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Introduction to the Vermont ANR
Stream Alteration General Permit Program

Wild Branch, Wolcott, 1995

Throughout this Program Introduction, the reader is instructed to see *guidance and permit documents* which have been prepared by the Rivers Program and made available on the "Rivers Management and Permits" web page at: *http://www.vtwaterquality.org/rivers/htm/rv_management.htm*.

Purpose of Stream Alterations

Stream alterations are typically conducted for purposes which fall into four categories. The first and most common purpose is to ***resolve a conflict***. These are projects where existing investments in private property or public infrastructure are threatened by fluvial erosion or flood inundation. Such projects most often consist of stream bank armoring, vertical stabilization of the stream bed, clearance of flow obstructions, adjustment of the channel profile (channel bed elevation), scour protection, and horizontal realignment of the channel.

The second purpose is c***onstruction of new development*** in, under, or along a stream or river; such as a new bridge, culvert, ford, buried utility crossing, water and sewer intakes and outfalls, and bank armoring for the protection of new development in a flood plain or riparian area.

The third purpose is the ***reconstruction or modification of existing development*** typically due to structural and/or service deficiencies, deterioration, or, in some cases, removal.

The fourth, and least common, of stream alteration purposes, is the ***restoration of dynamic equilibrium conditions*** in the stream or river. These projects are typically undertaken to reduce or mitigate existing flood and erosion hazards, and/or restore in-stream and riparian fisheries and wildlife habitat. Restoration projects may involve removal of existing property investments or infrastructure, placement of in-stream structural elements, re-establishment of equilibrium slope through channel re-alignment, and excavation of overbank areas to restore a functioning flood plain.

Primary Considerations for Success

Streams are dynamic (ever-changing) systems that respond to many natural and human-imposed influences. Existing and new human investments in private property and public infrastructure, when located in, across, under, and along rivers and streams, are at risk and vulnerable to damage due to the dynamic nature of fluvial systems. In most cases, these vulnerable facilities are dependent upon streams remaining static or unchanging, for the long term viability of the private property uses or public infrastructure. To be static, or confined to one state or form, is not the natural, sustainable condition of rivers. To expect or attempt to force streams to never change guarantees future conflict and loss. Armoring streams in place often exacerbates the hazard and frequently transfers the hazard to threaten other property and infrastructure.

The long term viability of human investments along rivers, and the stream alterations often necessary to protect these investments, is dependent upon the extent to which the project accommodates stream ***dynamic equilibrium***. Dynamic equilibrium exists when water flow, sediment, and woody debris are transported by the stream channel in such a manner that the stream maintains its dimension, general pattern, and slope without unnaturally aggrading (raising) or degrading (lowering) the channel bed elevation. See an *Introduction to Dynamic Equilibrium* on the River Management and Permits web page.

Accommodating Dynamic Equilibrium

In order to achieve the greatest potential for success of a planned or proposed stream alteration activity, it is necessary to identify the most likely river form that exists or would exist in dynamic equilibrium at the location of the alteration. This involves the evaluation of several factors:

1) What stage of channel evolution exists at the present time at the project location? Stream reaches or segments evolve through predictable and transient forms or states in response to many, usually human imposed, influences including channelization, dredging or gravel mining, confinement due to armoring, watershed-scale hydrologic changes, and flood plain loss or encroachment. The driving force behind channel evolution is the process of the fluvial system seeking a state of dynamic equilibrium. For more detail see an *Introduction to Stream Channel Evolution.*

2) What is the dominant sediment regime that exists in this stream segment at this point in time? Does the current sediment regime represent a departure from the sediment regime that would exist in a state of dynamic equilibrium? For more technical detail about sediment transport and its association with dynamic equilibrium and channel evolution, see the Program fact sheet: *River Dynamics 101*.

3) Is the energy of the stream at its bankfull discharge balanced with the resistance of the channel boundaries, either at the site of the proposed activity or in adjacent stream segments upstream and downstream? Is the channel bed profile (elevation) experiencing aggradation or degradation? Is the longitudinal slope of the channel so steep as to result in the erosion of stream banks, scouring of the stream bed, unnaturally increased volume or gradation of the sediment supply, or all of the above? Does the channel need to lengthen itself through lateral migration, becoming less straight, achieving greater sinuosity, thereby reducing it slope, and re-establishing a balance with the channel boundary materials? For more detailed guidance on the assessment of stream morphology, see the *Stream Equilibrium Assessment Guide*.

4) To what extent has the stream lost or retained access to its flood plain or overbank areas? Is the stream unnaturally confined by human encroachments and to what extent?

Preparing a Stream Alteration Project Proposal

The Vermont Agency of Natural Resources, through its Rivers Program, is directed by state statute (10 VSA, Chapter 41) to provide regulatory and technical assistance services related to alteration of all perennial streams. More information may be obtained in *Guidance for the Identification of Perennial Streams.*

A Stream Alteration General Permit has been adopted that creates jurisdictional thresholds and categories of activities for the regulatory framework. The ***Stream Alteration General Permit*** is available at the River Management and Permits web page and contains a table summarizing the jurisdictional framework. A *General Permit Jurisdictional Summary* document is also available.

The Stream Alteration General Permit establishes several watershed area-based thresholds that influence the level of regulatory authority that will be applied to a planned stream alteration activity. Depending on the type of activity anticipated, it is necessary to determine the watershed size at the location of the proposed project, relative to the regulatory thresholds. Is the watershed size:

- Less than 0.5 square miles;
- 0.5 square miles or greater, but less than 1.0 square miles;
- 1.0 square miles or greater, but less than 10.0 square miles; or
- 10.0 square miles or greater?

An on-line map of watershed size ranges is available to assist in the determination of watershed size at the location of any proposed stream alteration activity at the River Management and Permits web page. Contact a River Management Engineer for additional assistance. For contact information: http://www.anr.state.vt.us/dec/waterq/rivers/docs/rv_contact.pdf

Examine the provisions of the Stream Alteration General Permit to determine whether your project will be considered an exempt activity, non-reporting activity, reporting activity, or subject to an Individual Permit. Permit applications for a reporting activity or an Individual Permit are available at: the River Managements and Permits web page. At any time in the process you may contact a River Management Engineer for assistance in the application process and on-site technical assistance.

Roaring Branch, Bennington, 2010
Removal of confining berm and restoration of flood plain