“Freeboard” is a nautical term for the amount of boat above the water line, and for purposes of floodplain management means extra elevation (usually expressed in feet) above the estimated base flood elevation. Freeboard requirements compensate for the many unknown factors that could contribute to flood heights greater than the height calculated on flood maps, such as ice and debris jams, restrictive bridge openings, and the hydrological effect of urbanization of the watershed. Any fill that was placed in the floodplain after the maps were produced also has raised flood heights to some degree beyond what the maps show. Freeboard also provides a factor of added safety for when the actual flood levels are higher than that calculated for the "100-year flood."

"Freeboard" is defined as follows (from 44 CFR 59.1):

Freeboard means a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

An example of a freeboard requirement is that a local floodplain management ordinance may require a structure's lowest floor to be placed 1 foot (at a minimum) above the 100-year flood level. Many communities across the nation have chosen to have 2 feet or even 3 extra feet for their freeboard requirements.

Conventional wisdom suggests that modern maps are accurate: clearly and flawlessly depicting features, distances, and issues for development planning. However, the fact that maps are now digital and look high-tech can belie underlying errors. Maps are only as accurate as the data that created them, and in the case of floodplain maps, representations of risk may be products of highly-detailed modeling or simply best estimates based on historical records. (For more information on floodplain maps and mapping, please see the companion fact sheet #3 Living with Inadequate Maps.)

Many communities are now receiving new flood maps, but these are often just digital versions of previous maps, not maps created from new flood data. (cont’d on page 2)
Use of Setbacks

Setbacks are the horizontal version of freeboard, limiting development in areas that may be at risk of flooding, even though they may not be designated as such on FIRMs. This can take place in two ways – restricting basements near the flood zone, and staying back from eroding stream banks.

Flood regulations must restrict basements within the flood zone, since water above the ground also means water below the ground. However, most regulations stop restricting basements right outside the flood zone boundary. Even though the surface may not be inundated beyond that point, water can be in the soil and under considerable pressure well past it. Therefore, continuing to restrict basements near mapped flood zones can be a prudent public safety measure.

Areas with eroding streambanks may be at an elevation where they will never flood, but then the river moves sideways, the bank fails, and what was high and dry falls into the river.

Significant amounts of flood damage occur in exactly this way in Vermont. Keeping structures fifty feet back from the top of streambanks is the recommended state minimum.

These homes under construction in Stowe are near an obviously eroding bank. The river moving towards the homes is more of a danger than a flood rising over the bank.

What is Freeboard and Why is it Good? (cont’d)

When flood hazard areas are actually recalculated using the latest topography and other information, recalculated flood heights in parts of Vermont have been raised by a few feet. Having freeboard provisions provides a margin of safety for new development in poorly mapped areas, helping landowners and developers to avoid unpleasant surprises if an area is restudied for new flood maps.
Fluvial Erosion Hazards (FEH)

Much flood damage in Vermont is associated with stream channel instability, also known as the fluvial erosion hazard (FEH), as opposed to inundation related losses. This is a reflection of Vermont’s natural geography and its human landscape consisting of steep, relatively narrow valleys with agricultural land uses, highway infrastructure, private residences and commercial properties located in close proximity to stream channels.

River channels that are undergoing an adjustment process as a result of historic channel management activities or floodplain encroachments oftentimes respond catastrophically during large storm events.

The NFIP standards often allow for significant encroachment within floodplain areas and river corridors that may prevent the stream from ever re-establishing its stability. The NFIP standards do not recognize the danger present in unstable channels which may be undergoing a physical adjustment process. The stream bed may be eroding or it may be actively aggrading due to erosion occurring upstream.

The damage in the photo below occurred in a single flood event where the channel moved precariously close to the structure.

The NFIP standards often allow for significant encroachment within floodplain areas and river corridors that may prevent the stream from ever re-establishing its stability.

Special mapping and geomorphic assessments can identify FEH areas along rivers, more comprehensively defining high-hazard areas. For more information on this additional area that towns should consider regulating, contact your regional planning commission or VT DEC’s River Management Program. (This article is adopted from a factsheet by the River Management Program).
This is an example of a map showing both floodplains and fluvial erosion hazard (FEH) areas. Note that the FEH zones are often much larger than the floodplains, in this case showing many areas unlikely to be inundated but having a very high risk from erosion.