



Ascutney Professional Building, Route 5  
Post Office Box 320, Ascutney, VT 05030  
802 674-9201 / fax 802 674-5711  
[www.swcrpc.org](http://www.swcrpc.org)

## **REQUEST FOR PROPOSALS (RFP)**

# **DEVELOPMENT OF PRELIMINARY AND FINAL ENGINEERING DESIGN PLANS FOR STORMWATER INFRASTRUCTURE IN WINDSOR, VERMONT**

RFP Issued.....May 5, 2020

Deadline to submit questions.....May 20, 2020 by 5:00 PM

Deadline for submissions.....June 5, 2020 by 5:00 PM

Prepared by:

**Southern Windsor County Regional Planning Commission  
Post Office Box 320  
38 Ascutney Park Road  
Ascutney, Vermont 05030**

The Southern Windsor County Regional Planning Commission (hereinafter “SWCRPC”) and the Town of Windsor (hereinafter “the Town”) invite qualified firms to submit proposals for the development of stormwater infrastructure engineering design plans to better manage stormwater runoff from County Road and the Mount Ascutney Hospital property in Windsor.

Three (3) sealed Technical Proposals and three (3) separately sealed Cost Proposals, as well as one (1) electronic copy (such as on a thumb drive or compact disk) of each must be mailed to:

Southern Windsor County Regional Planning Commission  
Attn: Chris Yurek  
Post Office Box 320  
38 Ascutney Park Road  
Ascutney, Vermont 05030-0320

Proposals must be received by no later than the response deadline of Friday, June 5, 2020 by 5:00 PM Eastern Standard Time (EST). Late proposals will not be considered.

## **I. BACKGROUND**

Paradise Park is located adjacent to County Road and Mount Ascutney Hospital in Windsor, Vermont. A massive stormwater gully has formed beneath the outlet of a cross culvert that discharges runoff from County Road and the hospital property to the Park. This ongoing erosion is causing sediment and nutrient pollution in nearby Hubbard Brook. The gully is presumed to have formed as a result of the large volume of runoff discharging from the culvert, in tandem with the presence of highly erodible soils in the Park.

The Project Partners agree that a necessary first step to address the issue is to mitigate the volume of runoff flowing into the cross culvert beneath County Road. In 2018, Fitzgerald Environmental Associates (FEA) was retained by the Town to carry out a preliminary assessment and scoping of projects to mitigate the volume of runoff directed to the culvert. A memo summarizing those identified projects is attached to this RFP. SWCRPC and the Town seek proposals from qualified firms to begin engineering some of the identified projects.

This project is a collaborative effort between the SWCRPC, the Town of Windsor, the Vermont Department of Environmental Conservation (DEC), the Paradise Park Commission (PPC), and the Mount Ascutney Hospital and Health Center.

## **II. ANTICIPATED SCOPE OF WORK & DELIVERABLES**

The Selected Consultant will review the above referenced and attached June 15, 2018 memo from Fitzgerald Environmental Associates to the Town of Windsor and work with the project stakeholders to prioritize the top four (4) projects outlined in the memo. Projects will be discussed and selected at a project kick-off meeting to be convened by SWCRPC and facilitated by the Selected Consultant. In light of current social distancing guidelines due to the COVID-19 pandemic, this kick-off meeting will likely be held on a Zoom session or other similar remote meeting platform.

Upon selection of the top four projects, the Selected Consultant shall begin preparing engineering design plans. The top prioritized project will be engineered up to 100% final design. The remaining three (3) projects shall be engineering to the 30% preliminary level. Design completion levels shall be generally

guided by the definitions outlined in the *Ecosystem Restoration Design Terminology and Guidance Document, revised June 24, 2014*. That guidance is available [here](#). Please note that this guidance is tailored to very high-cost, complex projects, but is intended to be scalable based on project complexity. We anticipate that the projects under the scope of this effort would be defined by the guidance document as of “intermediate” complexity or less, therefore most of the bullet points outlined in this guidance will not apply. We intend to defer to the judgement of the Selected Consultant to decide which elements of this guidance document are appropriate for each of the four projects. However, each design report must contain, at a minimum, all of the information outlined under deliverable 3 in the table below.

Each stormwater treatment practice (STP) must be designed to meet or exceed the Stormwater Treatment Standards outlined in the *2017 Vermont Stormwater Management Manual Rule*. The Manual is available [here](#).

A list of the project milestones and required deliverables is provided below. Proposals offering a timelier schedule may be evaluated more favorably.

MILESTONE		DELIVERABLE	DUE DATE
1	Kick-off meeting	Meeting minutes	June 19, 2020
2	Determination of required permits	Memo documenting required permits for project implementation, indicating potential challenges/conflicts for obtaining permits (if applicable) and project locator map	July 10, 2020
3	One 100% final engineering design plan and three 30% preliminary design plans completed	One (1) Final Design Report and three (3) Preliminary Design Reports. Each report must include, at a minimum, each of the following: <ul style="list-style-type: none"> <li>1. Engineered drawings</li> <li>2. Construction cost estimate with a level of effort document</li> <li>3. Modeled pollutant load reduction estimates (phosphorus and nitrogen required, sediment a plus)</li> <li>4. Soil infiltration rate (if applicable)</li> <li>5. STP storage volume</li> <li>6. STP contributing drainage area (including pervious vs impervious contributing acreage)</li> <li>7. Written landowner commitment to next project phase (to be provided by SWCRPC for inclusion in the reports)</li> </ul>	April 1, 2021

All electronic files, supporting data, GIS layers and documents generated by the retained consultant in the performance of this contract shall become the property of the SWCRPC and the State of Vermont. The Selected Consultant may retain copies of all files and documents.

### III. REQUIRED PROPOSAL CONTENT

Firms responding to this RFP shall provide a completed Scope of Services as needed to complete the Scope of Work described herein. The proposal shall contain the following sections:

- A. TECHNICAL PROPOSAL: Technical Proposals should contain the following:

1. Cover letter
  2. Qualifications: Describe the Firm's related experience in design and permitting of stormwater management and treatment infrastructure.
  3. Scope of Work: A Scope of Work for the project detailing the consultant's proposed approach to addressing the tasks detailed in the RFP.
  4. Proposed Schedule: The schedule should include completion date of each deliverable as well as any key meetings. This project shall be substantially complete by no later than April 1, 2021.
  5. Management Structure: Discuss project management structure and relate the job categories listed in the Cost Proposal to the project tasks and deliverables.
  6. References: Please provide a minimum of two (2) references for clients provided with similar services, including name, telephone number, and email address of the contact person.
  7. Resumes of key staff
- B. COST PROPOSAL: Cost information shall be included with the Proposal. The following information, listing the prime consultant and each sub-consultant separately, shall be submitted (NOTE: The maximum payment to the Selected Consultant shall not exceed \$22,500):
1. A schedule of staff to be assigned to the project, their hourly rates, and estimated hours per person by task.
  2. Overhead rates, travel, fees, mileage reimbursement, etc.
  3. Overall project cost.
- C. PROOF OF INSURANCE: Proposals should include proof of general liability and property damage insurance, having all major divisions of coverage including:
- Premises – Operations
  - Independent Contractor's Protective Products and Completed Operations
  - Personal Injury Liability
  - Contractual Liability
- The policy shall be on an occurrence form and limits shall not be less than:
- \$1,000,000 per Occurrence
  - \$1,000,000 General Aggregate
  - \$1,000,000 Products/Completed Product Aggregate

#### IV. BUDGET

Funding for this project is provided by a grant through the Vermont Agency of Natural Resources (VT ANR) Department of Environmental Conservation (DEC) Ecosystem Restoration Program (ERP) Grant Number 2020-CWF-D-1-09. The budget shall not exceed **\$22,500**.

#### V. REVIEW OF WRITTEN PROPOSALS

All proposals will be evaluated using the criteria listed below by a selection committee composed of staff of the SWCRPC, the Town of Windsor, and the Vermont Department of Environmental Conservation. Proposals will be ranked based upon the following criteria:

- Relevant qualifications of the firm and the personnel to be assigned to the project (30 pts)
- Demonstrated understanding of and experience in stormwater infrastructure engineering design and permitting in Vermont and demonstrated understanding of the project deliverables (40 pts)
- The relative value and number of hours that the consultant will put into the project based upon the information contained in the Cost Proposal section of the submission (30 pts)

The SWCRPC reserves the right to seek clarification of any proposal submitted and to select the proposal considered to best promote the public interest. All proposals become the property of the SWCRPC upon submission. The cost of preparing and submitting a proposal is the sole expense of the consultant. The SWCRPC reserves the right to accept or reject any and all proposals received as a result of this solicitation, to negotiate with any qualified source, to waive any formality and any technicalities or to cancel the RFP in part or in its entirety if it is in the best interest of the SWCRPC. This solicitation of proposals in no way obligates the SWCRPC to award a contract.

If any proposer is aggrieved by the proposed award of the contract, they may appeal in writing, via U.S. Mail or Delivery Service or via email to the SWCRPC at:

Southern Windsor County Regional Planning Commission  
 Attn: Chris Yurek  
 Post Office Box 320  
 38 Ascutney Park Road  
 Ascutney, Vermont 05030-0320  
 E-mail: [cyurek@swcrpc.org](mailto:cyurek@swcrpc.org)

The appeal must be postmarked or sent within fourteen (14) calendar days following the date of the written notice to award the contract.

Proposals must be received by no later than the response deadline of Friday, June 5, 2020 by 5:00 PM EST. Late proposals will not be considered. If you have any questions pertaining to the RFP or desire additional information, please contact Chris Yurek at [cyurek@swcrpc.org](mailto:cyurek@swcrpc.org) by no later than Wednesday, May 20, 2020 by 5:00 PM EST.

RFP TIMELINE	
STEP	DATE
1. RFP Issued	May 5, 2020
2. Questions regarding RFP due to SWCRPC	May 20, 2020 by 5:00 PM
3. SWCRPC responds to questions	May 22, 2020
4. Proposals due to SWCRPC	June 5, 2020 by 5:00 PM

## VI. CUSTOMARY STATE GRANT PROVISIONS

Please note that the Contract will be subject to the following State flow-down provisions:

- A. Fair Employment Practices and Americans with Disabilities Act: CONSULTANT agrees to comply with the requirement of 21 V.S.A. Chapter 5, Subchapter 6, relating to fair employment practices, to the full extent applicable. CONSULTANT shall also ensure, to the full extent required by the Americans with Disabilities Act of 1990, as amended, that qualified individuals

with disabilities receive equitable access to the services, programs, and activities provided by the CONSULTANT under this Agreement.

- B. False Claims Act: The CONSULTANT acknowledges that it is subject to the Vermont False Claims Act as set forth in 32 V.S.A. § 630 et seq. If the CONSULTANT violates the Vermont False Claims Act it shall be liable to the State for civil penalties, treble damages and the costs of the investigation and prosecution of such violation, including attorney's fees, except as the same may be reduced by a court of competent jurisdiction. The CONSULTANT's liability to the State under the False Claims Act shall not be limited notwithstanding any agreement of the State to otherwise limit CONSULTANT's liability.
  
- C. Whistleblower Protections: The CONSULTANT shall not discriminate or retaliate against one of its employees or agents for disclosing information concerning a violation of law, fraud, waste, abuse of authority or acts threatening health or safety, including but not limited to allegations concerning the False Claims Act. Further, the CONSULTANT shall not require such employees or agents to forego monetary awards as a result of such disclosures, nor should they be required to report misconduct to the CONSULTANT or its agents prior to reporting to any governmental entity and/or the public.
  
- D. Taxes Due to the State:
  - 1. CONSULTANT understands and acknowledges responsibility, if applicable, for compliance with State tax laws, including income tax withholding for employees performing services within the State, payment of use tax on property used within the State, corporate and/or personal income tax on income earned within the State.
  - 2. CONSULTANT certifies under the pains and penalties of perjury that, as of the date the Agreement is signed, the CONSULTANT is in good standing with respect to, or in full compliance with, a plan to pay any and all taxes due the State of Vermont.
  - 3. CONSULTANT understands that final payment under this Agreement may be withheld if the Commissioner of Taxes determines that the CONSULTANT is not in good standing with respect to or in full compliance with a plan to pay any and all taxes due to the State of Vermont.
  - 4. CONSULTANT also understands the State may set off taxes (and related penalties, interest and fees) due to the State of Vermont, but only if the CONSULTANT has failed to make an appeal within the time allowed by law, or an appeal has been taken and finally determined and the CONSULTANT has no further legal recourse to contest the amounts due.
  
- E. Child Support: (Only applicable if the CONSULTANT is a natural person, not a corporation or partnership.) CONSULTANT states that, as of the date this Agreement is signed, he/she:
  - 1. is not under any obligation to pay child support; or

2. is under such an obligation and is in good standing with respect to that obligation;  
or,
3. has agreed to a payment plan with the Vermont Office of Child Support Services and is in full compliance with that plan.

CONSULTANT makes this statement with regard to support owed to any and all children residing in Vermont. In addition, if the CONSULTANT is a resident of Vermont, CONSULTANT makes this statement with regard to support owed to any and all children residing in any other state or territory of the United States.

- F. No Gifts or Gratuities: CONSULTANT shall not give title or possession of anything of substantial value (including property, currency, travel and/or education programs) to any officer or employee of the State during the term of this Agreement.
- G. Certification Regarding Debarment: CONSULTANT certifies under pains and penalties of perjury that, as of the date that this Agreement is signed, neither CONSULTANT nor CONSULTANT's principals (officers, directors, owners, or partners) are presently debarred, suspended, proposed for debarment, declared ineligible or excluded from participation in Federal programs, or programs supported in whole or in part by Federal funds.

CONSULTANT further certifies under pains and penalties of perjury that, as of the date that this Agreement is signed, CONSULTANT is not presently debarred, suspended, nor named on the State's debarment list at: <http://bgs.vermont.gov/purchasing/debarment>

- H. Certification Regarding Use of State Funds: If CONSULTANT is an employer and this Agreement is a State-funded Grant in excess of \$1,001, CONSULTANT certifies that none of these State funds will be used to interfere with or restrain the exercise of CONSULTANT's employee's rights with respect to unionization.
- I. State Facilities: If the State makes space available to the CONSULTANT in any State facility during the term of this Agreement for purposes of the CONSULTANT's performance under this Agreement, the CONSULTANT shall only use the space in accordance with all policies and procedures governing access to and use of State facilities which shall be made available upon request. State facilities will be made available to CONSULTANT on an "AS IS, WHERE IS" basis, with no warranties whatsoever.
- J. Location of State Data: No State data received, obtained, or generated by the CONSULTANT in connection with performance under this Agreement shall be processed, transmitted, stored, or transferred by any means outside continental United States, except with the express written permission of the State.
- K. Subconsultants: CONSULTANT shall not assign or subcontract the performance of this agreement or any portion thereof to any other consultant without the prior written approval of the State. CONSULTANT also agrees to include in all subcontract agreements a tax certification in accordance with section D above.



## Fitzgerald Environmental Associates, LLC.

Applied Watershed Science & Ecology

### MEMORANDUM

**To:** Town of Windsor  
**From:** Evan Fitzgerald, Evelyn Boardman, and Joe Bartlett  
**Re:** Paradise Park Stormwater and Flooding Concerns  
**Date:** June 15, 2018

#### Introduction

Fitzgerald Environmental Associates (FEA) was retained by the Town of Windsor (Town) to conduct watershed mapping, field survey, reporting, and grant scoping to address sediment loading, poor water conveyance, and water quality problem areas in Paradise Park and the lower Hubbard Brook watershed. FEA has reviewed existing watershed mapping of drainage features and erosion potential from various sources. FEA has conducted field survey of the drainage channels in the area between Juniper Hill Road, the north dike of Lake Runnemedede, and the culvert carrying Hubbard Brook beneath Route 5. FEA has identified erosion hazards and stormwater BMP opportunities in Paradise Park and the areas draining to the park (i.e., Mount Ascutney Hospital). Below is a summary of work completed to date and recommended next steps.

#### Background and Areas of Concern

##### Hubbard Brook and Tributary Between Juniper Hill Road and Route 5

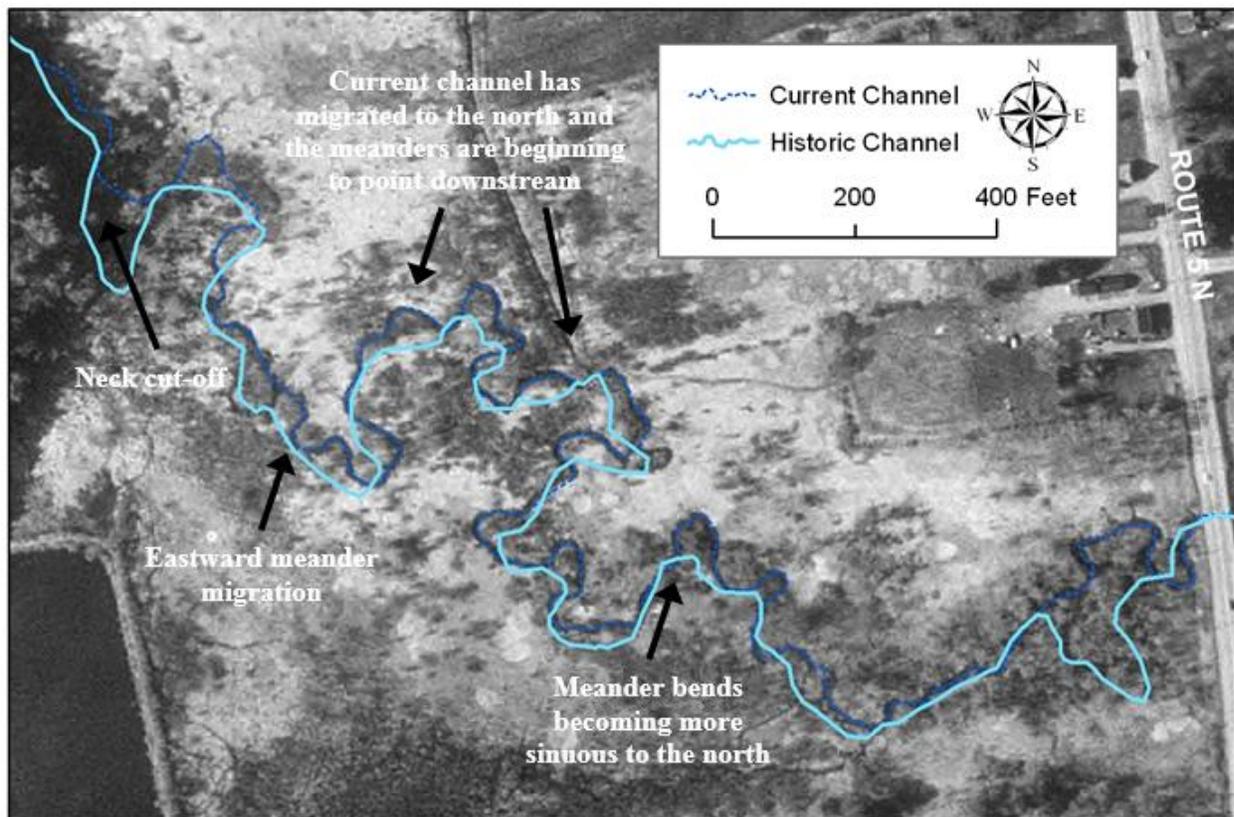
An undersized culvert conveying a tributary to Hubbard Brook underneath Juniper Hill Road culvert was replaced during sewer line upgrades. The replacement culvert was installed four feet above the invert elevation of the previous culvert to provide one foot of vertical distance between the culvert bottom and the new sewer line. The replacement culvert, 24"-diameter CPP, is undersized. The 2016 hydraulic study for the site by Northstar Hydro, Inc. recommended upsizing the 24"-diameter culvert at the site to a structure (or side-by-side structures) with at least 9 square feet of waterway area. The tributary channel downstream of the culvert has a maintenance history that includes beaver dam removal and dredging as well as a berm that appears recently man-made separating the tributary channel from Hubbard Brook.



Juniper Hill Road Culvert Inlet (24" CPP)

The reference stream type for the lower reach of Hubbard Brook (M01) is an E-type channel characterized by low slope, high sinuosity and a wide accessible floodplain (FEA 2008). Phase 1 geomorphic assessment described reach M01 as having 0.28% slope channel, a typical channel width of 29.4 feet and a typical valley width of 464 feet. Aerial imagery from the 1960's shows the lower reach of Hubbard Brook was

historically used for agriculture and likely straightened, but the reach within Paradise Park has since returned to a wetland and become more sinuous.



Previous FEA study of Hubbard Brook showing changes in channel planform between 1963 and 1994 on Hubbard Brook in the area of interest (FEA 2008).

#### Valley Toe Channel Between Hubbard Brook and Lake Runnemede

A channel north of Lake Runnemede is impounded by beaver terraces near the north dike of the lake. During the elevated flow conditions caused by Tropical Storm Irene, the channel was observed to convey floodwaters toward the lake. During baseflow conditions the water flowing southward into the lake through this small channel originates from hillslope seepage, not flow from Hubbard Brook.

#### Paradise Park Stormwater Erosion Hazards

The Paradise Park commission has identified problems with gully erosion and trailside erosion on the western side of the park, near County Road. The northern gully east of the Hospital is a significant source of sediment and is likely degrading water quality downstream and into the Connecticut River. In addition, this mass of sediment moving through lower Hubbard Brook contributes to some of the poor water conveyance issues around Juniper Hill Road, as sediment is being deposited in this zone. Attempts to address the erosion in the Park include recent rock lining of a ditch near the park entrance for stability. Runoff from County Road, Mount Ascutney Hospital, as well as Paradise Park infrastructure (parking, trails, etc.) contribute to the stormwater erosion problem areas.



### Field Survey of Lower Hubbard Brook and Tributary

FEA surveyed a longitudinal profile of the tributary from Juniper Hill road to the confluence with Hubbard Brook using an auto-level and a sub-meter GPS unit. Flow paths and directionality were also identified and recorded in the area of interest, including from Hubbard Brook to the tributary and in the area near the north dike of Lake Runnemedede. The longitudinal profile includes the Juniper Hill Road culvert, the tributary channel, a side channel to the tributary with a significant headcut, and Hubbard Brook from a berm at the historical confluence with the tributary channel to the current confluence (See Longitudinal Profile, Attachment). A map showing the directionality of flow in the area of interest is attached (See Map 1, Attachment). The locations of two historic beaver dams in a 2007 map obtained from the Town are also shown on the flow direction map. It is important to note that our field surveys were conducted under elevated flow conditions, comparable to water levels during spring melt or following small to moderate rain events.



Ponded water in the Hubbard Brook tributary downstream of Juniper Hill Road.



Manmade berm separating the tributary (foreground) from Hubbard Brook (background) at the historical confluence.

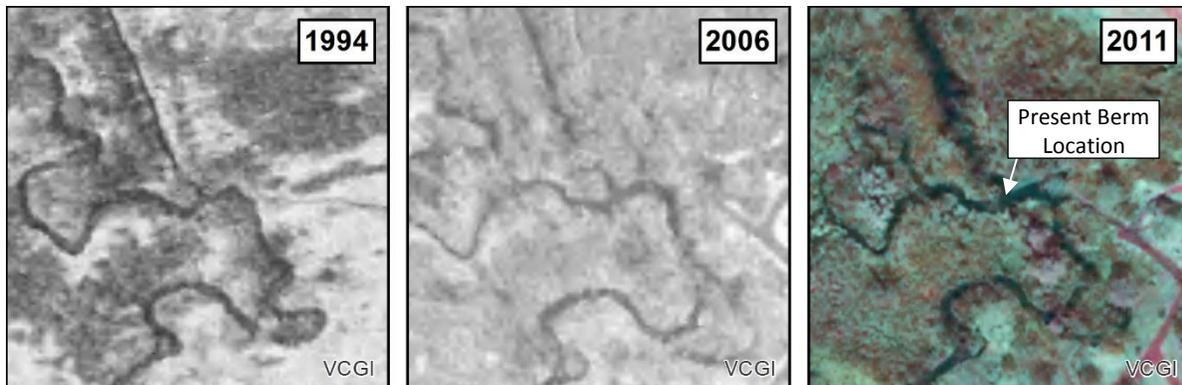


Flow from Hubbard Brook is directed across the floodplain toward the tributary channel, likely increasing its water level.

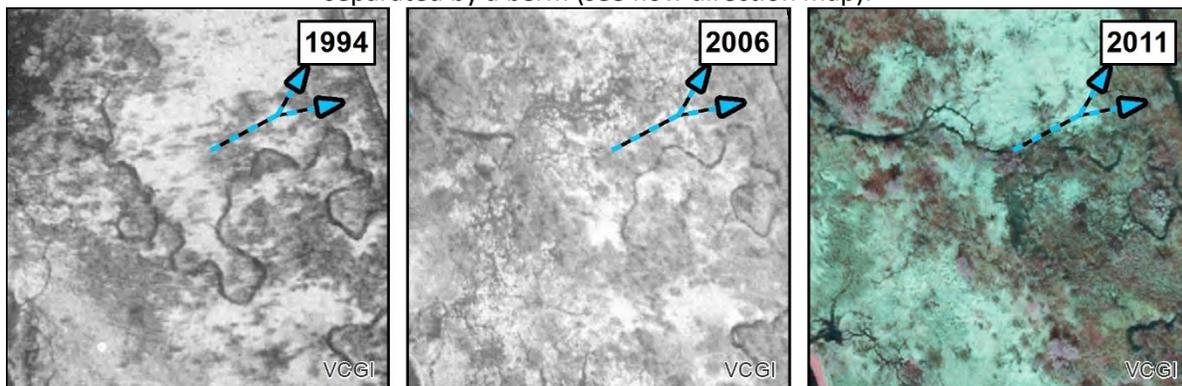


Large black willow and debris cause Hubbard Brook to split. Approximately 20% of flow fans out across the floodplain toward the tributary.





Historical confluence of the tributary with Hubbard Brook, where the two channels are currently separated by a berm (see flow direction map).



Area where a black willow and debris cause Hubbard Brook to split, with overbank flow over the floodplain (blue arrows) currently traveling to the tributary. The flow split area appears to have become the main channel between 2006 and 2011 due to a neck cutoff along the sinuous channel to the south visible in the 1994 imagery.

*Conclusions:*

- The water level at Juniper Hill Road is controlled by a hump in the channel bed near the former confluence of the tributary with Hubbard Brook, which are now separated by a manmade berm (890 ft distance on Longitudinal Profile, Attached). Under most flow conditions, water is pooled in the tributary channel upstream of this location. The culvert beneath Juniper Hill Road has little to no effect on the ponding of water upstream (north) of the road during most flow conditions.
- The berm separating Hubbard Brook and the tributary at their historic confluence may have originated as a beaver dam or have been built in response to historic beaver activity in the vicinity (see aerial imagery above). The berm slightly elevates the water level in the tributary by separating it from the Hubbard Brook channel, which itself has a lower elevation. This directs more water into a channel with an actively eroding headcut that receives approximately 40% of the tributary's flow.
- Based on our surveyed tributary profile, the water level around Juniper Hill Road during low flow conditions is expected to be at the bottom elevation of the culvert. This is consistent with Town staff observations since the culvert was replaced.
- A large black willow has accumulated debris and dammed Hubbard Brook to the west of the tributary. The channel likely changed course in the last 10-15 years, redirecting flow toward this



area (see aerial imagery above). The willow causes the flow to split, with approximately 20% of the water from Hubbard Brook fanning out across the floodplain toward the tributary. This increases the volume of water in the tributary channel, exacerbating the ponding experienced by the properties alongside the channel and upstream of Juniper Hill Road.

- The channel along the toe of the valley wall which feeds the beaver impoundments on the northern edge of Lake Runnemedede is fed by water seeping from the hillslope, not Hubbard Brook. At very high flows (i.e. Tropical Storm Irene), water from the brook likely overflows into this channel and makes its way to the lake.
- There is no clear solution to the flooding of the land adjacent to the tributary and along Juniper Hill Road. The homes and lawns are adjacent to the wetland, where the naturally sinuous channel is likely change course and become dammed by beavers, sediment, and vegetation. Management of channels and alteration of the wetland to alleviate nuisance flooding is not likely to be permitted by state and federal regulatory agencies under current rules and policy.

### Mount Ascutney Hospital & County Road Right-of-Way

Evan Fitzgerald met with Hospital representatives and the Windsor Town Manager on May 29, 2018 to discuss the history of stormwater treatment features on the property and explore further opportunities for retrofit stormwater practices at the site and within the Town’s right-of-way along County Road. State stormwater infrastructure mapping was discussed and subwatershed drainage boundaries were revised based on field observations (See Map 2, Attachment). The Hospital’s permitted detention basin treats much of the area to the west of the building; however, it is unclear whether the pond meets all current VTANR Stormwater criteria (i.e., water quality volume, channel protection volume, etc.) for the contributing drainage area. It is likely some of the impervious surface draining to this pond, as well as other untreated impervious areas on the Hospital campus, will fall under VTANR’s forthcoming “3-acre rule” permit. This permit will likely require stormwater retrofits in the future on the campus.

Five (5) potential projects were identified to slow and treat runoff from the Hospital property and along County Road. They are summarized below in Table 1 and correspond to the best management practices (BMP) identified on Map 2. Photographs of each area are provided on the following pages.

**Table 1:** Mount Ascutney Hospital and County Road Right-of-Way Stormwater Retrofit Opportunities

BMP	Landowner	Retrofit Best Management Practice (BMP) Description
1	Hospital	An existing swale along northern parking lot shows signs of erosion. Install stone check dams to slow runoff and encourage infiltration. Establish grass in the ditch. This practice would reduce the volume of stormwater volume directed to the large gully in Paradise Park.
2	Hospital/Town	Runoff from the Hospital’s northern parking lot is carried by a swale and discharged to the County Road right-of-way to the east. Some runoff from County Road enters this area from the north. Install an infiltration practice to handle small to moderate runoff events. This practice would reduce the volume of stormwater volume directed to the large gully in Paradise Park.
3	Hospital/Town	The grassed swale along County Road is steep (approx. 7%) but stable and appears to have sandy underlying soils. Consider installing 3 to 4 earthen, grassed check dams to slow runoff and encourage infiltration. Check dams would have subtle grades to



**Table 1: Mount Ascutney Hospital and County Road Right-of-Way Stormwater Retrofit Opportunities**

BMP	Landowner	Retrofit Best Management Practice (BMP) Description
		facilitate uninterrupted mowing along the right-of-way and Hospital property. This practice would reduce the volume of stormwater directed to the large gully in Paradise Park.
4	Hospital	A stone-lined swale along the Hospital entrance is stable but very shallow. Consider deepening the swale to provide more conveyance capacity. The swale should have a minimum depth of 1 foot. Existing stone size/gradation appears adequate and can be repurposed. Avoid geotextile fabric beneath stone as the native soils likely provide adequate coarse gravel/sand bedding.
5	Hospital/Town	A paved swale along County Road receives runoff from the Hospital property and the road. The swale causes high runoff velocity to downstream areas, exacerbating erosion during larger storm events where it discharges across the road to Paradise Park. Remove the pavement, return to grass, and install a series of stone check dams to slow runoff and encourage infiltration in the underlying sandy soils.



BMP #1: Swale along north side of Hospital.



BMP #2: Looking north along County Road with potential BMP location to left.



BMP #3: Upper swale along County Road.



BMP #4: Stone-lined swale along Hospital entryway.





BMP #5: Looking south along paved swale along County Road.

### Paradise Park Erosion Problem Areas

Evan Fitzgerald, with assistance from Marv Klassen-Landis of the Paradise Park Commission (PPC), made observations of stormwater erosion problem areas within Paradise Park. Five (5) problem areas were identified and potential mitigation strategies or ideas for further exploration were outlined for each site (See Map 3, Attachment). A summary of these areas follows in Table 2.

**Table 2:** Paradise Park Stormwater Problem Area Observations

Problem Area	Problem Area Description
1	A stone lined swale carries runoff from the Paradise Park parking lot before discharging toward Kimball Brook. The swale is approx. 15 feet long and 3 feet wide with little to no depth. The swale could be made wider/deeper to capture sediment from the Paradise Park parking lot. Suggested dimensions are 20 feet long, 7-8 feet wide, and 1 foot deep, with a sump and check dam to capture sediment. There appears to be space for this feature while maintaining the driveway entrance through the gate.
2	A turnout carrying Carriage Road runoff is eroding and incised down the bank to Kimball Brook. To stabilize incision and slow runoff, 2-3 cubic yards of Type I stone and 2 check dams should be added to the conveyance from the edge of the Carriage Road part way down the bank.
3	A new footbridge on the south bank is prone to scour during bankfull flows. Consider anchoring the bridge footings with rebar with stone to keep them from washing away.
4	A 35-foot long and 5-foot high section of the Kimball Brook bank along the east side of the Carriage Road is eroded. The erosion could be stabilized with log or root wad revetments to stabilize the toe of the bank with minimal encroachment.
5	A 1-foot diameter plastic culvert discharging to Kimball Brook near the waterfall has some old erosion at the outlet. Further investigation is advised to determine where the culvert originates from and the extent of its drainage area. This information could be used to estimate how much flow passes through it, and whether erosion is still a concern at the outlet.





PP-1: Swale draining Paradise Park parking lot.



PP-2: Turnout from Carriage Road into Kimball Brook.



PP-3: New footbridge across Hubbard Brook.



PP-4: Bank erosion along Carriage Road and lower Kimball Brook.



PP-5: Pipe outlet draining to Kimball Brook upstream of waterfall.



### Next Steps

- We recommend the Town consider partnering with Mount Ascutney Hospital to pursue funding to design and implement stormwater features on the Hospital campus and along the County Road right-of-way. Potential grant sources include the VTDEC Clean Water Initiative and VTDEC Clean Water Block Grant. The Southern Windsor County Planning Commission may also suggest additional grant funding sources, and/or assist with grant applications. We believe these projects would be reviewed favorably given the severe erosion problems downstream in Paradise Park.
- Consider pursuing funding sources for projects within Paradise Park beyond the Town's ability to implement. The Town and PPC can likely implement PP-1, PP-2, and PP-3 with its own labor, equipment and perhaps volunteer labor from PPC. Further design work is needed for PP-4 and PP-5.
- The 24"-diameter culvert under Juniper Hill Road is undersized. Although its size does not appear to contribute to flooding upstream during normal to moderately elevated flows, it may exacerbate flooding during high flows. The recommendations provided in the hydraulics study (Northstar Hydro, 2016) should be considered to prevent flooding during large events.

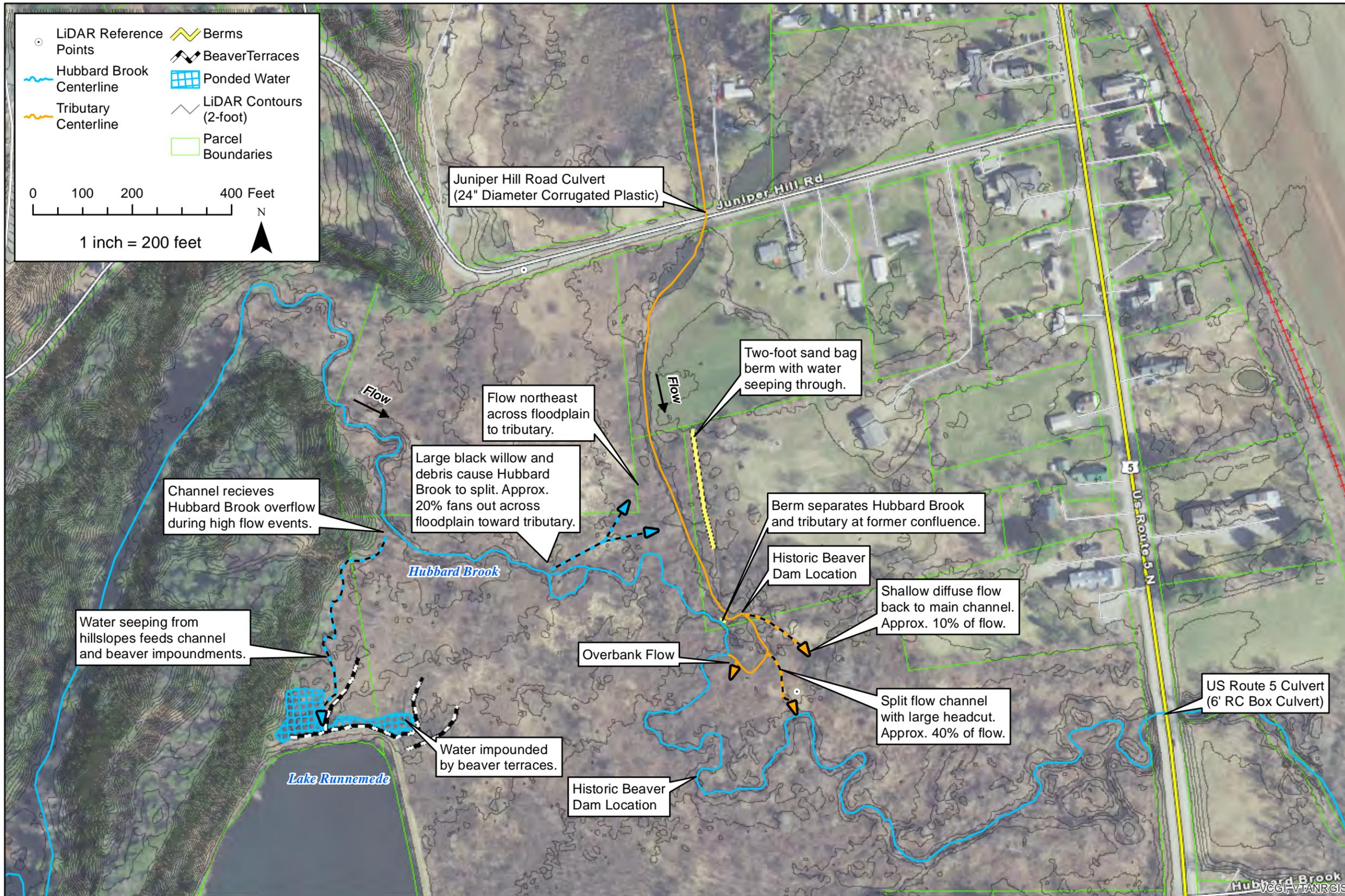
### References

FEA (Fitzgerald Environmental Associates), 2008, Hubbard Brook Phase 1 SGA Summary. Prepared for Southern Windsor County Regional Planning Commission. Dated December 11, 2008.

Northstar Hydro, Inc., 2016, Juniper Hill Road Culvert Hydraulics Study. Submitted to the Town of Windsor and VTrans District 4 on October 21, 2016



**ATTACHMENT**



**Notes:**

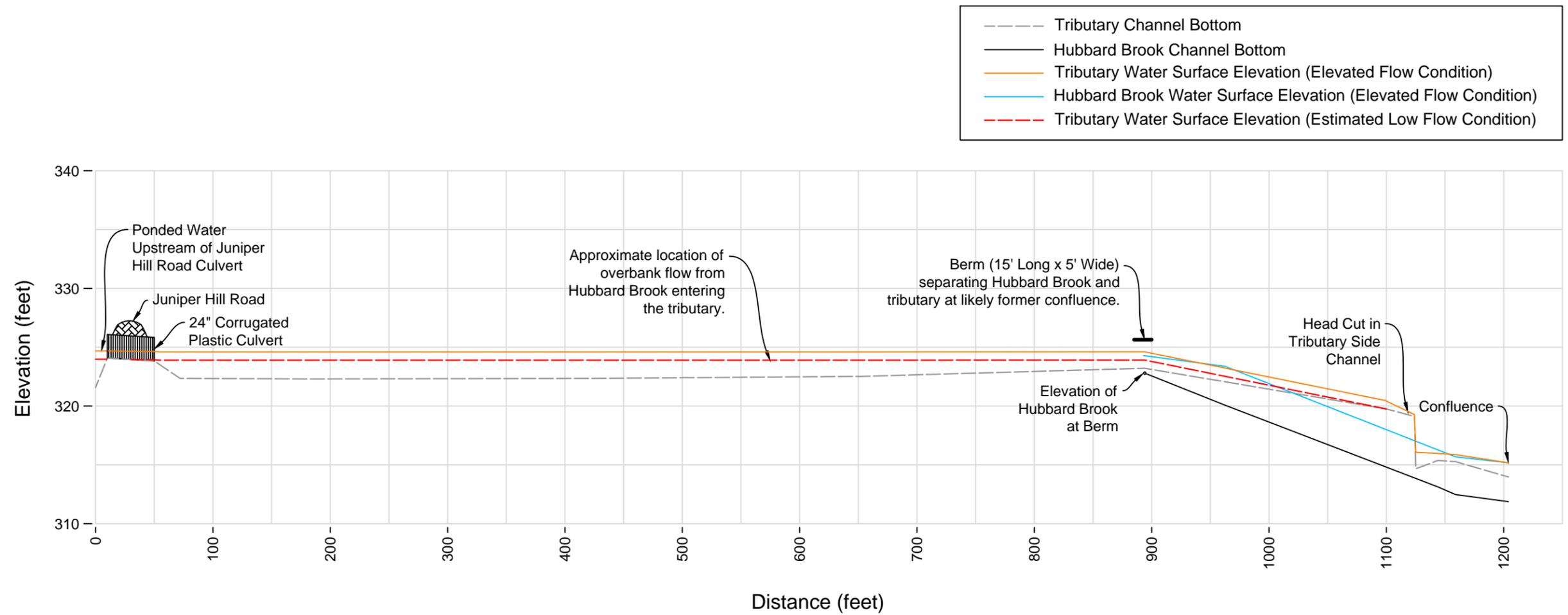
- VCGI imagery is from 2016.
- Contours derived from 2016 Connecticut River LiDAR data (0.7 m).
- Mapping based on observations and field survey on May 2, 2018.

Map By: EHB  
Date: June 12, 2018

# Map 1: Paradise Park Flow Direction Map Windsor, VT

**Fitzgerald Environmental Associates, LLC.**

18 Severance Green, Suite 203  
Colchester, VT 05446  
Tel: 802.876.7778  
www.fitzgeraldenvironmental.com



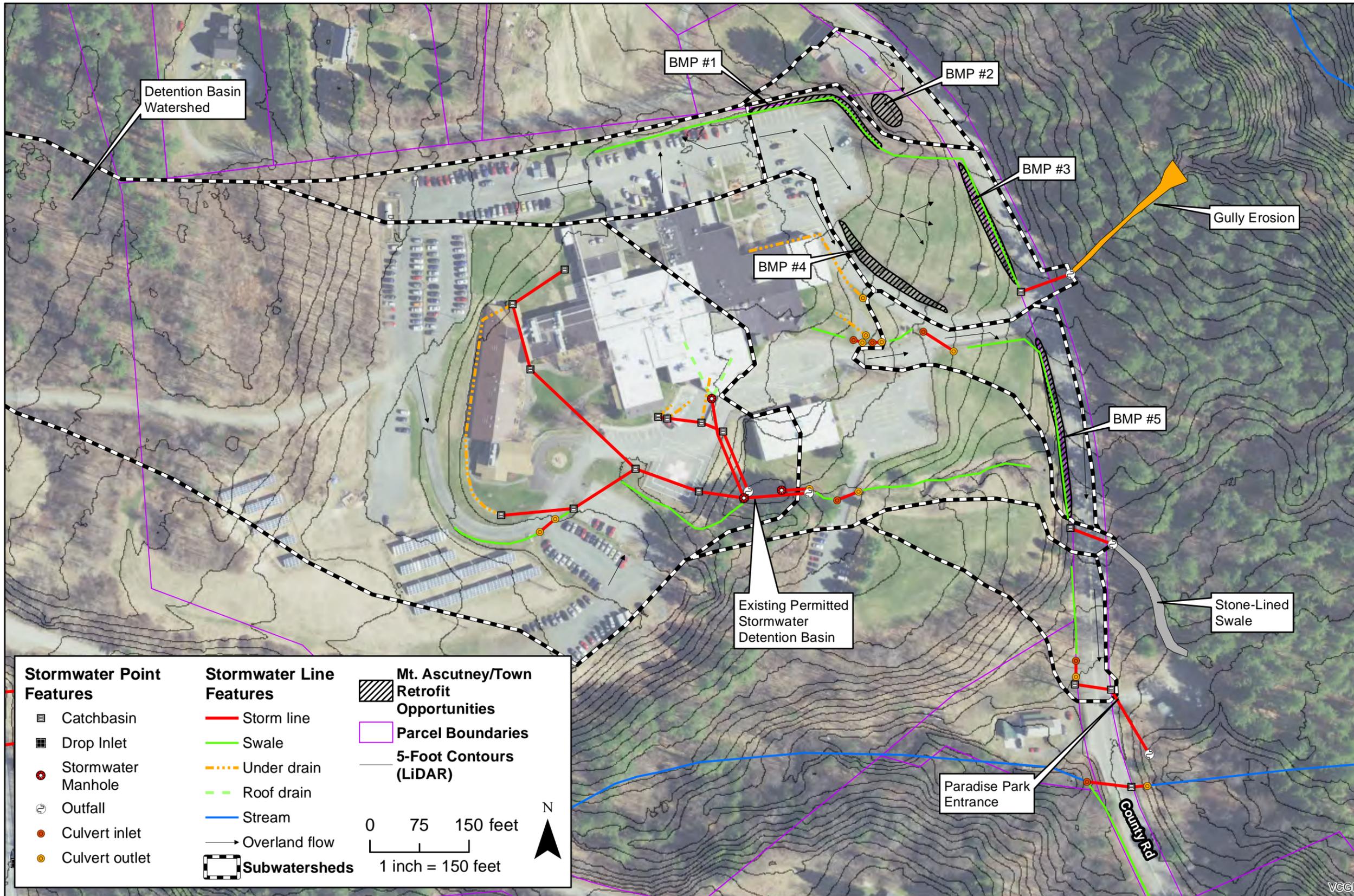
 Fitzgerald Environmental Associates, LLC  
 18 Severance Green, Suite 203  
 Colchester, VT 05446  
 Telephone: 802.876.7778  
[www.fitzgeraldenvironmental.com](http://www.fitzgeraldenvironmental.com)

### Hubbard Brook Tributary Windsor, VT

Vertical Scale: 1"=10'  
 Horizontal Scale: 1"=100'  
 May 15, 2018  
 Drawn: EHB  
 Checked: EPF & JHB

Notes: Existing profile and features based on LiDAR data and field observations. Elevation datum based on LiDAR elevation of points identified during field survey on May 2, 2018.

### Longitudinal Profile



<b>Stormwater Point Features</b>	<b>Stormwater Line Features</b>	<b>Mt. Ascutney/Town Retrofit Opportunities</b>
<ul style="list-style-type: none"> <li>☐ Catchbasin</li> <li>☐ Drop Inlet</li> <li>● Stormwater Manhole</li> <li>⊖ Outfall</li> <li>● Culvert inlet</li> <li>● Culvert outlet</li> </ul>	<ul style="list-style-type: none"> <li>— Storm line</li> <li>— Swale</li> <li>- - - Under drain</li> <li>- - - Roof drain</li> <li>— Stream</li> <li>→ Overland flow</li> <li>☐ Subwatersheds</li> </ul>	<ul style="list-style-type: none"> <li>▨</li> <li>☐ Parcel Boundaries</li> <li>— 5-Foot Contours (LIDAR)</li> </ul>
<p>0 75 150 feet</p> <p>1 inch = 150 feet</p>		<p>N</p>

**Notes:**

- VCGI imagery is from 2016.
- Contours derived from 2016 Connecticut River LIDAR data (0.7 m).
- Stormwater infrastructure mapping from VT ANR. Updated by FEA based on field visits in May 2018.

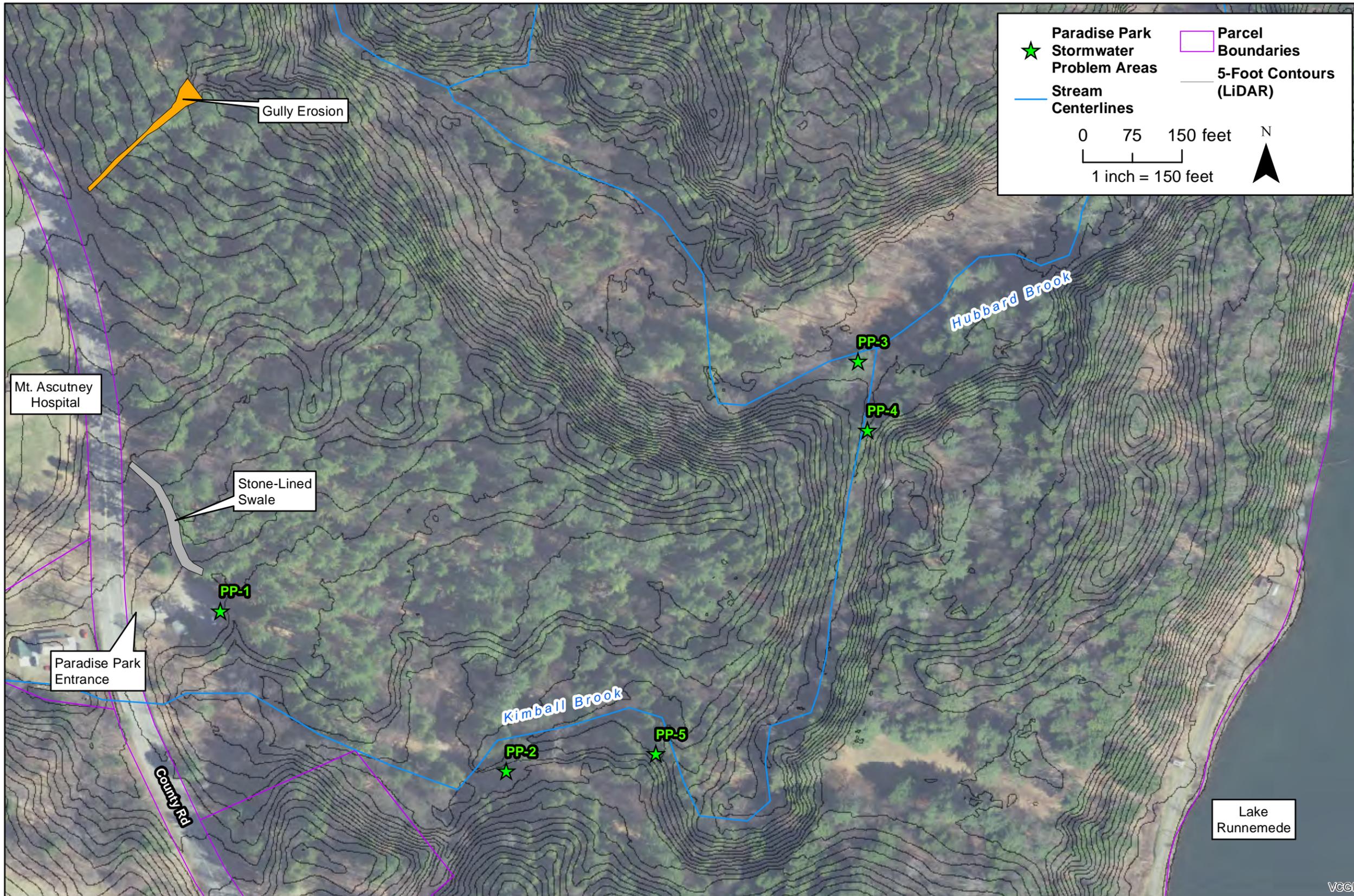
**Map By:** EHB    **Date:** June 12, 2018

## Map 2: Paradise Park & Mt. Ascutney Hospital Windsor, VT

**Fitzgerald Environmental Associates, LLC.**

18 Severance Green, Suite 203  
 Colchester, VT 05446  
 Tel: 802.876.7778  
 www.fitzgeraldenvironmental.com

VCGI



**Notes:**

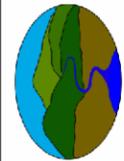
- VCGI imagery is from 2016.
- Contours derived from 2016 Connecticut River LiDAR data (0.7 m).

Map By: EHB  
Date: June 12, 2018

## Map 3: Paradise Park Stormwater Problem Areas Windsor, VT

**Fitzgerald Environmental Associates, LLC.**

18 Severance Green, Suite 203  
Colchester, VT 05446  
Tel: 802.876.7778  
www.fitzgeraldenvironmental.com



VCGI