

Town of Londonderry, Vermont

Selectboard Meeting Agenda

September 21, 2026/6:00 pm

100 Old School Street, South Londonderry, VT 05155

PUBLIC ACCESS: Hybrid meeting as allowed under 1 V.S.A. 312. Remote access is not guaranteed, especially during a storm, a power outage, or technical difficulties. Selectboard meetings are recorded.

Join Zoom Meeting: <https://us02web.zoom.us/j/87870498479> Meeting ID: 878 7049 8479;

One tap mobile: +13052241968,,87870498479# US or +13092053325,,87870498479# US

1. Call Regular Meeting to Order
2. Additions or Deletions to the Agenda [1 V.S.A. 312(d)(3)(A)]
3. Minutes Approval – Meeting of 09/08/2026
4. Selectboard Pay Orders
5. Announcements/Correspondence
6. Visitors and Concerned Citizens
 - a. Winhall Hollow Road Concern (Pamela Spaulding)
7. Liquor Commission
8. Roads and Bridges
 - a. Review and Approve Driveway Access Permit
 - b. Discuss driveway permit application improvements
 - c. Review and Approve Spring Hill Rd culvert change order
9. Town Officials Business
 - a. Town Staff
 - i. Discuss Doings in Derry Newsletter
 - b. Recreation Director
 - i. Approve REDI grant application
 - c. Planning Commission
 - d. Short Term Rental Administrator
 - i. Review and Approve STR fee structure changes
10. Transfer Station/Solid Waste Management
 - a. Updates
11. Old Business
 - a. Discuss Bond Vote for Williams Dam
 - b. Discuss Grant Opportunity for Engineering Design for Dam Removal
 - c. Review and Approve Windham County Humane Society Contract
12. New Business
 - a. Discuss Rules and Procedures for Obtaining Quotes
 - b. Discuss Municipal Planning Grant Opportunities
13. Executive Sessions: 1 V.S.A. § 313 (a)(3) The appointment or employment or evaluation of a public officer or employee, provided that the public body shall make a final decision to hire or appoint a public officer or employee in an open meeting and shall explain the reasons for its final decision during the open meeting (Assistant Clerk 6 month Review); 1 V.S.A. § 313 (a)(1)(E); Pending or probable civil litigation or a prosecution, to which the public body is or may be a party(Short Term Rental Ordinance); 1 V.S.A. § 313 (a)(2) Negotiating or securing of real estate purchase or lease options (North Village Wastewater)
14. Adjourn

Posted and distributed on 9/18/2026

Meeting documents will be available at londonderryvt.gov/sbagendas approximately 24 hours before the meeting.

Livestream: <https://www.youtube.com/user/GNATaccess> <https://www.facebook.com/GNATtelevision>

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DRAFT
Town of Londonderry, Vermont
Selectboard Tuesday, September 9, 2026
Selectboard Meeting 6:00 PM
100 Old School Street, South Londonderry, VT 05155

Board members present: James Ameden, Leanne Alexander and Taylor Prouty.

Board members absent: Tom Cavanagh.

Town Officials: Aileen Tulloch, Town Administrator; Liam Elio, Recreation Director; Andy Dahlstrom, Short Term Rental Administrator; Larry Gubb, Town Hall Renovation Committee; Cindy Gubb, Town Hall Renovation Committee.

Others present: Jeff Cleary, Hunter Excavating LLC; Kelly Capen (online).

1. Call Special Meeting to Order

James Ameden called the meeting to order at 6pm.

2. Additions or Deletions to the Agenda

[1 V.S.A. 312(d)(3)(A)]

Aileen Tulloch requested to remove 8.b as she did not receive the documents, and to add an executive session at the end under 1 V.S.A. § 313 (a)(1)(F).

Taylor Prouty moved to remove 8.b. and to add an executive session under 1 V.S.A. § 313 (a)(1)(F) and Leanne Alexander seconded. The motion passed unanimously.

3. Minutes Approval – Meeting(s) of 08/17/2026 and 08/24/2026

Aileen Tulloch noted that she changed the signatory from Tom Cavanagh to James Ameden on both since Cavanagh was not present.

Leanne Alexander moved to approve the minutes of the Selectboard meetings of 08/17/2024 and 08/24/2026 and Taylor Prouty seconded. The motion passed unanimously.

4. Selectboard Pay Orders

Taylor Prouty moved to approve the pay orders for payroll and accounts payable and Leanne Alexander seconded. The motion passed unanimously.

5. Announcements/Correspondence

Town Administrator Aileen Tulloch made the following announcements:

- a. Office staff have purchased Letterhead with the new Town Logo. Tulloch thanked the Board for approving a logo. She has already used the letterhead twice.
- b. Tulloch has completed the paper work for the Category Z Administrative costs for the DR4720 FEMA project which is hopefully the last step to close out the 2023 flood projects.
- c. The new file structure is in place and Town Staff will beta test it hopefully next week. The plan is to roll it out to all Staff so that document storage and sharing is easier across departments

d. There's been an uptick in public records requests recently, both from large companies hoping to sell information and from residents. These requests have been eating into staff time.

e. Tulloch will be meeting with the Towns in the ACO Regional agreement on 9/10 where they will hopefully vote to allow Londonderry into the program. Tulloch will also be attending a Q&A session on 9/10 at the Brattleboro Legion for candidates for Lieutenant Governor and then will be attending a Roundtable in Wilmington on Friday. The Town Clerk and the Town Treasurer will be out on Wednesday and Thursday, so the office will be sparsely occupied for the rest of the week.

The following correspondence in the Selectboard packet are as follows:

- a. An announcement from SeVEDS about the Get On Board program.
- b. A notice from WRC about their upcoming draft regional plan hearing on September 21, 2026 at 6pm
- c. A notice from WRC about a public hearing in Jamaica concerning their Enhanced Energy Plan on September 22, 2026 at 4pm
- d. A grant opportunity: Extreme Cold Weather Shelter Program
- e. Notice from the State appointing Rich Phelan as the Health Officer
- f. A draft model Class 4 Highway policy. Does the Selectboard want to update the current one (adopted in 1996)
- g. A bunch of catering permits came through-they did not make it to the packet due to network issues. All just FYI.
- g. A draft of the Flood Scoping study for North Village properties done by Steffen Krei
- h. Email correspondence from Barry Randall accusing Town Staff of misinformation and misconduct. Tulloch added that both the Town Clerk and the Town Treasurer work extremely hard to accommodate the public and they do not engage in either misinformation or misconduct. They are often at the forefront of people's anger or frustration and they handle it well, but they are also human. Be kind.

6. Visitors and Concerned Citizens

None.

7. Liquor Commission

None.

8. Roads and Bridges

a. Updates

Taylor Prouty mentioned that progress is being made on the Grants in Aid projects. The town garage shed project is also moving along. Spring Hill Road will be closed at the site of the box culvert with intermittent closures for the other culvert replacements. Little Pond Road will also have intermittent closures but they will coordinate with the school bus schedule. James Ameden mentioned that wastewater project now has stop lights instead of flaggers, so anyone driving on Route 100 should be aware of that.

b. Review and Approve Driveway Access Permit (Woodall)

The Board discussed whether this second access should be subject to DRB review.

Leanne Alexander moved to approve access permit application submitted Ronnie Woodall for a modification of an existing access to their parcel located on the north side of Melendy Hill Road, and authorize the Chair to sign the permit on behalf of the Board, subject to DRB review, and Taylor Prouty seconded. The motion passed unanimously.

9. Town Officials Business

a. Town Treasurer

i. Appoint Selectboard Representative for Tax Sale

Tulloch explained that the Town needs to have a representative at the tax sale in case the Town wishes to purchase any of the properties. She recommended Taylor Prouty since he is on the Land Acquisition Task Force.

Leanne Alexander moved to appoint Taylor Prouty as the Selectboard Representative for the Tax Sale occurring on September 16, 2026 at 10:30 am at the Town Office, and Taylor Prouty seconded. The motion passed unanimously.

b. Recreation Director

i. Review and Approve Change Order for Tennis Court

Liam Elio explained that pickle ball is very popular with all six courts often in use. Those playing tennis have to compete with those playing pickle ball. This change order would add two new pickle ball courts to help accommodate everyone. There might be an opportunity to fundraise as well. Work will start in a few weeks to give everyone a few more weeks to play.

Taylor Prouty moved to approve the Change Order for Pingree Park Tennis Court Replacement in the amount not to exceed \$7,159.00 and authorize the Town Administrator to sign on behalf of the Board, and Leanne Alexander seconded. The motion passed unanimously.

ii. Accept resignation of Kelly Pajala from Parks Board

The Board thanked Kelly Pajala for her service to the Town.

Taylor Prouty moved to accept the resignation of Kelly Pajala from the Parks Board and Leanne Alexander seconded. The motion passed unanimously.

iii. Appoint Parks Board Member (Christine Blaylock)

Taylor Prouty moved to appoint Christine Blaylock to the Parks Board to fill out the remainder of Kelly Pajala's term, which ends on 04/01/2027, and Leanne Alexander seconded. The motion passed unanimously.

c. Beautification Committee

i. Appoint Beautification Committee Member (Melissa Brown)

Leanne Alexander moved to appoint Melissa Brown to the Beautification Committee to fill out the remainder of Pam Abraham's term, which ends on 04/01/2029 and Taylor Prouty seconded. The motion passed unanimously.

d. Short Term Rental Administrator

i. Discuss Administrative Fee for Declined Applications

Andy Dahlstrom presented to the board a request to add an administrative fee of \$150 to the fee structure policy to account for applications that are declined. The Board agreed to add this fee; Dahlstrom will bring the changes to the Board at the next meeting.

ii. Discuss adding non-refundable clause to Fee Schedule

Andy Dahlstrom wanted to add a non-refundable clause on the Fee Schedule to deter people from paying first and then not filling out the application or renting before they are approved. The Board agreed this was also a good addition.

iii. Review and Approve STR Appeal Board Members

The Short Term Rental Appeal Board had willing members from Emergency Services, the DRB, a Justice of the Peace and the Town Clerk, but needed a Selectboard member to round out the Board. Leanne Alexander agreed to be part of the STR Appeals Board. There was a question about Terms and whether they should be staggered. The Board agreed to give the members a 1 year term to start and Aileen Tulloch will ask the Town Attorney what the best practice going forward is.

Taylor Prouty moved to appoint Allison Marino, Maureen Cronin, Paul Hendler, Rich Phelan and Leanne Alexander to the STR Appeals Board for a term of 1 years pending attorney review and Leanne Alexander seconded. The motion passed unanimously.

e. Town Hall Renovation Committee

i. Request for Approval for MERF Loan Application

MERF is a new State revolving fund with goals similar to MERP to help rehabilitate older buildings with energy efficiency and sustainability in mind. The Revolving Fund comes with a guarantee of 0% interest until 12/31/2026. Towns that did not receive MERP funding had first crack at the MERF funding, so it is not a guarantee that Londonderry would get a approval for a loan.

Leanne Alexander moved to approve the application of a MERF loan with the caveat that the final approval will come back to the Selectboard and Taylor Prouty seconded. The motion passed unanimously.

ii. Request for Approval to apply for additional grants

The Town Hall Renovation Committee would like to go out for an ADA grant offered by the Vermont Community Development Program to fund the construction of a first floor ADA compliant bathroom.

Leanne Alexander moved to approve the Town Hall Renovation Committee application for the Vermont Community Development Program Accessibility Modification Grant and authorize the Town Administrator to execute any documents necessary to secure the funding for the grant and Taylor Prouty seconded. The motion passed unanimously.

iii. Review and Approve Town Hall General Contractor Services Proposal
One bid was received.

Leanne Alexander moved to accept the proposal from Hunter Excavating to provide General Contractor Services estimated to cost \$284,771 and 2) authorize the Town Administrator to execute any documents necessary for the hiring of the contractor to conduct the necessary work and Taylor Prouty seconded. The motion passed unanimously.

10. Transfer Station/Solid Waste Management

a. Updates

None.

11. Old Business

a. Review and Approve Updated Itinerant Vendor Ordinance

Aileen Tulloch recommended that they table this because Will Goodwin had not yet had a chance to review it.

b. Review and Approve Updated Itinerant Vendor Permit Application

This also hasn't been reviewed yet.

12. New Business

a. Review and Approve line striping and sealing of Town Office Parking Lot

The Board asked if this had been budgeted for. Aileen Tulloch answered that it had not. The Board agreed that it should be put in the budget for next year.

b. Review and Approve Town Garage Shed Roof Change Order

During repair of the Town Garage Shed it was noted that the fasteners on the roof had failed. The options were to replace the fasteners, or replace the whole roof. Replacing the roof was deemed the better option.

Leanne Alexander moved to approve the Change Order Town Garage Shed Roof Repair in the amount not to exceed \$5,819 and authorize the Town Administrator to sign on behalf of the Board to conduct the necessary work and Taylor Prouty seconded. The motion passed unanimously.

13. Executive Session: 1 V.S.A. § 313 (a)(1)(F) Confidential attorney-client communications made for the purpose of providing professional legal services to the body.

Taylor Prouty moved to find that premature general public knowledge of confidential attorney-client privilege will clearly place the Town, the Board or person involved at a substantial disadvantage by revealing negotiating and Leanne Alexander seconded. The motion passed unanimously

Taylor Prouty moved that the Board enter executive session pursuant to 1 V.S.A. § 313 (a)(1)(F) Confidential attorney-client communications made for the purpose of providing professional legal services to the body and invite the Town Administrator to join the session and Leanne Alexander seconded. The motion passed unanimously.

Entered executive session: 7:09 pm

Exited executive session: 7:22pm

Taylor Prouty moved to authorize the Town Administrator to enter into discussions with the State to reallocate a portion of the North Village ARPA funds to the South Village Phase II project, and to seek additional grant funding for the North Village projects as appropriate and Leanne Alexander seconded. The motion passed unanimously.

14. Adjourn

Leanne Alexander moved to adjourn and Taylor Prouty seconded. The motion passed unanimously.

The meeting adjourned at 7:27 pm

Respectfully Submitted,
Aileen Tulloch, Town Administrator

Approved
LONDONDERRY SELECTBOARD

Chair, Tom Cavanagh

Short-Term Rental: Annual License Fees

Unhosted Rental: Base fee (includes one-bedroom): \$250

Each additional bedroom (defined as any room furnished for sleeping): \$250/room

Total Fees: 1br = \$250, 2br = \$500, 3br = \$750, 4br = \$1000, 5br = \$1250, 6br = \$1500,
7br = \$1750 8br = \$2000 9br = \$2250 10br = \$2500 ...

Hosted Rental: Base fee (includes all bedroom counts): \$150, Total Fee: \$150

Note: All STR rental applications are subject to a non-refundable application fee of \$150, included in the annual fee. The only circumstance in which an STR License applicant can be eligible for a refund of the annual fee—minus \$150—is if the applicant has been fully compliant with the Short-Term Rental Ordinance through the current STR Licensing year and the license application process.

Re: Updated Williams Dam numbers

From Aileen Tulloch <townadmin@londonderryvt.gov>

Date Wed 9/9/2026 11:08 AM

To Charlie W. Johnston <cjohnston@dubois-king.com>

Cc Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>; Shawn Patenaude <spatenaude@dubois-king.com>

Okay, thank you.

Aileen Tulloch

Town Administrator

Town of Londonderry, Vermont

100 Old School Street

South Londonderry, VT 05155

802-824-3356, ext. 5

Please note my new email address: townadmin@londonderryvt.gov

Please note that this email message, along with any response or reply, may be considered a public record, and thus, subject to disclosure under the Vermont Public Records Law (1 V.S.A. 315-320).

From: Charlie W. Johnston <cjohnston@dubois-king.com>

Sent: Wednesday, September 9, 2026 11:07 AM

To: Aileen Tulloch <townadmin@londonderryvt.gov>

Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>; Shawn Patenaude <spatenaude@dubois-king.com>

Subject: Re: Updated Williams Dam numbers

This would include dredging in the vicinity of the dam to alleviate sediment pressure on the dam, and to allow the low-level gate to be rehabilitated. On the drawings with the alternative analysis depicted dredging within 50-feet of the dam, i.e. up to the bridge.

If dredging of the reservoir/river is desired, this could be part of the same project since it would require much of the same permitting.

However, we only surveyed the river 200-feet upstream of the Route 11 bridge. Since the 2021 survey there likely has been additional sedimentation and probably quite a bit since of the major floods. It will require an additional survey and some bounds on how much is being required to be dredged. If we are dredging just up to the hydrant likely looking at an additional \$100k to \$200k. If it is up to Cobble Ridge Road, this could be another million dollar project.

Charlie

From: Aileen Tulloch <townadmin@londonderryvt.gov>

Sent: Wednesday, September 9, 2026 10:10 AM

To: Charlie W. Johnston <cjohnston@dubois-king.com>

Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>; Shawn Patenaude <spatenaude@dubois-king.com>

Subject: Re: Updated Williams Dam numbers

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Thank you, and do those numbers include dredging or would that be a separate project/cost?

Aileen Tulloch

Town Administrator

Town of Londonderry, Vermont

100 Old School Street

South Londonderry, VT 05155

802-824-3356, ext. 5

Please note my new email address: townadmin@londonderryvt.gov

Please note that this email message, along with any response or reply, may be considered a public record, and thus, subject to disclosure under the Vermont Public Records Law (1 V.S.A. 315-320).

From: Charlie W. Johnston <cjohnston@dubois-king.com>

Sent: Wednesday, September 9, 2026 10:06 AM

To: Aileen Tulloch <townadmin@londonderryvt.gov>

Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>; Shawn Patenaude <spatenaude@dubois-king.com>

Subject: Re: Updated Williams Dam numbers

Aileen,

Apologies for not getting back to you sooner. I do not think we need to undertake a new project solely to update the construction cost estimates. My reasoning is outlined below.

The alternative analysis project was conducted during the winter of 2021–2022, with the final report issued in March 2022. As we discussed, the Town is interested in putting a bond question before the voters for either a rehabilitation or a replacement option rather than the removal option.

In the March 2022 report, we estimated probable construction costs of approximately \$800,000 for the rehabilitation option, with additional costs for engineering, construction administration, and permitting fees totaling nearly \$100,000. The replacement option was estimated at approximately \$1,200,000 in construction costs, with an additional \$150,000 for engineering, construction administration, and permitting.

Given that approximately 4.5 years have passed since the report was issued, I believe adding 20% to account for inflation would provide a reasonable and conservative adjustment. The original construction cost estimates already included a 30% contingency, and the engineering and permitting costs were developed based on those construction estimates.

Based on this, I would recommend that the Town consider a bond amount of \$1.0 million for the rehabilitation option and \$1.6 million for the replacement option. I believe these amounts provide a reasonable allowance for inflation while maintaining an appropriate level of contingency.

Charles W. Johnston, P.E.

Dam Engineering, Structures Division

DuBois & King Inc.

6 Green Tree Drive

So Burlington VT 05403

(D) 802.728.7217

(C) 802.989.4402

From: Aileen Tulloch <townadmin@londonderryvt.gov>
Sent: Tuesday, August 25, 2026 11:29 AM
To: Charlie W. Johnston <cjohnston@dubois-king.com>
Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>
Subject: Updated Williams Dam numbers

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Good morning,

The Town would like to pursue updating the 2022 Williams Dam study for the purpose of possibly bonding the amount needed for repair/replacement.

Please let us if this is possible and what the cost would be.

Thank you,

Aileen Tulloch
Town Administrator
Town of Londonderry, Vermont
100 Old School Street
South Londonderry, VT 05155
802-824-3356, ext. 5
Please note my new email address: townadmin@londonderryvt.gov

Please note that this email message, along with any response or reply, may be considered a public record, and thus, subject to disclosure under the Vermont Public Records Law (1 V.S.A. 315-320).

PROPOSAL

CUSTOMER
Town of Londonderry
Attn: Tom Cavanagh



PROPOSAL #
HE1990
DATE
2/12/2025
Job Site Info:
Mill Pond
Londonderry, Vt.

MILL POND DREDGING

Unless otherwise defined below this quote provides for all material, supervision, equipment, tools and labor to perform all work in a professional and timely manner.

This quote is based on the following:

SCOPE OF WORK: Dredging Mill Pond

1. Mobilization of equipment and labor for duration of proposed work
2. Provide traffic control plan and signage
3. Provide erosion control plan and management for duration of proposed work
4. Provide clean water bypass and water management for duration of proposed work
5. Construction of haul road and access locations with imported stone material
6. Provide excavation/dredging equipment to remove +/- 40,000 cubic yards of material on approximately 9.3 acres (see attached map)
7. Provide trucking to dispose of +/- 40,000 cubic yards of material
8. Provide restoration to impacted areas and stabilization with seed and mulch

PROPOSED TOTAL.....\$2,500,000.00

Acceptance:

Hunter Excavating, Inc. is hereby authorized to perform the work defined in this quote. Terms of this agreement are mutually agreeable.

X_____ Date _____
Authorized Representative

RE: Williams Dam

From Green, Benjamin <Benjamin.Green@vermont.gov>
Date Sun 8/30/2026 7:42 PM
To Aileen Tulloch <townadmin@londonderryvt.gov>
Cc Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>

Hi Aileen,

Periodic Inspections for SIGNIFICANT hazard potential dams are required at a frequency of not more than 5-years. ‘

Best regards,

Ben



Benjamin Green, PE | Dam Safety Engineer
Vermont Department of Environmental Conservation
Water Investment Division | Dam Safety Program
1 National Life Drive, Davis 3 | Montpelier, VT 05620-3510
802-622-4093 (cell)
<https://dec.vermont.gov/water-investment/dam-safety>

From: Aileen Tulloch <townadmin@londonderryvt.gov>
Sent: Friday, August 28, 2026 3:44 PM
To: Green, Benjamin <Benjamin.Green@vermont.gov>
Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>
Subject: Re: Williams Dam

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Thank you for this information!

Do we know when the next inspection cycle will be?

Aileen Tulloch
Town Administrator
Town of Londonderry, Vermont
100 Old School Street
South Londonderry, VT 05155
802-824-3356, ext. 5
Please note my new email address: townadmin@londonderryvt.gov

Please note that this email message, along with any response or reply, may be considered a public record, and thus, subject to disclosure under the Vermont Public Records Law (1 V.S.A. 315-320).

From: Green, Benjamin <Benjamin.Green@vermont.gov>
Sent: Friday, August 28, 2026 3:38 PM
To: Aileen Tulloch <townadmin@londonderryvt.gov>
Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>
Subject: RE: Williams Dam

Good day Aileen,

Thanks for your email.

The Dam Safety Program has historically had limited authority to require dam owners to make safety improvements. That will change soon as the new Technical Dam Safety Rules, which were delayed due to the 2023 and 2024 floods, are nearly finalized and are expected to be adopted next year. These rules include expanded authority for the State to compel corrective actions when warranted.

Williams Dam is a Significant hazard potential that has been in poor condition for many years. The most recent inspection, completed in 2025, rated the dam as Unsatisfactory (see attached). Like many dams of its age, Williams Dam has seen limited investment over time and is approaching a point substantial action is needed. Given the dam's condition and its inspection history, it is likely that the State will expect the Town to undertake safety improvements by the next inspection cycle and if conditions worsen, that would accelerate things. If no action is taken, the dam could be entered into the Unsafe Dams process, in which the State would be obligated to take steps to reduce risk. In a case like Williams Dam, that would likely mean breaching the dam.

All that said, the State's strong preference is to work with the Town toward voluntary compliance and a collaboratively planned path forward. A cooperative approach is far better for all parties and is the most effective way to achieve long-term dam safety goals at Williams Dam.

Happy to discuss further if helpful.

Ben



Benjamin Green, PE | Dam Safety Engineer
Vermont Department of Environmental Conservation
Water Investment Division | Dam Safety Program
1 National Life Drive, Davis 3 | Montpelier, VT 05620-3510
802-622-4093 (cell)
<https://dec.vermont.gov/water-investment/dam-safety>

From: Aileen Tulloch <townadmin@londonderryvt.gov>
Sent: Tuesday, August 25, 2026 11:34 AM
To: Green, Benjamin <Benjamin.Green@vermont.gov>
Cc: Tom Cavanagh <T.CAVANAGH@londonderryvt.gov>
Subject: Williams Dam

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EXTERNAL SENDER: Do not open attachments or click on links unless you recognize and trust the sender.

Good morning Ben,

The Town is trying to come to a resolution on what to do with Williams Dam. I am pursuing updated costs for repair/replacement and dredging for the purposes of possible having a bond vote on the subject, but I would also like to know what the scenario is from the State's perspective if the Town continues to do nothing.

Thank you!

Aileen Tulloch

Town Administrator

Town of Londonderry, Vermont

100 Old School Street

South Londonderry, VT 05155

802-824-3356, ext. 5

Please note my new email address: townadmin@londonderryvt.gov

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Williams Dam - Periodic Inspection Report	
Inspection Type: Periodic Inspected By: Steven Hanna, Margaret Wladyslawski Weather: Cloudy, Raining, 68°F	Inspection Date: 08/25/2025 09:44 Others Present: None Owner: Town of Londonderry
Site Map	Dam Info
	Hazard Potential Classification: Significant StateID: 115.01 Town: Londonderry County: Windham Watershed: West River Stream: West River Type: Stone, Concrete, Gravity Foundation Conditions: Rock; Known Purpose: Other Status: In Service Height: 20 ft Length: 87 ft Construction Date: 1900 Reconstruction Date: 1976
Other Considerations	Reservoir Info
Dam does not have public road on crest. Dam does not have public bridge. Dam does not have associated dike.	Normal Storage: 24.2 acre-ft Normal Surface Area: 9.3 acres Max Storage: 97.1 acre-ft Max Surface Area: 29.90 acres Drainage Area: 26112 acres
Purpose	
The Dam Safety Program is performing this inspection in accordance with 10 V.S.A. § 1105.	
Limitation	
The condition rating assigned below is based on a visual inspection of the dam, and using information on file.. Detailed investigations/analyses are beyond the scope of this report. Please see the General Information section at the end of this report for more information.	
Overall Condition Rating	
☐ Satisfactory ☐ Fair ☐ Poor ☒ Unsatisfactory ☐ Not Rated <i>*See General Information section at the end of report for definitions.</i>	
Condition Rating Notes	
Since the previous inspection, the conditions of the concrete structures, downstream wall, and LLO pipe have worsened. The sluicgate stem remains bent, leaving it inoperable. The dam is also considered to be hydraulically inadequate as it is not capable of being safely overtopped by the inflow design flood. Accordingly, the condition rating has been lowered from POOR to UNSATISFACTORY . It is recommended that additional maintenance, engineering, and remedial measures be implemented to further address the deficiencies noted in this report.	
Prepared by: Margot Wladyslawski on 9/2/2025	Reviewed by: Steven Hanna 10/01/2025

Dam Safety Recommendations

The following recommendations and remedial measures describe the recommended approach to address current deficiencies at the dam following a visual periodic inspection performed by the Dam Safety Program. Maintenance recommendations can be performed by the Owner, while Studies and Analyses and Remedial Repair Recommendations will require the services of a qualified professional engineer registered in the State of Vermont who is experienced in dam safety engineering design, permitting, and construction.

Williams Dam has the capability to impound more than 500k cubic feet (11.48 acre-ft). Per 10 V.S.A. § 1082, performing repairs or improvements will likely require obtaining a Dam Order authorizing the work to be performed. It is recommended that Dam Owners communicate with the DSP about any planned repairs to evaluate if the planned work requires obtaining a Dam Order.

Immediate Consideration

Retain a professional engineer qualified in dam safety to evaluate erosion occurring at the left end of the dam and leakage on the right end at the low-level outlet and prepare plans for correcting the problem. The evaluation should take place with the water level of the impoundment lowered. A professional engineer should also evaluate the dam and prepare plans for repair, replacement, or removal of the dam.

Maintenance Recommendations

General	- Perform an update to the Emergency Action Plan at least every other year and provide updates to all key contacts. - Consider posting warning signage restricting public access to the dam. - On a regular basis and following unusual or extreme loading conditions, perform monitoring of the dam and its appurtenances. Report any unsafe conditions to the Dam Safety Program.
Spillways	- Maintain the principal spillway free of debris to ensure free-flow conditions. - Monitor and repair minor concrete cracking and deterioration. - Monitor the condition of the concrete joints.
Embankment Walls	Monitor the downstream stone masonry wall for unusual movement.

Studies and Analysis Recommendations

General	Perform necessary analyses to support either the design of repairs to bring the dam into compliance with current dam safety rules and guidelines or dam removal.
Hydrology and Hydraulics	- Identify alternatives to make the dam hydraulically adequate or capable of safely being overtopped during the Inflow Design Flood. - Evaluate the condition and adequacy of the low-level outlet gate and identify repair or replacement alternatives.
Operation and Maintenance (O&M)	Develop an Operations and Maintenance Manual for the dam and provide a copy to the Dam Safety Program for record keeping purposes.
Structural	- Perform engineered stability analyses of the dam. - Perform a structural inspection of the concrete elements of the dam. - Evaluate condition of the concrete and identify repair or replacement alternatives.

Remedial Repair Recommendations

- Based on the studies and analysis recommended above, develop a plan to repair, rehabilitate, or replace the dam to bring it into compliance with current dam safety rules and guidance. Alternatively, consider pursuing dam removal.
- Make the dam hydraulically adequate or capable of being safely overtopped during the Inflow Design Flood.
- Replace the deteriorated low-level outlet operator and gate.

Dam Background

The Williams Dam is a stone masonry dam with a concrete cap principal spillway with a gated low-level outlet (LLO). According to file records, the dam has a total length of 87 feet and an approximate height of 20 feet. The principal spillway is a 73-foot-long concrete broad-crested weir located at the center of the dam. The LLO consists of a 6-foot diameter corrugated galvanized metal pipe (CGMP) with a vertical aluminum slide gate at the upstream end, located at the right abutment at the 13-foot-wide sluiceway structure. A concrete training wall at the right end is connected to a new concrete bridge abutment. The drainage area of the dam is reportedly 26,112 acres, or 40.8 square miles. At normal pool, the reservoir is approximately 9.30 acres with an estimated normal storage capacity of 24.2 acre-feet and a maximum storage capacity of 97.10 acre-feet. The dam was constructed in at least 1900 or potentially earlier. A new gate was installed in 1978 to repair damage caused by the 1976 flood. Large stone fill was placed on the right abutment by VTrans to repair damages after the July 2023 flood.

Inspection History

The last periodic inspection of this dam was performed on August 6, 2015. The dam was found to be in POOR condition due to concrete conditions throughout the dam structures; leakage through the downstream wall, right abutment, and 6-foot low level outlet pipe; corrosion in the LLO pipe; and the inoperable sluiceway. A Rapid Inspection was performed after the July 2023 Flood and new scour was noted around the training walls.

Operation & Maintenance (O&M)

An O&M Manual is **NOT** on file

O&M Approved Date: N/A

Date Last Revised: N/A

Operating Problems Since Last Inspection: None reported, flood damage 2023

History of Repairs Since Last Inspection: VTrans placed large stone fill (type III) and sandy gravel on the right abutment following the July 2023 flooding.

Frequency of Mowing: As needed

Frequency of Dam Owner Surveillance: Regular
Owner Surveillance During Storm Events: ☒ Yes ☐ No

Accessibility to Outlets/Low-Level Outlet (LLO):
Right abutment of dam on concrete platform
Frequency of Outlet/LLO Operation: Not operable

Seasonal Drawdown? ☐ Yes ☒ No

Access to the Dam

Access Type:

Maintained paved road

Road Name: VT-11

Distance from Access Road to Dam: 30 ft

Seasonal Access:

☒ Plowed winter ☐ Sanded winter ☐ Maintained in mud season

☐ Passable in all weather conditions

☐ Need high clearance vehicle

Access for Emergency Construction

Equipment: Access from VT RT 11 or Edge Hill Road

Action

☒ None
☐ Monitor
☐ Maintenance
☐ Engineer

Security

Device Type(s): Fences

Dam has **no** sign of vandalism, trespassing or unauthorized operation.

Action

☒ None
☐ Monitor
☐ Maintenance
☐ Engineer

Operation & Maintenance (O&M)	
Safety Considerations	Action
Confined Space Entry Required: None Fall Protection Required: None Other Safety Required: None Public Safety Consideration: Fences restrict access to dam	☒ None ☒ Monitor ☐ Maintenance ☐ Engineer
O&M Issues	Action
☐ None ☐ Revisions required ☐ Not approved ☒ No plan available ☐ Format out of date ☐ Under review	☐ None ☐ Monitor ☒ Maintenance ☐ Engineer

Hazard Potential Classification
Current classification: Significant The hazard potential classification of the dam informs dam design standards and requirements. The current classification appears appropriate, and an inundation map was used to determine the classification. There appears to be no significant changes in land use or habitation since the last inspection. According to the study performed by the VT Dam Safety Program in 2022, during a dam failure, the following could be at risk of flood damage: • VT Route 11 (N Main St) • Approximately 11 structures, including commercial buildings and private homes

Emergency Action Plan (EAP)	
EAP on file	EAP Approved Date: August 1, 2022
EAP Type: Significant Hazard	Last Revised Date: N/A
Since the dam is a SIGNIFICANT Hazard Potential Dam, an up-to-date EAP with dam failure flood inundation mapping is required.	
Has the EAP been exercised? ☐ Yes ☒ No How has the plan been exercised? N/A	
EAP Issues	Action
☐ None ☒ Revisions required – EAP and contacts should be updated at least every year ☐ Not approved ☐ No plan available ☐ Inundation study required ☐ Format out of date ☐ Under review	☐ None ☐ Monitor ☒ Maintenance ☐ Engineer

Hydrologic & Hydraulic Data		
Freeboard Measurements		
Principal Spillway/Normal Pool to Dam Crest: 4 feet	Principal Spillway/Normal Pool to Auxiliary Spillway: N/A	Auxiliary Spillway to Dam Crest: N/A

Hydrologic & Hydraulic Data

Since Williams Dam is currently rated as SIGNIFICANT hazard potential, the inflow design flood (IDF) is the 1000-year flood event according to Federal Guidance currently applied in the State of Vermont. A hydraulic analysis was carried out by Dubois & King in 2022 which provided the following results:

Key Elevations (NAVD88):

- Downstream Channel Invert: 1129.0
- Principal Spillway Crest: 1142.0
- Normal Storage Pool Elevation: 1143.0
- Top of Dam (top of gate structure): 1146.0
- Low Chord of VT RT 11 Bridge: 1150.0

Location	Associated Water Surface Elevation (ft)				
	10-year	50-year	100-year	500-year	1000-year
Bridge (Deck El. 1151.7-ft)	1150.78	1154.14	1154.25	1156.88	1157.23
Dam (Spillway El. 1141.9-ft)	1145.08	1151.07	1151.25	1154.93	1155.33

Based on the results from the hydraulic analysis, Williams Dam would have no freeboard during the IDF in its current configuration and is considered hydraulically inadequate.

Geotechnical and Structural Data

Structural stability analyses were not found on file. According to Dubois & King, the dam is likely experiencing unintended loading from sediment deposition and does not appear to have been constructed with modern materials. The dam is assumed to rely on the weight of the structure to resist loading. Erosion at the dam, specifically the left abutment, could lead to a potential breach as erosion of earthen material continues.

Upstream Slope

No upstream slope was observed during the inspection.

Visual Comments: N/A

Additional Comments: N/A

Crest

Length: 87 feet

Width: Not measured

Additional Notes: The dam crest elevation is considered to be the low chord of VT RT 11 Bridge (1150.0).

Crest Issues

Remove debris.

Action

- ☒ None
- ☒ Monitor
- ☐ Maintenance
- ☐ Engineer

Crest Image



Downstream Slope

No downstream slope was observed during the inspection.

Visual comments: N/A

Additional Comments: N/A

Seepage Collection Systems

Total Count

No seepage collection system was observed during the inspection.

0

Instrumentation

No installed instrumentation was observed during the inspection.

Water Level and Flow Observations

Normal Pool Elevation: 1143.0 (NAVD88)
(according to file records)

Pool Elevation During Inspection: Not calculated

Tailwater Elevation During Inspection: No
backwater

Reservoir Drained: ☐ Yes ☒ No

Reservoir Lowered: ☐ Yes ☒ No

Principal Spillway Flow Depth: 32 inches below
spillway crest

Auxiliary Spillway Flow Depth: N/A

Additional Notes: None

Principal Spillway	
Spillway Type: Weir Spillway Location: Center of dam Primary Material: Stone masonry capped with concrete	Weir: Broad-Crested Gate: None Erosion Control Structures: None
Spillway Components: ☐ Anti-vortex plate ☐ Filter Diaphragm ☒ Training Walls ☐ Flashboard ☐ Trashrack ☐ Other:	
Additional Notes: The principal spillway weir is 73 feet long. The concrete spillway cap inclination is 2.5H:1V, and 9.25 feet of the cap was exposed at the time of the inspection.	

Principal Spillway Issues	Action
<u>Deteriorating Materials</u> Description of Issue: Concrete spalling, scouring, and cracking across the principal spillway crest.	☐ None ☒ Monitor ☐ Maintenance ☐ Engineer
<u>Abandoned Pipe</u> Description of Issue: Exposed abandoned pipe running along the principal spillway crest. Investigate to determine purpose and any remediation.	☐ None ☒ Monitor ☐ Maintenance ☒ Engineer
<u>Trees Obstructing Spillway</u> Quantity: 2 Size: >12" Location: Inlet Description of Issue: Two large trees are on the spillway crest and should be removed.	☐ None ☐ Monitor ☒ Maintenance ☐ Engineer
<u>Training Wall Issues</u> Material: Concrete Alignment: Good alignment Condition: Poor Description of Issue: The right training wall is cracked and deteriorating with water and cementitious material eroding from the construction joints.	☐ None ☒ Monitor ☒ Maintenance ☒ Engineer

Principal Spillway Drains	Number
No drains associated with the principal spillway structure were observed during the inspection.	0

Principal Spillway Images

Photo 1. Principal spillway weir viewed from sluiceway structure (right side of dam) with large trees



Photo 2. Principal spillway viewed from Edge Hill Road (left side of dam)



Outlets
Number of Outlets: 1

Sluiceway Structure	
Elevation: Mid-height of dam	Location: Right abutment
Drain Size and Configuration: 6-foot diameter corrugated galvanized metal pipe (CGMP) sluiceway	Access: Accessible from right abutment of dam off VT RT 11
Additional Comments: The outlet was not operated during inspection. 80 inches measured from current water level to top of LLO structure.	

Outlet Issues	Action
<u>Inoperability</u> Description of Issue: The sluice gate stem is not operable due to a bend in the stem suspected to be from ice or debris. Investigate what is necessary to make operational or if replacement is needed.	☐ None ☒ Monitor ☒ Maintenance ☒ Engineer
<u>Concrete Structure</u> Issues: ☐ Bug holes ☐ Hairline crack ☒ Efflorescence ☐ Spalling ☐ Popouts ☐ Honeycombing ☐ Scaling ☐ Crazed/Map cracks ☒ Isolated crack ☐ Exposed rebar ☐ Disintegration ☐ Other: Location: Entire Surface Description of Issue: Water was leaking through cracks and separated concrete.	☐ None ☒ Monitor ☒ Maintenance ☒ Engineer
<u>Outlet Conduit</u> Description of Issue: 6-foot diameter metal pipe has numerous perforations, leakage, and corrosion throughout.	☐ None ☒ Monitor ☐ Maintenance ☒ Engineer
<u>Leakage</u> Flow Rate: approximately 100 gpm Description of Issue: Leakage was observed through the sluiceway structure with a flow rate estimated to be about or exceed 100 gpm.	☐ None ☒ Monitor ☐ Maintenance ☒ Engineer

Outlet Images

Photo 1. Concrete sluiceway structure viewed from right abutment of dam



Photo 2. 6-foot diameter corrugated galvanized metal pipe on downstream side of sluiceway structure



Outlet Images

Photo 3. LLO sluice gate on upstream side of sluiceway structure



Downstream Wall

Wall Type: Dry-set stone masonry Length: Approximately 73 feet (length of spillway weir) Wall Height (exposed): 13 feet	Horizontal Wall Alignment: Good Vertical Wall Alignment: Good Joint Condition: Enlarged joints with large voids between stones Abutment Contact Condition: Leakage observed at the right abutment connected with the concrete LLO structure. Surface Condition: Stone masonry; pressurized voids and leakage throughout	Unusual Wall Movement: ☐ Yes ☒ No
Additional Notes: Right side of the downstream wall could not be inspected due to leakage through the wall.		

Downstream Wall Issues	Action
Leakage Flow Rate (gpm): Unable to measure Description of Issue: Significant and forceful leakage is present through the downstream wall. Two known openings exist on the downstream wall: one is 3 feet wide and located at the dam toe about 10 feet from the left end of the dam, and the other is 9 feet below the crest near the angle point and has a concrete patch. This second opening could potentially be an old low-level outlet.	☐ None ☒ Monitor ☐ Maintenance ☒ Engineer

Downstream Wall Issues	Action
<u>Could Not Inspect:</u> run of river dam Description of Issue: Leakage through the dam, 200-300 gpm.	☐ None ☒ Monitor ☐ Maintenance ☐ Engineer

Downstream Wall Images

Photo 1. Leakage through downstream stone masonry wall



Photo 2. Downstream wall viewed from Edge Hill Road



GENERAL INFORMATION

DSP Website: <https://dec.vermont.gov/water-investment/dam-safety>

A dam owner is responsible for the safe management and operation of their dam, and compliance with Vermont Title 10, Chapter 43.

Purpose: The Dam Safety Program conducts periodic safety inspections of non-federal, non-power dams to determine their condition and the extent to which they pose a potential or actual threat to life, property, and the environment. The dam safety program (DSP) performed this inspection in accordance with 10 V.S.A. § 1105.

Limitations: The condition rating reported herein is based on visual inspection of the dam under conditions present at the time of the inspection, and using information on file. Detailed investigations/analyses are beyond the scope of this report. The condition of the dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the reported condition of the dam will continue to represent the condition of the dam in the future.

Hazard Potential Classifications:

HIGH: Dams where failure or mis-operation will probably cause loss of human life.

SIGNIFICANT: Dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

LOW: Dams where failure or mis-operation results in no probable loss of human life and low economic and environmental losses.

MINIMAL: A dam that meets the LOW hazard definition, above, but is only capable of impounding less than 500,000 cubic feet.

Condition Ratings:

SATISFACTORY: No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

FAIR: No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

POOR: A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

UNSATISFACTORY: A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

NOT RATED: The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated.

Definitions:

Upstream: The side of the dam that borders the impoundment located up gradient of the dam.

Downstream: The side of the dam opposite the upstream side, located down gradient of the dam.

Right: The area to the right when looking in the downstream direction (also known as “river right”).

Left: The area to the left when looking in the downstream direction (also known as “river left”).

Structural Height-of-Dam: The vertical distance from the lowest point in the stream bed or native ground surface at the downstream toe of the dam to the elevation of the lowest non-overflow section of the dam crest.

Embankment: An artificially constructed feature usually consisting of earth and rock with sloping sides and a flat crest, intended to provide a permanent barrier that impounds or is capable of impounding water.

Dam Crest: The top of the non-overflow portion of the dam.

Abutment: The part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed at the interface with a concrete gravity section.

Normal Pool: The water elevation, reservoir surface area, and reservoir storage capacity that is prevalent at the site or typical under normal, non-storm conditions. Typically, this level is controlled by the principal spillway.

Maximum Pool: The highest water elevation, reservoir surface area, and reservoir storage capacity that could be impounded by the dam, including accumulated sediments, with the water or liquid level at the top of the lowest non-overflow part of the structure or dam crest.

Principal spillway: A structure that maintains normal pool conditions and over which daily non-storm related and flood flows are discharged. Also called a primary or service spillway.

Auxiliary Spillway: The secondary spillway not in use under normal conditions but used when needed to pass flood flows that exceed the capacity of the principal spillway.

Low-level outlet or "LLO": An installed pipe and operable gate or valve typically located in or near the foundation of a dam that can be used to alter water levels, drain the reservoir, or otherwise meet operational or safety needs. Also called a pond drain.

Inflow Design Flood or "IDF": The flood event which the hydraulic capacity of the spillway structure(s) and dam is designed and required to safely pass. Dam safety rules under development are considering the following prescriptive IDF's, Low and Minimal = 100-year, Significant = 1,000-year, High = PMF. The prescriptive IDF may be refined to a site specific IDF if additional analyses are performed.

Emergency Action Plan (EAP): A written plan that identifies the area that would likely be inundated by the failure of a dam and identifies the actions that should be taken by the Owner to protect life, property, lifelines, and the environment in the event of a dam failure or threatening condition at the dam. The plan is usually implemented in cooperation with the local, regional, and state emergency personnel.

Operation and Maintenance Plan or "O&M": A plan that provides guidelines for the necessary, regular operation and maintenance activities at a dam.

Definitions from the Administrative Rule:

<https://anrweb.vt.gov/DEC/IronPIG/DownloadFile.aspx?DID=185352&DVID=0>

Williams Dam

Town of Londonderry



Prepared By:

**DuBois
& King** inc.

March 24, 2022



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Introduction

Williams Dam (State ID #115.01) is located on the West River in Londonderry, VT in close proximity to VT Route 11. The State of Vermont completed an inspection of the dam in August 2015, and recommended that the Town of Londonderry (Town) retain an engineer to evaluate the dam. The State recommendations included monitoring erosion occurring on the left abutment of the dam, and the evaluation and preparation of plans to repair, replace, or remove the dam. These recommendations were based upon the observed poor condition of the dam and the potential risk to the stability of the Vermont Route 11 (VT Rte 11) bridge and the downstream inundation area.

In November 2021, the Town authorized a comprehensive study of alternatives for Williams Dam. The Town engaged DuBois & King, Inc., to evaluate the condition of the dam and determine comparative costs for the dam's rehabilitation, replacement, or removal. This evaluation included:

- Inspection of the dam,
- Meetings with Town Staff and State of Vermont Dam Safety engineers,
- Review of available information and records,
- Development of alternatives including conceptual engineering plans and construction cost estimates,
- Evaluation of conceptual alternative permitting requirements, and
- A presentation to the Town.

Dam Description

Williams Dam is a run-of-the-river dam constructed of stone masonry and concrete in the 1800s. A run-of-the-river dam is a structure constructed to impound a portion of a river with the normal flow of water flowing over the dam. Williams Dam was originally constructed to generate power for an adjacent machinery shop.

The dam appears to be founded on bedrock, with stone masonry that was capped in concrete. The dam is approximately 20-ft tall from the downstream toe of the dam to the top of the intake structure and approximately 90-ft long between the abutments. The dam consists of a primary spillway and a low-level outlet structure. The low-level structure contains a 6-foot diameter corrugated metal outlet pipe and vertical slide gate on the upstream side of the structure.



Dam Background & History

The Londonderry Historical Society states that the Town was chartered in 1780, and by the 1800's the Town's population was approximately 1,300 people due to an increase in manufacturing jobs. The Gazetteer and Business Directory of Windham County, VT, 1724-1884, lists several manufacturing businesses from gristmills to a tub factory. A three-story machine shop on Main Street was erected in 1867. In 1883, Mr. Williams constructed a stone dam across the West River for the machine shop.



1908 – Mill Dam, Bridge and Bacon's Store in Londonderry, VT
Source: Shelburne Museum, Shelburne, Vermont

The Town of Londonderry resides within the Connecticut River watershed, and a majority of developed land within the Town occurs along the West River. The Town has experienced major flooding events along the West River near Williams Dam.

In the Fall of 1927, Vermont experienced what is considered the worst flooding event recorded. That fall, the State was experiencing unusually high rainfall. Between November 2nd and November 4th, 1927, the State of Vermont recorded a rainfall depth of 8.71 inches. Flooding within Vermont rivers destroyed approximately 1,285 bridges, and killed 84 people. Notes associated with the following photo describe the pictured bridge, upstream of Williams Dam, to have been damaged or destroyed and replaced in 1928. The photo also shows that the store and mill from the 1908 photo remain.



1928 – Bridge built after the flood of 1927, Bacon's store on right, Williams mill on other side of bridge.
Source: "Crossings, A History of Vermont Bridges" by Robert McCullough.

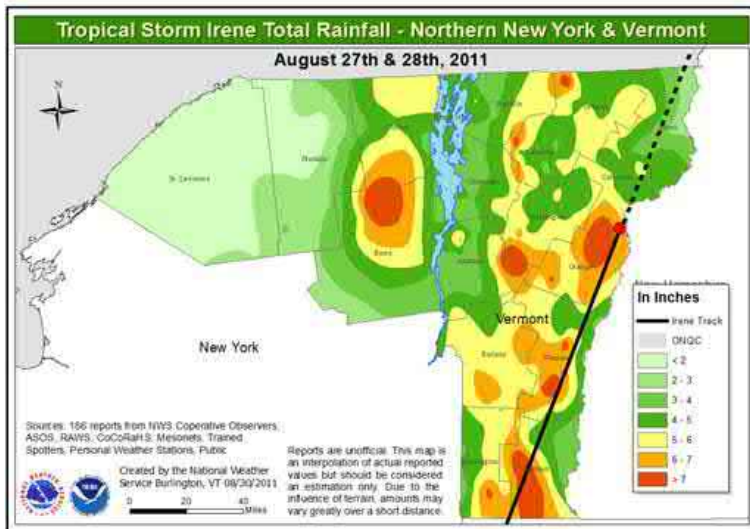
Documentation of flooding and other records of the dam between 1928 and the 1970's could not be found. However, in May and June 1973, Vermont again experienced above average rainfall. On June 28, 1973, a significant storm event with 7.19-inches of rainfall was recorded in South Londonderry. Notes associated with the following photo describe the bridge to be damaged again. In this photo, the mill structure appears to have been removed and there appears to be damage to the abutments of the dam. Vermont Dam safety reports that the last documented rehabilitation of the dam was in 1978 when the low-level gate structure was constructed and repairs were made to the primary spillway to address damages from the 1973 flood.



1973 – Intersection of Vt. Rte. 11 and 100 in north Londonderry village after 1973 flood
Source: Vermont State Archives and Record Administration

In June 2008, the Vermont Agency of Natural Resources issued Basin 11 Management Plan, West River, Williams River, Saxton River. This plan outlined known issues within the basin and effects to water quality, habitat, etc. The Plan discusses that Williams Dam be considered for dam removal due to deteriorating condition, blocking fish passage, sediment accumulations and potential safety hazards.

The second largest flooding event occurred in 2011, when Hurricane/Tropical Storm Irene passed through the Connecticut River watershed. NOAA reports that between 4 and 11-inches of rainfall occurred in Vermont on August 28, 2011. At Williams Dam in Londonderry, the West River overflowed the banks of the river and flooded the VT Rte 11 and 100 area.



2011 – Tropical Storm Irene Rainfall and Flooding in Londonderry on VT Route 100

Following the 2011 storm, discussion regarding flooding near Williams Dam resulted in structures adjacent the dam being removed to improve the floodplain in 2013. The 2016 Tactical Basin Plan for the West, Williams and Saxtons Rivers and adjacent Connecticut River Tributaries created a list of dams to be removed to have the greatest ecologic benefit, listing Williams Dam with the highest rank.



March 2022 - Ice from West River upstream of the Dam

Data Collection & Site Investigation

DuBois & King completed several site visits to collect information related to Williams Dam. This included a topographic and bathymetric survey of the dam, wetland review, a dam inspection, and sediment sampling.

Dam Survey

D&K conducted a limited survey of the Williams Dam and the surrounding area. The purpose of the survey was to collect key dam measurements and topographic/bathymetric information suitable for producing an existing conditions base plan and to develop conceptual alternative plans and construction cost estimates.

The survey took place on November 15 & 16, 2021. The survey was based upon the NAD83 VT feet State Plane horizontal datum and the NAVD88 feet vertical datum. The topographic survey included the dam and abutments, the VT Rte-11 bridge, ground shots along the upstream and downstream banks of the West River, and surrounding areas such as Edge Hill Road, the Veterans Park and existing dry hydrant location. In addition, a bathymetric survey was completed of a portion of the West River using a dual frequency sonar probe. The limits of the bathymetric survey extended 500-ft upstream of the dam and 100-ft downstream of the dam.

Survey data was imported to AutoCAD, a computer-aided engineering drafting software, to develop elevation models and site layout. This information was augmented with additional topographic information from a publicly available Light-Detection and Ranging (LiDAR) digital elevation model, Middle Connecticut River sub basin 2016 0.7-m DEM. An Existing Conditions Plan depicting Williams Dam and the surrounding area is included in **Appendix A**.

Wetland Review

D&K conducted a preliminary wetland investigation at the site. The purpose of the wetland investigation was to identify possible locations of wetland areas near the dam that may be impacted by modifications to the dam. This information is important to developing permitting requirements for each alternative.

Two wetlands were identified near the dam and approximate boundaries were established. This site visit occurred on November 30, 2021, outside of the growing season, and did not include formal wetland delineation. The wetlands are likely Class II because they are contiguous with the West River, but review by the district wetlands ecologist will be necessary to verify this wetland classification.

The Natural Resources Atlas Map shows no elements of concern (rare, threatened, or endangered species or significant natural communities) in the immediate project area. No significant natural communities were observed during the course

of fieldwork. A field survey during the growing season would be necessary to determine whether rare, threatened, or endangered species are present in the project area. A memorandum summarizing the wetland investigation is included in **Appendix B**.

Dam Inspection

On November 30, 2021, D&K engineers including Charles Johnston P.E., Andrew Sampsell, and Bobby Lanzilotta, conducted a site visit to inspect the dam, take additional measurements of the dam, review the upstream and downstream areas of the West River, and meet with the Town to discuss the project.

The inspection began with a review of the primary spillway and low-level structure. The days leading up to the inspection had a mix of rain and snow precipitation, which affected the conditions under which the inspection took place. The dam was observed to have approximately a foot of flow over the primary spillway and snow cover in the surrounding area. The primary spillway appears to be a stone masonry structure with a concrete cap. A concrete apron on the upstream side of the dam extends from the low-level structure on the right side of the river (directions looking downstream) to the left abutment. Pressurized leakage is occurring at different heights and locations on the downstream face of the structure.



November 2021 – Williams Dam

The low-level intake structure consists of a slide gate on the upstream face, a 6-foot corrugated metal outlet pipe, and open concrete flume on the downstream

side. The condition of the overall structure is very poor. The slide gate stem is bent making the gate inoperable. The gate is sealed on the upstream side of the outlet pipe but there is some seepage at the bottom of the gate. The bottom of the gate seals to a wooden sill, and during the inspection the wood was observed to be cracked and covered in ice. Silt has accumulated on the upstream side of the gate, which may contribute to it being inoperable. Fine textured sediment is leaking through the gate sill and accumulating in the outlet pipe.

The outlet pipe is heavily deteriorated with rusting observed throughout the pipe. Soundings on the pipe indicated the metal pipe has delaminated from the concrete. Pressurized water leaks through the pipe and water flowing between the pipe and concrete at the outlet end of the pipe are further indicators that the pipe is delaminated from the concrete.



November 2021 – Low-Level Outlet



November 2021 – Dam to concrete structure

The concrete portion of the structure was observed to be in very poor condition. The section of the structure that the outlet pipe appears to have been constructed as a concrete cap over the stone masonry dam. Large portions of this concrete have spalled, exposing the stones and allowing hydraulic connection to the upstream pool. The concrete flume wall, which extends downstream of the dam, has separated from the base slab of the structure and water can be seen flowing between the wall and slab. The flume wall also has large spalls, however, no steel reinforcement was found in areas where the concrete has separated from the structure. The right flume wall was noted to be out-of-plumb, which may indicate a global stability failure of the wall.



November 2021 – Primary Spillway



November 2021 – Right wall of Outlet Flume

The right abutment consists of several components including the VT Rte-11 bridge abutment, the concrete wall upstream of the intake structure, the intake structure, and a riprap slope. During the inspection the ground was covered in snow, however, no seepage was noted in the earthen abutment area. This may indicate the concrete walls are acting as sufficient hydraulic cut-offs. The slope of the abutment is steep with a portion of the riprap extending into the river.



November 2021 – Left Abutment



November 2021 – Flow through left abutment

The left abutment is comprised of the banks of the West River that supports Edge Hill Road. The dam contact at the abutment is a combination of exposed bedrock and large riprap stone. The river at the time of the inspection was flowing through the riprap and along an exposed portion of bedrock along the far left side of the river. The left abutment appears to have been washed out during a high flood event, which allows the river flow around the concrete dam. The depth of the flow

around the left side of the dam is difficult to determine due to a large portion being frozen at the time of the inspection.

The impounded area of the dam extends upstream of the VT Rte-11 bridge and through several bends of the West River. During the site visit, the majority of the impounded area was frozen with some exposed portions near the dam and along the edges of the river. The impoundment appears to be heavily filled with accumulated sediment. In one location, there appears to be a small island of sediment deposition near the right bank of the West River. A dry hydrant is located approximately 310-feet upstream of the dam.

Downstream of the dam, there is a scour hole at the toe of the dam, possibly from flow over the dam or from the natural formation of the bedrock the dam was constructed upon. Downstream, the inspection continued to observe crossings of the West River and Utley Brook, which converges with the West River approximately 1800-feet downstream of the dam. Other than the VT Rte-11 crossing at the dam, Rte-100 crosses the river twice downstream of the dam. Overall, the West River downstream of the dam consists of high banks with relatively flat surrounding floodplain.

Sediment Sampling

As part of the dam inspection, D&K collected two samples of sediment from the West River. The purpose of the sediment collection was to test the sediment for possible contaminant impacts. For future improvements, sediments removed during dredging activities may require testing for contaminants to verify if the sediment is acceptable to be disposed of as clean fill or development soils. River flow over the dam is disturbed and suspended sediments naturally collect upstream of the dam.

The first sample was collected on the left side of the west river under the VT Rte-11 Bridge. The second sample was collected from the edge of the river near the dry hydrant location. These sample location were selected due to the possible dredging that would be needed upstream of the dam for each of the evaluated alternatives, and potential dredging of the dry hydrant intake. The sample locations are shown on the Existing Conditions Plan in **Appendix A**.

Samples were sent to Endyne Inc. for testing. The samples were tested for:

- Total petroleum hydrocarbons in the gasoline and diesel range organics (EPA 8015 method),
- Oil & Grease (EPA 1664 method),
- Volatile and Semi-Volatile organic compounds (EPA 8260 & 8270 method),
- RCRA heavy metals (EPA 6020C/7471 method),
- Polychlorinated biphenyl (EPA 8082 method),
- Pesticides (EPA 8081B method), and
- Total Kjeldahl Nitrogen (TKN) (EPA 351.4 method)

The samples were tested and compared to the “Vermont Watershed Management Division’s Recommended Guidelines for Evaluating Contaminant Concentrations in Freshwater Sediments and the Potential for those Contaminants to Adversely Affect Aquatic Biota”. A summary of the results and comparison to Vermont standards are included in **Appendix C**.

The results of the sediment testing indicate that no contaminants were detected above the State of Vermont Threshold Effect Concentration (TEC) or Probable Effects Concentration (PEC) limits. Additional testing of material dredged from the West River will be required during construction; however, it was assumed the dredged sediment would be suitable for common fill in the alternative analysis.

Existing Conditions Hydraulic Analysis

To develop alternatives for Williams Dam, D&K conducted a hydraulic analysis of the dam. The purpose of this analysis was to model the dam during key design flood events (10-yr, 50-yr, 100-yr, and 1000-yr) and evaluate the dam’s performance in reference to the anticipated 2022 VT Dam Safety Program design requirements.

The hydraulic analysis was completed using US Army Corps of Engineers HEC-RAS (version 6.0) 2D hydraulic modeling software, which is a computer program that models the flow of water through two-dimensional terrain surfaces. The program is also used for analysis of peak water surface, velocities, flow, and mapping the extent of flooding.

The model was created utilizing the digital elevation model from the D&K survey and publically available LiDAR. The West River is part of the Federal Emergency Management Agency Flood Insurance Study (FEMA FIS) for Windham County, Vermont, which was completed to aid in the establishment of flood insurance rates. The FEMA studies model various aspects of watersheds and rivers to accurately establish extent of flooding for various storm events. FEMA FIS is widely accepted as an accurate measure of flooding. D&K utilized the study’s flow values for the hydraulic analysis of Williams Dam.

Flood Event	Flow (cubic feet per second (cfs))
10-year (10% probability)	5,419
50-year (2% probability)	11,500
100-year (1% probability)	11,759
500-year (0.2% probability)	20,552
1000-year (0.1% probability)	21,912

The existing conditions model began at a FEMA FIS cross-section approximately 4000-feet upstream of the dam. The model was extended 4100-feet downstream of the dam, beyond the confluence of Utley Brook and the West River. It was assumed that during larger storm events, Utley Brook, might cause backwater to Williams dam and have an impact upon flooding.

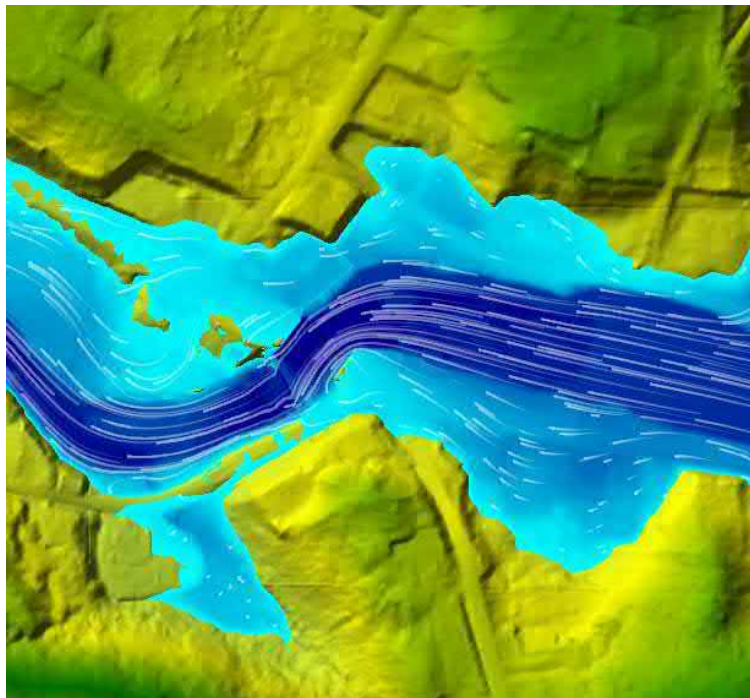
The model utilizes land cover aspects to determine flow along the terrain file. Land cover types such as open fields have different flow characteristics from wooded or urban areas. These land cover types were mapped utilizing ortho-imagery and notes from the site visit. In general, the Town of Londonderry was broken into three major land coverage complexes: agricultural, forest, and urban/residential.

The model also included features such as the VT Rte-11 bridge. The hydraulic opening of the bridge restricts the flow that reaches Williams Dam. Additional flow can reach the dam if flooding flows over or around the bridge. Due to this, the model includes information like the bridge deck, low chord steel beams, and concrete abutments.

Results from the model are separated into two important sections. The first section is taken at the upstream end of the bridge to capture information prior to the bridge restriction. The second section is taken at the dam.

Location	Associated Water Surface Elevation (ft.)				
	10-year	50-year	100-year	500-year	1000-year
Bridge (Deck El. 1151.7-ft)	1150.78	1154.14	1154.25	1156.88	1157.23
Dam (Spillway El. 1141.9-ft)	1145.08	1151.07	1151.25	1154.93	1155.33

Results from the model indicate that the bridge opening is restricting flow to the dam. Flow that diverts around the bridge flows through the surrounding area and re-enters the West River after to the dam. The model also shows the 10-year flood event is not expected to overtop the VT Rte-11 bridge. The flood inundation mapping associated with the existing dam for the 10-year and 100-year flood events are included in **Appendix D**.



HEC-RAS 2D Flow Analysis

Dam Safety Coordination

During the process of establishing the condition of Williams Dam, D&K coordinated with Vermont ANR Dam Safety Program (VT DSP). Meetings with the Town and VT DSP discussed the dam's condition, upcoming dam regulation changes, the dam's hazard classification, and other aspects of the dam.

Prior to D&K's involvement, VT DSP conducted an inspection of the Williams Dam on August 6, 2015. The inspection report identified concerns regarding the dam's condition and gives the dam an overall condition rating of Poor. Key observations from the 2015 inspection include:

- Numerous cracks within the concrete, forming spalls and voids and allowing leakage through the dam.
- Leakage through the wooden sill of the sluice gate at approximately 1,000 gallons per minute.
- The sluice gate stem is not operable due to a bend in the stem.
- Corrosion, leakage, and section loss in the 6-foot diameter outlet pipe.
- Cementitious material erosion is occurring within the construction joints in the right training wall.
- Leakage through the right abutment.

In the 2015 report, the State of Vermont classified Williams Dam as a Low Hazard Dam.

Dam hazard classifications are not based upon the current condition of the dam, but rather the potential impacts in the event of a dam failure. Dam classifications are defined as follows:

- Low Hazard – Dams where failure or mis-operation results in no probable loss of human life and low economic and environmental losses.
- Significant Hazard – Dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or other impacts of concern. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- High Hazard – Dams where failure or mis-operation will probably cause loss of human life.

As part of this study, D&K coordinated with the Vermont Dam Safety Program to complete an updated hazard classification of the dam. The classification of the dam is important to the alternative analysis as it establishes the regulatory and design standards for the dam rehabilitation and replacement alternatives.

Dams in the State of Vermont are regulated by 10 V.S.A Chapter 43, and the engineering guidelines associated with the existing law are considered outdated. The Dam Safety Program recently adopted new Administrative Rules, which went into effect on August 1, 2020. The administrative rules establish hazard classification updates, inspection schedules, and other requirements for dam owners. In addition to the Administrative Rules, Standard Engineering Rules are expected to be adopted in 2023, which will establish engineering design requirements for new and existing dams.

To quantify the potential impacts of a dam failure, a breach analysis of the dam through the downstream floodplain is typically completed. A breach analysis is helpful tool, not only for emergency action planning purposes, but can also support the selection of a project alternative (i.e. if the consequence of the dam failing is significant/costly this can support the decision to make capital expenditures to avoid these consequences). In discussions with Vermont Dam Safety the source for the Low Hazard classification was unknown and sediment accumulation may impact the classification due to downstream impacts.

A memorandum, dated March 2, 2022, by Vermont Dam Safety is included in **Appendix E**, which outlines a breach analysis and reclassification of Williams Dam to Significant Hazard. D&K provided information the Dam Safety Program from the Existing Conditions Hydraulic Analysis and estimates of water and sediment volume impounded by the dam. The Dam Safety program completed the breach analysis utilizing the DSS-Wise Lite program and analyzed Williams Dam under several scenarios:

- Sunny Dam Failure (260 cfs)
- Storm Day Failure (1,620 cfs)
- Storm Day Failure (11,500 cfs)

The reclassification of the dam was based on the potential impacts for property loss in the event of a dam failure.

Summary of Deficiencies

Williams Dam is in poor condition and requires action by the Town of Londonderry. The following is a list of deficiencies identified during the site inspection, by Vermont Dam Safety, and from the analysis.

1. Dam Structural Integrity

The dam structure is no longer acting as an efficient hydraulic cut-off and the integrity of the structure is questionable. Visual indicators, such as pressurized leakage, large cracking and spalling, and walls out-of-plumb show that the dam is experiencing significant deterioration. The dam does not appear to have been constructed with modern materials and is assumed to rely on the weight of the structure to resist loading. Structural stability of the dam was not analyzed for this study, however, the dam is likely experiencing unintended loading from sediment deposition.

Other aspects, such as erosion in the left abutment, has led to the West River to continue to erode through a low point. This area is susceptible to continued erosion of the earthen material, which may lead to a partial breach.

2. Inadequate Dam Operating Controls

The Town lacks the ability to operate the low-level outlet stem to drain the impoundment in case of an emergency. The ability to reduce the water level behind the dam in a controlled way is crucial to increasing the stability of the dam in an emergency. Without the ability to lower the pond, a partial breach or full breach of the dam will result in an uncontrolled release.

In addition, with no way to regularly exercise the low-level outlet to flush sediment downstream, sediment accumulation behind the dam has increased significantly. Dams naturally act as sediment traps, and regularly exercising the low-level outlet allows for movement of sediment downstream.

3. Insufficient Spillway Hydraulic Capacity

Historical flooding near the dam structure has been documented. Hydraulic analysis by FEMA and D&K indicate that the combination of the VT Route 11 bridge and the dam restrict flow in the West River causing flooding upstream of the dam. Removal of the dam has been discussed in several ANR Basin Plans for the West River to reduce flooding and improve aquatic habitat.

Alternative Analysis

The Town of Londonderry requested the following scenarios to be analyzed:

- No Action
- Dam Rehabilitation
- Dam Replacement
- Dam Removal

D&K completed an analysis of these alternatives by outlining the key elements of each, preparing conceptual plans and opinion of construction costs, outlining permitting requirements and other dam safety concerns. Conceptual plans and overlay on ortho-imagery of each alternative are contained within **Appendix F** and estimated opinions of probable construction costs are in **Appendix G**. Each alternative is detailed below. The flood inundation mapping associated with the replacement and removal alternatives for the 10-year and 100-year flood events are included in **Appendix D**.

No Action Alternative

The focus of this alternative is to establish requirements and potential costs that the Town of Londonderry would encounter if one of the following alternatives were not implemented. In this case it was assumed the dam would remain in its current condition and that the Town would not implement any remedial measures to repair the dam.

Without improvements to the dam, the structure is expected to continue to deteriorate. The low-level structure flume walls are separating from the base of the structure, likely due to freeze and thaw of entrapped water between the wall and slab. In addition, the concrete cap of the stone dam is failing and exposing large portions of stone. The leakage through the stones may accelerate this process making the dam less stable. Failure of the dam may occur due to the deterioration of the dam. This alternative does not account for the costs associated with the potential downstream impacts of a failure or for reconstruction of the dam.

As outlined previously, the State of Vermont Dam Safety standards are in the process of being updated. These standards will continue to require the Dam Owner to continue to pay the annual dam registration fee, in addition to other expenses associated with future required inspections. The annual dam registration fee is \$350 for Significant Hazard Dams.

Other expenses the Town may incur due to the new rule change include engineering fees associated with periodic and comprehensive dam inspection. The new administrative rule requires a Significant Hazard dam to have a periodic inspection every 5-years. The Dam Safety Program intends to complete the majority of these inspections, however, depending on their workload, VT DSP may require the Dam Owner to hire an engineer to complete the inspection. This inspection includes review of existing information, a site inspection, and producing an inspection report. To accommodate for this potential expense, the annual fee for this alternative and other alternatives that maintain the dam, includes a set aside of \$500/year.

In addition to the periodic inspection, the Dam Safety program also requires a comprehensive inspection of Significant Hazard dams every 15-years. This is a more detailed inspection to be completed by an engineer hired by the Dam Owner. It involves a review and update to all studies and analyses (H&H, stability, breach, etc.), and an in-depth inspection of the dam. The requirements for this are not yet established, however, to accommodate this future expense the annual fee for this alternative and other alternatives that maintain the dam, includes a set aside of \$1,150/year.

Lastly, with the implementation of the new standards, the State of Vermont will focus initially on High and Significant Hazard Dams to ensure that action is taken to rehabilitate dams in poor condition. Due to the current condition of the dam and the reclassification to Significant

Hazard, a no action alternative may not be acceptable to the Dam Safety Program. Future inspections by the State will include similar recommendations as the 2015 inspection report, which was to prepare plans for repair, replacement, or removal of the dam. In the event the Town does not complete the required recommendations, the Dam Safety program may take enforcement actions to ensure public safety. The cost of completing future recommendations and the cost of future enforcement actions are not included in this alternative.

Dam Rehabilitation Alternative

This alternative retains the existing dam and maintains the current water level. The existing spillway is left in place with minor repairs. This alternative requires that a new concrete wall to be constructed on the upstream face of the dam. This wall will be designed to be structurally independent of the existing dam. The following is a list of improvements associated with this alternative:

- Construct new concrete spillway at the upstream face of the existing spillway.
- Dredge sediment for approximately 25-feet upstream of existing dam. This should allow for the construction of the new upstream concrete wall, and removes sediment load from the structure.
- Demolish a portion of the existing low-level outlet structure to remove the headwall, corrugated outlet pipe, and slide gate.
- Extend the new upstream wall across the existing outlet structure and construct a new headwall with access deck, new slide gate, and downstream concrete flume walls within existing walls.
- Construct new trashrack/debris diversion to protect slide gate and access deck.
- Install new abutment training walls and stone riprap along abutments to reduce erosion of river banks during large flood events.
- Dredge existing dry hydrant location.

This alternative is estimated to have a probable construction cost of \$800,000. This involves the new cast-in-place upstream wall, sediment dredging, channel restoration, and other construction related items. It was assumed that sediment dredged from the river would be retained and disposed of by the Contractor.

Beyond construction costs, there will be additional costs such as engineering and permitting fees. Engineering for this project will involve a preliminary design, coordination with various permitting agencies, permitting of the project, and final design. Other services such as bidding and construction administration and observation could be included. It is

estimated an additional \$80,000 will be needed to advance this alternative from a conceptual alternative to a complete construction package.

The following are anticipated permits and coordination required to be able to construct this alternative:

- Dam Alteration Order,
- Wetlands Permit,
- Stream Alteration & Crossings Permit,
- Army Corps of Engineers Section 404 Wetland Permit,
- Federal Permit for work in Rivers and Streams,
- Work in the State Right of Way Permit,
- Coordination with Vermont Division of Historic Preservation, and
- Coordination with Vermont Fish & Wildlife.

There may be other coordination items or permits required with specific construction techniques such as discharging of water from construction activities downstream. The permit application fees for the project vary depending upon areas of impact. The estimated area of impacts for this alternative is approximately 2,250 sq. feet. It is estimated the permitting fees for the project are approximately \$10,000. Information sheets discussing the permits are included in **Appendix H**.

Additional analysis was completed to detail a secondary rehabilitation alternative. This alternative utilized a roller compacted spillway on the downstream face of the dam to provide stability and hydraulic cut-off. An exhibit of this secondary rehabilitation alternative is included in **Appendix F**. This alternative is estimated to have a probable construction cost of \$675,000. This involves the new roller compacted concrete spillway, sediment dredging, channel restoration, and other construction related items. It was assumed that permitting fees and engineering fees associated with this alternative are similar to the upstream concrete wall alternative.

Dam Replacement Alternative

This alternative involves constructing a new concrete dam downstream of the existing dam. The location of the new dam, approximately 20-ft downstream was selected to allow for a longer spillway to improve hydraulics and to allow for construction of the new dam with the existing dam in-place. The following is a list of improvements associated with this alternative:

- Construct new concrete dam downstream of the existing dam. This will include a new spillway section, and new low-level outlet section. The new dam will maintain a similar normal pool and will be approximately 10-ft longer between the left abutment and outlet structure.

- New low-level outlet section will have similar improvements as the previous alternative. New slide gate, new trashrack/debris diversion, new access deck, and new outlet flume.
- Dredge sediment approximately 25-feet upstream of existing dam. Dredging is to allow for the demolition of existing dam.
- Demolish the existing dam. To preserve its historic significance, construct a public information board in Veterans' Park.
- Install new abutment training walls and stone riprap along abutments to reduce erosion of river banks during large flood events. Training wall would tie into the existing dam abutments to provide hardened stream edge to contain flow over the dam.
- Abandon existing hydrant location and install new hydrant location at the Veteran's Park. The intake/strainer will be positioned within the trashrack/sediment diversion to protect components.

This alternative is estimated to have a probable construction cost of \$1,186,000. This involves the construction of the new dam, demolition of the existing dam, sediment dredging, new dry hydrant, upstream and downstream channel restoration, and other construction related items. It was assumed that sediment dredged from the river would be retained and disposed of by the Contractor.

Similar to the previous alternative, this alternative will involve various engineering tasks and permitting assistance. It is estimated that \$120,000 will be needed to progress this alternative from a conceptual alternative to a complete construction package. This engineering fee is expected to be larger than the rehabilitation alternative due to both the increase in design requirements and permitting requirements compared to the rehabilitation alternative.

The following are anticipate permits and coordination required to be able to construct this alternative:

- Dam Alteration Order,
- Wetlands Permit,
- Stream Alteration & Crossings Permit,
- Army Corps of Engineers Section 404 Wetland Permit,
- Federal Permit for work in Rivers and Streams,
- Work in the State Right of Way Permit,
- Coordination with Vermont Division of Historic Preservation, and
- Coordination with Vermont Fish & Wildlife.

Similar to the previous alternative, additional permits and coordination that may be needed. The estimated area of impacts for this alternative is approximately 13,250 sq. feet. Due to increased impacts to wetlands and

stream alterations, the estimated the permitting fees for the project are \$23,000.

Dam Removal Alternative

This alternative involves dredging the West River and demolishing the existing dam. Based on the historic information and the downstream river bottom, it is presumed that there is a bedrock bottom of the West River below the sediment. The goal will be to remove the sediment to the natural bottom to create a stable channel. The following is a list of improvements associated with this alternative:

- Dredge upstream of the existing dam to the natural channel bottom or create a sloped stable channel using natural stabilization techniques and stone rip-rap.
- Demolish the existing dam. To preserve its historic significance, construct a public information board in Veterans' Park.
- Abandon existing hydrant location.

This alternative is estimated to have a probable construction cost of \$364,000. This involves demolition of the existing dam, sediment dredging, removal of the existing dry hydrant, upstream and downstream channel restoration, and other construction related items. It was assumed that sediment dredged from the river would be retained and disposed of by the Contractor.

Similar to the previous alternatives, this alternative will involve various engineering tasks and permitting assistance. The majority of the work will be involved with coordination with permitting agencies on the channel restoration. It is estimated that \$40,000 will be needed to progress this alternative from a conceptual alternative to a complete construction package.

The following are anticipate permits and coordination required to be able to construct this alternative:

- Dam Alteration Order,
- Wetlands Permit,
- Stream Alteration & Crossings Permit,
- Army Corps of Engineers Section 404 Wetland Permit,
- Federal Permit for work in Rivers and Streams,
- Work in the State Right of Way Permit,
- Coordination with Vermont Division of Historic Preservation, and
- Coordination with Vermont Fish & Wildlife.

Similar to the previous alternative, additional permits and coordination that may be needed. The estimated area of impacts for this alternative is approximately 21,750 sq. feet. Due to impacts to wetlands and stream

alterations, the estimated the permitting fees for the project are approximately \$21,000.

Summary of Alternative Costs & Possible Funding Sources

The estimated probable construction costs included a 30% contingency due to some gaps in information for each alternative. These include:

- Unknown soil conditions and depth of bedrock,
- Unconfirmed State of Vermont dam design standards, and
- Lack of records/plans depicting the original construction of the dam.

The following table outlines the total costs for each alternative:

Owner Costs	No-Action	Dam Rehabilitation A	Dam Rehabilitation B	Dam Replacement	Dam Removal
Annual Fees	\$2,000	\$2,000	\$2,000	\$2,000	-
Construction Cost	\$0	\$808,000	\$675,000	\$1,186,000	\$364,000
Engineering Fees	\$0	\$80,000	\$80,000	\$120,000	\$40,000
Permit Application Fees	\$0	\$10,000	\$10,000	\$23,000	\$21,000
Total	\$2,000	\$900,000	\$767,000	\$1,331,000	\$425,000

The funding for the selected alternative is anticipated to be by the Town of Londonderry; however, there are outside funding sources available. During the coordination meetings with the Dam Safety program, several funding sources we discussed.

The dam replacement alternative currently has no potential outside funding source. The Dam Safety program discussed a possible High Hazard Potential Dam Grant program through FEMA. This program is only for High Hazard dams but it may be expanded in the future.

The dam rehabilitation alternative could receive funding through the Vermont State Historic Preservation Grants. This program has funded dam rehabilitations in the past. To qualify for this grant, Williams Dam would need to be listed or determined eligible for listing in the National Register of Historic Places. This funding would likely not be available for the rehabilitation alternative that would cap the downstream side of the existing dam.

The dam removal alternative has a much larger source for potential outside funding. The Vermont Agency of Natural Resources maintains a list of dam removal funding sources, including Federal funding by NOAA, the US Fish and Wildlife services, and State grants. Successful examples of dam removal utilizing outside funding sources include the Magic Mountain Dam removal in Londonderry, which received fundraising and grant writing assistance from CRC. Funding for this alternative can contribute to the engineering design, permitting, and construction costs.

See **Appendix I** for a list of potential funding sources for the Alternatives.

Summary & Conclusions

	Dam Alternatives			
	No-Action	Dam Rehabilitation (both)	Dam Replacement	Dam Removal
Addresses Deficiencies	This alternative does not address any deficiencies.	✓✓ This alternative improves structural integrity, and dam controls	✓✓✓ This alternative replaces existing dam with dam design to all applicable standards.	✓✓✓ This alternative removes the existing dam.
Continued Maintenance Costs and Annual Fees		✓✓ Improves structural integrity and dam controls	✓✓✓ Replaces existing dam with dam design to all applicable standards.	✓✓✓ This alternative removes the existing dam.
Total Cost	\$2,000 Least expensive alternative, however requires future action which will result in additional costs.	✓✓ \$767,000/\$900.000	✓ \$1,331,000	✓✓✓ \$425,000 Most cost effective, removes dam related future expenses.
Additional Funding Available		✓ Possible funding through State Historic Preservation Grant		✓✓✓ Numerous funding options.

The following is a summary of the report findings and conclusions of analysis:

1. Williams Dam is in poor condition and requires action by the Owner to address deficiencies that may lead to a dam breach. Future anticipated (2023) dam safety standards would require the Owner to complete some remedial action to the dam.
2. The dam structure is no longer acting as an efficient hydraulic cut-off and the integrity of the structure is questionable. Visual indicators, such as pressurized leakage, large cracking and spalling, and walls out-of-plumb, show that the dam is experiencing significant deterioration.
3. The Town lacks the ability to drain the impoundment in case of an emergency due to damage to the low-level outlet stem. The ability to reduce the water level behind the dam in a controlled way is crucial to increasing the stability of the dam in an emergency. Without the ability to lower the pond, a partial breach or full breach of the dam will result in an uncontrolled release.
4. Hydraulic analysis by FEMA and D&K indicate that the combination of the VT Route 11 bridge and the dam restrict flow in the West River causing flooding upstream of the dam.
5. The No-Action Alternative is not recommended due to the condition of the dam. The Owner will likely be required by the State of Vermont to correct deficiencies in the near future.
6. The least costly alternative is Dam Removal. This alternative also addresses the existing dam deficiencies by removing the structure and hazard potential. There are no future dam fees and maintenance costs associated with the alternative. This alternative has several outside funding sources.
7. The Dam Rehabilitation alternative is the most cost effective alternative that maintains the dam. This alternative provides the structural integrity by being independent of the existing dam, and replaces inoperable controls at the dam. This alternative may have a potential outside funding source.
8. The Dam Replacement alternative addresses all the existing deficiencies and the new dam will be designed to current applicable standards. It is the most expensive option and may have most permitting requirements.

After the Town selects a preferred alternative, the next steps will be to coordinate with the State of Vermont Dam Safety program on the Town's intention for Williams Dam and to secure possible funding sources. Following those actions, the project would progress to preliminary design, permitting, final design, and construction of the project. Based upon the date of the upcoming Town Meeting day on April 30, 2022, and the time needed to design, permit, and bid the project, the construction of the project may not occur until the 2024 construction season.

Appendices

- Appendix A – Existing Conditions Plan
- Appendix B – Wetlands Memorandum
- Appendix C – Sediment Testing and Comparison
- Appendix D – Hydraulic Analysis Mapping
- Appendix E – Vermont Dam Safety Hazard Classification
- Appendix F – Alternative Plans
- Appendix G – Alternative Opinion of Probable Construction Costs
- Appendix H – Alternative Permitting
- Appendix I – Potential Funding Sources

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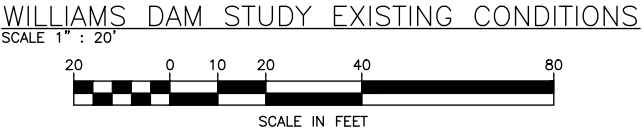
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4. Vermont Watershed Management Division’s Recommended Guidelines for Evaluating Contaminant Concentrations in Freshwater Sediments and the Potential for those Contaminants to Adversely Affect Aquatic Biota
5. Federal Emergency Management Agency Flood Insurance Study (FEMA FIS) for Windham County, Vermont. September 28, 2007
6. Vermont Environmental Protection Rules, Vermont Dam Safety Rules, August 1, 2020.
7. State Of Vermont, Agency of Commerce and Community Development, <https://accd.vermont.gov/historic-preservation/funding/historic-preservation-grants>

Appendix A

Existing Conditions Plan



DATUM:
VERTICAL: NAVD 88 GPS DERIVED
HORIZONTAL: NAD 83 GPS DERIVED



DuBois & King
6 GREEN TREE DR.
S. BURLINGTON, VT 05401
TEL: (802) 728-3376
FAX: (866) 783-7101
www.dubois-king.com

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NOT FOR CONSTRUCTION

NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF LONDONDERRY
100 OLD SCHOOL STREET
S. LONDONDERRY, VT 05155

WILLIAMS DAM STUDY (#115.01)
LONDONDERRY, VT

SHEET TITLE
EXISTING CONDITIONS SITE PLAN

DRAWN BY RJL	DATE PROGRESS
CHECKED BY CWJ	D&K PROJECT # 827442
PROJ. ENG. CWJ	

SHEET NUMBER
1
SHEET 1 OF 9

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Appendix B

Wetland Memorandum



MEMORANDUM

To: Charles Johnston, Project File
Date: December 2, 2021
From: Grace Glynn
Subject: Londonderry Williams Dam Wetlands Review
Project No.: 827442

This memorandum summarizes the preliminary wetlands investigation performed on November 30, 2021 at the Williams Dam at 2306 N Main St in Londonderry, VT, as shown on the attached Natural Resource Atlas Map.

Two wetlands were identified in the vicinity of the dam. This site visit occurred outside of the growing season and did not include formal wetland delineation, but the approximate wetland boundaries are shown on the attached map, and photos of the wetland are attached. Downstream of the dam, the river banks are generally steep and dominated by Japanese knotweed, a noxious invasive species.

Both wetlands are palustrine emergent/scrub-shrub (PEM/SS) and are located along the edge of the West River, upstream from the dam. The wetlands appear to be dominated by purple loosestrife, soft rush, cattails, meadowsweet, water horehound, and reed canary grass. The wetlands principal functions and values likely include wildlife habitat and flood storage. The wetlands are likely Class II because they are contiguous with the West River, but review by the district wetlands ecologist would be necessary to verify this wetland classification.

Work in any wetland or below Ordinary High Water elevations within the West River would require an Army Corps of Engineers Section 404 Wetlands Permit. Work in any Class II wetland or in the 50ft jurisdictional buffer of any Class II wetland would require a VT Wetlands Permit. Because the wetlands above the dam are Surface Water Margins located along waters of the state, wetland and buffer zone impacts over 150 square feet would likely require an Individual Wetland permit from the VT Wetlands Program. In general, Individual Wetland permits can take from 3-6 months and authorizations under the Wetland General permit can take from 1-3 months to process from the receipt of complete application to issuance of permit decision.

In order to determine potential wetland impacts and permitting needs, wetlands should be formally delineated during the growing season in accordance with the COE 1987 Wetland Delineation Manual and the COE 2012 Regional Supplement for the Northcentral and Northeast Region.

Work within the mapped River Corridor of the West River may be subject to municipal regulation in order to comply with Vermont's Flood Hazard and River Corridor Rule. Work involving movement of over 10 CY of material within the riverbed may require a Stream Alteration permit through the VT Department of Environmental Conservation's River Management Program.

The Natural Resources Atlas Map of the area shows no elements of concern (rare, threatened, or endangered species or significant natural communities) in the immediate project area, as shown on the attached Natural Resources Map. No significant natural communities were observed during the course of field work. A field survey during the growing season would be necessary to determine whether rare, threatened, or endangered species are present in the project area.



LEGEND

Wetland - VSWI

- Class 1 Wetland
- Class 2 Wetland
- Buffer

- Wetlands Advisory Layer
- River Corridors (Aug 27, 2019)
- .5 - 2 sqmi.
- .25-.5 sqmi.
- Soils - Hydric
- Parcels (standardized)

Roads

- Interstate
- US Highway; 1
- State Highway
- Town Highway (Class 1)
- Town Highway (Class 2,3)
- Town Highway (Class 4)
- State Forest Trail
- National Forest Trail
- Legal Trail
- Private Road/Driveway
- Proposed Roads

Stream/River

- Stream
- Intermittent Stream

- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas



150.0 0 75.00 150.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

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1" = 245 Ft.

1cm = 29 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

Williams Dam, Londonderry VT Wetlands Review
November 30, 2021



Surface margin wetland along the West River, looking west toward the dam



Downstream side of the dam, looking south from N Main St.

Appendix C

Sediment Testing and ANR Sediment Quality Guidelines

**Town of Londonderry
William's Dam Alternative Study
Upstream Sediment Sampling**

Substance	ANR		Sampling Locations	
	TEC	PEC	Bridge Abutment	Dry Hydrant
Metals (in mg/kg - ppm DW)				
Arsenic	9.79	33.0	ND < 3.6	ND < 7.5
Cadmium	0.99	4.98	ND < 0.36	ND < 0.75
Chromium	43.4	111.0	7.3	9.7
Copper	31.6	149.0	-	-
Lead	35.8	128.0	7.4	ND < 15.0
Mercury	0.18	1.1	ND < 0.051	ND < 0.093
Nickel	22.7	48.6	-	-
Zinc	121.0	459.0	-	-
Polycyclic Aromatic Hydrocarbons (in µg/kg - ppm DW)				
Anthracene	57.2	845.0	ND < 24.1	ND < 31.8
Benz(a)anthracene	108.0	1050.0	ND < 24.1	ND < 31.8
Benzo(a)pyrene	150.0	1450.0	ND < 12.0	ND < 15.9
Chrysene	166.0	1290.0	ND < 24.1	ND < 31.8
Dibenzo(a,h)anthracene	33.0		ND < 12.0	ND < 15.9
Fluoranthene	423.0	2230.0	ND < 24.1	ND < 31.8
Fluorene	77.4	536.0	ND < 24.1	ND < 31.8
Naphthalene	176.0	561.0	ND < 24.1	ND < 31.8
Phenanthrene	204.0	1170.0	ND < 24.1	ND < 31.8
Pyrene	195.0	1520.0	ND < 24.1	ND < 31.8
Total PAHs	1610.0	22800.0	204.8	270.3
Polychlorinated Biphenyls (in µg/kg - ppm DW)				
Total PCBs	59.8	676		
Organochlorine Pesticides (in µg/kg - ppm DW)				
Chlordane	3.24	17.6	ND < 25.0	ND < 31.9
Dieldrin	1.9	61.8	ND < 5.0	ND < 6.4
Sum DDD	4.88	28.0	ND < 5.0	ND < 6.4
Sum DDE	3.16	31.3	ND < 5.0	ND < 6.4
Sum DDT	4.16	62.9	ND < 5.0	ND < 6.4
Total DDTs	5.28	572.0		
Endrin	2.22	207.0	ND < 5.0	ND < 6.4
Heptachlor Epoxide	2.47	16.0	ND < 5.0	ND < 6.4
Lindane (gamma-BHC)	2.37	4.99	ND < 5.0	ND < 6.4

1. ANR Limits from Vermont Watershed Management Division's Recommended Guidelines for Evaluating Contaminant Concentrations in Freshwater Sediments and Potential for those Contaminants to Adversely Affect Aquatic Biota
2. TEC = Threshold Effect Concentration; PEC = Probable Effects Concentration
3. "ND < " result was below the detectable threshold for the test.

Dubois & King, Inc.

6 Green tree Drive

080439

So. Burlington, VT 05403

Atten: Charlie Johnston

PROJECT: Williams Dam

WORK ORDER: **2112-35270**

DATE RECEIVED: December 01, 2021

DATE REPORTED: December 17, 2021

SAMPLER: CWJ

Laboratory Report

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields. The Williston, VT facility is also ISO/IEC 17025:2017 accredited for Total Coliform and E coli by SM9223B.

The NELAC column also denotes the accreditation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:



Harry B. Locker, Ph.D.
Laboratory Director

www.endynelabs.com

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

001	Site: Bridge Location		Date Sampled: 11/30/21 Time: 11:30			
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC Qual.
TKN	1,100	mg/Kg, dry	EPA 351.2	12/8/21	N MAP	U
Phosphorus, Total	440	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	U
Mercury Digestion	Digested		EPA 7471B	12/8/21	W FAA	A
Metals Solids Digestion	Digested		EPA 3050B	12/2/21	W FAA	A
Arsenic, Total	< 3.6	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Barium, Total	42	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Cadmium, Total	< 0.36	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Chromium, Total	7.3	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Lead, Total	7.4	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Mercury, Total	< 0.051	mg/Kg, dry	EPA 7471B	12/9/21	W FAA	A
Selenium, Total	< 7.2	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Silver, Total	< 3.6	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Oil & Grease	255	mg/Kg, Dry	modified EPA 1664A	12/14/21	W CLD	N
Volatile Organic Compounds						
Prep EPA 5035A	Complete		EPA 5035A-H	12/1/21	W TRP	A
Dichlorodifluoromethane	< 715	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Chloromethane	< 715	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Vinyl chloride	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Bromomethane	< 715	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Chloroethane	< 715	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Trichlorofluoromethane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Diethyl ether	< 715	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
1,1-Dichloroethene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Acetone	< 1,430	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Carbon disulfide	< 715	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Methylene chloride	< 1,430	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
t-Butanol	< 3,580	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Methyl-t-butyl ether (MTBE)	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
trans-1,2-Dichloroethene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Di-isopropyl ether (DIPE)	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
1,1-Dichloroethane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Ethyl-t-butyl ether (ETBE)	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
2-Butanone	< 2,860	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
2,2-Dichloropropane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
cis-1,2-Dichloroethene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Bromochloromethane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Chloroform	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Tetrahydrofuran	< 1,430	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
1,1,1-Trichloroethane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Carbon tetrachloride	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,1-Dichloropropene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Benzene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
t-Amylmethyl ether (TAME)	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
1,2-Dichloroethane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Trichloroethene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2-Dichloropropane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

001	Site: Bridge Location		Date Sampled: 11/30/21 Time: 11:30			
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC Qual.
Dibromomethane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Bromodichloromethane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
cis-1,3-Dichloropropene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
4-Methyl-2-pentanone (MIBK)	< 1,430	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Toluene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
trans-1,3-Dichloropropene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,1,2-Trichloroethane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Tetrachloroethene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,3-Dichloropropane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
2-Hexanone	< 1,430	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Dibromochloromethane	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2-Dibromoethane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Chlorobenzene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Ethylbenzene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,1,1,2-Tetrachloroethane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Xylenes, Total	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Styrene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Bromoform	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Isopropylbenzene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,1,2,2-Tetrachloroethane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Bromobenzene	< 143	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
n-Propylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2,3-Trichloropropane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
2-Chlorotoluene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
1,3,5-Trimethylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
4-Chlorotoluene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
t-Butylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2,4-Trimethylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
s-Butylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
4-Isopropyltoluene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,3-Dichlorobenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,4-Dichlorobenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2,3-Trimethylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
n-Butylbenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2-Dichlorobenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2-Dibromo-3-Chloropropane	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
1,2,4-Trichlorobenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
1,3,5-Trichlorobenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Hexachlorobutadiene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Naphthalene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2,3-Trichlorobenzene	< 286	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Surr. 1 (Dibromofluoromethane)	108	%	EPA 8260C	12/1/21	W TRP	U
Surr. 2 (Toluene d8)	102	%	EPA 8260C	12/1/21	W TRP	U
Surr. 3 (4-Bromofluorobenzene)	99	%	EPA 8260C	12/1/21	W TRP	U
Unidentified Peaks	0		EPA 8260C	12/1/21	W TRP	U
TPH-GRO Package						

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

001	Site: Bridge Location		Date Sampled: 11/30/21 Time: 11:30			
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC Qual.
Prep EPA 5035A High Level	Complete		EPA 5035A-H	12/2/21	W TRP	N
C5-C10 TPH GRO	< 11.4	mg/Kg, dry	EPA 8260C	12/2/21	W TRP	N
> C10 Volatile Hydrocarbons	< 11.4	mg/Kg, dry	EPA 8260C	12/2/21	W TRP	U
TPH DRO Package						
Extraction	Completed		EPA 3550C	12/10/21	W EM	A
C7-C10 TPH	< 28.6	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	U
C10-C28 TPH-DRO	69.8	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	A
C28-C40 TPH	22.5	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	U
Tot. Petroleum Hydrocarbons	92.3	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	U
Hydrocarbon Window	C14-C34		EPA 8015D	12/13/21	W DPD	U
Priority Pollutant Pesticides						
Extraction	Completed		EPA 3545A	12/13/21	W CLD	A
alpha-BHC	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
gamma-BHC (Lindane)	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
beta-BHC	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
delta-BHC	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Heptachlor	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Aldrin	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Heptachlor Epoxide	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
4,4'-DDE	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Endosulfan I	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Dieldrin	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Endrin	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
4,4'-DDD	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Endosulfan II	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
4,4'-DDT	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A AN1
Endrin Aldehyde	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Endosulfan Sulfate	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Methoxychlor	< 5.0	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A AN1
Chlordane	< 25.	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Toxaphene	< 25.	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A
Surrogate-TCMX	109	%	EPA 8081B	12/14/21	W DPD	A
Surrogate-DCB	85	%	EPA 8081B	12/14/21	W DPD	A
Poly-Chlorinated Biphenyls						
Extraction	Completed		EPA 3545A	12/13/21	W CLD	A
Aroclor 1016 (PCB-1016)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Aroclor 1221 (PCB-1221)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Aroclor 1232 (PCB-1232)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Aroclor 1242 (PCB-1242)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Aroclor 1248 (PCB-1248)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Aroclor 1254 (PCB-1254)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Aroclor 1260 (PCB-1260)	< 9.6	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A
Surrogate-TCMX	74	%	EPA 8082A	12/15/21	W DPD	A
Surrogate-DCB	99	%	EPA 8082A	12/15/21	W DPD	A
EPA 8270C Semi-VOA						
Extraction	Completed		EPA 3550C	12/6/21	W EM	A

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.

WORK ORDER: 2112-35270

PROJECT: Williams Dam

DATE RECEIVED: 12/01/2021

001	Site: Bridge Location		Date Sampled: 11/30/21		Time: 11:30		
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
N-Nitrosodimethylamine	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Pyridine	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Aniline	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Bis(2-chloroethyl)ether	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,2-Dichlorobenzene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,3-Dichlorobenzene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,4-Dichlorobenzene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzyl alcohol	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2,2'-Oxybis(1-chloropropane)	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
N-Nitrosodi-n-propylamine	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Hexachloroethane	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Nitrobenzene	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
N-Nitrosopiperidine	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Isophorone	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Bis(2-chloroethoxy)methane	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,2,4-Trichlorobenzene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Naphthalene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Chloroaniline	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Hexachlorobutadiene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
N-Nitrosodi-n-butylamine	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2-Methylnaphthalene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1-Methylnaphthalene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
Hexachlorocyclopentadiene	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2-Chloronaphthalene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1-Chloronaphthalene	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2-Nitroaniline	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Dimethyl phthalate	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,6-Dinitrotoluene	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Acenaphthylene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
3-Nitroaniline	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Acenaphthene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Dibenzofuran	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2,4-Dinitrotoluene	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1-Naphthylamine	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2-Naphthylamine	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Fluorene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Diethyl phthalate	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Chlorophenyl phenyl ether	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Nitroaniline	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
N-Nitrosodiphenylamine	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Azobenzene/1,2-Diphenylhydrazine	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
4-Bromophenyl phenyl ether	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Hexachlorobenzene	< 48.2	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Phenanthrene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Anthracene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Carbazole	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	

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Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

001		Site: Bridge Location		Date Sampled: 11/30/21		Time: 11:30	
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
Di-n-butylphthalate	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Fluoranthene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzidine	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Pyrene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Butyl benzyl phthalate	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(a)anthracene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Chrysene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
3,3'-Dichlorobenzidine	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Bis(2-ethylhexyl)phthalate	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Di-n-octylphthalate	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(b)fluoranthene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(k)fluoranthene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(a)pyrene	< 12.0	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Indeno(1,2,3-cd)pyrene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Dibenzo(a,h)anthracene	< 12.0	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(g,h,i)perylene	< 24.1	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Phenol	< 96.4	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2-Chlorophenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2-Methylphenol (o-cresol)	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
3&4-Methylphenol (m&p-cresol)	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Cresols, Total	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
2-Nitrophenol	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4-Dimethylphenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4-Dichlorophenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,6-Dichlorophenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
4-Chloro-3-methylphenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4,5-Trichlorophenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4,6-Trichlorophenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4-Dinitrophenol	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Nitrophenol	< 241	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4,6-Dinitro-2-methylphenol	< 964	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Pentachlorophenol	< 482	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
BaP Toxic Equiv. Quotient	< 31.5	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
B/N Surr.1 Nitrobenzene-d5	55	%	EPA 8270D	12/16/21	W EEP	U	
B/N Surr.2 2-Fluorobiphenyl	54	%	EPA 8270D	12/16/21	W EEP	U	
B/N Surr.3 Terphenyl-d14	66	%	EPA 8270D	12/16/21	W EEP	U	
Acid Surr.1 2-Fluorophenol	53	%	EPA 8270D	12/16/21	W EEP	U	
Acid Surr.2 Phenol-d5	58	%	EPA 8270D	12/16/21	W EEP	U	
Acid Surr.3 Tribromophenol	72	%	EPA 8270D	12/16/21	W EEP	U	
Unidentified Peaks	> 10		EPA 8270D	12/16/21	W EEP	U	

002		Site: Hydrant Location		Date Sampled: 11/30/21		Time: 12:00	
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
TKN	1,800	mg/Kg, dry	EPA 351.2	12/8/21	N MAP	U	
Phosphorus, Total	570	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	U	

Laboratory Report

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CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

002	Site: Hydrant Location		Date Sampled: 11/30/21 Time: 12:00			
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC Qual.
Mercury Digestion	Digested		EPA 7471B	12/8/21	W FAA	A
Metals Solids Digestion	Digested		EPA 3050B	12/2/21	W FAA	A
Arsenic, Total	< 7.5	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Barium, Total	58	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Cadmium, Total	< 0.75	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Chromium, Total	9.7	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Lead, Total	< 15	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Mercury, Total	< 0.093	mg/Kg, dry	EPA 7471B	12/9/21	W FAA	A
Selenium, Total	< 15	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Silver, Total	< 7.5	mg/Kg, dry	EPA 6010C	12/3/21	W FAA	A
Oil & Grease	253	mg/Kg, Dry	modified EPA 1664A	12/14/21	W CLD	N
Volatile Organic Compounds						
Prep EPA 5035A	Complete		EPA 5035A-H	12/1/21	W TRP	A
Dichlorodifluoromethane	< 1,260	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Chloromethane	< 1,260	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Vinyl chloride	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Bromomethane	< 1,260	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Chloroethane	< 1,260	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Trichlorofluoromethane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Diethyl ether	< 1,260	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
1,1-Dichloroethene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Acetone	< 2,520	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Carbon disulfide	< 1,260	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Methylene chloride	< 2,520	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
t-Butanol	< 6,300	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Methyl-t-butyl ether (MTBE)	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
trans-1,2-Dichloroethene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Di-isopropyl ether (DIPE)	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
1,1-Dichloroethane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Ethyl-t-butyl ether (ETBE)	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
2-Butanone	< 5,040	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
2,2-Dichloropropane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
cis-1,2-Dichloroethene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Bromochloromethane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Chloroform	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Tetrahydrofuran	< 2,520	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
1,1,1-Trichloroethane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Carbon tetrachloride	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,1-Dichloropropene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Benzene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
t-Amylmethyl ether (TAME)	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	U
1,2-Dichloroethane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Trichloroethene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
1,2-Dichloropropane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A
Dibromomethane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N
Bromodichloromethane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A

**ENDYNE Inc.**

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Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

002	Site: Hydrant Location		Date Sampled: 11/30/21		Time: 12:00		
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
cis-1,3-Dichloropropene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
4-Methyl-2-pentanone (MIBK)	< 2,520	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Toluene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
trans-1,3-Dichloropropene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,1,2-Trichloroethane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
Tetrachloroethene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,3-Dichloropropane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
2-Hexanone	< 2,520	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Dibromochloromethane	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2-Dibromoethane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Chlorobenzene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
Ethylbenzene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,1,1,2-Tetrachloroethane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Xylenes, Total	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
Styrene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Bromoform	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
Isopropylbenzene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,1,2,2-Tetrachloroethane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
Bromobenzene	< 252	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
n-Propylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2,3-Trichloropropane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
2-Chlorotoluene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
1,3,5-Trimethylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
4-Chlorotoluene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
t-Butylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2,4-Trimethylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
s-Butylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
4-Isopropyltoluene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,3-Dichlorobenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,4-Dichlorobenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2,3-Trimethylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
n-Butylbenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2-Dichlorobenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2-Dibromo-3-Chloropropane	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
1,2,4-Trichlorobenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
1,3,5-Trichlorobenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Hexachlorobutadiene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Naphthalene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	A	
1,2,3-Trichlorobenzene	< 504	ug/Kg, Dry	EPA 8260C	12/1/21	W TRP	N	
Surr. 1 (Dibromofluoromethane)	106	%	EPA 8260C	12/1/21	W TRP	U	
Surr. 2 (Toluene d8)	101	%	EPA 8260C	12/1/21	W TRP	U	
Surr. 3 (4-Bromofluorobenzene)	100	%	EPA 8260C	12/1/21	W TRP	U	
Unidentified Peaks	0		EPA 8260C	12/1/21	W TRP	U	
TPH-GRO Package							
Prep EPA 5035A High Level	Complete		EPA 5035A-H	12/2/21	W TRP	N	
C5-C10 TPH GRO	< 20.1	mg/Kg, dry	EPA 8260C	12/2/21	W TRP	N	

Laboratory Report

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PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

002		Site: Hydrant Location			Date Sampled: 11/30/21		Time: 12:00	
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.	
> C10 Volatile Hydrocarbons	< 20.1	mg/Kg, dry	EPA 8260C	12/2/21	W TRP	U		
TPH DRO Package								
Extraction	Completed		EPA 3550C	12/10/21	W EM	A		
C7-C10 TPH	< 41.4	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	U		
C10-C28 TPH-DRO	45.7	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	A		
C28-C40 TPH	43.3	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	U		
Tot. Petroleum Hydrocarbons	89.1	mg/Kg, dry	EPA 8015D	12/13/21	W DPD	U		
Hydrocarbon Window	C14-C34		EPA 8015D	12/13/21	W DPD	U		
Priority Pollutant Pesticides								
Extraction	Completed		EPA 3545A	12/13/21	W CLD	A		
alpha-BHC	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
gamma-BHC (Lindane)	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
beta-BHC	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
delta-BHC	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Heptachlor	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Aldrin	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Heptachlor Epoxide	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
4,4'-DDE	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Endosulfan I	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Dieldrin	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Endrin	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
4,4'-DDD	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Endosulfan II	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
4,4'-DDT	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A	AN1	
Endrin Aldehyde	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Endosulfan Sulfate	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Methoxychlor	< 6.4	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A	AN1	
Chlordane	< 31.9	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Toxaphene	< 31.9	ug/Kg, dry	EPA 8081B	12/14/21	W DPD	A		
Surrogate-TCMX	74	%	EPA 8081B	12/14/21	W DPD	A		
Surrogate-DCB	71	%	EPA 8081B	12/14/21	W DPD	A		
Poly-Chlorinated Biphenyls								
Extraction	Completed		EPA 3545A	12/13/21	W CLD	A		
Aroclor 1016 (PCB-1016)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Aroclor 1221 (PCB-1221)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Aroclor 1232 (PCB-1232)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Aroclor 1242 (PCB-1242)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Aroclor 1248 (PCB-1248)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Aroclor 1254 (PCB-1254)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Aroclor 1260 (PCB-1260)	< 12.8	ug/Kg, dry	EPA 8082A	12/15/21	W DPD	A		
Surrogate-TCMX	69	%	EPA 8082A	12/15/21	W DPD	A		
Surrogate-DCB	96	%	EPA 8082A	12/15/21	W DPD	A		
EPA 8270C Semi-VOA								
Extraction	Completed		EPA 3550C	12/6/21	W EM	A		
N-Nitrosodimethylamine	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A		
Pyridine	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A		

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

002	Site: Hydrant Location			Date Sampled: 11/30/21	Time: 12:00		
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
Aniline	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Bis(2-chloroethyl)ether	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,2-Dichlorobenzene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,3-Dichlorobenzene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,4-Dichlorobenzene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzyl alcohol	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2,2'-Oxybis(1-chloropropane)	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
N-Nitrosodi-n-propylamine	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Hexachloroethane	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Nitrobenzene	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
N-Nitrosopiperidine	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Isophorone	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Bis(2-chloroethoxy)methane	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1,2,4-Trichlorobenzene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Naphthalene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Chloroaniline	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Hexachlorobutadiene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
N-Nitrosodi-n-butylamine	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2-Methylnaphthalene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1-Methylnaphthalene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
Hexachlorocyclopentadiene	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2-Chloronaphthalene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1-Chloronaphthalene	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2-Nitroaniline	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Dimethyl phthalate	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,6-Dinitrotoluene	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Acenaphthylene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
3-Nitroaniline	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Acenaphthene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Dibenzofuran	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2,4-Dinitrotoluene	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
1-Naphthylamine	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
2-Naphthylamine	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Fluorene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Diethyl phthalate	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Chlorophenyl phenyl ether	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Nitroaniline	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
N-Nitrosodiphenylamine	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Azobenzene/1,2-Diphenylhydrazine	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
4-Bromophenyl phenyl ether	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Hexachlorobenzene	< 63.7	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Phenanthrene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Anthracene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Carbazole	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
Di-n-butylphthalate	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Fluoranthene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	

**ENDYNE Inc.**

www.endynelabs.com

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: 2112-35270
DATE RECEIVED: 12/01/2021

002

Site: Hydrant Location

Date Sampled: 11/30/21 Time: 12:00

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
Benzidine	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Pyrene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Butyl benzyl phthalate	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(a)anthracene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Chrysene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
3,3'-Dichlorobenzidine	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Bis(2-ethylhexyl)phthalate	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Di-n-octylphthalate	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(b)fluoranthene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(k)fluoranthene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(a)pyrene	< 15.9	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Indeno(1,2,3-cd)pyrene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Dibenzo(a,h)anthracene	< 15.9	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Benzo(g,h,i)perylene	< 31.8	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Phenol	< 127	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2-Chlorophenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2-Methylphenol (o-cresol)	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
3&4-Methylphenol (m&p-cresol)	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Cresols, Total	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
2-Nitrophenol	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4-Dimethylphenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4-Dichlorophenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,6-Dichlorophenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	N	
4-Chloro-3-methylphenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4,5-Trichlorophenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4,6-Trichlorophenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
2,4-Dinitrophenol	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4-Nitrophenol	< 318	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
4,6-Dinitro-2-methylphenol	< 1,270	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
Pentachlorophenol	< 637	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	A	
BaP Toxic Equiv. Quotient	< 41.7	ug/Kg, dry	EPA 8270D	12/16/21	W EEP	U	
B/N Surr.1 Nitrobenzene-d5	61	%	EPA 8270D	12/16/21	W EEP	U	
B/N Surr.2 2-Fluorobiphenyl	70	%	EPA 8270D	12/16/21	W EEP	U	
B/N Surr.3 Terphenyl-d14	84	%	EPA 8270D	12/16/21	W EEP	U	
Acid Surr.1 2-Fluorophenol	64	%	EPA 8270D	12/16/21	W EEP	U	
Acid Surr.2 Phenol-d5	72	%	EPA 8270D	12/16/21	W EEP	U	
Acid Surr.3 Tribromophenol	96	%	EPA 8270D	12/16/21	W EEP	U	
Unidentified Peaks	> 10		EPA 8270D	12/16/21	W EEP	U	

Laboratory Report

DATE REPORTED: 12/17/2021

CLIENT: Dubois & King, Inc.
PROJECT: Williams Dam

WORK ORDER: **2112-35270**
DATE RECEIVED: 12/01/2021

Report Summary of Qualifiers and Notes

GRO values are based on the response and calibration of Unleaded Gasoline.

VOC results below 200 ug/Kg may be biased low due to sample preparation by 5035A High method.

DRO values are based on the response and calibration of Diesel/#2 Fuel Oil.

AN1: Instrument performance degraded during the analytical sequence due to the nature of the samples analyzed.

Result of the closing calibration check standard was below method control limits for this parameter. Reported result may be biased low.

Appendix D

Hydraulic Modeling Exhibits



Figure 1

**Existing Conditions
10-Yr Water Depth**

**Williams Dam Study
(#115.01)**

**Town of Londonderry
100 Old School Street
S. Londonderry
VT 05155**

Legend

Existing 10-Yr Flood Depth

Value

High : 18.4 ft
Low : 0.01 ft

0 0.0125 0.025 0.05
Miles



**DuBois
& King inc.**



Figure 2

Alt 1 Dam Removal
10-Yr Water Depth

Williams Dam Study
(#115.01)

Town of Londonderry
100 Old School Street
S. Londonderry
VT 05155

Legend

Removal 10-Yr Flood Depth
Value

High : 11.8

Low : 0.01

00.01250.0250.05

Miles

DuBois
& King
INC.



Figure 3

**Alt 2 Dam Replacement
10-Yr Water Depth**

**Williams Dam Study
(#115.01)**

**Town of Londonderry
100 Old School Street
S. Londonderry
VT 05155**

Legend

Replacement 10-Yr Flood Depth

Value

High : 18.0

Low : 0.01

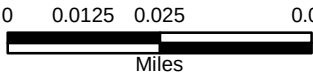




Figure 4

**Existing Conditions
100-Yr Water Depth**

**Williams Dam Study
(#115.01)**

**Town of Londonderry
100 Old School Street
S. Londonderry
VT 05155**

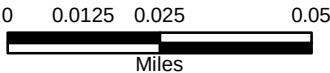
Legend

Existing 100-yr Flood Depth

Value

High : 22.2 ft

Low : 0.01 ft



**DuBois
& King inc.**



Figure 5

**Alt 1 Dam Removal
100-Yr Water Depth**

**Williams Dam Study
(#115.01)**

**Town of Londonderry
100 Old School Street
S. Londonderry
VT 05155**

Legend

**Removal 100-Yr Flood Depth
Value**

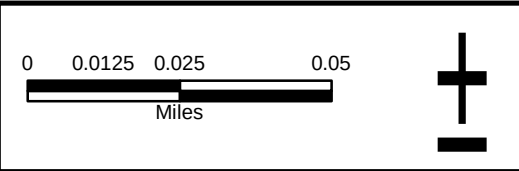
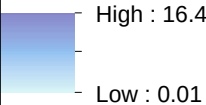




Figure 6

**Alt 2 Dam Replacement
100-Yr Water Depth**

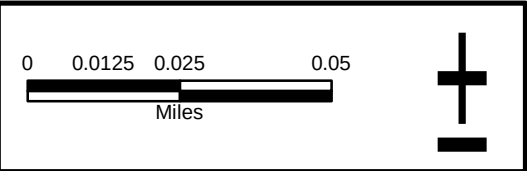
**Williams Dam Study
(#115.01)**

**Town of Londonderry
100 Old School Street
S. Londonderry
VT 05155**

Legend

Replacement 100-Yr Flood Depth

Value
High : 21.4
Low : 0.01



Appendix E

Vermont Dam Safety - Williams Dam Failure Analysis and Hazard Potential Classification Study

Vermont Department of Environmental Conservation*Agency of Natural Resources*

Water Investment Division
1 National Life Drive, Davis 3
Montpelier, VT 05620
Phone: 802-622-4093

MEMORANDUM

TO: Town of Londonderry – Dam Owner
Charles Johnston, PE, Dubois & King, Inc.

FROM: Benjamin Green, PE, VTDEC Dam Safety Program (DSP) - Dam Safety Engineer
Andrew Sampsell, DSP - Dam Safety Engineer

DATE: March 2nd, 2022

SUBJECT: DSS-Wise Lite Dam Failure Analysis and Hazard Potential Classification Study
Williams Dam, Londonderry, Vermont
State ID No: 115.01, National ID: VT00257

This memorandum summarizes the methods, assumptions, and results of a simplified dam failure and downstream flood inundation analysis using the Decision System for Water Infrastructural Security (DSS-Wise Lite) model for the Williams Dam located in Londonderry, VT. The following attachments are included for the modeling scenario that controlled the hazard potential classification selection for the dam:

- **Attachment A:** Flood Inundation Map
- **Attachment B:** DSS-Wise Lite Reservoir Simulation Results
- **Attachment C:** DSS-Wise Lite Reservoir Simulation Human Consequences Final Report

It should be noted that **Attachments B** and **C** are automatically generated reports by the DSS-Wise Lite Program.

Purpose:

The analysis was performed to investigate the hazard potential classification of the dam and to gain a greater understanding of the potential ranges of consequences of a dam failure or incident. Updated hazard potential classification review is needed for many dams in the State's inventory due to the adoption of new definitions and processes in the Dam Safety Rules and the potential for downstream development that could impact classification. This analysis will evaluate the hazard potential classification using a simplified procedure and publicly available data. In addition, it is our hope that the flood inundation map generated from this work can be used in future emergency action planning for the dam.

Dam Overview:

Williams Dam is a run-of-the-river stone masonry and concrete gravity dam with an outlet gate that is currently classified as a LOW hazard potential dam. A dam at the site dates back to at least 1900 and likely earlier. The last documented rehabilitation of the dam was in 1978 when the gate structure was installed and repairs were made to address damages from the 1976 flood. The dam is located just downstream of the VT Route 11 Bridge. The dam was last inspected by the DSP in August 2015 and was found to be in POOR condition. The dam spans approximately 90 feet across the West River (from abutment to abutment). The 90-foot length includes an approximately 73 foot long broad-crested weir principal spillway with the remaining 14 feet being the concrete framed gate structure. The dam appears to be founded on bedrock. At the right abutment is a concrete training wall that extends from the gate approximately 15 feet upstream to the VT Route 11 Bridge. The left abutment contacts a bedrock outcrop adjacent to Edge Hill Road. The height of the dam from the downstream channel invert to the principal spillway crest is approximately 13 feet and to the top of the gate structure or dam crest is about 17 feet per recent survey. Based on USGS StreamStats, the drainage area of the West River at the dam is approximately 40.8 square miles.

Downstream Conditions:

Williams Dam is located on the West River which flows through the Town of Londonderry. Utleigh Brook, which has a drainage area of approximately 27.7 square miles (USGS StreamStats), joins the West River approximately 1,900 feet downstream of Williams Dam. The West River flows South alongside Route 100 until it reaches Main Street in the Town of South Londonderry where Route 100 diverges west, while the West River continues south. After flowing through the Town of South Londonderry, the floodplain becomes less developed, until the West River reaches the US Army Corps of Engineers Ball Mountain Flood Control Dam located between Winhall Brook Campground and Jamaica State Park. The Ball Mountain Dam is approximately 7.3 miles downstream of Williams Dam. The drainage area of the West River at the Ball Mountain Dam is approximately 169.0 square miles according to USGS StreamStats.

Background / Supporting Data:

The Town of Londonderry recently contracted with the consulting engineering firm Dubois & King, Inc. (D&K) to analyze potential alternatives to either rehabilitate or remove the dam. As part of the alternatives study, D&K was able to collect limited bathymetry and sediment probing data that was provided to the DSP. Outside field survey limits, D&K relied on LIDAR, FEMA Flood Insurance Study (FIS) data, and design plans for the VT Route 11 Bridge to develop a reasonable estimate of reservoir storage volume. Table 1, below, summarizes elevation and estimated storage data.

Table 1: Elevation and Storage Data

	Elevation	Impoundment Surface Area	Sediment Volume ¹	Total Storage Volume ^{1,2}
	NAVD88 FT	Acres	Acre-ft	Acre-ft
Downstream Channel Invert	1,129	0	0	0
Principal Spillway Crest	1,142	9.3	3.8	24.2
Top of Dam (Top of gate structure)	1,146	29.9	3.8	97.1
Low Chord of VT RT 11 Bridge	1,150	41.8	3.8	244.7

¹ Sediment and total storage volumes are estimates based on the combination of field measurements and available mapping.

² Includes estimated volume of sediment storage behind the dam.

Hydrologic and Hydraulic Methods:

The DSP prepared six DSS-Wise Lite simulations/scenarios of the Williams Dam and the downstream floodplain in order to evaluate the dam's hazard potential classification. DSS-Wise Lite is a publicly available flood modeling and consequence analysis tool developed by The National Center for Computational Hydroscience and Engineering at the University of Mississippi. DSS-Wise Lite is a web-based program that allows the user to setup an automated two-dimensional dam failure model with minimal inputs and provides results including inundation maps, flood arrival times, hydrographs, and other life consequence information. As noted in program literature, DSS-Wise Lite is a simplified analysis producing rough, approximate results that are not intended to replace more detailed modeling processes/programs. The following key limitations of DSS-Wise Lite should be understood, additional limitations are described in the user's manual and technical documentation:

- The model relies on a national LIDAR digital elevation model (DEM). The resolution of the DEMs used in the model is 1 meter by 1 meter (3.281 feet). The user has no ability to edit or correct the elevations of the LIDAR DEM outside of inputting the dam structure and levees.
- The model relies on a national land cover dataset to approximate roughness coefficients of the stream channel and floodplain for use in the hydraulic computations. The resolution of the national land cover data base is 30 meters by 30 meters (98.4 feet).
- The smallest cell size for the computation mesh used to perform the 2D hydraulic calculations is 15 feet by 15 feet. Limitations with this cell size, for example, are that it could prevent the model from accurately representing cases with dramatic elevation changes in a small horizontal distance or cases where varying roughness values apply within one cell.
- Large bridges can be input in the model but are modeled as an opening with no bridge deck. The program does not allow for the modeling of culverts at downstream road crossings.
- As with any dam failure analysis, the model relies on the input values of normal and maximum pool storage in the reservoir. In many cases, these values may be rough estimates based on measurements from maps or coarse

field measurements, followed by the application of empirical equations, which may or may not accurately represent the actual storage volume that could be lost during a dam failure.

- The model performs the hydraulic computations using the 2D Shallow Water Equations, which assume a hydrostatic pressure distribution within the water column. This assumption becomes invalid in areas with steep slopes or vertical drops (i.e. calculations in steeply graded flow areas potentially have a higher error).
- No detailed/site specific hydrology besides estimating peak flows using rudimentary methods were performed in this simplified analysis. Since development of a detailed unsteady flood hydrograph is beyond the scope of this analysis, a simplified unsteady flood hydrograph is used that combines steady state peak flows during Storm Day conditions with a basic dam failure flood hydrograph.
- The model is limited to a single discharge input location, which is at the dam/origin of the dam failure. This limitation means that lateral inflows from downstream tributaries during flooding conditions cannot be included in the model. Due to this limitation, “Storm Day” failure analysis comparisons may be limited in ability to accurately represent flooding elevations during regional storm events. The further downstream from the dam, the greater the potential for model error due to the inability to account for flood flow in other tributaries.

Model Scenarios:

Table 2, below, outlines each of the six scenarios modeled for Williams Dam using DSS-Wise Lite. For each selected starting water level/flow condition at the dam, the model was run assuming “no dam failure” and then with “dam failure” to gain an understanding of the potential impacts and incremental consequences of dam failure over baseline flooding in the river.

Table 2: Dam Failure Analysis Scenarios

No.	Scenario	Water Surface Elev. at Start of Simulation (feet) ¹	Failure Type	DSS-Wise Failure Method	Base River Flow
1	Sunny Day - No Dam Failure	1,143	No Failure	Specified Hydrograph	~260 cfs ²
2	Sunny Day - Dam Failure	1,143	Froehlich Piping Failure	Specified Hydrograph	~260 cfs ²
3	Storm Day - No Dam Failure	1,146	No Failure	Specified Hydrograph	~1,620 cfs ²
4	Storm Day - Dam Failure	1,146	Froehlich Piping Failure	Specified Hydrograph	~1,620 cfs ²
5	Storm Day - No Dam Failure	1,150	No Failure	Specified Hydrograph	~ 11,500 cfs ³
6	Storm Day - Dam Failure	1,150	Froehlich Piping Failure	Specified Hydrograph	~ 11,500 cfs ³

¹ Water levels at El. 1,143 represents approximately 1 foot of flow over the principal spillway weir, while E. 1,146 and El. 1,150 represent 4 feet of flow and water levels at the dam crest and 8 feet of flow and water levels at the low chord of the VT Route 11 Bridge, respectively.

² Base river discharges were computed using the weir equation and a discharge coefficient of ~2.9 to determine the amount of flow at the dam required to achieve the specified elevation in column 3.

³ The 100-yr flood discharge from the FEMA Flood Insurance Study was modeled based on the historic LOW hazard potential classification of the Williams Dam. Based on FEMA 100-yr floodplain mapping, the 100-yr flood results in water flowing out of the channel and around the VT Route 11 Bridge and the dam. The DSP decided to limit the reservoir elevation at time of failure to the low chord elevation of the bridge (El. 1,150).

Dam failure parameters were calculated based on the geometry, material composition, and reservoir storage capacity using the Froehlich 2008 method. The Froehlich 2008 method estimates failure parameters using empirical equations developed from past dam failure case study data. The computed failure parameters were then included in a US Army Corps of Engineers (USACE) HEC-HMS hydrologic model to compute a dam failure outflow hydrograph for use in DSS-Wise Lite. A summary of key failure parameters and resulting peak outflow for each failure scenario is provided in Table 3 below. A sensitivity analysis of the range of potential failure parameters was not completed and is beyond the scope of this study.

Table 3: Dam Failure Parameters and Peak Outflow

Scenario	Bottom Opening Width	Formation Time	Piping Coefficient	Peak Discharge
	ft	hrs		cfs
2 - Sunny Day (El. 1,143)	33	0.2	0.6	4,435
4 - Storm Day (El. 1,146)	40	0.2	0.6	8,712
6 - Storm Day (El. 1,150)	60	0.2	0.6	18,182

In the non-failure scenarios, a 24-hour steady state discharge hydrograph representing the base river flow was input into the model immediately downstream of the dam. In the dam failure scenarios, a 6-hour steady state base river flow was input immediately downstream of the dam to “prime” the downstream channel before the unsteady dam failure hydrograph occurred. The steady state discharge was set to continue following the dam failure hydrograph until flood waters reached the model end point (Ball Mountain Flood Control Dam).

Hazard Potential Classification Definitions and Guidance:

Hazard potential classification for dams in Vermont is determined in accordance with the Dam Safety Rules (effective August 1, 2020). Hazard potential classification definitions for HIGH, SIGNIFICANT, and LOW Hazard dams and guidance for evaluating the four main loss types caused by dam failure (direct loss of life, property loss, lifeline loss and environmental loss) are provided in the Rule at the following link: <https://dec.vermont.gov/water-investment/dam-safety/dam-safety-statute-and-rules>. Of particular interest are the definitions of the hazard potential classification definitions considered for Williams Dam:

HIGH Hazard Potential Dam mean dams where failure or mis-operation will probably cause loss of human life.

SIGNIFICANT Hazard Potential Dam means dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

LOW Hazard Potential Dam means dams where failure or mis-operation results in no probable loss of human life and low economic and environmental losses.

Model Results and Hazard Potential Classification:

The DSS-Wise Lite model results are summarized in *Attachments A* through *C*. The dam failure flood results were compared to the potential loss types as required by the Dam Safety Rule.

Direct Loss of Life:

Loss of Life was evaluated in reference to criteria established in Downstream Hazard Classification Guidelines developed by the US Bureau of Reclamation in 1988 (ACER Technical Memorandum No. 11). For Williams Dam, Direct Loss of Life focuses on life loss potential of people inside structures at the time of the dam failure. While there is a possibility people could be caught outside within the flood inundation area during a dam failure, in this case, it is reasonable to assume that they would be able to self-evacuate to higher ground. The following two figures depict estimated dam failure flood flow depths and velocities and resulting loss of life potential during dam failure versus non-failure for each of the scenarios at the top four impacted downstream structures. The top four impacted downstream structures are located just downstream of the dam and include the following commercial buildings:

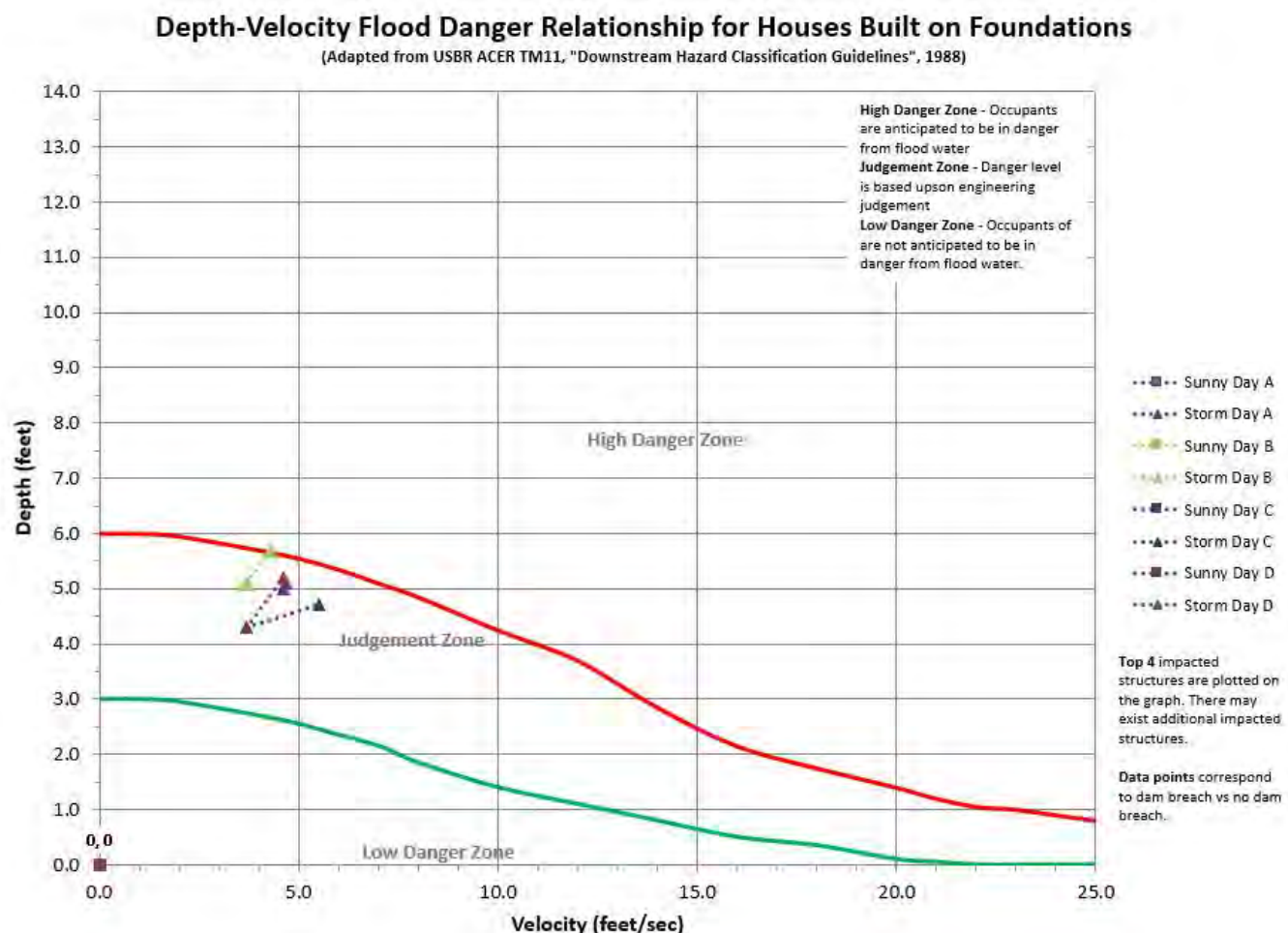
- 2136 North Main Street – Garden Café and Gallery - (A)
- Route 11, 2116 North Main Street – Garden Market - (B)
- 2170/2180 North Main Street – Maple Leaf Diner and Main Street Market and Deli – (C)
- 2152 North Main Street – unknown – (D)

Depths were evaluated above the first-floor elevation of buildings. For this simplified analysis, it was assumed that the first-floor elevations of buildings were 1 foot above the LIDAR DEM elevation around the footprint of the building.

During Scenarios 1/2 (El. 1,143 Sunny Day Baseflow Failure/Non-Failure), when comparing flood depth and velocity combinations at buildings within the downstream floodplain, there appears to be no difference in potential for life loss as no structures are anticipated to experience flooding above their first-floor elevation, whether under non-failure or failure conditions. Accordingly, it is anticipated there would be no direct loss of life from this scenario.

Similarly, during Scenarios 5/6 (El. 1,150 Storm Day Failure/Non-Failure), comparing flood depth and velocity combinations at buildings within the downstream floodplain indicates there is only minor differences between non-failure and failure conditions. While depth and velocity combinations are potentially hazardous at the four structures (depths in the 4-to-5-foot range, velocities in the 3 to 5 ft/s range and plot in the “Judgement Zone”), the incremental increase in flood depth and velocities from dam failure over baseline flooding appears limited to generally less than 1 foot and 1 ft/s and values remain plotted in the “Judgment Zone” as opposed to the “High Danger Zone”. Accordingly, the potential risk to life is present during the flood/non-failure condition and not measurably worsened by dam failure. Therefore, loss of life during this scenario due to dam failure is not considered probable. See the plot below that shows flood depth and velocity combinations during this scenario under non-failure and failure flows and the minor incremental increases due to failure.

Figure 1: USBR ACER No. 11 Life loss Potential (Scenario 5/6, El. 1,150 Storm Day Comparison)



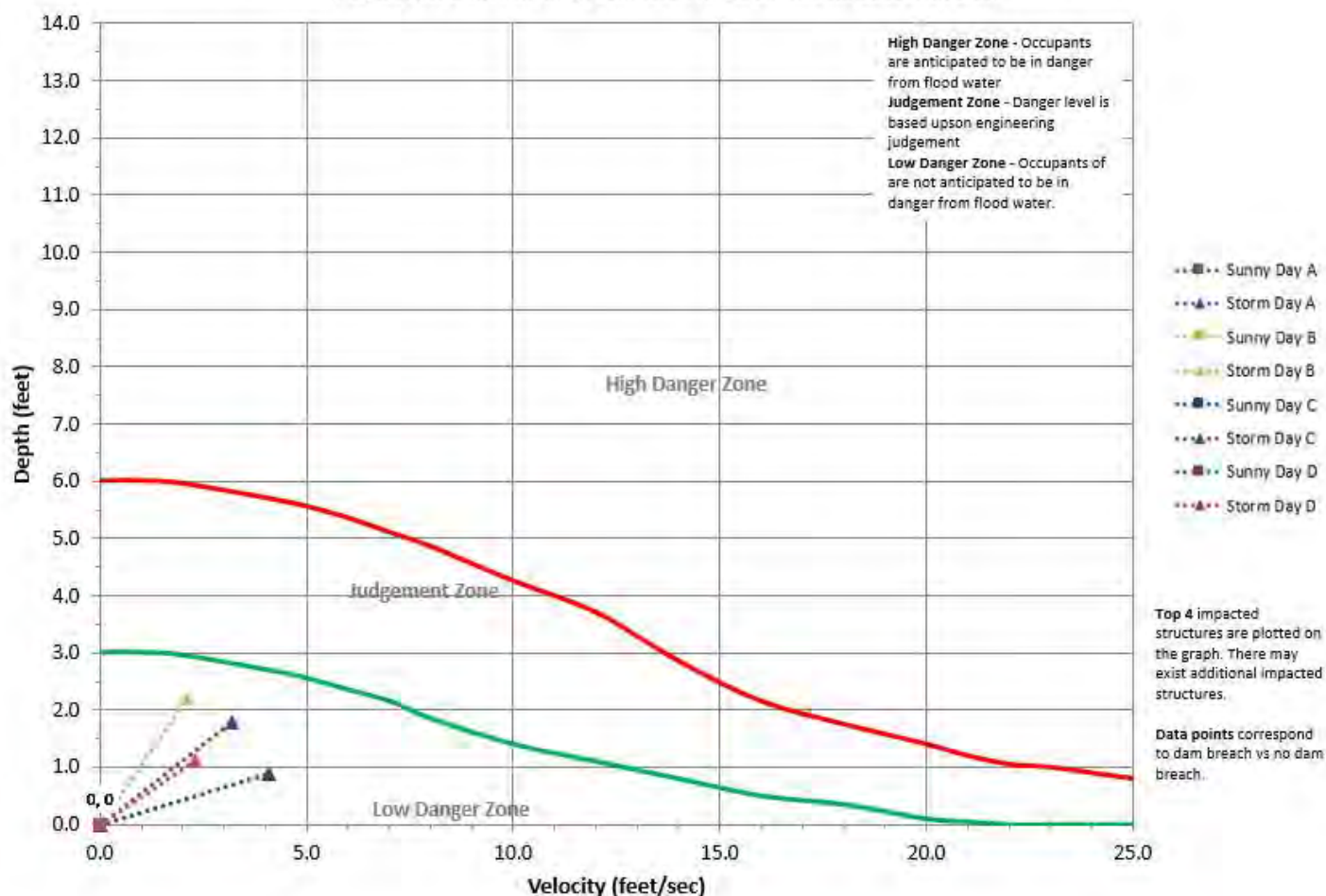
However, Scenarios 3/4 (El. 1,146 Storm Dam Non-Failure/Failure) appear to control in terms of potential for damages and direct loss of life due to the failure of Williams Dam. The Human Consequences Report (HCOM) module within DSS-Wise for these scenarios provides an estimated range of Population at Risk (PAR), which is defined as the estimated number of people located within the inundation limits of a simulated dam failure (not necessarily the number of potential fatalities, as depths and velocities within the inundation extents can range from little to no impact/non-life threatening to life threatening). While PAR is not specifically used for hazard potential classification, understanding the potential range of PAR for a dam failure can be useful in emergency planning. The estimated PAR for Williams Dam could range from approximately 10 to 50 people .

In comparing flood depth and velocity combinations at buildings within the downstream floodplain, there appears to be notable differences between non-failure and failure conditions. While depth and velocity combinations under non-failure conditions do not appear to be potentially hazardous as no buildings are flooded, the incremental increase in flood depth and velocities from dam failure over baseline flooding appears to range from 1 to 2 feet and 2 to 4 ft/s above estimated first floor elevations. However, these increased depths and velocities still plot within the Low Danger zone of the ACER plot, indicating that loss of life during this scenario due to dam failure, is also not considered probable. See the plot below that shows flood depth and velocity combinations during this scenario under non-failure and failure flows and the incremental increases due to failure.

Figure 2: USBR ACER No. 11 Life loss Potential (Scenario 3/4, El. 1,146 Storm Day Comparison)

Depth-Velocity Flood Danger Relationship for Houses Built on Foundations

(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)



Based on these results, the potential for direct loss of life due to a failure of Williams Dam does not appear probable. Accordingly, based on this analysis, the hazard potential classification of HIGH is eliminated from consideration and the hazard potential classification of SIGNIFICANT shall be considered through the evaluation of potential property, lifeline, and environmental losses, below.

Property Losses:

Based on reviewing the potential for property damage to occur (using DSS-Wise Results, Orthoimagery, and LIDAR elevation data) it was found that Scenarios 3/4 (El. 1,146 Storm Dam Non-Failure/Failure), as was noted above, are the controlling scenarios. The total number of impacted structures for each scenario is presented in Table 4 below. An estimated total of 11 structures, including mainly commercial buildings and several homes are impacted as a result of the flood flows plus dam failure, versus 0 for non-failure conditions. Flooding depths at these structures attributed to dam failure ranged from less than one foot to approximately 3 feet adjacent to the structures and multiple structures were surrounded by flooding. As a result, it is anticipated that property damage would occur to these structures as flooding up to 2 feet above first floor elevations could be realized.

Scenario	Number of Impacted Structures
1 - Sunny Day (El. 1,143) Non-Failure	0
2 - Sunny Day (El. 1,143) Dam Failure	5
3 - Storm Day (El. 1,146) Non-Failure	0
4 - Storm Day (El. 1,146) Dam Failure	11
5 - Storm Day (El. 1,150) Non-Failure	37
6 - Storm Day (El. 1,150) Dam Failure	37

Based on these results, the potential for property losses due to a failure of Williams Dam appear to be fairly extensive to occupied buildings. Accordingly, based on this analysis, the hazard potential classification of at least SIGNIFICANT is considered appropriate due to the potential for property loss.

Lifeline Losses:

Under the Dam Safety Rules, the hazard potential classification cannot be increased above SIGNIFICANT as a result of lifeline losses. Therefore, since property losses already drives the hazard potential classification to SIGNIFICANT, lifeline losses are not considered a hazard classification driver. However, it should be noted that during Scenario 4, VT Route 11 (North Main Street) would overtop due to dam failure to a depth of approximately 1.5 feet and velocity of 3 ft/s. The overtopping location is in the vicinity of 2180 North Main Street. It is anticipated that these depth and velocity combinations could cause some damage to the roadway. No other bridge/roadway overtopping locations were identified during this scenario.

Environmental Losses:

Similarly to Lifeline Losses, above, the hazard potential classification cannot be increased above SIGNIFICANT as a result of environmental losses, so environmental losses are not considered a hazard classification driver. It should be noted that D&K has estimated that approximately 3.8 acre-feet of sediment is impounded by the dam, which could be potentially released in the event of a dam failure, stressing water quality and habitat in downstream areas.

Conclusions:

Based on this analysis, the hazard potential classification of Williams Dam should be increased from LOW to SIGNIFICANT based on the potential for property losses in the event of a dam failure. SIGNIFICANT hazard potential dams are subject to additional requirements over LOW hazard potential dams, including more frequent inspections, Emergency Action Planning requirements, and compliance with more rigorous design and construction standards.

The DSP recommends that the dam owner develop an Emergency Action Plan (EAP) for the dam, using the flood inundation map attached here-in. We would also be happy to provide a copy of the current EAP template for SIGNIFICANT hazard

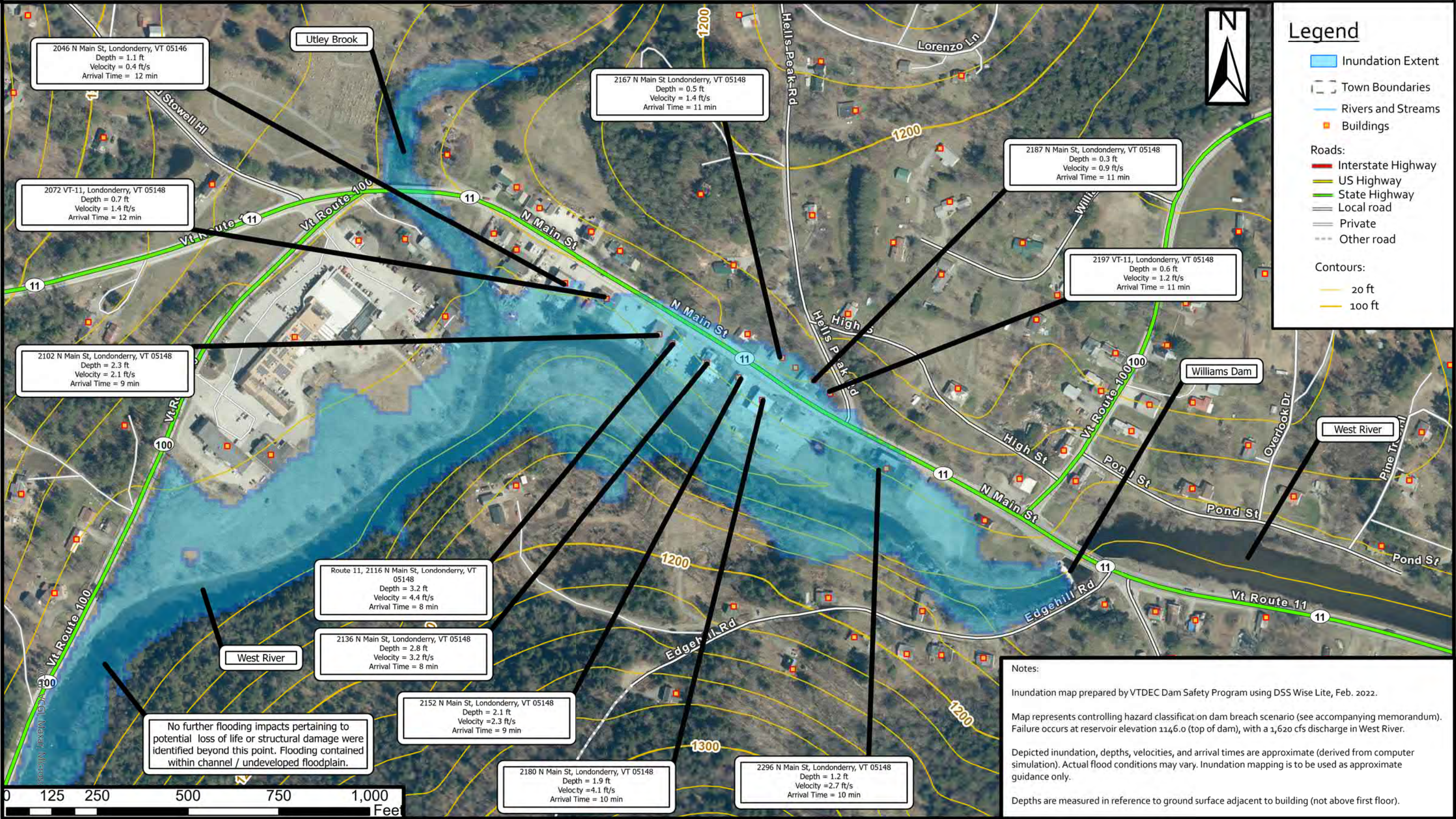
potential dams. EAPs are documents that include pre-planned actions in the case of a dam incident or failure and identify key emergency personnel as well as potential evacuation areas for emergency response planning.

This analysis used simplified methods, assumptions, and techniques, and focused on a limited number of dam failure and flooding scenarios. It is possible that additional losses could be realized in a scenario or flow condition that was not considered in this study. It is recommended to apply caution and conservancy when using the results of this simplified analysis for decision making and emergency action planning. If the dam owner disagrees with the classification assigned based on this study, they may apply to the DSP to reconsider the classification in accordance with Dam Safety Rule, 37-109(5) Hazard Potential Reconsideration.



Williams Dam (No. 115.01) - Londonderry, VT - Flood Inundation Map

Vermont Agency of Natural Resources - Department of Environmental Conservation - Dam Safety Program



ATTACHMENT B



DSS-WISE™ Lite Flood Simulation Report

Storm Day (1146.0) Dam Breach (Froehlich Partial)

Williams Dam

NAXXXXX

February 18, 2022

Contact Information:

DSS-WISE™ Lite modeling questions: admin@dsswiseweb.ncche.olemiss.edu

National Center for Computational
Hydroscience and Engineering (NCCHE)



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1.0 Overview

The Decision Support System for Water Infrastructure Security (DSS-WISE™) is an integrated software package combining 2D numerical flood modeling capabilities with a series of GIS-based decision support tools. It was developed by the National Center for Computational Hydroscience and Engineering (NCCHE) at the University of Mississippi and was initiated by the US Department of Homeland Security (DHS) Science and Technology Directorate through the Southeast Region Research Initiative (SERRI) Program.

A simplified, and fully automated, version of the DSS-WISE™ software suite (DSS-WISE™ Lite Ver 1.0) was developed on behalf of the US Army Corps of Engineers (USACE) Critical Infrastructure Protection and Resilience (CIPR) Program and the DHS Office of Infrastructure Protection. This simplified dam break flood modeling capability was available to interested parties through the Dams Sector Analysis Tool (DSAT) secure web portal until November 2014. An updated version with more features was developed on behalf of Federal Emergency Management (FEMA) and is available at dsswiseweb.ncche.olemiss.edu.

The DSS-WISE™ Lite software suite, running on NCCHE servers, automatically processes input files for dam-break modeling scenarios submitted by an user. DSS-WISE™ Lite further simplifies simulations by making several general overarching assumptions in an effort to streamline data preparation and computations.

The results produced by this simplified dam-break flood simulation tool represent a rough approximation. They are not intended to replace more detailed flood inundation modeling and mapping products or capabilities developed by hydraulic and hydrologic engineers and GIS professionals.

The user is, therefore, warned that professional engineering judgment should be used in the interpolation of the results generated by this simplified and automated dam-break flood analysis.

To learn more about DSS-WISE™ and DSS-WISE™ Lite visit us at:
<https://dsswiseweb.ncche.olemiss.edu>

Disclaimer

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Elevation Datum

All reported elevations use the North American Vertical Datum of 1988 (NAVD 88).

2.0 Modeling Parameters and Conditions

2.1 Project Information

Project Name:	Williams Dam
Scenario Name:	Storm Day (1146.0) Dam Breach (Froehlich Partial)
NIDID:	NAXXXXXX
Scenario Description:	Storm Day (1146.0) Dam Breach Froehlich Partial Breach HEC-HMS Hydrograph 1624 cfs Baseflow 40 Bottom Breach Width 0.2 hr Failure Time 8712.4 cfs Peak Discharge 7.5 sq. mi. 2 days 15 ft x 15 ft cell size
User e-mail:	andrew.sampsell@vermont.gov

2.2 Simulation Parameters

Domain buffer distance (miles):	7.5
Simulation cell size requested (ft):	15.0
Simulation duration requested (days):	2

2.3 Impounding Structure(s) Characteristics

Number of Structures: 1

Structure Name:	Williams Dam
Structure Type:	Embankment
Hydraulic Height (ft):	17.0
Crest Elevation (ft):	1150.0
Length (ft):	97.0982233099

2.4 Bridge(s) to be Removed

Number of Bridges: 0

2.5 User-Specified Breach Hydrograph

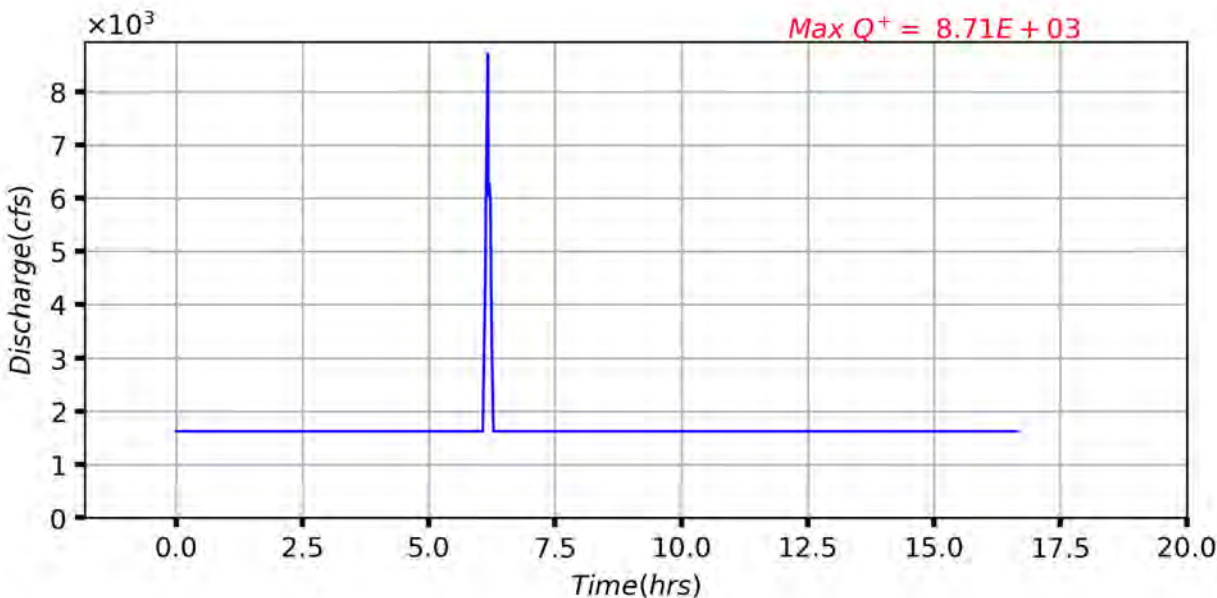


Figure 1. Breach inflow hydrograph for: Williams Dam.

2.6 Reservoir Characteristics

Number of Reservoirs: 1

Reservoir Name:	Williams Dam Reservoir
Selected Reservoir Point (Latitude/Longitude):	43.2266717542/-72.8063386331
Pool Elevation @ Max Storage (ft):	1146.0
Maximum Storage Volume (ac-ft):	97.1
Pool Elevation @ Normal Storage (ft):	1143.0
Normal Storage Volume (ac-ft):	42.43
Pool Elevation @ Failure (ft):	1146.0
Failure Storage Volume (ac-ft):	97.1

2.7 Failure Conditions

Structure ID:	1
Structure Name:	Williams Dam
Structure Type:	Embankment
Failure Mode:	Partial Dam Breach
Breach Width (ft):	40.0
Breach Location (Latitude/Longitude):	43.226506097/-72.8072398148

3.0 Automated Data Preparation and Job Flow Summary

3.1 Job Flow Summary

1. Prepare Digital Elevation Model (DEM) and Land Use/Land Cover (LULC) tiles for the Area of Interest (AOI) based on requested cellsize and maximum downstream distance.
2. Burn U.S. Army Corps of Engineers (USACE) levee lines into DEM for the AOI.
3. Assign Manning's coefficients based on LULC classifications.
4. Validate user provided simulation input parameters.
5. Remove user identified bridges from the DEM.
6. Estimate reservoir bathymetry.
7. Extend impounding structures if the specified reservoir level cannot be contained.
8. Fill reservoir to specified failure elevation.
9. Prepare boundary condition and all input data for simulation.

3.2 Reservoir Bathymetry and Filling

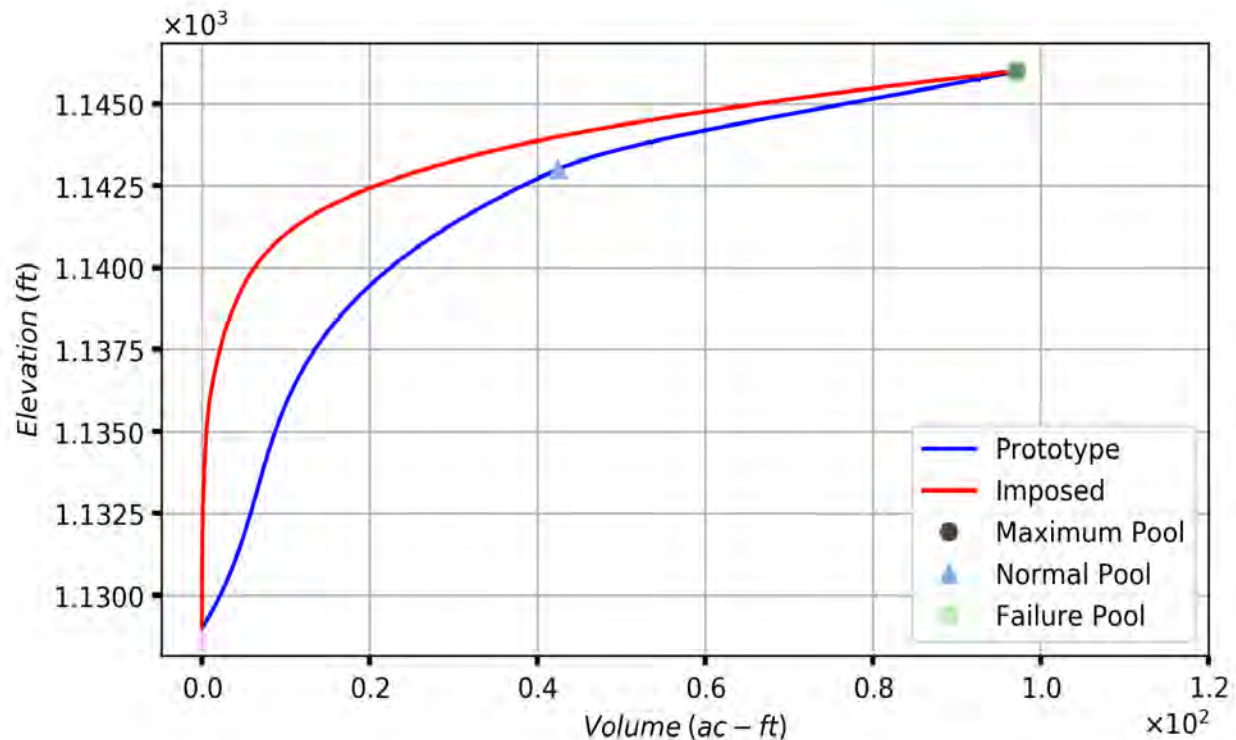


Figure 2. Stage-Volume Curve for Reservoir: Williams Dam Reservoir.

Prototype: Theoretical cubic Hermite spline curve generated from user-provided reservoir elevation and volume information.

Imposed: Measured from reservoir bathymetry after filling to the failure elevation.

The reservoir water surface was detected to be in the DEM, so bathymetry estimation was performed using the prototype stage-volume curve shown above.

User-given Storage Volume at Failure (ac-ft): 97.1

Imposed Storage Volume at Failure (ac-ft): 97.1

After filling to the failure elevation, the imposed reservoir volume matched 100.0% of the prototype volume.

3.3 Data Sources

1. Digital Elevation Models

Sources: USGS 2018 National Elevation Dataset, NOAA, DEM provided by group.

Resolutions: 2, 1, 1/3, 1/9, 0.15 arc-seconds, 1 meter, and 10 feet based on availability

Vertical Datum: NAVD88

Horizontal Datum: NAD83

2. National Land Use/Land Cover Data

Source: USGS 2016 National Land Cover Database

Resolution: 30 m

3. National Levee Database

Source: USACE

3.4 Digital Elevation Model

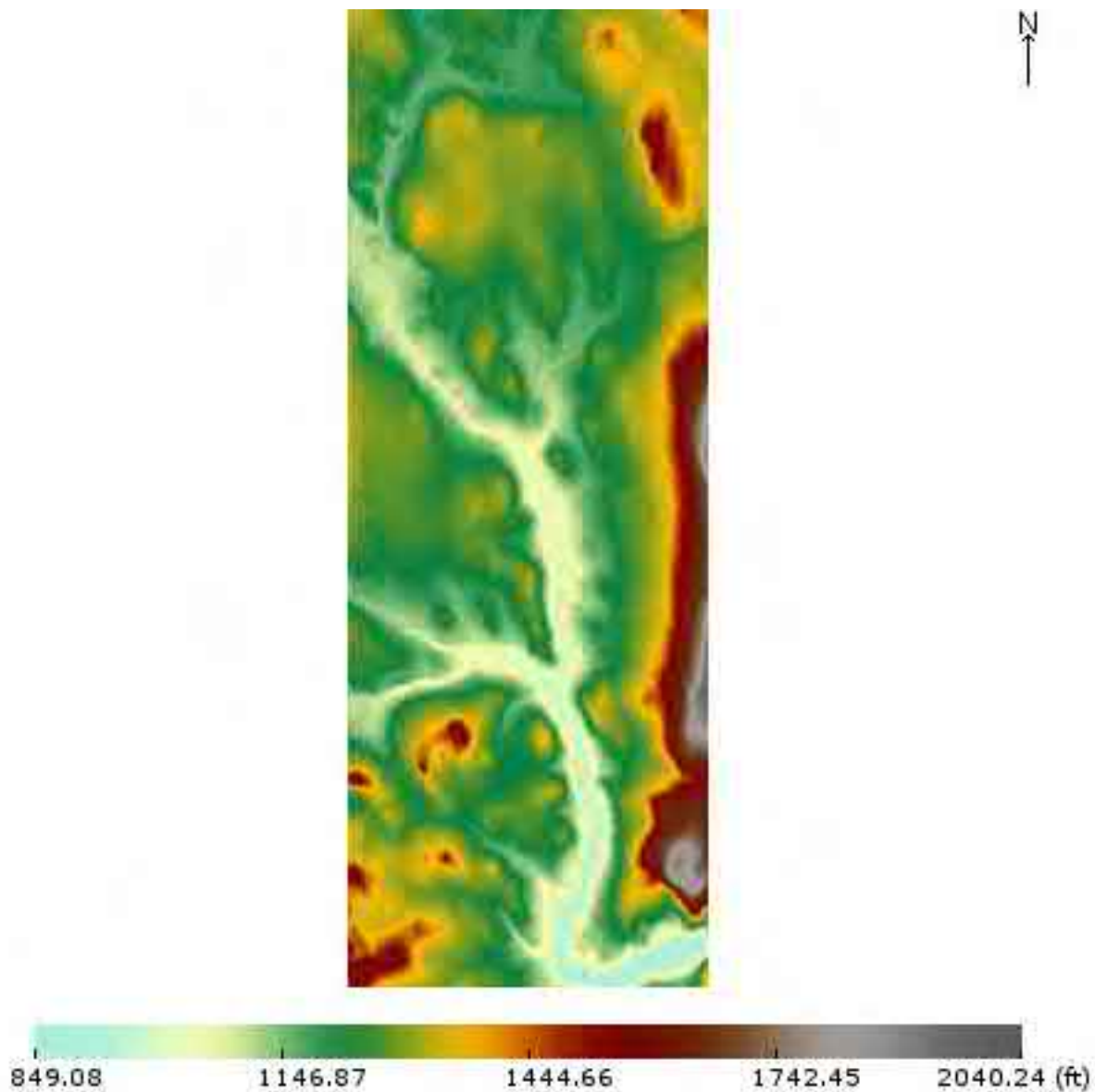


Image Dimensions: N-S: 7.750 miles E-W: 2.849 miles
Figure 3. Map of Digital Elevation Model with Levees for AOI.

3.5 Reservoir Boundary and Breaching Structure

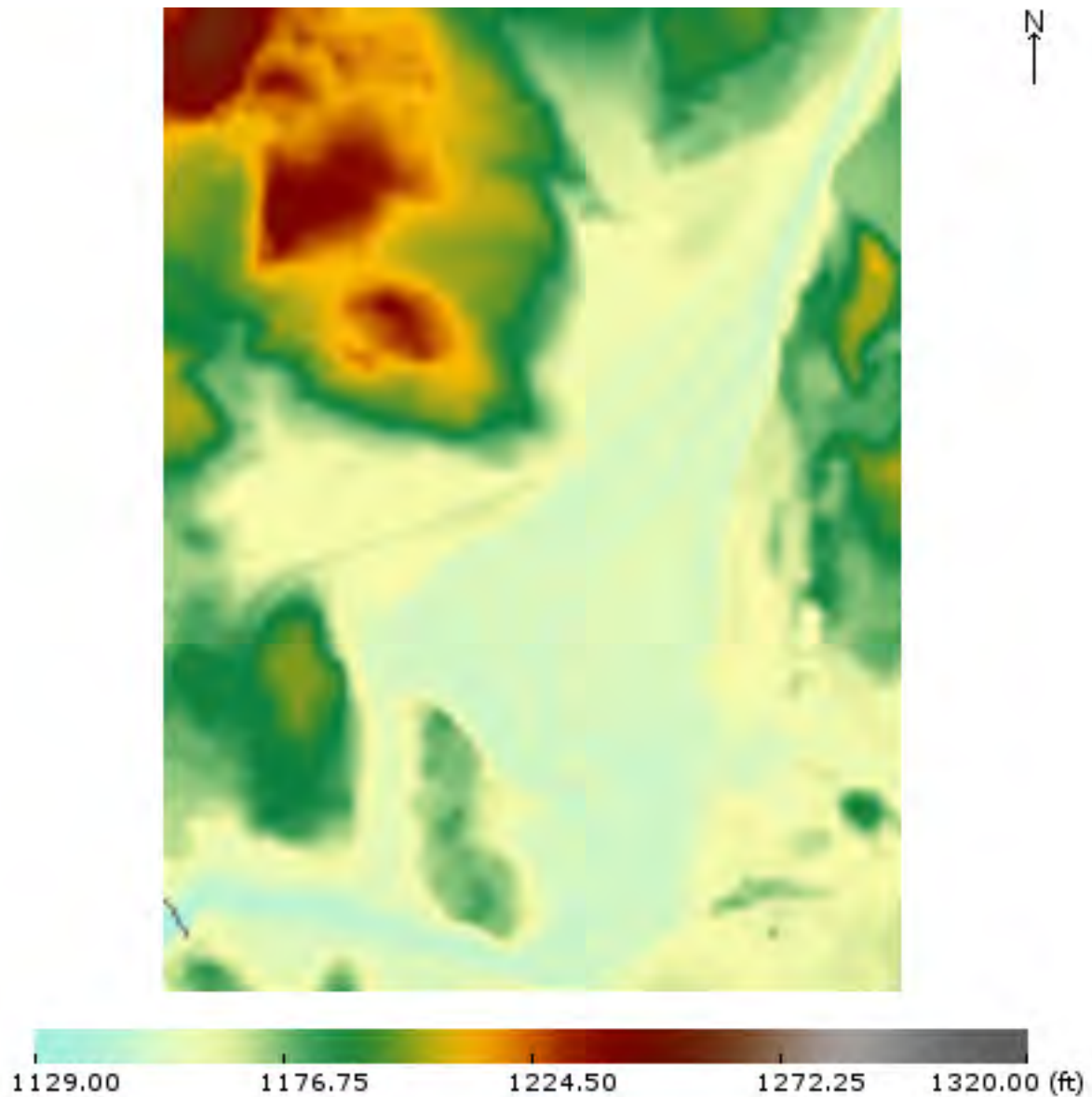


Image Dimensions: N-S: 0.668 miles E-W: 0.500 miles
Figure 4. Map of Reservoir Boundary and Breached Structure.

3.6 Reservoir Initial Depth Profile

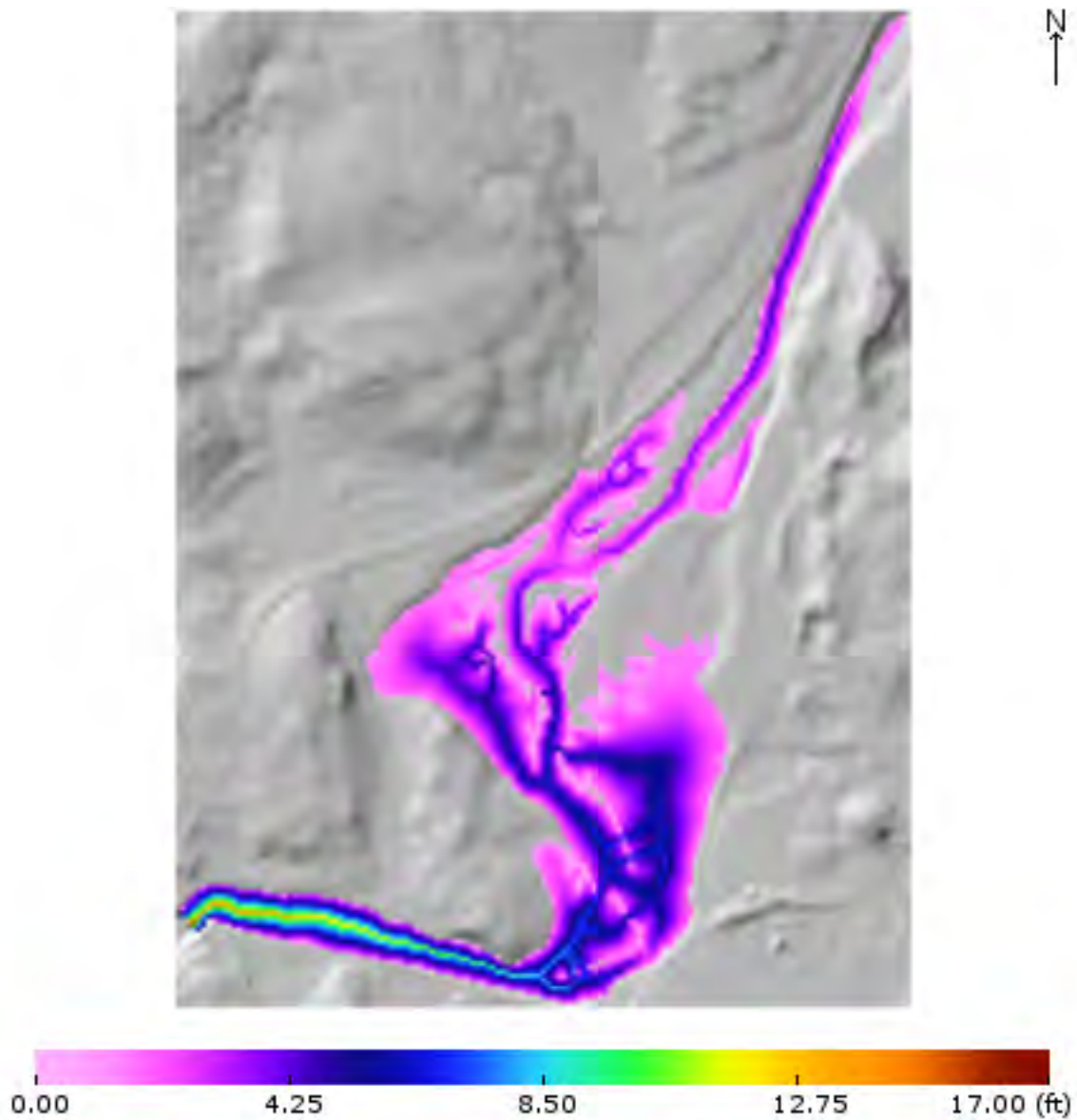


Image Dimensions: N-S: 0.679 miles E-W: 0.503 miles
Figure 5. Map of Initial Depths in Reservoir at Failure Conditions.

3.7 Land Use/Land Cover



Image Dimensions: N-S: 7.750 miles E-W: 2.849 miles

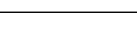
Figure 6. Map of Land Use for AOI.

4.0 Simulation Results

4.1 Simulation Summary

Simulation Request Received:	11:08 AM CST (02/18/2022)
Simulation Start Time:	11:09 AM CST (02/18/2022)
Simulation End Time:	11:17 AM CST (02/18/2022)
DEM resolution used for simulation (ft):	15.0
DEM resolution requested (ft):	15.0
Final distance reached downstream (miles):	7.2
Domain buffer distance (miles):	7.5
Elapsed simulation time after breach initiation (hrs):	23.2
Termination condition:	Water stopped spreading.

4.2 Land Use and Manning's Roughness Coefficient for Inundated Area

Land Use Description	% of Inundated Area	n-Value($m^{-1/3}s$)	Code	Color
Open Water	32.20	0.0330	11	
Evergreen Forest *	17.51	0.1000	42	
Woody Wetlands	16.24	0.1500	90	
Deciduous Forest *	8.22	0.1000	41	
Hay/Pasture	6.44	0.0350	81	
Barren Land	4.50	0.0113	31	
Developed, Low Density	3.81	0.0678	22	
Emergent Herbaceous Wetlands	2.74	0.1825	95	
Developed, Medium Density	2.42	0.0678	23	
Developed, Open Space	1.90	0.0404	21	
Mixed Forest *	1.59	0.1200	43	
Grassland/Herbaceous	1.04	0.0400	71	
Shrub/Scrub	0.91	0.0400	52	
Developed, High Density	0.31	0.0404	24	
Cultivated Crops	0.09	0.0700	82	
Unclassified	0.00	0.0350	0	
Perennial Snow/Ice	0.00	0.0100	12	
Dwarf Scrub *	0.00	0.0350	51	
Sedge/Herbaceous *	0.00	0.0350	72	
Lichens *	0.00	0.0350	73	
Moss *	0.00	0.0350	74	

Note: * indicates an n-value estimated by NCCHE. ** indicates an n-value given by the user. Other values are taken from literature.

4.3 Coverage and Sources of DEM Raster Datasets



Figure 7. Coverage of DEM Raster Datasets in the Inundation Area.

DEM Source	Source Resolution	Source Dataset	Color
USGS	1 arc-second	usgs_1as	
USGS	1/3 arc-seconds	usgs_13as	
USGS	1 meter	usgs_utm_z18_1m	

Note: The DEM for this job was created from the source DEM raster datasets listed above. These DEM raster datasets were resampled and reprojected to the user defined cell size and UTM zone, respectively. Resampled and projected DEM raster datasets were then stacked in the order specific to the group under which this simulation was submitted.

4.4 Maximum Flood Depth

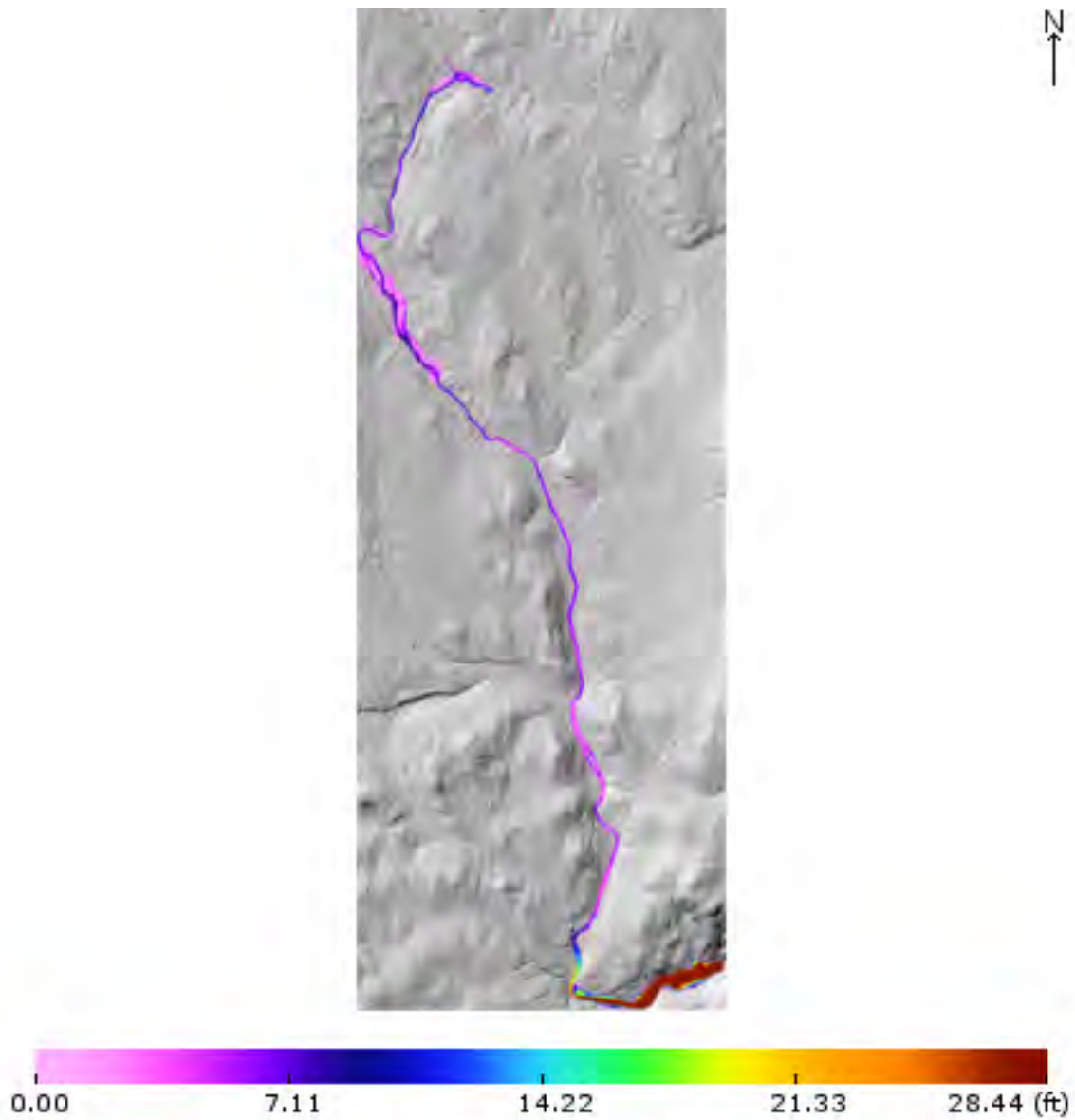


Image Dimensions: N-S: 7.761 miles E-W: 2.861 miles
Figure 8. Maximum Flood Depth Map.

4.5 Flood Arrival Time

Flood arrival time is measured from the beginning of the simulation.

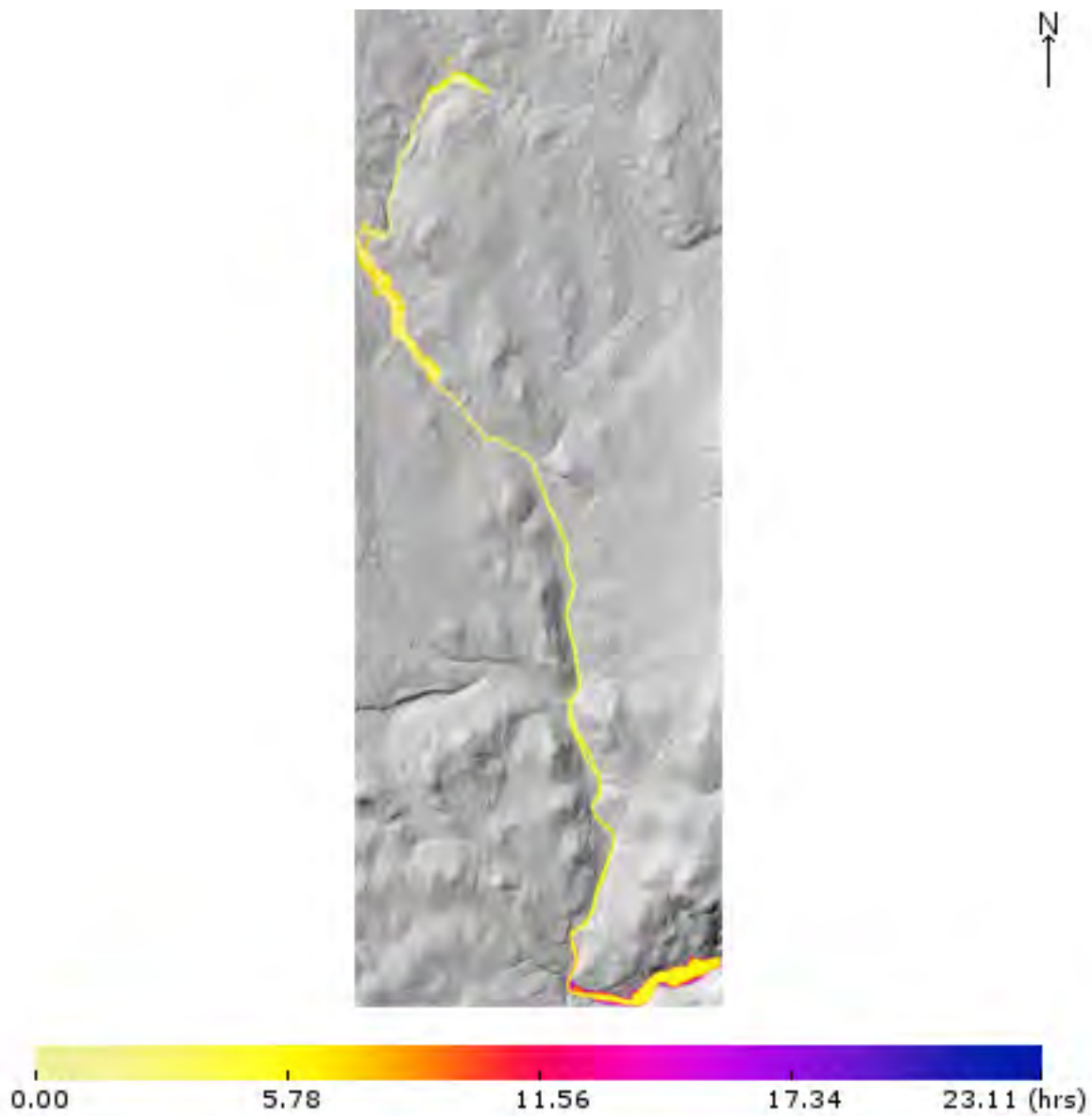


Image Dimensions: N-S: 7.761 miles E-W: 2.861 miles

Figure 9. Flood Arrival Time Map.

4.6 Downloading Simulation Results

The simulation results can be accessed at the following web address:

<https://dsswiseweb.ncche.olemiss.edu/download>

Job ID: 44667

ATTACHMENT C



FEMA

DSS-WISE™ HCOM HUMAN CONSEQUENCE REPORT

Williams Dam

Storm Day (1146.0) Dam Breach (Froehlich Partial)

NAXXXXX

February 18, 2022

DSS-WISE Lite Simulation ID: 44667

National Center for Computational
Hydroscience and Engineering (NCCHE)



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EXECUTIVE SUMMARY

This document reports the human consequences assessment for the DSS-WISE Lite simulation ID: **44667**

INUNDATION EXTENT

Total inundated area (acres)(see [figure 1](#)): 323.02

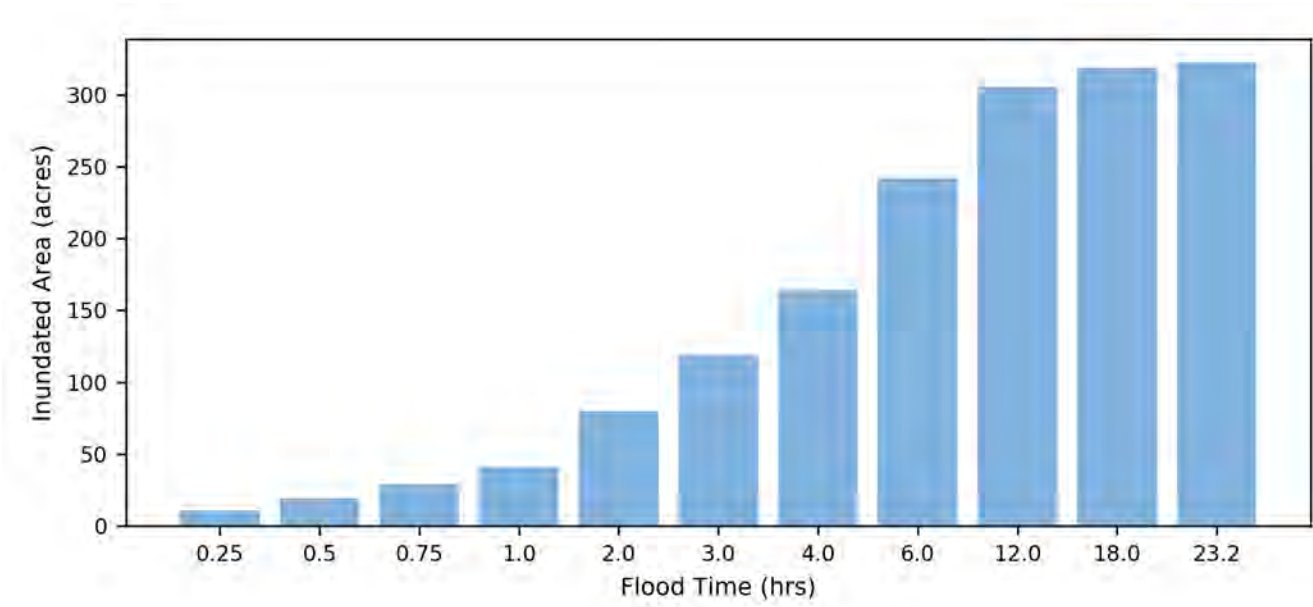


Figure 1. Evolution of total inundated area as a function of time.

ANALYSIS BASED ON CENSUS BLOCK DATA

Population in completely or partially inundated census blocks:	741
Housings in completely or partially inundated census blocks:	641
Number of states in inundated area:	1
Number of counties in inundated area:	1
Number of census blocks in inundated area:	44

ANALYSIS BASED ON GRIDDED LANDSCAN USA DATA

Total Nighttime PAR in inundated area (see figure 2):	7
Total Daytime PAR in inundated area (see figure 3):	47

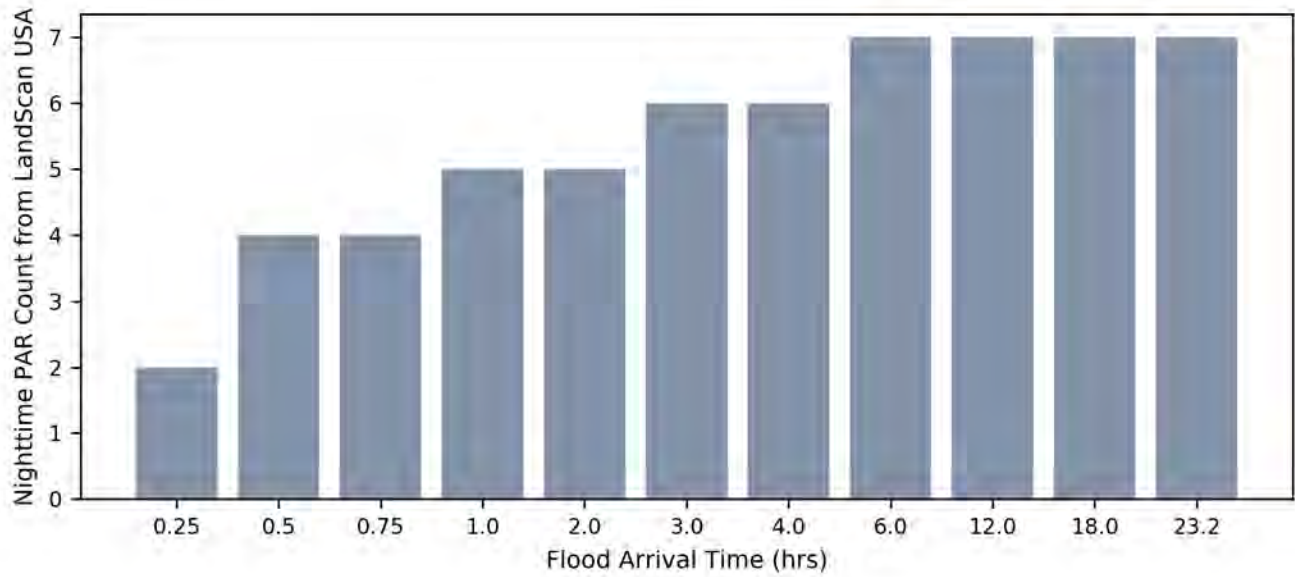


Figure 2. Evolution of nighttime PAR as a function of time.

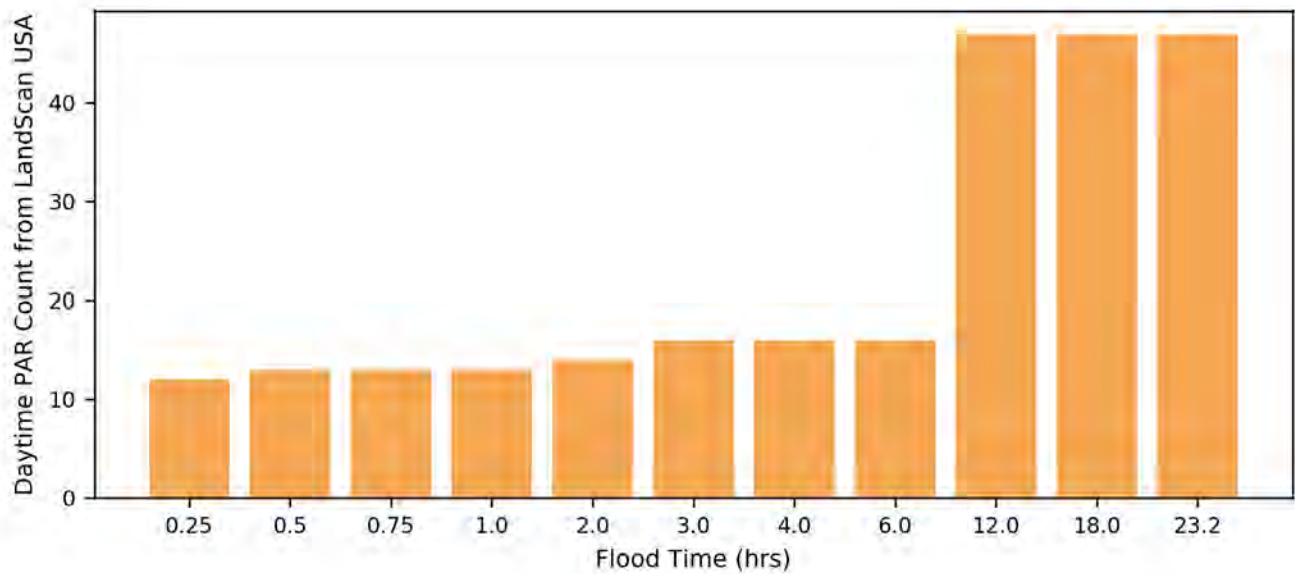


Figure 3. Evolution of daytime PAR as a function of time.

1.0 Overview

This report is produced DSS-WISE HCOM, which is part of the DSS-WISE Web system developed by the National Center for Computational Hydroscience and Engineering, at the University of Mississippi. Funding for DSS-WISE HCOM was provided by the U.S. Federal Emergency Management Agency (FEMA) through a contract with Argonne National Laboratory (ANL).

The results provided to the user by DSS-WISE HCOM include the following:

- the present report,
- a Microsoft Excel file containing data, results and plots, and
- a series of geospatial results files (in the form of polygon shapefiles).

These files can be used for further analysis and decision making for preparedness or during the response to an emergency. The files can also be used for hazard classification, risk prioritization preparing Emergency Actions Plans (EAPs).

DSS-WISE HCOM interfaces two-dimensional flood simulation results provided by DSS-WISE Lite with the population data provided by the U.S. Census Bureau and LandScan USA.

Please send any questions or suggestions to
admin@dsswiseweb.ncche.olemiss.edu

2.0 List of Abbreviations

ft	feet
hrs	hours
ft^2/s	Unit discharge, feet-squared per second
m^2/s	Unit discharge, meters squared per second
ft/s	feet per second
$ft.lb.$	foot-pounds
$m.kg.$	Meter-kilograms
D_{max}	Maximum depth
DV	Depth times velocity, unit discharge
DV_{max}	Maximum depth times velocity, maximum unit discharge
q_{max}	Maximum unit discharge, also called DV_{max}
DSS-WISE	Decision Support System for Water Infrastructural Security
DSS-WISE Web	Decision Support System for Water Infrastructural Security Web, the web-based system housing DSS-WISE Lite and other tools
DSS-WISE Lite	Decision Support System for Water Infrastructural Security Lite, the web-based version of DSS-WISE dam-break and flood modeling software
HCOM	Human Consequence Module
NCCHE	National Center for Computational Hydroscience and Engineering
PLFZ	Potentially Lethal Flood Zones
PAR	Population At Risk
EAP	Emergency Action Plan
NIDID	National Inventory of Dams (NID) Identifier
USCB	United States Census Bureau, or officially the Bureau of the Census
FEMA	Federal Emergency Management Agency
ANL	Argonne National Laboratory
ORNL	Oak Ridge National Laboratory
ESRI	Environmental Systems Research Institute
LSM	Life Safety Model

3.0 HCOM DATA SETS

3.1 DSS-WISE Lite Results Files

The human consequence analysis in this report are provided by DSS-WISE HCOM based on the raster results files for the following dam-break flood modeling simulation with DSS-WISE Lite:

DSS-WISE Lite simulation ID:	44667
Project Name:	Williams Dam
Scenario Name:	Storm Day (1146.0) Dam Breach (Froehlich Partial)
NIDID:	NXXXXXX
Scenario Description:	Storm Day (1146.0) Dam Breach Froehlich Partial Breach HEC-HMS Hydrograph 1624 cfs Baseflow 40 Bottom Breach Width 0.2 hr Fail- ure Time 8712.4 cfs Peak Discharge 7.5 sq. mi. 2 days 15 ft x 15 ft cell size
Simulation distance requested (<i>miles</i>):	7.5
Simulation cell size (<i>ft</i>):	15.0
Simulation duration requested (<i>days</i>):	2.0

Table 1. DSS-WISE Lite results files used by DSS-WISE HCOM.

File Name	Type	Units	Description
44667_Hmax_ft_upto_final.tif	Raster	<i>ft</i>	Maximum flood depth
44667_Arrival_Time_hr_upto_final.tif	Raster	<i>hrs</i>	Flood Arrival Time
44667_Vmax_ftps_upto_final.tif	Raster	<i>ft/s</i>	Maximum flood velocity
44667_DVmax_ft2ps_upto_final.tif	Raster	<i>ft²/s</i>	Magnitude of the maximum specific discharge
44667_DVmax_ft2ps_upto_final.tifArrivalTime	Raster	<i>hrs</i>	Arrival time of the maximum value of specific discharge

3.2 Population Data Sets Used by DSS-WISE HCOM

DSS-WISE HCOM uses two different sets of population data to estimate the Population at Risk (PAR) potentially affected by the flood:

1. 2010 Census Block data provided by the United States Census Bureau (USCB), which is federal government agency in charge of producing data about the people and economy of the U.S. A census block is the smallest geographic unit for which USCB collects data from all the houses in the unit (rather than a sample of houses). Census Blocks are bounded by visible features such as streets, roads, streams and nonvisible features such as property lines and limits of city, township, school district, and counties, etc. They are defined as polygons in a shapefile covering the entire territory of the U.S. including Puerto Rico and the Island areas. The attributes of the census block polygons include 2010 Census Housing Unit Count and 2010 Census Population Count. The latter should be considered as 2010 nighttime population data.
2. LandScan USA gridded population data developed and maintained by the Oak Ridge National Laboratory (ORNL) located in Oak Ridge, TN. LandScan USA (<https://landscan.ornl.gov/>) is a collection of gridded nighttime and daytime population datasets developed by the Oak Ridge National Laboratory (ORNL), Department of Energy. These gridded population datasets are available as raster files with a resolution of 3 arc-second (90m or 295.28ft.). They were developed by combining satellite remote sensing data, geospatial infrastructure datasets, and demographic data from USCB. Researchers at ORNL used “Intelligent” dasymetric modeling method to assign the population counts to the grid cells (Dobson et al. 2000 and Bhaduri et al. 2007) by defining a habitability index and by maintaining the total count of cells in a census block to be equal to the total population of the census block. The LandScan USA datasets used in this report are projections for 2016 (McKee et al. 2014). Daytime data is generated using specially developed techniques for population dynamics (Bhaduri 2007).

Detailed explanations on the methodologies used by DSS-WISE HCOM are provided in the technical manual, which can be downloaded from documentation page of the DSS-WISE Web website.

4.0 FLOOD HAZARD MAPPING

Flood-hazard mapping consists of partitioning the inundation extent into zones of pre-defined potential danger classes for humans. The resulting map is an ESRI shapefile of polygon type. The polygons correspond to different levels of potential danger for humans caught outdoors and indoors.

The potential danger classes are identified based on the ranges of the value of the maximum specific discharge, DV_{max} . The ranges of $q_{max} \equiv DV_{max}$ values are different for persons caught outdoors or indoors.

4.1 Potential Flood Hazard for Humans Caught Outdoors

For humans caught outdoors, the ranges of DV_{max} corresponding to five potential hazard (or danger) levels identified by different color codes are summarized in [Table 2](#), which is adapted from [Cox et al. \(2010\)](#). The potential hazard levels are:

1. “Very Low Hazard: Shallow flow or deep standing water”;
2. “Low Hazard: Dangerous to children”;
3. “Moderate Hazard: Dangerous to some adults”;
4. “Significant Hazard: Dangerous to most adults”; and
5. “Extreme Hazard: Dangerous to all”.

The three rightmost columns of [Table 2](#) correspond to the interpretation of five potential hazard levels by [Cox et al. \(2010\)](#) for three population categories defined by an index value corresponding to the product of height (H) and mass (M) of the individual as listed at the bottom of [Table 2](#).

1. “Infants and small Children”,
2. “Children”, and
3. “Adults”;

The five polygons corresponding to the five potential flood hazard levels for people caught outdoors as listed in [Table 2](#) are provided as an ESRI shapefile of polygon type.

Cox et al. (2010) notes that the limits of DV_{max} in Table 2 correspond loosely to the loss of stability of different population categories. However, it is important to note that the ranges of DV_{max} given in Table 2 should not be considered as strict limits. Various other factors may influence the stability of individuals caught outdoors by the flood, such as:

- Bottom conditions (uneven surface, slippery surface, visible or invisible obstacles);
- Flow conditions (floating debris, low temperature, poor visibility, unsteady flow and flow aeration);
- Human subject (standing or moving, experience and training, clothing and footwear, physical attributes, such as height, mass and muscular development, disabilities, and psychological factors); and
- Other factors (strong wind, poor lighting, feeling unsafe or complete loss of footing).

Table 2. Potential flood hazard levels for humans caught outdoors by the flood (adapted from Cox et al. 2010).

DV_{max}				Potential Hazard Category	Explanation		
m^2/s		ft^2/s			Adults	Children	Infants, Small Children and Frail/Older Persons
from	to	from	to				
0.0	0.4	0.0	4.3	HZ01 Very Low Hazard: Shallow flow or deep standing water	Low Hazard	Low Hazard	Extreme Hazard Dangerous to all Infants, small Children and Frail/Older Persons
0.4	0.6	4.3	6.5	HZ02 Low Hazard: Dangerous to Children		Significant Hazard; Dangerous to most Children	
0.6	0.8 ⁽²⁾	6.5	8.6 ⁽²⁾	HZ03 Moderate Hazard: Dangerous to some adults	Moderate Hazard: Dangerous to some adults		
0.8	1.2 ⁽³⁾	8.6	13 ⁽³⁾	HZ04 Significant Hazard: Dangerous to most adults	Significant Hazard: Dangerous to most adults	Extreme Hazard: Dangerous to all children	
1.2 ⁽³⁾		13 ⁽³⁾		HZ05 Extreme Hazard: Dangerous to all	Extreme Hazard: Dangerous to all		
1) Small children, children and adult categories are defined based on $height(H) \times mass(M)$ Small children: $H \times M \leq 25l(m.kg.)$ $H \times M \leq 181(ft.lb.)$ Children: $25 < H \times M(m.kg.) \leq 50$ $181 < H \times M(m.kg.) \leq 362$ Adult: $50 < H \times M(m.kg.)$ $362 < H \times M(ft.lb.)$							
2) Recommended upper limit of tolerable working flow regime for trained safety workers or experience and well-equipped persons							
3) Above this value, the hazard is extreme according to majority of the past studies.							

Results file package of DSS-WISE HCOM contains an ESRI shapefile of polygon type containing up to five polygons (see [Table 6](#)) corresponding to the five potential flood hazard levels for humans caught outdoors by the flood, which are listed in [Table 2](#). For convenience, [Map 09](#) of this report shows the inundation extent colored by the five potential flood hazard levels listed in [Table 2](#).

4.2 Flood Hazard for Humans Caught Indoors

For people caught indoors by the flood, it is assumed that the potential danger is associated with the collapses of the building (see [FEMA 2011, p.43](#)). This implicitly assumes that the people indoors are in potential danger of loss of life if the building collapses due to inundation by floodwaters.

[Table 3](#) list the DV_{max} values for the potential collapse of different types of buildings, which are taken from the technical report of the Life Safety Model (LSM) developed by British Columbia Hydro ([BCH 2006](#)).

Table 3. Potential flood hazard levels for humans caught indoors based on the BC Hydro LSM Building Stability Criteria.

DV_{max}		Color Code	Building Type
(m^2/s)	(ft^2/s)		
≥ 5	≥ 54		HZ06: Poorly constructed building
≥ 10	≥ 108		HZ07: Well-built timber building
≥ 15	≥ 161		HZ08: Well-built masonry building
≥ 20	≥ 215		HZ09: Concrete building
≥ 35	≥ 377		HZ10: Large concrete building

Results file package of DSS-WISE HCOM contains an ESRI shapefile of polygon containing up to five stacked polygons (see [Table 6](#)) corresponding to the five potential flood hazard levels for humans caught indoors by the flood, which are listed in [Table 3](#). For convenience, [Map 10](#) of this report shows the inundation extent colored by the five potential flood hazard levels listed in [Table 3](#).

5.0 MAPPING POTENTIALLY LETHAL FLOOD ZONES (PLFZs) FOR CHILDREN AND ADULTS

The mapping of potentially lethal flood zones (PLFZs) for humans consists of partitioning the inundation extent into zones of predefined potential lethality classes for humans. The resulting map is an ESRI shapefile of polygon type for each category. The polygons correspond to different levels of potential lethality that are defined based on the maximum depth, D_{max} , and maximum specific discharge, DV_{max} . The PLFZs for different categories of people caught outdoors, cars, mobile homes and typical residential structures are listed in [Table 4](#) ([Feinberg, 2017](#)).

Table 4. Definition of potentially lethal flood zones (PLFZs) for different categories ([Feinberg, 2017](#)).

Category	Color Code	D_{max} (<i>ft.</i>)		DV_{max} (<i>ft</i> ² / <i>s</i>)
Children caught outdoors (tent camping, fishing, hiking, etc.)		≥ 2	or	≥ 5.4
Adults caught outdoors (tent camping, fishing, hiking, etc.)		≥ 4	or	≥ 6.5
Motor vehicle (compact car) floating	None	≥ 1	or	≥ 4.3
Motor vehicle (compact car) sliding/toppling	None			≥ 5.4
Mobile homes	None	≥ 2	or	≥ 30
Typical residential structures	None	≥ 4	or	≥ 75

Results file package of DSS-WISE HCOM contains an ESRI shapefile of polygon type containing two stacked polygons corresponding to the first two categories in [Table 4](#). These two polygons were extracted using the maximum flow depth and maximum specific discharge files provided in the results package of DSS-WISE Lite simulation (see [Table 6](#)). For convenience, [Map 11](#) of this report shows the extents of these two PLFZ polygons.

The polygons for the remaining PLFZ zones can also be extracted from the D_{max} and DV_{max} raster files using a suitable GIS software.

6.0 POPULATION AT RISK (PAR) ANALYSIS

The population at risk (PAR) analysis aims to provide an estimate of the number of people that will be potentially affected by the propagation of the dam-break flood. DSS-WISE HCOM provides two different types of PAR analysis based on the two different population data sets that are available (see [Section 3.2](#)).

6.1 PAR Analysis Using Census Block Population Data

The results of the PAR analysis using 2010 census block population are given in two different forms:

- The list of the census blocks that are inundated (completely or partially) by the dam-break flood is provided in the “CensusBlock_Analysis” worksheet of the MS Excel file accompanying the present report.
- The polygons of the census blocks that are inundated (completely or partially) by the dam-break flood are provided in a shapefile accompanying the present report. The attributes of the census block polygons are the same as the data columns in the MS Excel file.

The polygons of census blocks included in the inundation extent (completely or partially) are provided as an ESRI shapefile (see [Table 6](#)) in the results package of DSS-WISE HCOM. The worksheet “CensusBlock_Analysis” lists all the census blocks and their attributes, which include various data extracted by DSS-WISE HCOM. The attributes of the census-block polygons are the same as the columns in the worksheet “CensusBlock_Analysis” of the MS Excel file accompanying the present report.

These attributes of the census blocks are listed and explained in [Table 5](#). [Map 06](#) in this report shows the census block polygon outlines overlaid on the flood extent.

Table 5. Attributes of the census block polygons in the shapefile and the corresponding columns in the worksheet “CensusBlock_Analysis” of the MS Excel file accompanying the present report.

ExcelFile		Shapefile	Unit	Description
Col	Title	Attributes		
A	State Name	STATE_NAME		Abbreviation of the state name
B	County Name	CNTY_NAME		County Name

C	State FIPS CODE	STATEFP10		2010 Census state FIPS code
D	County FIPS CODE	COUNTYFP10		2010 Census county FIPS code
E	Tract CODE	TRACTCE10		2010 Census tract code
F	Tabulation Block Number	BLOCKCE		2010 Census tabulation block number
G	Block ID Number	BLOCKID10		Census block identifier; A concatenation of 2010 Census state FIPS code, 2010 Census county FIPS code, 2010 Census tract code , and 2010 Census block number
H	Partial Block Indicator	PARTFLG		Y = partial block N = whole block
I	Total Number of Housing	HOUSING10	<i>Count</i>	2010 Census Housing Unit Count
J	Total Number of Population	POP10	<i>Count</i>	2010 Census Population Count
K	Total Area	AREATOT	<i>Acres</i>	Total area of the census block. This information is extracted from the geometry of the census block
L	Inundated Area	AREAINUND	<i>Acres</i>	Area of the census block inundated. This information is extracted by intersecting the inundation extent with the census block.
M	Percent Area Inundated	AINUND_PCT	%	This quantity is calculated in the MS Excel spreadsheet by the dividing the AREAINUND (column L) by the AREATOT (column K).

N	Flood Arrival Time (Avg)	FLDAT_AVG	<i>hrs</i>	This quantity is extracted from the arrival time raster. It corresponds to the average value of the arrival times of all computational cells within the extent of the census block.
O	Flood Arrival Time (Min)	FLDAT_MIN	<i>hrs</i>	This quantity is extracted from the arrival time raster. It corresponds to the minimum value of the arrival times of all computational cells within the extent of the census block.
P	Flood Arrival Time (Max)	FLDAT_MAX	<i>hrs</i>	This quantity is extracted from the arrival time raster. It corresponds to the maximum value of the arrival times of all computational cells within the extent of the census block.
Q	Flood Maximum Depth (Avg)	HMAX_AVG	<i>ft</i>	This quantity is extracted from the maximum flood depth raster. It corresponds to the average value of the maximum flood depths of all computational cells within the extent of the census block.
R	Flood Maximum Depth (Min)	HMAX_MIN	<i>ft</i>	This quantity is extracted from the maximum flood depth raster. It corresponds to the minimum value of the maximum flood depths of all computational cells within the extent of the census block.
S	Flood Maximum Depth (Max)	HMAX_MAX	<i>ft</i>	This quantity is extracted from the maximum flood depth raster. It corresponds to the maximum value of the maximum flood depth of all computational cells within the extent of the census block.

T	Flood Maximum DV Arrival Time (Avg)	DVMAXATAVG	<i>hrs</i>	This quantity is extracted from the arrival time of maximum specific discharge raster. It corresponds to the average value of the maximum specific discharge arrival times of all computational cells within the extent of the census block.
U	Flood Maximum DV Arrival Time (Min)	DVMAXATMIN	<i>hrs</i>	This quantity is extracted from the arrival time of maximum specific discharge raster. It corresponds to the minimum value of the maximum specific discharge arrival times of all the computational cells within the extent of the census block.
V	Flood Maximum DV Arrival Time (Max)	DVMAXATMAX	<i>hrs</i>	This quantity is extracted from the arrival time of maximum specific discharge raster. It corresponds to the maximum value of the maximum specific discharge arrival times of all the computational cells within the extent of the census block.
W	Flood Maximum DV (Avg)	DVMAX_AVG	ft^2/s	This quantity is extracted from the maximum specific discharge raster. It corresponds to the average value of the maximum specific discharge of all the computational cells within the extent of the census block.
X	Flood Maximum DV (Min)	DVMAX_MIN	ft^2/s	This quantity is extracted from the maximum specific discharge raster. It corresponds to the minimum value of the maximum specific discharge of all the computational cells within the extent of the census block.

Y	Flood Maximum DV (Max)	DVMAX_MAX	ft^2/s	This quantity is extracted from the maximum specific discharge raster. It corresponds to the maximum value of the maximum specific discharge of all the computational cells within the extent of the census block.
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6.2 PAR Analysis Using LandScan USA Gridded Population Data

The PAR analysis using LandScan USA 3 arc-second gridded population data provides three sets of tabular results classified in up to 17 flood times and 10 flood hazard categories based on DV_{max} :

- Tabular summary of inundation areas as a function of flood time is presented in the worksheet “InundatedArea” of the MS Excel file accompanying the present report. The inundation area values are presented as a stacked column plot in the same worksheet.
- Tabular summary of nighttime PAR counts as a function of flood time is presented in the worksheet “Nighttime_PAR” of the MS Excel file accompanying the present report. The nighttime PAR counts are plotted as a stacked column plot in the same worksheet.
- Tabular summary of daytime PAR counts as a function of flood time is presented in the worksheet “Daytime_PAR” of the MS Excel file accompanying the present report. The tabular data is also plotted as a stacked column plot.

The nighttime and daytime PAR counts were obtained from nighttime and daytime population densities, which were extracted from LandScan USA following the methodologies described in the technical manual for DSS-WISE HCOM. [Map 07](#) and [Map 08](#) in this report show the nighttime and daytime population densities over the inundation area.

7.0 RESULTS FILES GENERATED BY DSS-WISE HCOM

All the results files generated by DSS-WISE HCOM are listed [Table 6](#).

Table 6. List of results files generated by DSS-WISE HCOM.

No	Name	Type	Description
1	44667_HCOM_Final_Report.pdf	PDF	The present report.
2	44667_HCOM_Analysis.xlsx	Ms Excel	Ms Excel file accompanying this report. It contains four worksheets: 1. InundatedArea 2. Nighttime_PAR 3. Daytime_PAR 4. CensusBlock_Analysis
3	44667_HCOM_Census_Block_polygons.shp	ESRI Shapefile	This ESRI shapefile of polygon type contains the polygons of the census blocks completely or partially included in the inundation extent. The attributes of the polygons are the same as the columns in the worksheet “CensusBlock_Analysis”. They are listed in Table 5 .
4	44667_HCOM_Outdoor_Hazard_Categories_polygons.shp	ESRI Shapefile	This ESRI shapefile of polygon type contains up to five polygons corresponding to the five potential flood hazard levels for humans caught outdoors by the flood as listed in Table 2 (Section 4.1)
5	44667_HCOM_Indoor_Hazard_Categories_polygons.shp	ESRI Shapefile	This ESRI shapefile of polygon type contains up to five polygons corresponding to the five potential flood hazard levels for humans caught indoors by the flood as listed in Table 3 (Section 4.2)

6	44667_HCOM_PLFZ_ polygons.shp	ESRI Shapefile	This ESRI shapefile of polygon type contains up to two stacked polygons corresponding to the PLFZ areas as listed in the first two rows of Table 4 .
7	44667_HCOM_NT_PopDensity_ persqmi_polygons.shp	ESRI Shapefile	This ESRI shapefile of polygons type contains polygon of nighttime population density per square mile extracted from LandScan USA data. This file should be treated as FOUO
8	44667_HCOM_DT_PopDensity_ persqmi_polygons.shp	ESRI Shapefile	This ESRI shapefile of polygons type contains polygon of daytime population density per square mile extracted from LandScan USA data. This file should be treated as FOUO

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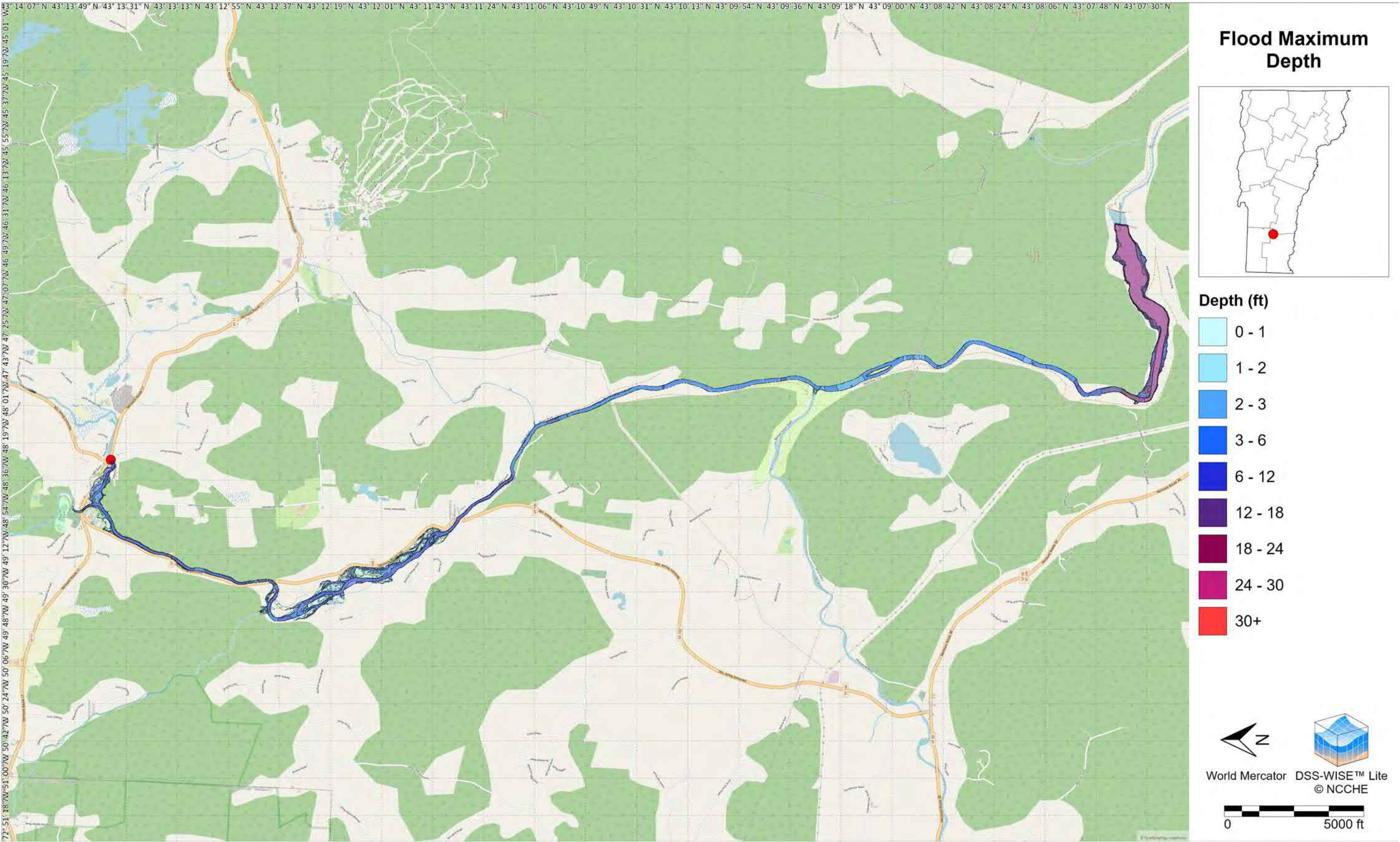
Dobson, J.E., Bright, E.A., Coleman, Ph.R., Durfee, R.C., and Worley, B.A. (2000). LandScan: A Global Population Database for Estimating Populations at Risk. *Photogrammetric Engineering & Remote Sensing*, Vol. 66, NO. 7, pp. 849-857. https://www.asprs.org/wp-content/uploads/pers/2000journal/july/2000_jul_849-857.pdf

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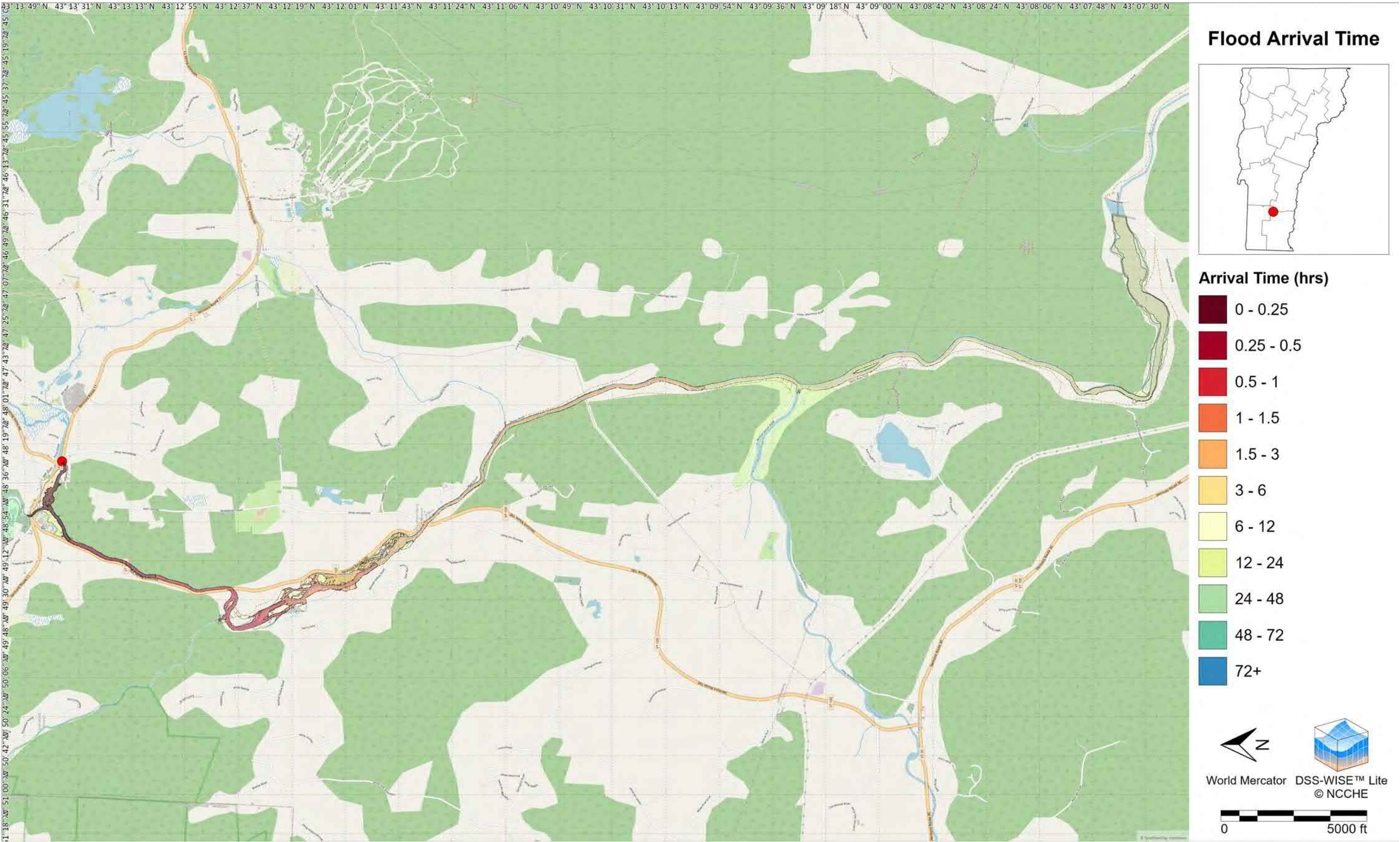
FEMA (2011). Estimating Loss of Life for Dam Failure Scenarios. Draft version.

McKee, J.J., Rose, A.N., Bright, E.A., Huynh, T., and Bhaduri, B.L. (2014). Locally adaptive, spatially explicit projection of US population for 2030 and 2050. *PNAS*, 112(5), 1344-1349. <http://www.pnas.org/content/pnas/112/5/1344.full.pdf>

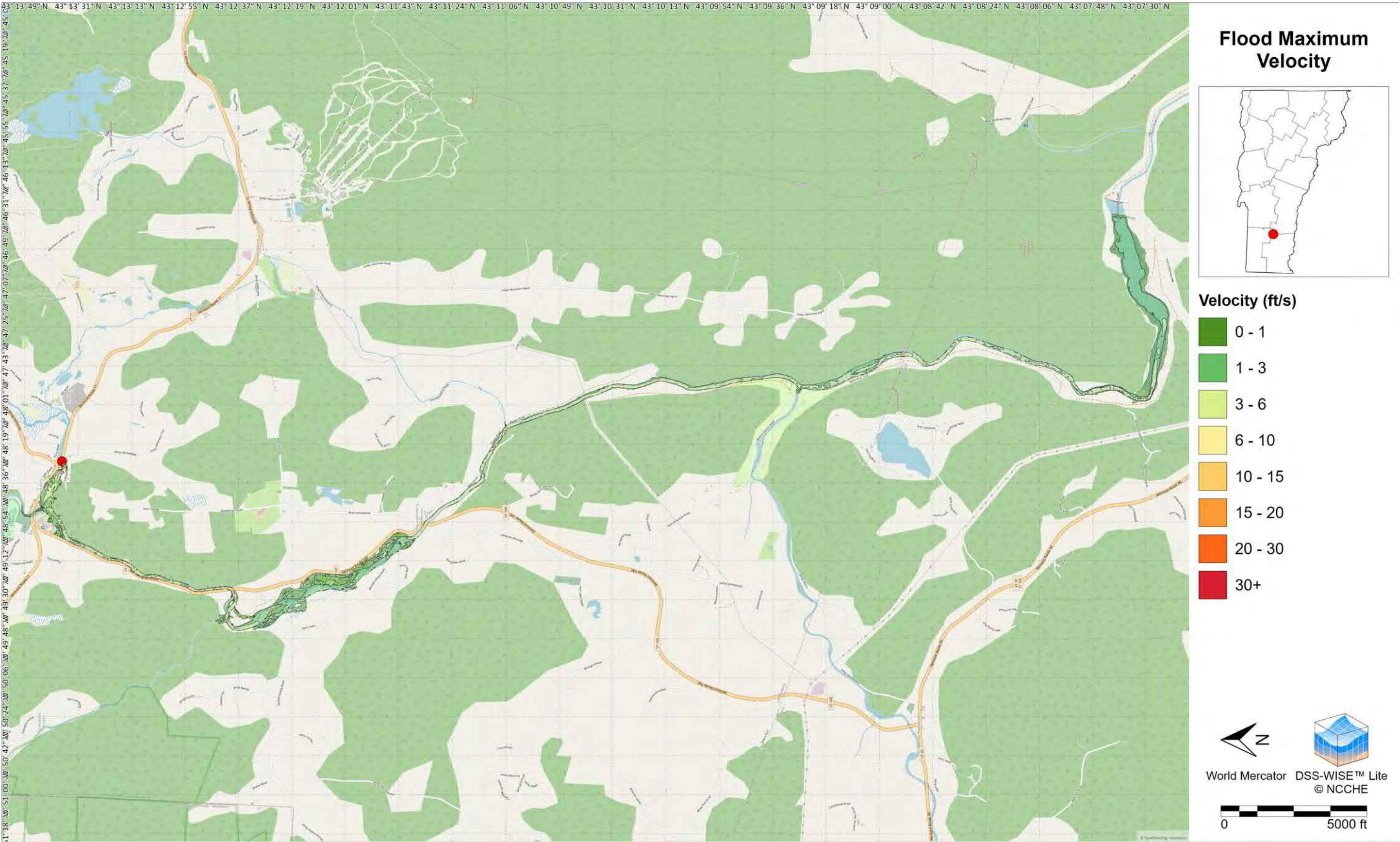
Map 01: Flood Maximum Depth



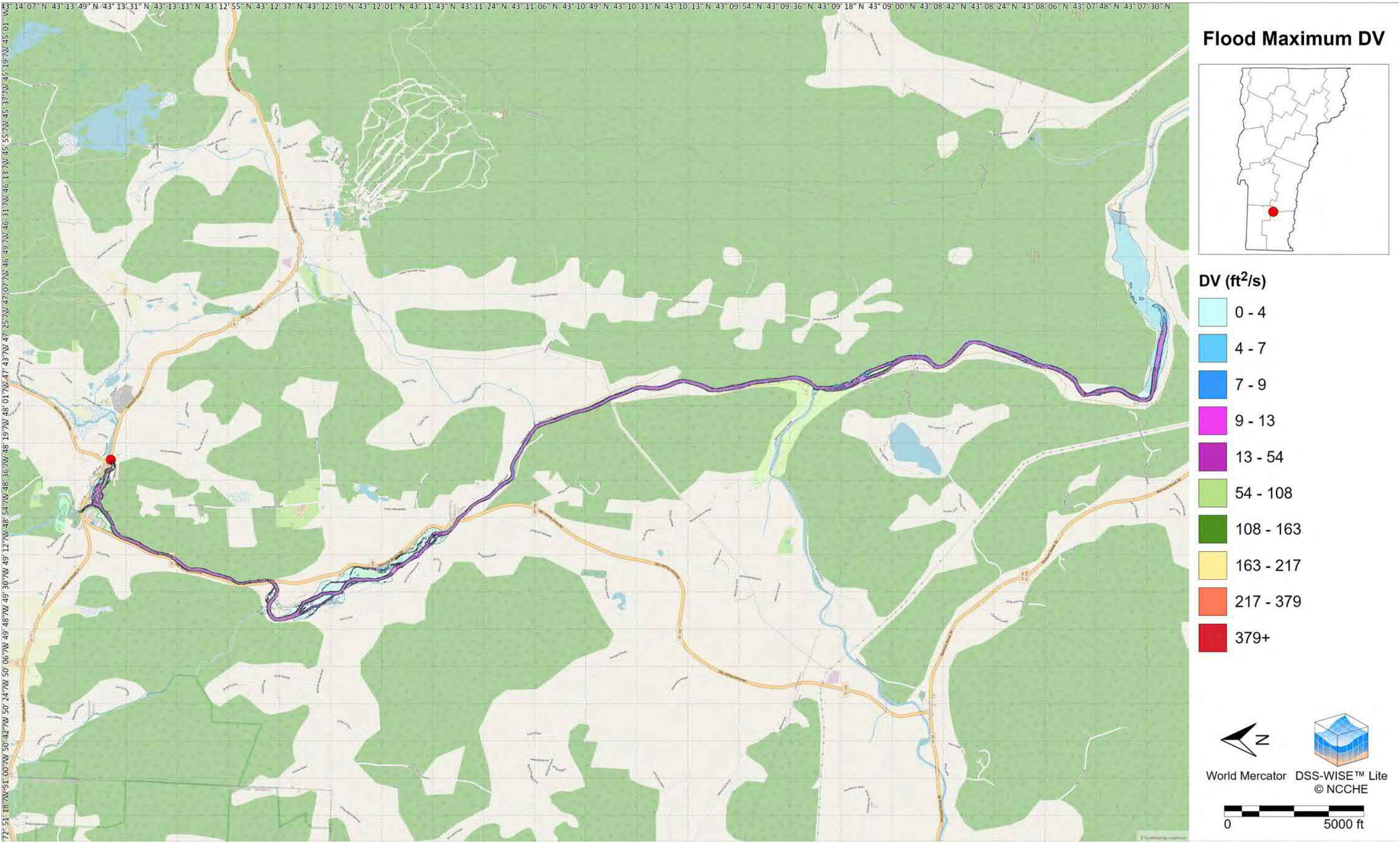
Map 02: Flood Arrival Time



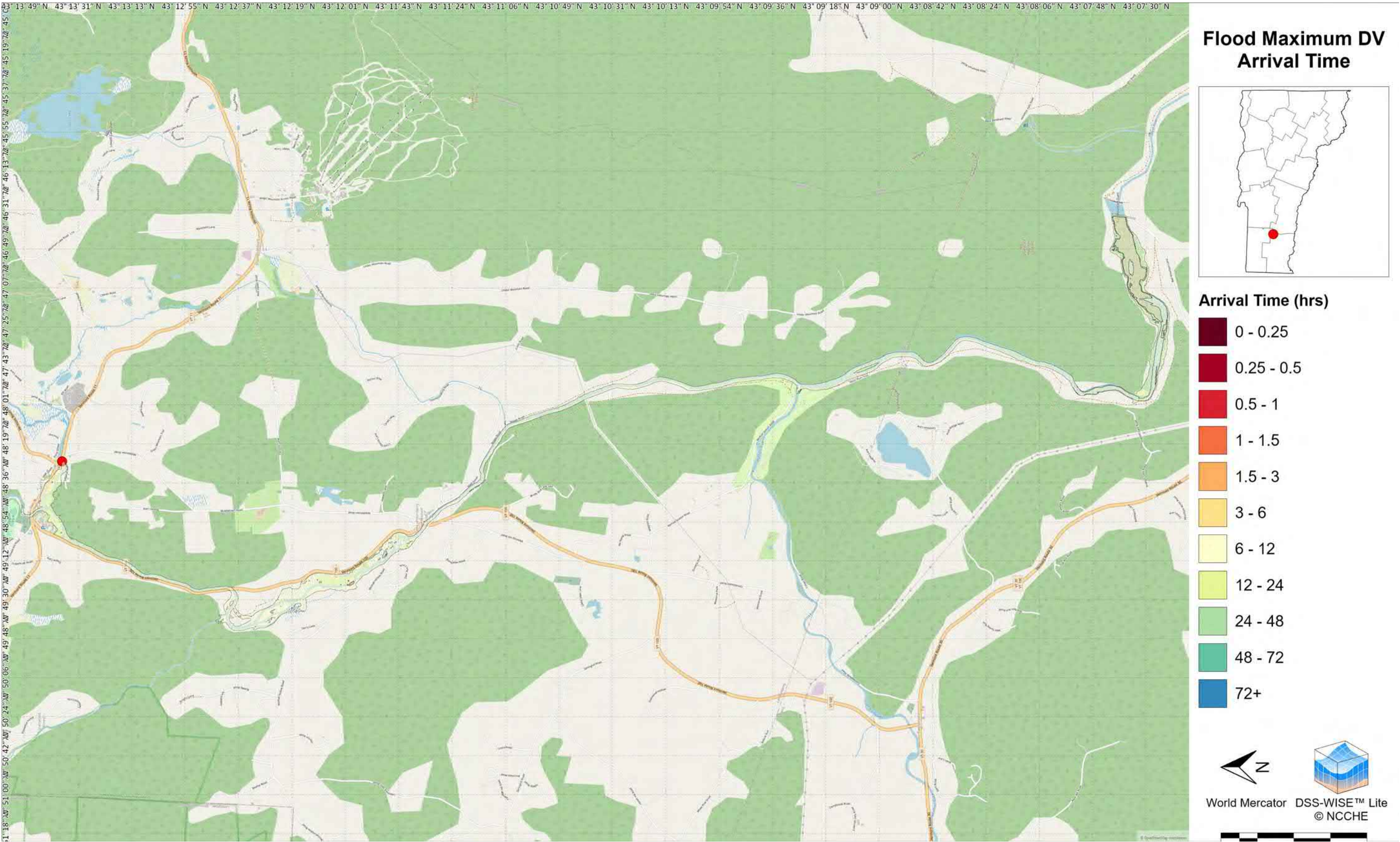
Map 03: Flood Maximum Velocity



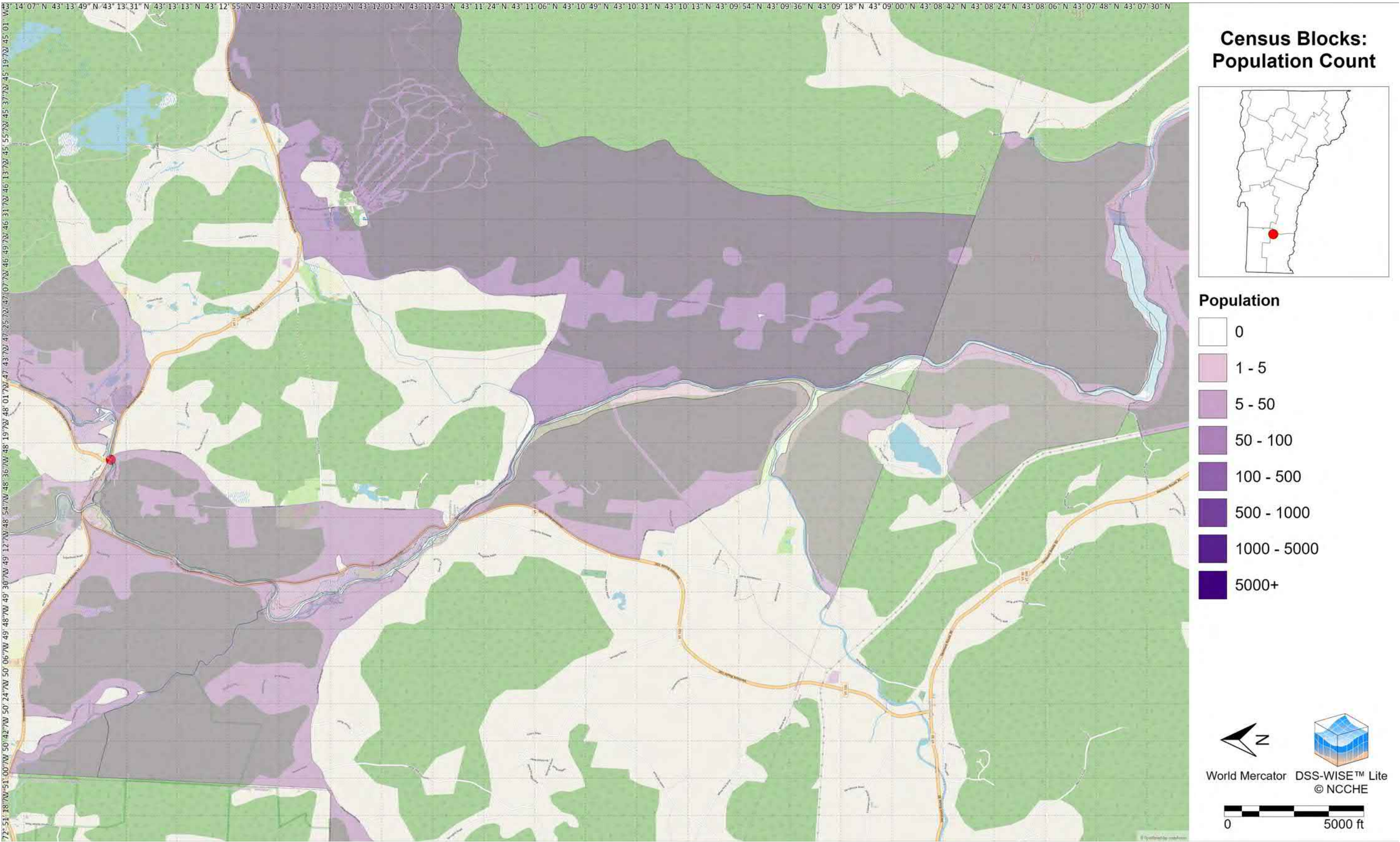
Map 04: Flood Maximum DV



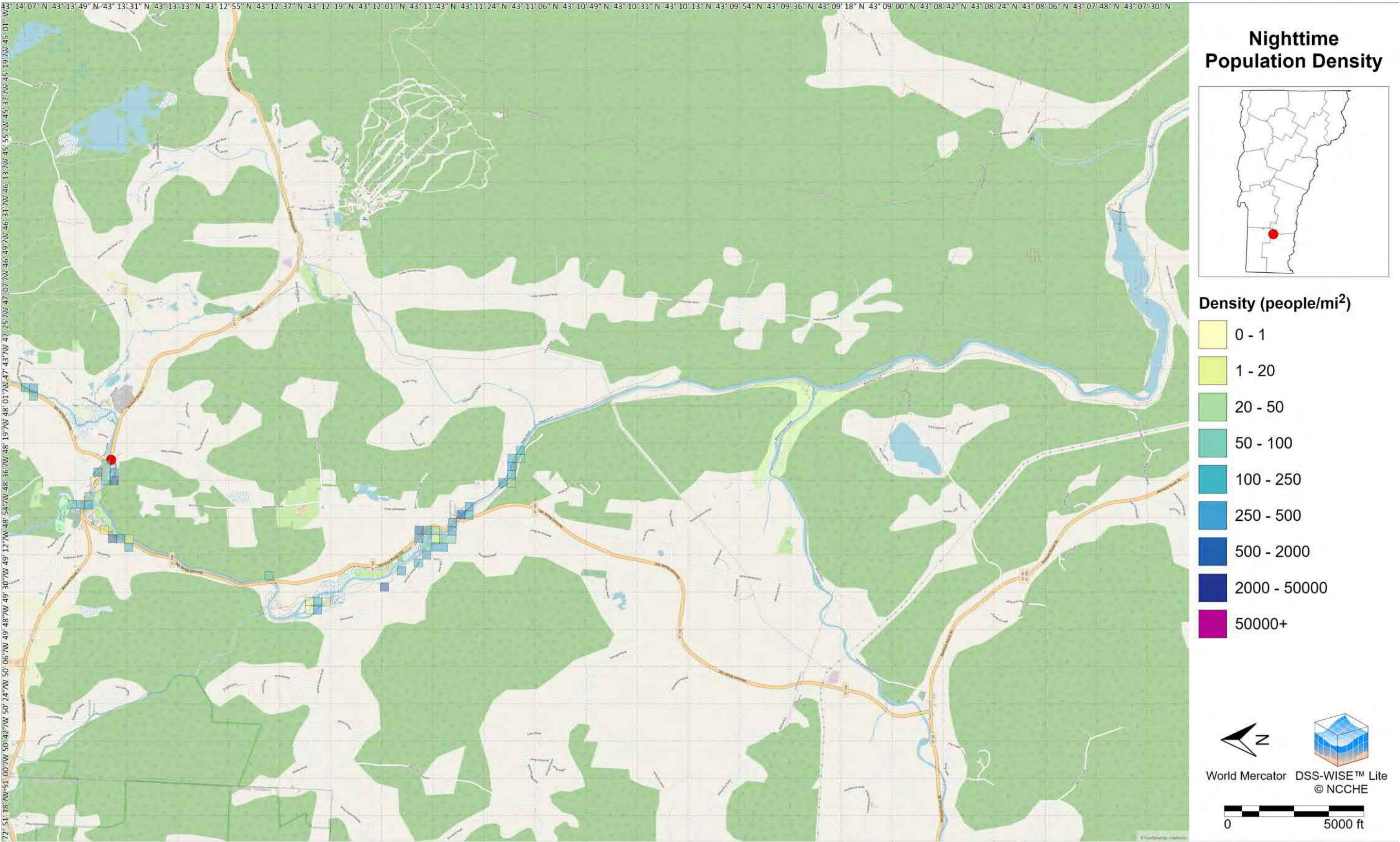
Map 05: Flood Maximum DV Arrival Time



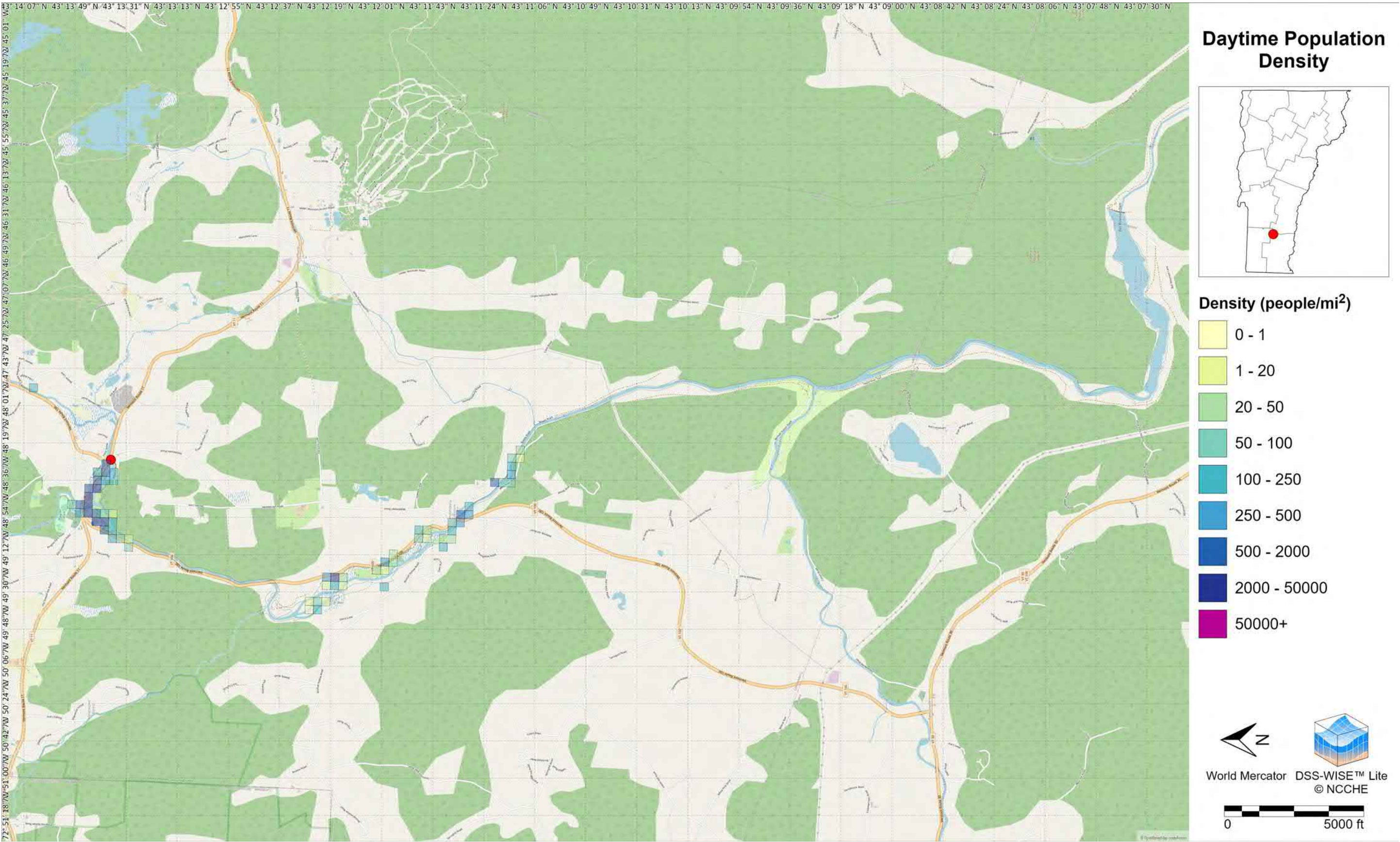
Map 06: Census Blocks: Population Count



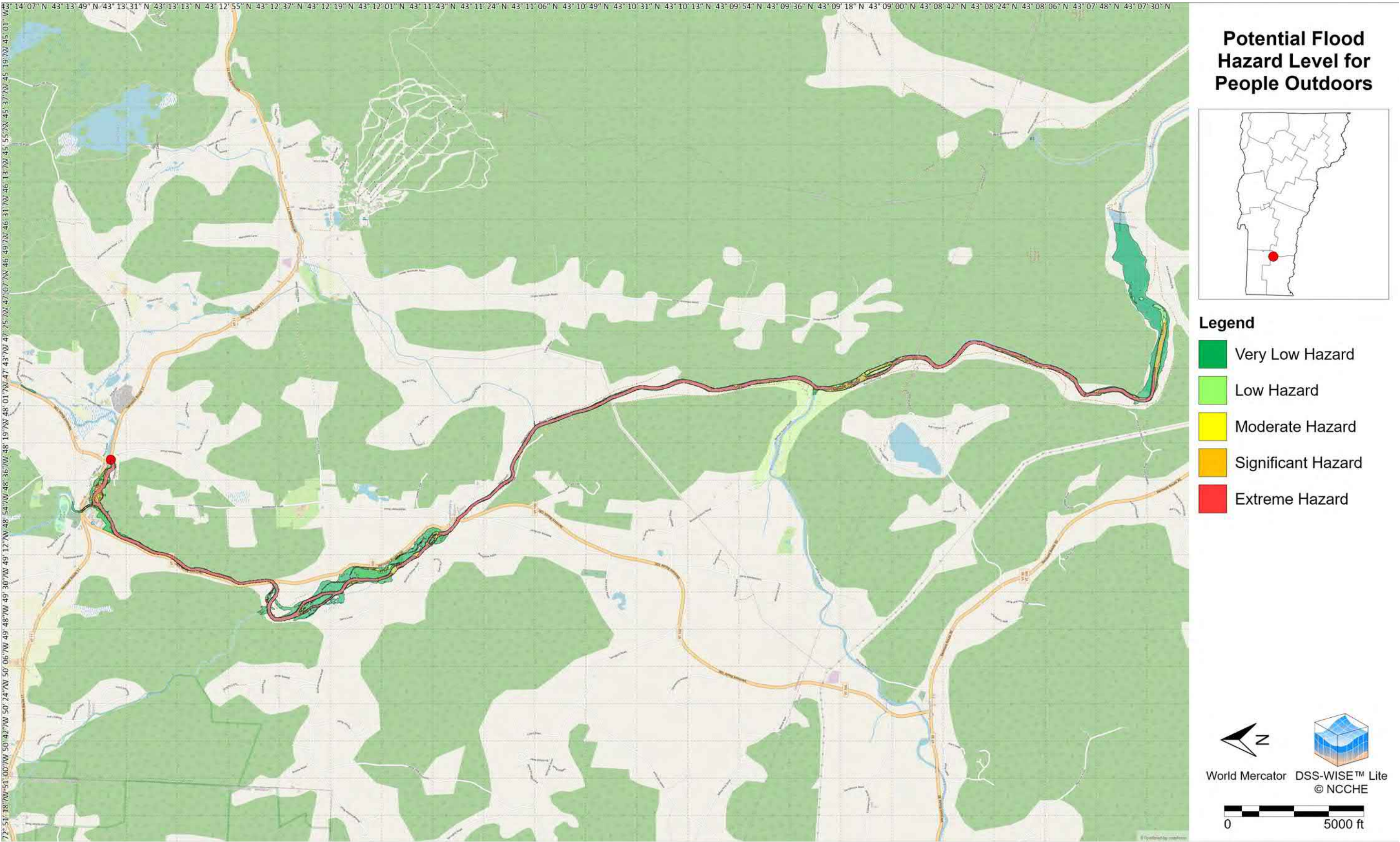
Map 07: Nighttime Population Density



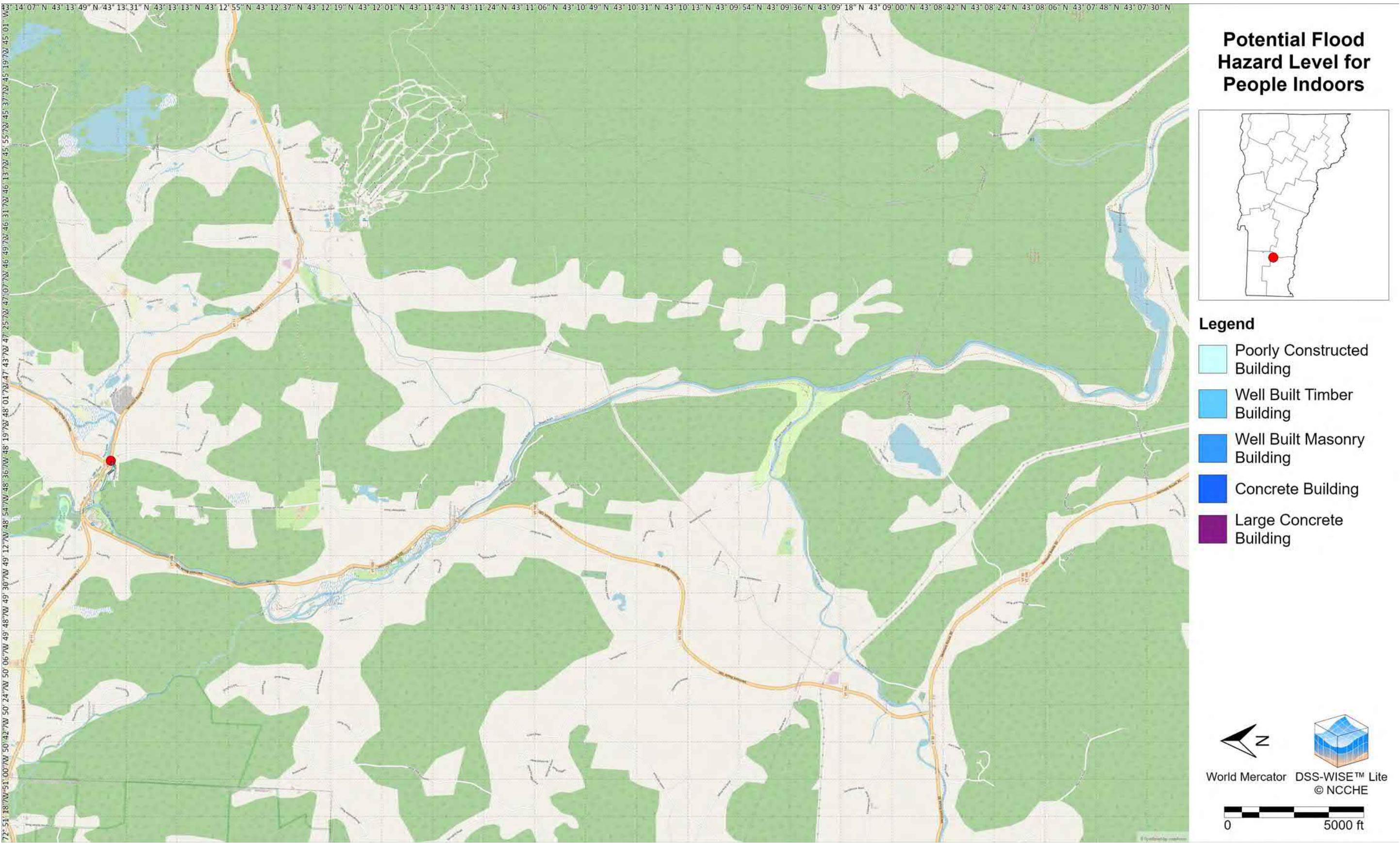
Map 08: Daytime Population Density



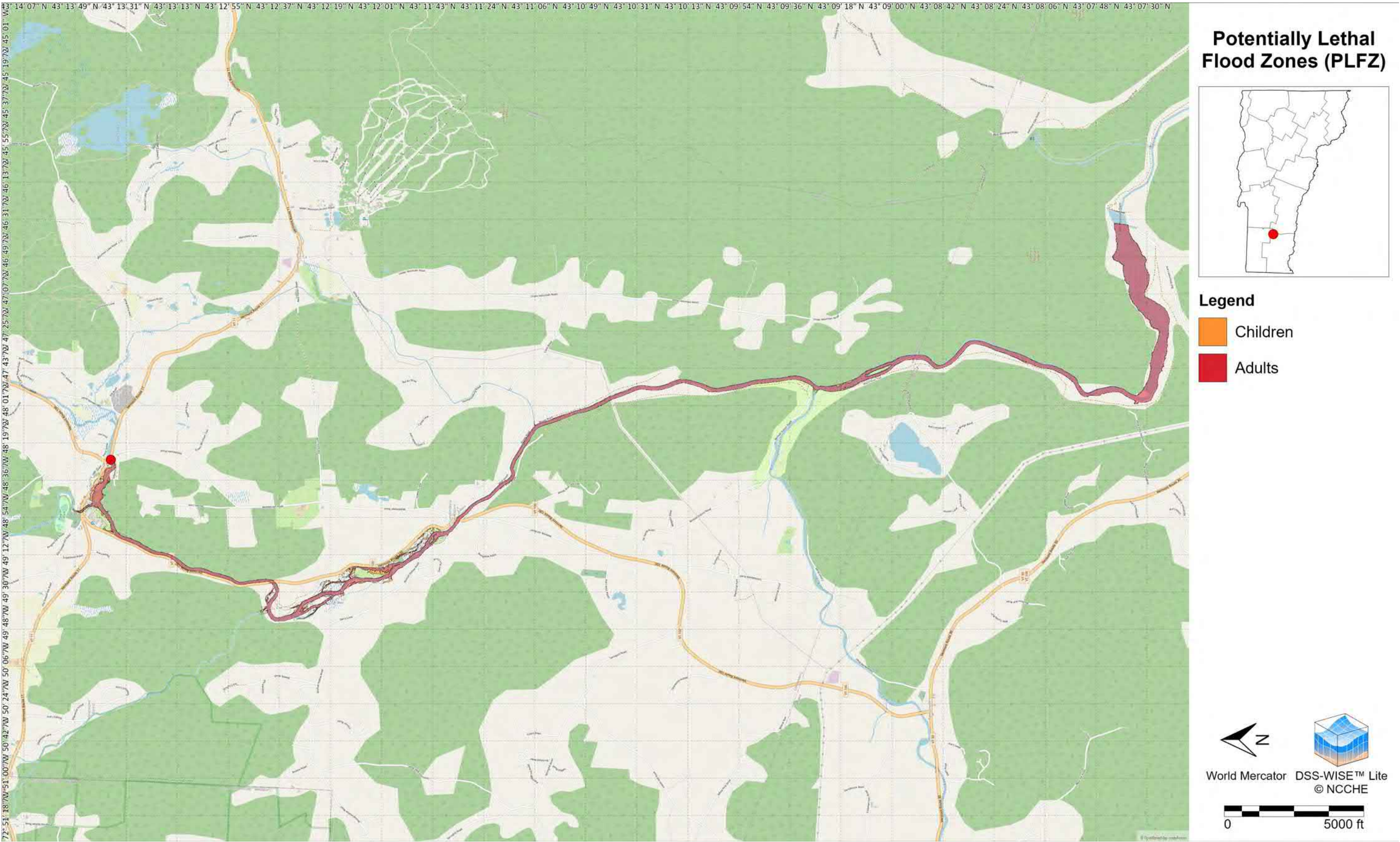
Map 09: Potential Flood Hazard Level for People Outdoors



Map 10: Potential Flood Hazard Level for People Indoors



Map 11: Potential Lethal Flood Zones (PLFZ)

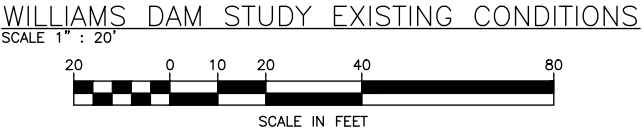


Appendix F

Alternative Conceptual Plans



DATUM:
VERTICAL: NAVD 88 GPS DERIVED
HORIZONTAL: NAD 83 GPS DERIVED



DuBois & King
6 GREEN TREE DR.
S. BURLINGTON, VT 05401
TEL: (802) 728-3376
FAX: (866) 783-7101
www.dubois-king.com

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PROFESSIONAL SEAL

**NOT FOR
CONSTRUCTION**

NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF
LONDONDERRY
100 OLD SCHOOL
STREET
S. LONDONDERRY,
VT 05155

WILLIAMS DAM
STUDY (#115.01)
LONDONDERRY, VT

SHEET TITLE

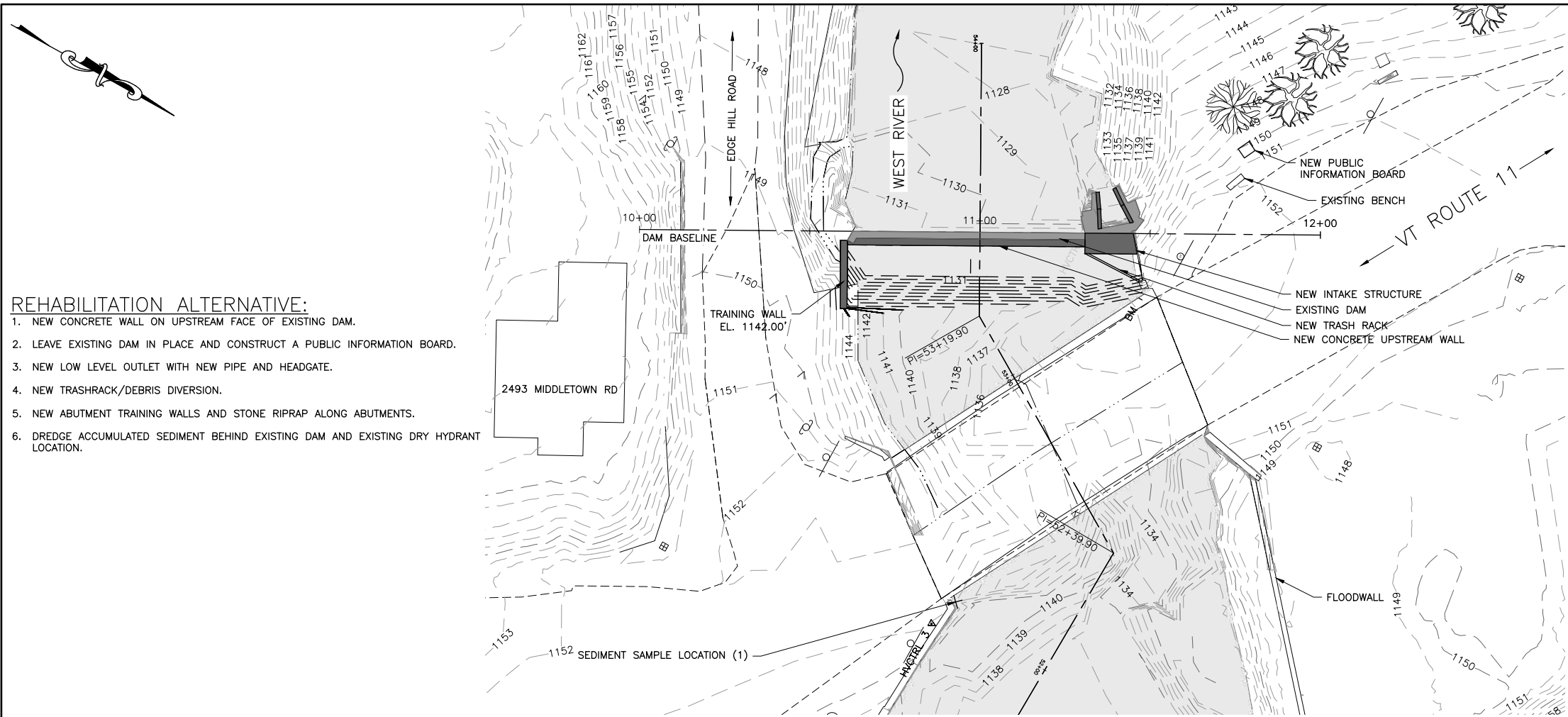
EXISTING
CONDITIONS SITE
PLAN

DRAWN BY RJL	DATE PROGRESS
CHECKED BY CWJ	D&K PROJECT # 827442
PROJ. ENG. CWJ	

SHEET NUMBER

1
SHEET 1 OF 9

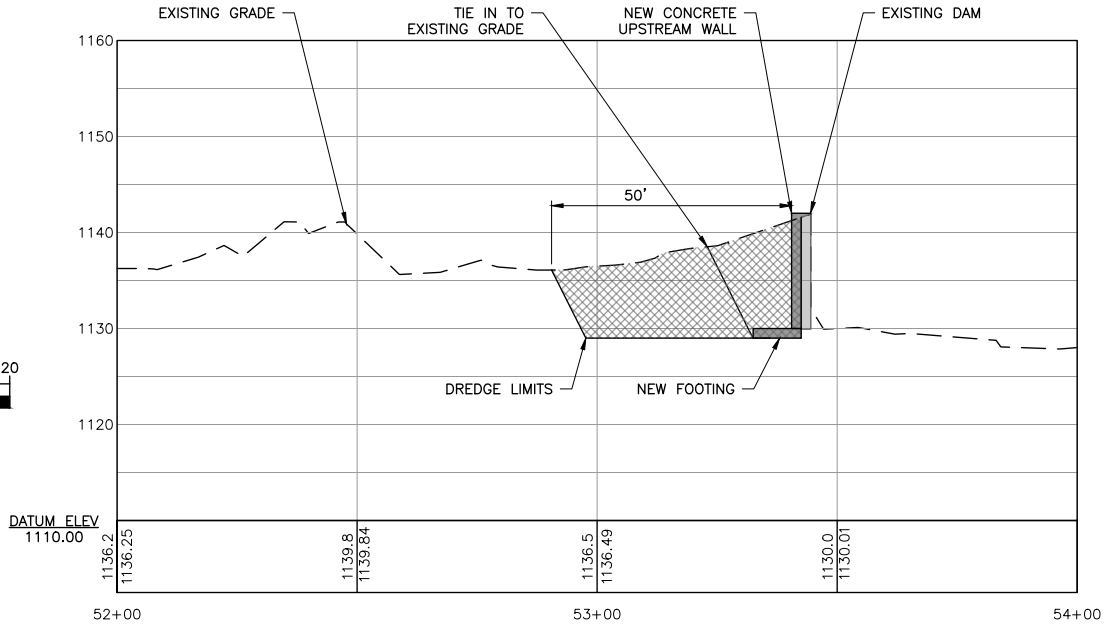
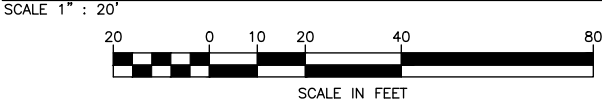
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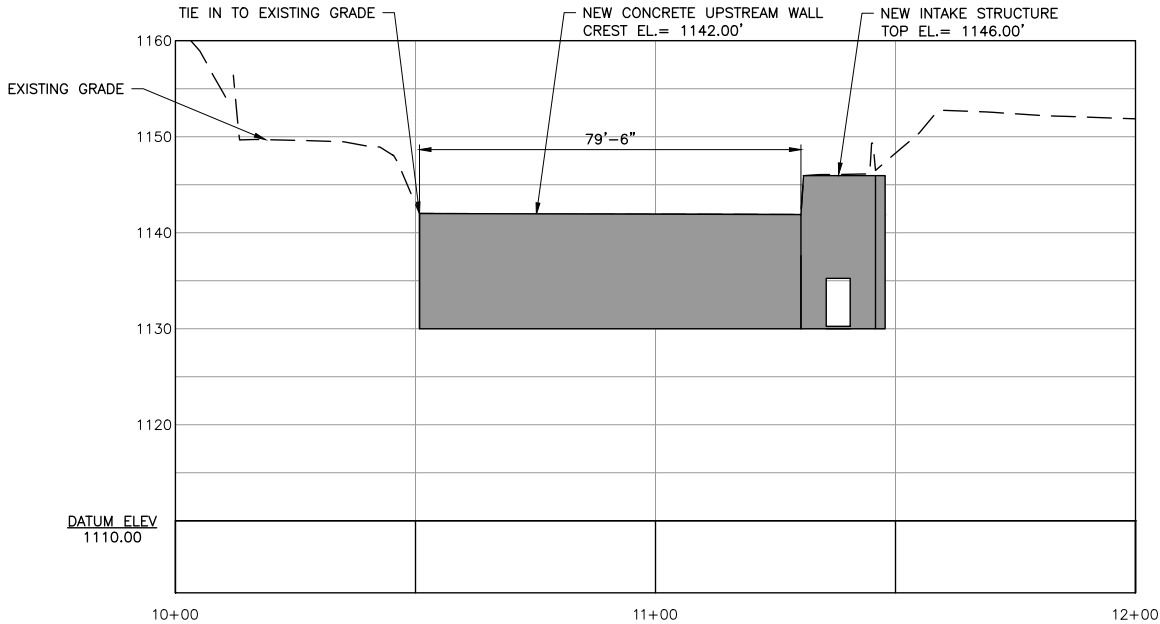
REHABILITATION ALTERNATIVE:

1. NEW CONCRETE WALL ON UPSTREAM FACE OF EXISTING DAM.
2. LEAVE EXISTING DAM IN PLACE AND CONSTRUCT A PUBLIC INFORMATION BOARD.
3. NEW LOW LEVEL OUTLET WITH NEW PIPE AND HEADGATE.
4. NEW TRASHRACK/DEBRIS DIVERSION.
5. NEW ABUTMENT TRAINING WALLS AND STONE RIPRAP ALONG ABUTMENTS.
6. DREDGE ACCUMULATED SEDIMENT BEHIND EXISTING DAM AND EXISTING DRY HYDRANT LOCATION.

CONCEPTUAL ALTERNATIVE DAM REHABILITATION



CHANNEL BASELINE PROFILE



DAM BASELINE PROFILE

DATUM:
VERTICAL: NAVD 88 GPS DERIVED
HORIZONTAL: NAD 83 GPS DERIVED

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NOT FOR
CONSTRUCTION

NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF
LONDONDERRY
100 OLD SCHOOL
STREET
S. LONDONDERRY,
VT 05155

WILLIAMS DAM
STUDY (#115.01)
LONDONDERRY, VT

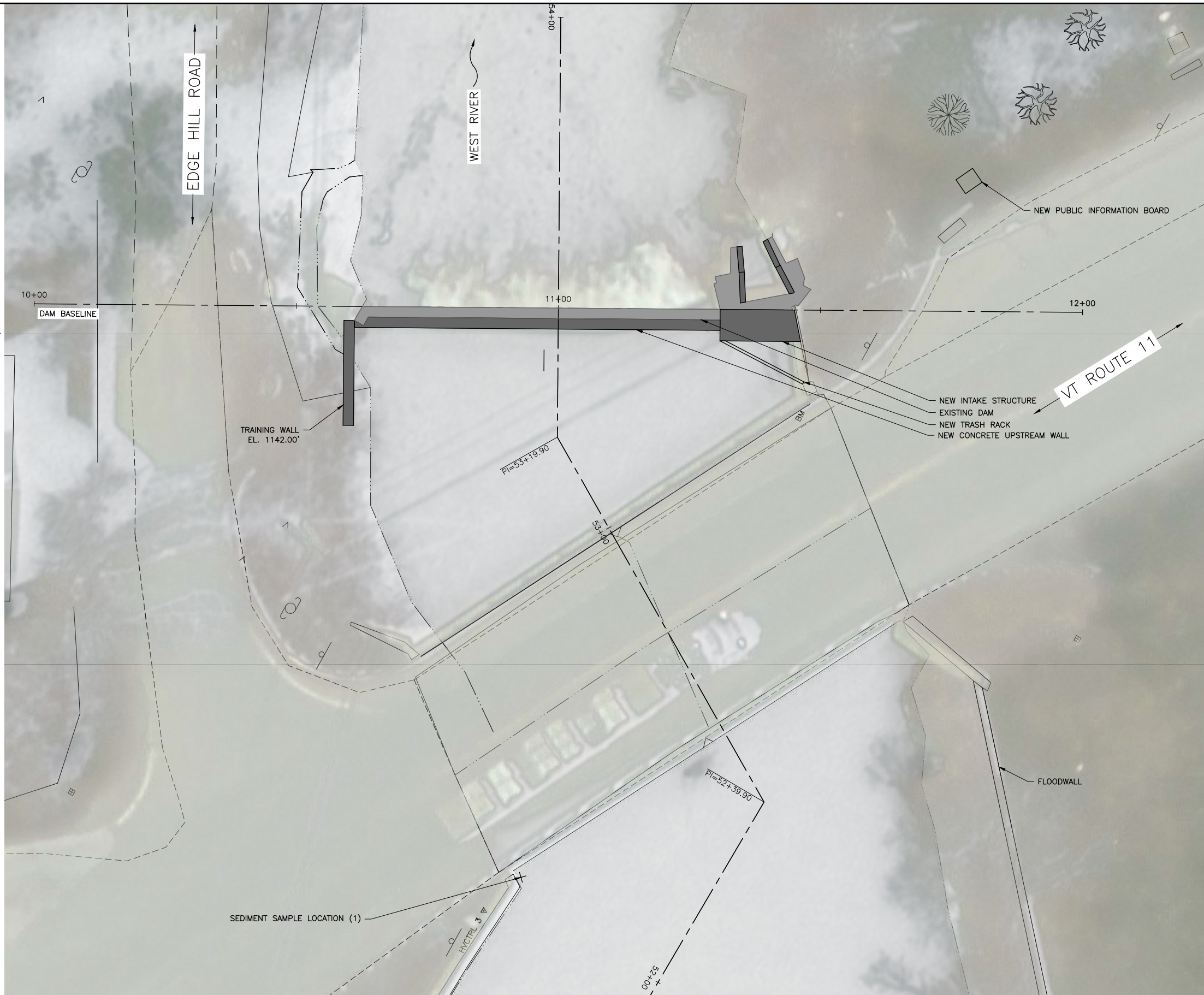
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CONCEPTUAL
ALTERNATIVE DAM
REHABILITATION

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CHECKED BY CWJ	D&K PROJECT # 827442
PROJ. ENG. CWJ	

SHEET NUMBER
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SHEET 2 OF 9

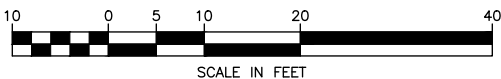


1. NEW CONCRETE WALL ON UPSTREAM FACE OF EXISTING DAM.
2. LEAVE EXISTING DAM IN PLACE AND CONSTRUCT A PUBLIC INFORMATION BOARD.
3. NEW LOW LEVEL OUTLET WITH NEW PIPE AND HEADGATE.
4. NEW TRASHRACK/DEBRIS DIVERSION.
5. NEW ABUTMENT TRAINING WALLS AND STONE RIPRAP ALONG ABUTMENTS.
6. DREDGE ACCUMULATED SEDIMENT BEHIND EXISTING DAM AND EXISTING DRY HYDRANT LOCATION.



DATUM:
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CONCEPTUAL ALTERNATIVE DAM REHABILITATION
SCALE 1" : 10'



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WILLIAMS DAM
STUDY (#115.01)

LONDONDERRY, VT

SHEET TITLE

DAM
REHABILITATION
ORTHOIMAGERY

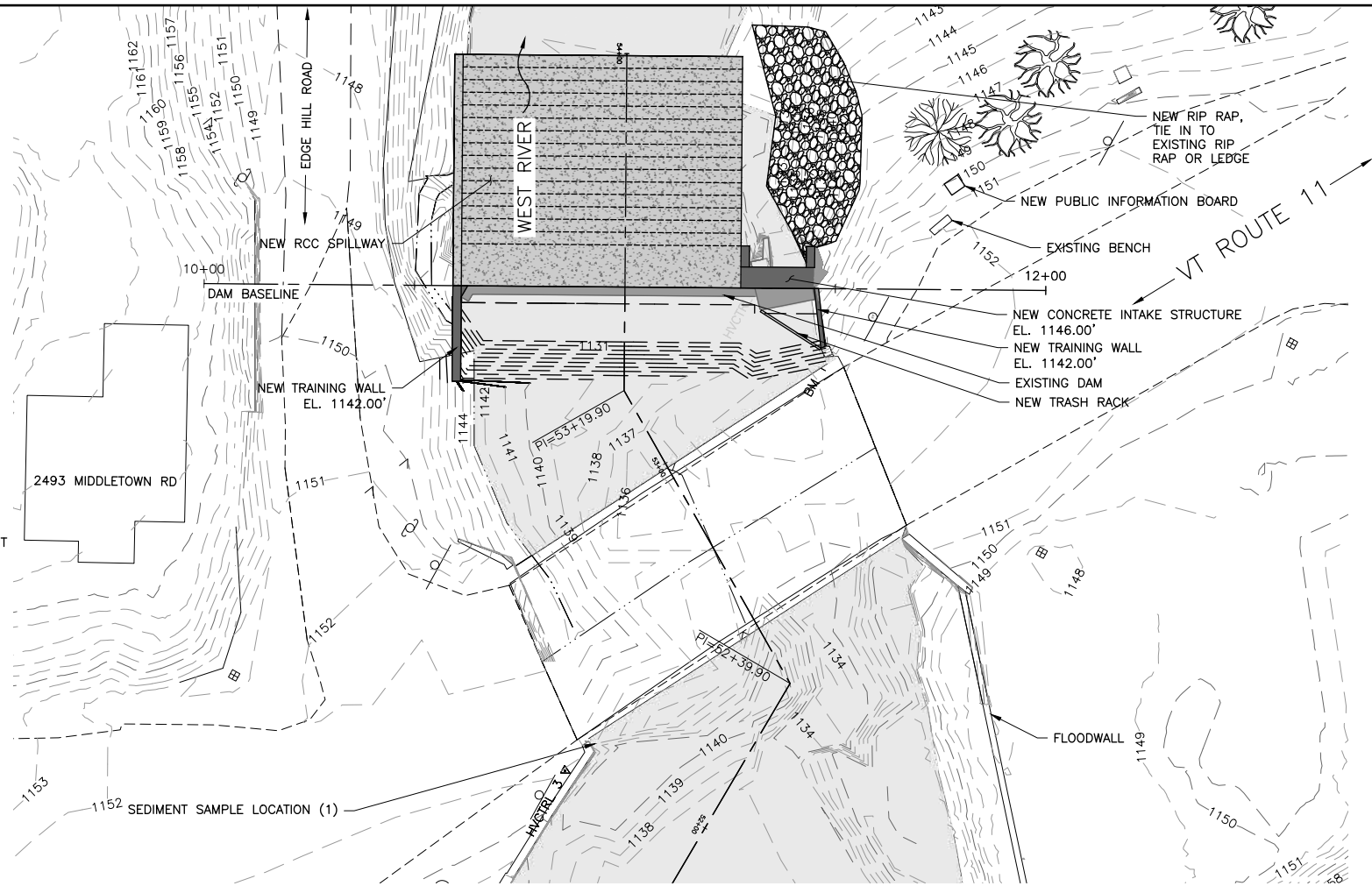
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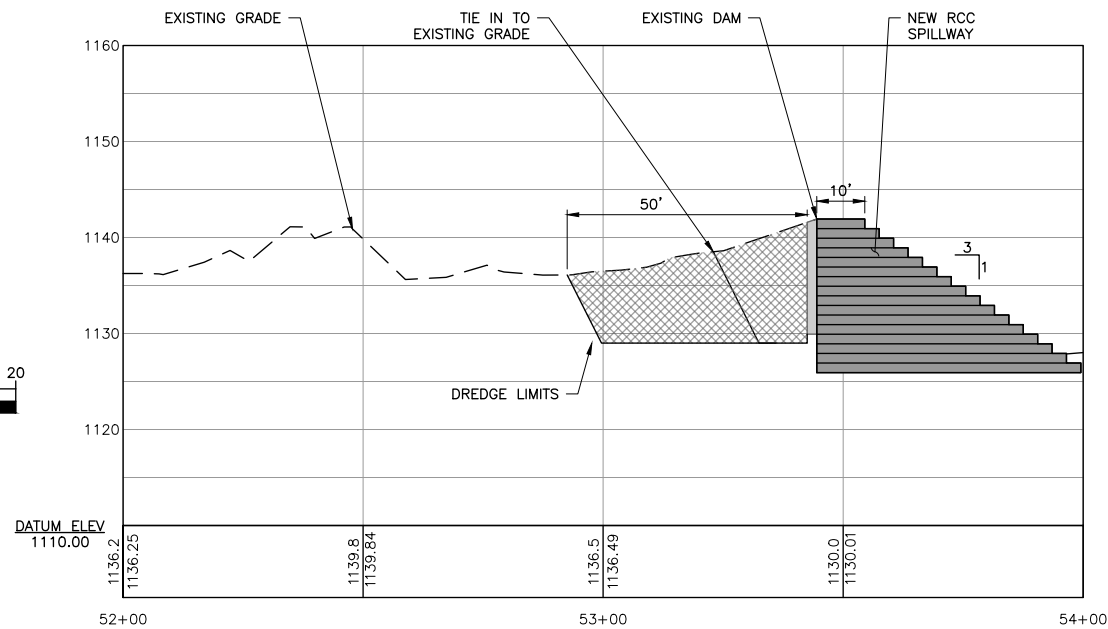
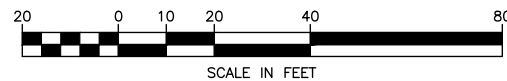
REHABILITATION (B) ALTERNATIVE:

1. NEW CONCRETE WALL ON UPSTREAM FACE OF EXISTING DAM.
2. LEAVE EXISTING DAM IN PLACE AND CONSTRUCT A PUBLIC INFORMATION BOARD.
3. NEW LOW LEVEL OUTLET WITH NEW PIPE AND HEADGATE.
4. NEW TRASHRACK/DEBRIS DIVERSION.
5. NEW ABUTMENT TRAINING WALLS AND STONE RIPRAP ALONG ABUTMENTS.
6. DREDGE ACCUMULATED SEDIMENT BEHIND EXISTING DAM AND EXISTING DRY HYDRANT LOCATION.

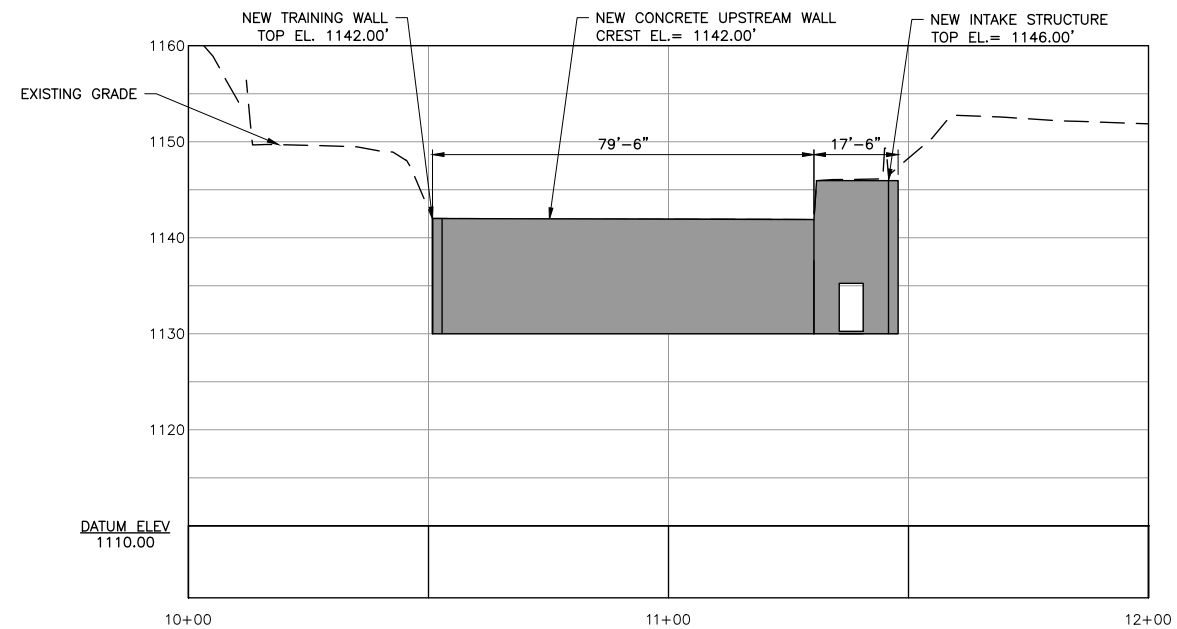


CONCEPTUAL ALTERNATIVE DAM REHABILITATION (B)

SCALE 1" = 20'



CHANNEL BASELINE PROFILE



DAM BASELINE PROFILE

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DATUM:
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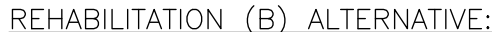
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100 OLD SCHOOL
STREET
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VT 05155

WILLIAMS DAM
STUDY (#115.01)
LONDONDERRY, VT

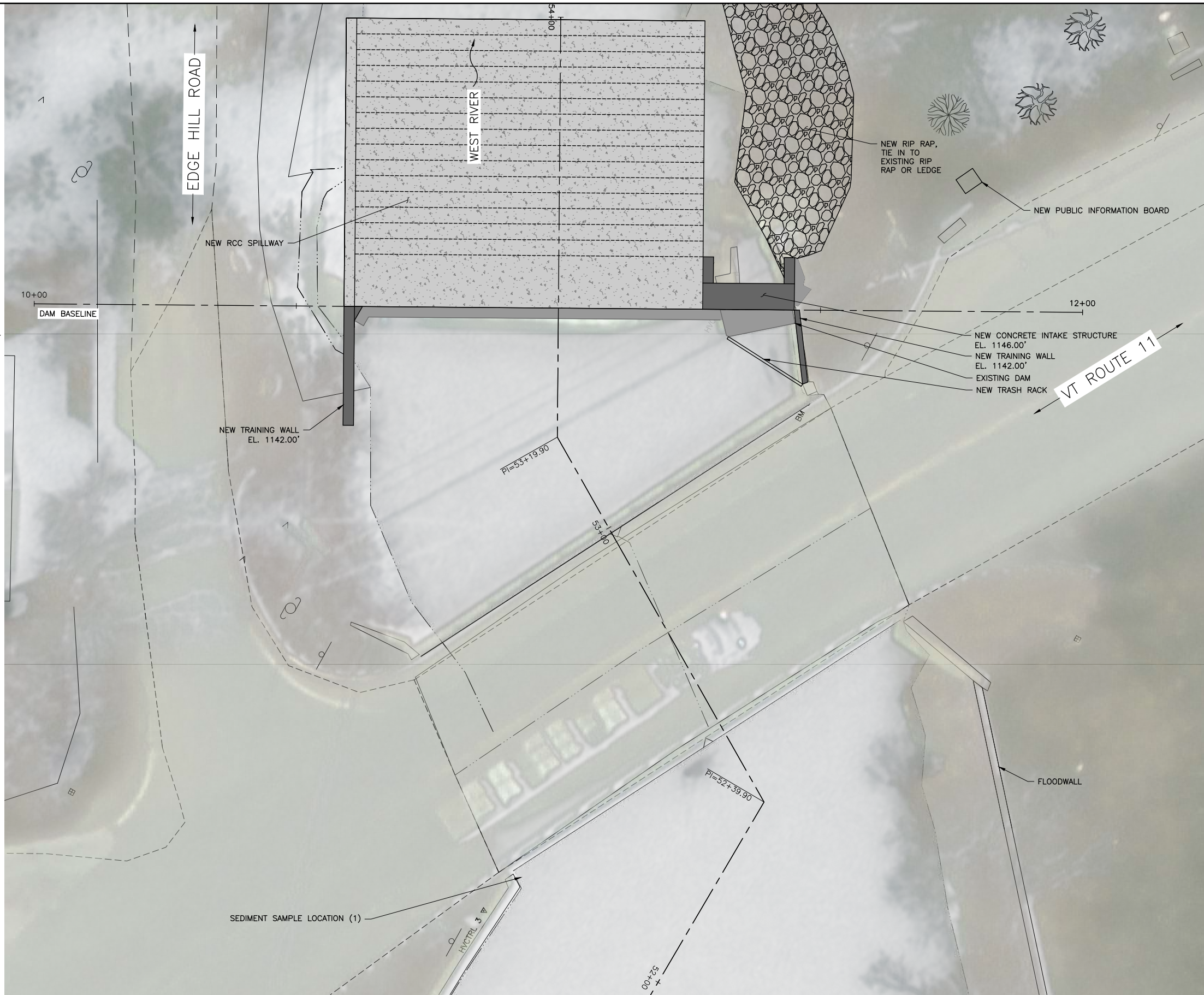
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CONCEPTUAL
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REHABILITATION (B)

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CHECKED BY CWJ	D&K PROJECT # 827442
PROJ. ENG. CWJ	

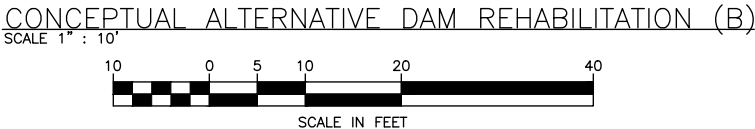
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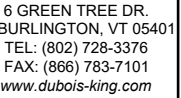
1. NEW CONCRETE WALL ON UPSTREAM FACE OF EXISTING DAM.
2. LEAVE EXISTING DAM IN PLACE AND CONSTRUCT A PUBLIC INFORMATION BOARD.
3. NEW LOW LEVEL OUTLET WITH NEW PIPE AND HEADGATE.
4. NEW TRASHRACK/DEBRIS DIVERSION.
5. NEW ABUTMENT TRAINING WALLS AND STONE RIPRAP ALONG ABUTMENTS.
6. DREDGE ACCUMULATED SEDIMENT BEHIND EXISTING DAM AND EXISTING DRY HYDRANT LOCATION.



DATUM:
VERTICAL: NAVD 88 GPS DERIVED
HORIZONTAL: NAD 83 GPS DERIVED



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WILLIAMS DAM STUDY (#115.01)									
LONDONDERRY, VT									
SHEET TITLE									
DAM REHABILITATION (B) ORTHOIMAGERY									
DRAWN BY RJL				DATE PROGRESS					
CHECKED BY CWJ				D&K PROJECT # 827442					
PROJ. ENG. CWJ									
SHEET NUMBER									
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SHEET 5 OF 9									



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VT 05155

WILLIAMS DAM
STUDY (#115.01)

DONDERRY, VT

SHEET TITLE

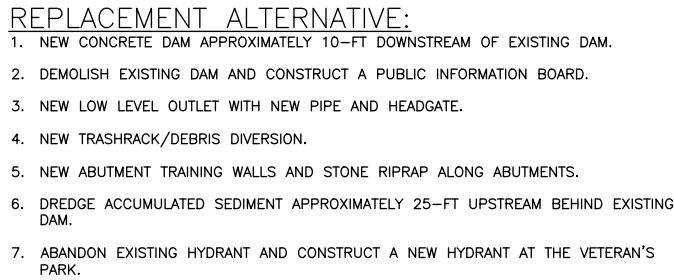
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ALTERNATIVE
DAM
REPLACEMENT

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BY J. ENG. CWJ	

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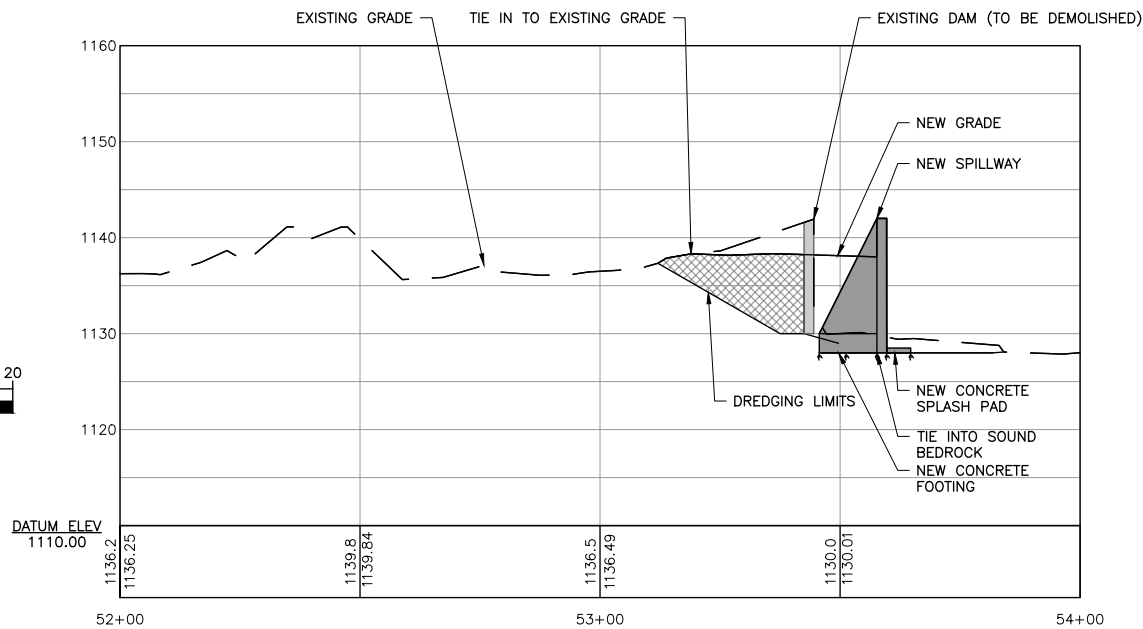
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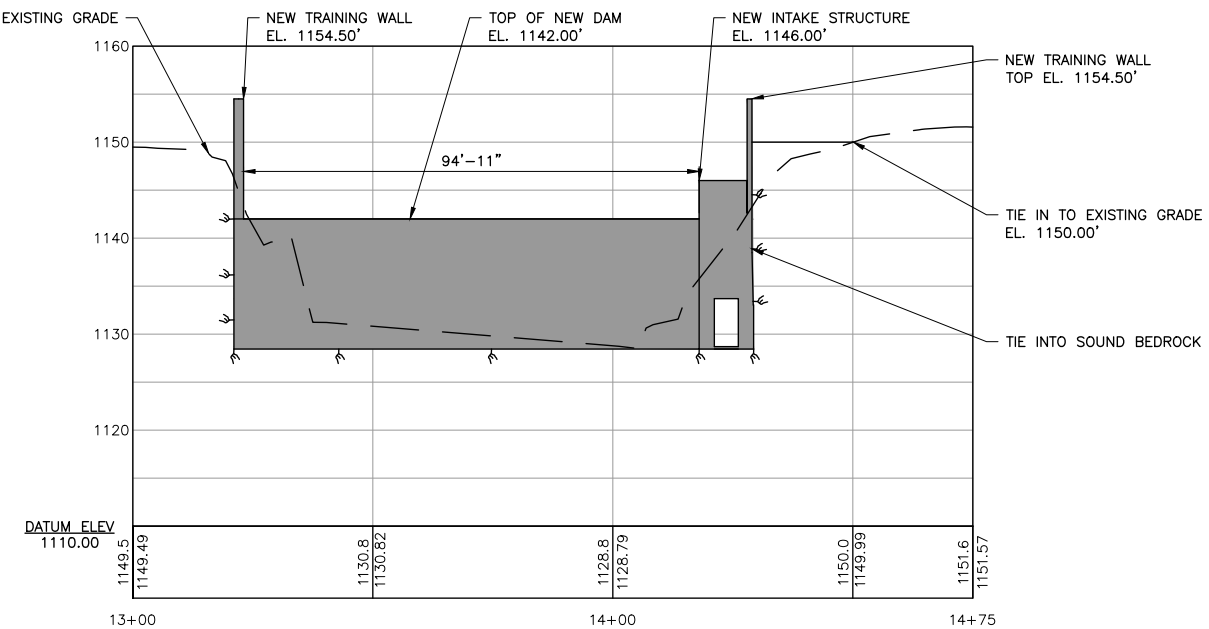


CONCEPTUAL ALTERNATIVE DAM REPLACEMENT

SCALE 1" : 20'



CHANNEL BASELINE PROFILE



PROPOSED DAM BASELINE PROFILE

DATUM:	
VERTICAL:	NAVD 88 GPS DERIVED
HORIZONTAL:	NAD 83 GPS DERIVED

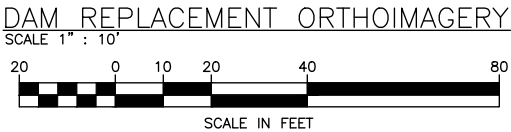
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1. NEW CONCRETE DAM APPROXIMATELY 10-FT DOWNSTREAM OF EXISTING DAM.
2. DEMOLISH EXISTING DAM AND CONSTRUCT A PUBLIC INFORMATION BOARD.
3. NEW LOW LEVEL OUTLET WITH NEW PIPE AND HEADGATE.
4. NEW TRASHRACK/DEBRIS DIVERSION.
5. NEW ABUTMENT TRAINING WALLS AND STONE RIPRAP ALONG ABUTMENTS.
6. DREDGE ACCUMULATED SEDIMENT APPROXIMATELY 25-FT UPSTREAM BEHIND EXISTING DAM.
7. ABANDON EXISTING HYDRANT AND CONSTRUCT A NEW HYDRANT AT THE VETERAN'S PARK.



DATUM:	
VERTICAL:	NAVD 88 GPS DERIVED
HORIZONTAL:	NAD 83 GPS DERIVED



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WILLIAMS DAM
STUDY (#115.01)
LONDONDERRY, VT

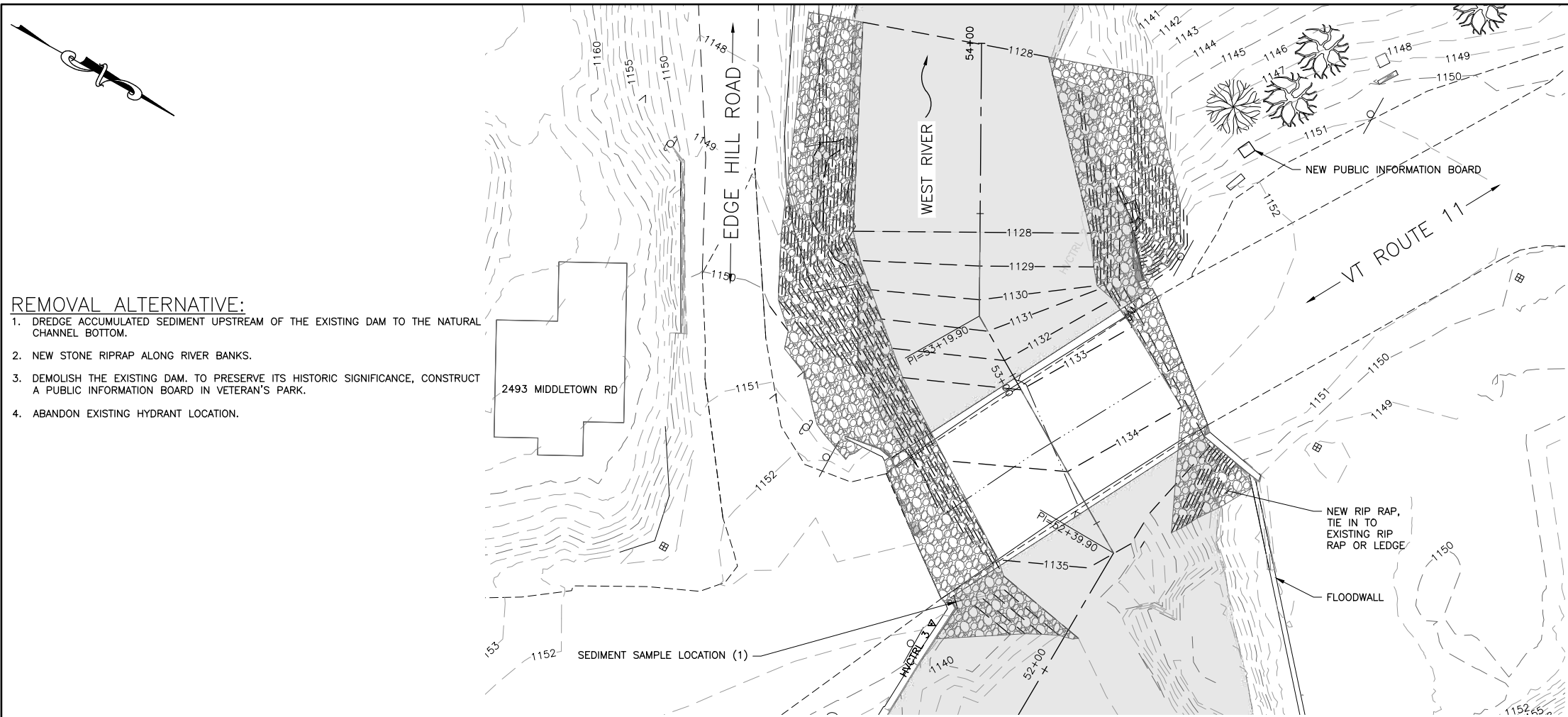
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DAM
REPLACEMENT
ORTHOIMAGERY

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PROJ. ENG. CWJ	

SHEET NUMBER
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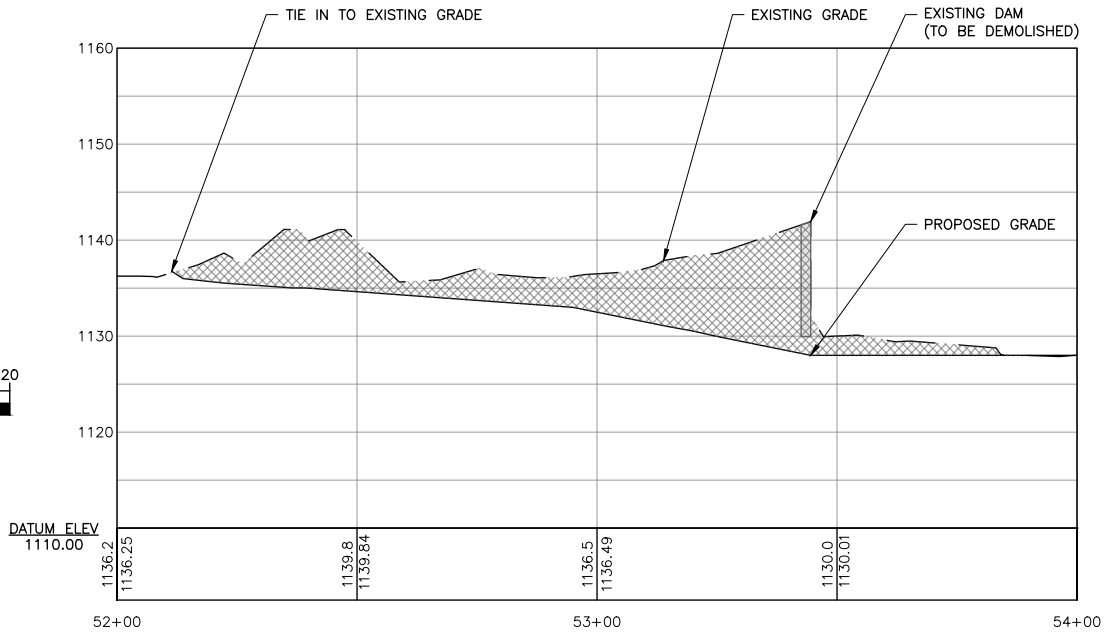
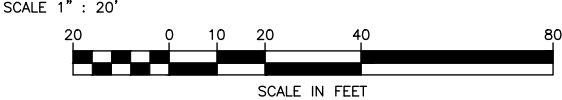
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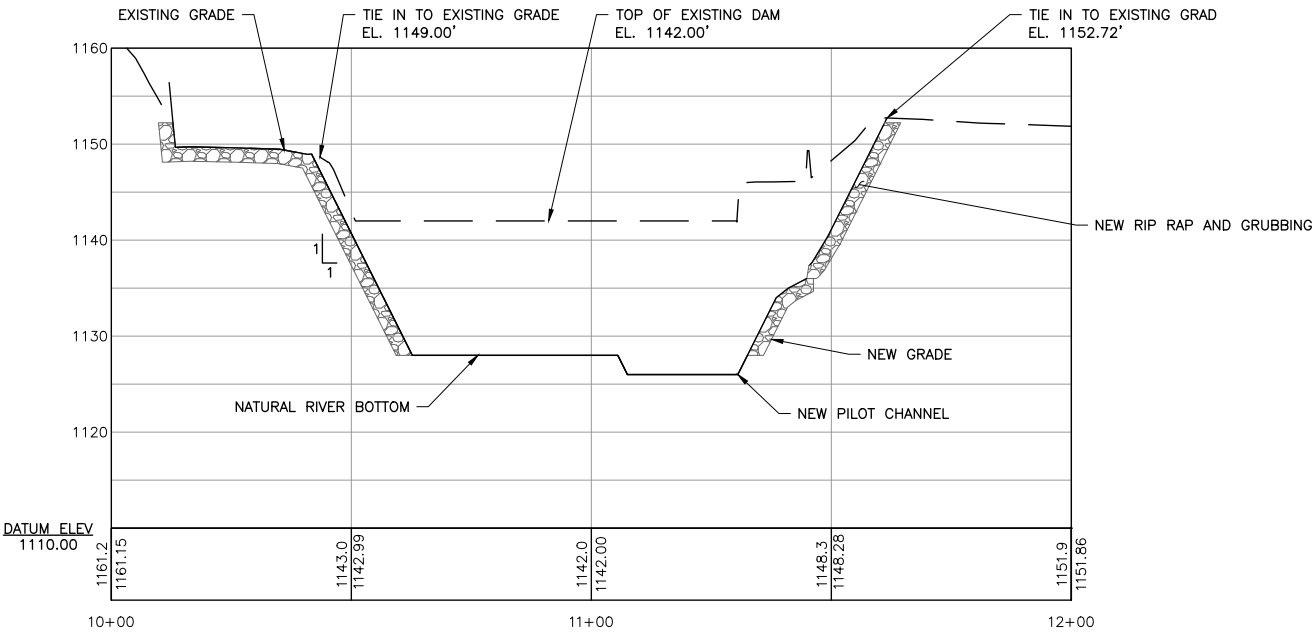
REMOVAL ALTERNATIVE:

1. DREDGE ACCUMULATED SEDIMENT UPSTREAM OF THE EXISTING DAM TO THE NATURAL CHANNEL BOTTOM.
2. NEW STONE RIPRAP ALONG RIVER BANKS.
3. DEMOLISH THE EXISTING DAM. TO PRESERVE ITS HISTORIC SIGNIFICANCE, CONSTRUCT A PUBLIC INFORMATION BOARD IN VETERAN'S PARK.
4. ABANDON EXISTING HYDRANT LOCATION.

CONCEPTUAL ALTERNATIVE DAM REMOVAL



CHANNEL BASELINE PROFILE



RIVER CHANNEL SECTION

DATUM:
VERTICAL: NAVD 88 GPS DERIVED
HORIZONTAL: NAD 83 GPS DERIVED

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VT 05155

WILLIAMS DAM
STUDY (#115.01)
LONDONDERRY, VT

SHEET TITLE
**CONCEPTUAL
ALTERNATIVE
DAM REMOVAL**

DRAWN BY: RJL
CHECKED BY: CWJ
DATE: PROGRESS
D&K PROJECT #: 827442

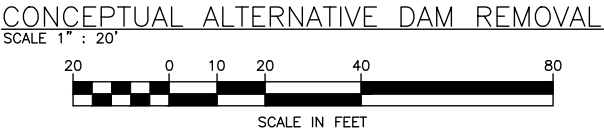
SHEET NUMBER
8
SHEET 8 OF 9

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REMOVAL ALTERNATIVE:

1. DREDGE ACCUMULATED SEDIMENT UPSTREAM OF THE EXISTING DAM TO THE NATURAL CHANNEL BOTTOM.
2. NEW STONE RIPRAP ALONG RIVER BANKS.
3. DEMOLISH THE EXISTING DAM. TO PRESERVE ITS HISTORIC SIGNIFICANCE, CONSTRUCT A PUBLIC INFORMATION BOARD IN VETERAN'S PARK.
4. ABANDON EXISTING HYDRANT LOCATION.

DATUM:
VERTICAL: NAVD 88 GPS DERIVED
HORIZONTAL: NAD 83 GPS DERIVED



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WILLIAMS DAM STUDY (#115.01)
LONDONDERRY, VT

SHEET TITLE
DAM REMOVAL
ORTHOIMAGERY

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CHECKED BY	D&K PROJECT # 827442
PROJ. ENG. CWJ	

SHEET NUMBER
9
SHEET 9 OF 9

Appendix G

Alternative Opinion of Probable Construction Costs



**Town of Londonderry
William's Dam Study**

**Conceptual Alternative: Dam Rehabilitation
Opinion of Probable Construction Costs**

ITEM NO.	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
DAM REHABILITATION					
1	Upstream CIP Concrete Wall	CY	200	\$ 1,800.00	\$ 360,000.00
2	Sediment Excavation	CY	950	\$ 18.00	\$ 17,100.00
3	Sediment Haul	CY	950	\$ 22.00	\$ 20,900.00
DAM REPLACEMENT SUBTOTAL					\$ 398,000
CHANNEL RESTORATION					
4	Silt Fencing	LF	120	\$ 4.10	\$ 492.00
5	Engineered Log Jams	EA	3	\$ 5,000.00	\$ 15,000.00
6	Channel Vegetation (Seed/mulch)	LS	1	\$ 5,000.00	\$ 5,000.00
7	Topsoil	CY	25	\$ 35.40	\$ 885.00
8	Seed	LB	5	\$ 8.73	\$ 43.65
9	Fertilizer	LB	10	\$ 3.83	\$ 38.30
10	Hay Mulch	TON	1	\$ 857.35	\$ 857.35
11	Grubbing Material	SY	20	\$ 3.83	\$ 76.60
CHANNEL RESTORATION SUBTOTAL					\$ 22,392.90
ADDITIONAL ITEMS					
13	Survey Layout	DAY	1	\$ 2,000.00	\$ 2,000.00
14	Stabilized Construction Entrance	CY	50	\$ 52.52	\$ 2,626.00
15	Inlet Protection Device, Type 1	EA	3	\$ 171.67	\$ 515.01
16	Rolled Erosion Control Product	SY	100	\$ 1.66	\$ 166.00
17	Reset Roadway Signs	EA	1	\$ 27.14	\$ 27.14
18	Remove and Reset Roadway Lighting	EA	1	\$ 1,000.00	\$ 1,000.00
ADDITIONAL ITEMS SUBTOTAL					\$ 6,334
GENERAL					
19	Mobilization (10% of Construction Costs)	LS	1	\$ 43,000.00	\$ 43,000.00
20	EPSC (5% of Construction Costs)	LS	1	\$ 22,000.00	\$ 22,000.00
21	Traffic Control (10% of Construction Costs)	LS	1	\$ 43,000.00	\$ 43,000.00
22	Control of Water (20% of Construction Costs)	LS	1	\$ 86,000.00	\$ 86,000.00
GENERAL SUBTOTAL					\$ 194,000.00
CONSTRUCTION ITEMS SUB-TOTAL (rounded to nearest \$1,000) = \$621,000 30% CONTINGENCY = \$187,000 TOTAL CONSTRUCTION COST = \$808,000					



**Town of Londonderry
William's Dam Study**

**Conceptual Alternative: Dam Rehabilitation (B)
Opinion of Probable Construction Costs**

ITEM NO.	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
DAM REHABILITATION					
1	ROLLER COMPACTED CONCRETE	CY	740	\$ 200	\$ 148,000
2	STRUCTURAL CONCRETE	CY	90	\$ 1,800	\$ 162,000
2	Sediment Excavation	CY	600	\$ 10	\$ 6,000
3	Sediment Haul	CY	600	\$ 20	\$ 12,000
DAM REPLACEMENT SUBTOTAL					\$ 328,000
CHANNEL RESTORATION					
4	Silt Fencing	LF	12	\$ 4	\$ 49
5	Engineered Log Jams	EA	3	\$ 5,000	\$ 15,000
6	Channel Vegetation (Seed/mulch)	LS	1	\$ 5,000	\$ 5,000
7	Topsoil	CY	25	\$ 35	\$ 885
8	Seed	LB	5	\$ 9	\$ 44
9	Fertilizer	LB	10	\$ 4	\$ 38
10	Hay Mulch	TON	1	\$ 857	\$ 857
11	Grubbing Material	SY	20	\$ 4	\$ 77
CHANNEL RESTORATION SUBTOTAL					\$ 21,950
ADDITIONAL ITEMS					
13	Survey Layout	DAY	1	\$ 2,000	\$ 2,000
14	Stabilized Construction Entrance	CY	30	\$ 53	\$ 1,576
15	Inlet Protection Device, Type 1	EA	3	\$ 172	\$ 515
16	Rolled Erosion Control Product	SY	200	\$ 2	\$ 332
17	Reset Roadway Signs	EA	2	\$ 27	\$ 54
18	Remove and Reset Roadway Lighting	EA	2	\$ 1,000	\$ 2,000
ADDITIONAL ITEMS SUBTOTAL					\$ 6,477
GENERAL					
19	Mobilization (Assume 10% of Construction Costs)	LS	1	\$ 36,000	\$ 36,000
20	EPSC (5% of Construction Costs)	LS	1	\$ 18,000	\$ 18,000
21	Traffic Control (10% of Construction Costs)	LS	1	\$ 36,000	\$ 36,000
22	Control of Water (20% of Construction Costs)	LS	1	\$ 72,000	\$ 72,000
GENERAL SUBTOTAL					\$ 162,000
CONSTRUCTION ITEMS SUB-TOTAL (rounded to nearest \$1,000)					= \$ 519,000
30% CONTINGENCY					= \$ 156,000
TOTAL CONSTRUCTION COST					= \$ 675,000



**Town of Londonderry
William's Dam Study**

**Conceptual Alternative: Dam Replacement
Opinion of Probable Construction Costs**

ITEM NO.	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
DAM REPLACEMENT					
1	CONCRETE CLASS A	CY	290	\$ 1,800.00	\$ 522,000
2	Sediment Excavation	CY	950	\$ 18.00	\$ 17,100
3	Sediment Haul	CY	950	\$ 22.00	\$ 20,900
DAM REPLACEMENT SUBTOTAL					\$ 560,000
DAM REMOVAL					
4	Concrete Demolition	CY	175	\$ 23.82	\$ 4,169
5	Rock Excavation	CY	225	\$ 40.68	\$ 9,153
DAM REMOVAL SUBTOTAL					\$ 13,322
CHANNEL RESTORATION					
6	Silt Fencing	LF	310	\$ 4.10	\$ 1,271
7	Engineered Log Jams	EA	3	\$ 5,000.00	\$ 15,000
8	Riprap, Heavy Type	CY	260	\$ 63.13	\$ 16,414
9	Channel Vegetation (Seed/mulch)	LS	1	\$ 5,000.00	\$ 5,000
10	Topsoil	CY	70	\$ 35.40	\$ 2,478
11	Seed	LB	10	\$ 8.73	\$ 87
12	Fertilizer	LB	20	\$ 3.83	\$ 77
13	Hay Mulch	TON	1	\$ 857.35	\$ 857
14	Grubbing Material	SY	130	\$ 3.83	\$ 498
CHANNEL RESTORATION SUBTOTAL					\$ 41,682
ADDITIONAL ITEMS					
15	Survey Layout	DAY	1	\$ 2,000.00	\$ 2,000
16	Stabilized Construction Entrance	CY	50	\$ 52.52	\$ 2,626
17	Inlet Protection Device, Type 1	EA	3	\$ 171.67	\$ 515
18	Rolled Erosion Control Product	SY	200	\$ 1.66	\$ 332
19	Reset Roadway Signs	EA	2	\$ 27.14	\$ 54
20	Dry Hydrant System	LS	1	\$ 5,000.00	\$ 5,000
20	Remove and Reset Roadway Lighting	EA	2	\$ 1,000.00	\$ 2,000
ADDITIONAL ITEMS SUBTOTAL					\$ 12,527
GENERAL					
21	Mobilization (10% of Construction Costs)	LS	1	\$ 63,000.00	\$ 63,000
22	EPSC (5% of Construction Costs)	LS	1	\$ 32,000.00	\$ 32,000
23	Traffic Control (10% of Construction Costs)	LS	1	\$ 63,000.00	\$ 63,000
24	Control of Water (20% of Construction Costs)	LS	1	\$ 126,000.00	\$ 126,000
GENERAL SUBTOTAL					\$ 284,000
CONSTRUCTION ITEMS SUB-TOTAL (rounded to nearest \$1,000)				=	\$ 912,000
30% CONTINGENCY				=	\$ 274,000
TOTAL CONSTRUCTION COST				=	\$ 1,186,000



**Town of Londonderry
William's Dam Study**

**Conceptual Alternative: Dam Removal
Opinion of Probable Construction Costs**

ITEM NO.	DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT COST	TOTAL
DAM REMOVAL					
1	Concrete Demolition	CY	170	\$ 23.82	\$ 4,049.40
2	Rock Excavation	CY	210	\$ 40.68	\$ 8,542.80
DAM REMOVAL SUBTOTAL					\$ 12,592
CHANNEL RESTORATION					
3	Sediment Excavation	CY	3,000	\$ 18.00	\$ 54,000.00
4	Sediment Haul	CY	3,000	\$ 22.00	\$ 66,000.00
5	Silt Fence	LF	420	\$ 4.10	\$ 1,722.00
6	Riprap, Heavy Type	CY	260	\$ 63.13	\$ 16,413.80
7	Engineered Log Jams	EA	3	\$ 5,000.00	\$ 15,000.00
8	Channel Vegetation (Seed/mulch)	LS	1	\$ 5,000.00	\$ 5,000.00
9	Topsoil	CY	40	\$ 35.40	\$ 1,416.00
10	Seed	LB	10	\$ 8.73	\$ 87.30
11	Fertilizer	LB	30	\$ 3.83	\$ 114.90
12	Hay Mulch	TON	1	\$ 857.35	\$ 857.35
13	Grubbing Material	SY	400	\$ 3.83	\$ 1,532.00
CHANNEL RESTORATION SUBTOTAL					\$ 162,143.35
ADDITIONAL ITEMS					
14	Survey Layout	DAY	1	\$ 2,000.00	\$ 2,000.00
15	Stabilized Construction Entrance	SY	110	\$ 52.52	\$ 5,777.20
16	Stabilized Construction Entrance	CY	110	\$ 52.52	\$ 5,777.20
17	Rolled Erosion Control Product	SY	250	\$ 1.66	\$ 415.00
18	Reset Roadway Signs	EA	3	\$ 27.14	\$ 81.42
19	Remove and Reset Roadway Lighting	EA	2	\$ 1,000.00	\$ 2,000.00
ADDITIONAL ITEMS SUBTOTAL					\$ 16,051
GENERAL					
20	Mobilization (10% of Construction Costs)	LS	1	\$ 20,000.00	\$ 20,000.00
21	EPSC (5% of Construction Costs)	LS	1	\$ 10,000.00	\$ 10,000.00
22	Traffic Control (10% of Construction Costs)	LS	1	\$ 20,000.00	\$ 20,000.00
23	Control of Water (20% of Construction Costs)	LS	1	\$ 39,000.00	\$ 39,000.00
GENERAL SUBTOTAL					\$ 89,000.00

CONSTRUCTION ITEMS SUB-TOTAL (rounded to nearest \$1,000)	=	\$280,000
30% CONTINGENCY	=	\$84,000
TOTAL CONSTRUCTION COST	=	\$364,000

Appendix H

Alternative Permitting Information Sheets



State of Vermont
PERMIT AND LICENSE INFORMATION

DAMS

**SUMMARY
DESCRIPTION
OF PERMIT**

A permit is required to ensure that the construction, reconstruction, alteration or removal of dams is carried out to serve the public good and provide adequately for the public safety.

Owners of dams capable of impounding more than 500,000 cubic feet of water are responsible for the payment of the **annual fee**, based on the hazard class of the dam: low hazard dams \$200/year, significant hazard dams \$350/year, and high hazard dams \$1,000/year.

**EXAMPLE OF
REGULATED
ACTIVITY**

Construction, enlargement, raising, lowering, remodeling, reconstruction, breaching or otherwise altering any dam, pond or impoundment not related to generation of electric energy for public use or part of a public utility system which is or will be capable of impounding more than 500,000 cubic feet of water or other liquid, as measured to the top of the dam.

**INFORMATION
REQUIRED**

Requires submittal of completed application form, fee, plans and specifications and design data. May require public information meeting [10 VSA Chapter 170](#).

WEB ADDRESS

<http://dec.vermont.gov/facilities-engineering/dam-safety/dam-ownership-and-responsibility/dam-orders>

**ADMINISTERING
AGENCY**

**AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FACILITIES ENGINEERING DIVISION**

CONTACT: Ben Green, P.E. Dam Safety Engineer
802-622-4093 benjamin.green@vermont.gov
Steven Hanna, Dam Safety Engineer
802-490-6123 steven.hanna@vermont.gov

ADDRESS: Facilities Engineering Division
1 National Life Drive
Montpelier, Vermont 05620-3510

AUTHORITY

[10 VSA Chapter 43](#)

**APPLICABLE
RULES**

If dam impounds less than 500,000 cubic feet it may require a [Stream Alteration Permit](#) (10 VSA Chapter 41, Subchapter 2), or [Stream Obstruction Permit](#) (10 VSA Chapter 111, § 4607) (Issued by the Commissioner of Fish and Wildlife). If hydroelectric project, it is regulated under 10 VSA Chapter 43 of the Public Utility Commission. May also require a [Conditional Use Determination](#) under Wetlands Rules and US Army Corps of Engineers permit. See general information about pond construction on [Sheet 32.1](#).

**APPEAL
PROCESS**

Within 30 days of the date of an act or decision, any person aggrieved by an act or decision of the secretary, or any party by right, may appeal to the environmental court in accordance with the provisions of [10 VSA Chapter 220](#).



State of Vermont
PERMIT AND LICENSE INFORMATION

WETLANDS PERMIT

**SUMMARY
DESCRIPTION
OF PROGRAM**

The purpose of this program is to protect significant wetlands in Vermont. The Vermont Wetland Rules establish a three-tier classification system for wetlands.

**EXAMPLE OF
REGULATED
ACTIVITY**

Placement of fill for an access road, land clearing, excavation of ponds. Any activity within the wetland or 50-foot buffer zone.

**CRITERIA FOR
JURISDICTION**

Class I and Class II wetlands are designated significant wetlands based on the function and value they provide. The [Vermont Wetland Rules](#) (VWR) refer to criteria for presuming a wetland is significant under Section 4.6 of the VWR which includes connection to other surface waters, size of a half-acre or more, and mapped wetlands. Classification can be assigned by the Secretary for mapped or unmapped wetlands through a Wetland Determination. Activities that are allowed within the significant wetlands and their adjacent buffer zones are listed in Section 6 of the VWR, provided there is no draining, dredging, filling, grading or alteration of the water flow. All uses that are not allowed uses require either an Individual Wetland Permit or a Vermont Wetland General Permit. If an individual is unsure whether a permit is required, they should contact their District Wetland Ecologist.

**INFORMATION
REQUIRED**

Application forms for permits and determinations are available from the Vermont Wetlands Office, website, and from our website.

WEB ADDRESS

<http://dec.vermont.gov/watershed/wetlands>

FEES

Minimum Application Fee \$240.00 PLUS:

- (A) \$0.75 per square foot of proposed impact to Class I or II wetlands;
- (B) \$0.25 per square foot of proposed impact to Class I or II wetland buffers;
- (C) Maximum fee, for the conversion of Class II wetlands or wetland buffers to cropland use, \$200.00 per application. "Cropland" means land that is used for the production of agricultural crops, including row crops, fibrous plants, pasture, fruit-bearing bushes, trees or vines and the production of Christmas trees;
- (D) Clearing and maintenance of forested wetland corridors for utility lines, pipelines and ski trails: \$0.25 per square foot of proposed impact.

**APPLICATION
TIME FRAME**

The performance standard for processing a complete application is 90 days without a meeting and 120 days with a meeting.

**ADMINISTERING
AGENCY****AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION**

CONTACT: Contact your regional [District Wetlands Ecologist](#)
for site-specific questions
(802) 490-6195
ANR.WSMDWetlands@vermont.gov

ADDRESS: Watershed Management Division
1 National Life Drive, Davis 3
Montpelier, VT 05620-3522

AUTHORITY

10 V.S.A. § 905(a)(7-9) & V.S.A. § 2822(j)(26)

**APPLICABLE
RULES**

[Vermont Wetland Rules](#)
Effective February 23, 1990, and amended April 1, 2017

**APPEAL
PROCESS**

Any person aggrieved by an act or decision of the Secretary may appeal to the Environmental Court within 30 days of the date of the act or decision in accordance with [10 VSA Chapter 220](#) and the Vermont Rules of Environmental Court Proceedings.

**OTHER PERMITS
AND APPROVALS**

Contact a Permit Specialist for a Project Review Sheet, see:
<http://dec.vermont.gov/environmental-assistance/permits>.



State of Vermont
PERMIT AND LICENSE INFORMATION

STREAM ALTERATIONS & CROSSINGS

SUMMARY DESCRIPTION OF PERMIT	This permit regulates the alteration of streams. Regulated activities may be covered under either an individual or general permit. Permit review protects against creation of flood hazards and damage to fish life; protects rights of neighboring landowners; and, with respect to the stream alteration activity, assures compliance with Vermont Water Quality Standards.
EXAMPLE OF REGULATED ACTIVITY	Streambank stabilization, mineral prospecting, municipal roadway improvements requiring instream work, utility crossings under streambeds, municipal or private bridge construction or repair.
CRITERIA FOR JURISDICTION	Movement, excavation or fill of 10 or more cubic yards annually in any perennial stream, or construction or maintenance of a berm in a flood hazard area or river corridor. No person may remove gravel from any watercourse primarily for construction or sale. Exemptions for: emergency protective measures with municipal authorization and reporting and implementation requirements, removal of 50 cubic yards or up to 10 cubic yards in Outstanding Resource Waters annually for riparian landowners with reporting requirements, and Required Agricultural Practices as defined by the Commissioner of Agriculture. Approval required for municipal or private stream crossings on perennial streams.
INFORMATION REQUIRED	Requires specific information regarding project location and extent, adjacent and opposite landowners, working dates, maps/drawings, plans and notification of application to adjoining landowners and the municipality.
WEB ADDRESS	http://dec.vermont.gov/watershed/rivers/river-management
FEES	Individual Permit: \$350.00 (municipalities are not exempt) General Permit: New, repair, or replacement culverts and bridges and restoration projects: \$200.00 (municipalities are not exempt) General Permit: Next flood or emergency protective measures: No Fee
APPLICATION TIME FRAME	The performance standard for processing a complete application is 40 days.

**ADMINISTERING
AGENCY**

**AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION**

Map of the regions served by the River Management Engineers:
http://dec.vermont.gov/sites/dec/files/wsm/rivers/docs/RME_districts.pdf

For Northwestern Vermont:

Chris Brunelle, River Management Engineer
 Essex Regional Office
 Work Cell 802-777-5328: Fax: 802 879-3871
 Email: chris.brunelle@vermont.gov

For Northeastern Vermont:

Patrick Ross, P.E. River Management Engineer
 St. Johnsbury Regional Office
 Work Cell: 802-279-1143 Fax: 802-748-6687
 Email: patrick.ross@vermont.gov

For Central Vermont:

Jaron Borg, River Management Engineer
 Central Montpelier Office
 Work Cell: 802-371-8342 Fax: 802-828-1544
 Email: jaron.borg@vermont.gov

For Southwestern Vermont:

Josh Carvajal, River Management Engineer
 Rutland Regional Office
 Work Cell: 802-490-6163 Fax: 802-786-5915
 Email: joshua.carvajal@vermont.gov

For Southeastern Vermont:

Scott Jensen, River Management Engineer
 Springfield Regional Office
 Work Cell: 802-490-6962 Fax: 802-885-8890
 Email: scott.jensen@vermont.gov

AUTHORITY

10 VSA Chapter 41

**APPEAL
PROCESS**

Effective January 31, 2005, within 30 days of the date of an act or decision, any person aggrieved by an act or decision of the secretary, or any party by right, may appeal to the environmental court in accordance with the provisions of [10 VSA Chapter 220](#).

OTHER PERMITS

Local Flood Hazard Area permits, U.S. Army Corps of Engineers permits, 401 Water Quality Certification, ANR Flood Hazard Area & River Corridor General Permit may apply. For further information, contact a [Permit Specialist](#) for a Project Review Sheet.

<http://dec.vermont.gov/environmental-assistance/permits>



State of Vermont
PERMIT AND LICENSE INFORMATION

FEDERAL PERMIT REQUIREMENTS FOR WORK IN WETLANDS
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**SUMMARY
 DESCRIPTION
 OF PERMIT**

Permits required for the discharge of dredged or fill material or mechanized land clearing in all waters of the United States, including wetlands, under Section 404 of the Clean Water Act. Impacts subject to Federal review include not only the area of wetland directly filled, but also any inundation or drainage of wetlands caused by the placement of fill or mechanized land clearing.

**EXAMPLE OF
 ACTIVITY**

Filling a wetland adjacent to Lake Champlain; construction of a pond in wetland.

**CRITERIA FOR
 JURISDICTION**

Projects or activities, which involve the placement of fill, excavation, or mechanized land clearing in jurisdictional wetlands. Certain small projects may be eligible for authorization under abbreviated procedures.

DEFINITION OF "WETLAND": The term "wetland" is defined by Federal regulations to mean "...those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions..." (33 CFR Part 328.3 (b), as published in the November 13, 1986 Federal Register). Wetlands generally include swamps, marshes, bogs and similar areas.

DEFINITION OF "FILL": The term "fill material" is defined by Federal regulations to mean "...any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a waterbody. The term does not include any pollutant discharged into the water primarily to dispose of waste..." (33 CFR Part 323.2 (b), as published in the November 13, 1986 Federal Register).

**INFORMATION
 REQUIRED**

Requires submission of completed application form, vicinity map, site plan and cross-sections of proposed activity. A wetland delineation using the [1987 Corps of Engineers Wetlands Delineation Manual](#) and [Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region](#) is required. The Natural Resources Conservation Service should be contacted for delineation of agricultural lands. Plans should be drawn to scale and include the wetland boundary, dimensions of the proposed work, and extent of wetland encroachment. Waterways and wetlands are vital areas that constitute productive and valuable public resources, the unnecessary alteration or destruction of which is to be discouraged. Therefore, Federal regulations state that filling of these resources shall not be permitted unless the applicant clearly demonstrates the following:

- a. that the activity associated with the fill must have direct access or proximity to or be located in the water resources in order to fulfill its basic purpose, and that other site or construction alternatives are not practicable; or
- b. if the activity associated with the fill does not have to have direct access to the water resources, you must provide information on the need to place fill in the waterway and/or wetlands and the feasibility of alternative sites or methods to accomplish the objective of the project.

In addition to a and b above, the possibilities for mitigation of any unavoidable damages to the resources must be discussed. If mitigation is possible, it should be included as part of the application. The applicant must submit information that thoroughly and clearly documents the need for the fill, alternatives, and mitigation possibilities.

WEB ADDRESS

<http://www.nae.usace.army.mil/Missions/Regulatory/>

FEES

\$0 - \$100; dependent upon type of permit to be processed.

**APPLICATION
TIMEFRAME**

Dependent upon type and complexity of project. Small, non-controversial projects can be processed in 15-90 days; large, controversial projects can take considerably longer.

**ADMINISTERING
AGENCY****U.S. ARMY CORPS OF ENGINEERS**

CONTACT: U.S. Army Corps of Engineers
Vermont Project Office
802-872-2893

ADDRESS: 11 Lincoln St, Room 210
Essex Junction, Vermont 05452

AUTHORITY

33 USC 1344 (Clean Water Act)

**APPLICABLE
RULES**

33 CFR Part 323 as published in the November 13, 1986 Federal Register

APPEAL PROCESS

None



State of Vermont
PERMIT AND LICENSE INFORMATION

**FEDERAL PERMIT REQUIREMENTS FOR WORK IN
RIVERS AND STREAMS**

SUMMARY DESCRIPTION OF PERMIT	Permits required for all structures or work beyond the ordinary high-water mark in navigable waters of the United States under Section 10 of the Rivers and Harbors Act. Permits required for the discharge of dredged or fill material or mechanized land clearing in all waters of the United States under Section 404 of the Clean Water Act.
EXAMPLE OF ACTIVITY	Rip-rap river bank below ordinary high water; filling of streambed for bridge abutments.
CRITERIA FOR JURISDICTION	Projects or activities which encroach beyond the ordinary high watermark of the Batten Kill, Black River, Connecticut River, Lamoille River, Missisquoi River, Moose River, Nulhegan River, Nulhegan River - Black Branch, Nulhegan River - East Branch, Nulhegan - Yellow Branch, Ompompanoosuc River, Otter Creek, Paul Stream, Passumpsic River, Passumpsic River - East Branch, Waits River, Wells River, White River, and Winooski River, including (but not limited to) dredging, shoreline stabilization, and water intakes. Projects or activities, which involve the discharge of, dredged or fill material or mechanized clearing beyond the ordinary high-water mark in all other rivers and streams within the State. Certain small projects may be eligible for authorization under abbreviated procedures.
INFORMATION REQUIRED	Requires submission of completed application form, vicinity map, site plan and cross-sections of proposed activity. Plans should be drawn to scale and include the ordinary high-water mark, dimensions of the proposed work, and extent of encroachment beyond the ordinary high water mark.
WEB ADDRESS	http://www.nae.usace.army.mil/Missions/Regulatory/
FEES	\$0 - \$100; dependent upon type of permit to be processed.
APPLICATION TIMEFRAME	Dependent upon type and complexity of project. Small, non-controversial projects can be processed in 15-90 days; large, controversial projects can take considerably longer.

**ADMINISTERING
AGENCY****U.S. ARMY CORPS OF ENGINEERS**

CONTACT: U.S. Army Corps of Engineers
Vermont Project Office
802-872-2893

ADDRESS: 11 Lincoln St, Room 210
Essex Junction, Vermont 05452

AUTHORITY

33 USC 403 (Rivers and Harbors Act of 1899) and
33 USC 1344 (Clean Water Act).

**APPLICABLE
RULES**

33 CFR 322-323 as published in the November 13, 1986 Federal Register.

APPEAL PROCESS

None



State of Vermont
PERMIT AND LICENSE INFORMATION

WORK IN A STATE HIGHWAY RIGHT OF WAY

**SUMMARY
DESCRIPTION
OF PERMIT**

Prior to performing any work or installing any utility facility within the State highway right-of-way, a Title 19, § 1111 permit is required from the Agency of Transportation.

**EXAMPLE OF
REGULATED
ACTIVITY**

Work within the limits of a State highway right-of-way (for example, construction of a driveway, installation of a culvert, excavation of a ditch or re-grading, paving or re-paving) requires a permit from the Agency.

**CRITERIA FOR
JURISDICTION**

A permit is needed for nearly any activity in or directly affecting the highway right-of-way, including (but not necessarily limited to) creation or modification of a driveway, repaving a portion of a driveway within the right-of-way, placement of structures, placement or grading of earthen material, discharge of water, or nearly anything else that would affect the right-of-way. The full scope of this permit process is beyond the scope of the general information handout.

**INFORMATION
REQUIRED**

Includes the applicant's and/or owner's name, address, phone number(s); location and description of the work to be performed; when the work is planned to begin and be completed; if Act 250 or local zoning permit is required; and, if filing for such permits, has the process been initiated. Other information includes a plan or sketch, providing a clear showing of the proposed work, including all appropriate details. Requests for residential access permits are to be submitted to the Agency's District Transportation Administrator.

FEES

A processing fee may be required. The applicant will be responsible for any mitigation improvements needed to the State highway because of the applicant's work; and for any inspection services deemed necessary to ensure the work is performed to State requirements. In the case of a permit for access (driveway), the applicant is also responsible for the land records recording fee, paid to the municipality, to record "Notice of Permit Action".

**APPLICATION
TIME FRAME**

One – two months

**ADMINISTERING
AGENCY**

AGENCY OF TRANSPORTATION

CONTACT: Craig Keller, Chief of Permitting Services
Phone: 802-279-1152 Office: 802-828-2653
craig.keller@vermont.gov
<http://vtrans.vermont.gov/planning/permitting>

ADDRESS: 219 N. Main St.
Barre, VT 05641

AUTHORITY

19 V.S.A. § 1111

APPEAL PROCESS

Administrative Hearing, Transportation Board, Superior Court



State of Vermont

PERMIT AND LICENSE INFORMATION**PROTECTION OF HISTORIC SITES UNDER CRITERION 8 OF ACT 250****SUMMARY**

The Vermont Division for Historic Preservation is considered under state law (22 V.S.A. Chapter 14) the state's expert on historic and archeological resources. The Division provides District Commissions with comments and the necessary information for them to make a positive finding under the historic sites aspect of Criterion 8. Project review by the Division consists of identifying the project's potential impacts to historic buildings, structures, historic districts, historic landscapes and settings, and known or potential archeological resources. Under 10 V.S.A. Chapter 151 (Act 250), section 6001 (9), the Vermont Advisory Council on Historic Preservation is responsible for providing testimony about the significance of historic and archeological resources.

NOTE: In some cases, an Act 250 project also has federal funding or requires a federal permit. In such cases, the project is also subject to the provisions of Section 106 of the National Historic Preservation Act (see [Sheet #101](#)). Compliance with Section 106 generally satisfies the needs of the Act 250 process. However, because of the very specific Section 106 review procedures, satisfying Act 250 may not ensure compliance with Section 106 requirements.

EXAMPLES OF ACTIVITY

Including but not limited to: ground disturbing projects (i.e. subdivisions, golf courses, ski area improvements, radio towers, etc.), whole or partial demolition of buildings or structures, new construction in an historic district or historic landscape, rehabilitation of buildings or structures.

INFORMATION REQUIRED

Copy of USGS topographic map showing project location; detailed project description; site plan, if available; information about past and current land use; clearly labeled photographs of any buildings or structures that are 50 years old or older within the project area and photos of their surroundings and adjacent landscape; building's dates of construction and any significant alterations; building elevations, if rehabilitation of an historic building is proposed. The Division or Advisory Council may require additional information as the review process proceeds. **The review process works best when early planning and consideration of historic and archeological resources allows adequate time for thoughtful and careful decision making, thereby avoiding last minute surprises, tight turnaround times, and delays.**

WEB ADDRESSES

<http://accd.vermont.gov/historic-preservation/review-compliance>

FEES

None. However, Act 250 applicants may find it necessary to hire qualified consultants such as professional archeologists, professional architectural historians, and architects to assist resource identification and review of potential project effects.

**APPLICATION
TIME FRAME**

Depends on size and complexity of project and degree of potential impacts. Consultation with Division as early as possible in planning stage will ensure a more efficient process and may reduce potential development conflicts with resources through a "least impact" project design. If field inspection by Division staff and Advisory Council review are necessary, process may require several months. Field inspections (or archeological field investigations) cannot be undertaken under conditions of frozen ground or snow cover. This seasonal limitation to field activities requires appropriate, advanced planning during the review process to take maximum advantage of frost-free/snow free ground (mid-late April to early-mid November).

**ADMINISTERING
AGENCY**

**AGENCY OF COMMERCE AND COMMUNITY DEVELOPMENT
VERMONT DIVISION FOR HISTORIC PRESERVATION
Serving as the STATE HISTORIC PRESERVATION OFFICE**

CONTACT: Jamie Duggan, Historic Preservation Review Coordinator
James.Duggan@vermont.gov
(802) 477-2288

ADDRESS: One National Life Dr, Davis Bldg 6th Floor
Montpelier, Vermont 05620-0501
ACCD.ProjectReview@vermont.gov

AUTHORITY

10 VSA Chapter 151 (Act 250);
22 VSA Chapter 14 (VT Historic Preservation Act).

APPEAL PROCESS

See [Sheet #47](#) relating to Act 250



State of Vermont
PERMIT AND LICENSE INFORMATION

OBSTRUCTING STREAMS

SUMMARY DESCRIPTION OF PERMIT	Commissioner approval required for permanent or temporary stream obstructions to fish passage. Permit form is a letter from Commissioner authorizing obstruction.
EXAMPLE OF REGULATED ACTIVITY	Dam or weir repair and construction; culvert installation.
CRITERIA FOR JURISDICTION	Impact of proposed activity on fish passage.
INFORMATION REQUIRED	Description and location of proposed activity, name of waterbody.
FEES	None.
WEB ADDRESS	http://vtfishandwildlife.com/conservation/development-review
APPLICATION TIME FRAME	30-60 days from receipt of request. Review may include on-site inspection by fisheries biologist.
ADMINISTERING AGENCY	VERMONT FISH & WILDLIFE DEPARTMENT CONTACT: Local fisheries biologist in district office closest to site.
AUTHORITY	10 V.S.A. Section 4607
APPEAL PROCESS	None
OTHER PERMITS	Ponds Fact Sheet # 32.1 , Dams Sheet # 45 , Stream Alteration Sheet # 32 , Water Quality Certificate Sheet # 27 , Wetlands Sheet # 29 , Corps. of Engineer Sheets # 98 & 99 .

Appendix I

Alternative Funding Sources

Dam Rehabilitation Alternative

Historic Preservation Grants Frequently Asked Questions

Do I qualify for a Historic Preservation Grant?

Properties owned by non-profit organizations or municipalities are eligible for funding through the state grant program. A building must also be either listed or determined eligible for listing in the *National Register of Historic Places* to qualify. You may contact the Division for Historic Preservation to learn if your building is listed or has been determined eligible for listing. Privately owned businesses or homes are not eligible for funding.

How much funding is available?

Grants of up to \$20,000 are available on a 1 to 1 matching basis. This is a reimbursement program, which means that if you are awarded a grant, you are responsible for paying for the full amount of the project and the State will then reimburse you once the project and required paperwork are complete. Annually, and pending legislative approval, the program has \$200,000 available in grant funds.

Can I start my project before I get a grant?

No. You may not apply for funding to support projects that have already been completed or are in progress. If your project is large with many components, you may be able to do work on your building before you get a grant, if the portion of the project to be funded with a grant has NOT started.

What work is eligible for funding?

Projects to repair and/or restore historic building features are eligible. Work must meet the Secretary of the Interior's *Standards for Rehabilitation* to qualify for funding. This could include but is not limited to:

- Work on a failed structural component, such as the building's frame, foundation or roof;
- Repairs to damaged or deteriorated components of the historic building, such as windows, doors, porches, and siding; and
- Preservation or restoration of significant historic features of a building, including historic plaster or decorative painting restoration

Ineligible work includes new construction, additions, electrical, plumbing or heating projects and weatherization or code improvements. Work that is generally considered maintenance such as cleaning or painting, will not be funded. Planning projects are also not eligible for funding.

What information must be provided with an application?

In addition to completing a Historic Preservation Application, all applicants must provide the following information to the Division for Historic Preservation in order to be considered for grant funding:

- Estimate – a detailed, written estimate from a qualified contractor for your project
- Photographs – digital photographs documenting your building and the issues you are trying to resolve
- Proof of non-profit status

When can I apply?

Applications for funding are generally made available during August annually and the deadline for applications is the first Monday of October each year. To receive notification regarding the next round of Grants and be added to our mailing list, contact Caitlin Corkins at 802-828-3047.

Caitlin Corkins, Tax Credits & Grants Coordinator 802-828-3047

Dam Removal Alternative

<https://dec.vermont.gov/watershed/rivers/streamflow-protection/dam-removal#:~:text=Dam%20removal%20has%20in%20recent,financial%20burdens%20on%20their%20owners>.

https://dec.vermont.gov/sites/dec/files/wsm/rivers/docs/drw_funding.pdf

<https://www.ctriver.org/our-work/reconnecting-habitat-for-fish/>

<https://www.americanrivers.org/river-restoration-funding-sources/>

<https://www.federalgrants.com/National-Fish-Passage-Program-19005.html>

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/equip/>



CONTRACT FOR ANIMAL HOLDING

Bill To: Town of Londonderry

Service Description:

Pursuant to 20 V.S.A. § 3381, Windham County Humane Society ("WCHS") shall serve as the designated animal impoundment facility for the Town of Londonderry.

Contract Term:

July 1, 2026 – June 30, 2027

Amount Due: \$954.00

Payment Terms:

Payment is due within one hundred twenty (120) days of receipt of the fully executed contract. Please make checks payable to **Windham County Humane Society** and remit payment to:

Windham County Humane Society
P.O. Box 397
Brattleboro, VT 05301

Thank you for your partnership and continued support of animal welfare services.

Respectfully,

Maya Richmond
Executive Director
Windham County Humane Society

Contract for Animals Holding

This agreement between the Windham County Humane Society, operations in Brattleboro, Vermont, hereinafter referred to as WCHS, the Town of Londonderry, hereinafter referred to as the TOWN, shall be in effect from 7/1/2026 through 6/30/2027.

The purpose of this contract is to define the terms by which the Windham County Humane Society will serve as the impoundment facility for the TOWN to satisfy 20 V.S.A. 3381.

WCHS Responsibilities

WCHS will accept stray, domestic, canine, and feline animals and small domesticated pets, including reptiles and birds found within the TOWN limits. WCHS will shelter safe, legal, healthy animals.

Animals may be relinquished by the Animal Control Officer (ACO), Law Enforcement Officer (LEO), or a resident of the town. Town residents must provide proof of residency and complete an intake form stating where the stray animal was found and sign a statement swearing to the accuracy of the information provided.

WCHS will provide the TOWN's ACO/LEO with access to the building to allow for immediate sheltering of stray animals between 5 pm and 8 am daily, when the shelter is not typically staffed, as well as holidays (New Year's Day, Memorial Day, Juneteenth, 4th of July, Labor Day, Thanksgiving, Christmas) when the shelter is minimally staffed.

WCHS will be responsible for the care, feeding, cleaning, and advertising of any impounded animal. WCHS reserves the right to accept or reject any TOWN animal based on, but not limited to, the following reasons:

EXCLUSIONS

- WCHS will not hold aggressive dogs, including dogs that have been picked up for biting a person. If an aggressive dog is found at WCHS after being delivered by a Town ACO/LEO, the TOWN is responsible for transporting said animal to a veterinary clinic and for any medical bills incurred in handling the animal.
- WCHS will not hold known feral cats at its facility. Feral Kittens under 8 weeks of age may be held for evaluation at the discretion of the WCHS staff.
- Grievously injured or sick animals requiring immediate veterinary care must be transported directly to a veterinary clinic by the TOWN. WCHS staff are available daily from 9:00 am to 4:00 pm to determine whether an animal needs veterinary care or can be cared for at the shelter by WCHS staff.
- WCHS will not hold animals for rabies observation. WCHS cannot safely sequester such animals from the public. The TOWN is responsible for rabies holds.
- The TOWN may not bring any animals to the shelter that are considered illegal under the Vermont State Annotated Statutes.
- WCHS will not hold any wildlife, including frozen specimens.
- WCHS will not hold livestock.

WCHS will act on behalf of the TOWN to reunite stray animals with their owners. WCHS will release animals during shelter business hours. Proof of current rabies vaccination will be required for all cats, ferrets, and dogs over 16 weeks of age prior to release of an animal to its owner. WCHS may hold animals named on the Town Warrant List until the animal is licensed.

Upon request, WCHS will issue a disposition report.

WCHS may charge a \$30 impoundment fee to pet owners to cover the cost of WCHS services and medical treatments.

Any and all animals not claimed within five (5) business days of acceptance at the WCHS shelter are considered released to WCHS for their discretion regarding release or disposition. If an animal proves unadoptable, it shall be euthanized and its remains disposed of; this service shall be included in the flat fee paid by the TOWN.

TOWN RESPONSIBILITIES

The Town shall pay WCHS a flat fee of *|\$954.00|* to serve as the impoundment facility for the Town to satisfy 20 VSA 3381.

In the event that a TOWN animal requires veterinary care within the five-day legal hold period, those services will be approved and paid by the TOWN (except for emergency treatments during hours when the Town is not available).

The Town will inform WCHS immediately of any changes in personnel and contact information regarding the ACO/LEO. New ACOs/LEOs are responsible for calling the WCHS to arrange a time to come to the facility for training on impounding animals after hours, at which time they will be issued a code for after-hours access. The TOWN's ACO/LEO is responsible for placing an impounded animal in a kennel or cage, providing water, and completing the proper forms. **Animals left without proper identification or documentation will be refused at the TOWN's expense.** (edited 4/27/26-KR)

SEIZURE OF ANIMALS 13 V.S.A. 354

This agreement does not include services for animals seized by an ACO, police officer, the Town, or the State of Vermont in an animal cruelty/neglect/abandonment case or investigation.

In cases where boarding of seized or abandoned animals (excluding livestock, aggressive, severely ill, or injured animals) is necessary, and the total number of seized animals is under 6 (six), WCHS will hold animals for a period of 5 (five) business days. This window allows the Town time to file appropriate legal paperwork for charges, including:

Cruelty or neglect, abandonment or failure to license (canines only), and if necessary, to negotiate a written holding agreement with WCHS.

The Town is responsible for veterinary examinations as required in 13 V.S.A. 354.

Should the Town choose not to file charges, the owners will have an additional three (3) business days to reclaim animals. If the owners do not reclaim the animals, the animals will be automatically surrendered to WCHS. The Town will pay \$100 per animal per day. The maximum fee period will not exceed eight (8) days.

Under this Contract, WCHS does not agree to hold any animal beyond a total of 8 days. **For seizures exceeding the 8-day limit, a separate Written Agreement must be executed between Town officials and WCHS. Seizure of 7+ animals requires written, negotiated agreements in advance.**

Prolonged holding or the holding of 7+ animals seized requires written agreements that must meet the following conditions:

- The Town is 100% responsible for the cost of operations, including the potential negative impact of facility closure, and animal care during the hold time.
- The Town must recover these costs from the violator: WCHS will not seek payment from the defendant.
- The Town must pay WCHS promptly during the seizure-holding period, not at the conclusion of the investigation/case.

WCHS reserves the right to terminate the holding of any seized animal. WCHS will provide written notice of termination. Upon receipt of notice, the Town has 72 hours to relocate the animal(s) to another facility.

This contract does not include emergency services, transportation to veterinary hospitals, or participating in the gathering of evidence. At no time should an injured animal be left at WCHS when a staff member is not immediately available and aware of the animal's needs.

In the event of a cruelty, neglect, or abandonment investigation involving livestock, the WCHS will assist in finding proper shelter and transportation for the animals at the expense of the TOWN.

GENERAL

The TOWN will hold harmless and indemnify WCHS, its employees, volunteers, and Board of Directors from any and all claims for injuries, accidents, or death of TOWN police officers, authorized agents, or animals while on WCHS property, or any function sponsored by or in conjunction with WCHS.

WCHS will hold harmless and indemnify the TOWN, its employees, agents, and elected officials from any and all claims for injuries or damages caused to any animals while in the care, custody, and control of WCHS.

In the event of a dispute between WCHS and the TOWN, the matter will be resolved through binding arbitration.

This contract is subject to modification if both parties agree, and renewal on a schedule to be determined by both parties, with the approval of both parties.

The contract can be nullified by either party with thirty(30) days written notice.

The parties hereby have approved and executed this agreement:

_____	_____	_____
WCHS Authorized Agent	Title	Date

_____	_____	_____
TOWN Authorized Agent	Title	Date

PURCHASING POLICY

Town of Londonderry, Vermont

Amended May 18, 2026

I. PURPOSE:

The purpose of this Purchasing Policy is to obtain the highest quality goods and services for the Town of Londonderry at the lowest reasonable price, to exercise financial control over the purchasing process, to clearly define authority for the purchasing function, to allow fair and equal opportunity among qualified suppliers, and to provide for increased public confidence in the procedures followed in public purchasing.

To the extent practical and cost effective, preference will be given to local vendors.

All purchases should, where possible, be made within the budget line item that would apply to that purchase.

II. PURCHASE AUTHORIZATION:

- A. **Purchases under \$3,000:** Any Town officer or employee may purchase items or materials provided that the purchase can be shown to be necessary and is in the best interest of the Town.
- B. **Purchases between \$3,000.01 and \$5,500:** Any Town officer or employee must contact the Selectboard and the Town Administrator prior to the purchase to inform of the need for the purchase.
- C. **Purchases between \$5,500.01 and \$10,000:** Any Town officer or employee must obtain prior approval of the Selectboard. Officers and employees must solicit quotes from at least three vendors unless the Selectboard has approved a sole source vendor. Vendors will be selected based on cost, the quality of the goods and services offered, and the ability, capacity, and skill of the vendor demonstrated (if applicable) under prior contracts with the Town.
- D. **Purchases over \$10,000:** Any purchase of \$10,000 or more is subject to the Bid Process below.

III. ONGOING AND RECURRING PURCHASES:

Certain purchases occur on a continuous and ongoing basis. An example is gravel and other road materials. For these types of purchases, the Town official or employee responsible for the purchases should maintain a current comparison price list from available vendors/suppliers. The price list will be used to make purchase decisions based on price, quality, availability, and other pertinent factors. The price list should be updated regularly. Authority to purchase is subject to the amount of the purchase as listed under Purchase Authorization listed above.

IV. BID PROCESS:

All purchases of \$10,00 or more shall be subject to a bid process, except for the ongoing and recurring purchases discussed above, and emergency purchases specified under Exceptions, below.

The bid process shall be initiated by the issuance of a Request for Bids prepared by the Selectboard, Town administrator or department heads. At a minimum, Notice of the Request for Bids shall be made by letters or emails to known providers soliciting bid responses, on the Town website, and advertisements placed in a newspaper of general circulation in the region. Depending on the services requested, other broader venues might be used at the discretion of the Town.

Bid Specifications: The Request for Bids shall include the following specifications:

1. Bid name.
2. Bid submission deadline.
3. Date, location, and time of bid opening.
4. How bids should be delivered.
5. Specifications for the project or services including quantity, design, and performance features.
6. Bond and/or insurance requirements.
7. Any special requirements unique to the purchase.
8. Delivery or completion date.

Once a request for bids has been issued, the bid specifications will be available for inspection on the Town Website.

Bid Submission:

Bidders shall bid to specifications and any exceptions must be noted. A bidder submitting a bid thereby certifies that the bid is made in good faith without fraud, collusion, or connection of any kind with any other bidder for the same work, and that the bidder is competing solely on his/her behalf without connection with or obligation to any undisclosed person or firm.

Bid Opening:

Every bid received prior to the bid submission deadline will be tabulated and reviewed at a Selectboard meeting. The tabulation will include the name of bidder; for lump sum contracts, the lump sum base bid and the bid for each alternate; for unit price contracts, the unit price for each item and the total, if stated; and the nature and the amount of security furnished with the bid if required.

Criteria for Bid Selection:

In evaluating bids, the Selectboard will consider the following:

1. Price.
2. Bidder's ability to perform within the specified time limits.
3. Bidder's experience and reputation, including past performance for the Town.
4. Quality of the materials and services specified in the bid.
5. Bidder's ability to meet other terms and conditions, including insurance and bond requirements.
6. Bidder's financial responsibility.
7. Bidder's availability to provide future service, maintenance, and support.

8. Nature and size of bidder.
9. Any other factors that the Selectboard determines are relevant and appropriate in connection with a given project or service.

The Selectboard reserves the right at its sole discretion to reject any and all bids, wholly or in part, to waive any informalities or any irregularities therein, to accept any bid even though it may not be the lowest bid, to call for rebids, to negotiate with any bidder, and to make an award which in its sole and absolute judgment will best serve the Town's interest. The Selectboard reserves the right to investigate the financial responsibility of any bidder to determine his or her ability to assure service throughout the term of the contract. The board also reserves the right to consult with outside sources to determine the ability of a bidder to perform the requirements of the proposal.

Change orders:

If specification changes are made prior to the close of the bid process, the Request For Bids will be amended and notice shall be sent to any bidder who already submitted a bid and a new bid process will be initiated. Once a bid has been accepted, if changes to the specifications become necessary, the Selectboard will prepare a change order specifying the scope of the change. Once approved, the contractor and an authorized agent of the Town must sign the change order.

V. EXCEPTIONS TO THE BID PROCESS REQUIREMENTS:

1. **Sole Source Purchases:** If the Selectboard determines that there is only one possible source for a proposed purchase, it may waive the bid process and authorize the purchase from the sole source. In addition a contract may be awarded without competitive bid when a Town employee determines, in consultation with the Town Administrator, after conducting a good faith review of available sources, that there is only one qualified source for the required supply, service or construction or the Town wants purchase same equipment including computers and vehicles in order to streamline servicing and maintenance. The employee shall conduct negotiations, as appropriate, as to price, delivery, and terms. A Bid Waiver Form should be completed and sent to the Town Administrator.
2. **Emergency Purchases:** The Selectboard may award contracts and make purchases for the purpose of meeting an emergency without complying with the bid process. Emergency expenditures may include immediate repair or maintenance of Town property, vehicles, or equipment if the delay in such repair or maintenance would endanger persons or property or result in substantial impairment of the delivery of important Town services. In situations where the Town's Emergency Operations Center has been activated due to a significant public emergency, and there is an immediate need for a purchase in direct support of emergency response activities, such purchase can be authorized by any one Selectboard member (or the Town Administrator in the absence of a Selectboard member) upon request of the Emergency Management Director or Acting Emergency Management Director.
3. **Professional Services:** The bid process requirements do not apply to the selection of providers for services that are characterized by a high degree of professional judgment and discretion including legal, financial, auditing, engineering, risk management, and insurance services.

4. **Federal/State Grant Funding:** When the purchase involves the expenditure of federal/state assistance or contract funds, the bid process shall be conducted in accordance with any mandatory applicable federal/state laws and regulations.

VI. CONTRACTS

The Town Administrator is authorized to sign contracts for any purchases not subject to the bid process. For purchases that are subject to the bid process, the Selectboard will delegate the authority to execute and sign contracts to the Town Administrator or other employee as appropriate.

VII. DISPOSAL OF EQUIPMENT:

When disposing of replacement equipment that it is no longer needed by the Town, the item shall be placed for bid on the Town website for three weeks, notice sent on the Town email distribution list and posted in 3 conspicuous places in town. Bids can be dropped off, mailed or sent by email to the Town Clerk and should include name, contact information and the amount of the bid. Bid amounts will be disclosed and more than one bid can be submitted. The bids will be reviewed by the Selectboard, and awarded to the highest bidder. The Selectboard reserves the right to reject all bids.

In the event that an item receives no or insufficient bids, the Selectboard has the option to donate the item to a charitable organization or to otherwise dispose of the item(s) as appropriate.

When replacing capital equipment, value of the equipment shall be determined by the best method(s). Such equipment may be offered for sealed bid with stated minimum bid or traded-in whichever will net the greatest value to the Town. Notice will be given as above and also printed in the newspaper of record.

The foregoing Policy is hereby adopted by the Selectboard of the Town of Londonderry, Vermont, this 18th day of May 2026 and is effective as of this date until amended or repealed.

Town of Londonderry, Selectboard

Thomas Cavanagh, Chair

James Ameden Jr, Vice-Chair

Leanne Alexander

Jim Fleming

Taylor Prouty

Municipal Planning Grant 2027

Program Description

State of Vermont
Agency of Commerce and Community Development
Department of Housing and Community Development
Division of Community Planning + Revitalization

Issued: July 15, 2026



Image: Roxbury Village Center Revitalization Plan. 2025. gbArchitecture & Fairweather Consulting

Program Basics

In fiscal year 2027, the Vermont Department of Housing and Community Development (DHCD) will grant funds to municipalities to promote planning, revitalization, and development activities that maintain Vermont's land use goal of compact settlements separated by rural lands.

The Municipal Planning Grants (MPG) fund a wide range of municipal planning projects as allowed by Title 24 of Vermont Statutes Annotated (V.S.A.) Section 4306 (b) and (c).

Projects that promote Vermont's historic pattern of compact settlements surrounded by working farms, forest, and open space are given priority.

Each municipality may submit one application per year. The maximum grant amount is \$50,000 for individual municipalities and \$65,000 for group (consortium) applications. All applications are required to provide a minimum cash match of 10%, unless an application is for a first municipal plan or bylaw under 24 VSA Chapter 117.

Grant funds are regionally apportioned based on the number of municipalities in a region. Eligible municipalities compete within their region for grant funding. Funding decisions are made by the DHCD Commissioner based on the competitive criteria listed under the Grant Selection Process later in this guide.

Purpose

The purpose of municipal planning grants is to carry out the statewide planning goals:

b) It is also the intent of the legislature that municipalities... shall engage in a continuing planning process that will further the following goals:

(1) To establish a coordinated, comprehensive planning process and policy framework to guide decisions by municipalities, regional planning commissions, and state agencies.

(2) To encourage citizen participation at all levels of the planning process...

(3) To consider the use of resources and the consequences of growth and development...

(c) In addition, this chapter shall be used to further the following specific goals:

(1) To plan development so as to maintain the historic settlement pattern of compact village and urban centers separated by rural countryside... (24 V.S.A. § 4302)

Funding

The fiscal year 2027 the Department of Housing and Community Development has approximately \$1.9 million for municipal planning grants from the municipal and regional planning and resilience fund that comes from property transfer taxes.

Timeline

The timeline for grantees to complete their MPG projects is 24 months.

- October 1, 2026: Online application opens
- December 1, 2026: Deadline to have an RPC confirmed planning process for a plan implementation project.
- December 2, 2026, at 6PM: Deadline to submit online application
- December: Award decisions
- January 1, 2027: Grant term begins
- December 2027: Mid-project report due
- December 31, 2028: Grant term ends; Project is complete and all funds are spent
- January 31, 2029: Final report and products submitted to DHCD

Eligible Applicants

Vermont Municipalities

For the purposes of the Municipal Planning Grant Program, a municipality is defined by 24 V.S.A. §4303(12). Under this definition, an incorporated village is not considered a separate municipality unless the village adopts its own plan one or more bylaws either before, concurrently with, or after such action by the town.

Single Municipality

Municipal Plan Implementation Projects: Individual municipalities with a local planning process confirmed by the municipality's regional planning commission (RPC) on or before the deadline, are eligible to apply for projects that implement the municipal plan. To be confirmed, a locally adopted and unexpired municipal plan must be approved by the RPC, and the municipality must maintain efforts to provide local funds for municipal and regional planning purposes as required by 24 V.S.A. §4350.

Municipal Plan Projects: Municipalities without a confirmed local planning process may apply for funding only to create a municipal plan approvable by the RPC and must have voted to provide local funds for municipal and regional planning purposes. Grant proposals from municipalities that have received RPC recommendations to bring their plan into compliance with statewide requirements must propose to address necessary updates identified by the RPC.

Group of Municipalities

Two or more municipalities may apply jointly for a group (or consortium) application. The application must address a shared issue and identify a lead municipality for financial administration of the project. The RPC may serve as grant administrator for a group (see consultant selection below). All municipalities in the consortium must have a confirmed planning process by the deadline, and each municipality must submit a separate resolution form in support of the project. The consortium may involve or benefit municipalities that are not identified as a consortium member in the application. No member of a consortium application may apply for an individual MPG the same year. A municipality can only serve as a lead municipality for one application but may be part of multiple consortia.

Other Applicant Information

Simultaneous Grants: Municipalities may have two open MPG grants at one time. If a municipality has an open MPG grant, they are eligible to apply for a second grant. However, if two municipalities are tied for scoring, the grant will be awarded to the town without an existing grant. Also, municipalities that accept MPG funding are not eligible to accept a [Better Connections Grant](#) award for the same state fiscal year as the MPG award.

Originating Applicants: Municipal organizations other than the governing body and the planning commission (such as the conservation or economic development commission) may also apply for a grant, but only with prior approval of the municipal governing body.

Financial Good Standing: Municipalities may not receive funding if they are suspended or debarred by the State or Federal Government; delinquent in submitting a subrecipient annual report; or delinquent in submitting their single audit reports (if required).

Municipal Resolution Form: The governing body must designate via the [Municipal Resolution Form](#), who will have access to the GEARS online grants management system application, and grant should the application be awarded. This form is required to be submitted with the application. If there are questions on roles in the online system, please review the [Municipal Planning Grant roles document](#).

Certificate of Good Standing: The [Certificate of Good Standing form](#) must be completed by each applicant indicating compliance with Act 154 of 2016, Section 13.

Funding Amounts & Match

Single Municipality Maximum

Single municipalities may apply for a grant of any amount between \$5,000 and \$50,000 maximum.

Group Maximum

A consortium of municipalities may apply for a grant of any amount between \$5,000 and \$65,000.

Local Cash Match

Municipalities must provide a minimum local cash match requirement of 10%, based on the total project cost. The local match requirement is waived for applications for a first municipal plan or bylaw project under 24 VSA Chapter 117. Any source of cash match funds may be used: federal, other state grants, municipal, private, or non-profit. In-kind contributions or contributions of municipal staff or others' time cannot be offered as a match, with some flexibility for very small towns as described further in this document.

Documentation for Closeout

Documentation of total project expenditures (including grant and all match funds) are required at the close out of the grant. If a project is completed with less than the total project cost expended, the grant award and match funds required will be proportionately reduced to maintain the required 90 / 10 split of grant award and match.

Funding Examples

- Total Project Cost of: \$5,556
 - 10% Minimum Cash Match \$556
 - **Grant Amount** **\$5,000**

- Total Project Cost of: \$55,556
 - 10% Minimum Cash Match \$5,556
 - **Grant Amount** **\$50,000**

- Total Project Cost of: \$72,222
 - 10% Minimum Cash Match \$7,222
 - **Grant Amount** **\$65,000**

Grant Awards

The DHCD Commissioner reserves the sole right and responsibility to allocate grant funding and award less than the amount requested, based on the scoring of the applications and availability of funds. For timing, refer to the “Program Basics” above.

Note: municipalities that accept MPG funding are not eligible to accept a [Better Connections Grant](#) award for the same state fiscal year as the MPG award.

Eligible Activities

MPGs support a wide range of projects relating to planning, land use, and resilience and promote cooperation, collaboration, public input, and the exchange of ideas. Eligible projects must have a clear connection to the creation or implementation of the municipal plan and will be reviewed for conformance with the regional plan, as well as statewide smart growth principles, planning goals, and land use policies.

Funds may be used to:

- Underwrite expenses for public meetings and hearings, informational workshops, citizen surveys, outreach, and notification costs; participant stipends are allowed when stipend expenses can be documented with an invoice or receipt and municipal proof of payment
- Support research, data collection, capacity studies, inventories, and mapping
- Pay consultants, interns, regional planning commission staff, or legal fees associated with the project
- Purchase development rights, easements, and titles of properties for housing and conservation purposes identified in the municipal plan
- Purchase materials needed to produce a plan, bylaw, or implement or administer the project -- like writing supplies, maps, and copies
- Conduct other non-prohibited activities
- Pay an RPC with ‘agent’ status for project management expenses up to 5% of sub-contracted (non-RPC) expenses. This must be disclosed in the application and be included as a line in the work plan and budget
- Subscriptions for a reasonable period directly related to the planning project
- Pay a municipality up to 10% of the total project costs for project management tasks identified work plan when the project is managed by a volunteer (non-staff) municipal official in a *very small town*, defined as towns with populations of 1,000 or less. (There are 88 municipalities with populations of 1,000 or less.)

Funds may not be used to:

- Support political activities
- Support projects incompatible with the Regional Plan
- Pay regional planning commission dues
- Reimburse expenses incurred before the grant is awarded
- Subsidize tax mapping (see Mapping Requirements below)
- Pay municipal officials or municipal staff
- Capitalize a “reserve” fund for use beyond the grant period
- Purchase computer hardware, software licenses, or other equipment not related to a specific grant funded planning project
- Pay for the cost of administering the MPG grant such as municipal or regional staff time for documenting grant expenditures and submitting the progress report and close-out,
- Support plans, bylaws and policies that violate the State or Federal Fair Housing Act. Fair housing training is available to all grantees and is encouraged for projects relating to housing and/or revisions to zoning bylaws. Please contact the [Housing Division](#) in DHCD if you are interested in training opportunities.
- Pay for single-jurisdiction Local Hazard Mitigation Plans
- Parcel mapping or tax mapping

Mapping Requirement

All GIS mapping must follow applicable VCGI data guidelines or standards.

Single Project Scope Requirement

MPG grants are limited to projects with a singular and well-defined focus – even if the proposal is part of a larger project (see example below). Municipalities seeking funds for large, multi-phase projects are encouraged to separate projects into related, stand-alone phases, each with a defined product upon completion, and apply for a grant each year to complete the phases. Because funds are allocated competitively each year, MPG support for subsequent phases cannot be guaranteed.

If multiple products or separate consultant projects are proposed for MPG funds, the application may not meet the single project scope requirement. This finding will result in a lower score and only one of the projects will be funded if a grant is awarded. Applicants with questions about scope should call the program’s staff.

Example: work on both a municipal plan and bylaws in the same application will usually be considered two separate projects and typically both are not funded. However, a

focused issue-oriented amendment of a plan element and the associated bylaws to implement that section of the plan, can be proposed as a single project. For instance, a housing element of a plan and a bylaw amendment to adopt housing-ready regulations may be considered one project.

Use of MPG as Part of a Larger Project

MPGs may be used as part of a larger or phased project. An MPG may also be used in conjunction with grants from other programs. If you propose to use the MPG for a larger project, assign a discrete part of the larger project to the MPG. Choose a component that best meets the competitive criteria and can easily be completed within the 24-month MPG timeframe and satisfy all grant programmatic, closeout, and financial requirements. If applicable, applicants must explain use of an MPG as part of a larger project in the application. Applicants may contact DHCD to ensure that the activity will meet the grant requirements.

Example: A municipality could use an MPG for the community outreach component of a major public project. In this instance, include the work plan for just the MPG portion of the project in the online application, explain the project in the application, and submit the overall work plan for the larger project as an attachment.

Coordination with State Agencies

Some local planning and regulatory projects require coordination with state agencies that have planning and regulatory authority over the project. For projects where state authority can be anticipated, applicants must identify the relevant agencies as project partners and include a task for coordinating with that agency in the work plan. Applicants are also encouraged to review the work plan with any such agency and include comments from the agency as an attachment to the application.

Example: Any project (streetscape, traffic calming, sidewalk, water, wastewater etc.) that proposes work within a state highway right-of-way must coordinate with appropriate sections at the Agency of Transportation. At a minimum, the District Transportation Administrator and the Permitting Services section should be involved. Early coordination will increase the likelihood that the work product(s) can be implemented in the future.

Example: A project to consider village wastewater solutions must coordinate with the Department of Environmental Conservation (DEC) Water Infrastructure Financing Program before submitting an MPG application, to ensure the work plan will result in a product that can be used to obtain state and federal infrastructure funding. The best evidence of this coordination is an email from DEC indicating review of the work plan. This can be attached to the application.

Grant Selection Process

DHCD uses competitive criteria to score and rank applications. The State's priorities are updated annually to comply with policy initiatives, legislation, or current events. Grants are awarded based on the application's score and ranking compared to the scores from the other applications in the same region, as well as the amount of grant funds available. Applications scoring at or below 60 points will not be funded, and regional funds may be reallocated to high-scoring projects in other regions. Applications are scored as follows:

Scoring Summary of Competitive Criteria

Applications are scored on a 120-point scale, as follows:

Project Readiness & Need, 20 points

- Well-Defined Issue & Urgency 5
- Funding Need, 5
- Project Readiness for a Municipal Plan or Plan Implementation Project, 5
- Project Management, 5

Statewide Priorities, 45 points

- Project Outcomes & Goal Consistency, 5
- State Priority Projects, 20
- Designated Area Projects, 20

Project Approach, 45 points

- Work Plan, 20
- Public Outreach, 10
- Budget, 15

Application Quality and Past Performance, 10 points

TOTAL POINTS: 120

Project Readiness & Need

Projects can demonstrate need and readiness by outlining specific and well-documented issue(s) the community is trying to solve and the urgency of that problem, explaining why MPG is the best fit and the project cannot qualify for funding through other sources, demonstrating the readiness for the project, and outlining a well-organized project management structure and partnerships for success. Projects with structured collaboration or financial partnership with outside organizations demonstrate strong community support and readiness.

- **Well-Defined Issue & Urgency**
- **Funding Need**
- **Project Readiness for a Municipal Plan or Plan Implementation Project**
- **Project Management**

Statewide Priorities: Outcomes, State Priority Projects & Designation

Outcomes: Each year the program recognizes projects with outcomes that meet statewide priorities and conform with the regional plan, the Vermont Planning & Development Act's purpose and goals (24 V.S.A. 4302), the Downtown & Community Investment Acts (Chapters 76A & 139 of Title 24), and the state's smart growth principles.

State priorities: Projects that meet at least one of the following.

- Planning for a Step Up: Downtown Designation: Step 3 Center or Village Designation: Step 2 Center application (with a pre-application consultation with program staff)
- Specific-Area Physical Improvement (Master) Plans for Designated Centers & Neighborhoods, including pre-engineering water/wastewater, multi-modal streets visioning, or neighborhood development for homes
- Comprehensive Capital Programming to support climate resilient development in Designated Centers & Neighborhoods per 24 VSA 4430
- Statewide innovative project that includes a replicable template other communities can use as a work plan deliverable
- Projects in [very small towns](#) with populations of 1,000, and under or projects in municipalities that are not regularly/recently funded.

Designated Areas: projects that relate to and have a clear connection to the legacy state designated areas receive priority in accordance with 24 V.S.A. Chapter 76A: downtowns, villages, neighborhood development areas, new town centers, and growth

centers. This will be the last year the legacy designations will be used during the transition period when some regions will have new designations (under Chapter 139) and some will have legacy designations (under Chapter 76A).

Lower priorities: Basic municipal plan updates and minor amendments are less likely to be funded by the MPG program. MPGs prioritize funding for new plans or major amendments in communities facing significant change. Applications for local hazard mitigation plans, unless multi-jurisdictional and in coordination with VEM, are less likely to be funded.

Project Approach

Work Plan & Budget: Projects should have a well-considered work plan and budget. Regional planning commissions and private consultants have expertise in work plans and budgets for planning projects, and this does not bar these entities from later bidding on a project under state rules. Break out common expense categories like project management, technical work, outreach/engagement, formal hearing/meetings, and material costs. Work plan tasks should not be overly broad or overly detailed. Prevailing hourly rates are generally above \$100/hr. for consulting services funded by MPG.

Once grants are awarded, minor work plan changes that do not change the state grant award can only be accomplished via a grant amendment, so the scope of work and tasks described should be as accurate as possible. The work plan and budget submitted with the application will become part of the grant agreement.

Allowed Project Management Expenses: Project management expenses are permitted for one of three scenarios:

- RPC as agent for rural town and group projects. Up to 5% of the subcontracted costs for project management tasks identified work plan may be added;
- RPC as agent for subcontracted project. Up to 10% of the subcontracted costs for project management tasks identified work plan may be added;
- Volunteer project management in a very small town, up to 10% of contracted expense.

Work Plan Outreach: Planning projects are more successful: 1) when there is sustained public outreach throughout a project that involves those affected, including harder-to-reach and under-represented, lower-resourced or under-served people, 2) when they begin with strong community support, and 3) when they are done in partnership with organizations outside the municipal government. Competitive applications will demonstrate how the project's work plan will outreach to the broader public, who it supports, and is part of the project from the outset. This includes necessary coordination with State agencies.

For projects where state authority can be anticipated, applicants must identify the relevant agencies as project partners and include a task for coordinating with that agency in the work plan.

Application Quality & Past Performance

Reviewers consider the overall quality and clarity of the application, as well as applicants past grant performance on timely reporting, accurate and complete closeout documentation, and completion of past projects.

Application Template & Guide

The Application Guide assists applicants in preparing a competitive application and allows applicants to prepare draft responses before submitting the application online.

Applicants can see each application question, read advice on answering the question, view how the response will be evaluated and scored by DHCD, and prepare a draft response -- all on one form. DHCD recommends applicants prepare their responses offline in the Word document provided, to be able to copy and paste narrative responses into the online form later. The GEARS system will time out after forty minutes on one page, even if you are actively entering in information. Please “save” often so applicants do not lose their work.

Grant Awards and Administration

Award notices are sent via email to successful applicants through the online Grants Management System. In the event of partial funding, applicants are asked to submit a modified work plan and budget. Grant agreements and other required documents will be available shortly thereafter. Completion of all grant agreement documents, reporting, closeout, and requisitions will occur in the online grants management system.

Grant payments and reporting requirements are as follows:

First Payment – Upon execution of the grant agreement, a requisition may be submitted for a payment of 40% of the award amount.

Second Payment – Mid-project reports are due December 2027. Requisition for 30% of the award must be submitted along with a progress report.

Final or Close Out Reimbursement – Up to 30% of the award is made on a reimbursement basis once DHCD receives, reviews, and approves the closeout package. The reimbursement is made when the project and its deliverables, as detailed in Attachment A of the Grant Agreement, are complete and submitted, the final report has been completed, and the financial expenditures are properly documented (copies of invoices, receipts, canceled checks, and/or a detailed transaction report) showing that

the funds were spent for the purposes specified in the grant agreement. Invoices must show that grantees have spent all grant funds and match funds, if applicable, no later than December 31, 2028. Funds that are unused as of that date, as well as expenditures that are ineligible or are not documented, must be returned to DHCD.

While grant activities must be completed by December 31, 2028, grantees have up to one month after that date to assemble a final report. Final reports must be submitted online no later than January 31, 2029.

Purchase of goods and services through the grant must conform with the procurement requirements defined in Attachment D to the Grant Agreement. In most cases, consultants must be selected through a competitive process.

All final products and public communication **must** acknowledge funding from the Municipal Planning Grant Program, administered by the Vermont Department of Housing and Community Development, Agency of Commerce and Community Development. This means there must be a statement, usually on the cover page of the final plan or product, such as “*This project was funded in part by a Municipal Planning Grant, administered by the Vermont Department of Housing and Community Development.*”

Amendments

Amendments include the following options:

- 1) Minor alterations to the work plan or the approved budget may be allowed, but only upon request and approval from DHCD. Substantial alterations are not allowed, and the grant award, and final product must remain the same.
- 2) Time extensions are offered for up to one additional year only.

Consultant Selection

The rules for consultant selection are detailed in the grant agreement’s procurement provisions (see Attachment D of the MPG Grant Agreement). A Regional Planning Commission may help a municipality prepare a grant application and bid on a grant-funded project; this is not a prohibited activity.

Pre-Application Process

Consultants may be selected before the application is submitted. If a municipality is engaged in a competitive procurement process while developing the grant application and selects a contractor at that time, there is no requirement to re-open the selection process if the grant is awarded, provided the scope of work remains substantially similar

to what was in the contractor's proposal. All information regarding procurement and how the consultant was selected must be retained.

Regional Planning Commission as Agent

The regional planning commission may serve as an agent of the town for the Municipal Planning Grant as follows:

Rural Towns: For rural towns with a population of less than 2,500 as defined in 24 V.S.A. §4303(25). (5% of the subcontracted costs for project management tasks identified work plan may be added.)

Group Projects: For any multi-town group/consortium project. (5% of the subcontracted costs for project management tasks identified work plan may be added.)

Subcontracted Projects: For ALL projects where the RPC agrees to be the project manager for expenses and subcontracts with ALL other services/expenses according to the procurement thresholds. (10% of the subcontracted costs for project management tasks identified in the work plan may be added.)

Agent Responsibilities: The agent is expected to prepare the application, support grant administration and will be exempt from competitive selection if serving as a project consultant, but the municipality must remain the financial administrator.

Simplified Bid Process

For contracts up to and including \$15,000, the grantee is required to obtain price or rate quotations from a reasonable number of sources, but no less than two, and maintain a record of the same in its files.

Competitive Bid Process

For contracts more than \$15,000, the grantee is required to use a competitive selection method. A Request for Proposals (RFP) or Request for Qualifications (RFQ) should be broadly publicized to permit reasonable competition. The grantee must maintain records in its files to document how the decision was made.

Exceptions

If the grantee is a "rural town" or a multi-town consortium and has identified the regional planning commission as its agent, the simplified bid and competitive processes for hiring the RPC are not required.

Consultants working on an earlier phase of a multi-phase project may be re-selected for the project phase funded by the MPG, to maintain continuity between phases.

Information

[MPG Application Webpage](#) - instructions and resources.

Jacob Hemmerick

Community Planning & Policy Manager

802-828-5249

jacob.hemmerick@vermont.gov

Act 250 Criterion 8(C) - Public Information Sessions

From Windham Regional Commission <wrc@windhamregional.org>

Date Fri 9/18/2026 2:11 PM

To Windham Regional Commission <wrc@windhamregional.org>

We are sharing this on behalf of the Land Use Review Board (LURB). Should you have any questions please contact Alex Weinhagen with the LURB:

Alex Weinhagen | Board Member
Land Use Review Board
10 Baldwin Street
Montpelier, VT 05633-3201
alex.weinhagen@vermont.gov
802-480-1885
<https://act250.vermont.gov>

From: Weinhagen, Alex <Alex.Weinhagen@vermont.gov>

Sent: Friday, September 18, 2026 12:06 PM

To: alougee <alougee@acrpc.org>; bcolvin@bcrcvt.org; Christian Meyer <meyer@cvregion.com>;
cbaker@ccrpcvt.org; tasha <tasha@lcpvcvt.org>; jasmussen@marcvt.org; dsnedeker <dsnedeker@nvda.net>;
cdimitruk@nrpcvt.com; Devon Neary <devon@rutlandrpc.org>; Peter G. Gregory <pgregory@trorc.org>;
ccampany <ccampany@windhamregional.org>

Subject: Act 250 Criterion 8(C) - Public Information Sessions

Regional Planning Executive Directors,
Please consider forwarding the information below to your communities and your networks.
Apologies for the cross postings – also posted to the VPA Listserv.

Act 250 Public Information Sessions Criterion 8(C) – Forest Blocks & Habitat Connectors

The Vermont Land Use Review Board (LURB) will host four public information sessions across the state to introduce Vermonters to a new Act 250 review criterion that goes into effect on January 1, 2028. Criterion 8(C) only applies to projects that already require an Act 250 permit and does not affect when a permit is needed. This criterion is aimed at ensuring forest blocks and habitat connectors are considered in the Act 250 review process. The LURB's formal rulemaking process will begin in 2027, but the LURB would like to inform and hear from Vermonters ahead of time.

The LURB welcomes both in-person and remote participation. More information, including remote connection details, is available online at <https://act250.vermont.gov/modernizing-land-use-review/criterion-8c-forest-blocks-and-habitat-connectors>

- **September 29, 6:30 PM to 8:00 PM – Essex** – Act 250 Conference Room, 111 West Street, Building 2, Essex Junction, VT 05452.

- **September 30, 6:30 PM to 8:00 PM – West Burke** – Burke Town Office, 212 School Street, West Burke, VT 05871.
- **October 1, 6:30 PM to 8:00 PM – Brattleboro** – Brattleboro Town Office, 230 Main St #108, Brattleboro, VT 05301.
- **October 6, 6:30 PM to 8:00 PM – Rutland** – Regional Planning Commission Office, 16 Evelyn St, 2nd Floor, Rutland, VT 05701.

These informational sessions will focus on: what are forest blocks and habitat connectors and why are they important; what Criterion 8(C) rules must include; critical considerations for the drafting process; rulemaking timeline; ways to keep Vermonters updated and opportunities for public input. Each session will include time for questions and comments.

Frequent Questions:

- Why Criterion 8(C)? The Legislature's stated intent is to, "discourage fragmentation of the forest blocks and habitat connectors by encouraging clustering of development."
- Will this mean more land is subject to Act 250 review? No. Criterion 8(C) does not change when or where an Act 250 permit is required.
- Is there a draft rule to review and comment on? Not yet. These information sessions are intended to provide general information and to raise awareness about the Criterion 8(C) rulemaking process that is coming in 2027. We want Vermonters to have opportunities to learn and ask questions now. We plan to get public feedback on draft rules in January 2027 (before we start the formal rulemaking process) and again in May 2027 (as part of the formal rulemaking process).

Can't make any of the information sessions? Have a specific question? Reach out by phone to Alex Weinhagen, Board Member, 802-480-1885 or Kirsten Sultan, Board Member, 802-261-1946, or by email to act250.rulemaking@vermont.gov

Alex Weinhagen | Board Member
 Land Use Review Board
 10 Baldwin Street
 Montpelier, VT 05633-3201
alex.weinhagen@vermont.gov
 802-480-1885
<https://act250.vermont.gov>

Emails and other written or recorded information produced or acquired in the course of public agency business are public records and may be subject to public examination under Vermont's Public Records Act.

FW: Special Message on Behalf of the VERB Board of Directors - 1

From Tina Labeau <TREASURER@londonderryvt.gov>
Date Fri 9/18/2026 3:21 PM
Cc Aileen Tulloch <townadmin@londonderryvt.gov>

Tina Labeau

(she/her)

Treasurer/Delinquent Tax Collector

Town of Londonderry, VT

100 Old School Street

S. Londonderry, VT 05155

802-824-3356 ext 103

treasurer@londonderryvt.gov

PLEASE NOTE THAT MY EMAIL HAS CHANGED!

To Pay by credit card: <https://pay.xpress-pay.com/org/D6F2CEAF94204A6>

To File your Homestead Declaration and Property tax Credit claim online:

https://myvtax.vermont.gov/_/#7

Office Hours:

Monday – Friday 8:30 am to 4:00 pm (Closed all Federal Holidays)

Please note that this email message, along with any response or reply, is considered a public record, and thus, subject to disclosure under the Vermont Public Records Law (1 V.S.A. §§ 315-320).

PLEASE NOTE: The Town of Londonderry does not bear any responsibility or liability for missing or incorrect information or documents. Documents are provided as a courtesy due to current circumstances.

From: Phil Latvis <platvis@vlct.org>

Sent: Friday, September 18, 2026 3:00 PM

To: fsatink@vtpacif.org

Subject: Special Message on Behalf of the VERB Board of Directors - 1

You don't often get email from platvis@vlct.org. [Learn why this is important](#)

Dear PACIF and VERB members:

In my current role as Executive Secretary for the PACIF Board of Directors, I wanted to let every PACIF and VERB member know that within the next few days, your municipality will be receiving a **ballot mailing** that corresponds to your membership in PACIF and/or VERB. The ballot is coming from the PACIF and/or VERB Boards of Directors and includes a cover letters

from me and each Board President, a notice of annual meeting, an official PACIF and/or VERB Ballot and a return envelope addressed to Primmer Piper Eagleston & Cramer, PC, who is the legal firm assisting the Boards with the ballot process. The mailing is being directed to the PACIF and/or VERB billing contact with the intent that the ballot and enclosed information be directed to the municipal official who can ensure the ballot is considered and cast as directed by the legislative body.

As you may be aware, this is a new process for electing Directors. The PACIF and VERB Boards desire to have greater member involvement than what typically has occurred at the VLCT Town fair, where typically only 10-15% of members cast their vote in any given year. By adopting a mailed ballot approach, the Board gives every member the opportunity to cast a ballot.

Note that if your municipality belongs to both PACIF and VERB, you will receive two separate ballot mailings which should be returned separately, each in their own envelope.

Please be on the lookout for this mailing and thank you in advance for your assistance in ensuring that it is reviewed and acted upon by your municipality. Feel free to contact me at fsatink@vtpacif.org or 802 209-8100 if you have any questions.

Respectfully,

A handwritten signature in cursive script, appearing to read "Frederick J. Satink".

Frederick J. Satink
Executive Secretary, PACIF Board of Directors

-



Application ID: DLL - Application - 82323
Application for: Special Events Permit (Manufacturer)
Category of Business: Manufacturer

Business/ Entity Information

Business/ Entity Name: Smugglers Notch Distillery LLC
Business ID: 0026240
Business Address: P.O. Box 69,
Jeffersonville, Vermont 05464
Entity Type: Limited Liability Corporation
Phone: 802-760-0619
Management Type if LLC: Manager-managed
Email: jeremy@smugglersnotchdistillery.com

Foundational License (if applicable)

License Type: Manufacturer
License Number: LP-016543
Licensee Name: Smugglers Notch Distillery (MANU)
License Status: License issued-new application
Licensee Address: 5087 VT Rte 15 ,
Jeffersonville, Vermont 05464
License Start Date: 2026-07-01
License End Date: 2027-06-30

Event Contact/s

Person:
Chris Restino

Business Role:
Others

Business Address:

,
, ,

Phone:

Email:

chrisr@smugglersnotchdistillery.com

Violations:

Violation ID	Court/Traffic Bureau	Offense	Date of Offense
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Event Details**Start date of event:**

Sun Sep 27 13:30:00 GMT 2026

End date of event:

Sun Sep 27 22:30:00 GMT 2026

Physical Location Street 1

825 Vermont 11

Physical Location Name:

Taylor Farm

Physical Location Street 2/Unit/Suite:**Physical Location State:**

Vermont

Town Clerk/ Municipal Jurisdiction:

Londonderry

Outside Side Consumption End time:**Physical Location City/Town:**

Londonderry

Landlord Name:**Landlord Email:****Do you Lease the Premises:****Business Location:****Lease Expiration Date:****Approximate Number of Persons Expected:**

1000

Outside Side Consumption Start time:**Outside Side Consumption Hours Requested:****Outside Side Consumption Days Requested:****Physical Location Zip:**

05148

Describe the type of event/ OCP Area:

we will be serving free .25oz tastings of our classic spirits from

Location:

LN-039088

Days or specific bingo date(s):**Documents Attached**

Name	Document Type	Assosicated With
D-07689	Other	Smugglers Notch Distillery LLC
D-09350	Lease or proof of ownership	Smugglers Notch Distillery LLC
D-10876	Lease or proof of ownership	Smugglers Notch Distillery LLC
D-13619	Sales and Use tax documents	Smugglers Notch Distillery LLC
D-13620	Meals & Rooms Tax Certificate	Smugglers Notch Distillery LLC
D-16490	Other	Smugglers Notch Distillery LLC
D-16491	Other	Smugglers Notch Distillery LLC
D-16825	Other	Smugglers Notch Distillery LLC
D-16829	Other	Smugglers Notch Distillery LLC
D-17419	Map/Area Sketch	Smugglers Notch Distillery LLC
D-17590	Map/Area Sketch	Smugglers Notch Distillery LLC
D-23095	Other	Smugglers Notch Distillery LLC
D-28091	Other	Smugglers Notch Distillery LLC

D-45050	Other	Smugglers Notch Distillery LLC
D-49679	Other	Smugglers Notch Distillery LLC
D-49691	Other	Smugglers Notch Distillery LLC
D-55703	Map/Area Sketch	LN-039088
D-55704	Map/Area Sketch	LN-039088
D-01005	Other	Smugglers Notch Distillery LLC
D-01030	Operating Agreement	Smugglers Notch Distillery LLC
D-55703	Map/Area Sketch	LN-039088
D-55704	Map/Area Sketch	LN-039088

Payment and Acknowledgement

Signed by:

Christopher Restino

State of Vermont / DLL Application Fee:

35.00

Date and time of Submission:

2026-09-15 18:56:42

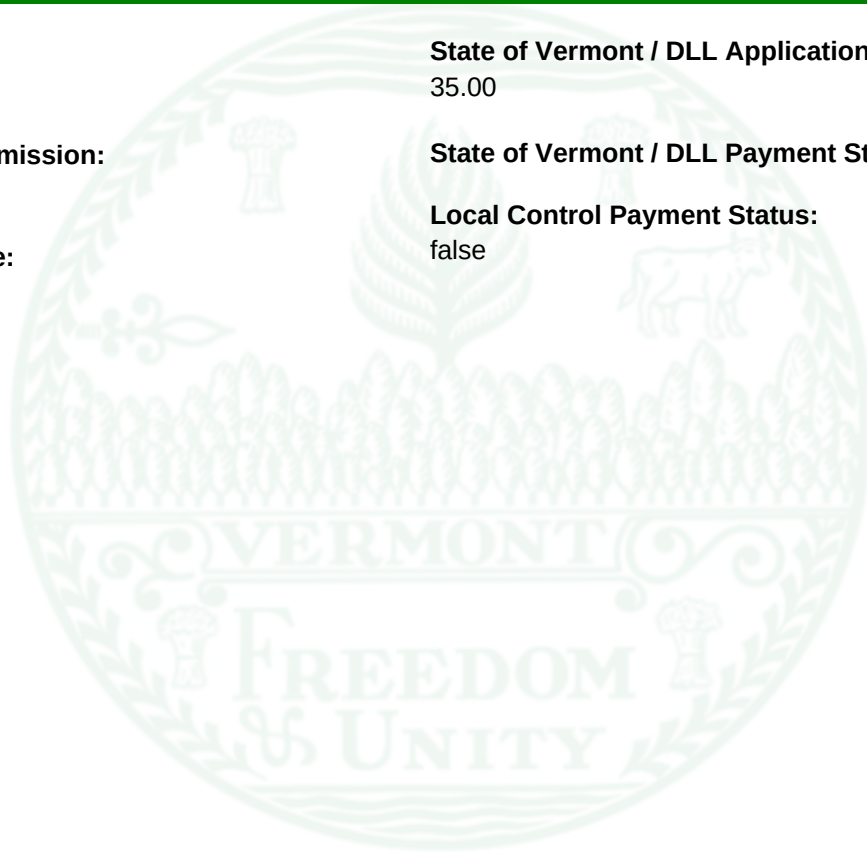
State of Vermont / DLL Payment Status:

Local Control Payment Status:

false

Local Application Fee:

0





Application ID: DLL - Application - 82240
Application for: Special Events Permit (Manufacturer)
Category of Business: Manufacturer

Business/ Entity Information

Business/ Entity Name: Highland Beverage LLC	Business ID: 0429131
Business Address: 732 Under The Mountain Road, Londonderry, Vermont 05155	Entity Type: Limited Liability Corporation
Phone: 617-955-9914	Management Type if LLC: Member-managed
Email: twistedhornbrewery@gmail.com	

Foundational License (if applicable)

License Type: Manufacturer	License Number: LP-034979
Licensee Name: Twisted Horn	License Status: License issued-new application
Licensee Address: 3714 Rte 11 , Londonderry, Vermont 05155	License Start Date: 2026-04-27
	License End Date: 2027-04-26

Event Contact/s

Person:
Robert Cowles

Business Role:
Member/Manager

Phone:
(802) 558-5525

Business Address:
732 Under the Mountain Road,
South Londonderry, Vermont, 05155

Email:
glebemtngardens@gmail.com

Violations:

Violation ID	Court/Traffic Bureau	Offense	Date of Offense
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Event Details**Start date of event:**

Sun Sep 27 15:00:00 GMT 2026

End date of event:

Sun Sep 27 21:00:00 GMT 2026

Physical Location Street 1

825 VT 11

Physical Location Name:

Taylor Farm

Physical Location Street 2/Unit/Suite:**Physical Location State:**

Vermont

Town Clerk/ Municipal Jurisdiction:

Londonderry

Outside Side Consumption End time:**Physical Location City/Town:**

Londonderry

Landlord Name:**Landlord Email:****Do you Lease the Premises:****Business Location:****Lease Expiration Date:****Approximate Number of Persons Expected:**

150

Outside Side Consumption Start time:**Outside Side Consumption Hours Requested:****Outside Side Consumption Days Requested:****Physical Location Zip:**

05148

Describe the type of event/ OCP Area:

1.5 acres

Location:

LN-039055

Days or specific bingo date(s):**Documents Attached**

Name	Document Type	Assosicated With
D-14026	Articles of Organization	Highland Beverage LLC
D-14027	Operating Agreement	Highland Beverage LLC
D-14028	Articles of Organization	Highland Beverage LLC
D-14032	Articles of Organization	Highland Beverage LLC
D-14033	Federal Employee Identification #	Highland Beverage LLC
D-14034	Federal Employee Identification #	Highland Beverage LLC
D-16328	Lease or proof of ownership	Highland Beverage LLC
D-20648	Sales and Use tax documents	Highland Beverage LLC

Payment and Acknowledgement**Signed by:**

David Barker

State of Vermont / DLL Application Fee:

35.00