

**RECOMMENDATIONS OF THE
DRBC FLOOD ADVISORY COMMITTEE (FAC)
FOR MORE EFFECTIVE FLOODPLAIN REGULATIONS
IN THE DELAWARE RIVER BASIN**



October 2009

While we have made great progress in providing flood control works, many of our river valleys are still subject to destructive floods, and the degree of protection varies widely. Moreover, it will probably not be possible, because of physical and economic limitations, to provide full flood protection. This leads to the inescapable conclusion that greater attention must be given by states, municipalities and industry, and by the federal agencies concerned with development, to some form of regulation of floodplain use... We should be as much concerned with the avoidance of creating a future flood hazard, as with means of correcting the damage after it occurs.

-Brigadier General John L. Person, Assistant Chief of Engineers for Civil Works, in testimony before the House Committee on Public Works, May 1959.

DRBC Flood Advisory Committee

Delaware Department of Natural Resources and Environmental Control (DNREC)	New Jersey Department of Environmental Protection (NJDEP)
New York State Department of Environmental Conservation (NYSDEC)	Pennsylvania Department of Environmental Protection (PADEP)
New York City Department of Environmental Protection (NYCDEP)	Federal Emergency Management Agency (FEMA) RII and RIII
Delaware Emergency Management Agency (DEMA)	New Jersey Office of Emergency Management (NJOEM)
New York State Office of Emergency Management (NY SEMO)	Pennsylvania Emergency Management Agency (PEMA)
US Army Corps of Engineers, Philadelphia District	US Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS)
U.S. Geological Survey (USGS)	National Weather Service (NWS)
National Park Service	Delaware River Joint Toll Bridge Commission
Electric Generation Industry (Hydropower and Off-Stream Storage)	County Water Resources Agencies
County and Local Emergency Management Representatives	

We dedicate this report to our late colleague, Mr. Joseph Zagone, P.E., PLS, CFM who was employed by the Federal Emergency Management Agency and served most recently on the Floodplain Regulations Evaluation Subcommittee (FRES). Joe was among a handful of early Certified Floodplain Managers. Joe was stalwart member of the DRBC FAC and a champion of stronger floodplain management through his work on the FRES.

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INTRODUCTION:

Background: Between September 2004 and June 2006, three major floods caused devastation along the main stem Delaware River, repeatedly damaging property and disrupting tens of thousands of lives.

Reducing flood loss is a responsibility shared by many. Recognizing this, the governors of the four basin states – Delaware, New Jersey, New York and Pennsylvania – directed the executive director of the Delaware River Basin Commission, Carol Collier, to convene an interstate task force to develop a set of recommended measures for mitigating and alleviating flooding impacts along the Delaware and its tributaries.

In July 2007, the Delaware River Basin Interstate Flood Mitigation Task Force issued a report identifying six priority management areas and a total of 45 consensus recommendations for a more proactive, sustainable, and systematic approach to flood damage reduction in the basin. One of the six priority management areas identified by the Task Force was floodplain regulations.

In November 2008, at the request of New Jersey and Pennsylvania commissioners, the Flood Advisory Committee of the DRBC formed the Floodplain Regulations Evaluation Subcommittee to address Recommendation FR-1 of the Interstate Task Mitigation Task Force Report.

Excerpt from Recommendation FR-1:

“There is no consistent set of floodplain regulations basinwide to uniformly manage development within the floodplain areas of the basin. Currently, floodplain regulations vary widely from State to State and often from community to community. As a result, development may be occurring in the floodplain of one State or community that may be adversely affecting other States and communities.

Development in the floodplain individually and cumulatively results in adverse impacts somewhere in the watershed. These adverse impacts can include increased flood stages, increased velocities, erosion and sedimentation, water quality degradation and habitat loss. In addition to these negative effects, development in the floodplain disturbs naturally vegetated riparian corridors and often threatens the safety of both residents and emergency personnel in the event of a flood.” (Task Force Report July, 2007)

The Flood Advisory Committee (FAC) of the DRBC provides a forum for coordination of flood warning and flood loss reduction activities and the efficient use of technical and financial resources for the benefit of the Delaware River Basin community.

FAC Charge to the Floodplain Regulations Evaluation Subcommittee: To review and evaluate the similarities and differences in floodplain regulations throughout the Delaware River Basin, and to develop and present recommendations on the potential for more effective floodplain management throughout the Basin to the FAC.

Subcommittee Organization: The Floodplain Regulation Evaluation Subcommittee (FRES) was composed of twenty (20) representatives who represent the interests of the basin states, federal government, environment, citizens, builders, agriculture, commerce, floodplain mapping and local officials. Representatives were appointed by their representative interest group when possible. The list of subcommittee representatives is included in Appendix II of this report.

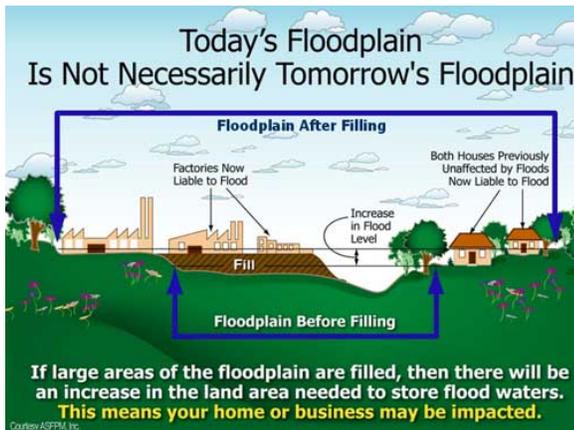
Review Materials: The following list of regulations and guidance was reviewed by the subcommittee to inform their deliberations:

- National Flood Insurance Program (NFIP) minimum requirements (44 CFR 60.3)
- Delaware River Basin Commission Floodplain Regulations
- New Jersey - NJDEP Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)
- Pennsylvania – Pennsylvania Flood Plain Management Act (Act 166-1978)
- Guidance from PADCED on how municipalities can meet the minimum National Flood Insurance Program (NFIP) requirements
- New York - Floodplain Management Criteria for State Projects (6NYCRR Part 502)
- NYS Residential Building Code (Chapter III, Section R323)
- Guidance by NYSDEC; Optional Additional Language to Model Local Law for Flood Damage Prevention

- New Castle County, DE (Unified Development Code Section 40.10.310 – Floodplains and Floodways)
- National Flood Programs and Policies in Review, Association of State Floodplain Managers, 2007
- Effective State Floodplain Management Programs, Association of State Floodplain Managers, 2003

Timeline: The Floodplain Regulation Evaluation Subcommittee (FRES) of the FAC met eight (8) times over the course of seven months. The first meeting convened on November 12, 2008. Meeting agendas noting speakers when applicable are included as Appendix II to this report.

In May 2008, the subcommittee presented its report and recommendations to the FAC. Following deliberation and some modification, the FAC now presents its recommendations for more effective floodplain regulations to the Commission.



SUMMARY:

The FAC herein presents twelve (12) recommendations for more effective floodplain regulations to the Commission. These recommendations can be considered each individually or in their entirety for a comprehensive approach.

A summary table of FAC recommendations and regulations currently in place is included as an Appendix to this report. Currently, floodplain regulations vary widely from State to State and often from community to community.

The National Flood Insurance Program (NFIP), administered by the Federal Emergency Management Agency (FEMA), requires that communities adopt and enforce floodplain management ordinances in order for flood insurance to be available to homeowners in that community. These floodplain management ordinances are known as the “minimum” requirements that each community must have in place.

Communities are allowed and even encouraged by FEMA to adopt floodplain regulations that are “more than the minimum”. Some progressive communities in the basin have adopted more stringent regulations, but the majority have only adopted NFIP minimum regulations.

As there are 868 communities in the basin, this report does not catalog the floodplain regulations adopted by each community. Instead, National Flood Insurance Program (NFIP) minimum regulations, DRBC Floodplain Regulations and basin state regulations are compared in Appendix I.

In most cases, the FAC is proposing that in order to be more effective, floodplain regulations need to be applied on a broader, watershed basis and not adhere to state jurisdictional boundaries. Flood damage potential is a function of human development in floodplains. Development in flood-prone areas needs to be discouraged and new and substantially improved structures must be constructed in ways that minimize or prevent future flood damage.

The regulations currently in place for addressing development in the floodplain have not successfully reduced flood damages, in fact they have allowed new development, redevelopment, and expansion of existing development to continue and the result has been a continued increase in flood damages.

A brief summary of the twelve (12) FAC recommendations for more effective floodplain regulations is presented here:

A. Regulatory Floodplain Definition:

1. The regulatory floodplain for waterways in the Delaware River Basin should be greater than the 1% annual chance (previously known as the 100-year) floodplain.

2. Unmapped waterways of the Basin need a mechanism for identifying the regulatory floodplain.

B. Floodway Definition:

The floodway in the Delaware River Basin should be defined by a 0.2 foot rise standard for main stem Delaware River and all other streams and rivers within the basin. The floodway is currently defined as a less restrictive 1.0 foot rise.

C. Development/Fill in the Flood Fringe:

Protect the flood fringe in a naturally vegetated state and limit development including, but not limited to, structures, infrastructure, impervious surfaces, fill, grading and removal of vegetation.

D. Development/Fill in the Floodway:

New development in floodways should be prohibited.

E. Stream/Riparian Corridors and Vegetation Disturbance:

Incorporate the buffer concept as part of a comprehensive floodplain management program to protect communities from flood damage.

F. Adopted Building Code:

Continue the adoption of International Codes issued by the International Code Council.

G. Standards for the Lowest Habitable Floor of Structures (Freeboard):

All new substantially improved residential, institutional and commercial structures within the Delaware River Basin should be constructed two (2) feet above 1% annual chance base flood elevation.

H. Enclosed Areas below Flood Elevation:

- 1: Deed restriction should be required for enclosures.
2. Structural requirement: If the enclosure below the flood elevation is greater than 6 feet in height measured from floor to floor, at least 25 percent of the surface area of the outer wall of enclosures should be left permanently open.

I. Substantial Damage/Improvement to Structures:

1. Cumulative Substantial Damage Declaration
2. Tracking of Cumulative Substantial Damage/Improvements

J. Dams and Flood Damage Risk:

1. Increase monitoring of dams. Dams with a clear and present danger of failure should be removed.
2. States should increase funding and assistance to small dam owners for evaluation and removal.
3. Hydraulic studies in the vicinity of high and medium hazard dams should be revisited to evaluate the change in flood hazard areas.
4. Completion of emergency action plans for high hazard and significant hazard dams must be prioritized. These plans contain inundation maps that identify flood hazard areas in cases of a dam failure.
5. Before a dam is removed, hydraulics must be revisited to evaluate the adequacy of downstream drainage structures, and the accuracy of upstream floodplain maps.
6. Require the evaluation of downstream flooding impacts as part of the permit application process for dam decommissioning or dam repair which increases spillway capacity.

K. Bridge/Culvert Construction or Reconstruction and Flood Damage Risk:

1. Design new bridges and culverts to ensure that flooding to existing buildings or facilities is not exacerbated upstream or downstream. Design should be based on the results of updated flood models using recent climate data that incorporates changing precipitation trends.
2. Maps should be updated for new crossings.

L. Stormwater Regulations - New and Redevelopment:

The goal of stormwater design within the Delaware River Basin should mimic pre-development hydrology at a minimum.

CONSIDERATIONS:

In developing recommendations on the potential for more effective floodplain management throughout the Basin, the following considerations were recognized and discussed:

- ◆ Diversity of Stream Character across the Basin
 - f* Main stem vs. tributary
 - f* Urban vs. Rural
 - f* Tidal vs. Non-tidal
 - f* Agricultural Lands

- ◆ Floodplain Restoration
- ◆ Floodplain Mapping
- ◆ Implementation
- ◆ Socio/economic Impacts
- ◆ Permitting/Enforcement
- ◆ Education

Diversity of Stream Character across the

Basin: The committee recognizes that the character of stream reaches in the Delaware River Basin vary tremendously. The main stem Delaware River stretches roughly 360 miles from its headwaters in New York State to its mouth at the Delaware Bay, and its tributaries extend many hundreds of miles more. Over its course the river and its tributaries run through a variety of landscapes, all which affect the risk to life and property from flood events differently.

Many geomorphic, geologic, climatological, and anthropogenic factors influence the flood risk on a particular stream reach, including location in the watershed (mainstem vs. tributary), land use and population distribution (urban vs. rural), and the effect of tidal action (tidal vs. non-tidal). This committee found that comprehensive floodplain regulations beyond minimum NFIP standards need to be implemented across the entire Delaware River Basin, which responsibly reflect the conditions and needs of the various watershed regions within the basin.

Given the diversity across the Basin in watershed and stream corridor character, and development patterns, it is essential that management prescriptions be suited to the stream reach where they are applied. Good stream management on a lightly populated headwater reach is going to look very different from good stream management on a lower estuarine reach adjacent to a major metropolitan area. While adopting consistent goals throughout the Basin is critical, the methods for attaining those goals are going to vary on particular stream reaches. Stream regulators and managers must be wary of over-generalizing the Basin when prescribing management solutions. To proceed otherwise risks harming communities, either by not requiring enough safety precautions, or by over-regulation.

A major consideration resulting from the difference in flood risk across the Basin is how to

allocate resources to the areas where they are most needed.

Main stem vs. tributary: The character of flood risk varies considerably between the main stem Delaware River and its tributaries, and changes continuously as one moves downriver. As an example of two extremes, many headwater tributaries in the upper watershed are characterized by flash flooding in narrow canyons. These flash floods develop very quickly (minutes to a few hours) in response to excessive local runoff, are brief in duration, and transport a relatively small amount of water compared to floods on the lower main stem. Floods on the lower main stem generally come on more gradually, cover a large extent, convey a large amount of water, and persist for longer periods of time. Each kind of flood requires different methods of preparation and response in order to avoid loss of life and property. When developing a management prescription for a particular stream reach, its location in the watershed should be considered.

Urban vs. rural: Anthropogenic factors, development patterns in particular, are a key determinant of the risk a flood poses to life and property. In the event of a flood, more people and property will be in harm's way in densely populated areas. Current and future population distribution in flood hazard areas should be taken into account when creating management prescriptions for particular stream reaches.

Tidal/Non-tidal: Storm surge can affect all of the tidal portions of the Delaware River and tributaries and can extend well beyond the normal head of tide in severe surge events. The head of tide for the main stem of the Delaware River is at Trenton, New Jersey.

Storm surge associated with major hurricanes can far exceed the 100-year flood elevations. For example, at Wilmington, Delaware the 100 year flood level is +10 NAVD 88 yet the storm surge elevation associated with a Category 3 hurricane is over 16 feet NAVD 88. Although the return frequency of a major hurricane may be rare, and may not be appropriate for normal floodplain construction standards, for certain critical facilities and emergency operations functions, it may be appropriate to use hurricane surge levels, in location and design considerations.

Hurricane evacuation scenario planning often relies on surge modeling and mapping. Where surge

areas have been mapped using outdated topography, they are likely not very accurately delineated.

- Surge inundation areas should be delineated using best available topography.

Existing DRBC floodplain regulations are applicable only to non-tidal areas of the Delaware River Basin. NFIP regulations allow fill in tidal areas because it is assumed that encroachment in tidal areas will not cause increase in the 100-year flood stage. It is known, though, that filling may cause increases in regional flooding and exacerbate drainage problems during rainfall events in which flood stages do not approach 100-year levels.

- Consideration of restriction of fill, such as through DRBC's floodplain regulations, should be given to tidal areas.

Agricultural Lands:

Agricultural use has historically occurred in the floodplains because of their fertile soils and generally flat topography. The effect of agriculture in the floodplain should be taken into account when creating management prescriptions for particular stream reaches. It is not the goal of these recommendations to create regulations on agriculture that may impede their ability to remain competitive against other regional farm operations. Instead, agriculture in the floodplain should be encouraged to be compatible with responsible floodplain management including, but not limited to, existing programs that provide incentives to farmers to provide buffers along watercourses.

Floodplain Restoration: As articulated by the Congressional Task Force on Natural and Beneficial Functions of the Floodplain, June 2002, floodplains “reduce flooding and limit flood-related damages through their floodwater conveyance and storage functions.”

As a result, protecting and restoring floodplain functions “will reduce flood losses” in addition to providing groundwater recharge, filtering sediment and contaminants, transporting nutrients, supporting habitats for a variety of sensitive living resources, and enhancing community quality of life.

The regulations currently in place for addressing development in the floodplain have not successfully reduced flood damages, in fact they have allowed new development, redevelopment, and expansion of

existing development to continue and the result has been a continued increase in flood damages.

Communities subject to increasing flood damages include both historic communities (those over 100 years old) as well as recent development (those built within the past 5 years). Historic communities play an important role in the history of our region and nation. New development has contributed to increasing flood damages by both placing new homes in harms way as well as increasing flood flows and peaks for pre-existing communities. If we are to reduce flood damages in the future it will be important to undertake a floodplain protection and restoration strategy.

Floodplains vegetated with trees and shrubs can be four times as effective at retarding flood flows as grassy areas. Naturally vegetated floodplains are generally layered with leaf and organic matter that result in organic soils with high porosity and a greater capacity for holding water. More than just being an area that can help address flooding issues in a community, the floodplain, in this natural state, is a riparian ecosystem that needs the overbank flows that the natural watershed's hydrology provides in order to remain healthy and in balance.

The protection and restoration of forested floodplains reduces the harm and threat of flooding to homes, businesses and communities (1) by ensuring they are not located in these most hazardous of areas that are known to flood and (2) by reducing the peak and breadth of flooding thereby protecting homes that historically have not been located in the path of floods. Protection and restoration of the floodplain also removes the need for emergency services, the costs of rebuilding, and all of the other financial, physical and psychological costs associated with flood damaged communities located in the floodplain.

A floodplain protection and restoration program focused on reducing present and future flood damages does not mandate the removal of every structure – for example there are numerous community reasons for maintaining and protecting historic structures and vistas despite their location in the floodplain as these structures and areas have other cultural, historic and social values to the community. A floodplain protection and restoration strategy can and should leave room for honoring these and other values of the community.

- The Basin States and the DRBC should provide funding and programs for acquisition, protection and restoration of developed and undeveloped property in the flood plain on both tributary streams and the main stem Delaware River. DRBC's authority to engage in acquisition and restoration of floodplain lands is provided under Article 6, section 6.3 of the Delaware River Basin Compact.

- States should craft and carry forward a program to identify and purchase for fair value structures located in the floodplain that property owners are interested and willing to sell – this program would be focused on identifying and pursuing structures/properties that the home owner/property owner has, by their own volition, initiation, choice and action, put on the market for sale. This program should include a mechanism whereby homeowners could reach out to state, federal and/or regional agencies to first offer them the home for sale at fair market value plus an additional financial incentive- thereby providing the homeowner an economic incentive to offer the home first to government programs focused on purchase and removal of structures at risk of flooding prior to the homes entering the public market for sale.

- DRBC should develop a prioritization of areas, communities and structures for acquisition and floodplain restoration and reforestation activities. This prioritization should include identification of historic communities and structures that should be targeted for alternative flood damage solutions including floodproofing and elevation.

- The Basin states must get out ahead of efforts of the federal government regarding the potential impacts of climate change on flood risk and incorporate this information in all of its flood mitigation strategies. Regional predictions for sea level rise, temperature and precipitation trends are available. There is now a solid, scientific basis for these predictions and further refinements in predictions for the Delaware Basin can be expected on a periodic basis.

- The Basin states must get out ahead of efforts of FEMA regarding repetitive loss properties and put together a repetitive loss reduction strategy. This strategy should include well-rounded programs that encourage the offer and acceptance of buyouts for repetitive loss properties including creating and

funding programs that provide funds needed to give fair market value for purchased properties as well as creation of programs to assist flood victims in their relocation programs to assist in securing new, affordable mortgage rates, and affordable housing within their community if they so chose. A basin-wide committee that works with FEMA, state emergency management agencies and other state and regional agencies to identify priorities, possible funding and programs should be formed.

- States should also create and implement programs to remove highly vulnerable public works structures from the floodplain with a special emphasis on waste water treatment plants which are routinely overwhelmed by floodwaters and discharge untreated or partially treated sewage into receiving streams and rivers. As part of this program, all public works without an NHR listing that have experienced repetitive loss should be phased out by requiring removal from the flood hazard area upon substantial change. For instance, a wastewater treatment plant should be required to move out of the flood hazard area if the footprint of the physical plant is expanded.

Floodplain Mapping: FEMA develops and produces flood hazard data and maps in order to administer the National Flood Insurance Program (NFIP). The Delaware River Basin is comprised of two FEMA Regions, FEMA Region II and FEMA Region III. This requires the states and FEMA Regions to coordinate and confer on methodology and mapping specifics so that a seamless map can be created across state boundaries.

Having accurate maps of flood hazard areas is critical to the ability to properly identify and manage flood hazard areas. There are many areas, particularly in the upper portions or other undeveloped areas of the Basin, where flood hazard maps do not exist or if they do exist are inaccurate. New regulations based on inaccurate maps will be ineffective. Furthermore, any regulation based on a flood hazard map is only applicable on streams where flood hazard areas are defined. While the expense inherent in creating detailed flood hazard maps is great, it is an inescapable fact that this information is necessary to plan for flood damage prevention and the enforcement of regulations regarding development in stream corridors. Also critical is the ability of the appropriate people to access and use those maps.

- Fund further detailed studies and flood hazard mapping throughout the basin: Available resources should be directed at creating new, more accurate flood hazard maps in the areas that are lacking this information. This is essential to proper planning for flood damage prevention and the enforcement of any new regulation.

- Fund training in the use of flood hazard maps for individuals tasked with enforcing existing and any potential new regulations: Individuals who will be encountering potentially non-compliant projects the most should be familiar with flood hazard maps for their community and their use. This includes but is not limited to code enforcement officers, planning board members, and realtors.

- Make maps accessible and easy to use: Maps should be widely accessible and easy to use, so that any person concerned with the flood risk to a particular property can access and understand that information. Making maps available in an interactive form on the internet would be a good way to provide access to many people at low cost.

- FEMA must develop a means to incorporate into its flood mapping program the projected impacts of sea level rise and precipitation due to climate change in assessing flood hazard areas. Periodically updated projections of what flood hazard maps for T+10, T+25, T+50, and T+100 years from now (T= year of update) would be very helpful to planners, especially in low lying coastal areas.

Implementation: The committee did not recommend means of implementation for the recommendations contained within this report. The committee realized that there may be many different means of implementing any one recommendation. When possible, proposed regulations should be implemented within existing regulatory frameworks either at the local, county, state or regional level recognizing that adequate implementation of any one recommendation is strongly dependant on education, permitting and enforcement.

Socio/economic Impacts: The committee did not analyze social, economic or environmental impacts of the recommendations contained in this report. This issue of considering impacts was raised as an important factor that should be considered as recommendations were formulated. This type of analysis is often required as any rule making process

and should be performed by the entity proposing any higher regulatory standard.

The higher standards for floodplain development recommended by the committee are primarily intended to specifically reduce flood damage to new and existing property and generally to reduce the impacts of flood events on both the built and natural environment.

Permitting/Enforcement: Permitting and enforcement of floodplain regulations often occurs at the local level by local officials. Floodplain managers come from a variety of curricula and backgrounds. In small communities, floodplain managers are sometimes part-time employees. The role of these floodplain managers is expanding due to increases in disaster losses and the emphasis being placed upon mitigation to alleviate the cycle of damage-rebuild-damage. Many of these localities do not have the necessary resources to provide consistent and comprehensive administration and enforcement of floodplain regulations. An integral part of improving the floodplain management in the Basin is the allocation of more resources to this function.

A review of the enforcement methods throughout the Basin found that there was consistency in the structure of the regulations as many were based on State models that were subsequently adopted by the local communities. However: effective administration of existing regulations and the potential adoption of new standards will not be successful unless the overall administration and enforcement of floodplain regulation improves. The following components need to be included in any proposed floodplain regulation:

1. Due process for applicants
3. The ability to issue stop work orders with the owner having the option to fully mitigate or remove a structure
4. A variance procedure and no certificate of occupancy issued without completion of an as-built elevation certificate
5. Monitoring and investigative staff
6. The ability to levy fines
7. Training for inspection/enforcement personnel

Education: There is a need for a coordinated education, outreach and training program in the basin

for floodplain managers, local planning and zoning boards, professionals and the public. Communities need to be armed with the proper knowledge to properly evaluate whether development is reasonably safe from flooding or will exacerbate local flooding conditions, will result in increased flood damages and flood response costs, and result in other issues of community concern.

The Certified Floodplain Managers (CFM) certification should be promoted for all local floodplain managers and professionals. This national certification was established by the Association of State Floodplain Managers (ASFPM) to improve the knowledge and abilities of floodplain managers in the United States. CFMs are professionals that:

- understand the rules and regulations of floodplain management;
- understand natural and beneficial functions of the floodplain;
- understand the various causes of flooding (e.g. how several moderate rain events in quick succession can increase flood risk);
- understand how NWS products and services can be utilized to assess the near term flood risk;
- understand the possible impacts on flood risk of sea level rise and increased heavy rainfall and warmer temperatures associated with climate change;
- understand risk analysis and map interpretation;
- understand the impacts of building in the floodplain;
- stay current with floodplain management trends and activities by taking continuing education classes;
- provide guidance on local conditions and development;
- provide guidance to officials and citizens on floodplain management and describe the risks involved in building in the floodplain as well as the beneficial uses of the floodplain; and
- have attained a level of knowledge of floodplain management that allows them to perform a variety of flood preventive activities in the community.

The local State chapters of ASFPM, the New Jersey Association of Floodplain Managers (NJAFM) and the New York State Floodplain and Stormwater Managers Association (NYSFSMA) currently provide CFM training and exam opportunities.

RECOMMENDATIONS

A. Regulatory Floodplain Definition

Background: A naturally functioning floodplain is a hydrologically important and dynamic component of a watershed. In addition to being environmentally sensitive and ecologically diverse, floodplains provide flood storage and conveyance, protection of water quality and recharge of groundwater.

A regulatory floodplain may, or may not, encompass the natural floodplain, the area needed for a watercourse to maintain its natural biologic, geomorphic and hydrologic functions. Instead, regulatory floodplains are adopted standards designed to guide floodplain development and lessen the effects of floods on the built environment.

In order for property owners to be able to purchase flood insurance through the National Flood Insurance Program (NFIP), their municipality is required to enforce certain minimum regulations on development in the floodplain. FEMA defines its regulatory floodplain, the Special Flood Hazard Area (SFHA), as any area inundated by the base flood. The base flood is the national standard used by the NFIP and Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development.

The base flood is defined as having a one-percent chance of being equaled or exceeded in any single year. It is also informally referred to as the 100-year flood, which incorrectly leads to the assumption that a base flood is expected to occur once in 100 years. Instead, the base flood has a one-percent (1 out of a 100) chance of being equaled or exceeded in any single year. Therefore, a base flood could occur two times in the same year, two years in a row, or four times over the course of 100 years. The terms “base flood,” “100-year flood,” and “one-percent annual chance flood” are often used interchangeably with the 1% annual chance of flood deemed the most accurate description.

Flood Probabilities	
Return Period	Chances
500-year	1 in 500 (0.2%)
100-year	1 in 100 (1%)
50-year	1 in 50 (2%)
25-year	1 in 25 (4%)
10-year	1 in 10 (10%)

It is important to acknowledge that floods do not stop at regulatory floodplains, nor does the regulatory floodplain define the limit of potential flood damage or losses. Nationally, FEMA reports that 25 percent of total flood insurance claims are made by property owners located outside of the 1% annual chance floodplain. In the Delaware River Basin, 35 percent of repetitive loss property owners are located outside of the 1% annual chance floodplain.

In addition, an uncontrolled release of water during either a non-storm or storm event, like the catastrophic dam failure or the breach of a levee, could result in significant flooding impacts beyond the 1% annual chance floodplain.

States and local municipalities are encouraged by FEMA to adopt “more than the minimum” requirements. In fact, the Community Rating System (CRS), a FEMA program, rewards such communities by issuing credit points based on the adoption of standards higher than the NFIP's minimum requirements. Policyholders in these communities receive discounts on their flood insurance premiums because their communities are implementing floodplain management programs that go beyond the minimum requirements of the NFIP.

Future development and the impacts of climate change are not taken into account during the development of FEMA flood hazard area mapping. As future development or other land use changes within a watershed area occur, runoff may increase flows to flood-prone areas downstream.

In NJ, for State land use regulatory permits, the NJ Flood Hazard Area Design Flood (NJFHADF) is equal to the 1% annual chance flood plus an additional 25% in flow, not to exceed the 0.2% annual chance flood. The NJFHADF boundary is to regulate disturbance to the land and vegetation within a flood hazard area. This regulation is set forth by the State of New Jersey Flood Hazard Area Control Act Rules N.J.A.C. 7:13 and is administered by the New Jersey Department of Environmental Protection. This NJFHADF is more restrictive than the national standard of the 1% annual chance floodplain and was adopted by NJ as a means to consider the effects of future development. It is important to notice that at points along the Delaware River, the NJFHADF ranges from about 3 to 8 feet above the 1% annual chance base flood elevation.

DE, PA and NY currently use the 1% annual chance peak flow to define the regulatory floodplain without any considerations for future build out.

As mentioned in the Preamble under the heading “Floodplain Mapping”, substantial portions of the Basin have inaccurate maps, or in some cases no maps at all. In these areas map-based regulations are currently not an option. Members of the sub-committee expressed the importance of evaluating the flood risk in these areas based on population density, development trends, projected climate change impacts, and history of flood damage.

Recommendations: The regulatory floodplain for waterways in the Delaware River Basin should be greater than the 1% annual chance floodplain.

Projected impacts due to climate change should be incorporated into flood plain maps and future regulatory decisions. This is especially important in coastal areas where significant changes in sea level are projected. While doing this will be a significant challenge, it is important given recent projections. It is recommended that projected flood maps be created for times T+10, T+25, T+50, T+100 years based on the best available predictions for sea level rise, temperature, and precipitation in the basin. (T= year of update)

1) The Flood Advisory Committee proposes one of the following two comparable approaches:

Option 1

The regulatory floodplain for the Delaware River Basin should be defined by the 1% annual chance flood plus an additional 25% in flow, not to exceed the 0.2% annual chance flood along the main stem of the Delaware River and all other streams and rivers within the basin. Flood hazard area maps should include this residual risk factor of 25%; 1) to consider current and future planned development, 2) to recognize variability in hydrologic modeling, 3) to consider temporary blockages to culverts and other hydraulic impediments, and 4) to more accurately define flood risk.

Option 2

The regulatory floodplain for the Delaware River Basin should be defined by the 0.2% annual chance floodplain (also known as the 500-year floodplain) along the main stem of the Delaware River and all other streams and rivers within the basin. Any change in the regulatory floodplain for

the Delaware River Basin would require a remapping effort. As the 0.2% annual chance floodplain is already mapped in a large part of the basin, implementation of this regulatory floodplain definition may be able to occur more quickly. If and when projected flood plain maps for T+10, T+25, T+50, T+100 years become available, consideration should be given to defining the flood plain using one of these maps.

2) Unmapped waterways of the Basin need a mechanism for identifying the regulatory floodplain. Whether this mapping is prepared by 1) DRBC, 2) the developer, or 3) States and Communities, all maps prepared along previously unmapped waterways should be prepared using consistent methodology.

In order to prioritize mapping preparation, unmapped or inadequately mapped areas should be evaluated based on population density, development trends, projected climate change impacts, and history of flood damage. Areas at high risk of flood damage based on this evaluation can be prioritized for future mapping and possibly more stringent regulations.

B. Floodway definition

Background: Existing flood hazard area maps greatly underestimate the limit of floodways along the main stem Delaware River and other waterways within the Delaware River Basin. The flood hazard area, or floodplain, is the area along a waterway that is expected to be or has been inundated by floodwaters. The floodway, which is the inner portion of the flood hazard area nearest the stream or river, is the most dangerous area that carries deeper flows and higher velocities during a flood. New construction of structures is generally prohibited in floodways because it is unsafe and obstructs the passage of floodwaters, although removal of vegetation and construction of parking or other nonstructural activities while having an impact are often allowed. The flood fringe, or areas immediately adjacent to floodways where development is commonly allowed are often subject to flood depths and velocities similar to those of the floodway.

A regulatory floodway is defined as the channel of a river or other watercourse and portions of the floodplain adjoining the channel that must be reserved in order to carry and discharge the base (or 1% annual chance) flood without cumulatively increasing the

water surface elevation more than a designated height. The Floodway drawn on floodplain maps is based on a technique of compressing the wetted cross section in the hydraulic model, until a desired surcharge is achieved. This surcharge is the floodway standard, of which the minimum FEMA floodway standard allows for a 1.0-ft rise. The current New Jersey State floodway standard, allows for a more conservative 0.2-ft. rise in flood depths. This more stringent, lower rise determination results in a larger regulatory floodway allowing the same base floodwaters to be carried downstream over a larger area. Even though NJ has adopted this more stringent standard on its in-state waterways, the less stringent FEMA standard was used to delimit the floodway for the main stem of the Delaware River to avoid inconsistencies between different floodway criteria on the New Jersey and Pennsylvania sides of the river. Both Pennsylvania and New York allow a 1.0-ft rise floodway standard throughout the Delaware River Basin. Communities must regulate development in these floodways to ensure that there is no increase in the base flood elevation at any location.

Due to the inherent challenges of hydrologic and hydraulic modeling, limitations of topographic accuracy, and general cartographic limitations, the exact placement of a floodway is open for discussion, debate and change. An experienced land development engineer, working for a developer with enough resources, will likely be able to relocate the floodway boundary using the FEMA Letter of Map Revision (LOMR) process. Therefore, while the floodway concept is a strong floodplain management tool, it is only as strong as the mapping it is based on. Any regulation tied to the floodway could be avoided entirely if the floodway is amended via the LOMR process. Savvy developers will review the modeling and determine if it is cheaper to comply with stricter regulation, or simply attempt to adjust the floodway limits and thereby remove themselves from regulatory authority. In these cases, a 0.2-ft rise floodway standard would make it more difficult to play these types of games.

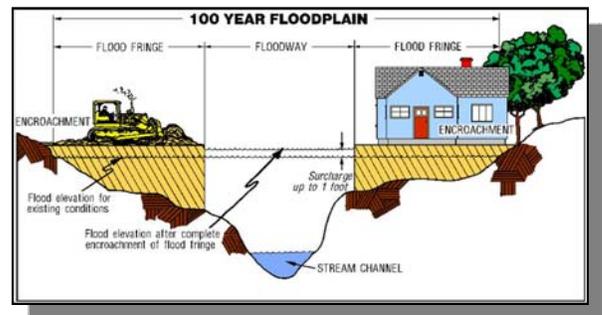
Currently designated 1-ft rise floodways are extremely narrow and new construction is sometimes improperly permitted in close proximity to streams and rivers simply because they are not currently demarcated as floodways. Greater portions of the floodplain would lie within mapped floodways if the 0.2-ft floodway standard were to be used. Adequately

defining the floodway and regulating development in these floodways is one way to ensure future flood loss reduction.

Recommendation: The floodway in the Delaware River Basin should be defined by a 0.2-foot rise standard for the main stem Delaware River and all other streams and rivers within the basin. Such a change would help to deter risky, new development in close proximity to streams and rivers.

C. Development/ Fill in the Flood Fringe

Background: The Flood Hazard Area, as defined by FEMA, is composed of a floodway and a flood fringe. The flood fringe is the portion of the floodplain that lies outside the floodway.



Floodwaters generally move more slowly in the flood fringe as compared with the floodway, and the flood fringe serves to temporarily store large volumes of floodwater during a flood. The space that floodwaters occupy on a given site during a flood is referred to as the "flood storage volume" of that site.

When structures or fills are placed in a flood fringe, it occupies a space that would otherwise be filled with floodwaters during a flood, thus reducing the flood storage volume on the site. If a significant volume of floodwater is prevented from occupying a given area, excess floodwater will instead occupy neighboring and downstream properties, thus worsening flood conditions on those sites.

Unless properly managed, development within floodplains can exacerbate the intensity and frequency of flooding by increasing stormwater runoff, reducing flood storage, and obstructing the flow of floodwaters. Structures constructed in the flood fringe are subject to flood damage and threaten the health, safety and welfare of both the people who occupy them and emergency responders who respond in times of flood emergency.

Historically, the earliest settlements along the eastern seaboard were established along navigable waters. As a result, many of the Delaware River basin's older communities lie partially or completely within floodplains. As development has continued within the basin over the years, increased impervious cover in the form of roads, buildings and parking lots combined with the destruction of forest and wetlands for development and agriculture has increased peak rates and the volume of runoff flowing to the streams and rivers within the basin.

Development within the floodplain obstructs flood flows and compromises the flood storage and peak attenuation contributions of a natural floodplain. In addition, it knowingly places structures, infrastructure and people in the very locations that are known and expected to be subject to flooding and flood damages. As a result, flooding that naturally occurs along waterways has become progressively more threatening and damaging to people, buildings and infrastructure as a combination of increased runoff, decreased vegetation and storage absorption capacity and additional development in floodplains occurs. It is expected that these negative trends will continue so long as buildings and structures continue to be placed in the floodplains of the streams and rivers of the Delaware River basin.

Recommendation: Protect the flood fringe in a naturally vegetated state and limit development including, but not limited to, structures, infrastructure, impervious surfaces, fill, grading and removal of vegetation.

The goal of managing development in the floodplain shall be to prohibit, except in extraordinary cases, new development in the flood fringe and to reduce risk to people and structures currently located in the floodplain. Development, for purposes of this document, is defined to include structures, infrastructure, impervious surfaces, fill, grading, storage of materials and equipment, and removal of vegetation.

Furthermore, the overall goal shall be to preserve existing floodplains and enhance the ability and function of floodplains by removing unnatural obstructions and reconnecting streams to their floodplains.

All communities in the basin should be encouraged to develop comprehensive plans that establish no build and no disturbance zones within

environmentally sensitive and high storm hazard areas such as riverine floodplains and coastal storm surge areas.

Development shall be based on avoiding construction in the flood fringe and maintaining the floodplains in a natural state. Strong standards shall be established for siting, construction and protection of all structures in the flood fringe.

As governments face the costs of maintaining an aging infrastructure, it is wise to focus on flood solutions that do not depend on active maintenance. Non-structural solutions to flooding problems should be considered before structural solutions. Non-structural solutions include, but are not limited to, physical relocation or elevation of structures in the floodplain and floodplain or stream restoration projects. Some structural solutions include dams, levees and backflow prevention devices. Structural solutions should be reserved only to address existing development.

The Flood Advisory Committee recommends establishing regulations and policies throughout the basin that:

- Promote standards that protect floodplains from alteration and promote enhancement.
- Permit only passive uses in the flood fringe. Passive uses are defined as uses that do not require grading or placement of habitable structures. Examples include agriculture, pasture, orchards and natural areas.
- In the flood fringe, prohibit creation of new lots without sufficient buildable area outside of the flood hazard area.
- Limit new structures within the flood fringe to the maximum extent possible.
- Prohibit the placement of fill as a means to make a previously undevelopable parcel buildable.
- Require any development in the flood fringe to be designed so that it does not unnecessarily displace existing flood storage or increase flood heights. Where flood storage displacement does occur, an equal volume of flood storage shall be created offsite, but within the same watershed and as near to the fill as possible.

- Require critical facilities including, but not limited to, hospitals, fire and police stations, transportation facilities to be kept outside of the 0.2% (500 year floodplain) to protect life, health and the local economy.
- Provide incentives to existing property owners in the flood fringe to: 1) relocate homes and businesses outside the flood hazard area where possible; 2) make improvements to structures below substantial improvement levels to reduce flood damage potential and increase flood storage (reference K. Substantial Damage/Improvement to Structures); and 3) make improvements to properties in the flood fringe to increase flood storage.
- Design new bridges and crossings to ensure that flooding to existing buildings or facilities is not exacerbated upstream or downstream.
- Design new agricultural structures in a manner that results in minimal damage to the structure and its contents, and will create no additional threats to public safety or environmental degradation.
- Establish urban floodplain reclamation programs. These should establish incentives for projects that include floodplain reclamation, such as a “density bonus” for building outside of the floodplain.
- Coordinate with existing programs that preserve agricultural lands, forests, wildlife habitat and others, which help guide encroaching development areas outside of floodplains.

D. Development/ Fill in the Floodway

Background: The floodway is the portion of the floodplain that is required to carry the design flood with a pre-defined rise. The depth and velocity of flow in the floodway is much greater than flow within the flood fringe. Therefore, development in floodways is subject to greater flood damage potential from the depth and velocity of flow. It is recommended that policies prohibit new development in the floodway and encourage relocation of people who have chosen to live in floodways.

People living within floodways are subject to devastating flood events that impact public health,

safety and welfare, and often result in loss of life and severe damage to property. Emergency response systems are often overextended during floods as they attempt to rescue people from dangerous flood prone areas.

Since the floodway is the portion of the floodplain that is reasonably required to carry floodwaters, the dynamics of flooding are much different in the floodway than within the flood fringe. Whereas the flood fringe temporarily stores floodwaters, the floodway quickly conveys floodwaters.

Placing structures or fill within a floodway can also cause serious obstructions to flow, which increases the depth of flooding and exacerbates erosion, therefore adversely impacting people situated outside the floodway as well as within the floodway. Furthermore, placing fill in one portion of a floodway can not easily be offset by an equal cut in another portion of the floodway because floodwater conveyance within floodways can be quite complicated and is often sensitive to a number of factors, such as the size, shape, skew, cross-sectional area and friction of the channel and adjacent floodway, as well as the presence of manmade structures and natural topographic features.

Structures situated in floodways are often subject to greater depth and velocity of flooding than those in the flood fringe, placing the people who use and rely on these structures at great risk during a flood.

Recommendation: New development in floodways should be prohibited. Development, for purposes of this document, is defined to include structures, infrastructure, impervious surfaces, fill, grading, storage of materials and equipment, and removal of vegetation.

The Flood Advisory Committee recommends establishing regulations and policies throughout the basin that:

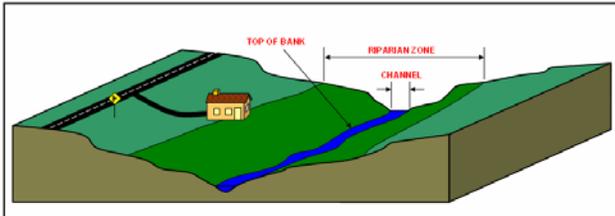
- Prohibit the placement of fill or new structures within floodways.
- Eliminate/redesign existing obstructions to flow where possible.
- Provide existing floodway property owners with opportunity to make improvements below substantial improvement levels to

properties and structures to reduce flood damage potential.

- Provide incentives to relocate homes and businesses outside the floodway, where possible.
- Design and construct all bridges and crossings to ensure that flooding to existing buildings or facilities is not exacerbated upstream or downstream.

E. Stream/riparian Corridors and Vegetation Disturbance

Background: A stream corridor is composed of several essential elements including the stream channel itself, associated wetlands, floodplain and vegetation. Literature indicates that stream buffers, particularly those dominated by woody vegetation, are instrumental in providing numerous ecological and socioeconomic benefits. Simply put, riparian corridors protect and restore the functionality and integrity of streams. A natural riparian corridor decreases flood damages, decreases erosion, and improves water quality.



While the focus of riparian buffer research has often been on the water quality and habitat benefits of buffers, there is support for the ability of buffers to attenuate flooding. Research has demonstrated that because of the hydrologic and hydraulic impacts of vegetated buffers, buffered streams experience a less dramatic spike in stream flow from storm events, and do a better job of storing floodwaters and releasing them gradually, thus reducing flood crest height downstream.

While there is no question that riparian buffers can help to prevent flood damage, there was debate over the most effective way to define and regulate them in the Basin. Literature does indicate that the desirable width and character of a riparian buffer varies according to the purpose of the buffer (flood damage prevention, water quality, bank stability, aquatic habitat, terrestrial habitat, etc.), and the characteristics of the stream and the riparian area

(stream width, stream discharge, drainage area, topography, soil type, land use, population density, existing and traditional riparian vegetation, etc.). Several formulas exist to determine buffer design based on desired function and site characteristics.

While designing buffers based on site and watershed characteristics is ideal, it requires scientific analysis that can be time consuming and expensive. Regulations based on science can also be more complex and thus more difficult to enforce. For these reasons, many regulators advocate a fixed-width buffer mandate.

Recommendations: Incorporate the buffer concept as part of a comprehensive floodplain management program to protect communities from flood damage.

The Flood Advisory Committee proposes one of the following two comparable approaches:

Option 1

1) Adopt a minimum 100' vegetated buffer along all waterways of the basin; and

2) Communities who have crafted an approved fixed or variable-width riparian buffer program can implement that program in lieu of the 100' minimum buffer mandate.

Option 2

1) DRBC should establish and require a riparian variable-design buffer program. The program should include a minimum buffer recommendation based on an evaluation of buffer widths as they relate to flood damage prevention. This model program should be informed by an evaluation of existing programs in the basin and elsewhere.

2) If a community already has a buffer program in place judged by DRBC or the relevant state agency to be effective, that program should be considered adequate for compliance.

3) The resulting buffer program should include an element that requires restoration/creation of vegetated buffers in new development and redevelopment circumstances.

F. Adopted Building Code

Background: The International Building Code (IBC) is a model building code developed by the

International Code Council. It has been adopted throughout most of the United States.

Pennsylvania, New York, New Jersey and New Castle County, DE have adopted the 2006 International Code issued by the International Code Council. Section 1612.4 of the International Building Code states the design and construction of buildings and structures located in flood hazard areas shall be in accordance with American Society of Civil Engineers known as the ASCE 24 – 05 Flood Resistant Design and Construction. Highlights of the ASCE 24 are as follows:

Freeboard:

- Dwellings: 1-foot freeboard.
- Essential/Emergency Facilities: 2-3 feet freeboard
- Agricultural/Temporary Facilities: Lowest Floors at Base Flood Elevation (BFE)

Fill: Required to be stable under conditions of flooding, including rapid rise and rapid drawdown, prolonged inundation, and erosion and scour; structural fill compaction is specified or an engineering report is required; side slopes are required to be no steeper than 1:1.5.

Soil considerations: Soil characteristics and underlying strata, including soil consolidation, expansion or movement, erosion and scour, liquefaction, and subsidence must be considered.

Flood-Damage Resistant Materials: Flood-damage resistant materials shall be used below the lowest floor elevations, including freeboard. Requires structural steel exposed to salt water, salt spray, or other corrosive agents to be hot-dipped galvanized after fabrication; other metal components shall be stainless steel or hot-dipped galvanized.

Utilities and Service Equipment: Utilities and attendant equipment that is elevated shall not be located below the lowest floor elevations, including freeboard.

Siting Considerations: Structures shall not be built in:

- Areas subject to flash flooding (floodwaters rise to 3 feet or more above banks in less than 2 hours).
- Erosion-prone areas (determined by analyses) unless protected.

- High velocity flow areas (faster than 10 ft/sec) unless protected.

Buildings in proximity to flood protective works (dams, levees, floodwalls, diversions, channels) shall not have adverse effects on, or conflict with, maintenance and repairs of those protective works.

Recommendation: Continue the adoption of International Codes issued by the International Code Council concerning standards in the floodplain, except in cases where the recommendations proposed in this report are more restrictive.

G. Standards for the Lowest Floor of Structures (Freeboard)

Background: “Freeboard” is 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 a watershed.

Benefits of freeboard include avoided damages and insurance savings. Freeboard often results in significantly lower flood insurance rates due to the lower flood risk. The flood damage reduction benefits of freeboard—and the savings on NFIP flood insurance policies—were documented in the NFIP Evaluation Report, Evaluation of the National Flood Insurance Program’s Building Standards (October 2006).

Example A Zone building, slab or crawspace foundation (no basement). \$200,000 building coverage, \$75,000 contents coverage.	
Floor Elevation above BFE	Reduction in Annual Flood Premium*
1 foot	39%
2 feet	48%
3 feet	48%
4 feet	48%

* Compared to flood premium with lowest floor at BFE

Freeboard is not required by FEMA’s NFIP standards, which require that the lowest floor (including basements) of structures within the 1% annual chance floodplain be constructed at or above the FEMA base flood elevation (BFE). The BFE is the computed elevation to which floodwater is

anticipated to rise during the base flood. BFEs are shown on Flood Insurance Rate Maps (FIRMs) and on flood profiles.

Recently FEMA proposed to have a freeboard requirement added directly to the 2009 International Residential Code (IRC). Despite strong support, the vote required the addition of freeboard for V Zones and Coastal A Zones only. The requirement will not extend to all Special Flood Hazard Areas, including riverine floodplains.

Many states already require freeboard. In the basin, these states include New York and New Jersey. In NY, the lowest floor of all one or two family buildings must be constructed two (2) feet above the FEMA base flood elevation. In NJ, the lowest floor of all residential and commercial structures must be set at least one (1) foot above the NJ Flood Hazard Area Design Flood (NJFHADF), or, in cases where a NJ flood hazard design flood elevation does not exist, two (2) feet above the FEMA base flood elevation.

Pennsylvania and Delaware currently adhere to the NFIP minimum which permits the lowest floor of all residential and commercial structures to be at or above the BFE.

It is important to notice that at points along the Delaware River, the NJFHADF ranges from about 3 to 8 feet above the FEMA base flood elevation. Therefore, at a specific locations, current regulations in NJ will require new construction to be built approximately 6' above the FEMA base flood elevation (1' above the NJFHADF), whereas at the same location across the river in PA, the lowest floor of new construction is permitted to be built at the FEMA base flood elevation.

Recommendation: All new or substantially improved residential, institutional and commercial structures within the Delaware River Basin should be constructed with two (2) feet of freeboard above the 1% annual chance base flood elevation. This recommendation should apply to all structures within the 1% annual chance floodplain and those outside of it that are less than two feet higher than the base flood elevation.

Currently, floodproofing of non-residential structures, instead of elevation, is an approved means to prevent or reduce flood damage. In the event of a basinwide freeboard requirement, a provision for

floodproofing of non-habitable and/or commercial structures may be requested.

H. Enclosed Areas below Flood Elevation

Background: History tells us that what was, at the time of construction, compliant space below the lowest floor, over time transitions to living space. Vigilance on the part of local officials is needed to prevent this from occurring.

NFIP standards require that the lowest floor (including basements) of structures within the 1% annual chance floodplain be constructed at or above the FEMA base flood elevation (BFE). Fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Specific opening requirements can be found at 44 CFR 60.3 (c)(5).

Recommendations:

1) At time of construction, a deed restriction should be required for enclosures. This deed restriction would need to be filed with the recorder of deed. It is recommended that a copy of the deed restriction be filed with floodplain administrator to aid in proper floodplain management and enforcement at the community level.

2) Structural requirement: If the enclosure below the flood elevation is greater than 6 feet in height measured from floor to floor, at least 25 percent of the surface area of the outer wall of enclosures should be left permanently open. Such a requirement would prevent conversion of enclosures built below the flood hazard design elevation from being converted into living space.

I. Substantial Damage/Improvement to Structures

Background: "Substantial damage" has occurred when the cost of restoring a structure to its pre-damage condition equals or exceeds 50 percent of the structure's pre-damage market value. A cumulative substantial loss determination would be two (2) flood losses over a ten year period with an average damage of 25% of the structure's market value at the time of each damage event. Once a structure is considered substantially damaged, the structure is required to

come into NFIP compliance which often means elevation of the structure is mandatory.

Increased Cost of Compliance or ICC coverage will pay up to thirty thousand dollars beyond the flood insurance claim payment for compliance with local flood damage reduction regulations. Structures that have been declared substantially damaged and are required to meet flood damage reduction regulations because of cumulative losses can only obtain ICC coverage if the community has adopted the cumulative provisions in their ordinance. ICC coverage is part of the standard flood insurance policy.

To qualify for Increased Cost of Compliance, a building must be:

- Covered by a National Flood Insurance Program standard policy,
- Located in a Special Flood Hazard Area, also known as a regulatory floodplain,
- Below the base flood level, and
- Either "substantially damaged" or a "repetitive loss property."

The primary advantage to adding the cumulative provision for substantial damage is to increase the availability of Increased Cost of Compliance (ICC) flood insurance coverage. The extra money can be used by property owners to make their homes or businesses safe from future floods.

Unless records are kept very well and up to date, there can be difficulty in implementing cumulative provisions for substantial improvement and substantial damage. This issue needs to be well covered by educational training programs.

“Substantial improvement” means any reconstruction, rehabilitation, addition or other improvement to a structure, the total cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement.

Recommendation(s):

1) Cumulative Substantial Damage

Declaration: A cumulative loss determination should be applied in the basin following the ICC definition of cumulative loss, two flood losses over a ten year period with an average damage of 25% of the structure’s market value at the time of each damage event.

As ICC coverage does not fully cover the costs of mitigation, it is recommended that once a property is determined to be substantially damaged or a repetitive loss property, the structure should go on a high priority list for acquisition and/or have greater access to funds for elevation.

2) Tracking of Cumulative Substantial Damage/ Improvements: Tracking of cumulative substantial improvements and/or damages for structures in special flood hazard areas is necessary to ensure that flood protection measures are incorporated.

J. Dams and Flood Damage Risk

Background: When considering dam construction, dam removal, spillway modification and potential dam failure, the most significant issue related to flood damage prevention is the change in floodwater distribution that will result. FEMA generally doesn’t include small impoundments as being influential to the 100 year floodplain. More common flood events (1yr, 10yr, 25yr, 50yr), however, can be greatly affected by smaller impoundments. The creation/removal/failure of a dam has the potential to dramatically change the magnitude of these flood events, and their failure during larger flood events can result in increased damage and loss of life immediately downstream.

There are a large number of dams in the Delaware River basin. Many of these dams are very old, and present a wide range of structural integrity. Failure of these dams can create a flood hazard that is not predicted by existing maps, especially in areas directly downstream. Failure of dams of this nature has resulted in fatalities in Delaware County, NY. Better monitoring of dams and their effects on flood damage is necessary to fully safeguard life and property in the basin.

Recommendations:

1) Monitoring of all dams, and small, possibly-overlooked dams in particular, **should be increased.** Dams that present a clear and present danger of failure should be removed or their hazard sufficiently mitigated.

2) States should seek to increase funding and technical assistance to small dam owners for evaluation and removal, where necessary.

3) Completion of emergency action plans for high hazard and significant hazard dams must be prioritized. These plans contain inundation maps that identify flood hazard areas in cases of a dam failure. These maps are essential for emergency planning. A mechanism should be developed to communicate the location of dam failure hazard zones to the public. The emergency action plans should be regularly exercised and include notification of the National Weather Service in their communication plan.

4) Hydraulic studies in the vicinity of high hazard and significant hazard dams should be revisited to evaluate the change in flood hazard areas above and below the dam in the event of failure. Consideration should be given to the possibility of the failure of multiple small dams in a major flood event. Such studies should also occur prior to any non-emergency dam breach.

5) Before a dam is removed, hydraulics must be revisited to evaluate the adequacy of downstream drainage structures, and the accuracy of upstream floodplain maps.

6) The evaluation of downstream flooding impacts should be completed as part of the permit application process for either a dam decommissioning or dam repair which increases spillway capacity. This evaluation should detail the effects of a breach or change in spillway configuration on the downstream channel demonstrating that the project will not adversely affect flooding conditions downstream during the 10-, 50-, and 100-year storm events.

K. Bridge/Culvert Construction or Reconstruction and Flood Damage Risk

Background: The Delaware River watershed is very large. Over its course the river runs through a variety of landscapes, all which affect the risk to life and property from flood events differently. Particularly important to bridge and culvert design is the geomorphology of the stream channel, valley, and adjacent uplands, and population distribution and density where the structure occurs. While all of the states in the basin should be aware of the policies and standards of the others, and all should work together where appropriate to mitigate flooding, it is important for each state in the watershed to develop standards and details that are appropriate for their topography,

population densities and development. One standard design procedure for the entire basin is inappropriate.

The central concerns of designing highway drainage structures are the duration of their useful life, the costs they will incur over the course of that lifespan, and risk assessment. While it is possible to design and build structures that would withstand extremely large events, it is likely that the benefit will not be worth the cost given that the structure will reach the end of its useful life long before the design event affects it.

Recommendation(s):

1) Design new bridges and culverts to ensure that flooding to existing buildings or facilities is not exacerbated upstream or downstream. Design should be based on the results of updated flood models using recent climate data that incorporates changing precipitation/temperature trends and, where appropriate, the latest regional projections for sea level rise. It is likely that old models for determining the probability of occurrence of a particular event are no longer appropriate, given the impacts of climate change in the Basin. These models should be re-evaluated using USGS stream gage data.

The USGS streamgage network is critical to providing real-time information used for making flood forecasts, determining adequate heights for construction of bridges and levees, and to emergency management agencies for deciding whether or not to evacuate cities and towns that are in danger of flooding. It is highly important that the streamgage network continue to be maintained and supported via funding of its local cooperators.

2) Maps should be updated for new crossings; the applicant should submit Letter of Map Revision (LOMR) as part of the application process should there be any change in the base flood elevation or extent.

L. Stormwater Regulations –New and Redevelopment

Background: Managing the impacts of stormwater runoff and the flooding that often results is becoming as challenging as ever. Impacts caused by urbanization and impervious land cover include increased runoff volumes, diminished stream base flow, increased frequency of bank full flooding,

stream bank erosion, loss of riparian forest cover, floodplain disconnection, decline in aquatic and plant diversity and changes in sediment yield and transport. Facing many of the same challenges experienced by stormwater managers nationwide, such as impaired watercourses listed on the EPA 303d stream inventory, antiquated drainage infrastructure and an increase in flooding frequency and severity, stormwater managers and regulators have been forced to move away from traditional stormwater management methods which have been proven to be ineffective.

To that end, ordinances have been promulgated that focus on a runoff volume based method of stormwater management; rather than traditional store and release stormwater designs. These new designs emphasize the importance of maintaining a healthy hydrologic balance between recharging groundwater supplies, the use of infiltration to maintain stream health and filtering stormwater runoff using natural, non-structural practices by the implementation of Green Technology Best Management Practices (GTBMPs). Stormwater managers in the Mid-Atlantic region recognize that approximately 90% of the annual rainfall comes from rain events of 2 inches or less.

The challenges to successfully managing stormwater runoff are not limited to the physical boundaries of hydrology and hydraulics. Runoff is a natural occurring process respective of land uses and the associated land covers. A successful stormwater program must address the range of land uses from residential to commercial and Greenfield development to Brownfield development and redevelopment.

Recommendation: The goal of stormwater design within the Delaware River Basin should mimic pre-development hydrology at a minimum by the following:

- Require post development infiltration to achieve 100% of the pre-development infiltration condition when feasible.
- Mandate no net increase in the volume rate of runoff post development as compared to pre-development.
- Mandate use of stormwater best management practices to address runoff volume management, pre-development infiltration goals, re-use and reduction of stormwater. Include peak rate control for the 2, 10 and 100 year design storm if not already addressed by the series of strategies already used to address volume, infiltration and quality issues.
- Establish corridors for the conveyance event (typically the 10 year frequency storm event) and verify that no hazards or life-safety issues exist for storm events up to the 100 year flood event through the creation of easements or right of ways.
- Require minimum vegetated buffers on riparian buffers to all watercourses in the basin.
- Provide 100% water quality treatment for the 2.0" rainfall event in 24-hours.

APPENDIX I – Floodplain Regulations Matrix

Issue	Recommendation of the Flood Advisory Committee (FAC)	National Flood Insurance Program (NFIP) (Minimum national standards as required by FEMA)	DRBC	New Jersey	Pennsylvania	New York	Delaware
A. Regulatory Floodplain Definition	<p>1. The regulatory floodplain for waterways in the Delaware River Basin should be greater than the 1% annual chance floodplain. Option 1: Define as the 1% annual chance peak flow plus 25% or Option 2: Define as the 0.2% annual chance floodplain</p> <p>2. Unmapped waterways of the Basin need a mechanism for identifying the regulatory floodplain.</p>	<p>Area of special flood hazard is the land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year.</p> <p>The area may be designated as Zone A on FEMA Flood Maps. This area is also known as the Special Flood Hazard Area (SFHA) and was previously known as the 100 year floodplain.</p> <p>The regulatory floodplain is composed of the flood fringe and the floodway.</p>	Section 6 of the DRBC Flood Plain Regulations(FPR).	<p>More restrictive than the NFIP Minimum</p> <p>NJ Flood Hazard Area equal to 100-year flood in tidal area and 100-year flood plus an added factor of safety in non-tidal areas (NJ flood hazard area design flood = 125% of 100-year discharge in non-tidal areas), not to exceed the 0.2% annual chance flood.</p> <p>At points along the Delaware River, the NJFHADF ranges from about 3 to 8 feet above the FEMA base flood elevation.</p>	NFIP Minimum	NFIP Minimum	NFIP Minimum
B. Floodway Definition	The floodway in the Delaware River Basin should be defined by a 0.2 foot rise standard for main stem Delaware River and all other streams and rivers within the basin.	<p>Regulatory Floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.</p> <p>The NFIP maximum height allowed is 1.00 foot.</p>	Section 6 of the DRBC Flood Plain Regulations(FPR). Similar to FEMA definition.	<p>More restrictive than the NFIP Minimum</p> <p>Since 1974, defined by 0.2 foot rise in water levels. Interstate waterways defined by 1 foot rise in water level.</p>	NFIP Minimum	NFIP Minimum	NFIP Minimum
C. Development/Fill in the Flood Fringe	Protect the flood fringe in a naturally vegetated state and limit development including, but not limited to, structures, infrastructure, impervious surfaces, fill, grading and removal of vegetation.	Allowed in floodway fringe with restrictions (lowest floor elevation, venting, etc.)	<p>Development: Authorities provided under Section 6 of the Compact, the Commission's Practice and Procedures (section 2.3.5.B 9 & 16 and FPR)</p> <p>Fill: Section 6.3.3. Not to adversely affect the capacity of the floodway.</p>	<p>More restrictive than the NFIP Minimum: Regulated by Flood Hazard Area Control Act Rules N.J.A.C. 7:13</p> <p>0% net fill restriction in non-tidal flood fringe statewide - therefore may only be allowed with compensatory storage onsite or nearby in same floodplain</p>	NFIP Minimum except that PA Act 166 requires structures for production/storage of hazardous chemicals to be elevated 1 +1/2 ft. above the FEMA base flood elevation & designed to prevent pollution	NFIP Minimum except that the Residential Building Code of NYS requires the lowest flood of all one and two family buildings must be constructed two (2) feet above the FEMA base flood elevation.	NFIP Minimum
D. Development/Fill in the Floodway	New development in floodways should be prohibited.	Must demonstrate no rise (0.00 foot)	<p>Development is restricted as specified in Section 6.3.2, e.g. no residential development, stock piling or disposal of pesticides, domestic or industrial waste, radioactive materials, etc.</p> <p>Fill: Section 6.3.2 Prohibited</p>	Prohibited	NFIP Minimum except that PA Act 166 - Structures for production/storage of hazardous chemicals are prohibited	NFIP Minimum	NFIP Minimum
E. Stream/Riparian Corridors and Vegetation Disturbance	Incorporate the buffer concept as part of a comprehensive floodplain management program to protect communities from flood damage. Option 1: 100' minimum vegetated buffer and Option 2: Establish a riparian variable-design buffer program	Not addressed	Not addressed	Depends on type of stream. Riparian zone is 50 ft, 150 ft, or 300 ft from top of bank.	Not addressed	<p>No required buffer or riparian zone.</p> <p>State DEC stream encroachment permit required for regulated streams for work in or below stream banks.</p>	Not addressed
F. Adopted building code	Continue the adoption of International Codes issued by the International Code Council concerning standards in the floodplain, except in cases where the recommendations proposed by the FAC are more restrictive.	N/A	Section 6.2.1 requires approval of State and Local standards of Floodplain Regulation. Section 6.4.1. provides that duly empowered state or local approvals can be in lieu of Commission approval, However Sections 6.2.1 and 6.4.3.A provide that such standards must be equivalent of the Commission	Through the NJDCA, the NJ Construction Code identifies the model codes as sub-codes including 2006 IBC, 2006 IRC, 2006 National Standard Plumbing, 2005 National Standard Electrical Code, 2006 IFC, State-developed rehabilitation code (existing buildings).	PA Uniform Construction (UCC)	2007 Building Code of NYS and Residential Code of NYS, based on IBC.	
G. Standards for the Lowest Habitable Floor of Structures (Freeboard)	All new substantially improved residential, institutional and commercial structures within the Delaware River Basin should be constructed two (2) feet above 1% annual chance base flood elevation within the flood fringe.	Lowest floor must be at or above the base flood elevation (no freeboard required)	Section 6.3.2.A.1 No erection of structures in floodway for occupancy by humans or animals at any time. Section 6.3.3.B.2 In flood fringe, lowest floor to be above the Flood Protection Elevation (equivalent to one (1) foot above the FEMA base flood elevation).	<p>More restrictive than the NFIP Minimum</p> <p>Lowest floor to be constructed must be set at least one (1) foot above the NJ Flood Hazard Area Design Flood (NJFHADF) elevation, or, in cases where a NJFHADF elevation does not exist, two (2) feet above the FEMA base flood elevation.</p>	NFIP Minimum	<p>More restrictive than the NFIP Minimum</p> <p>2' above the FEMA base flood elevation for one or two family buildings.</p>	NFIP Minimum

Issue	Recommendation of the Flood Advisory Committee (FAC)	National Flood Insurance Program (NFIP) (Minimum national standards as required by FEMA)	DRBC	New Jersey	Pennsylvania	New York	Delaware
H. Enclosed Areas below Flood Elevation	<p>1. At time of construction, a deed restriction should be required for enclosures.</p> <p>2. Structural requirement: If the enclosure below the flood elevation is greater than 6 feet in height measured from floor to floor, at least 25 percent of the surface area of the outer wall of enclosures should be left permanently open.</p>	60.3 (c)(5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.	Not addressed	<p>More restrictive than the NFIP Minimum</p> <p>1. 1 square inch of net vent opening per square foot of floor area; 2. Crawl spaces must be less than 6 feet high or 25% of wall space must remain permanently open; 3. Deed of property must state habitation of crawl space prohibited</p>	NFIP Minimum	NFIP Minimum	NFIP Minimum
I. Substantial Damage/Improvement to Structures	<p>1. Cumulative Substantial Damage Declaration</p> <p>2. Tracking of Cumulative Substantial Damage/Improvements</p>	Entire structure treated as new construction and must be brought into compliance with the current ordinance.	Section 6.5.2 Prior non conforming Structures: Non-conforming structures in the floodway cannot be expanded. Non-conforming structures in floodway that are damaged or destroyed by any means to the extent of 50% or more cannot be restored, repaired or improved except in conformity with these regs.	All new construction, additions, improvements must meet current rules. If more than 50% of a structure is replaced, entire structure must meet new rules.	NFIP Minimum	NFIP Minimum	NFIP Minimum
J. Dams and Flood Damage Risk	<p>1. Increase monitoring of dams. Dams with a clear and present danger of failure should be removed.</p> <p>2. States should increase funding and assistance to small dam owners for evaluation and removal.</p> <p>3. Completion of emergency action plans for high hazard and significant hazard dams must be prioritized.</p> <p>4. Hydraulic studies in the vicinity of high and medium hazard dams should be revisited to evaluate the change in flood hazard areas.</p> <p>5. Before a dam is removed, hydraulics must be revisited to evaluate the adequacy of downstream drainage structures, and the accuracy of upstream floodplain maps.</p> <p>6. Require the evaluation of downstream flooding impacts as part of the permit application process for dam decommissioning or dam repair which increases spillway capacity.</p>	None	Not addressed	<p>NJ Dam Safety Standards (N.J.A.C. 7:20-1.7(h)) requires the submission of computations that demonstrate that the proposed dam removal will not adversely affect flooding conditions downstream during the 10-, 50- and 100-year storm events.</p> <p>NJ EAP statistics: High Hazard: 214 out of 216 or 99% have an EAP Significant Hazard: 257 out of 345 or 74% have an EAP</p>	<p>A permit is required to remove a dam and it must be determined if there would be a substantial adverse impact to the public health and safety both upstream and downstream of the dam. This would include the effect on flood elevations.</p> <p>PA EAP statistics: High Hazard: 639 out of 776 total or 82.4% have an EAP Non-High (Significant): 98 out of 281 total or 34.9% have an EAP</p>	<p>New York State Dam Safety Standards; 6 NYCRR Parts 608,621 and 673 Revised August 19, 2009. Prior to the revision, EAP's were not required by NYS regulations. The new regulations require EAP's for High Hazard and Intermediate Hazard dams.</p> <p>NY EAP statistics: High Hazard: 275 out of 390 dams or 71% have an EAP Intermediate Hazard: 71 out of 751 dams or 9% have an EAP</p>	
K. Bridge/Culvert Construction or Reconstruction and Flood Damage Risk	<p>1. Design new bridges and culverts to ensure that flooding to existing buildings or facilities is not exacerbated upstream or downstream. Design should be based on the results of updated flood models using recent climate data that incorporates changing precipitation trends.</p> <p>2. Maps should be updated for new crossings.</p>	None	Not addressed	<p>N.J.A.C. 7:13-11.7 requires that the structure does not cause any offsite flooding of buildings, railroads, roadways or parking areas during any rain event and no more than a 0.2 foot rise in the NJ Flood Hazard Area Design Flood elevation within 500 feet of the structure.</p>	<p>Bridges and culverts should be designed to pass flood flows without loss of stability, may not create hazard to life or property, may not significantly alter the natural regimen of the stream, may not increase velocities which results in erosion, may not significantly increase water surface elevations and shall be consistent with local flood plain programs. No increase in the 100 year flood elevation where detailed FEMA mapping exists and a maximum of 1 foot increase if no FEMA study exists.</p>		
L. Stormwater Regulations - New and Redevelopment	<p>The goal of stormwater design within the Delaware River Basin should mimic pre-development hydrology at a minimum.</p> <p>Recommendation includes infiltration, volume rate reduction, peak rate control, vegetated buffers and water quality treatment.</p>	None	Not addressed	Stormwater Management Rules N.J.A.C. 7:8		<p>DEC permit required for disturbance of over 1 acre. More detailed requirements in MS4 areas.</p> <p>No peak rate stormwater control required for fourth order streams or larger.</p>	

**APPENDIX II – Floodplain Regulations Evaluation Subcommittee (FRES)
Representatives and Meeting Agendas**

Floodplain Regulations Evaluation Subcommittee Representatives

<p>Co-chair: Joseph Ruggeri, P.E., CFM State NFIP Coordinator's Office, Bureau of Dam Safety & Flood Control, New Jersey Department of Environmental Protection (NJDEP)</p>	<p>Co-chair: Dan Fitzpatrick, CFM State NFIP Coordinator's Office, Pennsylvania Department of Community & Economic Development (PADCED)</p>
<p>William Nechamen, CFM State NFIP Coordinator's Office, Chief, Flood plain Management, New York State Department of Environmental Conservation (NYSDEC)</p>	<p>Michael S. Powell, CFM State NFIP Coordinator's Office, Flood Mitigation Program, Delaware Department of Natural Resources & Environmental Control (DNREC)</p>
<p>Vincent Mazzei, P.E. Division of Land Use Regulation, New Jersey Department of Environmental Protection (NJDEP)</p>	<p>Dennis E. Stum Bureau of Watershed Management, Pennsylvania Department of Environmental Protection (PADEP)</p>
<p>Joseph Zagone, P.E., PLS, CFM FEMA Region III</p>	<p>Jason Miller, P.E. Flood Plain Management Services Branch, US Army Corps of Engineers, Philadelphia District</p>
<p>Maya K. van Rossum, Delaware Riverkeeper Delaware Riverkeeper Network</p>	<p>Mick Drustrup Riverfront Property Owner</p>
<p>Jane Stanley Nurture Nature Foundation</p>	<p>Valerie Hrabal, P.E., P.P. National Association of Home Builders</p>
<p>Marie Banasiak New Jersey Farm Bureau</p>	<p>George Donovan Central Bucks Chamber of Commerce</p>
<p>Jim DeAngelo, CFM Michael Baker, Jr., Inc.</p>	<p>Kim Dunn, P.E., CFM Dewberry</p>
<p>Lynn Bush Executive Director, Bucks County Planning Commission</p>	<p>Nicole Franzese Director of Planning, Delaware County Planning Department</p>
<p>John Gysling, P.E., CFM Engineer, New Castle County Department of Land Use</p>	<p>Robert Miller, CFM Local Certified Floodplain Administrator, Hopewell and Delaware Townships, Stockton Borough, NJ</p>



Delaware River Basin Commission

PO Box 7360
25 State Police Drive
West Trenton, New Jersey
08628-0360

Carol R. Collier
Executive Director

Robert A. Tudor
Deputy Executive Director

AGENDA

DRBC Floodplain Regulations Evaluation Subcommittee (FRES) of the DRBC Flood Advisory Committee (FAC)

Meeting 1
Wednesday, November 12, 2008, 9:30am
DRBC – Goddard Room

Topics proposed for discussion are as follows:

- A. Introductions
- B. Background, including Brief Overview of the Interstate Task Force Report
Dan Fitzpatrick, PA DCED
- C. Subcommittee Charge, Organization, Deliverables and Timeframe
Joseph Ruggeri, NJDEP
- D. Review and Basics of Floodplain Management & Planning (definitions, concepts, etc.)
Vince Mazzei, NJDEP
- E. Discuss Proposed Subcommittee Considerations and Present Comparison Matrix
Laura Tessieri, DRBC
- F. Review Current Levels of Floodplain Regulations in the Basin and Reach Consensus on Key Regulations for Subcommittee Review
Joseph Ruggeri, NJDEP
- G. Review Critical Path Schedule, Decision Making Process and Next Steps
Dan Fitzpatrick, PA DCED

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**January 13, 2009, 10:00 am
Agenda – Meeting #2**

1. Introductions
2. Concurrence on Future Meeting Dates
3. Presentation: National Flood Insurance Program
Joseph Zagone, CFM - FEMA RIII
4. Presentation: Delaware River Basin Commission Floodplain Regulations
William Muszynski P.E. – DRBC
5. Matrix Review/Discussion
6. Presentation: No Adverse Impact Approach to Floodplain and Watershed Management
Kimberly Bitters, CFM - co-chair of the ASFPM NAI Policy Committee
7. Wrap-up/Ideas for Future Consideration

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**Monday February 2, 2009, 10:00 am
Agenda – Meeting #3**

1. Introduction
2. Presentation: Pennsylvania Floodplain Regulations
Dan Fitzpatrick, CFM - PADCED
4. Presentation: New Jersey Flood Hazard Area Control Act Rules
Vincent Mazzei, P.E. - NJDEP
5. Review/ Discussion of Matrix
6. Discussion of Final Comparison Document and Recommendations – structure, development process, etc.
7. Future Meetings/ Upcoming Speakers

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**Thursday February 26, 2009, 10:00 am
Agenda – Meeting #4**

Morning

1. Introductions
2. Presentation: New York Floodplain Regulations
Bill Nechamen, CFM, NYSDEC and Nicole Franzese, Delaware County Planning Department
3. Presentation: New Castle County, Delaware Floodplain Regulations
John Gysling, P.E., New Castle County Department of Land Use

Afternoon

4. Development of Draft Recommendations
(Representatives will be split into groups and will tackle a subset of the matrix considerations. A suite of recommendations will begin to be developed.)
5. Brief Presentation of Initial Draft Recommendations
(Development of draft recommendations by representatives expected to continue following the meeting to prepare a document for use at the March 17th meeting.)
6. Future Meetings/ Upcoming Speakers

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**Tuesday March 17, 2009, 10:00 am
Agenda – Meeting #5**

Morning

1. Introductions
2. Presentation: “The Importance and Benefits of Forested Buffers”
*Bob Wendelgass, PA Campaign for Clean Water and Bern Sweeney, Ph.D.,
Stroud Water Research Center*
3. Subcommittee Discussion (Final development of consideration list, remaining big picture issues)

Afternoon

4. Further Development of Draft Recommendations
(Representatives will split into the two groups formed at the last meeting and consider the alternate subset of the matrix considerations.)
5. Reconvene Subcommittee for Discussion

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**Tuesday March 31, 2009, 10:00 am
Agenda – Meeting #6**

1. Introductions
2. Subcommittee Deliberations
3. 2pm - Presentation: “No Adverse Impact Floodplain Management- Legal Implications, Protecting the Rights of All” Ed Thomas, Esq., Michael Baker

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**Tuesday April 14, 2009, 10:00 am
Agenda – Meeting #7**

1. Introductions
2. Subcommittee Deliberations

**DRBC Floodplain Regulations Evaluation Subcommittee (FRES)
of the
DRBC Flood Advisory Committee (FAC)**

**Friday, May 8, 2009, 9:30am – 3:30pm
Agenda – Meeting #8**

1. Introductions
2. Review of Recommendation Document
3. Reach Consensus
4. Discussion of Preamble & Appendix (for letters from subcommittee members emphasizing any additional points they feel necessary)
5. 5/19 FAC Presentation

APPENDIX III – Correspondence

Letters submitted to the Flood Advisory Committee (FAC) by organizations, municipalities, or county government between May and October 2009.

- Brandywine Conservancy, October 21, 2009
- Sierra Club Pennsylvania Chapter, October 20, 2009
- Environmental Commission of Delaware Township, PA, October 19, 2009
- Delaware Riverkeeper Network, October 18, 2009
- Delaware County, NY Board of Supervisors, October 16, 2009
- Tincum Township, PA, October 13, 2009
- Association of State Floodplain Managers (ASFPM), October 9, 2009
- New Jersey Association for Floodplain Management (NJAFM), October 7, 2009
- Brandywine Conservancy, August 28, 2009
- Borough of Amber, PA, August 24, 2009
- Lower Macungie Township, PA, August 23, 2009
- Association of State Floodplain Managers (ASFPM), August 21, 2009
- New Jersey Association for Floodplain Management (NJAFM), August 13, 2009
- Stroud Water Research Center, August 5, 2009
- Pennsylvania Department of Transportation (PennDOT), July 24, 2009
- Delaware County, NY Planning Department, July 17, 2009
- New York State Department of Transportation (NYSDOT), June 30, 2009

October 21, 2009

Delaware River Basin Commission
25 State Police Drive
West Trenton, NJ 08628

Ladies and Gentlemen:

We write to urge that the final report of the Floodplain Regulations Evaluation Subcommittee (FRES) recommending strengthening of floodplain regulations be sent to the Commission itself for their review and action. It is important that the FRES recommendations, including an explicit and mandatory 100-foot forested riparian buffer requirement, move forward to the Commissioners. A 100-foot forested riparian buffer will help mitigate peak flood flows, reduce the volume of flow imposed upon downstream communities, and ensure that there exists an absolute, reasonable, and scientifically defensible setback within which no new structures will be subjected to flood damage and harm. Setting an explicit buffer minimum, while allowing for local planning to accommodate appropriate variation, will ensure that all communities benefit from an appropriate level of protection and avoid harm from inappropriate development by upstream neighbors.

Additionally, mandating forested buffers not only contributes to the reduction of flood damages but also provides other benefits, including the filtering of pollutants, providing fish and other aquatic habitat, improving waterway oxygen levels for fish, enhancing recreation and ecotourism, increasing the market value and marketability of nearby homes, and protecting public and private lands from erosion.

In addition to riparian forested buffers, we also strongly support other FRES recommendations:

Recommendation: The regulatory floodplain for waterways in the Delaware River Basin should be greater than the 1% annual chance floodplain. The Subcommittee recommended that this be done either by defining the regulatory floodplain as the 1% annual chance peak flow plus 25% (as they have already done in New Jersey) or by defining it as the 0.2% annual chance floodplain (also known as the 500 year floodplain). Brandywine supports both approaches - using the 500 year event may be more easily implemented as FEMA maps already include the 500 year floodplain. Given seeming worsening of flooding in local watersheds (from changing precipitation events? from altered watershed hydrology?), we are going beyond the 100-year floodplain elevation in our municipal ordinances.

Recommendation: The floodway in the Delaware River Basin should be defined by a 0.2 foot rise standard for the mainstem Delaware River and all other streams and rivers within the Basin.

Recommendation: Protect the flood fringe in a naturally vegetated state and limit development, including but not limited to, structures, infrastructure, impervious surfaces, fill, grading, and removal of vegetation.

Recommendation: New development in floodways should be prohibited. Because the floodway is the portion of the floodplain closest to the water where depth and velocity of flood flow is greatest, development in the floodway is subject to greater flood damage potential from depth and velocity of flow. According to the Subcommittee report, people living within floodways are subject to devastating flood events that impact public health, safety, and welfare, often resulting in loss of life and severe property damage. Therefore, development should be prohibited.

We appreciate this opportunity to comment. It is so important that DRBC move forward and set standards higher, as critical guidance for local municipalities.

Yours truly,

Wesley R. Horner, AICP
Senior Advisor for Water Resources
Environmental Management Center
Brandywine Conservancy
PO Box 141
Chadds Ford PA 19317
610-388-8124
whorner@brandywine.org

cc:

Sherri Evans-Stanton
John Theilacker
Jack Hines



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CLUB
FOUNDED 1892

Sierra Club Pennsylvania Chapter
PO Box 606
Harrisburg, PA 17108
717-232-0101 Fax: 717-238-6330
pennsylvania.chapter@sierraclub.org

October 20, 2009

Commissioners
Delaware River Basin Commission
P.O. Box 7360
25 State Police Drive
West Trenton, NJ 08628

The members of the Pennsylvania Chapter of the Sierra Club urge you to adopt and pursue the Floodplain Regulations Evaluation Subcommittee report you are considering on October 22nd. In those areas within the report where there are options provided, we urge you to adopt the strongest choice, and the one that provides the greatest level of clarity and detail.

And we urge you to pass a resolution that includes direct action and regulation by the Delaware River Basin Commission to protect our floodplains from future vegetation removal and development, to restore floodplains that have already been compromised by past action, and to ensure a minimum 100 foot forested buffer requirement (with limited but appropriate exceptions) for the main stem River and all watershed streams.

Current floodplain regulations are not providing the level of protection the communities of the Delaware River Basin need. It is critical that the Delaware River Basin Commission take strong and immediate steps to protect our floodplains from new and future development. It is also critical that the Delaware River Basin Commission exercise its full authority to create and implement programs that will restore to healthy function the floodplains that have already been compromised. While we agree it is important to recognize needed exceptions, such as for historic structures or other social and cultural goods, it is equally important that we stop the cycle of harm that ongoing, and past, development is inflicting on our communities.

It is especially important that the DRBC pass some of its own regulations and create and implement its own programs to accomplish the goals of floodplain protection and restoration, to ensure that downstream communities are not left to the mercy and/or wisdom of those that live upstream.

We particularly urge the DRBC to craft and carry out an explicit, and mandatory, 100 foot forested buffer requirement for floodplains along all rivers and streams. There is ample science and real world experience to justify this width and this approach for purposes of flood damage reduction. A 100 foot forested buffer will help to mitigate peak flows, reduce the volume of flow imposed upon downstream communities, and ensure that there exists an absolute, reasonable and defensible setback within which there are no structures that could be subjected to flood damage and harm.

Recommendations that the regulated floodplain and floodway be expanded are vital. Experience has demonstrated that merely regulating development within the 100 year floodplain is simply not protective enough. New Jersey has already set and defended a strong precedent for expanding the definition of the regulated floodplain.

It is critical that floodplain and floodway regulations be restructured so that their focus is on prevention of development in the floodplain, rather than the current approach which actually supports floodplain development but merely mandates the parameters by which that development will take place.

The Delaware River Basin Commission has an opportunity to lead the way towards wise and meaningful change. The members of the Pennsylvania Chapter, Sierra Club, urge you to take it.

Sincerely,

Barbara Benson, Water Issues Co-Chair

cc Dennis Winters, Chair
Thomas Au, Conservation Chair
Delaware Riverkeeper Network

Commissioners
Delaware River Basin Commission
P.O. Box 7360
25 State Police Drive
West Trenton, NJ 08628

October 19, 2009

Re: Floodplain Regulations

I am a member of the Environmental Commission in Delaware Township and serve as an advisor to the Planning Board. As head of the Stormwater Committee, I am astonished by the numbers of complaints about erosion and flooding we receive in this rural township. The long-awaited Stormwater Act has proved a disappointment because the use of TR 55 at its basis consistently overestimates current runoff and underestimates runoff from lawns and other modified landscapes. Our problems get nothing but worse with almost no funding available to us for retrofit as all the 319 monies for our area are directed to agencies, not our township. Our only hope is better management of floodplains and finally stopping the development of floodplains.

Please give your approval to the strongest recommendations of the Floodplain Regulations Evaluation Subcommittee report at your meeting on 22 October. Its recommendations, if implemented, will greatly aid in reducing damages to streams, forests and properties at a time when such damages are far too high. And please keep in mind that there is every indication that flooding problems will worsen substantially in our area in the future.

A group of experts assembled by the Union of Concerned Scientists have forecast an increase of total rainfall as well as an increase of the amount of rainfall coming from intenser storms for the near future in the northeast of the U.S. In addition, a detailed and lengthy report from the National Research Council has sharply critiqued and suggested revision of numerous methods that have become standard in attempting to deal with stormwater problems which also are of increasing incidence as more and more of the landscape is altered by development.

So it is time to think of improving protections of stream and river corridors which provide many useful and highly valuable services besides flood protection.

Respectfully yours,

Leslie Sauer
Box 45
Sergeantsville, NJ 08557

P.S. The two reports mentioned above are these:

Northeast Climate Impact Team. *Confronting climate change in the Northeast: Science, impacts and Solutions*, July 2007. This can be accessed on the Union of Concerned Scientists website.

Urban Stormwater Management in the United States. National Research Council, 2008, 598 pp. This can be accessed on the National Academy of Sciences website.



2009 OCT 19 A 11:23
ADMINISTRATIVE DIVISION

October 18, 2009

Commissioners
Delaware River Basin Commission
P.O. Box 7360
25 State Policy Drive
West Trenton, NJ 08628-0360

Submitted via: Paula.schmitt@drbc.state.nj.us

Subject: Floodplain Regulations Evaluation Subcommittee

Dear Commissioners,

The Delaware Riverkeeper Network was an active member of the Floodplain Regulations Evaluation Subcommittee. The process was very involved and intensive. The report submitted for your consideration is based on solid information, discussion and consideration.

What is happening along our River and based on the informed and experienced experts that participated in the Subcommittee, it is clear that the regulations we have in place regarding floodplain development is not effectively protecting our communities from flood damages:

- ✓ Not those being allowed to build and expand anew in the floodplain,
- ✓ Not those who live downstream and in adjacent communities, and
- ✓ Not those that have to invest their tax dollars and limited community resources in responding to a catastrophic flood and flood damages.

The catastrophic floods that have taken place in recent years were the result of extreme weather events. And things are only predicted to get worse with global climate change. The reality remains that there will always be changing storm scenarios that will cause new, different and catastrophic harm in the future. As global climate change continues, we will not just continue to have catastrophic events, but it is expected that we will have more of them, and that they will be more extreme.

Continuing to support existing development patterns focused on new construction in the floodplain – whether it be construction of entirely new buildings or expansion of those already present – is unwise, unsafe, unfair, and frankly unconscionable.

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drkn@delawareriverkeeper.org
www.delawareriverkeeper.org

Floods are a natural, normal and needed part of a river's life cycle – not only will future floods not be prevented, but a healthy Delaware River for us all demands that periodic floods be allowed to continue. It is time to start embracing that reality and to make decisions that recognize and honor this important and needed fact.

The best protection, the only true protection, we can provide for reducing flood damages is to prevent new development in the floodplain, to remove existing development where it has already occurred, and to protect and, where appropriate, restore the floodplain to the greatest extent possible.

By implementing a program of floodplain protection and restoration, including removing structures and reforestation, we

- ✓ provide the greatest level of flood protection and flood damage reduction to our region,
- ✓ provide drought protection,
- ✓ filter pollution from our river, fish and drinking water supply,
- ✓ maintain and improve existing water quality of particular import to the Wild and Scenic and Special Protection Waters designations of the upper, middle and lower sections of the River.
- ✓ and we provide food and habitat that support the fisheries, ecosystems, ecotourism, economies and quality of life so important to our watershed community as a whole.

A program of floodplain protection and restoration can still acknowledge and make exceptions for those communities and structures where there are other unique cultural, historic or community values it is agreed should be preserved.

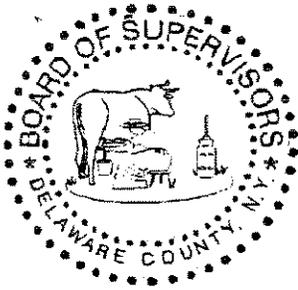
The Delaware Riverkeeper Network urges you to take strong steps to improve protection of our floodplain from future development and to identify and invest in programs that will help restore those areas of the floodplain that have already been compromised.

In terms of floodplain restoration, the FRES report identifies and discusses identification of options that assist and support those individuals and families who want to move out of the floodplain, not forcing them out, but assisting them to move out and preventing the dangers of living in the floodplain from being continually and knowingly transferred from present homeowners to future homeowners.

The Delaware Riverkeeper Network urges you to move this process of strengthening protection of our floodplains to the next level. We request that the DRBC commence a rulemaking process that will realize the recommendations placed before you so they can be adopted by, and implemented by, the Delaware River Basin Commission on an equitable, uniform and watershed-wide basis. It must be clear that this process will activate the recommendations in the FRES report, not reargue whether those recommendations should have been made. And there needs to be a defined timeline by which regulatory language for adoption by the DRBC and the watershed states will be put forth for consideration and comment.

Respectfully submitted,


Maya K. van Rossum
the Delaware Riverkeeper



DELAWARE COUNTY BOARD OF SUPERVISORS

Senator Charles D. Cook County Office Building
111 Main Street
Delhi, New York 13753

Telephone: 607- 746-2603
Fax: 607- 746-7012

James E. Eisel, Sr., Chairman
Christa M. Schafer, Clerk

October 16, 2009

Ms. Carol Collier, Executive Director
Delaware River Basin Commission
25 State Police Drive
P.O. Box 7360
West Trenton, NJ 08628-0360

Dear Ms. Collier:

I am writing to you with concerns regarding the Recommendations of the Floodplain Regulation Evaluation Subcommittee (FRES) of the DRBC Flood Advisory Committee (FAC). While I support improved flood protection, it is not clear to me that these recommendations will achieve that goal.

Broad Concerns:

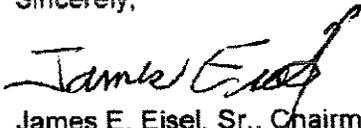
- State and local floodplain regulations already exist. How would an additional layer of DRBC regulations ensure any further risk reduction?
- The vast differences in the geography and topography of the basin dictate that any regulations should be site specific, science-based and flexible enough to address different circumstances.
- There is no commitment of funding to assist communities with the adoption or implementation of the regulations
- There may be a conflict of interest in the FRES recommendation in that members on the FRES also serve on the FAC.
- Clarification is needed on what authority and the due process and safeguards required by that authority for the Commission to adopt rules which will have the force of law.
- For these regulations to be implemented by local towns and villages, the towns and villages will have to comply with SEQRA and conduct a thorough analyses of their impact on the environment including community character and sustainability
- For these regulations to be adopted by DEC, a state agency, in addition to SEQRA, the state agency must conduct the following analyses: (i) impact on small business; (ii) impact on rural communities; (iii) regulatory flexibility; (iv) cost impact analyses and (v) approval of the NYS Environmental Board. Will DRBC conduct the same analyses and/or seek similar approvals?

Specific Concerns:

- A socio-economic impact analysis was not conducted. Both the new floodplain and floodway definitions pose significant socio-economic concerns left unanswered.
- An inventory and risk analysis to locate high priority areas was not conducted.
- To what extent do the proposed regulations conflict with existing local floodplain regulations?
- Delaware County is in the process of reviewing and adopting Preliminary digital Flood Insurance Rate Maps. The increased accuracy of these maps, their ease of use, and the attention they are drawing to floodplain management issues present a great opportunity educate the public and discuss with communities the importance of controlling activities in the floodplain and floodways to improve enforcement of floodplain regulations already in place.
- Given the amount of effort being put into the review and adoption of Preliminary DFIRMs by federal, state, county, and municipal agencies and officials, it is unrealistic to expect to be able to repeat this process based on new regulations from the DRBC any time in the near future.
- The FREC recommends a riparian buffer of uniform width throughout the basin. This contradicts the variable nature of floodplains and stream flow regimes within the basin. A variable-width buffer based on the greater need to protect hydrologically sensitive areas would allow more realistic, flexible and effective implementation.

It is incumbent upon the DRBC to address these concerns given the significant ramifications they present. The DRBC should address these issues and provide a response. A Delaware County Board of Supervisor's resolution pertaining to these concerns is enclosed.

Sincerely,



James E. Eisel, Sr., Chairman
Delaware County Board of Supervisors

Enclosure

CC: Governor Paterson
Senator Bonacic
Assemblyman Crouch
Commissioner Grannis
Section Chief Nechamen

RESOLUTION NO. 167

**TITLE: POSITION ON THE FINDINGS OF THE FLOODPLAIN REGULATIONS EVALUATION
SUB-COMMITTEE OF THE DELAWARE RIVER BASIN COMMISSION'S FLOOD ADVISORY
COMMISSION
PLANNING DEPARTMENT**

WHEREAS, the Delaware County Board of Supervisors participated in the Interstate Flood Mitigation Task Force of the Delaware River Basin Commission (DRBC) convened as a result of the 2006 flood event; and

WHEREAS, the DRBC established the Floodplain Regulation Evaluation Subcommittee (FRES) to review and evaluate the similarities, differences and effectiveness of floodplain regulations throughout the Delaware River Basin and to develop and present recommendations on the potential for more effective floodplain management throughout the Basin to the Flood Advisory Committee (FAC); and

WHEREAS, Delaware County as a member of the FRES disagreed with several of its findings and recommendations and therefore issued its own set of recommendations to the FAC that reflect the needs of New York State and more specifically Delaware County; and

WHEREAS, the FRES found that flood damage risks and therefore floodplain management solutions in Delaware County are different than those lower in the Delaware River watershed, given the unique topographic, climatic, and hydrologic characteristics of the county, as well as current and future patterns of development but ignored this finding when making their recommendations; and

WHEREAS, Delaware County's analysis concluded the current framework for regulating floodplain development has not been used to its fullest potential, and this problem is best addressed by improving local capacity to effectively administer the regulations already in place, not by creating another layer of regulation; and

WHEREAS, the Delaware County Board of Supervisors recognizes that regulations of the breadth and scope of those proposed by the FRES require a detailed evaluation of the environmental, economic, and social impacts of their implementation under New York State law as established by the State Administrative Procedures Act and the State Environmental Quality Review act; and

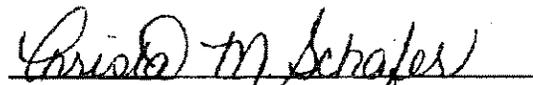
NOW THEREFORE BE IT RESOLVED, the Delaware County Board of Supervisors urge the Delaware River Basin Commissioners to refer any consideration of the FRES recommendations back to their respective state agencies to ensure that a socioeconomic and environmental analysis will be performed to determine the full impact of any floodplain management recommendation; and

BE IT FURTHER RESOLVED, that the Delaware County Board of Supervisors firmly oppose the adoption of additional floodplain regulations by the Delaware River Basin Commission.

State of New York
County of Delaware

I, Christa M. Schafer, Clerk of the Board of Supervisors of Delaware County, do hereby certify that the above is a true and correct copy of a resolution adopted by said Board on the 14th day of October 2009 and the whole thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Board at Delhi, New York, this 14th day of October 2009.


Clerk, Delaware County Board of Supervisors

172193

Incorporated March 12, 1738

TINICUM TOWNSHIP

Bucks County

BOARD OF SUPERVISORS

163 Municipal Road
Pipersville, Pennsylvania 18947

RECEIVED/DELAWARE RIVER
BASIN COMMISSION

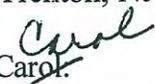
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ADMINISTRATIVE DIVISION

H. BOYCE BUDD, CHAIRPERSON
NICHOLAS C. FORTE, VICE-CHAIRPERSON
GARY PEARSON, MEMBER

October 7, 2009

Carol Collier, Executive Director
Delaware River Basin Commission
25 State Police Drive
P.O. Box 7360
West Trenton, NJ 08628-0360

Dear Carol 

The Tinicum Township Board of Supervisors enacted the attached Resolution during their public meeting last night. They are very supportive of DRBC's efforts to strengthen floodplain and buffer regulations on a regional basis.

We understand that there will be a meeting with the Flood Task Force on October 20th and hope that Tinicum's support will be helpful.

If there is anything else we can do to assist your efforts, please let me know.

Sincerely,


Linda McNeill
Township Manager

RESOLUTION NO. 10.04.09.1

**A RESOLUTION OF TINICUM TOWNSHIP, BUCKS COUNTY PENNSYLVANIA
SUPPORTING FLOODPLAIN AND RIPARIAN BUFFER PROTECTION
FOR THE DELAWARE RIVER**

WHEREAS, Tincicum Township recognizes that hurricanes, severe thunderstorms, heavy rains, and snowstorms affect the Delaware River watershed and its residents. and in areas lacking proper floodplain protection and riparian buffers, the increased water levels can create dangerous situations that are devastating emotionally, physically and financially, and result in damage to residents, communities, our environment, the River and all who rely upon it.; and

Whereas, Tincicum Township supports and encourages efforts by the Delaware River Basin Commission to strengthen protection of the floodplains of the mainstem Delaware River as well as tributary streams. Ensuring no new development occurs in the floodplain is critical for ensuring that no new families, businesses and structures are put in the path of future floods; and for ensuring that communities do not continue to develop in a way that exacerbates future flooding for downstream communities who will be the recipients of the increased runoff that will result from both the development and the reduced ability of the floodplain to help absorb and cleans stormwater and floodwaters; and

WHEREAS, Tincicum Township supports action by the Delaware River Basin Commission to pass regional regulations which must be carried forth by each of the watershed states and communities; and

WHEREAS, Tincicum Township believes it is important to set an explicit minimum buffer requirement in order to ensure a minimum level of protection for downstream communities from flooding, pollution, and ecological harm.

NOW THEREFORE, be it and it is hereby **RESOLVED** by the Board of Supervisors of Tincicum Township, Bucks County, Pennsylvania as follows:

1. Tincicum Township supports DRBC recommendations and actions that include requirement for an explicit, and mandatory, 100 foot forested buffer requirement on the mainstream River and tributary streams. There is ample science and real world experience to justify a mandatory 100 foot forested buffer width for purposes of flood damage reduction. A 100 foot forested buffer will help to mitigate peak flows, reduce the volume of flow imposed upon downstream communities, and ensure that there exists an absolute, reasonable and defensible setback within which there are no structures that could be subjected to flood damage and harm.
2. Tincicum Township supports mandating that the buffer minimum be “forested” as compared to “vegetated” to the greatest extent appropriate and possible. Forested buffers not only contribute to the reduction of flood damages but also provides a wealth of other benefits that support its adoption – including (but not limited to) filtering pollution, providing fish and other aquatic habitat, improving waterway oxygen levels for fish, enhancing recreation and ecotourism, increasing the market value and marketability of nearby homes, and protecting public and private lands from erosion.
3. Tincicum recognizes that removing vegetation from the floodplain and replacing it with impervious surfaces and structures increases the volume of floodwaters that enter the neighboring river or stream and thereby exacerbating their flood damages and recognizes that elevating a structure does not prevent this

continuing contribution of additional floodwaters and harm. Tincum recognizes the need to restructure floodplain and floodway regulations so that their focus is on prevention of development in the floodplain, rather than the current approach which actually supports floodplain development but merely mandates the parameters by which that development will take place.

4. Tincum supports expansion of the definition of the regulatory floodplain, and the New Jersey definition of the regulatory floodplain where it is defined as the 1% annual chance peak flow plus 25% or as the 0.2% annual chance floodplain (also known as the 500 year floodplain).

5. Tincum supports expanding the definition of the "floodway" so it is defined by a 0.2 foot rise standard for the main stem Delaware River and all other streams and rivers within the Basin. Tincum also supports a prohibition on new development in floodways.

6. Tincum supports protecting the flood fringe in a naturally vegetated state and limiting development, including but not limited to, structures, infrastructure, impervious surfaces, fill, grading and removal of vegetation.

7. Tincum urges the Delaware River Basin Commission to take steps to ensure restoration of portions of the floodplain that have already been compromised by removal of vegetation and/or development. Voluntary buyout programs and floodplain restoration programs are an important part of an overall strategy for reducing flood damages .

8. Tincum Township supports regulatory improvements that ensure substantial damage calculations include cumulative costs. It is important that homes which have been substantially damaged not be encouraged to continually rebuild in hazard areas as this is contrary to sound public and/or safety policy.

9. Tincum supports and encourages efforts by the Delaware River Basin Commission to create, support and implement strengthened stormwater regulations that mimic pre-development hydrology.

RESOLVED this 6th day of October, 2009.

ATTEST:

TINICUM TOWNSHIP BOARD OF SUPERVISORS


Linda McNEILL, Township Manager


Boyce Budd, Chairperson


Nicholas C. Forte, Vice Chairperson

Gary Pearson, Member



ASSOCIATION OF STATE FLOODPLAIN MANAGERS, INC.

2809 Fish Hatchery Road Suite 204 Madison, Wisconsin 53713
608-274-0123 Fax 608-274-0696 www.floods.org Email: asfpm@floods.org

Executive Director

Larry A. Larson, P.E., CFM

Deputy Director

George Riedel, CFM

October 9, 2009

Honorable Commissioners
Delaware River Basin Commission
25 State Police Drive
P.O. Box 7360
West Trenton, NJ 08628-0360

Re: Comments on the Recommendations of the Floodplain Regulations Evaluation Subcommittee

Dear Commissioners:

With much interest, the Association of State Floodplain Managers has reviewed the report from the Floodplain Regulations Evaluation Subcommittee of the Delaware River Basin Commission - Flood Advisory Committee. This letter provides our broad endorsement of the May 19, 2009 Recommendations of the Floodplain Regulations Evaluation Subcommittee based on this Association's collective experience with floodplain regulations throughout the United States over the past decades.

The Association of State Floodplain Managers (Association) has 14,000 members and 28 State Chapters throughout the nation. Our Association is focused on helping the 21,000 flood-prone communities in the nation reduce their flood losses and enhance the floodplain resources that reduce flood losses naturally. The Association's website (www.floods.org) is newly updated and provides links to publications, papers and practical guides to educate communities how to be more resilient to flooding. These references provide greater detail and case studies on a variety of measures being implemented in many states.

It is important to note that regions, states, counties and municipalities in the nation have progressed with local regulations that exceed Federal Emergency Management Agency (FEMA) minimum National Flood Insurance Program (NFIP) standards. As Commissioners, you should feel comfortable with adopting regulations that better protect the health and safety of the public. The proposed recommendations are in line with those used by progressive states and communities elsewhere in the nation

ASFPM has developed a management principal called *No Adverse Impact* that simply states that the action of one party shall not adversely impact the property and rights of another party.

Dedicated to reducing flood losses in the nation.

Chair

Gregory Main, CFM
State Floodplain Manager
Indiana DNR
317-234-1107
gmain@dnr.in.gov

Vice Chair

Sally McConkey, P.E., CFM
Water Resources Engineer
INRS Illinois State Water Survey
217-333-5482
sally@illinois.edu

Secretary

Judy Watanabe, CFM
Mitigation Section Manager
Utah Div. of Homeland Sec.
801-538-3750
judywatanabe@utah.gov

Treasurer

William Nechamen, CFM
State Floodplain Manager
New York State DEC
518-402-8146
wsnecham@gw.dec.state.ny.us



A review of case law demonstrates that courts have upheld additional local regulations¹, especially when based on the principle of protecting the property rights of everyone in the community or watershed. In addition, the National Flood Insurance Program regulations² encourage higher standards, whereby *"...community officials may have access to information or knowledge of conditions that require, particularly for human safety, higher standards than the minimum criteria set forth in...this part. Therefore, any floodplain management regulations adopted by a State or a community, which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence."*

ASFPM supports the Floodplain Regulations Evaluation Subcommittee's recommendations on incorporating future conditions in both floodplain mapping and by requiring structures to have freeboard above the base flood elevation³, an approach used by half of the communities in the nation. In our publications we cite where states have incorporated regulations designed to reduce flood losses and protect floodplain resources. Half of the nation's states have incorporated buffers and setbacks from floodprone areas⁴. Consistent with our recognition of states and communities that mandate such, the Association favorably views the adoption of a minimum 100' vegetated buffer along the waterways of the basin.

The Association is very pleased to observe the high percentage of Certified Floodplain Managers as representatives on the Floodplain Regulations Evaluation Subcommittee. We applaud the Subcommittee's work and we would be pleased to help you and your staff with case studies and examples of regulations adopted throughout the nation. The Association understands that the proposal of regulations can be politically difficult. We believe that incorporating the recommendations of the Subcommittee is acting in the best interest of the watershed's population, its communities and taxpayers and provides additional protection to this nationally significant river basin. We will expectantly watch how the recommendations proceed through the Delaware River Basin Commission rulemaking process.

Sincerely,

Greg Main, CFM
ASFPM Chair
Indiana DNR

Larry A. Larson, P.E., CFM
ASFPM Executive Director

¹ See: http://floods.org/PDF/Mitigation/ASFPM_Thomas&Medlock_FINAL.pdf

² From 44 CFR 60.1(d)

³ See: http://floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

⁴ See: http://www.floods.org/PDF/FPM_2003_Final.pdf



October 7, 2009

Honorable Commissioners
Delaware River Basin Commission
25 State Police Drive
P.O. Box 7360
West Trenton, NJ 08628-0360

**Re: Support of the May 19, 2009 Recommendations of the
Floodplain Regulations Evaluation Subcommittee
Of the Delaware River Basin Commission
Flood Advisory Committee**

Dear Commissioners:

The New Jersey Association for Floodplain Management (NJAFM) is dedicated to reducing loss of life and property damage resulting from floods and promoting sound floodplain management at all levels of government. To that end, we greatly support the work of the Delaware River Basin Commission (DRBC) Flood Advisory Committee (FAC) and its Floodplain Regulations Evaluation Subcommittee (FRES). This letter provides our comments on the May 19, 2009 Recommendations of the Floodplain Regulations Evaluation Subcommittee¹. The comments provided in this letter have been approved by the majority of the Association's Board comprised of elected representatives and committee chairs.

We note that nine (9) of the twenty (20) members of the FRES are Certified Floodplain Managers (CFM) as administered by the Association of State Floodplain Managers (ASFPM). NJAFM is one of twenty-eight (28) chapters of ASFPM that comprises a total of 14,000 Association and chapter members. The CFM program recognizes continuing education and professional development that enhances the knowledge and performance of local, state, federal, and private-sector floodplain managers. Our Board acknowledges the established experience and training of the FRES members that makes the recommendations even stronger.

As with our support letter to the FAC in August, we dedicate this letter to our late colleague, Mr. Joseph Zagone, P.E., PLS, CFM who was employed by the Federal Emergency Management Agency and served most recently on the FRES. Joe was among a handful of early Certified Floodplain Managers in the State of New Jersey. Joe was a stalwart member of the DRBC-FAC and a champion of stronger floodplain management through his work on the FRES.

Respectively, the New Jersey Association for Floodplain Management's Board, formally submits the following support and comments:

- A. Regulatory Floodplain Definition – NJAFM recognizes that floodplain limits are dynamic with regard to depth and aerial extents. In contrast, mapping of the floodplain along the Delaware River is derived from current conditions and past flood events. Development in the watershed increases the volume of runoff leading to greater flooding. We believe that future

¹ Report found at: http://www.state.nj.us/drbc/Flood_Website/FRES/Report_051909rev060209.pdf

-
- conditions should be considered in the definition of the regulatory floodplain and concur with Option 1 to add a residual risk factor of 25% to the 1% annual chance flood flow;
- B. Floodway Definition – NJAFM members have witnessed the scour and damage related to flood flow velocities outside of the regulatory floodway (typically defined from bank to bank of the Delaware River). We concur with the recommendation to lower the FEMA standard 1-foot rise in water surface elevation to a 0.2-foot rise. This would help inhibit development in the most destructive area of the floodplain;
 - C. Development/Fill in the Flood Fringe – NJAFM agrees that any development in the floodplain is risky, costly and presents dangers to the occupants and first responders. Therefore, we concur that keeping the floodplain in a natural state is of a high priority and that limiting new development in this sensitive areas should be incorporated into basin-wide policy;
 - D. Development/Fill in the Floodway – NJAFM wholeheartedly agrees with the FRES that new development activities in the floodway should be disallowed;
 - E. Stream/riparian Corridors and Vegetation Disturbance – the NJAFM supports the implementation of a floodplain buffer to protect the natural and beneficial functions of the floodplain. In chorus with the Association of State Floodplain Managers we recognize the importance of the floodplain for recreation, wildlife habitat and protection of the water resources we depend on for drinking water, bathing, fishing and the aesthetics that bring value to our riverside communities². We recognize the extensive costs to restore the floodplain once it has been spoiled, and believe that avoidance of its occupation is the best policy to protect floodprone land;
 - F. Adopted Building Code – NJAFM is in favor of greater freeboard and locating structures outside of the floodplain, with specific restrictions for areas that experience flash flooding, high velocity flows and have highly erodible soils;
 - G. Standards for the Lowest Floor of Structures (Freeboard) – We agree that a two-foot freeboard requirement would provide additional protection for people, building and contents. Freeboard in part accounts for the uncertainty of the floodplain delineation and the changes in the watershed and climate³. Freeboard also reduces future flood insurance premiums for subsequent owners of buildings;
 - H. Enclosed Areas below Flood Elevation – NJAFM concurs with the FRES recommendation of requiring a deed restriction to alert future owners and zoning officers of the limits to occupation of a structure below the regulatory flood elevation. We agree that the height of the enclosed area should be restricted to six-feet to thwart conversion of the restricted area to a living space;
 - I. Substantial Damage/Improvement to Structures – NJAFM believes that further education of local officials is needed for substantial damage and substantial improvement requirements;
 - J. Dams and Flood Damage Risk – We acknowledge the additional hazard that dams impose downstream in the floodplain. NJAFM concurs with the FRES recommendations to strengthen dam safety;

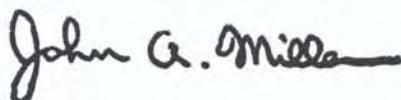
² See ASFPM whitepaper: http://floods.org/PDF/WhitePaper/ASFPM_NBF%20White_Paper_%200908.pdf

³ For further discussion of freeboard, see: http://www.floods.org/PDF/NFPPR_2007/ASFPM_NFPPR_2007.pdf

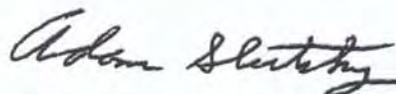
- K. Bridge/Culvert Construction or Reconstruction and Flood Damage Risk – NJAFM agrees that crossing of bodies of water should not increase the risk of flooding both downstream and upstream of the proposed infrastructure. We agree that if change in the floodplain cannot be avoided, the modification of risk must be exhibited on the Federal Emergency Management Agency Flood Insurance Rate Maps;
- L. Stormwater Regulations –New and Redevelopment – NJAFM agrees that more aggressive stormwater management in the Delaware River basin is needed. We commend the FRES for identifying measures that would make great strides in minimizing additional flooding and protect water quality.

The New Jersey Association for Floodplain Management appreciates the opportunity to submit these comments to the DRBC Commissioners. The FRES performed a vital service in its appraisal of the existing regulations and through its support of increased measures to protect the Delaware River, its communities, enhancing the safety of the population and reducing the expenditure of public monies with sound policy.

Sincerely,



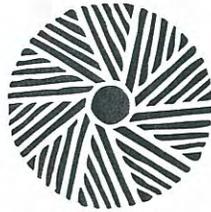
John A. Miller, P.E., CFM
Legislative Committee
Certified Floodplain Manager



Adam Slusky, P.E., CFM
Chair
Certified Floodplain Manager

cc: Mr. Larry Larson, P.E., CFM, Executive Director, ASFPM
Mr. George Riedel, CFM, Deputy Executive Director, ASFPM
Ms. Diane Brown, Communications and Events Manager, ASFPM
Ms. Anita Larson, Certification Coordinator, ASFPM
Ms. Kait Laufenberg, CFM, Chapter & Training Coordinator, ASFPM
NJAFM Board by email
Mr. Edward Pagan, Esq., CFM, NJAFM Legislative Committee Chair
NJAFM archives

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RECEIVED/DELAWARE RIVER
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... DIVISION

ENVIRONMENTAL MANAGEMENT CENTER
BRANDYWINE CONSERVANCY

P.O. BOX 141 CHADDS FORD PENNSYLVANIA 19317 • 610/388-2700 • FAX 610/388-1575

July 28, 2009

Flood Advisory Committee
c/o Delaware River Basin Commission
25 State Police Drive
West Trenton, NJ 08628

Ladies and Gentlemen:

We write to urge that the final report of the Floodplain Regulations Evaluation Subcommittee (FRES) recommending strengthening of floodplain regulations be sent by the Flood Advisory Committee to the Commission itself for review and action. It is important that the FRES recommendations, including an explicit and mandatory 100-foot forested riparian buffer requirement, move forward to the Commissioners. A 100-foot forested riparian buffer will help mitigate peak flood flows, reduce the volume of flow imposed upon downstream communities, and ensure that there exists an absolute, reasonable, and scientifically defensible setback within which no new structures will be subjected to flood damage and harm. Setting an explicit buffer minimum, while allowing for local planning to accommodate appropriate variation, will ensure that all communities benefit from an appropriate level of protection and avoid harm from inappropriate development by upstream neighbors.

Additionally, mandating forested buffers not only contributes to the reduction of flood damages but also provides other benefits, including the filtering of pollutants, providing fish and other aquatic habitat, improving waterway oxygen levels for fish, enhancing recreation and ecotourism, increasing the market value and marketability of nearby homes, and protecting public and private lands from erosion.

In addition to riparian forested buffers, we also strongly support other FRES recommendations:

Recommendation: The regulatory floodplain for waterways in the Delaware River Basin should be greater than the 1% annual chance floodplain. The Subcommittee recommended that this be done either by defining the regulatory floodplain as the 1% annual chance peak flow plus 25% (as they have already done in New Jersey) or by defining it as the 0.2% annual chance floodplain (also known as the 500 year floodplain). Brandywine supports both approaches - using the 500 year event may be more easily implemented as FEMA maps already include the 500 year floodplain. Given seeming worsening of flooding in local watersheds (from changing precipitation events? from

altered watershed hydrology?), we are going beyond the 100-year floodplain elevation in our municipal ordinances.

Recommendation: The floodway in the Delaware River Basin should be defined by a 0.2 foot rise standard for the mainstem Delaware River and all other streams and rivers within the Basin.

Recommendation: Protect the flood fringe in a naturally vegetated state and limit development, including but not limited to, structures, infrastructure, impervious surfaces, fill, grading, and removal of vegetation.

Recommendation: New development in floodways should be prohibited. Because the floodway is the portion of the floodplain closest to the water where depth and velocity of flood flow is greatest, development in the floodway is subject to greater flood damage potential from depth and velocity of flow. According to the Subcommittee report, people living within floodways are subject to devastating flood events that impact public health, safety, and welfare, often resulting in loss of life and severe property damage. Therefore, development should be prohibited.

We appreciate this opportunity to comment. It is so important that DRBC move forward and set standards higher, as critical guidance for local municipalities.

Yours truly,



Wesley R. Horner, AICP
Senior Advisor for Water Resources

cc:

Sherri Evans-Stanton

John Theilacker

Jack Hines

**Borough of Ambler**122 East Butler Avenue
Ambler, PA 19002-4476

215-646-1000

609-883 9522

August 24, 2009

Transmitted via FAX: ✓

Flood Advisory Committee
c/o DRBC
25 State Police Dr
West Trenton, NJ 08628

RE: Floodplain Regulations Recommendations

To Whom It May Concern:

It is important that the Floodplain Regulation recommendations that move forward to the Commissioners include an explicit and mandatory 100 foot forested buffer requirement. It is essential that we seize present moments to prevent and disallow development that would only make flooding worse for the future.

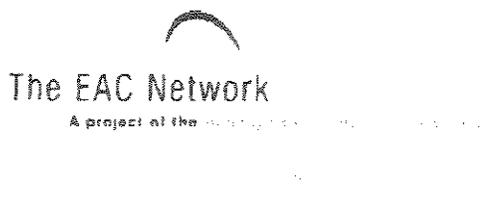
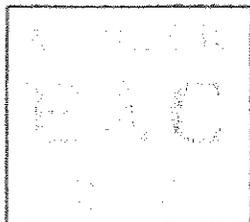
The five other members of the Ambler Borough Environmental Advisory Council authorized me to express our clear, strong position on this. As a Professional Planner specializing in environmental and community land planning, this is a subject that is very important to me personally and professionally.

There is plenty of science and real world experience to justify this width and this approach for purposes of flood damage reduction. A 100 foot forested buffer will help to mitigate peak flows, reduce the volume of flow imposed upon downstream communities, and ensure that there exists an absolute, reasonable and defensible setback within which there are no structures that could be subjected to flood damage and harm.

Setting an explicit buffer minimum, allowing for local planning to accommodate appropriate, thoughtful and defensible variation is a reasonable approach forward that ensures all communities are provided an appropriate level of protection including from inappropriate development by upstream neighbors.

Mandating forested buffers not only contributes to the reduction of flood damages but also provides a wealth of other benefits that support its adoption – including (but not limited to) filtering pollution, providing fish and other aquatic habitat, improving waterway oxygen levels for fish, enhancing recreation and ecotourism, increasing the market value and marketability of nearby homes, and protecting public and private lands from erosion.

The recommendation that the regulated floodplain be expanded is vital. Experience has demonstrated that merely regulating development within the 100 year floodplain is simply not protective enough. New Jersey has already set and defended a strong precedent for expanding the definition of the regulated floodplain.



Borough of Ambler

122 East Butler Avenue
Ambler, PA 19002-4476

215-646-1000

It is critical that floodplain and floodway regulations be restructured so that their focus is on prevention of development in the floodplain, rather than the current approach which actually supports floodplain development but merely mandates the parameters by which that development will take place.

Removing vegetation from the floodplain and replacing it with impervious surface and structures increases the volume of floodwaters that enter the neighboring river or stream and ensures that water is imposed upon downstream communities, thereby exacerbating their flood damages. Placing a structure on stilts, for example, does not prevent this continuing contribution of additional floodwaters and harm.

All members of the Ambler Environmental Advisory Council sincerely hope that you will see sufficient reason to adopt an expanded regulated floodplain. We understand there is federal stimulus funds dedicated to tree planting. We hope DRBC also helps to orchestrate reforestation efforts in the 100' floodplain buffer zones.

Sincerely, *Candace Kanaplue*

Susan M Curry

Candace Kanaplue, AICP, PP
Ambler EAC

Susan Curry,
Chair, Ambler EAC

cc: Maya K. van Rossum, the Delaware Riverkeeper *Via 215-369-1181*

2009 SEP 17 A 11:40

ADMINISTRATIVE DIVISION

August 23, 2009

Flood Advisory Committee
c/o Delaware River Basin Commission
25 State Police Drive
West Trenton, NJ 08628

Dear Flood Advisory Committee,

My name is Deana Zosky. I am one of five appointed Commissioners in Lower Macungie Township, which is located in the Lehigh Valley. My township, which presently has approximately 30,000 residents, has been one of the fastest growing townships in the state of Pennsylvania. Our township is also blessed with wonderful natural resources, including the Toad, Swabia, and Little Lehigh Creeks, all considered High Quality Cold Water fisheries in need of special protection. These streams traverse the length of our township and drain into the Lehigh, and ultimately, the Delaware River.

Our township has many miles of sensitive floodplain habitat as a result. Development in our township has taken a toll on these streams through the compounded effects of storm water quantity and quality impacts such as siltation and pollutant runoff, sewer surcharging, and the impacts of storm events resulting in flooding.

Never more than now in our townships history have we grappled with the seemingly increasing occurrences of flash and other flooding events on our streams and its impacts on our residents.

Our township ranks near the top of the Lehigh Valley Hazard Mitigation Report for areas with the highest flooding risk. Ironically, but not surprisingly, the hardest hit are our beautiful historic structures, many dating back over 250 years old, that are located along the banks of our streams. It has been a relatively recent event that these historic treasures are under persistent flooding pressure, and no coincidence that the level of development during this same period has been explosive.

Thankfully, the governing bodies before me had the foresight decades ago to implement what might arguably be the most stringent floodplain protection measures in the state. Our township prohibits any development in the 100 year floodplain and strictly regulates development in the 500 year floodplain. I cannot imagine how severe our already worrisome flooding problem would be had they not been visionary all those decades ago. It is now my responsibility as an appointed official to ensure these stringent protections remain and are enhanced with the addition of a comprehensive riparian buffer zone component.

Our regions Planning Commission, the Lehigh Valley Planning Commission, of which I am a member, recommends a minimum 75 foot riparian buffer. Our township is considering this model ordinance for implementation but I am also in favor of implementing a mandatory 100 foot buffer, when practical, to ensure that flooding impacts are mitigated and to protect the health of the stream for generations to come.

I urge you to follow in the footsteps of my visionary predecessors and implement the stringent floodplain regulations that prohibit any development in the 100 floodplain and severely regulate development in the 500 year floodplain, in addition to enacting 100 foot mandatory riparian buffer regulations, when practical.

There is plenty of science and real world experience to justify this width and this approach for purposes of flood damage reduction. A 100 foot forested buffer will help to mitigate peak flows, reduce the volume of flow imposed upon downstream communities, and ensure that there exists an absolute, reasonable and defensible setback within which there are no structures that could be subjected to flood damage and harm.

Setting an explicit buffer minimum, allowing for local planning to accommodate appropriate, thoughtful, and defensible variations is a reasonable approach forward that ensures all communities are provided an appropriate level of protection including from inappropriate development by upstream neighbors.

Mandating forested buffers not only contributes to the reduction of flood damages but also provides a wealth of other benefits that support its adoption – including (but not limited to) filtering pollution, providing fish and other aquatic habitat, improving waterway oxygen levels for fish, enhancing recreation and ecotourism, increasing the market value and marketability of nearby homes, and protecting public and private lands from erosion.

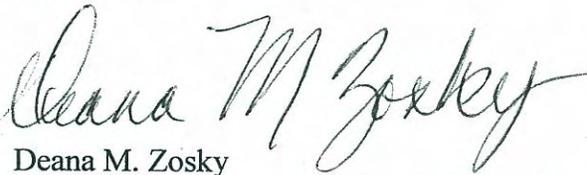
The recommendation that the regulated floodplain be expanded is vital. Experience has demonstrated that merely regulating development within the 100 year floodplain is simply not protective enough. New Jersey has already set and defended a strong precedent for expanding the definition of the regulated floodplain.

It is critical that floodplain and floodway regulations be restructured so that their focus is on prevention of development in the floodplain, rather than the current approach which actually supports floodplain development but merely mandates the parameters by which that development will take place.

Removing vegetation from the floodplain and replacing it with impervious surfaces and structures increases the volume of floodwaters that enter the neighboring river or stream and ensures that water is imposed upon downstream communities, thereby exacerbating their flood volumes.

I look forward to your leadership on these critically important topics. Should you wish to review our floodplain ordinances as a point of reference, they can be accessed at www.lowermac.org or by calling our Township Zoning Officer, at 610-966-4343. If you have any questions, I would be happy to speak with you at dzosky@lowermac.com or at 484-951-1289.

Sincerely,

A handwritten signature in cursive script that reads "Deana M. Zosky". The signature is written in black ink and is positioned above the typed name and title.

Deana M. Zosky
Vice President, Lower Macungie Township Commissioners
3400 Brookside Road
Macungie PA 18062



ASSOCIATION OF STATE FLOODPLAIN MANAGERS, INC.

2809 Fish Hatchery Road Suite 204 Madison, Wisconsin 53713
608-274-0123 Fax: 608-274-0696 www.floods.org Email: asfpm@floods.org

Executive Director

Larry A. Larson, P.E., CFM

Deputy Director

George Riedel, CFM

August 21, 2009

Flood Advisory Committee
Delaware River Basin Commission
25 State Police Drive
West Trenton, NJ 08628

**Re: Comments on the Recommendations of the
Floodplain Regulations Evaluation Subcommittee**

Dear Members of the Flood Advisory Committee:

With much interest, the Association of State Floodplain Managers has reviewed the report from the Floodplain Regulations Evaluation Subcommittee of the Delaware River Basin Commission - Flood Advisory Committee. This letter provides our broad endorsement of the May 19, 2009 Recommendations of the Floodplain Regulations Evaluation Subcommittee based on this Association's collective experience with floodplain regulations throughout the United States over the past decades.

The Association of State Floodplain Managers (Association) has 14,000 members and 28 State Chapters throughout the nation. Our Association is focused on helping the 21,000 flood-prone communities in the nation reduce their flood losses and enhance the floodplain resources that reduce flood losses naturally. The Association's website (www.floods.org) is newly updated and provides links to publications, papers and practical guides to educate communities how to be more resilient to flooding. These references provide greater detail and case studies on a variety of measures being implemented in many states.

It is important to note that regions, states, counties and municipalities in the nation have progressed with local regulations that exceed Federal Emergency Management Agency (FEMA) minimum National Flood Insurance Program (NFIP) standards. The Flood Advisory Committee should feel comfortable in recommending to the Delaware River Basin Commission the adoption of regulations that better protect the health and safety of the public. The proposed recommendations are in line with those used by progressive states and communities elsewhere in the nation

ASFPM has developed a management principal called *No Adverse Impact* that simply states that the action of one party shall not adversely impact the property and rights of another party. A review of case law demonstrates that courts have upheld additional local regulations¹, especially when based on the principle of protecting the property rights of everyone in the community or watershed. In addition, the National

Dedicated to reducing flood losses in the nation.

Chair

Gregory Main, CFM
State Floodplain Manager
Indiana DNR
317-234-1107
gmain@dnr.in.gov

Vice Chair

Sally McConkey, P.E., CFM
Water Resources Engineer
Illinois State Water Survey
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Secretary

Judy Watanabe, CFM
Mitigation Section Manager
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Treasurer

William Nechamen, CFM
State Floodplain Manager
New York State DEC
518-402-8146
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Flood Insurance Program regulations² encourage higher standards, whereby “...community officials may have access to information or knowledge of conditions that require, particularly for human safety, higher standards than the minimum criteria set forth in...this part. Therefore, any floodplain management regulations adopted by a State or a community, which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence.”

ASFPM supports the Floodplain Regulations Evaluation Subcommittee’s recommendations on incorporating future conditions in both floodplain mapping and by requiring structures to have freeboard above the base flood elevation³, an approach used by half the communities in the nation. In our publications we cite where states have incorporated regulations designed to reduce flood losses and protect floodplain resources. Half of the nation’s states have incorporated buffers and setbacks from floodprone areas⁴. Consistent with our recognition of states and communities that mandate such, the Association favorably views the adoption of a minimum 100’ vegetated buffer along the waterways of the basin.

The Association is very pleased to observe the high percentage of Certified Floodplain Managers as representatives on the Floodplain Regulations Evaluation Subcommittee. We applaud the Subcommittee’s work and we would be pleased to help the DRBC Commissioners and staff with case studies and examples of regulations adopted throughout the nation. The Association understands that the proposal of regulations can be politically difficult. We believe that incorporating the recommendations of the Subcommittee is acting in the best interest of the watershed’s population, its communities and taxpayers, and provides additional protection to this nationally significant river basin. We will expectantly watch how the recommendations proceed through the Delaware River Basin Commission rulemaking process.

Sincerely,

Greg Main, CFM
ASFPM Chair
Indiana DNR

Larry A. Larson, P.E., CFM
ASFPM Executive Director

¹ See: http://floods.org/PDF/Mitigation/ASFPM_Thomas&Medlock_FINAL.pdf

² From 44 CFR 60.1(d)

³ See: http://floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

⁴ See: http://www.floods.org/PDF/FPM_2003_Final.pdf



August 13, 2009

Flood Advisory Committee
Delaware River Basin Commission
25 State Police Drive
West Trenton, NJ 08628

**Re: Support of the May 19, 2009 Recommendations of the
Floodplain Regulations Evaluation Subcommittee
Of the Delaware River Basin Commission
Flood Advisory Committee**

Dear Members of the Flood Advisory Committee:

The New Jersey Association for Floodplain Management (NJAFM) is dedicated to reducing loss of life and property damage resulting from floods and promoting sound floodplain management at all levels of government. To that end, we greatly support the work of the Delaware River Basin Commission (DRBC) Flood Advisory Committee (FAC) and its Floodplain Regulations Evaluation Subcommittee (FRES). This letter provides our comments on the May 19, 2009 Recommendations of the Floodplain Regulations Evaluation Subcommittee¹. The comments provided in this letter have been approved by the majority of the Association's Board comprised of elected representatives and committee chairs.

We note that nine (9) of the twenty (20) members of the FRES are Certified Floodplain Managers (CFM) as administered by the Association of State Floodplain Managers (ASFPM). NJAFM is one of twenty-eight (28) chapters of ASFPM that comprises a total of 14,000 Association and chapter members. The CFM program recognizes continuing education and professional development that enhances the knowledge and performance of local, state, federal, and private-sector floodplain managers. Our Board acknowledges the established experience and training of the FRES members that makes the recommendations even stronger of merit.

We dedicate this letter to our late colleague, Mr. Joseph Zagone, P.E., PLS, CFM who was employed by the Federal Emergency Management Agency and served most recently on the FRES. Joe was among a handful of early Certified Floodplain Managers in the State of New Jersey. Joe was stalwart member of the DRBC-FAC and a champion of stronger floodplain management through his work on the FRES.

Respectively, the New Jersey Association for Floodplain Management's Board, formally submits the following support and comments:

- A. Regulatory Floodplain Definition – NJAFM recognizes that floodplain limits are dynamic with regard to depth and aerial extents. In contrast, mapping of the floodplain along the Delaware River is derived from current conditions and past flood events. Development in the watershed increases the volume of runoff leading to greater flooding. We believe that future

¹ Report found at: http://www.state.nj.us/drbc/Flood_Website/FRES/Report_051909rev060209.pdf

- conditions should be considered in the definition of the regulatory floodplain and concur with Option 1 to add a residual risk factor of 25% to the 1% annual chance flood flow;
- B. Floodway Definition – NJAFM members have witnessed the scour and damage related to flood flow velocities outside of the regulatory floodway (typically defined from bank to bank of the Delaware River). We concur with the recommendation to lower the FEMA standard 1-foot rise in water surface elevation to a 0.2-foot rise. This would help inhibit development in the most destructive area of the floodplain;
 - C. Development/Fill in the Flood Fringe – NJAFM agrees that any development in the floodplain is risky, costly and presents dangers to the occupants and first responders. Therefore, we concur that keeping the floodplain in a natural state is of a high priority and that limiting new development in this sensitive areas should be incorporated into basin-wide policy;
 - D. Development/Fill in the Floodway – NJAFM wholeheartedly agrees with the FRES that new development activities in the floodway should be disallowed;
 - E. Stream/riparian Corridors and Vegetation Disturbance – the NJAFM supports the implementation of a floodplain buffer to protect the natural and beneficial functions of the floodplain. In chorus with the Association of State Floodplain Managers we recognize the importance of the floodplain for recreation, wildlife habitat and protection of the water resources we depend on for drinking water, bathing, fishing and the aesthetics that bring value to our riverside communities². We recognize the extensive costs to restore the floodplain once it has been spoiled, and believe that avoidance of its occupation is the best policy to protect floodprone land;
 - F. Adopted Building Code – NJAFM is in favor of greater freeboard and locating structures outside of the floodplain, with specific restrictions for areas that experience flash flooding, high velocity flows and have highly erodible soils;
 - G. Standards for the Lowest Floor of Structures (Freeboard) – We agree that a two-foot freeboard requirement would provide additional protection for people, building and contents. Freeboard in part accounts for the uncertainty of the floodplain delineation and the changes in the watershed and climate³. Freeboard also reduces future flood insurance premiums for subsequent owners of buildings;
 - H. Enclosed Areas below Flood Elevation – NJAFM concurs with the FRES recommendation of requiring a deed restriction to alert future owners and zoning officers of the limits to occupation of a structure below the regulatory flood elevation. We agree that the height of the enclosed area should be restricted to six-feet to thwart conversion of the restricted area to a living space;
 - I. Substantial Damage/Improvement to Structures – NJAFM believes that further education of local officials is needed for substantial damage and substantial improvement requirements;
 - J. Dams and Flood Damage Risk – We acknowledge the additional hazard that dams impose downstream in the floodplain. NJAFM concurs with the FRES recommendations to strengthen dam safety;

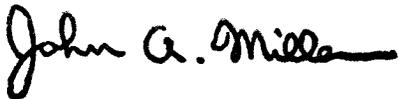
² See ASFPM whitepaper: http://floods.org/PDF/WhitePaper/ASFPM_NBF%20White_Paper_%200908.pdf

³ For further discussion of freeboard, see: http://www.floods.org/PDF/NFPPR_2007/ASFPM_NFPPR_2007.pdf

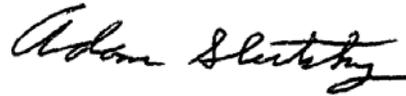
-
- K. Bridge/Culvert Construction or Reconstruction and Flood Damage Risk – NJAFM agrees that crossing of bodies of water should not increase the risk of flooding both downstream and upstream of the proposed infrastructure. We agree that if change in the floodplain cannot be avoided, the modification of risk must be exhibited on the Federal Emergency Management Agency Flood Insurance Rate Maps;
- L. Stormwater Regulations –New and Redevelopment – NJAFM agrees that more aggressive stormwater management in the Delaware River basin is needed. We commend the FRES for identifying measures that would make great strides in minimizing additional flooding and protect water quality.

The New Jersey Association for Floodplain Management appreciates the opportunity to submit these comments to the FAC. The FRES performed a vital service in its appraisal of the existing regulations and through its support of increased measures to protect the Delaware River, its communities, enhancing the safety of the population and reducing the expenditure of public monies with sound policy.

Sincerely,



John A. Miller, P.E., CFM
Legislative Committee
Certified Floodplain Manager



Adam Slusky, P.E., CFM
Chair
Certified Floodplain Manager

cc: Mr. Dave Fowler, CFM, Region 5 Director, ASFPM
Mr. Larry Larson, P.E., CFM, Executive Director, ASFPM
Mr. George Riedel, CFM, Deputy Executive Director, ASFPM
Ms. Diane Brown, Communications and Events Manager, ASFPM
Ms. Anita Larson, Certification Coordinator, ASFPM
Ms. Kait Laufenberg, CFM, Chapter & Training Coordinator, ASFPM
NJAFM Board by email
Mr. Edward Pagan, Esq., CFM, NJAFM Legislative Committee Chair
NJAFM archives

RECEIVED/DELAWARE RIVER
BASIN COMMISSION

2009 AUG -7 A 9:59

ADMINISTRATIVE DIVISION

August 5, 2009

Flood Advisory Committee
C/O Laura Tessieri
Delaware River Basin Commission
25 State Police Drive
P.O. Box 7360
West Trenton, NJ 08628-0360

Dear Ms. Tessieri:

This letter is in support of your subcommittee's inclusion of the concept of 100 foot wide buffers in the Delaware River basin. We have had active research programs regarding buffers for the past 30 years. In fact, the Newbold et al. (1980) publication was one of the earliest scientific studies showing that a buffer wider than 100 feet was needed to prevent significant impact on stream biota when a watershed is logged. In the early 1990's, two publications (Sweeney 1992, 1993) concluded that the presence or absence of trees adjacent to stream channels may be the single most important factor altered by humans that affects the structure and function of stream communities. In 2004, we published a landmark paper (Sweeney et al. 2004) based on 16 streams in PA and MD showing that stream reaches with forested riparian areas had more macroinvertebrates, ecosystem processing of organic matter, and nitrogen uptake per unit channel length than contiguous deforested reaches. Recently, we reminded the general public and decision makers like yourself that forest buffers are critical to both keeping unwanted contaminants out of streams as well as improving the health of stream ecosystem itself so that it can further process and degrade materials that do get into it (Sweeney and Blaine 2007). This year, we have a publication in press (Newbold et al. 2009) which reports on an 18 year study regarding a 100-115 foot wide forest buffer established in 1990. The paper shows that, once established, the buffer intercepts and removes on average ~26% of the nitrogen and ~43% of the sediments moving toward the stream from adjacent actively farmed land.

We are currently finishing up a literature review of past scientific studies that will be submitted soon for publication with the following tentative title: Streamside Forests for Protecting and Enhancing Water Quality and Stream Ecosystem Health and Services: How Wide Should They Be? We are evaluating the answer to that question with regard to the role that forest buffers play in protecting in-stream biota (macroinvertebrates and fish), maintaining natural in-stream habitat (water temperature, channel width, channel meandering and back stability, woody debris), and intercepting nutrients (phosphorous, nitrogen) and sediments before they get into a stream. We are close to finishing the review. We can tell you that, at this point, we will conclude that forest buffer widths of at least 100 feet are needed to adequately protect the in-stream biota and maximize the interception of nutrients and sediments before they get to the stream.

So, in conclusion, we view the decision by your subcommittee to include the concept of 100 foot wide buffers in the Delaware River basin as being both forward thinking and consistent with / strongly supported by the current scientific literature.

Please do not hesitate to contact either one of us if you have any questions on any of the above.

Sincerely,



Bernard W. Sweeney
Director, President, Senior Research Scientist



J. Denis Newbold
Research Scientist

References:

- Newbold, J.D., D.C. Erman, and K. B. Roby. 1980. Effects of logging on macroinvertebrates in streams with and without buffer strips. *Can. J. Fish. Aquat. Sci.* 37:1076-1085.
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- Newbold, J. D. N., S. Herbert, B. W. Sweeney, and P. Kiry. 2009. Water quality functions of a 15 year old riparian forest buffer. *Journal of the American Water Resources Association*: In Press.

**July 2009 PENNDOT Comments on
“Recommendations of the Floodplain Regulations Evaluation Subcommittee (FRES)
of the DRBC Flood Advisory Committee (FAC)”
May 19, 2009**

The Pennsylvania Department of Transportation offers the following comments on the above referenced Report.

- Provide for inclusion of the State Transportation agencies to be represented on those committees whose proposals will have a substantial impact on transportation facilities. The purpose of the state DOTs is to protect the health, safety and welfare of the traveling public. Every project satisfies a community transportation need and directly or indirectly serves the local economy. State transportation systems are a significant feature in floodplains in order to connect communities and as such state transportation agencies are a major stakeholder in any proposed floodplain regulations.
- Throughout the document, there is reference to structures in the floodplain or floodway. If the primary concern is damage to commercial or private buildings that should be clarified. Transportation facilities that are necessary for providing connectivity to the traveling public should have a reduced or specific set of requirements more applicable to their impacts.
- There are inconsistencies in the document related to the reduction of flood peaks from vegetated buffers. It is agreed that vegetated buffers will slow floodwaters and increase the storage capacity of the floodplain which may attenuate *downstream* peaks. But with slower floodwaters comes increased depth of water (flooding) in the riparian area and potentially upstream. Areas that have low vegetation have more effective conveyance than areas with trees, shrubs, higher vegetation etc, which retard the flow and provide less conveyance and increased water surface elevations. The action of vegetated buffers in flood reduction is in slowing the rate at which runoff from adjacent areas enters the stream. Once the area is flooded, they increase the depth of flooding locally.
- **Section A. Regulatory Floodplain Definition:** FRES recommends increasing the regulatory floodplain by either 25% over 1% annual chance or use of the 500-year storm event instead of the use of the 100-year storm event. Since our projects are linear by nature and cannot avoid crossing floodplains, this recommendation would have increased impacts to floodplains for transportation projects. This blanket recommendation across the Delaware does not account for the different concerns for small tributary streams versus the larger rivers within the watershed.
- **Section B. Floodway Definition:** FRES recommends that the floodway in the Delaware River Basin be defined by a 0.2-foot rise standard instead of the 1-foot rise standard used in Pennsylvania and New York currently. This would result in substantially increased structure costs for new or replacement structures spanning the floodway right-of-way due to an increased need to purchase floodway easements or would result in increased cost to avoid a rise over 0.2-foot rise. The primary concern here does not seem to be with

transportation facilities but rather that developers can move floodway locations to allow development of residential or commercial structures within close proximity to the waterways. Therefore, tighter regulations on amendments to the existing floodways by non-state agencies, etc. would have more value in limiting the development of new residential or commercial structures in the close proximity to waterways.

- **Section C. Development/Fill in the Flood Fringe:** FRES recommends limiting development in the flood fringe and includes infrastructure. Specifically, FRES wants to require critical facilities including transportation facilities to be kept outside of the 500-year floodplain to protect life, health and the local economy. This is impossible because roadways are linear projects that enable the public to travel from point “a” to point “b”. This cannot be accomplished without crossing the 100-year or 500-year floodplains. FRES has failed to consider the purpose of state DOTs – to protect the health, safety and welfare of the traveling public. Every project satisfies a community transportation need and directly or indirectly serves the local economy. Therefore, the reference to transportation facilities should be eliminated and an exception should be provided instead for transportation facilities. Additionally, allowing only passive use in the floodplain would prohibit new highways and raising profiles on existing highways. In many cases this is in conflict with the DOT’s mission to protect the travelling public which may include increased highway profiles to limit flooding on roadways.
- **Section D. Development/Fill in the Floodway:** FRES recommends that new development should be prohibited in floodways and includes infrastructure within its definition of development. As discussed in Section C, an exception must be provided for transportation facilities.
- **Section E. Stream/riparian Corridors and Vegetation Disturbance:** See comment above related to buffers and decreased flooding. Additionally, a blanket buffer width of 100 feet is not appropriate. A buffer to provide any downstream flood attenuation benefit to the Delaware River is a significantly larger buffer than would be required on a small tributary stream, especially for tributaries where the entire floodplain may be less than 100 feet wide. Additionally an exception is needed for transportation projects as discussed above.
- **Section H. Enclosed Areas below Flood Elevation:** FRES recommends deed restrictions on enclosed areas below flood elevation. An exception would be needed for transportation facilities. No restrictions should be in place that would restrict a needed improvement to a transportation facility especially given the fact that the right-of-way is owned by the state and purchased with taxpayer money.
- **Section J. Dams and Flood Damage Risk:** Recommendation 6 says: *“This evaluation must verify that flooding conditions downstream of the dam will not be increased during the 10-, 50-, and 100-year events.”* This recommendation would likely be in conflict with dam safety requirements that may require increased capacity of spillways for high hazard dams. Additionally, this may also limit some environmental mitigation measures to remove some low-level dams, etc.

- **Section K. Bridge/Culvert Construction:** Recommendation 1 indicates use of USGS stream gage data for all hydrology. As there are limited gages, this is not feasible and alternate methods should be allowed. Does Recommendation 2 apply to only “new” (new alignment structures) or replacement structures? *Change* in base flood elevation should be replaced with *increase* in base flood elevation.
- **Sections B, C and K:** FRES recommends that new bridges and crossings be designed to ensure that flooding to existing buildings or facilities is not exacerbated upstream or downstream. PennDOT does this for certain storm events and if an increase in flooding occurs for that storm even will purchase a flooding easement if there is a risk to buildings or facilities.
- **Section L Stormwater Regulations:** FRES recommends requiring 100% infiltration of additional stormwater volume. First, this is not possible in all soil types and considering certain geography, e.g., karst areas which are present in the Delaware River Basin. Second, this is not practical for linear type projects which do not involve the same types of stormwater impacts as residential and commercial developments.



DELAWARE COUNTY PLANNING DEPARTMENT

Highway Department Building • P.O. Box 367 • Delhi, New York 13753
Phone (607) 746-2944 • Fax (607) 746-8479 • Email: pln@co.delaware.ny.us

Jason F. Miller, P.E., Chair

DRBC Flood Advisory Committee

Chief, Flood Plain Management Services Branch, Philadelphia District

Wanamaker Building

100 Penn Square East

Philadelphia, PA 19107-3390

Sent via email

Dear Jason,

Delaware County would like to take this opportunity to reiterate their concerns with the document submitted to the FAC by the FRES. We would like to highlight several important issues: 1) The existing regulatory framework has not been utilized to its fullest potential; training and enforcement of existing regulations is lacking in the Delaware River Basin (DRB) and any strategy for improving floodplain management needs to address this issue. Simply creating more regulations does not fix this problem. 2) The DRB is too large and diverse to be adequately covered by one set of regulations. 3) Any regulatory change should be adopted on a state by state basis not by the DRBC to ensure that a socioeconomic and environmental analysis will be performed to determine the full impact of any floodplain management recommendation.

Our comments that were attached to the FRES findings clearly state our case for the recognition of the diversity of different reaches of the Delaware and its tributaries, but it is worth saying again: regulations that do not take local conditions into account are not necessarily going to make people safer everywhere. The character of flood events, human population and land use, and watersheds throughout the DRB require different strategies for minimizing flood damage. To not do the work to tailor any new regulation to specific areas shows laziness on the part of regulators and indicates that while it is easy to talk about alleviating flood hazards to people in the basin, there is an

unwillingness to back that talk up with the resources necessary to do the job effectively.

Ramped-up efforts to enhance enforcement of the regulations already in place are critical. Recent developments have created an ideal environment for this work in Upper Delaware River Basin. In areas of Delaware County, new flood hazard data is being released. Under the Hazard Mitigation Technical Assistance Program (HMTAP), detailed studies of the mainstem from the Village of Delhi downstream to the Village of Hancock were conducted in response to the 2006 flood. Advisory maps of this new data show expanded flood hazard areas along many stretches of the river. This data will be incorporated into the new DFIRMs that communities will be required to adopt as local law. The release of these new DFIRMs is an excellent opportunity to amplify and expand the dialog on flood damage prevention, and work towards adequate enforcement of existing regulations.

In Delaware County, plans are in the works to dovetail outreach efforts from federal, state, and local agencies surrounding the new maps, with the goal of having local elected officials, floodplain administrators, and citizenry more aware of flood danger and the regulations that are meant to protect them from it. Given that the new DFIRMs will contain expanded flood hazard areas in most areas, and the review and adoption process presents such a great opportunity to enhance enforcement of existing flood damage prevention regulations, it seems like an inopportune time to complicate the process with new regulations from yet another entity (communities on the upper Delaware in New York are already regulated by FEMA, the NYSDEC, NYCDEP, and local regulations). Where the DRBC could be extremely helpful is in assisting local communities with understanding the new maps, how to use them to guide development, and how they relate to their flood damage prevention regulations.

New York recognizes that effective floodplain regulations often need to balance community sustainability, implementation strategies, economic development, property rights, environmental quality, and health/safety issues. New York requires a comprehensive State Environmental Quality Review Act (SEQRA) review and the State Administrative Procedures Act (SAPA) process be followed that involves the public, solicits comments and balances all the factors. The SAPA process also allows for a specific ‘Rural Flexibility Analysis’ that considers the impact of potential regulations on rural communities. This process should not be circumvented by the adoption of any of these recommendations at the

DRBC level; the recommendations should be considered and adopted state by state using these processes.

It is going to require more time, money, and effort on the part of everybody involved in flood damage prevention to do the job of protecting people in the DRB from flood damage properly. This includes federal, regional, state, and local agencies. These entities will need to facilitate the creation of flood damage prevention strategies that are tailored to local conditions. In most cases, this requires empowering communities to better enforce their existing flood damage prevention laws. In some cases, new regulations may be required, but creating simplified basin-wide regulations is not going to adequately protect all of the citizens of the basin, particularly if existing problems with enforcement are not addressed.

We welcome the attention that DRBC is paying to local flood damage prevention in Delaware County, and thank you for the opportunity to serve on the FRES during this process. We look forward to continuing to work with the agency to create strategies that make people safer from flood damage.

Sincerely,

Nicole Franzese, Director
Planner

Michael Jastremski,

Cc: William Nechamen, NYSDEC
Laura Tessieri, DRBC

**June 2009 NYSDOT Comments on
“Recommendations of the Floodplain Regulations Evaluation Subcommittee (FRES)
of the DRBC Flood Advisory Committee (FAC)”
May 19, 2009**

We were given the opportunity to review and comment on these subcommittee recommendations, and believe that there are serious shortcomings on the proposal as written. Our comments are in two sections: first, recommendations and general comments for the Commission and its committees as they move forward, and second, our concerns with specific sections and recommendations in the draft.

1. NYSDOT GENERAL RECOMMENDATIONS:

- Before making sweeping regulatory changes, the Commission may want to consider other options. Would better enforcement of existing regulations adequately address the perceived problems? Would we be better off simply raising insurance rates, or increasing the subsidy of flood insurance? Floodplain mapping and floodway designation, using current standards, could be expanded to include more streams within the watershed. Would this approach better meet the Commission’s goals than changing the standards on those streams already regulated?
- **A complete study of social and economic as well as environmental impacts must be done before any such far-reaching changes in regulatory policy are made. This should include an annualized cost/benefit analysis** – how much will this cost States, Municipalities, Businesses and Residents, and what will the annual reduction in damage claims be? Of particular interest to us will be the fiscal impact to Transportation agencies of the greatly expanded floodways, where construction is prohibited. The distribution of costs and benefits (e.g. between headwater and main stem communities) should also be investigated, as should environmental justice considerations.
- Provide for inclusion of Transportation agencies to be represented on those committees (especially the Flood Advisory Committee) whose proposals will have a substantial impact on transportation facilities. With transportation facilities and stream crossing structures being dominant features in many floodplain encroachments, it would seem that State and local transportation agencies would be major stakeholders whose points of view should be considered in any proposed regulatory actions.
- Carefully investigate the out-of-floodplain losses used to justify these regulatory changes. Will expansion of floodplain and floodway definitions actually address the problem?
- Make all of the requirements consistent and risk-based. If the DRBC believes that the present 1% annual risk is unacceptably high, pick a lesser one (e.g. 0.5%) and tie all the requirements to that.
- Where the subcommittee is primarily concerned with one or more specific classes of structures (residential, mobile homes, industrial facilities, etc.) let the proposed regulation

so specify, rather than placing additional burden on structures that are of little or no concern.

- Define critical terms of interest – “waterway,” “new,” “stream,” etc.
- Consider a reduced level of regulation for transportation and other infrastructure works. Remember, in general your population centers are in and immediately adjacent to floodplains and river valleys. They still require transport, power and other utilities.

2. COMMENTS ON SPECIFIC ITEMS AND RECOMMENDATIONS

PREAMBLE

p 3 repeatedly (pp 4, pp6) emphasizes the need to tailor management approaches to specific reaches of streams and their location in the basin. Regulators are warned against over-generalization. Yet nowhere in the Recommendations is this observed. Recommendations refer instead to “all other streams and rivers within the basin,” (p 9, 10) or “all waterways of the basin,” (p 13), etc.

P 4. It is inaccurate to say that current regulations have not successfully reduced flood damages. Flood damage has not been eliminated, and further reduction is of course possible, but current regulations have been very successful at reducing losses as compared to a state of unregulated development.

It should also be noted that the frequently referenced reduction of flood peaks and areal extent of flooding due to restored vegetated floodplains applies **only** to downstream flooding. On site and upstream, both of these flood measures will increase. Downstream effects will in general be small and distributed over a wide area; upstream effects will be more localized but of more dramatic scale.

A. Regulatory Floodplain Definition,

Recommendations. What is the justification for adopting a risk standard of less than 1% annually? It is implied that this will reduce losses to properties outside the existing regulatory floodplains, but no evidence for such a reduction is ever referred to. In the New York portion of the watershed, many flood losses occur along flashy tributary streams that are not included in current FIS mapping or studies. In such cases, mapping to more uniformly apply the existing 1% risk floodplain regulations would be more effective in reducing out-of-floodplain claims than would widening the regulatory area of existing coverage and still leaving the tributaries off of the system.

Option 1. An arbitrary 25% increase in the 1% annual exceedence flow applies an inconsistent risk criterion to different locations. A survey of 25 to 30 USGS gages in the New York portion of the watershed indicates that 125% of the Q_{100} ranges from approximately a Q_{160} (0.6% annual exceedence probability) to a Q_{320} , (0.3% annual exceedence probability). A consistent level of risk, for instance a 0.5% annual basic risk, would seem to be fairer to affected property owners.

B. Floodway Definition

Much of this section seems to be confused and oversimplified. Statements like “The floodway...is the most dangerous area that carries deeper flows and higher velocities during a flood” are extremely misleading. That statement more accurately describes the channel, which should be part of a regulatory floodway but in general is not all of the floodway. *The floodway is a theoretical concept, a fiction, legally adopted to guide development.* Its dimensions and adequacy are purely a function of development management policy; please don’t blame them on nature, as this section strongly implies.

The proposed management policy change, requiring the adoption of significantly wider floodways, will have a potentially large effect on the size and cost of stream crossing structures. Coupled with the proposed limits on activities within floodplains and floodways, these redefinitions will have enormous impacts on transportation budgets in affected States and local jurisdictions.

As part of the social, economic and environmental analysis for these proposed regulations, there should be a thorough analysis of the existing New Jersey 0.2 ft. standard for floodways, to determine actual benefits and costs attributed to this standard as opposed to the existing 1.0 ft FEMA standard used by Pennsylvania, New York and Delaware.

It is inaccurate to say that “Any regulation tied to the floodway could be avoided entirely if the floodway is amended...” The floodway restrictions must still exist, they merely apply to some other nearby portion of the floodplain, which can then not be developed.

The real issue is stated just before the recommendation. It is that development can be “improperly permitted in close proximity to streams and rivers simply because they are not currently demarcated as floodways.” Merely widening currently demarcated floodways will not address the problem.

C. Development/Fill in the Flood Fringe

Again, there is a lack of clarity regarding distinctions between natural and regulatory floodplains. It should be made clear that this document proposes to set development policies within regulatory, administratively defined areas, which may be larger or smaller than the actual natural floodplain. The proposed regulatory floodplains will, as a matter of historical patterns of

development, include many of the areas of greatest population density. Absent any massive forced relocations, these towns and cities will continue to need infrastructure, often larger than the existing, and the more its development is restricted, the more expensive it will be.

Recommendations:

Permitting only passive uses (i.e. not requiring grading) in the floodplain would prohibit new highways or raising profiles of existing ones. In many cases, this would prevent transportation agencies from improving situations that now contribute to flooding, as well as others that pose safety risks to travelers.

“The goal... shall be to prohibit ... new development in the flood fringe.” It should be remembered that infrastructure elements like bridges, power transmission towers, water and sewer lines are structures. If the intent is to prohibit new residential, business or industrial buildings, the regulation should say so.

No net rise in flood heights, within the precision of predictive techniques, will be largely pointless for the great majority of small individual projects, which cumulatively could have a large impact. Only the largest projects are apt to raise water levels noticeably by themselves.

Compensatory storage sounds good in theory, but needs to be weighed carefully. What it amounts to is digging out a volume equal to the volume occupied by fill, up to the predicted flood level. This must be above the water table, or it will simply become a pond, already filled and providing no additional storage. This may result in environmental impacts that outweigh the value of the storage gained, in vegetation removal, habitat loss and disturbance, etc.

Critical infrastructure to be kept outside of the 500-year floodplain. Be careful of unintended consequences. In the case of Binghamton, in the Susquehanna basin, this would bar construction of police or fire stations in roughly 30% of the city. Some cities in the lower Delaware basin may be in similar circumstances.

“New bridges and crossings shall be designed to ensure that flooding...is not exacerbated upstream or downstream.” NYSDOT already does this in regard to upstream flooding. Practical limitations on current analysis techniques do not permit precise prediction of downstream effects. Every effort is made to eliminate downstream impacts, but it can't be pinned down to 0.00

D. Development/Fill in the floodway.

This section shows the same confusion between reality and administrative fiction noted earlier. Flow depths and velocities are not necessarily much greater in the floodway than those in the flood fringe. They may be the same. In parts, they may be greater. Under current management fiat, depths in the floodway portion outside the channel can never be more than 1' deeper than in the adjacent flood fringe. There is no necessary difference between flow inside the edge of a floodway and that immediately outside — nature does not recognize a floodway. It's a theoretical device created as a planning and management tool, nothing more.

Recommendations:

“Prohibit the placement of fill or new structures within floodways”. In New York State, this is already the case *as the floodway is currently defined*. For the greatly expanded floodways generated by using a 200- or 500-year base flood while reducing the allowable rise to 0.2', this has the potential to tremendously increase the cost of new bridges and their approach highway embankments.

This section also contains an internal inconsistency. Pp3 states: “Whereas the flood fringe temporarily stores floodwaters, the floodway quickly conveys floodwaters.” Yet the recommendation would prohibit removal of vegetation. Vegetation obstructs flow as surely as man-made features. That’s why floodways defined by flood-control levees are required to be kept mowed and free of shrubs and trees.

E. Stream/riparian Corridors and Vegetation Disturbance

Vegetated buffers do slow floodwaters, increase the storage capacity of the floodplain, and attenuate *downstream* peaks. Please note that they do this by increasing the depth and severity of flooding upstream and in the area of the vegetated floodplain. (When overbank floodway areas between flood control levees are kept mowed and free of trees and shrubs, it increases conveyance and helps keep the levees from being overtopped.) Generally, the upstream communities will take a hit to protect the downstream folks. The action of vegetated buffers in flood reduction is in slowing the rate at which runoff from adjacent areas enters the stream. Once the area is flooded, they retard flow and increase the depth of flooding locally.

G. Standards for Lowest Floor of Structures (Freeboard)

Recommendations:

The proposed regulation refers to the 1% exceedence probability base flood. This is inconsistent with the more restrictive proposed definition of “floodplain.” It is inconsistent to say “permit only passive uses in the flood fringe” (p 11), which has a flood risk of 0.5% (or 0.2%) annually, and then say “all new or substantially improved...structures within the Delaware River Basin” (whether in the regulatory floodplain or not) must be elevated to a level 2' above the 1% annual risk. The DRBC has no way of knowing whether the latter standard constitutes a 0.2% basic risk or a 0.0002%.

What is the purpose of the phrase “within the flood fringe” at the end of the recommendation? The previous Section C has virtually banned development within the (expanded) regulatory floodplain. For structures outside of this floodplain, it may not be clear what flood fringe is being referenced. The proposed regulation could be requiring someone, building outside the expanded floodplain, to elevate their house to “protect” it against a vanishingly small risk. Is it the intent to require meteorite shields for all new construction as well?

I. Substantial Damage/Improvement to Structures

The second paragraph of Recommendation 1 appears to be missing part of the text, and needs clarification.

K. Bridge/Culvert Construction or Reconstruction and Flood damage Risk

Recommendations:

Recommendation 1: Design to ensure that flood risk to existing development is not increased is already required by FEMA regulations, and is the policy of every transportation agency of which this reviewer is aware. So too is the use of the latest hydrologic models available.

It would be worthwhile for the DRBC to reach out to transportation agencies to determine their design policies. Likewise, the US Geological Survey should be contacted for their opinion on the various hydrologic models used throughout the region. In New York State, for example, the statistical regression equations were recently updated by USGS in 2006.

Design of bridges and culverts is based on safe conveyance of extreme events, typically of 2% or less annual probability. Statistical bases sufficient to define these events require years of data collection. New data are included in analyses as they become available, but the use of only “new” data to achieve a valid statistical analysis is impossible.

Recommendation #2 : This would require floodplain maps to be updated for new crossings, including submission of LOMRs as part of the application process. Does this apply only to “new” structures, as defined by NYSDOT, or to replacement structures as well? Does “any change” in base flood elevation include a lowering? If so, it will place significant cost and administrative burdens on our agency, as well as introducing delays in the design process which may prove to be completely unworkable. Such mapping revisions are also not required for any other class of development – what is the justification for singling out the transportation sector?

L. Stormwater Regulations - New and Redevelopment

Recommendations:

The second bullet point would mandate “no net increase in the **volume** of runoff.” Is the intent to limit the actual volume, or the volume **rate**?(The former might be measured in gallons, the latter in gallons per minute.) In the latter case, detention ponds can hold excess runoff up to a design event and release it gradually, serving the purpose of reducing flood levels. The storage volume of the pond is then available for the next rain event. If the volume is to be limited, ponds must be large enough to contain all excess runoff until it is lost to infiltration or evaporation. Rainfall intensities and total annual precipitation in the Delaware Basin portion of New York State are the highest in the state; in fact the highest in the 4-state area and all adjacent states. Storage facilities to so dispose of all excess volume would likely prove prohibitive.