers as well as rain gardens. The new code compliant septic system will improve ground water quality that migrates toward the Sound.

**FOR WATERFRONT PROPERTY ONLY:**

2. Is the project a water dependent use as defined in Section 22a-93(16) of the Connecticut Coastal management Act? If so, explain why.
   - The proposed dwelling replaces an existing dwelling in a fully developed single family residential neighborhood. The existing dock and float provides access to coastal waters for recreational use.
FOR WATERFRONT PROPERTY ONLY:

(3) Describe the impacts or effects (either positive or negative) that the project will have on future water dependent uses or development on and adjacent to this site as defined in Section 22a-93(17).

The project will have no impact on existing or future water dependent uses.

(4) Describe the proposed measures to mitigate (reduce or eliminate) any adverse impacts on coastal resources described in D(1) and, if applicable, on future water dependent development opportunities described in D(3).

There will be no adverse impacts.

E. Demonstration of the Acceptability of Remaining or Unmitigated Adverse Impacts on Coastal Resources and Future Water Dependent Uses and Development.

(1) Describe any adverse impacts that remain after employing all reasonable mitigation measures.

None.

(2) Explain why these remaining adverse impacts were not mitigated.

N/A

(3) Explain why the commission reviewing this application should find these remaining adverse impacts to be acceptable.

N/A
SPECIAL PERMIT APPLICATION

Project Name: Wen residence
Project Address: 2 Vista Drive, Greenwich, CT 06830
Property Owner(s): Shirley and Hoaai Wen
Tax Account Numbers(s): 02-1329 Zone(s): R-20 Lot Area: 1.9 acres

PLEASE SELECT ALL RELEVANT ITEMS BELOW:

☒ Section 6-17 — Special Permit standards and procedure
☐ Section 6-30 — Conservation Zone special provisions
☐ Section 6-94(b) — Non-residential Uses and Group Living Facilities permitted in Residential Zones including Resident Medical Professional Office
☐ Section 6-98 — RMF Zone
☐ Section 6-100 — Use Groups for Business Zones
☒ Section 6-101, 107 — Buildings over 40,000 c.f. in Central Greenwich Impact Overlay Zone, Post Road Impact Overlay Zone, WB, LB or LBR Zones; and over 150,000 c.f. in all other zones
☐ Section 6-103.1 — Parking deficient uses in CGBR
☐ Section 6-104 — Parking Structures incl. underground in LB Zone and Height exceptions
☐ Section 6-105, 106 — Front Yard Parking in GB or GBO Zone
☐ Section 6-109, 109.1 — HO & HRO Zones
☐ Section 6-110 — Dwellings under special requirements for Business Zones
☐ Section 6-112 — IND-RE Zone applications
☐ Section 6-113 — In Hospital Zones: certain accessory uses, expansions exceeding 4,000 s.f. or interior alterations or changes of use exceeding 20,000 s.f. (cumulative within 2 years)
☐ Section 6-114 — CCRC (Continuing Care Retirement Community)
☐ Section 6-118.1 — Uses within railroad rights of way
☐ Section 6-123 — Setbacks from Connecticut Turnpike in Business Zones
☐ Section 6-140.1 — Satellite Earth Stations that emit microwaves
☐ Section 6-141 — Changes in non-conforming uses, buildings
☐ Section 6-205 — Historic structures in CBG Zone exceeding FAR And Notes 7, 8 & 9

To be completed by P&Z staff only:
Check # __________________ Check Amount: $ __________
Application # ____________________________

PZ Special Permit App 2018
SITE PLAN APPLICATION

□ PRELIMINARY
□ FINAL

Project Name: Wen residence
Project Address: 2 Vista Drive, Greenwich, CT 06830
Property Owner(s): Shirley and Haocai Wen
Tax Account Number(s): 02-1329 Zone(s): R-20 Lot Area: 1.9 acres

Please select all relevant items below:
■ Special Permit – Complete special permit application form
■ Coastal Overlay Zone
□ Property is within 500 feet of a Municipal Boundary of __________________________ (for notification)
□ Amendment to Building Zone Regulations – Section(s)____________________________
□ Amendment to Building Zone Map – Zone(s) affected _____________________________
■ Health Department review needed
□ Sewer Department review needed
□ Architectural Review Committee Application attached or Review needed
□ Planning & Zoning Board of Appeals review needed
■ Inland Wetlands and Watercourses Agency Review / Approval Required

AUTHORIZED AGENT

Name: Eric V.P. Brower, AICP
Firm name: Eric V.P. Brower, AICP, Inc.
Street Address: 81 Holly Hill Lane
City: Greenwich St: CT Zip: 06830
Phone: 203 536 1049
Email: ericaicp@verizon.net
Signature: __________________________ Date: June 26, 2020

PROPERTY OWNER(S) AUTHORIZATION

Name: Shirley and Haocai Wen
Street Address: 2 Vista Drive
City: Greenwich ST: CT Zip: 06830
Phone: c/o agent
Email:
Signature: __________________________ Date:

To be completed by P&Z staff only:
Check # __________________________ Check Amount: $_________
Application #: _________________________ PZ Site Plan App 2018
# SITE PLAN ZONING STATISTICS

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<tr>
<td>Parking Spaces</td>
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<td>51,086 sf 62% min</td>
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<td><strong>AGE OF STRUCTURE</strong></td>
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This Site Plan Involves:

- [ ] ADDITIONS  
- [ ] ALTERATIONS  
- [ ] DEMOLITION  
- [ ] RE-CONSTRUCTION

PZSitePlan App 2018
May 26, 2020

Mrs. Katie Deluca, AICP
Town Planner - Director
Planning and Zoning Commission
Town of Greenwich

RE: Special Permit - Coastal Site Plan Application: Wen Residence, 2 Vista Drive, Greenwich, CT

Dear Mrs. Deluca,

Please be advised that Eric V.P. Brower, AICP is authorized to make application on our behalf for the above referenced property.

Sincerely,

Shirley Xueyue Wen
Haocai Wen

Date: May 26, 2020
AFFIDAVIT OF NOTIFICATION OF APPLICATION TO PLANNING AND ZONING COMMISSION

STATE OF CONNECTICUT  )
                     ) GREENWICH
COUNTY OF FAIRFIELD  )

1, Eric V.P. Brower, being first duly sworn, do hereby certify that on June 26, 2020 I caused to be mailed; postage prepaid, to those persons whose names are set forth on Exhibit A attached hereto, a copy of the notice attached hereto as Exhibit B. Said persons were the record owners, as of June 26, 2020 as shown on the Town Tax Assessor’s records of property abutting (as said term is defined in Sec. 6-14(a)(3) of the Greenwich Building Zone Regulations) the property belonging to Shirley and Haocai Wen for which an application has been filed with the Planning and Zoning Commission.

[Signature]
Eric V.P. Brower

Subscribed and sworn to

Before me on June 26, 2020

[Signature]
Deborah A. Moretti
Notary Public

DEBORAH A. MORETTI
Notary Public, State of Connecticut
My Commission Expires December 31, 2024
EXHIBIT A

BOUNDING OWNERS - 2 VISTA DRIVE, GREENWICH, CT, WEN PROPERTY AS OF 6-26-2020

Christine and Joel Lutzker
14 Lakewood Circle South
Greenwich, CT 06830

Hereford Holding Inc.
35 Vista Drive
Greenwich, CT 06830

Faten Sabry and Hindy Hayman
19 Lakewood Circle South
Greenwich, CT 06830
June 26, 2020

To Whom It May Concern:

Notice is hereby given that Shirley and Haocai Wen have filed a Coastal Area Management Site Plan – Special Permit Application with the Planning and Zoning Commission for property located at 2 Vista Drive, Greenwich, CT.

For further information concerning this application please contact the Planning and Zoning Commission office at 203-622-7894 or the undersigned at 203-536-1049.

Sincerely,

Eric V.P. Brower, AICP
February 13, 2020

Town of Greenwich
Department of Public Works
Building Inspection Department
Zoning Enforcement Division
101 Field Point Road
Greenwich, CT 06830
Attn: Zoning Enforcement Officer

RE: Wen Property – 2 Vista Drive – Greenwich, CT 06830

Dear Sir:

S. E. Minor & Co., Inc. (SEM) has established the Proposed Grade Plane elevation for the above referenced project to be 16.80 for a weighted first floor elevation of 19.70 resulting is a difference of 2.90 feet as indicated on attached worksheet and sketch by S. E. Minor & Co., Inc. and based on Planning and Zoning Regulations Section 6-5 (26). We have also determined that at no point is the finished floor more than 12’ above grade.

Please feel free to call if you have any questions regarding this matter.

Respectfully submitted,
S. E. Minor & Co., Inc.

John P. Giancola, P.E., P.L.S.
Senior Project Engineer

Attachments: Grade Plane Worksheet & Sketch
AREA 1: 0.7914 \times 20.00 = 15.83
AREA 2: 0.2086 \times 18.13 = 3.87
WEIGHTED FIRST FLOOR ELEVATION: 19.70

PROPOSED GRADE PLANE
PREPARED FOR
SHIRLEY & MICHAEL WEN
2 VISTA DRIVE
GREENWICH, CT

DATE: FEBRUARY 13, 2020
S. E. MINOR & CO., INC.
SCALE: 1" = 20'
FILE #02-1329
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<td>8000.28</td>
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COLUMN 3 / COLUMN 1 = GRADE PLANE ELEVATION = 8000.28 / 476.33 = 16.80

WEIGHTED FIRST FLOOR ELEVATION = 19.70 (See Plan)

WEIGHTED FIRST FLOOR ELEVATION - GRADE PLANE ELEVATION = 19.70 - 16.80 = 2.90 FEET

S. E. MINOR and CO., INC.
RE: Application #2020-043 to conduct regulated activities at 2 Vista Drive

Permit #2020-047

Dear Mr. & Mrs. Wen,

The Inland Wetlands and Watercourses Agency has reviewed the application record and found the proposed activities in the above mentioned application are consistent with the purposes and policies of the Inland Wetland and Watercourses Regulations. Accordingly, the Agency GRANTED the enclosed permit with conditions.

Your attention is directed to the special and standard conditions because those in BOLD require action either prior to the start of clearing or construction activities or within a specific time period after the receipt of the permit.

The statement and permit are on file in the office of this Agency.

The effective date of the permit is the date of issue. The permit expires 24 months from the effective date, but when deemed necessary, the Agency may extend the period according to the provisions in Section 11.11 of the Regulations.

If you have any questions concerning this permit or the functions and values of wetlands in Greenwich, please let me know.

Sincerely,

[Signature]

Brian Harris, Chairman
Elliot Benton, Vice Chairman
Stephan Skoufalos, Secretary

cc: S.E. Minor

An Equal Opportunity Employer, M/F/H
Permit #2020-047
Application #2020-043

Issued to: Shirley & Michael Wen
2 Vista Drive
Greenwich, CT 06830

Date Issued: 4/27/2020

Following a duly noticed public meeting, the Inland Wetlands & Watercourses Agency APPROVED regulated activities on the property of Shirley & Michael Wen at 2 Vista Drive, for the redevelopment of a dwelling and its appurtenances in regulated areas adjacent to a wetland and watercourse and relocation of a watercourse as further described in the following documents.


6. Site plan review, dated April 20, 2020, prepared by the Town of Greenwich, Department of Public Works, Engineering Division, signed by Scott Marucci, P.E.

7. Staff report dated April 26, 2020, prepared by Robert Clausi, senior wetlands analyst
After a full review of the considerations set forth in Section 10 of the Regulations and other pertinent factors, this permit is issued with the following special and standard conditions:

SPECIAL CONDITIONS:

*Conditions in bold require action either prior to the start of regulated activities or within a specified time period after the receipt of the permit.*

1. Prior to the commencement of any on-site permit related activity, the permittee shall provide the Agency with written approval from the DPW Engineering Division of the stormwater management system.

2. Prior to the commencement of any on-site permit related activity, final construction designs and locations showing house, driveway, terrace, geothermal wells, septic system, drainage system, and watercourse relocation shall be submitted for review and approval by Wetlands Agency staff. Once approved, plans shall be submitted in both paper and digital formats.

3. Prior to the commencement of any on-site permit related activity, an estimate for the retail, installed cost of the enhancement planting plan shall be submitted for the purpose of determining a bond amount. The estimate is subject to approval by this Agency or its staff.

4. Prior to the commencement of any on-site permit related activity, a cash performance bond of $4,000.00, plus 30% of the approved value of the planting plan shall be submitted to the Agency to ensure compliance with the conditions of this permit. The bond shall be submitted in the form of a check payable to the Town of Greenwich. No portion of the bond shall be eligible for release until all Conditions of this permit are satisfied and staff has deemed the project to be in compliance with the approved plans.

5. In the event a Declaration of Regulated Areas was not filed as required by Permit #2004-50, such a declaration shall be filed by the permittee on the Greenwich land records on a form provided by the Agency prior to the commencement of any on-site permit related activity. This Declaration shall reference Inland Wetlands and Watercourses Permit #2020-047 and Application #2020-043 and require the preservation of inland wetlands and
6. watercourses in an undisturbed and natural state unless further permits are obtained. A copy of the filed Declaration shall be provided to the office of the Agency.

7. Prior to the commencement of any on-site permit related activity, the permittee shall cause to be prepared a packet for the homeowner describing the components of the stormwater management system, their purpose, and practical means to maintain them. The packet shall be submitted for review and approval by this Agency or its staff. If the permittee is not the project end user, verification the end user received the information packet shall be submitted to the office of the Agency.

8. Prior to the commencement of watercourse stabilization in the eastern wetland and the watercourse relocation behind the house, the permittee shall arrange a site meeting between IWWA staff, the site contractor, and the permittee’s engineer/environmental consultant to discuss water handling and other details of this work.

9. Areas within the disturbance envelope where the soil is compacted during construction shall be restored to their original properties and porosity by incorporation of compost per recognized guidelines, such as the Soil Restoration section of the November 2016 “New York State Standards and Specifications for Erosion and Sediment Control”. The certification of compliance required in Special Condition #11 below shall include certification this soil de-compaction was carried out as specified.

10. The portion of the bond associated with the plantings shall be eligible for release two full years after the enhancement plan is fully implemented as verified by staff and at least 80% of the planted material is thriving. High-visibility tags shall be maintained on all of the planting stock for the duration of the two-year establishment period. The plan shall be fully implemented within six months of seeking a Certificate of Occupancy.

11. Areas to be maintained as meadow may be mowed no more than once a year in late winter.

12. The stormwater drainage system shall be certified to have been constructed according to the approved plans and to be in compliance with the permit and conditions by a registered, professional engineer. Certification shall include verification of the soil de-compaction required in Special Condition #8 above. Certification shall be based upon regular on-site supervision of construction activities. A written certification report shall be submitted to Agency staff upon the completion of construction.
13. The permittee shall file a note on the Town Land Records requiring a licensed professional to inspect and certify the stormwater management structures every five years to ensure the system has been properly maintained, as required to sustain the designed goal. A copy of the filed note and copies of the periodic certifications shall be submitted to the Agency for its records.

14. A copy of the Health Department’s "Permit to Discharge" and "as-built" septic plan depicting subsurface stormwater management features shall be submitted to Agency staff upon completion of the septic installation. Plans shall be submitted in both paper and digital formats.

15. Upon completion of construction activities, an "as-built" survey drawing locating foundations, other authorized structures, and surface stormwater management features with distances to inland wetland and watercourse areas shall be submitted. A copy of the plan shall be submitted in both paper and digital formats.

16. Work within the watercourse corridor shall be limited to periods of low flow. Low flow periods normally occur between August and October. Wetlands Agency staff may determine if the work can occur at other times following an on-site field investigation to evaluate flow conditions.

**STANDARD CONDITIONS:**

*All Greenwich Inland Wetlands and Watercourses Agency permits are subject to the following Standard Conditions:*

1. This permit expires on 4-27-22. If the authorized activity is not completed on or before this date, said activity shall cease and, if not previously revoked or specifically extended, this permit shall be null and void.

2. Prior to the commencement of any on-site permit related activity, the attached compliance statement shall be signed by the contractor engaged to perform the regulated activities and then returned to the Agency office. This form shall serve as written notice to the Agency as to when work is planned to commence. The permittee shall also provide written notice to the Agency upon completion of the regulated activities.

3. The permittee shall employ best management practices, consistent with the terms and conditions of this permit and provisions of the *Connecticut Guidelines for Soil Erosion and Sediment Control*
(2002, as revised), to control storm water discharges, to prevent erosion and sedimentation and to otherwise prevent pollution of wetlands or watercourses. For information and technical assistance, contact the Agency staff. The permittee shall immediately inform the Agency of any problems involving wetlands or watercourses which develop during the course of, or which are caused by, the authorized work.

4. Any material, man-made or natural, which is in any way disturbed and/or utilized during work authorized herein, shall not be deposited in any wetland or watercourse, either on or off site, unless specifically authorized in this permit.

5. Fuel oil tanks shall be installed above ground or within the structure unless specifically approved otherwise by the Agency or its staff.

6. This permit shall not be assigned or transferred by the permittee to any other party without the written consent of the Greenwich Inland Wetlands and Watercourses Agency.

7. This permit may be revoked or suspended if the permittee exceeds the conditions or limitations of this permit, or has secured this permit through deception or inaccurate information.

8. This permit does not obviate the permittee's obligation to obey all other applicable federal, state and local laws or to obtain any applicable federal, state and local permits.

Sincerely,

[Signature]

Brian Harris, Chairman
Elliot Benton, Vice Chairman
Stephan Skoufalos, Secretary
UTILITY NOTE:
Underground utilities, facilities and structures have been plotted from surface indications and record sources. The locations of all underground utilities are approximate only. Additionally, there may be other underground utilities the existence of which is presently unknown. Any party utilizing the utility information and data depicted on this survey shall call "CALL BEFORE YOU DIG" at 800-922-4455 a minimum of forty eight (48) hours prior to any construction activities to verify the location of underground utilities.
Drainage Summary Report
Property of
Shirley and Michael Wen
2 Vista Drive
Greenwich, Connecticut
March 19, 2020
Revised September 11, 2020
<table>
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<tr>
<td>SOIL SURVEY DATA</td>
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<tr>
<td>LID CREDITS CHECKLIST</td>
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<tr>
<td>WATER QUALITY CALCULATIONS</td>
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<td>STORMWATER MANAGEMENT OPERATION &amp; MAINTENANCE PLAN</td>
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Drainage Summary Report
Property of
Shirley and Michael Wen
2 Vista Drive
Greenwich, Connecticut
March 19, 2020
Revised September 11, 2020

The subject site is a residential building lot located on the West side of Vista Drive at the intersection with Lakewood Drive South. Proposals include the demolition of the existing residence and the construction of a new residence, garage, patios and associated site work. Currently, the site is covered with the existing house, driveway, pool, and patios. Vegetative cover consists of well-tended lawn around the house. The site also consists of extensive landscaping and many mature trees. As can be seen on the site plan package, there is a flowing brook through the property with wetland soils on its fringes.

The house site is surrounded by three inland wetland areas. The flowing brook in the front yard begins at the 18" drainage pipe near the driveway entrance. That pipe carries the neighborhood drainage out to Indian Harbor. Near the end of the driveway, the stream enters a 24 inch pipe that empties to the backyard wetland area. The brook then enters the tidal regions at the back of the property. It is proposed to relocate the 24" pipe closer to the property line. The path of the brook would also be relocated above the bridge, but maintaining existing conditions below the bridge to the entrance to the harbor. That entrance into the harbor waters was modelled as the Point of Concern. A lot area of 1.89 acres is accounted for in the model. No offsite flows were considered in this analysis, since such flows do not enter or impact the BMP structures.

In accordance with Appendix B of the Greenwich Drainage Manual, the NRCS Web Soil Survey was used to conduct the initial soils feasibility evaluation. According to the survey, the site is classified as Hollis-Chatfield-Rock outcrop complex. These soils are classified as HSG D. According to the survey these soils are somewhat excessively drained. There are no inland wetland soils mapped for this site.

The proposed development concept sought to utilize Low Impact Development (LID) design principles and techniques to the maximum extent practicable. The Stormwater Management Standards from the Town of Greenwich Drainage Manual, including Low Impact Development and Stormwater Management, are outlined below.
STANDARD 1: Low Impact Development

Low Impact Development site planning and design techniques are used to the maximum extent practical to reduce disturbance to the site. The emphasis on treatment is Water Quality, due to the frontage of the site on Long Island Sound. Several LID Water Quality measures have been included in the design. The runoff from the proposed impervious surfaces will pass through a Treatment Train of LID BMPs. The proposed storm water management system utilizes various LID BMPs in order to meet the required standards.

Two Rain Gardens, two small Cultec systems and Porous Asphalt near the garage will capture and treat the proposed runoff in LID fashion. Efforts were made to minimize the construction envelope to preserve existing vegetation where possible. The natural contours of the site are preserved to the maximum extent practicable.

Runoff from the back patio will be captured by slot drains and piped to a deep sump catch basin to act as a sediment and oil trap for the Pre-Treatment. The runoff will then be piped to Rain Garden #1 for filtering and treatment. This BMP will provide a filter media and infiltration of some of the runoff.

STANDARD 2: Protection of Natural Hydrology

A. Site disturbance has been minimized as depicted on the enclosed Site Plan package. The limit of disturbance is delineated by construction fencing. Disturbance area has been limited to mostly areas of lawn while preserving areas of extensive landscaping and mature trees. No grading or disturbance will occur beyond the Flood Zone "VE" line (El. 15).

B. Construction notes to the contractor to limit soil compaction and the limits of disturbance are included on the Site Plan. Infiltrating storm water structures have been proposed in areas that should not experience loads from heavy construction traffic. These areas shall be delineated with construction fencing prior to installation and protected from heavy loading post installation. Construction traffic will be limited to areas proposed as hardscape. Areas disturbed that are not proposed as hardscape will be returned to a vegetated state.

C. The time of concentrations after development will approximate preddevelopment values. There are no proposed steep slopes.

D. The enclosed Site Plan package illustrates how the development sought to follow the natural contours of the landscape. The proposed grading plan will not alter the existing overall watershed areas. As in the existing conditions, the entire site will continue to drain towards the three wetland areas.

E. An area of compost-amended soils has been incorporated into the design in front where the existing driveway will return to a vegetated area. Any pervious areas used for parking during construction shall have the soil tilled to a depth of 12 to 18 inches and amended with small amounts of organic matter if needed.

F. All areas disturbed, with the exception of the proposed impervious surfaces will be restored to a vegetated state upon completion of the project.
G. The existing pond will be preserved.
H. No roadway or driveway crossings of surface waters are proposed.
I. No roadway or driveway crossings of streams are proposed.

**STANDARD 3: Stormwater Best Management Practices**
A. Site disturbance was limited to the maximum extent practicable. Efforts were made to minimize the construction envelope to preserve existing vegetation where possible. The design sought to collect and treat runoff close to the source of runoff where possible. The driveway and garage parking area will be sent to the Stone Bed under the Porous Asphalt. The roof will be collected and routed to a Rain Garden or Porous Asphalt Stone Bed to meet LID requirements. The rear patio will be collected to a deep-ump catch basin and routed to Rain Garden 3rg.
B. Calculations are enclosed showing how Pollutant Reduction, Peak Flow Control, RRV and GRV standards are met. All proposed storm water structures provide pollutant reduction in order to meet the WQV. The proposed infiltrating Cultecs provided storage to meet RRV and GRV requirements. Rain Garden RG-1 and RG-2 meet the LID WQV requirement.
C. This standard is not applicable to this residential use.
D. No pumping of stormwater is proposed.
E. Pumping of groundwater is proposed on site. The pump shall discharge into Cultec system C-4. Cultec System C-4 will overflow to the proposed level spreader.

**STANDARD 4: Runoff Reduction Volume and Groundwater Recharge Volume**
A. RRV – The proposed improvements will decrease the volume of runoff generated from the 1-year storm. Calculations are enclosed.
B. GRV – The various infiltrating cultec systems provide adequate storage to meet the GRV.
C. RCV – (Runoff Capture Volume) calculations are required for this project.

**STANDARD 5: Peak Flow Control**
A. The Steam Channel Protection criteria are not required to be met for this project.
B. Conveyance calculations are enclosed.
C. Using HydroCAD, which incorporates the SCS TR – 20 Unit Hydrograph Method, the peak rates of runoff discharging through the harbor were computed for 1, 2, 5, 10, 25, 50, and 100-year 24-hour storm events, under existing and proposed conditions. These results are summarized in Drainage Summary Tables. Peak rates are not a concern for this design due to direct frontage on Long Island Sound.
DRAINAGE SUMMARY TABLES

SUMMARY OF HYDROLOGICAL & HYDRAULIC ROUTING CALCULATIONS
FOR DRAINAGE AREA 1S (1L)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Year</td>
<td>2.38</td>
<td>0.22</td>
<td>-91%</td>
<td>7,303</td>
<td>1,346</td>
<td>-82%</td>
</tr>
<tr>
<td>2 – Year</td>
<td>3.08</td>
<td>0.49</td>
<td>-84%</td>
<td>9,424</td>
<td>2,554</td>
<td>-73%</td>
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<tr>
<td>5 – Year</td>
<td>4.37</td>
<td>1.11</td>
<td>-75%</td>
<td>13,427</td>
<td>5,147</td>
<td>-62%</td>
</tr>
<tr>
<td>10 – Year</td>
<td>5.55</td>
<td>1.76</td>
<td>-68%</td>
<td>17,117</td>
<td>7,739</td>
<td>-55%</td>
</tr>
<tr>
<td>25 – Year</td>
<td>7.46</td>
<td>4.45</td>
<td>-40%</td>
<td>23,278</td>
<td>12,372</td>
<td>-47%</td>
</tr>
<tr>
<td>50 – Year</td>
<td>9.23</td>
<td>5.98</td>
<td>-35%</td>
<td>29,080</td>
<td>16,992</td>
<td>-42%</td>
</tr>
<tr>
<td>100 - Year</td>
<td>11.43</td>
<td>7.96</td>
<td>-30%</td>
<td>36,431</td>
<td>23,097</td>
<td>-37%</td>
</tr>
</tbody>
</table>

SUMMARY OF HYDROLOGICAL & HYDRAULIC ROUTING
CALCULATIONS FOR DRAINAGE AREA 2S (2L)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Year</td>
<td>0.60</td>
<td>0.16</td>
<td>-73%</td>
<td>2,087</td>
<td>1,110</td>
<td>-47%</td>
</tr>
<tr>
<td>2 – Year</td>
<td>0.80</td>
<td>0.35</td>
<td>-56%</td>
<td>2,765</td>
<td>1,679</td>
<td>-39%</td>
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<tr>
<td>5 – Year</td>
<td>1.19</td>
<td>0.77</td>
<td>-35%</td>
<td>4,069</td>
<td>2,805</td>
<td>-31%</td>
</tr>
<tr>
<td>10 – Year</td>
<td>1.55</td>
<td>1.03</td>
<td>-34%</td>
<td>5,291</td>
<td>3,888</td>
<td>-27%</td>
</tr>
<tr>
<td>25 – Year</td>
<td>2.15</td>
<td>1.83</td>
<td>-15%</td>
<td>7,357</td>
<td>5,770</td>
<td>-22%</td>
</tr>
<tr>
<td>50 – Year</td>
<td>2.70</td>
<td>2.63</td>
<td>-3%</td>
<td>9,322</td>
<td>7,594</td>
<td>-19%</td>
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<tr>
<td>100 - Year</td>
<td>3.40</td>
<td>3.07</td>
<td>-10%</td>
<td>11,829</td>
<td>10,007</td>
<td>-15%</td>
</tr>
</tbody>
</table>

D. Conveyance protection and outlet protection are provided to ensure compliance.

STANDARD 6: Pollution Reduction
A. Calculations are enclosed. The proposed stormwater structures will remove pollutants by utilizing deep sump catch basins and yard drains, infiltrating cultec systems, and a filtrating Rain Garden.

STANDARD 7: High Load Areas
A. This site is not classified as a High Load Area.
B. This site is not classified as a High Load Area.
C. This site is not classified as a High Load Area.

STANDARD 8: Critical Areas
A. This site is classified as a Critical Area.
B. This site is not classified as a High Load Area.

STANDARD 9: Redevelopment
A. The site has been evaluated as a redevelopment.
B. As previously discussed, this project meets the standards to the maximum extent practicable.
C. The entire property has been previously developed.
D. As previously discussed, this project meets the standards to the maximum extent practicable.
E. No known regulated or hazardous soils or materials were found on site during the onsite soil investigation, therefore, this standard is not applicable.

STANDARD 10: Construction Erosion and Sediment Control
A. Refer to the Soil Erosion Control Plan for a depiction of the proposed sedimentation and erosion control measures, including but not limited to construction fencing, silt fencing, stockpile areas, an anti-tracking pad at the construction entrance, and tree protection.
B. The proposed site design instructs the contractor to install all sedimentation and erosion control measures prior to commencing construction, and appropriately remove these measures at the completion of construction.

STANDARD 11: Construction Inspections
A. If required by the approving authority, the proponent will post a bond, cash or other acceptable surety, in an amount deemed sufficient to ensure the work will be completed in compliance with the approved plans.
B. The proponent will be instructed to notify the approving authority before starting land-disturbing activity and before construction of key components of the stormwater management system.
C. The project engineer will conduct periodic inspections of the stormwater management system.
D. The project engineer will perform site inspections as required by the Field Inspection Record form SC-106.
E. Regardless of compliance with the approved plans, the stormwater management system design shall be revised if performance is not deemed adequate due to operational failure. This shall occur prior to final approval by approving authority.
F. Upon project completion, all required inspections and certifications necessary to document compliance to the approved plans shall be performed prior to approval being granted by the approving authority.

STANDARD 12: Operation and Maintenance
A. Refer to the Operations and Maintenance Plan Report for specific maintenance activities necessary to ensure functionality of the proposed stormwater management system.
B. The Operations and Maintenance Plan shall identify all applicable items in Section 5 and Section 7 of the Town of Greenwich Drainage Manual – Low Impact Development and Stormwater Management.

C. The Operations and Maintenance Plan Report will identify the parties legally responsible for implementing the Operations and Maintenance Plan.

D. The parties legally responsible for maintaining the stormwater management system will be instructed to keep records of all maintenance or repair activities necessary to ensure system functionality.

E. The parties legally responsible for maintaining the stormwater management system will be instructed to keep records of all maintenance or repair activities, and to provide these to the approving authority during inspections and/or upon request.

F. When the parties legally responsible fail to implement the Operation and Maintenance Plan, the municipality is authorized to assume responsibility for their implementation, and to secure reimbursement for associated expenses from the parties legally responsible, including, if necessary, placing a lien on the subject property.

STANDARD 13: Stormwater Management Report
This report satisfies this standard.

STANDARD 14: Illicit Discharges
Based on investigation of the site, there are currently no existing illicit discharges that could enter the stormwater management system. No illicit discharges are proposed.

Based on the above we can be assured that this development will not have any adverse hydrological or hydraulic impacts to any surrounding or downstream properties or drainage facilities. To the best of my knowledge, the drainage aspects of this proposal comply with the Town of Greenwich Roadway Design Manual, Drainage Manual, and Construction Standards.

Respectfully submitted,
S.E. Minor & Co., Inc.

[Signature]
Peter J. Finkbeiner, PE
Senior Project Engineer
SOIL SURVEY DATA

- NRCS Soil Data
- Site Feasibility Testing
Table—Hydrologic Soil Group (2 Vista Drive)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>75C</td>
<td>Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes</td>
<td>D</td>
<td>1.7</td>
<td>86.9%</td>
</tr>
<tr>
<td>W</td>
<td>Water</td>
<td></td>
<td>0.3</td>
<td>13.1%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td></td>
<td><strong>2.0</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Rating Options—Hydrologic Soil Group (2 Vista Drive)

*Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified
Tie-break Rule: Higher*
SOIL EVALUATION TEST RESULTS

Project Name: Shirley and Michael Wen
Project Address: 2 Vista Drive - Greenwich, CT

Test Pit or Soil Boring #: 13  Ground Elevation: 9.9

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Soil Texture (Percent Sand, Silt and Clay)</th>
<th>Depth Range in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.3</td>
<td>Topsoil</td>
<td>0&quot; to 7&quot;</td>
</tr>
<tr>
<td>8.1</td>
<td>Red-Brown Silt Loam</td>
<td>7&quot; to 22&quot;</td>
</tr>
<tr>
<td>4.2</td>
<td>Orange-Red Silty Sand w/Some Gravel and Cobbles</td>
<td>22&quot; to 69&quot;</td>
</tr>
</tbody>
</table>

Saturated Hydraulic Conductivity Test Location #:

<table>
<thead>
<tr>
<th>Ground Elevation</th>
<th>Top Elevation of Proposed Infiltration System:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bottom Elevation of Proposed Infiltration System:</td>
</tr>
<tr>
<td></td>
<td>Elevation of Test*:</td>
</tr>
</tbody>
</table>

**Test Method (check one of the following acceptable methods**):

- Borehole infiltration test (NHDES, 2008)
- Guelph permeameter - ASTM D5126-90 Method
- Falling head permeameter - ASTM D5126-90 Method
- Double ring permeameter or infiltrimeter - ASTM D3385-03, D5093-02, D5126-90 Methods
- Amoosimeter or Amooszegar (constant head) permeameter - Amooszegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate: ________________

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

** All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

John P. Giancola, P.E., P.L.S.
Name of Test Conductor

Signature of Test Conductor: [Signature]
Date: June 5, 2019

Form SC-101
February 2012
**SOIL EVALUATION TEST RESULTS**

**Project Name:** Shirley and Michael Wen  
**Project Address:** 2 Vista Drive - Greenwich, C T

<table>
<thead>
<tr>
<th>Test Pit or Soil Boring #</th>
<th>Ground Elevation: 14.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>Soil Texture (Percent Sand, Silt and Clay)</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>13.9</td>
<td>Topsoil</td>
</tr>
<tr>
<td>12.9</td>
<td>Rec-Brown Silt Loam</td>
</tr>
<tr>
<td>11.7</td>
<td>Orange-Brown Sandy Loam</td>
</tr>
<tr>
<td>8.1</td>
<td>Gray-Red Silty Loam w/Heavy Mottles</td>
</tr>
</tbody>
</table>

**Saturated Hydraulic Conductivity Test Location #:**

<table>
<thead>
<tr>
<th>Ground Elevation:</th>
<th>Top Elevation of Proposed Infiltration System:</th>
<th>Bottom Elevation of Proposed Infiltration System:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation of Test*:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test Method (check one of the following acceptable methods**):
- Borehole infiltration test (NHDES, 2008)
- Guelph permeameter - ASTM D5126-90 Method
- Falling head permeameter - ASTM D5126-90 Method
- Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
- Amoozemeter or Amoozegar (constant head) permeameter - Amoozegar 1992

Attach field data forms for the respective infiltration test method.

**Calculated Saturated Hydraulic Conductivity Rate:**

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.**

**TEST CERTIFICATION**

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT

John P. Giancola, P.E., P.L.S.  
Name of Test Conductor

[Signature]  
Signature of Test Conductor  
June 5, 2019  
Date
**SOIL EVALUATION TEST RESULTS**

<table>
<thead>
<tr>
<th>Test Pit No. 15</th>
<th>Ground Elevation: 15.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>Soil Texture (Percent Sand, Silt and Clay)</td>
</tr>
<tr>
<td>15.8</td>
<td>Topsoil</td>
</tr>
<tr>
<td>15.1</td>
<td>Brown Silty Fill</td>
</tr>
<tr>
<td>14.4</td>
<td>Topsoil - Original</td>
</tr>
<tr>
<td>13.9</td>
<td>Brown Silty Sandy Loam (40% Sand)</td>
</tr>
<tr>
<td>13.3</td>
<td>Grey Silt (10% Sand)</td>
</tr>
<tr>
<td>12.4</td>
<td>Mottled Silt</td>
</tr>
<tr>
<td>11.9</td>
<td></td>
</tr>
</tbody>
</table>

- Saturated Hydraulic Conductivity Test Location #:

Ground Elevation:
Top Elevation of Proposed Infiltration System:
Bottom Elevation of Proposed Infiltration System:
Elevation of Test*:
Test Method (check one of the following acceptable methods**):
- Borehole infiltration test (NHDES, 2008)
- Guelph permeameter - ASTM D5126-90 Method
- Falling head permeameter - ASTM D5126-90 Method
- Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
- Amoozegar or Amoozegar (constant head) permeameter – Amoozegar 1992

Attach field data forms for the respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate:

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Depth in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.4</td>
<td>Mottling (Seasonally High Groundwater)</td>
</tr>
<tr>
<td>---</td>
<td>Groundwater - Seep</td>
</tr>
<tr>
<td>11.9</td>
<td>Ledge</td>
</tr>
</tbody>
</table>

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

* All field infiltration tests must be conducted in the actual location and soil layer where stormwater infiltration is proposed.

**TEST CERTIFICATION**

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Peter J. Finkbeiner
Name of Test Conductor

Signature of Test Conductor

August 27, 2020

Date
SOIL EVALUATION TEST RESULTS

Test Pit No. 16

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Soil Texture (Percent Sand, Silt and Clay)</th>
<th>Depth Range in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.7</td>
<td>Topsoil</td>
<td>0 - 4&quot;</td>
</tr>
<tr>
<td>9.4</td>
<td>Orange Silty Sandy Loam (50% Sand)</td>
<td>4 - 31&quot;</td>
</tr>
<tr>
<td>7.1</td>
<td>Yellow Fine Sand (90% Sand)</td>
<td>31 - 36&quot;</td>
</tr>
<tr>
<td>6.7</td>
<td>Pocket of Grey Silt with Sand (30% Sand)</td>
<td>36 - 40&quot;</td>
</tr>
<tr>
<td>6.4</td>
<td>Tan Sand (Dry - 80% Sand)</td>
<td>40 - 45&quot;</td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Elevation: 9.7 Ground Elevation:

Saturated Hydraulic Conductivity Test Location #:

- Ground Elevation:
- Top Elevation of Proposed Infiltration System:
- Bottom Elevation of Proposed Infiltration System:

Elevation of Test*:

Test Method (check one of the following acceptable methods**):
- Borehole infiltration test (NHDES, 2008)
- Guelph permeameter - ASTM D5126-90 Method
- Falling head permeameter - ASTM D5126-90 Method
- Double ring permeameter or infiltrometer - ASTM D3385-03, D5093-02, D5126-90 Methods
- Amooze or Amooze (constant head) permeameter - Amooze 1992

Attach field data forms for respective infiltration test method.

Calculated Saturated Hydraulic Conductivity Rate:

**A percolation test, performed in accordance with the guidelines of the Connecticut State Health Code or otherwise, is not an acceptable test for saturated hydraulic conductivity. Percolation tests overestimate the saturated hydraulic conductivity rate.

* All test pits or soil borings shall be excavated to an elevation four feet below the proposed bottom elevation of the infiltration system.

TEST CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE AND CORRECT.

Peter J. Finkbeiner
Name of Test Conductor

Signature of Test Conductor

August 27, 2020
Date
## Credits for Low Impact Development (LID) Best Management Practices (BMPs)

<table>
<thead>
<tr>
<th>LID Technique</th>
<th>Compliance Requirements</th>
<th>Credit Description</th>
<th>LID Used</th>
<th>Credit Taken</th>
</tr>
</thead>
</table>
| Minimizing Soil Compaction (Section 4.4.1)        | • The "no disturbance" areas are protected by having the limits of disturbance and access clearly shown on the Stormwater Management Plan, all construction drawings, and delineated/flagged/fenced in the field.  
  • "No disturbance" areas are not to be stripped of existing topsoil.  
  • "No disturbance" areas are not to be stripped of existing vegetation.  
  • Vehicle movement, storage, or equipment/material lay-down is not to be permitted in "no disturbance" areas.  
  • Use of soil amendments and additional topsoil is permitted in other areas being disturbed. Grading may be performed using low ground pressure equipment (less than 3 pounds per square inch) to reduce the potential for soil compaction.  
  • Lawn and turf grass are acceptable uses. Planted meadow is an encouraged use. | Areas that comply (i.e., "no disturbance areas") can use the forested cover and open space site cover runoff coefficient (R) when calculating the required Water Quality Volume. See Section 5.6.3 and Table 5-5, Site Cover Runoff Coefficients. |          |              |
| Minimizing Site Disturbance (Section 4.4.2)       | Site disturbance including earthwork and clearing of vegetation should be limited to 40 feet beyond the building perimeter, 10 feet beyond the primary roadway curbs, walkways, and main utility branch trenches, and 25 feet beyond areas of proposed infiltration in order to limit compaction in the proposed infiltration area. This guidance is not intended to limit lawn areas. | Areas that comply can use the forested cover and open space site cover runoff coefficient (R) when calculating the required Water Quality Volume. See Section 5.6.3 and Table 5-5, Site Cover Runoff Coefficients. |          |              |
| Protecting Sensitive Natural Areas (Section 4.4.3) | Sensitive natural areas should be conserved at development sites, thereby preserving predevelopment hydrologic and water quality characteristics. The area must be permanently protected under a conservation easement. | The project proponent can subtract the conservation area from the total area in the Water Quality Volume calculation. |   ✓      |              |
| Protecting Riparian Buffers (Section 4.4.4)       | Effective treatment of stormwater runoff is achieved when pervious and impervious area runoff is discharged to a grass or forested buffer via overland flow. The use of a filter strip is recommended to treat overland flow in the green space of a development site.  
  • The minimum stream buffer width (i.e., perpendicular to the stream flow path) shall be 50 feet as measured from the top bank elevation of a stream or the boundary of a wetland.  
  • The maximum contributing path shall be 150 feet for pervious surfaces and 75 feet for impervious surfaces.  
  • The average contributing overland slope to and across the buffer shall be less than or equal to 5%.  
  • Runoff shall enter the buffer as sheet flow. A level spreader shall be utilized where local site conditions prevent sheet flow from being maintained.  
  • The stream buffer remains unmanaged other than routine debris removal.  
  • The buffer is protected by an acceptable conservation easement or other enforceable instrument that provides perpetual protection of the area. The easement must clearly specify how the natural area vegetation shall be | The area draining by sheet flow to a buffer can be subtracted from the total area in the Water Quality Volume calculation, and the impervious area draining to the buffer by sheet flow can be subtracted from the impervious area in the Groundwater Recharge Volume calculation and post-development impervious area in the Runoff Reduction Volume calculation. |   ✓      |              |
### Credits for Low Impact Development (LID) Best Management Practices (BMPs)

<table>
<thead>
<tr>
<th>LID Technique</th>
<th>Compliance Requirements</th>
<th>Credit</th>
<th>LID Used</th>
<th>Credit Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoiding Disturbance of Steep Slopes (Section 4.4.9)</td>
<td>Development on steep slope areas shall be avoided. Unnecessary grading should be avoided on all slopes, as should the flattening of hills and ridges. Development shall follow the natural contours of the landscape.</td>
<td>Undisturbed steep slope areas can use the forested cover and open space site cover runoff coefficient (R) when calculating the required Water Quality Volume. See Section 5.6.3 and Table 5-5, Site Cover Runoff Coefficients.</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Siting on Permeable and Erodible Soils (Section 4.4.6)</td>
<td>Whenever possible, highly erodible soils should be left undisturbed and protected from disturbance during site construction. Gravel soils tend to be the least erodible. Also as clay and organic matter increase erodibility tends to decrease. Infiltration practices should be located on those portions of the site with the most permeable soils.</td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Protecting Natural Flow Pathways (Section 4.4.7)</td>
<td>Site designs should use and/or improve natural drainage pathways whenever possible to reduce or eliminate the need for stormwater pipe networks. Natural drainage pathways should be protected from significantly increased runoff volumes and rates due to development. The design should prevent the erosion and degradation of natural drainage pathways through the use of upstream volume and rate control BMPs, if necessary. Level spreaders, erosion control matting, revegetation, outlet stabilization, and check dams can also be used to protect natural drainage features.</td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Reducing Impervious Surfaces (Section 4.4.8)</td>
<td>By reducing the amount of paved surfaces, stormwater runoff is decreased while infiltration and evapotranspiration opportunities are increased.</td>
<td>Reducing impervious surfaces reduces the Water Quality Volume, Runoff Reduction Volume, Groundwater Recharge Volume, and Peak Flow/Runoff Attenuation requirements.</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Stormwater Disconnection (Section 4.4.9)</td>
<td>Disconnecting roof leaders and routing road and driveway runoff from conventional stormwater conveyance systems allows runoff to be collected and managed onsite. Runoff can be directed to vegetated areas designed for onsite storage, treatment, and volume control. All design criteria from section 4.4.9 must be met in order to obtain the credits shown.</td>
<td>Methods to compute the resultant runoff volumes and peak runoff rates from disconnected impervious areas are discussed in Section 4.6 of this manual and the design references cited therein. For simple disconnection, subtract 100% of the disconnected area from the total area in the Water Quality Volume calculation if the receiving pervious area is HSG A or B soils or 50% of the the</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
# Credits for Low Impact Development (LID) Best Management Practices (BMPs)

<table>
<thead>
<tr>
<th>LID Technique</th>
<th>Compliance Requirements</th>
<th>Credit</th>
</tr>
</thead>
</table>
| Compost-Amended Soils        | Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of infiltration BMPs.  
• Soil must be tilled to 12 to 16 inches and amended with small amounts of organic material.  
• For mechanical aeration of lawns/turf to be effective:  
  o Utilize a soil aerator that has a mechanical action that not only penetrates the soil surface but also shatters the soil matrix, causing the soil to decompact and crack, thus creating void space and increasing infiltration. (Passive-type aerators which simply poke a hole into the soil, whether it removes a plug or simply spikes a hole, can create a hardpan effect at the depth of penetration.)  
  o Shatter-type aerators include vertidrain, soil reliever, agrivator, and groundbreaker. Shatter-type aerators should penetrate the soil at depths of 8 to 18 inches.  
• The depth to water table or bedrock must be greater than 18 inches.  
• Existing soils may not be saturated or seasonal wet.  
• Slopes may not exceed 10%.  
• Existing tree root systems shall be avoided, no deep till or amendment under the tree drip lines. | disconnected area if the receiving pervious area is HSG C or D soils.  
For disconnection to LID BMPs, subtract 100% of the disconnected area from the total area in the Water Quality Volume calculation.  
Subtract 50% of any restored areas (100% of any restored and reforested areas) from the total post development site area and re-calculate the Runoff Reduction Volume. |
| Rainwater Harvesting (Rain Barrels) | Rain barrels should hold a minimum of 50 gallons.  
Rain barrels can be connected in series to provide larger storage volumes.  
Equip rain barrels with a drain spigot near the bottom of the barrel with garden hose threading to allow easy hook up and use for watering.  
Provide an overflow pipe or hose near the top of the rain barrel.  
Provide removable, child-resistant covers.  
Provide mosquito screening on water entry holes to prevent mosquito breeding in standing water. | Subtract 25% of the contributing drainage area from the total area in the Water Quality Volume calculation. |
<table>
<thead>
<tr>
<th>LID Technique</th>
<th>Compliance Requirements</th>
<th>Credit</th>
<th>LID Used</th>
<th>Credit Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater Harvesting (Cisterns)</td>
<td>The rooftop runoff must be captured and either (1) used on site for irrigation of lawns and gardens, wash water and other non-potable uses, or (2) treated and released, or (3) infiltrated. The cistern must be sized to treat the design rainfall from the roof area directed to the water harvesting system. If all of the design volume captured cannot be used, then a scaled reduction in credit will be given. The remaining volume must be treated by a properly designed BMP. A minimum factor of safety equal to 1.2 must be applied to the calculated cistern volume required. All stormwater collected must have a dedicated, year-round, use to assure no overflow of the system during a design rainfall. A water balance calculation must be used to establish the dedicated use volumes and rates. The water balance calculation must demonstrate that the design volume can: (1) be drawn down (used) within 3 days to allow for available volume in the system for the next rain event to be captured and stored, or (2) have an overflow of no more than 14 percent of the annual average historic rainfall, or (3) be drawn down within 3 days and discharged to a properly designed BMP. On a case-by-case basis, reduced credit may be given if the design volume cannot be reliably drawn down within 3 days, or if a year-round reuse is not available. The dedicated water use system must be automated to ensure that the water will be used at the rate and volume designed. The overflow shall discharge flows in excess of the design volume to a vegetated or natural area, or to another properly designed BMP (e.g., rain garden). This discharge shall be non-erosive flow for the 10-yr rainfall event. It shall not discharge directly to impervious surfaces. The elevation of the overflow pipe from the cistern shall be at or above the design volume elevation. If a first flush diverter is used, the bypassed water must discharge to a properly designed BMP. The first flush can be directed to a relatively small BMP next to the water harvesting system, or it can be directed to and accounted for in other BMPs on the site. At a minimum, a 1 mm or smaller screen at the entrance to the cistern from the gutter system shall be provided to filter out debris and to keep mosquitoes out of the cistern. If the water reuse system is designed to accommodate basement sump/foundation drain water and roof runoff, the design must allow for adequate storage for the full volume of roof runoff for the next design storm and basement sump/foundation drain water.</td>
<td>Subtract 100% of the contributing drainage area from the total area in the Water Quality Volume calculation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Credits for Low Impact Development (LID) Best Management Practices (BMPs)

<table>
<thead>
<tr>
<th>LID Technique</th>
<th>Compliance Requirements</th>
<th>Credit</th>
<th>LID Used</th>
<th>Credit Taken</th>
</tr>
</thead>
</table>
|                                                    | A properly designed footing for the cistern must be designed if the load of the cistern at full capacity is greater than the soils will support. If it is buried, buoyancy calculations must be provided to show the cistern will not float when empty. Buoyancy calculations and flotation constraints must be provided if any part of the buried cistern is below the seasonal high water table, or if the area is subject to flooding.  

An appropriate pump shall be selected to provide adequate pressure for its designated uses.  

Above ground cisterns shall be made of a material or color that prevents light from entering the cistern, which helps prevent algae growth within the cistern.  

Irrigation water from a cistern shall be applied so that the water infiltrates into the ground.  

If for any reason the designed dedicated end use becomes unavailable because of some change, it will be required that an approved alternative end use or a properly designed BMP treatment system be installed on site to manage the roof runoff.  

The harvesting system shall be labeled and identified as non-potable water. The harvesting system shall meet all local and state building and plumbing codes. |
### Credits for Low Impact Development (LID) Best Management Practices (BMPs)

<table>
<thead>
<tr>
<th>LID Technique</th>
<th>Can Credit be Used? Groundwater Recharge Volume GRV</th>
<th>Can Credit be Used? Run-off Reduction Volume RRV</th>
<th>Can Credit be Used? Water Quality Volume WQV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimizing Soil Compaction <em>(Section 4.4.1)</em></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Minimizing Site Disturbance <em>(Section 4.4.2)</em></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Protecting Sensitive Natural Areas <em>(Section 4.4.3)</em></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Protecting Riparian Buffers <em>(Section 4.4.4)</em></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Avoiding Disturbance of Steep Slopes <em>(Section 4.4.5)</em></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Siting on Permeable and Erodible Soils <em>(Section 4.4.6)</em></td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td>Protecting Natural Flow Pathways <em>(Section 4.4.7)</em></td>
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<td>NO</td>
<td>NO</td>
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<td>Reducing Impervious Surfaces <em>(Section 4.4.8)</em></td>
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<td>YES</td>
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<td>Stormwater Disconnection <em>(Section 4.4.9)</em></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Compost-Amended Soils</td>
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<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Rainwater Harvesting (Rain Barrels)</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Rainwater Harvesting (Cisterns)</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>
WATER QUALITY CALCULATIONS

- WQV Calculations
- Rain Garden Sizing Calculations
- TSS Worksheet
WATER QUALITY VOLUME (WQV) – Entire Site (Proposed Conditions)
Lot Area = 82,397 sf = 1.89157 acre = 100%
Impervious Area = 17,233 sf = 0.39561 acre = 20.9%
Turf Area = 65,164 sf = 1.49596 acre = 79.1%
Forest Area = 0 sf

WQV = 1 inch (R) (A) / 12
where R = Rvi * %I + RvT * %T + RvF * %F
      = 0.95 * 0.209 + 0.25 * 0.791 + 0.05 * 0.0 = 0.39630
WQV = 1 inch (0.39630) (1.89157 acre) / 12 = 0.06247 acre-feet = 2,721 cf

WATER QUALITY VOLUME (WQV) – Front Yard – Watershed 1S
Proposed Impervious Surfaces
Patios, etc. 790 sf

Total Proposed Impervious in 1S = 790 sf

Watershed Area = 49,260 sf = 1.13085 acre = 100%
Impervious Area = 790 sf = 0.01813 acre = 1.6%
Turf Area = 48,470 sf = 1.11272 acre = 98.4%
Forest Area = 0 sf

WQV = 1 inch (R) (A) / 12
where R = Rvi * %I + RvT * %T + RvF * %F
      = 0.95 * 0.016 + 0.2 * 0.984 + 0.03 * 0.0 = 0.2120
WQV = 1 inch (0.2120) (1.13085 acre) / 12 = 0.01998 acre-feet = 870 cf

WATER QUALITY VOLUME (WQV) – Backyard – Watershed 2S
Proposed Impervious Surfaces
Utility Pads, etc. 254 sf

Total Proposed Impervious in 2S = 254 sf

Watershed Area = 13,846 sf = 0.31786 acre = 100%
Impervious Area = 254 sf = 0.00583 acre = 1.8%
Turf Area = 13,592 sf = 0.31203 acre = 98.2%
Forest Area = 0 sf

WQV = 1 inch (R) (A) / 12
where R = Rvi * %I + RvT * %T + RvF * %F
      = 0.95 * 0.018 + 0.20 * 0.982 + 0.03 * 0.0 = 0.21350
WQV = 1 inch (0.21350) (0.31786 acre) / 12 = 0.00566 acre-feet = 246 cf
WATER QUALITY VOLUME (WQV) – Roof & Patio – Watershed 3S

House 4,510 sf
Patio 2,722 sf
Total Impervious 7,232 sf

Watershed Area = 8,463 sf = 0.19428 acre = 100%
Impervious Area = 7,232 sf = 0.16602 acre = 85.5%
Turf Area = 1,231 sf = 0.02826 acre = 14.5%
Forest Area = 0 sf

WQV = 1 inch (R) (A) / 12
where R = Rvl * %l + RvT * %T + RvF * %F
      = 0.95 * 0.855 + 0.20 * 0.145 + 0.03 * 0.0 = 0.84125
WQV = 1 inch (0.84125) (0.19428 acre) / 12 = 0.01362 acre-feet = 593 cf

Pre-Treatment is provided by a deep sump catch basin collecting all of the slot drains for capturing all patio runoff.

SIZING OF RAIN GARDEN 3rg
Surface Area = WQV / (PD + (SD x n) + (GD x n))
SA = 593 cf / (0.75' + (1.5' x 0.3) + (0.0' x 0.4)) = 494 square feet

RAIN GARDEN PROVIDED = 505 sf
Estimated Rain Garden Volume = 505 sf (0.75' x (1.5' x 0.3) + (0.0' x 0.4)) = 606 cf
HydroCAD Rain Garden Volume = 1,595 – 804 (Freeboard) = 791 cf

WATER QUALITY VOLUME (WQV) – Roof & Driveway – Watershed 4S

Proposed Impervious surfaces

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>House</td>
<td>1,767 sf</td>
</tr>
<tr>
<td>Walks</td>
<td>218 sf</td>
</tr>
<tr>
<td>Driveway</td>
<td>6,919 sf</td>
</tr>
<tr>
<td>Window Wells</td>
<td>53 sf</td>
</tr>
<tr>
<td>Total Proposed Impervious in 4S</td>
<td>8,957 sf</td>
</tr>
</tbody>
</table>

Watershed Area = 10,828 sf = 0.24858 acre = 100%
Impervious Area = 8,957 sf = 0.20562 acre = 82.7%
Turf Area = 1,871 sf = 0.04295 acre = 17.3%
Forest Area = 0 sf

WQV = 1 inch (R) (A) / 12
where R = Rvl * %l + RvT * %T + RvF * %F
      = 0.95 * 0.827 + 0.20 * 0.173 + 0.03 * 0.0 = 0.82025
WQV = 1 inch (0.82025) (0.24858 acre) / 12 = 0.01699 acre-feet = 740 cf

WQV provided by Porous Asphalt Driveway Courtyard at Garage
2,271 sf x 2.0' minimum depth = 4,542 cubic foot crushed stone bed
4,542 cf x 40% voids = 1,817 cubic feet **Storage Provided**
Porous Asphalt Storage according to HydroCAD model = 2,045 cf (inc. porous asphalt)

**60% Rule:**
- Rear Portion of House into Rain Garden: 4,510 sf = 100% LID Treatment
- Patio into Rain Garden: 2,722 sf = 100% LID Treatment
- Driveway and House Front into Stone Bed: 8,904 sf = 100% LID Treatment
- Total Impervious Surfaces Treated: 16,136 sf = 100% LID Treatment

<table>
<thead>
<tr>
<th>Total Treated Surfaces</th>
<th>16,136 sf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated Surfaces</td>
<td>1,097 sf</td>
</tr>
<tr>
<td>Total Impervious</td>
<td>17,233 sf</td>
</tr>
</tbody>
</table>

Percent L.I.D. Treatment = 16,136 / 17,233 = 93% LID Treatment
TSS REMOVAL
TSS removal rates are 80% for the Porous Asphalt Driveway and Rain Garden. Separate calculation sheets are attached.
| Location: 2 Vista Drive |

<table>
<thead>
<tr>
<th>TSS Removal Calculation Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
</tr>
<tr>
<td>BMP&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Porous Asphalt Stone Bed</td>
</tr>
<tr>
<td></td>
</tr>
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<td></td>
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</tbody>
</table>

**Total TSS Removal =**

Project: Wen
Prepared By: Peter Finkbeiner
Date: September 11, 2020

Separate Form Needs to be Completed for Each Outlet or BMP Train

*Equals remaining load from previous BMP (E) which enters the BMP*
### TSS Removal Calculation Worksheet

| Location: 2 Vista Drive |

<table>
<thead>
<tr>
<th>BMP&lt;sup&gt;1&lt;/sup&gt;</th>
<th>TSS Removal Rate&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Starting TSS Load*</th>
<th>Amount Removed (B*Cr)</th>
<th>Remaining Load (C-D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain Garden</td>
<td>80%</td>
<td>1.00</td>
<td>0.80</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.20</td>
<td>0.00</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.20</td>
<td>0.00</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.20</td>
<td>0.00</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.20</td>
<td>0.00</td>
<td>0.20</td>
</tr>
</tbody>
</table>

**Total TSS Removal =** 80%

---

*Separate Form Needs to be Completed for Each Outlet or BMP Train*

*Equals remaining load from previous BMP (E) which enters the BMP*
RUNOFF REDUCTION CALCULATIONS

- RRV Calculations

- RCV (Runoff Capture Volume)
RUNOFF REDUCTION VOLUME – Watershed 1S (1L)
Runoff Reduction Volume analyzes the runoff volumes for the 1 Year Design Storm. Calculations are as follows:

Existing Conditions = $V_{pre} = 7,303$ cubic feet

Proposed Conditions without BMPs = $V_{post} = 1S + 4S$
  $= 1,346 + 1,865 = 3,211$ cubic feet

$RRV = V_{post} - V_{pre} = 3,211 - 7,303 = -4,092$ cubic feet (negative)

Retention Storage Volume (Driveway Stone Bed 4P)
  $RSV = 2,045$ cubic feet

Proposed Conditions with BMPs
  $V_{post-BMP} = V_{post} - RSV = 3,211 - 2,045 = 1,166$ cubic feet

Since $V_{post-BMP}$ is less than $V_{pre}$, the standard is met.
Negative RRV is explained as almost full capture of the 1" storm to provide WQV

RUNOFF REDUCTION VOLUME – Watershed 2S (2L)
Runoff Reduction Volume analyzes the runoff volumes for the 1 Year Design Storm. Calculations are as follows:

Existing Conditions = $V_{pre} = 2,087$ cubic feet

Proposed Conditions without BMPs = $V_{post} = 2S + 3S = 378 + 1,522 = 1,900$ cubic feet

$RRV = V_{post} - V_{pre} = 1,900 - 2,087 = -187$ cubic feet (negative)

Retention Storage Volume (Rain Garden)
  $RSV = 791$ cubic feet

Proposed Conditions with BMPs
  $V_{post-BMP} = V_{post} - RSV = 1,900 - 791 = 1,109$ cubic feet

Since $V_{post-BMP}$ is less than $V_{pre}$ in all cases, the Runoff Reduction Volume Standard is met.
RUNOFF CAPTURE VOLUME (RCV)
The Runoff Capture Volume is applicable to this proposal since the site lies within 500 feet of the shore.

RCV = 1" (R) (A) / 12
   where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
   I = Percent Impervious
   A = Site Area in Acres

RCV = (0.05 + (0.009 x 17,233 x 100 / 82,397)) x 1.89 acres / 12
     = (0.05 + 0.18823) x 1.89 / 12 = 0.03752 acre-feet = 1,634 cubic feet

Capture Volume provided by a Rain Garden and the driveway Stone Bed
   RCV = 791 + 2,045 = 2,836 cubic foot

The standard is met.
GROUNDWATER RECHARGE CALCULATION

- GRV Calculations
- Drawdown Calculations
GROUNDWATER RECHARGE VOLUME (GRV) – Entire Site
GRV = F x I = target depth factor (in feet) x increase in Impervious area
F of Type B Soil = 0.35 inch = 0.0292 feet

GRV = F x I = 0.0083’ x (17,233 sf – 14,172 sf) = 0.0292 (3,061) = 89 cubic feet

DRAWDOWN CALCULATIONS
The two retention systems for treatment of runoff are both subject to completing the
drawdown within 72 hours. The systems are designed to fill up during the 10 Year
Design Storm. Thus, for the following calculations, the full volume of the Cultec system
is used.

The receiving soils are classed as Type D soils, but are described as “somewhat
excessively drained.” Septic perc rates were 1” in 20 minutes for 4 tests. Factor of
Safety of 2 gives 1” in 40 minutes. 1” in 60 minutes is used for the following
calculations.

K = 1.02 inches / hour x 1 ft per 12 inches = 0.085 foot / hour

Rain Garden
Time\_\text{Drawdown} = \frac{\text{Volume}}{K \times \text{Bottom Area}} = \frac{791 \text{ cf}}{(0.085 \text{ ft/hour}) (505 \text{ sf})} = 18.4 \text{ hours}

Porous Asphalt Stone Bed
Time\_\text{Drawdown} = \frac{\text{Volume}}{K \times \text{Bottom Area}} = \frac{2,045 \text{ cf}}{(0.085 \text{ ft/hour}) (2,271 \text{ sf})} = 10.5 \text{ hrs.}

Since all answers are less than 72 hours for all the systems, all the systems qualify.
CONVEYANCE CALCULATIONS

- Conveyance Calculations

- Outlet Protection Calculations
CONVEYANCE PROTECTION CALCULATIONS

The Rational Method is utilized for determining the proposed flow through each pipe, and the Manning’s Formula for comparison with the capacity of each pipe. The intensity for the 10 Year Design Storm was based on the Rainfall Intensity-Duration Curve for Greenwich, using a $T_c = 10$ minutes.

An 8" PVC drains the patio at the back of the house, draining to the Rain Garden. Collection of the patio runoff will be done with slot drains, pre-treating the patio runoff with a Deep-Sump Catch Basin. The 10 Year Storm flow is as follows: $T_c = 10$ minutes

8" PVC with a minimum slope of 0.01 feet / feet
$Q = CIA = 0.95 \text{ (5.5 inch/hour)} \times (2,722 \text{ sf} / 43,560 \text{ sf/acre}) = 0.33 \text{ cfs}$

Capacity = $(1.49 / n) AR^{2/3} S^{1/2} = (1.49 / 0.011) (0.34907) (0.34907 / 2.0944)^{2/3} (0.01)^{1/2} = (135.455) (0.34907) (0.30286) (0.10) = 1.43 \text{ cfs}$

An 8" PVC drains a portion of the house roof, primarily at the back of the house, to the Rain Garden.

$Q = CIA = 0.95 \text{ (5.5 inch/hour)} \times (4,510 \text{ sf} / 43,560 \text{ sf/acre}) = 0.54 \text{ cfs}$

8" PVC with a minimum slope of 0.01 feet / feet
Capacity = $(1.49 / n) AR^{2/3} S^{1/2} = (1.49 / 0.011) (0.34907) (0.34907 / 2.0944)^{2/3} (0.01)^{1/2} = (135.455) (0.34907) (0.30286) (0.10) = 1.43 \text{ cfs}$

An 8" PVC conveys the Overflow of the Driveway Stone Bed to new 24" PVC as it passes under the driveway. According to the HydroCAD analysis, the Peak Rate of Overflow for the driveway stone bed is 0.56

8" PVC with a minimum slope of 0.01 feet / feet
Capacity = $(1.49 / n) AR^{2/3} S^{1/2} = (1.49 / 0.011) (0.34907) (0.34907 / 2.0944)^{2/3} (0.01)^{1/2} = (135.455) (0.34907) (0.30286) (0.10) = 1.43 \text{ cfs}$

An 8" PVC conveys the Catch Basin near the front door to the Driveway Stone Bed.

$q = CIA = 0.95 \text{ (5.5 inch/hr)} \times (4,057 / 43560) + 0.20 \text{ (5.5)} (1,107 / 43560) = 0.51 \text{ cfs}$

8" PVC with a slope of 0.005 feet / feet
Capacity = $(1.49 / n) AR^{2/3} S^{1/2} = (1.49 / 0.011) (0.34907) (0.34907 / 2.0944)^{2/3} (0.005)^{1/2} = (135.455) (0.34907) (0.30286) (0.0707) = 1.01 \text{ cfs}$
OUTLET PROTECTION CALCULATIONS
The Level Spreader near the northern pond is subject to the Outlet Protection Calculations. The Town standard is 13 linear feet per 1 cfs with a minimum length of twenty feet. According to the HydroCAD model, the Overflow from the Rain Garden for the 10 Year Storm is 0.59 cfs. The Level Spreader is proposed to be only 10’ long due to its immediate proximity to the wetland. This proposed length is ample to convey the design flow. Refer to the HydroCAD output for further information. Velocity has not been calculated.
HYDROLOGICAL & HYDRAULIC CALCULATIONS
EXISTING CONDITIONS

- 25-Year 24-Hour Storm Event Model
  o Routing Diagram
  o Area Listing
  o Summaries
  o Wizards
    • Hydrograph Plots

- 1, 2, 5, 10, 25, 50, and 100-Year 24-Hour Storm Events Model
  o Area Listing
  o Node Listings
  o Node Totals
Northern Watershed

Western Watershed
## Area Listing (all nodes)

<table>
<thead>
<tr>
<th>Area (sq-ft)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68,225</td>
<td>80</td>
<td>&gt;75% Grass cover, Good, HSG D (1S, 2S)</td>
</tr>
<tr>
<td>13,327</td>
<td>98</td>
<td>Roofs, HSG D (1S)</td>
</tr>
<tr>
<td>845</td>
<td>98</td>
<td>Unconnected pavement, HSG D (2S)</td>
</tr>
<tr>
<td>82,397</td>
<td></td>
<td>TOTAL AREA</td>
</tr>
</tbody>
</table>
### Soil Listing (all nodes)

<table>
<thead>
<tr>
<th>Area (sq-ft)</th>
<th>Soil Group</th>
<th>Subcatchment Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>HSG A</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>HSG B</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>HSG C</td>
<td></td>
</tr>
<tr>
<td>82,397</td>
<td>HSG D</td>
<td>1S, 2S</td>
</tr>
<tr>
<td>0</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>82,397</td>
<td>TOTAL AREA</td>
<td></td>
</tr>
</tbody>
</table>
Type III 24-hr 25 Year Rainfall=6.40"

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1 S: Western Watershed
- Runoff Area=61,094 sf 21.81% Impervious Runoff Depth=4.57"
- Flow Length=363’ Tc=5.7 min CN=84 Runoff=7.46 cfs 23,278 cf

Subcatchment2 S: Northern Watershed
- Runoff Area=21,303 sf 3.97% Impervious Runoff Depth=4.14"
- Flow Length=204’ Tc=8.8 min UI Adjusted CN=80 Runoff=2.15 cfs 7,357 cf

Total Runoff Area = 82,397 sf Runoff Volume = 30,634 cf Average Runoff Depth = 4.46"
82.80% Pervious = 68,225 sf 17.20% Impervious = 14,172 sf
Summary for Subcatchment 1S: Western Watershed

Runoff = 7.46 cfs @ 12.08 hrs, Volume = 23,278 cf, Depth = 4.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span = 0.00-27.00 hrs, dt = 0.01 hrs
Type III 24-hr 25 Year Rainfall = 6.40"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,327</td>
<td>98</td>
<td>Roofs, HSG D</td>
</tr>
<tr>
<td>47,767</td>
<td>80</td>
<td>&gt;75% Grass cover, Good, HSG D</td>
</tr>
<tr>
<td>61,094</td>
<td>84</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>47,767</td>
<td></td>
<td>78.19% Pervious Area</td>
</tr>
<tr>
<td>13,327</td>
<td></td>
<td>21.81% Impervious Area</td>
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</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>100</td>
<td>0.0940</td>
<td>0.33</td>
<td></td>
<td><strong>Sheet Flow, Grass Lawn</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grass: Short  n = 0.150  P2= 3.40&quot;</td>
</tr>
<tr>
<td>0.2</td>
<td>19</td>
<td>0.0550</td>
<td>1.64</td>
<td></td>
<td><strong>Shallow Concentrated Flow, Grass Lawn</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture  Kv= 7.0 fps</td>
</tr>
<tr>
<td>0.2</td>
<td>159</td>
<td>0.0250</td>
<td>14.80</td>
<td>46.50</td>
<td><strong>Pipe Channel, 24&quot; PVC Pipe</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24.0&quot; Round  Area= 3.1 sf  Perim= 6.3'  r = 0.50'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n= 0.010  PVC, smooth interior</td>
</tr>
<tr>
<td>0.2</td>
<td>85</td>
<td>0.0210</td>
<td>6.57</td>
<td>32.87</td>
<td><strong>Channel Flow, Stream Flow</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Area= 5.0 sf  Perim= 7.5'  r = 0.67'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n= 0.025  Earth, clean &amp; winding</td>
</tr>
<tr>
<td>5.7</td>
<td>363</td>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>


Subcatchment 1S: Western Watershed

Type III 24-hr 25 Year Rainfall=6.40"

Runoff Area=61,094 sf
Runoff Volume=23,278 cf
Runoff Depth=4.57"
Flow Length=363'
Tc=5.7 min
CN=84
Summary for Subcatchment 2S: Northern Watershed

Runoff = 2.15 cfs @ 12.12 hrs, Volume= 7,357 cf, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.40"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>845</td>
<td>98</td>
<td>Unconnected pavement, HSG D</td>
</tr>
<tr>
<td>20,458</td>
<td>80</td>
<td>&gt;75% Grass cover, Good, HSG D</td>
</tr>
<tr>
<td>21,303</td>
<td>81</td>
<td>Weighted Average, UI Adjusted CN = 80</td>
</tr>
<tr>
<td>20,458</td>
<td>96.03% Pervious Area</td>
<td></td>
</tr>
<tr>
<td>845</td>
<td>3.97% Impervious Area</td>
<td></td>
</tr>
<tr>
<td>845</td>
<td>100.00% Unconnected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc</th>
<th>Length</th>
<th>Slope</th>
<th>Velocity</th>
<th>Capacity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0</td>
<td>100</td>
<td>0.0310</td>
<td>0.21</td>
<td></td>
<td>Sheet Flow, Grass Lawn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grass: Short  n= 0.150  P2= 3.40&quot;</td>
</tr>
<tr>
<td>0.8</td>
<td>104</td>
<td>0.0860</td>
<td>2.05</td>
<td></td>
<td>Shallow Concentrated Flow, Grass Lawn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture  Kv= 7.0 fps</td>
</tr>
</tbody>
</table>

Tc=8.8 min

Subcatchment 2S: Northern Watershed

Hydrograph

Type III 24-hr 25 Year Rainfall=6.40"  Runoff Area=21,303 sf  Runoff Volume=7,357 cf  Runoff Depth=4.14"  Flow Length=204'  Tc=8.8 min  UI Adjusted CN=80
## Area Listing (all nodes)

<table>
<thead>
<tr>
<th>Area (sq-ft)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68,225</td>
<td>80</td>
<td>&gt;75% Grass cover, Good, HSG D (1S, 2S)</td>
</tr>
<tr>
<td>13,327</td>
<td>98</td>
<td>Roofs, HSG D (1S)</td>
</tr>
<tr>
<td>845</td>
<td>98</td>
<td>Unconnected pavement, HSG D (2S)</td>
</tr>
<tr>
<td>82,397</td>
<td></td>
<td>TOTAL AREA</td>
</tr>
</tbody>
</table>
Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=61,094 sf  21.81% Impervious  Runoff Depth=1.43"
Flow Length=363'  Tc=5.7 min  CN=84  Runoff=2.38 cfs  7,363 cf

Subcatchment2S: Northern Watershed
Runoff Area=21,303 sf  3.97% Impervious  Runoff Depth=1.18"
Flow Length=204'  Tc=8.8 min  UI Adjusted CN=80  Runoff=0.60 cfs  2,087 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 9,390 cf  Average Runoff Depth = 1.37"
82.80% Pervious = 68,225 sf  17.20% Impervious = 14,172 sf
Existing Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.
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Type III 24-hr 2 Year Rainfall=3.40"
Printed 9/10/2020

Page 3

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
- Runoff Area=61,094 sf  21.81% Impervious  Runoff Depth=1.85"
- Flow Length=363’  Tc=5.7 min  CN=84  Runoff=3.08 cfs  9,424 cf

Subcatchment2S: Northern Watershed
- Runoff Area=21,303 sf  3.97% Impervious  Runoff Depth=1.56"
- Flow Length=204’  Tc=8.8 min  UI Adjusted CN=80  Runoff=0.80 cfs  2,765 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 12,189 cf  Average Runoff Depth = 1.78"
82.80% Pervious = 68,225 sf  17.20% Impervious = 14,172 sf
Existing Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.
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Type III 24-hr 5 Year Rainfall=4.30"  
Printed 9/10/2020  
Page 4

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method  -  Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed  
Runoff Area=61,094 sf  21.81% Impervious  Runoff Depth=2.64"
Flow Length=363'  Tc=5.7 min  CN=84  Runoff=4.37 cfs  13,427 cf

Subcatchment2S: Northern Watershed  
Runoff Area=21,303 sf  3.97% Impervious  Runoff Depth=2.29"
Flow Length=204'  Tc=8.8 min  UI Adjusted CN=80  Runoff=1.19 cfs  4,069 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 17,496 cf  Average Runoff Depth = 2.55"
82.80% Pervious = 68,225 sf  17.20% Impervious = 14,172 sf
Existing Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.
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Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=61,094 sf  21.81% Impervious  Runoff Depth=3.36"
Flow Length=363’  Tc=5.7 min  CN=84  Runoff=5.55 cfs  17,117 cf

Subcatchment2S: Northern Watershed
Runoff Area=21,303 sf  3.97% Impervious  Runoff Depth=2.98"
Flow Length=204’  Tc=8.8 min  UI Adjusted CN=80  Runoff=1.55 cfs  5,291 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 22,407 cf  Average Runoff Depth = 3.26"
82.80% Pervious = 68,225 sf  17.20% Impervious = 14,172 sf
Existing Conditions 2 Vista Drive
Type III 24-hr 25 Year Rainfall=6.40"
Prepared by S.E. Minor & Co.
Printed 9/10/2020
HydroCAD® 9.00 s/n 04501 © 2009 HydroCAD Software Solutions LLC
Page 6

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=61,094 sf 21.81% Impervious Runoff Depth=4.57"
Flow Length=363' Tc=5.7 min CN=84 Runoff=7.46 cfs 23,278 cf

Subcatchment2S: Northern Watershed
Runoff Area=21,303 sf 3.97% Impervious Runoff Depth=4.14"
Flow Length=204' Tc=8.8 min UI Adjusted CN=80 Runoff=2.15 cfs 7,357 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 30,634 cf  Average Runoff Depth = 4.46"
82.80% Pervious = 68,225 sf  17.20% Impervious = 14,172 sf
Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: Western Watershed**
- Runoff Area=61,094 sf 21.81% Impervious Runoff Depth=5.71"
- Flow Length=363' Tc=5.7 min CN=84 Runoff=9.23 cfs 29,080 cf

**Subcatchment2S: Northern Watershed**
- Runoff Area=21,303 sf 3.97% Impervious Runoff Depth=5.25"
- Flow Length=204' Tc=8.8 min UI Adjusted CN=80 Runoff=2.70 cfs 9,322 cf

**Total Runoff Area = 82,397 sf  Runoff Volume = 38,402 cf  Average Runoff Depth = 5.59"**
82.80% Pervious = 68,225 sf  17.20% Impervious = 14,172 sf
Time span = 0.00-27.00 hrs, dt = 0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH = SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: Western Watershed**
- Runoff Area = 61,094 sf
- 21.81% Impervious
- Runoff Depth = 7.16"
- Flow Length = 363’
- Tc = 5.7 min
- CN = 84
- Runoff = 11.43 cfs
- 36,431 cf

**Subcatchment2S: Northern Watershed**
- Runoff Area = 21,303 sf
- 3.97% Impervious
- Runoff Depth = 6.66"
- Flow Length = 204’
- Tc = 8.8 min
- Ul Adjusted CN = 80
- Runoff = 3.40 cfs
- 11,829 cf

Total Runoff Area = 82,397 sf
Runoff Volume = 48,260 cf
Average Runoff Depth = 7.03"
- 82.80% Pervious = 68,225 sf
- 17.20% Impervious = 14,172 sf
HYDROLOGICAL & HYDRAULIC CALCULATIONS
PROPOSED CONDITIONS

- 25-Year 24-Hour Storm Event Model
  o Routing Diagram
  o Area Listing
  o Summaries
  o Wizards
    ▪ Hydrograph Plots
    ▪ Stage-Discharge Plots
    ▪ Stage-Storage Plots
    ▪ Stage-Discharge Tables
    ▪ Stage-Storage Tables

- 1, 2, 5, 10, 25, 50, and 100-Year 24-Hour Storm Events Model
  o Area Listing
  o Node Listings
  o Node Totals
**Area Listing (all nodes)**

<table>
<thead>
<tr>
<th>Area (sq-ft)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>65,164</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B (1S, 2S, 3S, 4S)</td>
</tr>
<tr>
<td>11,679</td>
<td>98</td>
<td>Paved parking, HSG B (3S, 4S)</td>
</tr>
<tr>
<td>1,044</td>
<td>98</td>
<td>Unconnected pavement, HSG B (1S, 2S)</td>
</tr>
<tr>
<td>4,510</td>
<td>98</td>
<td>Unconnected roofs, HSG B (3S)</td>
</tr>
<tr>
<td>82,397</td>
<td></td>
<td><strong>TOTAL AREA</strong></td>
</tr>
</tbody>
</table>
Soil Listing (all nodes)

<table>
<thead>
<tr>
<th>Area (sq-ft)</th>
<th>Soil Group</th>
<th>Subcatchment Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>HSG A</td>
<td></td>
</tr>
<tr>
<td>82,397</td>
<td>HSG B</td>
<td>1S, 2S, 3S, 4S</td>
</tr>
<tr>
<td>0</td>
<td>HSG C</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>HSG D</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>82,397</td>
<td>TOTAL AREA</td>
<td></td>
</tr>
</tbody>
</table>
Proposed Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.
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Type III 24-hr 25 Year Rainfall=6.40"
Printed 9/10/2020
Page 4

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=49,260 sf  1.60% Impervious  Runoff Depth=2.28"
Flow Length=355'  Tc=5.7 min  UI Adjusted CN=61  Runoff=2.94 cfs 9,350 cf

Subcatchment2S: Northern Watershed
Runoff Area=13,846 sf  1.83% Impervious  Runoff Depth=2.28"
Flow Length=204'  Tc=8.8 min  UI Adjusted CN=61  Runoff=0.74 cfs 2,628 cf

Subcatchment3S: House & Patio
Runoff Area=8,463 sf  85.45% Impervious  Runoff Depth=5.58"
Tc=5.0 min  CN=93  Runoff=1.22 cfs 3,934 cf

Subcatchment4S: House & Driveway
Runoff Area=10,828 sf  82.72% Impervious  Runoff Depth=5.46"
Tc=5.0 min  CN=92  Runoff=1.54 cfs 4,930 cf

Pond 3rg: Rain Garden
Peak Elev=11.02'  Storage=1,193 cf  Inflow=1.22 cfs  3,934 cf
Outflow=1.10 cfs  3,142 cf

Pond 4P: Porous Pavement
Peak Elev=16.85'  Storage=1,976 cf  Inflow=1.54 cfs  4,930 cf
Outflow=1.52 cfs  3,022 cf

Link 1L: Western POC
Inflow=4.45 cfs  12,372 cf
Primary=4.45 cfs  12,372 cf

Link 2L: Northern POC
Inflow=1.83 cfs  5,770 cf
Primary=1.83 cfs  5,770 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 20,842 cf  Average Runoff Depth = 3.04"
79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
Proposed Conditions 2 Vista Drive

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Summary for Subcatchment 1S: Western Watershed

Runoff = 2.94 cfs @ 12.09 hrs, Volume = 9,350 cf, Depth = 2.28"

Runoff by SCS TR-20 method, UH = SCS, Time Span = 0.00-27.00 hrs, dt = 0.01 hrs
Type III 24-hr 25 Year Rainfall = 6.40"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>790</td>
<td>98</td>
<td>Unconnected pavement, HSG B</td>
</tr>
<tr>
<td>48,470</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
</tr>
<tr>
<td>49,260</td>
<td>62</td>
<td>Weighted Average, UI Adjusted CN = 61</td>
</tr>
<tr>
<td>48,470</td>
<td>98.40% Pervious Area</td>
<td></td>
</tr>
<tr>
<td>790</td>
<td>1.60% Impervious Area</td>
<td></td>
</tr>
<tr>
<td>790</td>
<td>100.00% Unconnected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc</th>
<th>Length</th>
<th>Slope</th>
<th>Velocity</th>
<th>Capacity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(min)</td>
<td>(feet)</td>
<td>(ft/ft)</td>
<td>(ft/sec)</td>
<td>(cfs)</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>100</td>
<td>0.0940</td>
<td>0.33</td>
<td></td>
<td>Sheet Flow, Grass Lawn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grass: Short  n= 0.150   P2= 3.40&quot;</td>
</tr>
<tr>
<td>0.2</td>
<td>19</td>
<td>0.0550</td>
<td>1.64</td>
<td></td>
<td>Shallow Concentrated Flow, Grass Lawn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture    Kv= 7.0 fps</td>
</tr>
<tr>
<td>0.2</td>
<td>149</td>
<td>0.0250</td>
<td>14.80</td>
<td>46.50</td>
<td>Pipe Channel, 24&quot; PVC Pipe</td>
</tr>
<tr>
<td></td>
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<td>24.0&quot; Round Area= 3.1 sf Perim= 6.3'</td>
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<td>r= 0.50' n= 0.010  PVC, smooth interior</td>
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<td>n= 0.025   Earth, clean &amp; winding</td>
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Subcatchment 1S: Western Watershed

Type III 24-hr 25 Year Rainfall=6.40"
Runoff Area=49,260 sf
Runoff Volume=9,350 cu ft
Runoff Depth=2.28"
Flow Length=355'
Tc=5.7 min
UL Adjusted CN=61
Summary for Subcatchment 2S: Northern Watershed

Runoff = 0.74 cfs @ 12.13 hrs, Volume = 2,628 cf, Depth = 2.28"  
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25 Year Rainfall = 6.40"

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<td>&gt;75% Grass cover, Good, HSG B</td>
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<tr>
<td>13,846</td>
<td>62</td>
<td>Weighted Average, UI Adjusted CN = 61</td>
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<td>98.17% Pervious Area</td>
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8.8 204 Total

Subcatchment 2S: Northern Watershed

Hydrograph

Type III 24-hr 25 Year Rainfall = 6.40"
Runoff Area = 13,846 sf
Runoff Volume = 2,628 cf
Runoff Depth = 2.28"
Flow Length = 204'
Tc = 8.8 min
UI Adjusted CN = 61
Summary for Subcatchment 3S: House & Patio

Runoff = 1.22 cfs @ 12.07 hrs, Volume=3,934 cf, Depth=5.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span=0.00-27.00 hrs, dt=0.01 hrs
Type III 24-hr 25 Year Rainfall=6.40"

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Subcatchment 3S: House & Patio

Hydrograph

Type III 24-hr 25 Year Rainfall=6.40"
Runoff Area=8,463 sf
Runoff Volume=3,934 cf
Runoff Depth=5.58"
Tc=5.0 min
CN=93
Summary for Subcatchment 4S: House & Driveway

Runoff = 1.54 cfs @ 12.07 hrs, Volume = 4,930 cf, Depth = 5.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span=0.00-27.00 hrs, dt=0.01 hrs
Type III 24-hr 25 Year Rainfall=6.40"

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Direct Entry, Minimum Tc

Subcatchment 4S: House & Driveway

Hydrograph

Type III 24-hr 25 Year Rainfall=6.40"
Runoff Area=10,828 sf
Runoff Volume=4,930 cf
Runoff Depth=5.46"
Tc=5.0 min
CN=92
Summary for Pond 3rg: Rain Garden

[93] Warning: Storage range exceeded by 0.02'

Inflow Area = 8,463 sf, 85.45% Impervious, Inflow Depth = 5.58" for 25 Year event
Inflow = 1.22 cfs @ 12.07 hrs, Volume= 3,934 cf
Outflow = 1.10 cfs @ 12.11 hrs, Volume= 3,142 cf, Atten= 9%, Lag= 2.6 min
Primary = 1.10 cfs @ 12.11 hrs, Volume= 3,142 cf

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 11.02' @ 12.11 hrs Surf.Area= 2,806 sf Storage= 1,193 cf

Plug-Flow detention time=139.2 min calculated for 3,141 cf (80% of inflow)
Center-of-Mass det. time=63.7 min (834.0 - 770.3 )

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<td>758 cf Overall x 30.0% Voids</td>
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<td>#2</td>
<td>9.50'</td>
<td>14 cf</td>
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<td>1,193 cf Total Available Storage</td>
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Device Routing Invert Outlet Devices
#1 Primary 10.50' 6.0" Horiz. 6" Overflow Standpipe C= 0.600
Limited to weir flow at low heads
#2 Primary 11.00' 50.0' long Top of Berm 2 End Contraction(s)

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=11.01' (Free Discharge)
1=6" Overflow Standpipe (Orifice Controls 0.68 cfs @ 3.45 fps)
2=Top of Berm (Weir Controls 0.25 cfs @ 0.38 fps)
Pond 3rg: Rain Garden

Hydrograph

Inflow Area=8,463 sf
Peak Elev=11.02'
Storage=1,193 cf

Pond 3rg: Rain Garden

Stage-Discharge

6" Overflow Standpipe
Top of Berm
Pond 3rg: Rain Garden
Stage/Area/Storage

Elevation (feet)
0 200 400 600 800 1,000
Storage (cubic-feet)
8 9 10 11 13

Sand Mix
Mulch
Ponding
Freeboard
Storage
### Proposed Conditions 2 Vista Drive

Prepared by S.E. Minor & Co.

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#### Type III 24-hr 25 Year Rainfall=6.40"

Printed 9/10/2020

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#### Stage-Discharge for Pond 3rg: Rain Garden

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Summary for Pond 4P: Porous Pavement

Inflow Area = 10,828 sf, 82.72% Impervious, Inflow Depth = 5.46" for 25 Year event
Inflow = 1.54 cfs @ 12.07 hrs, Volume= 4,930 cf
Outflow = 1.52 cfs @ 12.08 hrs, Volume= 3,022 cf, Atten= 1%, Lag= 0.8 min
Primary = 1.52 cfs @ 12.08 hrs, Volume= 3,022 cf

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 16.85' @ 12.08 hrs Surf.Area= 5,315 sf Storage= 1,976 cf

Plug-Flow detention time= 190.4 min calculated for 3,022 cf (61% of inflow)
Center-of-Mass det. time= 87.9 min (862.2 - 774.3)

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Device Routing Invert Outlet Devices
#1 Primary 16.70' 24.0" x 24.0" Horiz. 24" x 24" Grate C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max= 1.51 cfs @ 12.08 hrs HW= 16.85' (Free Discharge)
= 24" x 24" Grate (Weir Controls 1.51 cfs @ 1.26 fps)
Pond 4P: Porous Pavement

Hydrograph

Inflow Area=10,828 sf
Peak Elevation=16.85'
Storage=1,976 cf

Stage-Discharge

- 24" x 24" Grate
Proposed Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.
HydroCAD® 9.00  s/n 04501  © 2009 HydroCAD Software Solutions LLC

Type III 24-hr 25 Year Rainfall=6.40"  Printed 9/10/2020

Page 17

Pond 4P: Porous Pavement
Stage-Area-Storage

Storage

Freeboard

Porous Asphalt

Stone Bed

Elevation (feet)

Storage (cubic-feet)

0 500 1,000 1,500 2,000 2,500 3,000
## Stage-Discharge for Pond 4P: Porous Pavement

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Summary for Link 1L: Western POC

Inflow Area = 60,088 sf, 16.22% Impervious, Inflow Depth = 2.47" for 25 Year event
Inflow = 4.45 cfs @ 12.09 hrs, Volume = 12,372 cf
Primary = 4.45 cfs @ 12.09 hrs, Volume = 12,372 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs

Link 1L: Western POC

Hydrograph

Inflow Area=60,088 sf
Summary for Link 2L: Northern POC

Inflow Area = 22,309 sf, 33.56% Impervious, Inflow Depth = 3.10" for 25 Year event
Inflow = 1.83 cfs @ 12.11 hrs, Volume= 5,770 cf
Primary = 1.83 cfs @ 12.11 hrs, Volume= 5,770 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-27.00 hrs, dt= 0.01 hrs

Inflow Area=22,309 sf
### Area Listing (all nodes)

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<th>Area (sq-ft)</th>
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<td><strong>82,397</strong></td>
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<td><strong>TOTAL AREA</strong></td>
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Proposed Conditions 2 Vista Drive
Type III 24-hr 1 Year Rainfall = 2.90"
Prepared by S.E. Minor & Co.
HydroCAD® 9.00 s/n 04501 © 2009 HydroCAD Software Solutions LLC
Page 2

Time span = 0.00-27.00 hrs, dt = 0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH = SCS
Reach routing by Stor-Ind + Trans method - Pond routing by Stor-Ind method

<table>
<thead>
<tr>
<th>Subcatchment 1S: Western Watershed</th>
<th>Runoff Area = 49,260 sf</th>
<th>1.60% Impervious</th>
<th>Runoff Depth = 0.33&quot;</th>
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<th>Subcatchment 2S: Northern Watershed</th>
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<th>Subcatchment 3S: House &amp; Patio</th>
<th>Runoff Area = 8,463 sf</th>
<th>85.45% Impervious</th>
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<th>Subcatchment 4S: House &amp; Driveway</th>
<th>Runoff Area = 10,828 sf</th>
<th>82.72% Impervious</th>
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<th>Pond 3rg: Rain Garden</th>
<th>Peak Elev = 10.58'</th>
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<th>Pond 4P: Porous Pavement</th>
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<th>Link 1L: Western POC</th>
<th>Inflow = 0.22 cfs</th>
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<th>Link 2L: Northern POC</th>
<th>Inflow = 0.16 cfs</th>
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Total Runoff Area = 82,397 sf  Runoff Volume = 5,112 cf  Average Runoff Depth = 0.74"
79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
Proposed Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=49,260 sf  1.60% Impervious  Runoff Depth=0.53" Flow Length=355'  Tc=5.7 min  UI Adjusted CN=61  Runoff=0.49 cfs  2,169 cf

Subcatchment2S: Northern Watershed
Runoff Area=13,846 sf  1.83% Impervious  Runoff Depth=0.53" Flow Length=204'  Tc=8.8 min  UI Adjusted CN=61  Runoff=0.12 cfs  610 cf

Subcatchment3S: House & Patio
Runoff Area=8,463 sf  85.45% Impervious  Runoff Depth=2.64" Tc=5.0 min  CN=93  Runoff=0.60 cfs  1,861 cf

Subcatchment4S: House & Driveway
Runoff Area=10,828 sf  82.72% Impervious  Runoff Depth=2.54" Tc=5.0 min  CN=92  Runoff=0.75 cfs  2,293 cf

Pond 3rg: Rain Garden
Peak Elev=10.63'  Storage=898 cf  Inflow=0.60 cfs  1,861 cf  Outflow=0.25 cfs  1,069 cf

Pond 4P: Porous Pavement
Peak Elev=16.71'  Storage=1,911 cf  Inflow=0.75 cfs  2,293 cf  Outflow=0.03 cfs  385 cf

Link 1L: Western POC
Inflow=0.49 cfs  2,554 cf  Primary=0.49 cfs  2,554 cf

Link 2L: Northern POC
Inflow=0.35 cfs  1,679 cf  Primary=0.35 cfs  1,679 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 6,933 cf  Average Runoff Depth = 1.01"
79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

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<th>Runoff Depth (&quot;')</th>
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<th>CN</th>
<th>Runoff (cfs)</th>
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<th>Runoff Volume (cf)</th>
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<td>Runoff Area=10,828 sf 82.72% Impervious</td>
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<td>Link 1L: Western POC</td>
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<td>Primary=1.11 cfs 5,147 cf</td>
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Total Runoff Area = 82,397 sf Runoff Volume = 10,651 cf Average Runoff Depth = 1.55"
79.09% Pervious = 65,164 sf 20.91% Impervious = 17,233 sf
Proposed Conditions 2 Vista Drive

Type III 24-hr 10 Year Rainfall=5.10"

Prepared by S.E. Minor & Co.

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Page 5

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=49,260 sf  1.60% Impervious  Runoff Depth=1.43"
Flow Length=355'  Tc=5.7 min  UI Adjusted CN=61  Runoff=1.76 cfs  5,868 cf

Subcatchment2S: Northern Watershed
Runoff Area=13,846 sf  1.83% Impervious  Runoff Depth=1.43"
Flow Length=204'  Tc=8.8 min  UI Adjusted CN=61  Runoff=0.44 cfs  1,649 cf

Subcatchment3S: House & Patio
Runoff Area=8,463 sf  85.45% Impervious  Runoff Depth=4.30"
Tc=5.0 min  CN=93  Runoff=0.95 cfs  3,030 cf

Subcatchment4S: House & Driveway
Runoff Area=10,828 sf  82.72% Impervious  Runoff Depth=4.19"
Tc=5.0 min  CN=92  Runoff=1.20 cfs  3,778 cf

Pond 3rg: Rain Garden
Peak Elev=10.89'  Storage=1,108 cf  Inflow=0.95 cfs  3,030 cf
Outflow=0.59 cfs  2,239 cf

Pond 4P: Porous Pavement
Peak Elev=16.78'  Storage=1,943 cf  Inflow=1.20 cfs  3,778 cf
Outflow=0.56 cfs  1,870 cf

Link 1L: Western POC
Inflow=1.76 cfs  7,739 cf
Primary=1.76 cfs  7,739 cf

Link 2L: Northern POC
Inflow=1.03 cfs  3,888 cf
Primary=1.03 cfs  3,888 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 14,326 cf  Average Runoff Depth = 2.09"
79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
Proposed Conditions 2 Vista Drive
Type III 24-hr 25 Year Rainfall=6.40"
Prepared by S.E. Minor & Co.
Printed 9/10/2020
HydroCAD® 9.00 s/n 04501 © 2009 HydroCAD Software Solutions LLC

Page 6

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Western Watershed
Runoff Area=49,260 sf 1.60% Impervious  Runoff Depth=2.28"
Flow Length=355’  Tc=5.7 min  UI Adjusted CN=61  Runoff=2.94 cfs 9,350 cf

Subcatchment 2S: Northern Watershed
Runoff Area=13,846 sf 1.83% Impervious  Runoff Depth=2.28"
Flow Length=204’  Tc=8.8 min  UI Adjusted CN=61  Runoff=0.74 cfs 2,628 cf

Subcatchment 3S: House & Patio
Runoff Area=8,463 sf 85.45% Impervious  Runoff Depth=5.58"
Tc=5.0 min  CN=93  Runoff=1.22 cfs 3,934 cf

Subcatchment 4S: House & Driveway
Runoff Area=10,828 sf 82.72% Impervious  Runoff Depth=5.46"
Tc=5.0 min  CN=92  Runoff=1.54 cfs 4,930 cf

Pond 3rg: Rain Garden
Peak Elev=11.02’ Storage=1,193 cf  Inflow=1.22 cfs 3,934 cf
Outflow=1.10 cfs 3,142 cf

Pond 4P: Porous Pavement
Peak Elev=16.85’ Storage=1,976 cf  Inflow=1.54 cfs 4,930 cf
Outflow=1.52 cfs 3,022 cf

Link 1L: Western POC
Inflow=4.45 cfs 12,372 cf
Primary=4.45 cfs 12,372 cf

Link 2L: Northern POC
Inflow=1.83 cfs 5,770 cf
Primary=1.83 cfs 5,770 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 20,842 cf  Average Runoff Depth = 3.04"
79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
Proposed Conditions 2 Vista Drive
Prepared by S.E. Minor & Co.
HydroCAD® 9.00  s/n 04501 © 2009 HydroCAD Software Solutions LLC

Type III 24-hr 50 Year Rainfall=7.60"
Printed 9/10/2020
Page 7

Time span=0.00-27.00 hrs, dt=0.01 hrs, 2701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Western Watershed
Runoff Area=49,260 sf  1.60% Impervious Runoff Depth=3.14"
Flow Length=355’  Tc=5.7 min UI Adjusted CN=61 Runoff=4.15 cfs 12,901 cf

Subcatchment2S: Northern Watershed
Runoff Area=13,846 sf  1.83% Impervious Runoff Depth=3.14"
Flow Length=204’  Tc=8.8 min UI Adjusted CN=61 Runoff=1.04 cfs 3,626 cf

Subcatchment3S: House & Patio
Runoff Area=8,463 sf  85.45% Impervious Runoff Depth=6.77"
Tc=5.0 min CN=93 Runoff=1.46 cfs 4,772 cf

Subcatchment4S: House & Driveway
Runoff Area=10,828 sf  82.72% Impervious Runoff Depth=6.65"
Tc=5.0 min CN=92 Runoff=1.85 cfs 5,998 cf

Pond 3r: Rain Garden
Peak Elev=11.03’ Storage=1,193 cf Inflow=1.46 cfs 4,772 cf
Outflow=1.72 cfs 3,968 cf

Pond 4P: Porous Pavement
Peak Elev=16.87’ Storage=1,986 cf Inflow=1.85 cfs 5,998 cf
Outflow=1.84 cfs 4,091 cf

Link 1L: Western POC
Inflow=5.98 cfs 16,992 cf
Primary=5.98 cfs 16,992 cf

Link 2L: Northern POC
Inflow=2.63 cfs 7,594 cf
Primary=2.63 cfs 7,594 cf

Total Runoff Area = 82,397 sf  Runoff Volume = 27,297 cf  Average Runoff Depth = 3.98"
79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
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<th>Type</th>
<th>Runoff Area</th>
<th>Impervious</th>
<th>Runoff Depth</th>
<th>Flow Length</th>
<th>Tc</th>
<th>CN</th>
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<td>1.60%</td>
<td>4.30&quot;</td>
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<td>5.7 min</td>
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<td>5.74 cfs</td>
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<tr>
<td>Northern Watershed</td>
<td>SCS TR-20</td>
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<td>8.8 min</td>
<td>61</td>
<td>1.45 cfs</td>
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<tr>
<td>House &amp; Patio</td>
<td>House &amp; Driveway</td>
<td>8,463 sf</td>
<td>85.45%</td>
<td>8.26&quot;</td>
<td>5.0 min</td>
<td>93</td>
<td>1.76 cfs</td>
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<tr>
<td>House &amp; Driveway</td>
<td>SCS TR-20</td>
<td>10,828 sf</td>
<td>82.72%</td>
<td>8.13&quot;</td>
<td>5.0 min</td>
<td>92</td>
<td>2.24 cfs</td>
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<td></td>
<td>Peak Elev=11.03'</td>
<td>Storage=1,193 cf</td>
<td>Inflow=1.76 cfs</td>
<td>Outflow=1.79 cfs</td>
<td>5,822 cf</td>
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<tr>
<td>Porous Pavement</td>
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<td>Peak Elev=16.89'</td>
<td>Storage=1,996 cf</td>
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</table>

Total Runoff Area = 82,397 sf  Runoff Volume = 35,793 cf  Average Runoff Depth = 5.21" 79.09% Pervious = 65,164 sf  20.91% Impervious = 17,233 sf
STORMWATER MANAGEMENT
OPERATIONS & MAINTENANCE PLAN

- Maintenance Declaration (Form MD-100)
- Maintenance Plan
- Inspection Log

(Submitted as a separate document)
Engineer of Record Certification

Project Name: Shirley and Michael Wen

Project Address: 2 Vista Drive

Engineer's Name: Peter J. Finkbeiner

Engineering Firm's Name: S.E. Minor & Co., Inc.

Street Address: 81 Holly Hill Lane  City: Greenwich  State: CT  Zip: 06830

Phone: 203-869-0136  Fax: 203-869-7869  Email: peter.finkbeiner@seominor.com

The undersigned Registered Professional Engineer of Record certifies that the Stormwater Management Report and Plans submitted herewith entitled:

Drainage Summary Report

Site Plan Set

Stormwater Management Report Last Revision Date: Sept. 11, 2020

Number of Plan Sheets: 10  Last Revision Date: Sept. 11, 2020


Engineer's Signature

Date Sept. 11, 2020

Engineer's Seal

Form SC-100

February 2014
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA) CERTIFICATION
PRE-CONSTRUCTION

Property Address: 2 Vista Drive  Tax Account No.: 02-1329

Building Permit No.: 

PLANS & DRAINAGE SUMMARY REPORT INFORMATION

Engineering Firm: S.E. Minor & Co., Inc.
Design Plans Date: Sept. 11, 2020  Drainage Report Date: Sept. 11, 2020

PROPERTY INFORMATION FOR DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)

<table>
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<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Total Property Area (SF)</td>
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<tr>
<td>Total Proposed Site Disturbance Area (SF)</td>
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<tr>
<td>Total Impervious Area Under Existing Conditions (SF)</td>
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<tr>
<td>Total Impervious Area Under Proposed Conditions (SF)</td>
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<tr>
<td>Total Disconnected Impervious Area Under Proposed Conditions (SF)</td>
<td>16,136</td>
</tr>
<tr>
<td>Total Directly Connected Impervious Area Under Proposed Conditions (SF)</td>
<td>1,097</td>
</tr>
</tbody>
</table>

1 The entire property area (i.e. parcel/lot area) based on property address and tax account number.

2 The entire area being disturbed for the proposed construction activity (foundations, buildings, houses, stormwater systems, septic systems, pools, patios, accessory structures, vegetative soil cover modifications, etc.). The project disturbance area (delineated with construction/silt fence) shall be depicted on the design, construction, and mitigation plans, and shall be installed on-site prior to commencing land disturbance activities.

3 Impervious surfaces include but are not limited to roofs (including green roofs), buildings, houses, walks, patios, walls, tennis/sport courts (all surface types must be counted), landscape ponds, pools, paved streets/drives/parking areas constructed with concrete, asphalt, compacted dirt, gravel, or permeable pavements.

4 All impervious surfaces that are directed to stormwater BMPs that meet the water quality volume (WQV) standard will be considered disconnected impervious cover. Acceptable stormwater BMPs are Bioretention (infiltrating/filtering), Constructed Stormwater Wetlands, Extended Dry Detention Basins (infiltration required), Gravel Wetlands, Constructed Wet Stormwater Ponds, Sand/Organic Filters (sand filters, tree filters, stormwater planters, etc.), Infiltration Systems (drywells, Culverts, etc.), Permeable Pavement Areas (infiltrating/filtering), Green Roofs, and Disconnected Impervious Area (must meet all the standards under Simple Disconnection on page 44 and 45 of the Drainage Manual).

5 Subtract the Total Disconnected Impervious Area Under Proposed Conditions (SF) from the Total Impervious Area Under Proposed Conditions (SF).

Engineer’s Signature ___________________________ Date  Sept 11, 2020

Engineer’s Seal

Form SC-107  June 2019
Itemization of Revisions
2 Vista Drive
Greenwich, Connecticut
September 11, 2020

This letter itemizes revisions made in response to Engineering Division Comments, dated August 25, 2020, concerning an application to Planning & Zoning for a new residence in the CAM Zone.

1. A Revised Form SC-100 has been submitted.

2. A Revised Form SC-107 has been submitted.

3. Drainage Report

3.a. A deep test hole was dug in the Rain Garden. Results shown on the L.I.D. Plan.

3.b. A deep test hole was dug in the additional porous pavement area. Results shown on the L.I.D. Plan.

3.c. The results of the two new tests and the two previous tests are shown on the proper forms in the Drainage Summary Report.

3.d. The areas of the Rain Garden and the backyard that drains into the Rain Garden have been added to Watershed 3S.

3.e. A portion of the front roof area has been redirected to the Rain Garden in Watershed 3S. The standard has been met.

3.f. The Rain Garden berm has been raised to elevation 11.0 as a result of the deep test pit showing Ledge at 45".

3.g. The alternative design of two outlets has been dropped. The single overflow level spreader now drains into the on-site inland wetland. The top of berm is still considered to be the ultimate overflow for the Rain Garden. It is modeled as a long sharp-crested
weir, which is exactly how it will work. There is no berm overflow for the 10 Year Storm, and for the 25 Year Storm, the overflow is ¾” deep.

3.h. The WQV computations and HydroCAD have been revised.

3.i. The storage of the BMPs has been revised to the 1 Year Storm level.

3.j. The Drawdown Computations are now based on the Stage-Area-Storage Tables.

3.k. The Level Spreader has been lengthened to 20 feet.

3.l. The impermeable Poly-Liner has been shown in a new cross-section on the Detail Sheet.

3.m. All other information and computations have been revised, as needed.

4.a. Site Plan

4.a.i. Cut and Fill Quantities are now shown on the Site Plan.

4.a.ii. Top and Bottom Wall Elevations are shown on the L.I.D. and S.E.C. Sheets

4.a.iii. The impermeable Poly-Liner has been shown in a new cross-section on the Detail Sheet.

4.a.iv. Pipe sizes, materials, and slopes have been added to the plans.

4.a.v. Depth of stone has been added to the callout.

4.a.vi. The Stone Bed for Porous Asphalt has a cross-section of ¾” stone throughout. Bottom of stone has been previously shown.

4.b. Driveway Plan & Profile

A new sheet has been added to the Plan Set. It shows the required information.

4.c. Detail Sheet

4.c.i. The Overflow Standpipe for the Rain Garden and for the Overflow Catch Basin for the driveway stone bed are shown on the Detail Sheet.

4.c.ii. Retaining Walls are less than 3 feet in height and a design is not required for the Building Department.

4.c.iii. Notes have been added to the Detail Sheet.
5. O & M Plan  The draft Operations & Maintenance Plan has been re-submitted for review.

Respectfully submitted,
S.E. Minor & Co., Inc.

Peter J. Finkbeiner, P.E.
Senior Project Engineer
CT License No. 12357
PROPOSED FIRST FLOOR PLAN

F.A.R.
Floor Area Ratio Calculations

SUMMARY

1. Proposed First Floor Plan and FAR Calculations
2. Project: New Residence for Michael & Shirley Wen
3. Project Location: 2 Vista Drive, Greenwich, CT 06830
4. Project #: 1905
5. Date: 29 May 2020

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Subtotal Proposed First Floor: 5,656.39 SF
PROPOSED ATTIC FLOOR PLAN

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PRELIMINARY
STORMWATER MANAGEMENT
OPERATIONS & MAINTENANCE PLAN

For Property Located at

2 Vista Drive
Greenwich, Connecticut

Prepared for

Shirley and Michael Wen
2 Vista Drive
Greenwich, CT 06830

March 19, 2020
Stormwater Management Practices Maintenance Declaration

THIS DECLARATION is made this date, _____________, 20__, by and between the Town of Greenwich, a municipal corporation with principal offices located at 101 Field Point Road, Greenwich, CT 06830 and

Shirley and Michael Wen

[Owner(s) Name]

2 Vista Drive

[Address]

hereinafter referred to as “Owner(s)” of the “Property” as more fully described in a deed recorded in Book ______ at Page ______ of the Greenwich Land Records. In accordance with the Town of Greenwich Drainage Manual as Amended, the “Owner(s)” agree to install and maintain stormwater management practice(s) on the subject Property in accordance with approved plans and conditions. The Owner further agrees to the terms stated in this document to ensure that the stormwater management practice(s) continues serving the intended function in perpetuity. This Declaration includes the following exhibits located in the project files of one or all of the following Town of Greenwich Departments:

- Building Division – Permit # 20-
- Inland Wetlands and Watercourses Agency – Application # 2020-
- Planning and Zoning – Application # CAM PLPZ2020-

Exhibit A: Long-term Maintenance Plan that prescribes those activities that must be carried out to maintain compliance with this Declaration. Approved Maintenance Plan dated

Exhibit B: Improvement Location Survey depicting “As-Built” conditions and showing an accurate location of each stormwater management practice affected by this Declaration. Approved Improvement Location Survey dated

Note: After construction has been verified and accepted by the Town of Greenwich for the stormwater management practices, this declaration shall be recorded by the Owner on the Greenwich Land Records and copies of the recorded document shall be submitted to all of the following Town of Greenwich Departments involved in the approval:

- Building Division
- Inland Wetlands and Watercourses Agency
- Planning and Zoning

Through this Declaration, the Owner(s) hereby subjects the Property to the following covenants, conditions, and restrictions:

1. The Owner(s), at its expense, shall secure from any affected owners of land all easements and releases of rights-of-way necessary for utilization of the stormwater practices identified in Exhibit B and shall record them with the Town Clerk. These easements and releases of rights-of-way shall
not be altered, amended, vacated, released or abandoned without prior written approval of the Town of Greenwich.

2. The Owner(s) shall be solely responsible for the installation, maintenance and repair of the stormwater management practices, drainage easements and associated landscaping identified in Exhibit B in accordance with the Operation and Maintenance Plan (Exhibit A).

3. No alterations or changes to the stormwater management practice(s) identified in Exhibit B shall be permitted unless they are deemed to comply with this Declaration and are approved in writing by the Town of Greenwich.

4. The Owner(s) shall retain the services of a qualified inspector (as described in Exhibit A) to operate and ensure the maintenance of the stormwater management practice(s) identified in Exhibit B in accordance with the Operation and Maintenance Plan (Exhibit A).

5. The Owners(s) must maintain all records (logs, invoices, reports, data, etc.) and have them readily available for inspection at all times. Inspection Documentation must be maintained as frequently as required in Exhibit A.

6. The Town of Greenwich or its designee is authorized to access the property as necessary to conduct inspections of the stormwater management practices or drainage easements to ascertain compliance with the intent of this Declaration and the activities prescribed in Exhibit A. Upon written notification by the Town of Greenwich or their designee of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the Town of Greenwich. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs so that the public health, safety, general welfare or the environment shall not be endangered.

7. If the Owner(s) does not keep the stormwater management practice(s) in reasonable order and condition, or complete maintenance activities in accordance with the Operation and Maintenance Plan contained in Exhibit A, or the required maintenance or repairs under 6 above within the specified time frames, the Town of Greenwich is authorized, but not required, to perform the specified inspections, maintenance or repairs in order to preserve the intended functions of the practice(s) and prevent the practice(s) from becoming a threat to public health, safety, general welfare or the environment. In the case of an emergency, as determined by the Town of Greenwich, no notice shall be required prior to the Town of Greenwich performing emergency maintenance or repairs. The Town of Greenwich may levy the costs and expenses of such inspections, maintenance, repairs and appropriate fees against the Owner(s). The Town of Greenwich at the time of entering upon said stormwater management practice for the purpose of maintenance or repair may file a notice of lien upon the property affected by the lien. If said costs and expenses are not paid by the Owner(s), the Town of Greenwich may pursue the collection of same through appropriate court actions.

8. The Owner(s) hereby conveys to the Town of Greenwich an easement over, on and in the Property for the purpose of access to the stormwater management practice(s) for the inspection, maintenance and repair thereof, should the Owner(s) fail to properly inspect, maintain and repair the practice(s). The Town of Greenwich’s execution of any repair or maintenance does not alter the Owner(s) responsibility to maintain in future.
9. The Owner(s) agrees that this Declaration shall be recorded and that the land described in a deed
recorded in Book _______ at Page ________ of the Greenwich Land Records shall be subject to
the covenants and obligations contained herein, and this Declaration shall bind all current and
future owners of the property.

10. The Owner(s) agrees in the event that the Property is sold, transferred, or leased to provide
information to the new owner, operator, or lessee regarding proper inspection, maintenance and
repair of the stormwater management practice(s). The information shall accompany the first deed
transfer and include Exhibits A and B and this Declaration. The transfer of this information shall
also be required with any subsequent sale, transfer or lease of the Property.

11. The Owner(s) agree that the rights, obligations and responsibilities hereunder shall commence
upon execution of the Declaration.

12. The parties whose signatures appear below hereby represent and warrant that they have the
authority and capacity to sign this declaration and bind the respective parties hereto.

13. The Proprietor, its agents, representatives, successors and assigns shall defend, indemnify and hold
the Town of Greenwich harmless from and against any claims, demands, actions, damages,
injuries, costs or expenses of any nature whatsoever, hereinafter “Claims”, fixed or contingent,
known or unknown, arising out of or in any way connected with the design, construction, use,
maintenance, repair or operation (or omissions in such regard) of the storm drainage system
referred to in the permit as Exhibit “A” hereto, appurtenances, connections and attachments
thereto which are the subject of this Declaration. The Proprietor, its agents, representatives,
successors and assigns shall not be required to indemnify the Town, its officers, agents, servants,
or employees, against any such damages occasioned solely by acts or omissions of the Town, its
officers, agents, servants or employees, other than supervisory acts or omissions of the Town, its
officers, agents; servants, or employees, in connection with such Claims or the enforcement of
this Declaration.
IN WITNESS WHEREOF, the “Owner(s)” have executed this Declaration on this _____ day of __________________, 20_____.

By: ____________________________
   [Owner(s)]

By: ____________________________
   [Owner(s)]

STATE OF CONNECTICUT
  )
  ) ss: Greenwich
COUNTY OF FAIRFIELD

The foregoing instrument was acknowledged before me on this_______ day of
________________, 20____, by ____________________________, the
   [Owner(s)]

“Owner(s)” of ____________________________.
   [Address]

__________________________
Notary Public

My Commission Expires On:

__________________________

WHEN RECORDED RETURN COPY TO:
[All of the following departments involved in approval:
Building Division, Inland Wetlands & Watercourses Agency, and Planning & Zoning]
Exhibit A
Operations and Maintenance Plan

Scope:

The purpose of the Operations and Maintenance Report is to ensure that the existing and proposed stormwater components installed at 2 Vista Drive are maintained in operational condition throughout the life of the project. The service procedures associated with this plan shall be performed as required by the parties legally responsible for their maintenance.

Recommended Frequency of Service:

As further defined below, all stormwater components should be checked on a periodic basis and kept in full working order. Ultimately, the required frequency of inspection and service will depend on runoff quantities, pollutant loading, and clogging due to debris. At a minimum, we recommend that all stormwater components be inspected and serviced twice per year, once before winter begins and once during spring cleanup.

Qualified Inspector:

The inspections must be completed by an individual experienced in the construction and maintenance of stormwater drainage systems. Once every five years the inspections must be completed by a professional engineer.

Service Procedures:

1. **Catch Basins & Drainage Inlets:**
   
a. Catch basins and drainage inlets shall be completely cleaned of accumulated debris and sediments at the completion of construction.
b. For the first year, catch basins and drainage inlets shall be inspected on a quarterly basis.
c. Any accumulated debris within the catch basins/inlets shall be removed and any repairs as required.
d. From the second year onward, visual inspections shall occur twice per year, once in the spring and once in the fall, after fall cleanup of leaves has occurred.
e. Accumulated debris within the catch basins/inlets shall be removed and repairs made as required.
f. Accumulated sediments shall be removed at which time they are within 12 inches of the invert of the outlet pipe.
g. Any additional maintenance required per the manufacturer's specifications shall also be completed.
2. **Storm Drainage Piping and Manholes/Junction Boxes:**

a. All storm drainage piping shall be completely flushed of debris and accumulated sediment at the completion of construction.

b. Manholes/Junction Boxes shall be inspected and repaired on an annual basis.

c. Unless system performance indicates degradation of piping, comprehensive video inspection of storm drainage piping shall occur once every ten years.

d. Any additional maintenance required per the manufacturer's specifications shall also be completed.

3. **Stormwater Control Structures:**

a. All control structures (orifice, weir, etc.) shall be completely cleaned of accumulated debris and sediments at the completion of construction. Any repairs shall be performed.

b. For the first year, control structures (orifice, weir, etc.) shall be inspected on a quarterly basis.

c. Any accumulated debris shall be removed and any repairs made to the control structures (orifice, weir, etc.) as required.

d. From the second year onward, visual inspections shall occur twice per year, once in the spring and once in the fall, after fall cleanup of leaves has occurred.

e. Accumulated debris shall be removed and repairs made as required.

f. Any additional maintenance required per the manufacturer's specifications shall also be completed.

4. **Drainage Outfalls/Splash Pads/Scour Holes/Level Spreaders:**

a. All outfalls shall be completely cleaned of accumulated debris and sediments at the completion of construction. Any repairs to outlet protection material (rip rap) shall be performed.

b. For the first year, outfalls shall be inspected on a quarterly basis.

c. Any accumulated debris shall be removed and any repairs made to the outfalls as required.

d. From the second year onward, visual inspections shall occur twice per year, once in the spring and once in the fall, after fall cleanup of leaves has occurred.

e. Accumulated debris shall be removed and repairs made as required.

f. Any erosion shall be promptly repaired and the cause of the erosion shall be identified and corrected.

g. Any additional maintenance required per the manufacturer's specifications shall also be completed.
5. Bioretention/Biofiltration Basins and Rain Gardens:

a. Bioretention/Biofiltration basins and rain gardens shall be cleaned of debris and sediments upon the completion of construction. Any filter media (bioretention soil) impacted by the construction activities shall be removed and replaced at this time.

b. The filter media (bioretention soil) shall be visually inspected on a monthly basis for the first 6 months. Any erosion or displacement of the filter media (bioretention soil) shall be promptly repaired and the cause of the problem shall be identified and corrected. Monthly inspections shall continue until successful operation of the system is confirmed.

c. Bioretention/Biofiltration areas and rain gardens with grass shall not be mowed more than twice during the growing season, preferably only in late October. More frequent mowing will eliminate native forbs and sedges from the meadow cover.

d. Bioretention/Biofiltration areas and rain gardens with mulch and plantings shall be inspected during spring cleanup and one just prior to the winter season.

e. All dead plants and missing mulch shall be replaced and any necessary pruning of vegetation shall be completed.

f. The surface of these structures shall be inspected on a quarterly basis after the first six months of successful operation and after heavy runoff events (e.g. >3.0" in a 24-hour period). One inspection shall occur immediately following the completion of winter sanding and subsequent sweeping operations, and one shall occur just prior to the winter season. Any accumulated debris and sediments shall be removed.

g. Check draining time of bioretention/biofiltration areas and rain gardens annually. Check within 72 hours after a minimum one inch rain event. If there is no standing water, infiltration is acceptable. If draining time is excessive, quantitatively determine infiltration rate. Use a double ring infiltrometer or monitor drop in water level after a significant storm. If infiltration rate <0.5 in. /hour, remedial action shall be taken.

h. A soil-core investigation may be used to identify the clogged portion of stormwater facility and depth of clogging. Remedial measures may include removal of clogged soil layer and replacement with suitable media, aeration, and mixing upper strata with lower soil strata. After corrective measures have been implemented, infiltration rate and draining time shall be retested.

6. Drywells and Infiltration Systems:

a. All drywells/infiltrators shall be completely cleaned of accumulated debris and sediments upon the completion of construction.

b. For the first year, the drywells/infiltrators shall be inspected on a quarterly basis.

c. Any accumulated debris within the drywells/infiltrators shall be removed and any repairs made to the units as required.
d. From the second year onward, visual inspection shall occur twice per year, once in the spring and once in the fall, after fall cleanup of leaves has occurred.

e. Accumulated debris within the units shall be removed and repairs made as required.

f. Any additional maintenance required per the manufacturer's specifications shall also be completed.

7. Porous Asphalt Driveway with Stone Bed:

a. Changing the porous pavement surface to an impervious surface requires the review and approval of the Town of Greenwich DPW Engineering Division.

b. Clean and vacuum (Regenerative Air Vacuum for Permeable Interlocking Concrete Pavers) the porous pavement upon the completion of construction.

c. Check for standing water on the surface of the pavement after a precipitation event. If standing water remains within 30 minutes after rainfall had ended, cleaning of porous pavement is recommended.

d. Vacuum sweeper shall be used regularly to remove sediment and organic debris on the pavement surface. The sweeper may be fitted with water jets.

e. Pavement vacuuming should occur during spring cleanup following the last snow event to remove accumulated debris, at a minimum.

f. Pavement vacuuming should occur during fall cleanup to remove dead leaves, at a minimum.

g. Power washing can be an effective tool for cleaning clogged areas. See manufacturer's specifications.

h. Check for debris accumulating on pavement, especially debris buildup in winter. For loose debris, a power/leaf blower or gutter broom can be used to remove leaves and trash.

i. In the event that the porous surface becomes clogged, an engineer must be retained to determine how to restore the porous surface to its original condition.

j. Any additional maintenance required per the manufacturer's specifications shall also be completed.

8. Roof Gutters:

a. Remove accumulated debris and inspect for damage. Any damage should be repaired as required.

b. Splash pads must be cleared of debris and have any erosion repaired and the cause addressed.
**Disposal of Debris and Sediment:**

All debris and sediment removed from the stormwater structures and bioretention/biofiltration basins shall be disposed of legally. There shall be no dumping of silt or debris into or in proximity to any inland or tidal wetlands.

**Maintenance Records:**

The Owners(s) must maintain all records (logs, invoices, reports, data, etc.) and have them readily available for inspection at all times.
Exhibit B
Improvement Location Survey

To be submitted at a later date.
Operations and Maintenance Log (Page 1 of 4)
2 Vista Drive
March 19, 2020

Type of Inspection: □ Spring □ Fall □ Other

Inspector’s Name: ___________________________ Date of Inspection: ___________
Affiliation: ___________________________ Phone #: ___________________________

Catch Basins & Drainage Inlets:
- Has accumulated debris been removed from grates? □ Yes □ No □ N/A
- Do any basins require additional repair? (identify below): □ Yes □ No □ N/A
- Have sumps been cleaned of sediment? □ Yes □ No □ N/A

Notes:

Storm Drainage Piping and Manholes/Junction Boxes:
- Has accumulated debris been removed? □ Yes □ No □ N/A
- Do any manholes require additional repair? (identify below): □ Yes □ No □ N/A
- Is there any evidence of stormwater piping failure? □ Yes □ No □ N/A
- Has a comprehensive video inspection been completed? □ Yes □ No □ N/A

Notes:
# Operations and Maintenance Log (Page 2 of 4)

2 Vista Drive  
March 19, 2020

## Stormwater Control Structures:
- Has accumulated debris been removed? □ Yes □ No □ N/A  
- Are any repairs required? (Identify below): □ Yes □ No □ N/A  
- Have orifices and weirs been cleaned of debris? □ Yes □ No □ N/A  

### Notes:

## Drainage Outfalls/Splash Pads/Scour Holes/Level Spreaders:
- Have all drainage outlets been cleared of debris? □ Yes □ No □ N/A  
- Have all outlet protections been inspected/repaired? □ Yes □ No □ N/A  
- Have all erosion issues been repaired? □ Yes □ No □ N/A  

### Notes:

## Bioretention/Biofiltration Basins/Rain Gardens:
- Have basins been cleared of debris/sediments? □ Yes □ No □ N/A  
- Have draining times of basins been verified? □ Yes □ No □ N/A  
- Has vegetation been mowed (twice/year max.)? □ Yes □ No □ N/A  
- Has plantings and mulch been replaced (twice/year)? □ Yes □ No □ N/A  

### Notes:
Drywells and Infiltration Systems:

- Have units been cleared of debris/sediments? □ Yes □ No □ N/A
- Do units require additional repair? (identify below): □ Yes □ No □ N/A
- Have draining times of system been verified? □ Yes □ No □ N/A

Notes:

Porous Pavement:

- Has pavement been cleared of debris/sediments? □ Yes □ No □ N/A
- Has pavement been vacuumed? □ Yes □ No □ N/A
- Have draining times been verified? □ Yes □ No □ N/A

Notes:

Roof Gutters:

- Has accumulated debris been removed from gutters? □ Yes □ No □ N/A
- Do any gutters require additional repair? (identify below): □ Yes □ No □ N/A
- Have splash pads been cleared of debris and erosion repaired? □ Yes □ No □ N/A

Notes:
Operations and Maintenance Log (Page 4 of 4)
2 Vista Drive
March 19, 2020

Please make additional notes/observations and particular concerns below. Also, record any additional maintenance that has been performed:

Signature of Inspector: ___________________________ Date: ___________________________
WEN RESIDENCE
2 VISTA DRIVE | GREENWICH | CT
JUNE | 2020

LANDSCAPE PLAN

LEGEND
1. ENTRY COURTYARD
2. FRONT PLANTINGS
3. NATIVE WETLAND AND WOODLAND PLANTINGS
4. PRIVACY PLANTINGS AND FENCE
5. ESPALIER
6. HEDGED GARDEN WITH SEATING AND FLOWERING PLANTS
7. GREAT LAWN
8. NO MOW FESCUE MEADOW WITH NATIVE FLOWERING PERENNIALS
9. TERRACE
10. RETAINING WALLS

NATIVE PLANTINGS
- ARAUCARIA
- FALSE INDIGO
- RED BANE BERRY
- OSTRICH FERN
- VIRGINIA BLUEBELLS
- WINTER THURVIBURNUM
- ROSEBAY RHODODENDRON
- REDTWIG DOGWOOD
- PIN OAK
- BLACKGUM TREE
- WINTERBERRY
- SPICEBUSH
- WITCHHazel
- MOUNTAIN LAUREL
- SERVICEBERRY
- AMERICAN HOLLY

SCALE: 1” = 20’