

**Background and Considerations of the Federal Emergency
Management Agency's National Flood Insurance Program &
Local Floodplain Management Regulations
As They Relate to the
Study of Restoring Tidal Flow to the West Branch of the Pleasant River
Addison, Maine**



Prepared for

**The Town of Addison, Maine and the
West Branch Study Committee**

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Relevant Terms and Acronyms

Federal Emergency Management Agency	FEMA
National Flood Insurance Program	NFIP
Flood Insurance Study	FIS
Flood Insurance Rate Map	FIRM
Special Flood Hazard Area (100-year floodplain)	SFHA
Base Flood Elevation (100-year flood elevation)	BFE
National Geodetic Vertical Datum (1929)	NGVD
North American Vertical Datum (1988)	NAVD
Mean High Water	MHW
Mean Spring High Water	MSHW
Army Corps of Engineers	ACoE
National Oceanic and Atmospheric Administration	NOAA
Natural Resources Conservation Service	NRCS
Maine Department of Transportation	Maine DOT
Maine Office of Geographic Information Systems	Maine Office of GIS

Introduction

The Town of Columbia and Addison's West Branch Study Committee has been gathering and examining a multitude of informational layers, including; local knowledge, existing and emerging sets of historical and scientific data, new topographic maps, and information on the jurisdictions and regulations of various federal, state and local entities as they relate to the study of restoring tidal flow to the West Branch of the Pleasant River. As a part of this data gathering phase, the Committee has requested information on the relevant regulations of the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) and requirements of local Floodplain Management Ordinances that pertain to their study of the West Branch. This paper will supply a general background on the NFIP, an outline of the communities' mapping and participation status with the NFIP, and a discussion of the federal and local floodplain regulations that would need to be taken into consideration if future options and plans for restoring tidal flow were to be proposed.

In discussing the relevant floodplain regulations, this paper makes frequent reference to "restoring tidal flow". Use of this phrase does not mean a decision has already been made on restoring any, some, or all tidal flow. Rather, the phrase is used when explaining the floodplain issues that need to be considered IF any amount of tidal flow were to be restored. The West Branch Study Committee is not tasked with and is not developing any particular plan for changing the tide gates or the dam (dike). They are gathering data and studying related issues that will assist in the initial identification of potential options for town officials and the public to consider. Future public meetings, collaboration with the Maine Department of Transportation as well as other agencies, and eventually town votes will need to occur before any plan to restore partial or full tidal flow is pursued.

Background

The National Flood Insurance Act of 1968 and The Flood Disaster Protection Act 1973 established **The National Flood Insurance Program (NFIP)** in response to significant flood disaster events and uninsured losses in the '50s and '60s that were severely impacting the public, local, state and federal governments. Early floodplain management policies had focused on striving to keep flood waters away from areas of development through the construction of flood protection structures, such as levees, floodwalls and channelization projects. This proved to be ineffective. Inadequate protection or failure of such flood control structures combined with ever increasing development in and near flood prone areas resulted in a cyclical pattern of flood/damage/repair – flood/damage/repair. Floodplain management policy began shifting from the focus on structural solutions to include recognition and protection of the floodplain as a natural resource, mapping of the nation's Special Flood Hazard Areas, protection of floodplain development through building/construction design standards, and a federally backed but self-sustaining flood insurance program tied to community participation and federal lending laws. A community is considered the political area having the authority to adopt and enforce land use regulations. For the organized portions of Maine, this would be the municipality and in the unorganized areas it would be the Land Use Regulation Commission (LURC).

The NFIP was designed in support of this expanded policy and is a multi-faceted, floodplain management, flood loss mitigation and flood insurance program that operates on a Quid-Pro-Quo, or tit-for-tat basis.

- The federal government supplies the "Quid":

- The mapping of designated Special Flood Hazard Areas on a Flood Hazard Boundary Map or Flood Insurance Rate Map;
 - Availability of federally backed flood insurance (which is mandatory for any federally backed loan on buildings located within the Special Flood Hazard Areas); and
 - Federal Disaster Assistance loans.
- In exchange for the Community's "Quo":
 - Voluntary application to participate in the NFIP;
 - Adoption of a Resolution to Join the NFIP; and
 - Adoption, administration and enforcement of floodplain management regulations that meet the minimum criteria outlined in FEMA's federal floodplain regulations in 44 CFR Part 60.

Maps

Federal mapping of Maine's floodplains began in the early 70's with most municipalities receiving **Flood Hazard Boundary Maps** and information on joining the NFIP in 1974 and 1975. The majority of Maine's more technical **Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM)** activities were undertaken from the mid 1980's through the early 1990's, with more sophisticated and accurate digital mapping currently being undertaken in some parts of the country and Maine.

On the maps, FEMA has delineated the **Special Flood Hazard Area (SFHA)**, the portion of the natural floodplain that will be inundated with water during a **Base Flood**, which is a flooding event having a 1 percent chance of being equaled or exceeded in any given year, commonly referred to as the 100-yr flood. However, this term is misleading and it is important to remember that if a Base Flood occurs this year, there is still a 1% chance of a Base Flood occurring next year and the year after that. Different areas within Maine have experienced a "100-year" event during the past century: 1896, 1923, 1936, 1978 (Jan & Feb), 1987, 1991, and 1994.

The Special Flood Hazard Areas (SFHA), or 100-year floodplains, are depicted as shaded zones on the flood map. Flood Insurance Studies (FIS) have been conducted in roughly half of Maine's mapped communities and provide **Base Flood Elevation (BFE)** data for many flood zones on the maps. The Base Flood Elevation is the elevation to which the flood water will rise in a Base Flood, or 100-year event. The most commonly mapped zones are A, AE and VE.

Zone A – SFHA where no base flood elevation data has been calculated by FEMA = no Flood Insurance Study (FIS)

Zone AE – SFHA where a FIS has provided base flood elevations

Zone ZE – SFHA in open coastal areas where high velocity wind and water causes wave action of three feet or greater in height and a FIS has provided base flood elevations

Historically, the elevation datum used by FEMA for calculating and depicting flood elevations was the **National Geodetic Vertical Datum (NGVD)**, or mean sea level 1929. More recently FEMA began using the **National American Vertical Datum (NAVD)** of 1988 to be more consistent with current mapping standards. When gathering and reviewing elevation sensitive data it is critical to assure that all the information is either produced using the same datum or is converted to the same datum. Vertical elevation conversion adjustments, which vary by locale, are available on NOAA's website at http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl. Using this website and entering the

approximate latitude and longitude of the Ridge Road crossing of the West Branch provides the adjustment figure for converting NVGD elevations to NAVD, which is -0.686. The following shows the conversion of the 100-year flood elevation for the West Branch from NGVD to NAVD: 11.7 feet NGVD – 0.686 feet = 11.014 feet NAVD. For regulatory purposes, the figure is rounded to the nearest tenth of a foot, or 11.0 feet NAVD.

For communities that have chosen to participate in the National Flood Insurance Program (NFIP), the mapped zones are the Special Flood Hazard Areas where development must be reviewed and permitted according to the federal and local floodplain regulations. For communities that are mapped but have chosen not to participate in the NFIP (or are under suspension from the Program), the Flood Hazard Boundary Map or Flood Insurance Rate Map is still in effect. Lending institutions, insurance agents, surveyors, engineers, State and Federal agencies all use the flood maps that are in effect, regardless of community participation. As stated above, the NFIP lending laws (since 1973) have required the mandatory purchase of flood insurance as a condition of any federally backed loan for a building that is located in a Special Flood Hazard Area. Although flood insurance through the NFIP is available for any insurable structure anywhere in a participating community, it is not available for anyone, anywhere in a non-participating community.

Mapping Status for Addison and Columbia

The coastal Town of Addison has a Flood Insurance Study and Flood Insurance Rate Map that became effective July 16, 1991. The field work and hydrologic and hydraulic analyses for this study were completed by ENSR Engineering and Consulting under contract to FEMA. The datum used for vertical elevations in this study is National Geodetic Vertical Datum or NGVD (mean sea level 1929). The horizontal scale of the map is 1 inch equals 1,000 feet. Open coastal areas in Addison are mapped as high wind and water velocity areas, Zone VE, with Base Flood Elevations ranging from 22 to 14 feet above mean sea level. More protected tidal areas where wave heights are less than three feet are mapped as Zone AE and have Base Flood Elevations from 12 to 14 feet. The West Branch Pleasant River is located in a protected area impacted primarily by tidal storm surge and is mapped as a Zone AE with a Base Flood Elevation (BFE) of 12 feet. For mapping purposes only, this figure was rounded up from the regulatory Base Flood Elevation of 11.7 feet NGVD listed in Table 1 of the Flood Insurance Study. This elevation is the storm surge, or stillwater water elevation (coastal Base Flood Elevation in areas not subject to high wave action) as calculated by the Army Corps of Engineers for this section of the Maine coastline. The 11.7 feet NGVD figure can be converted to NAVD by using the -0.686 adjustment figure, producing a Base Flood Elevation for the West Branch of 11.014, which rounds to 11.0 feet NAVD.

The Town of Columbia has a Flood Hazard Boundary Map that became effective February 14, 1975. All of the special flood hazard areas, including the West Branch Pleasant River, are mapped as Zone A, with no base flood elevations provided. However, for study and planning purposes, the elevation data from the Addison FIS and FIRM for the West Branch can and should be used in Columbia for the river, brook and marsh areas that have elevations at or below 11.7 feet NGVD (or 11.0 feet NAVD). The horizontal scale of Columbia's Flood Hazard Boundary Map is 1 inch equals 1,200 feet.

Community Participation

Here in Maine, the State Planning Office is the State Coordinating Office for FEMA. Within the State Planning Office, the Maine Floodplain Management Program provides an abundance of information

and technical assistance on all NFIP issues and serves as a liaison for the local, State and Federal governments. With the assistance from the Maine Floodplain Management Program, approximately 93% of Maine communities (including LURC's entire jurisdiction) have voluntarily joined the National Flood Insurance Program. To participate in the Program, communities must complete a FEMA application, adopt a "Resolution to Join the NFIP" and adopt land use regulations consistent with the FEMA regulations and State Model Floodplain Management Ordinance. The Model Ordinance, produced by the Maine Floodplain Management Program, meets and even exceeds the federal minimum criteria and is customized for municipalities to include the effective Flood Hazard Boundary Map or Flood Insurance Rate Map and Flood Insurance Study (if produced), the specific flood zones reflected on their Map, the related standards for those zones, and the local officials designated to administer and enforce their Ordinance.

The Resolution that a municipality must adopt to join the NFIP stipulates that they agree to:

- Require and recognize the evaluation of flood hazards in all official actions relating to land use in the special flood hazard areas;
- Enact, maintain, administer and legally enforce floodplain management regulations within the Special Flood Hazard Areas, consistent with the criteria in the federal regulations;
- Maintain for public, state or federal inspection a record (i.e. floodplain applications/permits) of lowest floor elevations (including basements and enclosures) for all new or substantially improved structures located in the Special Flood Hazard Areas;
- Provide information as FEMA may request concerning present uses and occupancy within the Special Flood Hazard Area;
- Cooperate with Federal, State, local agencies and contractors who study, survey, map and identify floodplain areas;
- Cooperate with neighboring communities with respect to management of adjoining floodplain areas;
- Take such other official action as may be reasonable necessary to carry out the objectives of the Program.

Participation Status for Columbia and Addison

The Town of Columbia made the decision not to join the NFIP when the Federal Insurance Administration first presented the community with the opportunity along with its Flood Hazard Boundary Map in 1975. Since February 14, 1976 Columbia has officially been listed by FEMA as a non-participating community. The 1975 map is still in effect and would likely not be updated until and unless the community joins the NFIP. There has been some communication between the Town and the Maine Floodplain Management Program within the last two years regarding a request for information on joining the NFIP.

The Town of Addison does participate in the NFIP. In March, 1975 they completed an NFIP application, adopted a "Resolution to Join the NFIP" and a Floodplain Management Ordinance, which was submitted to the State and then FEMA in August 1975. The Town has continued since 1975 as a participating community and has periodically voted to update its ordinance to remain consistent with changes in the FEMA regulations and State Model Ordinance and also when a new Flood Insurance Study and Flood Insurance Rate Maps were produced for Addison in 1991. The current Floodplain Management Ordinance, dated March 8, 2005 is administered by the Planning Board and enforced by the Code Enforcement Officer.

Local Ordinance Requirements

The local Floodplain Management Ordinance establishes an application, review, permitting and enforcement process, to assure appropriate development within the floodplain that meets specific development standards and compliance with the federal regulations. Diligent administration and enforcement of the local Floodplain Management Ordinance will protect the floodplain resource and reduce future flooding losses, which can include physical damage (structures and infrastructure), bodily injury, and economic burden to property owners, as well as the local, state and federal government.

The following is a somewhat sequential listing of the pertinent sections of the local Floodplain Management Ordinance that should be taken into consideration as the West Branch Study Committee continues their studies, and must be complied with if the Town of Addison approves any future changes involving the West Branch Pleasant River. These requirements will not apply to the Town of Columbia as it has not adopted a Floodplain Management Ordinance.

Article II – Permit Required

According to the Town of Addison’s Floodplain Management Ordinance:

A Flood Hazard Development Permit application shall be obtained from the Planning Board before any type of development (as defined in Article XIV) is undertaken in the special flood hazard area.

Definition (Article XIV) - Development - Any change caused by individuals or entities to improved or unimproved real estate, ...

Any future proposal involving alterations to the West Branch Pleasant River tide gates, bridge, dam and/or other upstream road crossings constitutes “development” as defined in the Ordinance. As shown on Panel 5 of the Addison FIRM, the area is mapped within the 100-year floodplain (Zone AE). Therefore a local Flood Hazard Development Permit Application would be required prior to any future development taking place.

If Addison contributes any town funds or services, or utilizes grant funds in support of a future project on the West Branch, the Town itself must apply for and receive a Flood Hazard Development Permit from the Planning Board. If the Maine DOT undertakes the entire project with no contributions from the Town, neither is required to obtain a local Flood Hazard Development Permit. However, the Maine DOT is expected to comply with federal and local floodplain management regulations.

Article III – Application for Permit

This section lists the information to be included on the local Flood Hazard Development Permit Application, which according to Addison’s Ordinance is to be obtained from and submitted to the Planning Board. The local permit application and permits can be based on the models developed for communities by the Maine Floodplain Management Program (available on their website at www.maine.gov/spo/flood).

In addition to basic information, the required pieces of technical information that would be needed on an application for any future project involving the West Branch include:

- general location map and a specific site plans for each river or stream crossing;
- specification of dimensions of the proposed development;
- certified statement (from a professional engineer) that bridges will meet the standards of Article VI.M.;
- description of the extent to which any water course will be altered or relocated as a result of the proposed development;
- statement of construction plans describing how the applicable development standards in Article VI will be met (this will include the submission of scientific data).

Article V – Review Standards – The Planning Board shall:

- A. *Review all applications for the Flood Hazard Development Permit to **assure that proposed developments are reasonably safe from flooding** and to determine that all pertinent requirements of Article VI (Development Standards) have been, or will be met.*

Developments are to be designed and constructed to withstand the floodwater forces associated with a 100-year event at the site and to not increase the effects of flooding on other structures or land. For large scale projects this review criteria is frequently satisfied by the submission of technical plans, studies and certificates that have been signed by licensed professionals and accompany the application. However, it is important for the Planning Board and Code Enforcement Officer to know which development standards in the Ordinance must be satisfied for every proposal submitted in order to make sure that the applicant has properly addressed how they will meet all the “*pertinent requirements*” and submitted all necessary data and certificates. If needed, the Maine Floodplain Management Program can provide technical assistance to the Town (and project partners) on ordinance interpretation and permitting requirements regarding future proposals on the West Branch.

- D. *Determine that all necessary permits have been obtained from those federal, state, and local government agencies from which prior approval is required by federal or state law. (i.e., ACoE 404 permit, DEP Natural Resource Protection Act (NRPA) permit, local Shoreland Zoning permit, and possibly others).*

Before any future permitting could take place for changes to the West Branch, the Planning Board would need to make sure that other required permits have already been obtained. This protects the town from issuing a local floodplain permit on a project that does not comply with other federal, state or local regulations. The local floodplain permit is the last in the line of permits to be issued.

- E. *Notify adjacent municipalities, the DEP, and the Maine Floodplain Management Program in the State Planning Office prior to any alteration or relocation of a water course and submit copies of such notifications to FEMA.*

This is an extremely important review standard that a municipality does not want to overlook, as there can be significant fiscal repercussions. If any alteration of the tide gates or dam is proposed in the future, it will be the town’s responsibility to notify the State and Federal agencies listed above, which may result in the town being required to submit additional technical/scientific data to FEMA as outlined in the federal regulations at 44 CFR Part 65 (discussed below on page 10). Being aware of

this requirement ahead of time can help the town be prepared to ask engineers who may become involved in the study and design of future proposals to produce the type of hydrologic and hydraulic data that FEMA may require the town to submit. Producing this type of data can be costly, however Federal and State agency partners (such as Maine DOT) may help provide funding. If, in the future, the town approves a particular change to the West Branch watercourse, this same type of data will be required as part of the local floodplain permit application to satisfy other development standards in the local ordinance (see Floodway discussion below).

G. Maintain as a permanent record, copies of all Flood Hazard Development Permit Applications, corresponding Permits issued, and data relevant thereto.

This is a requirement of all participating communities in the NFIP so that upon inspection, FEMA and the State Planning Office can assure the community is complying with ordinance standards and appropriately administering and enforcing their local Ordinance. Since the Planning Board may be issuing a permit to the Town itself, it is particularly important for the public record, as well as FEMA and the State, to maintain complete records of the application, supporting data, and permits issued.

Article VI – Development Standards

*E. Watercourse Carrying Capacity - All development associated with altered or relocated portions of a watercourse shall be constructed and maintained in such a manner that **no reduction occurs in the flood carrying capacity of the watercourse.***

When permitting a project that involves moving a river/stream, channelizing it, adding or removing fill or altering it in any way, the applicant must demonstrate that there is no reduction in the flood carrying capacity of the watercourse. For example, when (re)designing culverts or bridges, the project must be designed and constructed to make sure additional flood water doesn't back up and more land doesn't flood. Engineering analyses may be required to meet this standard.

- K. Floodways – (Note: FEMA has not designated regulatory floodways on Addison's maps)*
- 2. In Zone AE and A riverine areas, for which no regulatory floodway is designated, ... **development shall not be permitted in the floodway unless a technical evaluation (consistent with FEMA guidelines and specifications) certified by a registered professional engineer is provided demonstrating that the cumulative effect of the proposed development...will not increase the water surface elevation of the base flood more than one foot at any point within the community.***
 - 3. In Zones AE and A for which no regulatory floodway is designated (by FEMA), the regulatory floodway is determined to be the channel of the river or other water course and the adjacent land areas to a distance of one-half the width of the floodplain as measured from the normal high water mark to the upland limit of the floodplain.*

Every river or stream with a mapped floodplain also has a floodway. It is the most dangerous central portion of the floodplain, where the majority of floodwater is being carried and it is moving the fastest. The floodplain is doing its most important work within the floodway. In some cases, FEMA has calculated and mapped the regulatory floodway. In all other cases, there is a default regulatory floodway, which is ½ the channel and ½ the width of the floodplain on one side of the river and the other ½ of the channel and ½ the width of the floodplain on the other side. Development within the default regulatory floodway is only allowed if a professional engineer calculates the hydrologic and

hydraulic effects of the project to make sure the 100-year flood elevation doesn't increase more than 1 foot.

A preliminary study produced by the Natural Resources Conservation Service (NRCS) entitled, "*West Branch Pleasant River Watershed Hydraulic Engineer's Report*" and accompanying "*Field Survey Overview*", was completed for Addison in December, 2003 and revised in March, 2007. It appears to demonstrate that potential modifications made to the tide gates or the dam would not result in an increase of the Base Flood Elevation. The NRCS calculations in Table 2 of the Report (reproduced with modifications on page 16) indicate that the 100-year riverine flood elevations at the upstream side of the dam, with just the tide gates removed would be 11.7 feet NGVD, or 11.0 feet NAVD. If part of the dam were removed and replaced with a 100-foot span bridge, the Base Flood Elevation would be 6.9 feet NGVD, or 6.2 feet NAVD. In either case, the riverine base flood elevations at the Ridge Road dam, as well as the Water Street, Point Street and Addison Road crossings, are not greater than the current 100-year tidal flood elevation of 11.7 ft. NGVD, or 11.0 ft. NAVD, which will continue to impact the West Branch watershed during coastal 100-year storms, despite any future changes that may or may not occur to the tide gates or dam.

In order to satisfy the floodway standards in the Ordinance a hydraulic study, similar to the one produced by NRCS, but more detailed and based on the specific changes that may be proposed, would need to be submitted to the Planning Board with any future Application for a Flood Hazard Development Permit.

- M. Bridges – New construction or substantial improvement of any bridge in Zones AE, A, and VE shall be designed such that:*
- 1. when possible, the lowest horizontal member (excluding the pilings, or columns) is elevated to at least one foot above the base flood elevation; and*
 - 2. a registered professional engineer shall certify that:*
 - a. the structural design and methods of construction shall meet the elevation requirements of this section and the floodway standards of Article VI.K.; and*
 - b. the foundation and superstructure attached thereto are designed to resist flotation, collapse and lateral movement due to the effects of wind and water loads (associated with the base flood) acting simultaneously on all structural components.*

In an effort to provide better public safety and protect the bridge and roadway infrastructure during flooding events, this standard was added to the State Model Ordinance around 2002, in consultation with the Maine Department of Transportation (Maine DOT). According to the 2007 revised NRCS Report and Field Survey, the "road overflow" elevation (the lowest road elevation) along the West Branch dam is 12.0 ft. NGVD (11.3 ft. NAVD). The 100-year, or base flood elevation of 11.7 ft. NGVD (11.0 ft. NAVD) will stop just short of overtopping the dam. If, in the future, the tide gates and box culverts are removed and replaced with a new bridge, the elevation standard should be discussed with Maine DOT and other project engineers to see if elevating to one foot above the base flood elevation (12.7 ft. NGVD or 12.0 ft. NAVD) is "possible".

The bridge elevation standard should also be considered if upgrades to any of the upstream road crossings are proposed, now or in the future, as the road overflow elevations are substantially lower at the Water Street, Point Street and Addison Road crossings.

In concluding this section on the “Local Ordinance Requirements”, it is important to remember that the Town’s Code Enforcement Officer and Planning Board may contact the Maine Floodplain Management Program in the State Planning Office (287-3261) for assistance with questions on ordinance interpretation and permitting requirements.

Federal FEMA Regulations

For development proposals that may affect the FEMA map, an additional layer of federal requirements comes into play. The studies and maps produced by FEMA are regulatory land use zoning and insurance maps, which need to reflect significant changes caused by natural events and development activities that may alter floodplain boundaries, zones or base flood elevations. Since production of the maps is FEMA’s responsibility, it is also their responsibility to review such natural or man-made changes, as well as significant new data that may become available, to determine if the maps need to be revised.

The FEMA regulations at **44 CFR Part 65** outline the steps a community needs to take in order to assist the Agency’s effort in providing up-to-date identification and publication of special flood hazard maps. There are various sections of Part 65 that describe different situations under which data must be submitted to FEMA.

- **Part 65.3 is a requirement to submit new technical data when physical changes affect flooding conditions:**

“A community’s base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Administrator of the changes by submitting technical or scientific data in accordance with this part. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates, and floodplain management requirements will be based upon current data.”

The notification requirement within the local Ordinance, as discussed above (page 7) under Review Standard E, which addresses alteration or relocation of a water course, provides FEMA with the opportunity to review proposals that may affect flooding conditions and to advise a municipality if additional technical or scientific data is required to be submitted to FEMA. This municipal responsibility is consistent with the Resolution that the Town of Addison adopted when they joined the NFIP in 1975 (as discussed on page 4), which states the town is to cooperate with FEMA in their study and identification of floodplain areas.

Once again, the revised 2007 NRCS Report (and supporting documentation) may provide all the data FEMA needs to satisfy this requirement, should future changes be proposed for the West Branch. Submission of the NRCS hydraulic data may allow FEMA to determine that a proposal to reintroduce the flow of tidal water into the West Branch will not affect 100-year flooding conditions. However, FEMA may require updating of that hydraulic data based on the specifics of a future design plan and also the use of a more detailed hydraulic model.

- **Part 65.4 gives communities the right to submit new technical data:**

(a) A community has a right to request changes to any of the information shown on an effective map that does not impact floodplain delineations or base flood elevations, such as community boundary changes, labeling, or planimetric details.

The Chief Executive Officer of a community may submit a written request to FEMA for changes involving corporate boundaries, road and water body names, and errors in the mapped locations of roadways and water bodies. The submission must include the appropriate supporting documentation. Such a request will not result in FEMA republishing the map panel(s) unless the community pays the required fee. However, the data will be kept on file and utilized when FEMA determines other significant changes warrant the reissuance or revision of the panel(s).

- **Under Part 65.5(b) a community with new topographic data may request a revision to special flood hazard area boundaries with no change to base flood elevation determinations:**

(b) A community may also follow the procedures in Section 65.5(a)(1)-(6) to request a map revision when no “physical changes” have occurred in the area of special flood hazard, when no fill has been placed, and when the natural ground elevations are at or above the elevations of the base flood, where new topographic maps are more detailed or more accurate than the current map.

It may be possible to request a revision to the mapped floodplain boundaries associated with the West Branch watershed in Addison based on the new detailed topographic data produced by James W. Sewall Company under sponsorship from NOAA. The current floodplain boundaries were mapped using the 7.5-minute series topographic map, which has a contour interval of 20 feet. The 1-foot contour topographic detail produced by Sewall Company would allow FEMA to much more accurately delineate the 11.7 foot NGVD (11.0 foot NAVD) floodplain boundary line. However, since Addison and Columbia may be examining possible “physical changes” to the West Branch, it may be advisable to wait and submit a map revision request based on both the new topographic data and new hydraulic data for the proposed change.

The formal application used for requesting a map revision is FEMA Form MT-2, which can be downloaded from FEMA’s website at http://www.fema.gov/plan/prevent/fhm/dl_mt-2.shtm. It is a pick-and-choose type application, where only certain pages are required to be completed depending on the type of revision being requested. Town officials may need some technical assistance in completing the application. Documentation that would need to be submitted with the MT-2 application would include at least the following: the new topographic data; the area tax map(s); pre-development site maps with grade elevations; anticipated post-development site maps and grade elevations, based on any proposed changes; and the hydrologic and hydraulic data to substantiate any anticipated changes to the base flood elevation (such as the 2003/2007 NRCS data or more detailed engineering data based on the proposed design plans).

Digital Floodplain Boundary Layer

The Maine Office of GIS website provides the FEMA floodplain boundaries in a digital data layer for use with other digital maps. When using the digital version of the new topographic maps, the currently mapped FEMA floodplain could be added as another data layer. In addition, it would also be possible to depict the actual base flood elevation contour line of 11.7 feet NGVD (11.0 feet NAVD) and see the

difference between the location of that line and the current location of the mapped floodplain boundary. If there is a significant difference and the Town would like to have it corrected, FEMA may be willing to revise the floodplain boundary if the Town submits a Letter of Map Revision, MT-2 application, as described above.

Federal Floodplain Executive Order 11988

In addition to any other State or Federal agency floodplain regulations, there is a Federal Floodplain Executive Order 11988, which applies to any activity that is in or affects the special flood hazard area as mapped by FEMA. If any Federal funds or State funds retaining a Federal identity are used for any aspect of a future project involving changes to the West Branch, Executive Order 11988 would apply. Federal regulations for this Executive Order vary slightly depending on the federal agency providing the funds, but they all contain the following elements:

- Determine if activity is located in, impacts, or is impacted by a 100-year floodplain
- Public notification of activity within the floodplain and opportunity for input
- Identification and examination of practicable alternatives
- 2nd public notification if the chosen alternative is to pursue activity in the floodplain, and justification for that choice
- Identification and incorporation of flood mitigation techniques

State agencies, such as MDOT are also responsible under a State Floodplain Executive Order to comply with floodplain management requirements.

Conclusion

As a non-participating community in the National Flood Insurance Program, the Town of Columbia has not adopted local floodplain management regulations. The NFIP is a voluntary Program so no local regulations are mandated by the State or Federal government. Therefore, a local Flood Hazard Development Permit is not required for proposed development in Columbia's floodplains. Flood insurance through the NFIP is not available for any structure in the Town. Columbia has a 1975 Flood Hazard Boundary Map, which remains in effect and should be used for planning purposes.

The Town of Addison voted to join the National Flood Insurance Program (NFIP) in 1975, adopting both a "Resolution to Join the NFIP" and a Floodplain Management Ordinance. The Ordinance was last amended in March 2005 and requires a local permitting process for any type of proposed development in the 100-year floodplain. It is administered by the Planning Board and enforced by the Code Enforcement Officer, with technical assistance available from the Maine Floodplain Management Program in the State Planning Office (www.maine.gov/spo/flood). FEMA has produced a detailed coastal Flood Insurance Study and set of Flood Insurance Rate Maps (7/16/91) that show much of the West Branch marsh system as being in the Special Flood Hazard Area, or 100-year floodplain. The calculated elevation of the tidal water during a 100-year flood (the Base Flood Elevation) in the study area of the Pleasant River and the West Branch is 11.7 feet National Geodetic Vertical Datum (NGVD mean sea level 1929), which converts to 11.0 feet in the North American Vertical Datum (NAVD 1988).

If future proposals are developed for the Towns of Columbia and Addison to consider involving modifications to the tide gates and dam on the West Branch, a number of floodplain management issues need to be taken into consideration. They include the following:

1. **Application, review and permitting to meet the requirements of the Addison Floodplain Management Ordinance** - If the Town contributes funds (town funds and/or grant funds) or in-kind services for proposed changes to the West Branch, the Town must submit a local Flood Hazard Development Permit Application with supporting documentation and technical data to the Addison Planning Board for review and permitting according to the standards in the Addison Floodplain Management Ordinance (discussed on pages 6 - 9 above). Proposals for altering the tidal flow will require engineering analyses to satisfy some of the development standards.
 - a. If a future project is undertaken entirely by the Maine DOT, with no contributions from the Town, a local Flood Hazard Development Permit is not required. However, the Maine DOT is expected to comply with the Federal and local floodplain regulations.
2. **Notification requirement for any proposal involving changes to the West Branch** - Review Standard E. in the Ordinance requires notification of any proposal to alter a water course (which would include removing the tide gates or opening a portion of the dam) to the Maine Floodplain Management Program, Maine Department of Environmental Protection and FEMA (discussed on pages 7 - 8 above).
3. **Requirement for Town to submit technical engineering data to FEMA** - Federal floodplain regulations in 44 CFR Part 65.3 require a community to submit hydrologic and hydraulic data to FEMA if physical changes are made that affect flooding conditions (discussed on page 10 above).

Existing products and data that may help the Town meet these requirements – During the past few years, the Town of Addison and the West Branch Study Committee have obtained important information and data produced by James W. Sewall Company and the Natural Resources Conservation Service (NRCS) that may help to address many of the considerations listed above.

With the help of NOAA sponsorship, Sewall Company has produced a detailed topographic map on an aerial photo base that depicts 1-foot contour lines for the West Branch marsh area in Columbia and Addison. This map, which is available in both paper and digital form, will greatly assist future West Branch studies and planning efforts and will help in creating the support documents and maps that may be needed to satisfy future permitting, notification and data submission requirements.

In 2003, the NRCS produced a preliminary study of riverine flooding at the West Branch dam and upstream road crossings entitled, “*West Branch Pleasant River Watershed Hydraulic Engineer’s Report*” with an accompanying “*Field Survey Overview*”. Grade elevations in this report were updated in March, 2007. The report analyzed two possible options for restoring tidal flow to the West Branch: (1) removing the tide gates but leaving the six box culverts in place, and (2) replacing the portion of the dam over the West Branch channel with a 100-foot span bridge.

The NRCS hydraulic analysis appears to indicate that the riverine flood elevations under either of the two options will not be greater than the 100-year flood elevation of 11.7 feet NGVD (11.0 feet NAVD) provided in FEMA’s coastal Flood Insurance Study. NRCS calculated the 100-year flood elevation at the upstream side of the dam with just the gates removed as 11.7 feet NGVD (11.0 feet NAVD). The calculated 100-year flood elevation with a 100-foot opening was significantly lower at 6.9 feet NGVD

(6.2 feet NAVD). The flood elevation data for various flood stages at the dam and all the crossings is listed in Table 2 of the Report (see modified Table on page 16 below).

Although the NRCS Report provides useful preliminary data for the Town, the West Branch Study Committee and other agencies supporting the current studies. However, any future permitting process or FEMA requirement to submit technical data may require new hydraulic data based on the specifics of future design plans and use of a more detailed hydraulic model. The Town will ultimately be responsible for obtaining any necessary hydrologic and hydraulic data, however potential partners in further planning efforts for the West Branch, such as Maine DOT, NRCS, NOAA and perhaps other funding agencies, are likely to be of assistance in arranging for and helping to cost share in the production of such data.

Addendum

Further Interpretation of the NRCS 2003/2007 Hydraulic Report

There is other useful information to be gleaned from the elevation data provided by NRCS in the 2003/2007 *Hydraulic Engineer's Report* and accompanying *Field Survey Overview* that does not relate to Federal, State or local floodplain management regulations or 100-year flooding events. The tables and profiles in the Report provide the WBSC, local officials and residents with information that indicates what could be expected for water elevations at affected road crossings during various tidal and flood stages. Introducing additional tidal flow into the West Branch would obviously raise surface water elevations in the marsh during high tide. With uninterrupted tidal flow, the area of land to be covered with water during Mean Spring High Water [Mean Higher-High Water (MHHW)], as approximated by NRCS, is illustrated in the maps on pages 3 and 6 of the Report. If future changes are made to the West Branch tide gates and/or the dam, the anticipated high and low water elevations ~~go~~ will depend on the specific type and design of the openings at the dam and each upstream road crossing (the hydraulic component), as well as the amount of water that needs to pass through those openings (the hydrology components – both tidal and riverine).

The flood elevation calculations in the NRSC study are for riverine flooding only, with no influence from tidal flooding. A set of riverine flood elevations was calculated for each of the following two sets of conditions involving changes at the Ridge Road crossing of the West Branch, with no changes to the culverts at the upstream crossings:

1. Removal of the six tide gates with no further alteration to the six box culverts or dam.
 - . For this preliminary study NRCS did not calculate what percentage of the tidal flow would pass through the box culverts without the gates. For purposes of their calculations they used 100% of the MSHW elevation for the Pleasant River (6.8 feet NGVD / 6.1 feet NAVD).
2. Removal of current structure (tide gates, box culverts and section of dam) and replacement with a 100-foot span bridge over the West Branch.
 - . Initial NRCS calculations indicate a 100' span will create no head loss and should result in tidal elevations being the same above and below the bridge.

Table 2 – Bridge and Culvert Data (see next page) from the NRCS Report, provides water surface elevations for both tidal and riverine floods. The Table shown on the page below is somewhat different than the original Table 2 from the NRCS Report. One important difference is that the elevations have been converted from NGVD to NAVD, to aid in the comparison with other elevation data being supplied to the West Branch Study Committee, which is in NAVD. The top part of the Table lists the 1, 10, 50, 100 and 500-year stillwater tidal flood elevations in Addison, as determined by the ACoE and used by FEMA in the Addison Flood Insurance Study. The bottom part of the Table shows the two sets of riverine flood elevations (as described in 1. and 2. above), for eight different flood stages, at each of the four affected road crossings. Keep in mind that when the tidal flood elevation is higher, it will take precedence over the riverine flooding.

Table 2 (modified) from - *West Branch Pleasant River Watershed Hydraulic Engineer's Report*,
 Natural Resources Conservation Service, L.P. Crosby, 12/15/03, revised 3/30/07
 (Permission obtained to use with modifications - 3/2/07)

NRCS Bridge and Culvert Data

1. Original NGVD elevations have been converted to NAVD (Mean Sea Level 1988).
2. Two sets of riverine flood elevations were calculated: (1) Without tide gates at Ridge Rd / (2) With 100 foot bridge at Ridge Rd
3. The starting elevation used by NRCS to calculate the riverine flood elevations was Mean Spring High Water = 6.1 feet NAVD in Addison

			1.1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr
TIDAL STILLWATER FLOOD ELEVATIONS For Pleasant River and W. Branch Pleasant River			7.7			9.8		10.5	11.0	11.8
RIVERINE FLOOD ELEVATIONS ONLY Without tidal storm surge										
Location	Road Overflow Elevation	Mean Spring High Water								
W. Branch Pleasant River										
Ridge Road	11.3	6.1	6.2/6.1	6.3/6.1	7.0/6.1	8.0/6.1	10.2/6.2	10.8/6.2	11.0/6.2	11.3/6.5
Unnamed Brook										
Water Street	8.7	6.1	7.8/7.8	8.0/7.9	8.4/8.3	8.5/8.5	10.2/8.6	10.8/8.7	11.0/8.7	11.4/8.9
Point Street	6.1	6.1	7.8/7.8	8.0/7.9	8.4/8.3	8.5/8.5	10.2/8.6	10.8/8.7	11.0/8.7	11.4/8.9
Bells Brook										
Addison Road	8.1	6.1	6.6/6.5	6.8/6.6	7.9/7.7	8.3/8.0	10.2/8.3	10.8/8.5	11.0/8.7	11.4/9.3

[Note: The two U.S. Rt. 1 crossings were determined to be minimally impacted by changes made at the Ridge Road crossing of the West Branch.]

The differences in elevations under the two sets of conditions (tide gates removed vs. 100-foot span bridge) at the Ridge Road crossing, increases noticeably as the severity of riverine flooding increases from a 5-year, to a 10-year, to a 25-year event. Whereas a 100-foot span bridge would allow for the discharge of virtually all water from a riverine flood of any size, the existing box culverts in the dam with just the gates removed would result in significant backwater flooding at the dam. Water from riverine flooding during a 100-year event would rise to 11.0 feet NAVD, which is just 0.3' shy of the lowest elevation of the Ridge Road along the top of the dam (11.3 feet NAVD).

During a 25-year or greater riverine event with the tide gates removed but the rest of the dam in place, the backwater flooding will spread upstream beyond the other road crossings, resulting in uniform flood elevations throughout the area. During a 50-year riverine flooding event, the water elevation at the Ridge Road crossing (10.8 feet NAVD) will be higher than the water elevation during a 50-year tidal event (10.5 feet NAVD). A 100-year riverine and a 100-year tidal event will have the same flood elevation of 11.0 feet NAVD.

During 10-year or smaller riverine events, flood elevations at the upstream crossings are all higher than at the dam and do not vary much under either set of modifications. The controlling factors at the upstream crossings appear to be the restrictions of the culverts and the road beds. The culverts at all of the upstream crossings will be entirely underwater at MHW. Any additional flood water coming downstream will pile up behind the culverts and impact the roads once flood waters rise above the road overflow elevation.

The graphic information shown on the road profiles on pages 8-11 of the NRCS Report is shown in table form below. The road profiles provide approximate information on how many feet of roadway may be underwater at two tide stages and three tidal flood elevations, if a proposed opening of the dam were to allow full entry of tidal flow.

The upstream crossings are particularly vulnerable to flooding, as their road elevations are considerably lower than the Ridge Road crossing at the dam. The table below showing the feet of flooded road helps to visualize the problem. A spring tide will begin to affect the Point Street crossing and a 10-year tidal flood will cover the roads at all three upstream crossings.

Location	Rd. Overflow Elevation	MHW	MSHW	1-Yr Tidal	10-Yr Tidal	100-Yr Tidal
Tide Elevations & Tidal Flood Elevations		5.2	6.1	7.7	9.8	11.0
			Feet Of	Road	Flooded	
W. Branch Pleasant River						
Ridge Road	11.3	0	0	0	0	0
Unnamed Brook						
Water Street	8.7	0	0	0	985'	1,220'
Point Street	6.1	0	30'	690'	1,050'	1,155'
Bells Brook						
Addison Road	8.1	0	0	0	460'	735'

It would be helpful for the West Branch Study Committee and the Towns to work with potential partner agencies, such as Maine DOT, NRCS, and NOAA, who may assist in some way with engineering efforts and other technical aspects of floodplain management requirements as studies continue and future planning opportunities unfold.

- 1) Analyze the effects of other possible modifications to the tide gates, the dam and the upstream crossings (and re-analyze the two options from the NRCS preliminary study), using a more detailed hydrologic and hydraulic model that will meet FEMA's requirements for submission of technical data. This will produce a broader range of accurate data that would be needed if the current study phase continues into a planning phase for developing actual proposals for the Towns to consider.
- 2) Provide additional data or analysis that may be requested by the Town or FEMA during the local permitting process or Flood Insurance Rate Map revision process.
- 3) Utilize GIS to graphically represent some of the important layers of elevation data on the new topographic maps provided by James W. Sewall Company and NOAA. Being able to see what areas of the watershed are currently being affected by different tide and flood stages, versus what areas will be affected under future proposals that may be developed, will allow Committee members, Town officials and the public a better understanding of the options and outcomes of restoration efforts on the West Branch Pleasant River.

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Appendix

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