Conservation Matters

A monthly column focused on conservation education, as the result of collaboration among several area conservation commissions and organizations.
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Thornton Flood Hazard Analysis

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Flooding continues to be one of the greatest regional threats to public safety, property and infrastructure. The National Flood Insurance Program (NFIP) has been promoted by the Federal Government and requires that municipalities regulate construction in flood hazard areas in order to qualify for flood insurance. Thornton entered into the program in the early 1970's and as required under the program, incorporated a flood zone ordinance to mitigate flood related harm. The flood zone ordinance relies upon the Digital Flood Insurance Rate Map (DFIRM) as published by FEMA to determine those areas in which the ordinance applies. The current FEMA flood map was released in 2009 and has served as a model for planning purposes since.

In 2011 and 2012, Hurricane's Irene and Sandy respectively caused considerable flood water inundation, infrastructure damage and property loss. Leading up to these events, expectations were found conspicuously different than outcome. As such, concerns over the applicability of the FEMA flood map for planning purposes had been cited by the Planning Board. A Flood Hazard Analysis was therefore conducted last fall in a collaborative effort between Plymouth State University and the Town of Thornton. The goal was to determine flood water extent and damage from Irene and Sandy and compare and contrast those findings with the current FEMA flood map. With the assistance of Tom Dubey, Thornton Road Agent –Retired, flood water inundation levels among roadways, campgrounds, trails, local businesses, public and private property, as well as points of road, rail, and culvert washout were located and marked for Geographic Information System (GIS) analysis.

Much of the immediate area along the Pemigewasset and Mad River is in the FEMA flood zone. Numerous low (1st, 2nd and 3rd) order streams run into both these rivers. Spatial analysis demonstrated nearly 50% of the data points collected were near these low order streams, yet remained outside any identifiable flood hazard area. Many of these streams are unnamed; however, among the named are: Bagley Brook, Chickenboro Brook, Eastman Brook, Hackett Brook, Hubbard Brook, Mill Brook, Johnson Brook, Lee Brook, Smarts Brook and Talford Brook. Upon further analysis, establishment of a 300' buffer zone around all rivers and streams demonstrated 75% containment of all flood related data points while a 350' buffer demonstrated nearly 100% containment. Although straightforward placement of a 350' buffer around all rivers and streams could be proposed, two additional factors need be considered. First, a +/- 50' margin of error was

found to exist between GPS point and GIS map data; thus, a flood hazard area of 300’ +/- 50’ was deemed both appropriate and warranted around all rivers and streams. Second, topology was found an important factor. Depression type areas allowed for significant pooling of water while areas of moderate slope did not. Deductions made through the use of Digital Elevation Models (DEM) demonstrated no flood related impacts on any slope greater than 16° within either the FEMA flood map, or during the spatial analysis process. Therefore, areas containing slope greater than 16° need not be considered flood prone.

The Planning Board whom cited concerns over utilizing existing flood maps for planning purposes were legitimized through science and technology. Upon completion of the Flood Hazard Analysis, augmented flood map products and a final report were presented to the Board. Although Hurricane frequency and intensity are expected to increase, local communities have a unique opportunity to undertake proactive measures against this premise. Flood resiliency is the ability to cope with and recover from flood related events. A Flood Resilience Program (See Vermont Act 16) can encourage a flood resilient community by: 1) assessing hazards and assets; 2) avoiding increased risk; 3) reducing current risk; 4) preparing for an emergency; and 5) insuring any residual risk. Thornton’s recent Flood Hazard Analysis is a critical first step in such a program.

While the existing flood zone ordinance has effectively served to reduce past flood related damage, safeguarding the newly defined flood hazard area can serve to further reduce risk to public safety, property and infrastructure in the future. To be successful in such an endeavor, meaningful dialogue and the exchange of information must take place among scientists, managers, decision makers, and the general public. This has long been recognized as a critical need in environmental science.