

**Vermont Department of Environmental Conservation**

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*Agency of Natural Resources*

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**MEMORANDUM**

**TO: Representative Sheldon, Chair, House Natural Resource, Fish, and Wildlife Committee**

**FROM: Mike Kline, Section Chief, Rivers Program, DEC Watershed Management Division  
Rob Evans, River Corridor and Floodplain Manager, DEC Watershed Management Division**

**DATE: February 11, 2019**

**RE: Answers to recent Rivers Program-related questions posed by the HNRFW Committee**

During recent testimony to the House Natural Resource, Fish, and Wildlife Committee, several questions were posed regarding DEC Rivers Program operations, the National Flood Insurance Program, FEMA buyouts, and river corridor delineation and infill procedures.

During our testimony on Thursday, February 7, 2019, several questions were posed by Representative Dolan regarding the number of project reviews and authorizations that are made for development in rivers, river corridors and floodplains. Attached to the end of this memorandum is a table from our results-based accounting spreadsheet which lists the annual technical and regulatory assistance provided by Program staff during the years 2015-2018. We would be happy to answer any questions the Committee may have regarding the work that is enumerated.

Also, in service to the Committee, The Nature Conservancy of Vermont forwarded the following questions, posed by members of your committee, following TNC testimony on the afternoon of Friday, February 8<sup>th</sup>, 2019. Below, we offer information that we hope will answer these questions.

1. Does FEMA offer support even after a homeowner refuses an initial buy-out?
2. Does FEMA offer the same amount of money every time?
3. Does FEMA pay for repairs if homeowner refuses?
4. Do private insurers provide insurance?
5. How are Vermont river corridors delineated?
6. Where and how is in-fill development authorized?

**1. Does FEMA offer support even after a homeowner refuses an initial buy-out?**

Generally, buyouts remain an option for homeowners, even if they initially opt out. In addition, if a homeowner is not interested in a buyout, FEMA's Hazard Mitigation Assistance (HMA) grant program can be used to retrofit a flood-prone building to reduce flood risk (e.g. elevating or relocating the building).

<https://www.fema.gov/news-release/2018/11/13/fact-sheet-acquisition-property-after-flood-event>.

**2. Does FEMA offer the same amount of money every time?**

FEMA typically funds 75 percent of the cost of property acquisition and demolition. The 25% non-federal share is typically the responsibility of the property-owner.

**3. Does FEMA pay for repairs if a homeowner refuses?**

If a homeowner has flood insurance, they can receive repair funding through the insurance claims process. If a homeowner does not have flood insurance and is not interested in a buy-out, limited post disaster funding may be available through the FEMA Individual Assistance program grant (maximum is \$33,000). Individual Assistance can only be used to cover those things that would not be covered by flood insurance (such as temporary housing, post flood clean-up, medical, moving/storage, etc.). Individual Assistance is only available if explicitly made available through the Presidential Disaster Declaration process. More information is here: [https://www.fema.gov/media-library-data/1461689021638-cfcfd7f6c263635802fa7a76a19e00ea/FS001\\_What\\_is\\_Individual\\_Assistance\\_508.pdf](https://www.fema.gov/media-library-data/1461689021638-cfcfd7f6c263635802fa7a76a19e00ea/FS001_What_is_Individual_Assistance_508.pdf).

**4. Do private insurers provide insurance?**

Yes, there are private insurers that provide flood insurance. However, it is typically very expensive and thus not a viable option for most homeowners.

**5. How are Vermont River Corridors delineated and updated?**

*(the following is excerpted from the DEC Flood Hazard Area and River Corridor Protection Procedure, adopted by the Department on September 7, 2017*

[https://dec.vermont.gov/sites/dec/files/documents/DEC\\_FHARCP\\_Procedure.pdf](https://dec.vermont.gov/sites/dec/files/documents/DEC_FHARCP_Procedure.pdf) )

River corridors encompass an area around and adjacent to the present channel where river erosion, channel evolution and down-valley meander migration are most likely to occur. River corridor widths are calculated to represent the narrowest band of valley bottom land necessary to accommodate the least erosive channel and floodplain geometry (i.e. equilibrium conditions) that would be created and maintained naturally within a given valley setting. The DEC Procedure outlines a process for recognizing certain rivers as highly managed or constrained by human structures and describes how a river corridor may be delineated to reflect the existence of “modified streams,” which are human constrained but exhibit vertical stability.

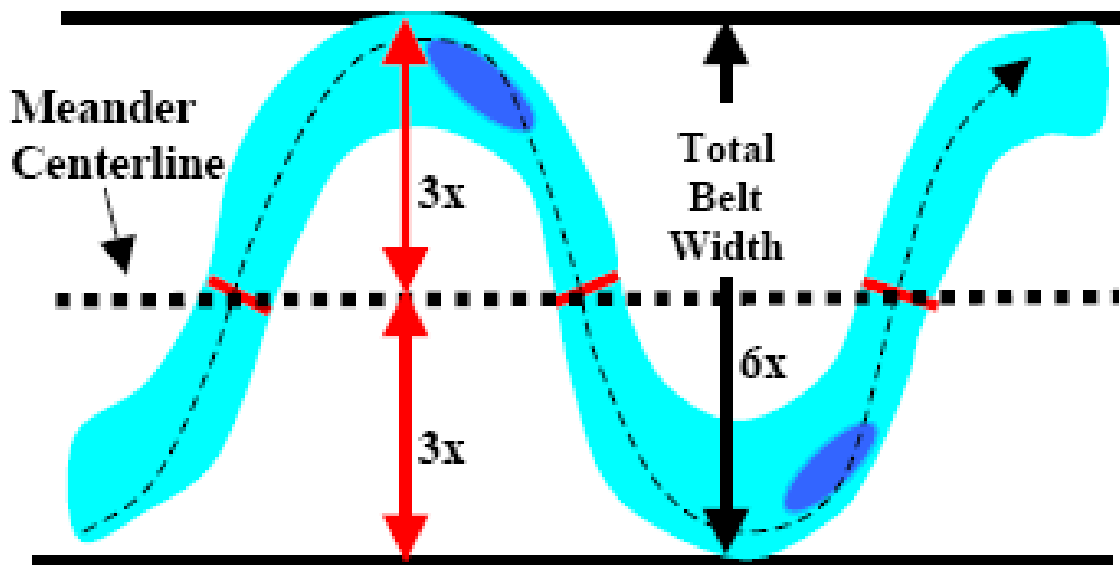
Managing a river corridor to accommodate equilibrium and channel adjustments serves to reduce damages to existing structures and property, avoid new damages, protect public safety, achieve the general health of the river system, and avoid the high cost to install and maintain channelization practices. Precluding the use of channelization practices, in turn, avoids the unintended consequences of transferring bank erosion and other damaging effects from concentrated flow and vertical channel adjustments to other locations along the river.

Consistent with the Performance Standards established in the State Stream Alteration Rule, this Procedure seeks to provide an adequate floodplain area to accommodate channel adjustments necessary to achieve and maintain vertical stability in the longitudinal profile over time. The meander belt represents, on average, the minimum amount of floodplain necessary to accomplish vertical stability. The river corridor includes space for both the meander belt and a riparian buffer.

Over 2,200 miles of Vermont streams have undergone detailed, field-based study through completed stream geomorphic assessments and the analysis of natural and altered meander belt geometry. Based on this data, the Agency has divided the vast network of Vermont's perennial rivers and streams into those streams which warrant geomorphic-based river corridor delineations, and those streams which, because of their low sensitivity, small watershed size, steeper valley slope, and/or valley confinement, may attain their least erosive form within an area delineated as a simple set-back from the top of each streambank.

**Meander Belt Component of the River Corridor.** A meander belt extends laterally across the river valley from outside meander bend to outside meander bend, thereby encompassing the natural plan form variability of the stream channel (Figure 1), which maintains the equilibrium slope and minimizes vertical channel instability over time along the extent of the stream reach.

Many Vermont streams, however, have been straightened, channelized, or have become incised (deepened), losing access to their historic floodplains. The lateral extent of present-day meanders in this case may be narrower than they would be under equilibrium conditions. These streams are undergoing channel evolution or the processes of erosion and deposition to adjust and reestablish a stable channel slope. Any river corridor which considers erosion hazards should accommodate both existing meanders and the meander belt width associated with equilibrium in order to minimize erosion processes. Where a stream has been straightened against the edge of the valley, bedrock may prohibit channel plan form adjustment along the valley toe, and, as such, the belt width (e.g., all six channel widths depicted in Figure 1) can only be achieved by providing more width on one side of the stream than the other.



**Figure 1. Depiction of meander centerline and belt width**

**Riparian Buffer Component of the River Corridor.** River corridors, for streams and rivers with drainages greater than 2 square miles, are defined and mapped with an additional 50-foot setback on either side of the meander belt to allow space for the establishment and maintenance of a vegetated buffer when the equilibrium slope and planform are achieved. The literature refers to appropriate buffer widths necessary to serve the different riparian functions important to society. The buffer component in the DEC Flood Hazard Area and River Corridor Protection Procedure is established for the functions of bank stability and slowing flood water velocities in the near-bank region. The Vermont General Assembly specifically called for the inclusion of buffers within the river corridor (10 V.S.A. § 1422(12)). Vegetated buffers are a least cost, self-maintaining practice to provide natural boundary conditions and stream bank resistance against erosion and moderate lateral channel migration. Providing space for these functions is consistent with the goal of achieving and maintaining

least-erosive, equilibrium conditions, thereby minimizing the risk of harm to life, property, and infrastructure from flooding.

**Procedure for Delineating the Meander Belt of the River Corridor.** The following steps describe how stream, floodplain, and valley characteristics are used to ascertain the meander belt of a river corridor. Variables include: the inherent stability of the stream channel; its sensitivity to erosion hazards; the presence of natural or significant human-created confining features; the evidence or likelihood of valley side slope failure; and the presence of hydrologically-connected features within the river valley.

- (1) **Streams with a Drainage of Less than or Equal to Two Square Miles.** On the base layer of the Statewide River Corridor Map Layer, perennial streams with a drainage area of less than or equal to two square miles shall be assigned a river corridor of 50 feet on either side of the stream, measured horizontally and perpendicularly from the top of each streambank, unless field data verifies a specific stream sensitivity type, in which case the river corridor may be amended consistent with the applicable provisions below;
- (2) **Very Low and Low Sensitivity Streams (with a drainage greater than 2 square miles).** The meander belt width shall be equal to the existing channel width, if the stream is a bed-rock or boulder substrate reference stream type (very low to low sensitivity). For mapping purposes, the meander belt shall be delimited at the top of the stream bank of the existing channel or a minimum of a half channel width on either side of the meander centerline, whichever provides the greater lateral extension on either side of the meander belt;
- (3) **Moderately Sensitive Streams (with a drainage greater than 2 square miles).** The meander belt width shall be equal to a minimum of four channel widths, if the stream (i.e., at the reach scale) is a steep to moderate gradient (greater than 2 percent gradient) reference stream type, and the existing stream type does not represent a stream type departure. The meander belt is delineated with a minimum of two channel widths on either side of the meander centerline; or,
- (4) **Highly and Extremely Sensitive Streams (with a drainage greater than 2 square miles).** The meander belt width shall be equal to a minimum of six channel widths, if the stream is a gentle gradient or braided reference stream type or if the stream is in a moderate gradient valley setting, but the existing stream type represents a stream type departure. For stream types that are in either very low gradient settings or very high deposition areas, the meander belt width multiplier may be increased up to eight times the channel width. The meander belt is delineated with a minimum of three to four channel widths on either side of the meander centerline. Within zones of extremely high and active deposition (e.g., active alluvial fans), the river corridor shall be delineated to include all recent channels and the entire zone of active depositional process; and

**Confining Features.** Where the meander belt extends a certain distance beyond the toe of the valley wall (including bedrock outcrops or ledge that limit river movement), the corridor is truncated at the valley toe, and that truncated distance is used to extend the meander belt laterally on the opposite side, to provide a total belt width as described above. This extension may, in some cases, be limited by the valley wall on the opposite side of the stream as well; in which case, the meander belt extends from the toe of one valley wall to the toe of the other and will be narrower than the multiple of channel widths prescribed above. State highways and railroads are treated in the same manner as valley walls.

## Map Updates.

River Corridor map must be updated and maintained. Updates are technical changes which fall into the categories of “minor updates” and “major updates.” Major updates involve the collection of data and analysis to reevaluate stream sensitivity type on which to derive specific meander belt or buffer widths. Minor updates include the correction of remnants from the mapping process, computer mapping errors, and adjustments to factor stream geomorphic features documented with data (e.g., unmapped bedrock outcrop) unavailable when the base layer was developed. Major updates may involve the analysis of:

- (1) Watershed Hydrologic Modifications including those natural processes and human activities or facilities which result in a significant **decrease** in peak discharges (e.g., flood control facilities); or significant watershed hydrologic modifications associated with, for example, land use conversion which raises peak discharges, as these activities serve to **increase** stream power, the level of erosion hazard, and stream sensitivity.
- (2) Slope Modifications Related to Sediment Transport and Sediment Regime Changes. Meander belt modelling captures a range of watershed factors and natural channel conditions and enables the State to cost-effectively implement this Procedure statewide. However, project proponents and their consultants may propose a stream-specific equilibrium slope assessment for a geomorphically-defined stream reach which, if approved, could be conducted and provide data to calculate a stream reach-specific meander belt width.

Updates delimiting vertically stable “modified streams” (designated as moderate to low sensitivity) fall into this category. A river corridor map amendment in consideration of a modified stream shall be limited to situations where the physical human constraints are so pervasive (e.g., the Winooski River through Montpelier) as to effectively preclude any expectation of re-establishing natural equilibrium conditions, and where active erosion hazards (vertical channel adjustments), upstream and downstream of the human-constrained reach, are low or have been mitigated.

- (3) Boundary Conditions. The resistance of the channel boundary materials to the erosive power of the stream as influenced by local conditions such as material type, size, and gradation; cohesiveness; and vegetation, or lack thereof, may significantly influence the anticipated range of channel adjustment and may therefore increase or decrease the level of erosion hazard, channel sensitivity, and river corridor extent. The role of human constructed channel stabilization treatments (such as rock rip rap) with respect to constraining channel adjustments, particularly in the absence of other improvements, will not be considered, because the typical long-term response to human-placed bank revetments is a higher rate of channel adjustment and an increased erosion hazard.
- (4) Bank and Valley Side-Slope Failure / River-Associated Landslide Hazard. There are stream bank, landslide, and other erosion hazards that may exist at or beyond the boundaries of the meander belt. The river corridor may be extended beyond the top of the banks, slopes, or meander belt if there is evidence of active toe erosion or historic mass wasting failures.

Additional information about Rivers corridors may be found in the “River Corridor FAQ” published on Vermont’s *Flood Ready* web page: <https://floodready.vermont.gov/rcfaq>.

## 6. Where and How Is In-Fill Development Authorized?

*(the following is excerpted from the DEC Flood Hazard Area and River Corridor Protection Procedure, adopted by the Department on September 7, 2017*

[https://dec.vermont.gov/sites/dec/files/documents/DEC\\_FHARCP\\_Procedure.pdf](https://dec.vermont.gov/sites/dec/files/documents/DEC_FHARCP_Procedure.pdf) )

DEC issues permits for development under the jurisdiction of the Flood Hazard Area and River Corridor Rule and makes recommendations for the regulation of development under Act 250 jurisdiction (specifically Criterion 1(D)) based on the proposed development meeting a “No Adverse Impact” standard. This means new habitable structures, accessory structures, public and private utilities, and public transportation infrastructure are not permitted within river corridors.

Exceptions to the “No Adverse Impact” requirement within the river corridor, include:

(i) **Redevelopment and infill development in designated centers** provided that the Secretary determines that the proposed development will not cause or contribute to fluvial erosion hazards as determined in using the River Corridor Performance Standard defined below.

(ii) **Bridges, culverts, utility crossings, and associated transportation and utility networks; dams; and functionally dependent uses that must be placed in or over rivers and streams.** “Associated transportation and utility networks” include those transportation and utility networks connected to a bridge, culvert, or utility for the purpose of crossing a river or stream and do not include transportation or utility networks within the river corridor that merely run parallel to a river or stream.

(iii) **The replacement of improvements within a comparable footprint of an existing improvement or immediately adjacent to an existing improvement**, provided that the replacement improvement meets the River Corridor Performance Standard defined below; and, where the improvement is not a habitable structure, it is not replaced with a habitable structure.

(iv) Meeting the **River Corridor Performance Standard**: In addition to the specific exceptions outlined in subdivisions (i) through (iii) above, development shall be allowed within the river corridor if the Secretary determines that, because of other existing and adjacent development within the corridor, the proposed development will not cause, contribute to, or be highly susceptible to fluvial erosion hazards. To make this determination the Secretary must find that a proposed development will:

- (1) not be placed on land with a history of fluvial erosion damage or be imminently threatened by fluvial erosion;
- (2) not (newly) cause the river reach to depart from or further depart from the channel width, depth, meander pattern, and slope associated with natural stream processes and equilibrium conditions; and
- (3) not result in an immediate need or anticipated future need for stream channelization, solely as a result of the proposed new development, that would increase flood elevations and velocities or alter the sediment regime triggering channel adjustments and erosion in adjacent and downstream locations.

cc. Rebecca Ellis, Deputy Commissioner, DEC  
Mary Borg, Deputy Director, Watershed Management Division  
Phil Hoffman, Director of Government Relations and Policy, TNC  
Rose Paul, Director of Science and Freshwater Programs, TNC

## Number of Projects the DEC Rivers Program Annually Provides Technical and Regulatory Assistance

		2015	2016	2017	2018	AVE
<b>Technical Assistance and Project Review</b>		<b>2418</b>	<b>2487</b>	<b>3634</b>	<b>2905</b>	<b>2861</b>
<b>Permits / Authorizations Issued</b>		<b>824</b>	<b>823</b>	<b>1053</b>	<b>1010</b>	<b>928</b>
<b>Protect</b>	<b>Easements TA / Review</b>	18	21	25	20	21
	<b>Easements Completed</b>	6	12	13	12	11
<b>Maintain</b>	<b>TA / Review**</b>	1679	1845	2769	1985	2070
	<b>Permits</b>	477	474	643	506	525
<b>Enhance</b>	<b>TA / Review</b>	258	182	241	273	239
	<b>Permits</b>	125	106	129	207	142
<b>Restore</b>	<b>TA / Review</b>	463	439	599	627	532
	<b>Permits</b>	279	231	268	285	266

### Types of maintenance projects

- Bed and Bank Stabilization and Other Minor Stream Alterations.
- Bridge and Culvert Repair
- Woody Debris Management (incl. work at beaver dams)
- Maintenance of Channel Conveyance (dredging to protect improved property)
- Municipal Floodplain and River Corridor Projects (\*\*representing at least half the annual project numbers listed)
- ANR Jurisdictional Floodplain and River Corridor Projects
- Act 250 Floodway Determinations to Protect Floodplains and River Corridors
- Flow and Habitat Maintenance

### Types of enhancement projects

- Culvert Retrofits to Enhance Fish Passage
- Bed or Bank Treatments Incorporating Fish Habitat Features
- Reductions and Relocation of Building Footprints and Reduction of Other Existing Fills
- Riparian Buffer Plantings
- Flow and Habitat Enhancements

### Types of restoration projects

- Removal of Berms, Derelict Dams or Stream Crossings
- Size and Replace Bridges and Culverts to Standard
- Floodplain and Equilibrium Channel Restoration (incl. bed fills or floodplain cuts)
- Removal of buildings from Floodplain or River Corridor
- Flow and Habitat Restoration