

Proposed Minimum Floodplain and Drainage Standards

Prepared for the Floodplain and Drainage Advisory Committee

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Proposed Floodplain Standards

Proposed Standard 1: Flood study required in unmapped floodplains.

Current Criteria: There are currently no NFIP minimum standards for development projects contiguous to streams where FEMA has not delineated a floodplain area.

Proposed Standard: For all new development activities which exceed 50 lots or 5 acres in locations contiguous to streams without a FEMA-delineated floodplain, with an upstream watershed greater than 1 square mile, a flood study shall be conducted in accordance with FEMA study criteria. Base flood elevations (BFEs) and floodplain delineations shall be submitted to local jurisdictions prior to record plan approval or building permit issuance. This standard does not apply to Minor Subdivisions as defined by local governments.

		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
	✓		✓		✓		

Supporting rationale: Many streams in Delaware do not have floodplains mapped. In 2011, two publicly funded floodplain buyouts were done in unmapped floodplains where homes were damaged beyond repair. Nationally, approximately 30 percent of all flood claims come from outside the 100-year floodplain. Currently, development in these areas is often done without consideration of flood risk. The photograph below shows flooding to a home in New Castle County which is contiguous to a stream with no FEMA mapped floodplain. The home has been repeatedly flooded and was damaged beyond repair during Hurricane Irene.



Proposed Standard 2: Flood Study required in Zone A (no BFE) FEMA mapped floodplains.

Current Criteria: The NFIP minimum standards require “base flood elevation data” to be included with all development proposals which exceed either 5 acres or 50 lots. The term “base flood elevation data” is not defined and has been interpreted to allow a wide range of submittals which do not reflect actual calculations of flood risk.

Proposed Standard: For all new development activities which exceed 50 lots or 5 acres in FEMA mapped floodplain areas without a base flood elevation, a flood study shall be conducted in accordance with FEMA study criteria. Base flood elevations and floodplain delineations shall be submitted to FEMA and approved prior to record plan approval so that official maps can be revised with these BFE’s and floodplain delineations. This standard does not apply to Minor Subdivisions as defined by local governments.

		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
	✓		✓			✓	

Supporting Rationale: CFR 44 60.3 requires NFIP-participating communities to require “base flood elevation data” to be submitted as part of development proposals which exceed 5 acres or 50 lots. “Base flood elevation data” is an ambiguous term which can include many types of data that FEMA will not accept. If FEMA cannot accept the data, then no corrections will be made to the floodplain map, property owners may have to determine base flood elevations on a lot-by-lot basis for building homes. Neither banks nor insurance companies can accept base flood elevation data that FEMA has not accepted, increasing insurance costs. The images below show the huge difference between a Zone A FEMA floodplain map (left) and an accurate floodplain map revised after a study was performed. Estimating a base flood elevation through point-on-the boundary or other means using the map on the left would almost certainly produce an inaccurate result.



Proposed Standard 3: Only FEMA approved floodplain and BFE data shall be shown on record plans and development documents.

Current Criteria: There are currently no NFIP minimum standards defining the source of base flood elevations or floodplain delineations which are depicted on building permit or development documentation.

Proposed Standard: In all areas with delineated floodplains, record plans and development documents shall show the floodplain delineation from a flood study approved by FEMA (with BFE where applicable). Flood studies submitted to FEMA for map revisions must be approved prior to the recordation stage for subdivisions.

		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Frequently, preparers of these site plans have modified the FEMA floodplain boundary on site plans to fit new topography, or to reflect new information. If these revised floodplain depictions have not gone through FEMA’s review, then the information cannot be used by insurance companies, banks, or code enforcement departments. It is critical that prospective buyers and design professionals use official regulatory flood information, not unofficial depictions based on new data that has not undergone FEMA review.

Proposed Standard 4: Use accepted base flood elevations in building permit application documents.

Current Criteria: There are currently no NFIP minimum standards defining the source of base flood elevations or floodplain delineations which are depicted on building permit application documents.

Proposed Standard: All building permit application documents in a floodplain shall reference only base flood elevation and/or floodplain delineation developed in flood studies which have been reviewed and approved by appropriate county or municipal agency, or the Federal Emergency Management Agency where applicable.

		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Communities participating in the NFIP are required to verify that the floodplain information used to permit construction in the floodplain is accurate. FEMA BFEs should be used in Zone AE floodplains. In Zone A floodplains where FEMA has not determined BFE’s, BFE data from other sources may be used such as a preliminary flood study, or appropriate calculation from the permit applicant’s surveyor or engineer. In all cases, the community having responsibility for floodplain management must review all submitted BFE data.

Proposed Standard 5: Floodplain information included on permitting documentation.

Current Criteria: The NFIP does not stipulate the administrative permitting process for floodplain development, although 44 CFR 60.3 (the NFIP Regulations) does require that a permit be issued for all development in a floodplain.

Proposed Standard: Floodplain information including Floodplain Map used, effective flood zone delineations, base flood elevations, and proposed lowest floor elevations shall be required on record plans and development documents for all new development activities or substantially improved structures (as defined by local governments) within a FEMA floodplain.

		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Development activities in floodplains in NFIP-participating communities require the dissemination and collection of building and development information which may not be required for development outside the floodplain. These data include:

- Flood map and flood zone for the property
- Floor elevation is required for the site
- Special flood protection required for utilities
- Foundation requirements
- Grading requirements and many others.

It has been the Department’s experience that there is a direct relationship between non-compliant floodplain development and unclear permitting documentation. Having permitting documentation that is specifically geared towards floodplain regulations increases the likelihood that requirements are passed along to the permit applicant, and that requirements are clear.

Proposed Standard 6: Require use of elevation and flood proofing certificates.

Current Criteria: The NFIP does not require the use of Elevation Certificates or Flood proofing Certificates.

Proposed Standard: FEMA Elevation certificates shall be completed properly for both pre and post-construction for all new structures and substantially improved structures (as defined by local governments) in the floodplain. For all new structures to be dry-flood proofed, a FEMA Flood proofing Certificate form shall be completed both pre and post construction.

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✓	✓	✓	✓	✓	✓	✓	✓

Supporting Rationale: The Elevation Certificate was specifically created and is widely used to collect compliance data about buildings in floodplain in NFIP-participating communities. Elevation certificate are already required for flood insurance policies to be written for new buildings, and for property owners who request Letters of Map Amendments or Map Revisions based on fill. It has been the Department’s experience that a significant contributing factor to non-compliant development is failure to use pre-construction and/or post construction elevation certificates. Improperly completed elevation certificates are also a major problem which is much harder for communities to address after the fact.

Proposed Standard 7: Require 18 inches of freeboard.

Current Criteria: The NFIP minimum standards currently do not require any freeboard for first floors elevations.

Proposed Standard: All new construction or substantially improved structures (as defined by local governments) located within a FEMA mapped floodplain shall have the lowest floor, including basement, and all equipment and machinery elevated to or above 18 inches above the base flood elevation. In lieu of elevation, non-residential structures may provide dry-floodproofing such that the lowest floor of the building and all utilities are protected to a minimum height of 18 inches above BFE.

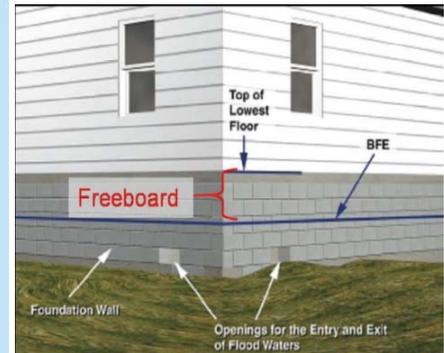
Examples of savings on NFIP1 with freeboard

Zone V ²	Zone V ²		Zone A ³	Zone A ³	
	Annual savings in NFIP premiums	Savings over 30-year mortgage		Annual savings in NFIP premiums	Savings over 30-year mortgage
1' freeboard	\$2,565 (33%)	\$76,950	\$725 (46%)	\$21,750	
2' freeboard	\$4,310 (56%)	\$129,300	\$984 (63%)	\$29,520	
3' freeboard	\$5,160 (67%)	\$154,800	\$1,074 (68%)	\$32,220	

¹ NFIP premiums based on October 2010 rates for a one-floor residential structure with no basement built after a FIRM was issued for the community (post-FIRM rates differ from pre-FIRM rates). \$500 deductible/\$250,000 coverage for the building/\$100,000 for contents.

² Zone V: This Flood Insurance Rate Map (FIRM) designation refers to coastal areas that are subject to the highest levels of wave energy and flooding.

³ Zone A: Also a FIRM designation, these areas are subject to flooding but with less wave energy than Zone V (i.e., wave heights less than 3 feet).



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✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: A significant amount of flood damage will occur to most structures if water reaches the first floor of the house, even if the floor is not overtopped. Also, flood studies have a significant amount of uncertainty and flood levels are likely increasing in many areas. Freeboard is the single most important factor in reducing flood damage, and lowering flood insurance costs. The insurance graphic illustrates that 18” freeboard results in a \$984/year savings in AE Zone floodplains and \$4310/year for VE Zone floodplains.

Proposed Standard 7: Require one foot of freeboard.

Current Criteria: The NFIP minimum standards currently do not require any freeboard for first floors elevations.

Proposed Standard: All new construction or substantially improved structures (as defined by local governments) located within a FEMA mapped floodplain shall have the lowest floor, including basement, and all equipment and machinery elevated to or above one foot above the base flood elevation. In lieu of elevation, non-residential structures may provide dry-floodproofing such that the lowest floor of the building and all utilities are protected to a minimum height of one foot above BFE.

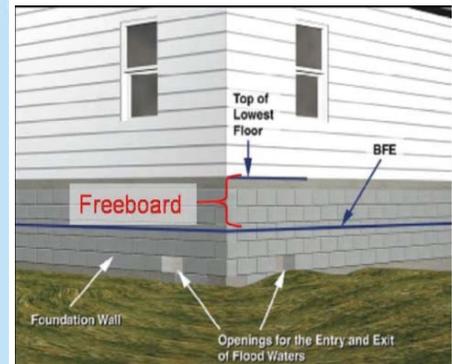
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¹ NFIP premiums based on October 2010 rates for a one-floor residential structure with no basement built after a FIRM was issued for the community (post-FIRM rates differ from pre-FIRM rates). \$500 deductible/\$250,000 coverage for the building/\$100,000 for contents.

² Zone V: This Flood Insurance Rate Map (FIRM) designation refers to coastal areas that are subject to the highest levels of wave energy and flooding.

³ Zone A: Also a FIRM designation, these areas are subject to flooding but with less wave energy than Zone V (i.e., wave heights less than 3 feet).



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✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: A significant amount of flood damage will occur to most structures if water reaches the first floor of the house, even if the floor is not overtopped. Also, flood studies have a significant amount of uncertainty and flood levels are likely increasing in many areas. Freeboard is the single most important factor in reducing flood damage, and lowering flood insurance costs. The insurance graphic illustrates that one foot freeboard results in a \$725/year savings in AE Zone floodplains and \$2565/year for VE Zone floodplains.

Proposed Standard 8: Require 18 inches of freeboard for Manufactured Homes

Current Criteria: The NFIP minimum standards currently do not require any freeboard for first floors elevations of manufactured homes and allow new or replacement manufactured homes placed in older manufactured home communities to be placed on 36” piers even when base flood elevation is more than 36” above grade.

Proposed Standard: All new or substantially improved (as defined by local governments) manufactured homes located within a FEMA mapped floodplain shall have the lowest floor, including basement, and all equipment and machinery elevated to or above 18 inches above the base flood elevation.

		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Significant flood damage will occur to manufactured homes if water reaches the first floor of the house, even if the floor is not overtopped. Most manufactured homes place ductwork below the lowest flood and use flooring materials which are susceptible to water damage. Flood studies have a significant amount of uncertainty and flood levels are likely increasing in many areas. Freeboard is the single most important factor in reducing flood damage to manufactured homes, and lowering flood insurance costs.

Proposed Standard 9: Shallow fill above BFE will not exempt a structure from floodplain regulations.

Current Criteria: Current criteria is to treat land removed from the floodplain by filling no differently than any other land which is outside the floodplain.

Proposed Standard: Fill placed in the floodplain which results in land having an elevation less than 18 inches above base flood elevation will not result in a relaxation of floodplain standards.



LETTER OF MAP REVISION BASED ON FILL DETERMINATION DOCUMENT (REMOVAL) ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)						
TABLE (CONTINUED)						
SUBDIVISION	STREET	OUTCOME WHAT IS REMOVED FROM THE SFHA	FLOOD ZONE	1% ANNUAL CHANCE FLOOD ELEVATION (NAVD 88)	LOWEST ADJACENT GRADE ELEVATION (NAVD 88)	LOWEST LOT ELEVATION (NAVD 88)
Americana Bayside, Phase 11	Wild Rose Circle	Property	X (shaded)	5.2 feet	--	5.3 feet
Americana Bayside, Phase 11	Wild Rose Circle	Property	X (shaded)	5.2 feet	--	5.3 feet
Americana Bayside, Phase 11	Wild Rose Circle	Property	X (shaded)	5.2 feet	--	5.4 feet
Americana Bayside, Phase 11	Wild Rose Circle	Property	X (shaded)	5.2 feet	--	5.3 feet
Americana Bayside, Phase 11	Wild Rose Circle	Property	X (shaded)	5.2 feet	--	5.6 feet
Americana Bayside, Phase 11	Coneflower Circle	Property	X (shaded)	5.2 feet	--	5.3 feet

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✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: FEMA may amend or revise floodplain maps to remove land from the floodplain when the property owner shows that grade has been elevated to or above the base flood elevation. Through this LOMR process, land may be removed from all floodplain regulation despite being almost exactly at the level of the base flood. There is a great deal of uncertainty in flood models, and flood heights are increasing in many areas. The photograph shows a basement filled with waters on a lot located immediately outside of the floodplain and elevated only 0.3 feet above BFE. The table above shows an example of lots which have been removed from the floodplain after having been filled to an elevation as little as 0.1 foot above base flood elevation.

Proposed Standard 10: Hydrostatic venting required.

Current Criteria: The NFIP minimum standards currently require hydrostatic venting by requiring enclosures below BFE “shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters”. This proposed standard does not exceed existing minimum NFIP criteria.

Proposed Standard: Hydrostatic vents shall be required within one foot of grade for all new construction or substantially improved structures (as defined by local governments) with enclosures below the lowest floor located in FEMA mapped floodplains excluding V-zones if the lowest adjacent grade to the structure is below the BFE. One square inch of openings must be provided for every square foot of enclosure.

*For example, 1400 sq. foot footprint
Means 1400 sq. inches of venting or
11 standard 128 sq. inch vents*



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✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Properly designed and installed hydrostatic venting (flood openings) is one of the single most cost-effective ways of lowering the price of flood insurance. CFR 44 60.3 requires all NFIP participating communities to requires flood openings for enclosures below BFE. Despite this, many homes are still built without proper flood openings, leading to unnecessarily expensive flood insurance premiums. This proposed standard does not exceed existing minimum NFIP criteria; however lack of enforcement is common.

Proposed Standard 11: Prohibit below-grade crawl spaces or enclosures

Current Criteria: The NFIP minimum standards prohibit “basements” and define basements as means any area of the building having its floor subgrade (below ground level) on all sides. Technically this would prohibit below grade crawl spaces, although it may be unclear whether the dirt grade in a crawl space is a “floor”.

Proposed Standard: If areas below the lowest floor of an elevated building are enclosed with areas usable for parking, storage, or building access, or are constructed with a crawl space, the elevation of the floor of the enclosure or crawl space floor or grade must be at or above lowest adjacent grade on at least one side of the building.



Inside below grade crawl space. The dashed line represents the approximate outside grade. Entry point of surface water visible. This type of construction, with inside grade below outside grade can lead to moisture and mold problems and is prohibited by the NFIP. Few communities explicitly prohibit this practice.

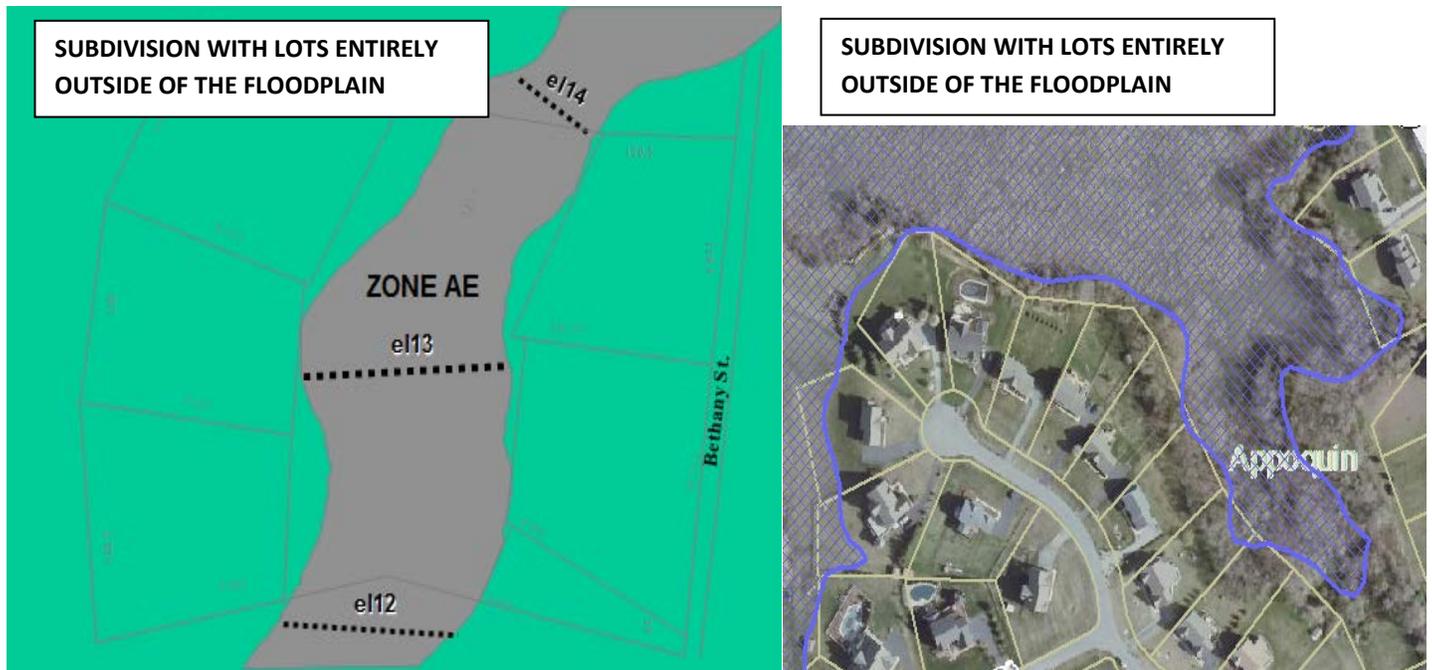
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Tidal	Non -Tidal	Recorded Lots Grandfathered	Proposed Subdivision >= 50 lots or 5 acres	Proposed Subdivision <50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Below grade crawl spaces and enclosures provide a collection point for floodwaters. Flood insurance premiums can be drastically more expensive for buildings with below grade enclosed areas. Technically the NFIP prohibits this practice but it frequently occurs due to a lack of specificity in community floodplain regulations.

Proposed Standard 12: Newly subdivided floodplain shall remain deed restricted open space.

Current Criteria: The NFIP does not prohibit new buildings, development or lots from being built in floodplains.

Proposed Standard: Mapped floodplains in all lands being newly subdivided shall be located in a lot or lots dedicated as public or private open space and deed restricted to prohibit development. No lot intended for development shall contain any portion of the mapped floodplain. This standard does not apply to Minor Subdivisions as defined by local governments.



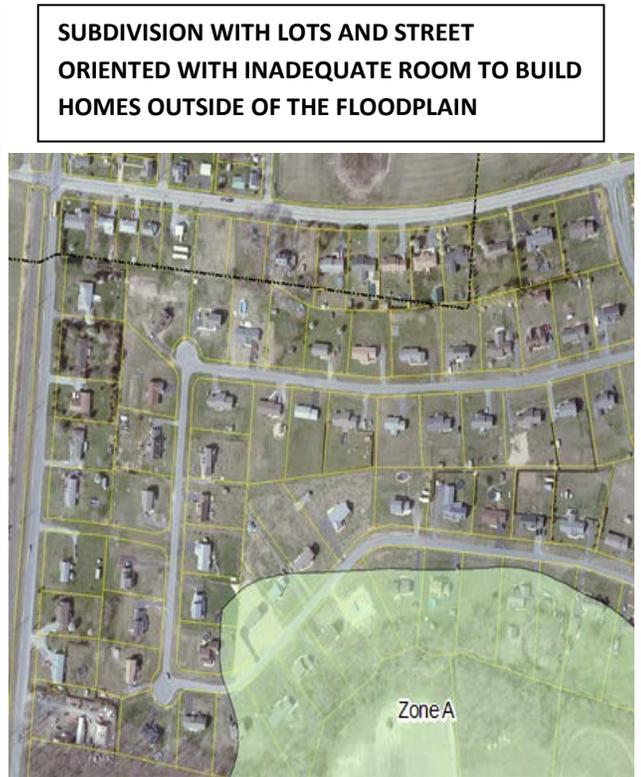
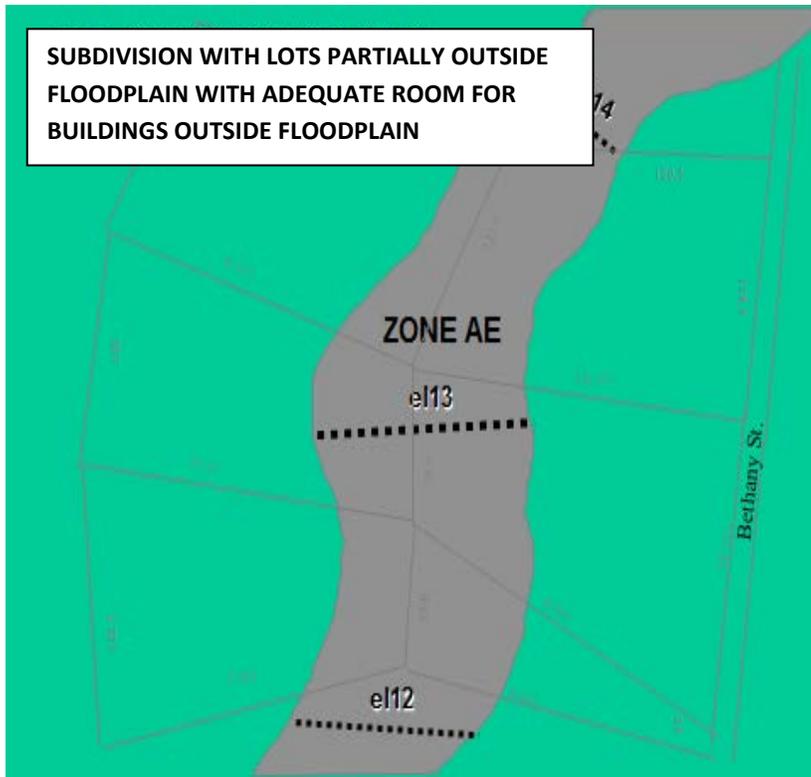
		Lot Scenarios			FIRM Map Scenarios		
Tidal	Non - Tidal	Recorded Lots Grandfathered	Proposed Subdivision \geq 50 lots or 5 acres	Proposed Subdivision $<$ 50 lots or 5 acres	Non-Delineated Floodplain	Delineated Floodplain No BFE (Zone A)	Delineated Floodplain with BFE (Zone AE)
	✓		✓	✓		✓	✓

Supporting Rationale: This standard prohibits new lots to be created which impact the floodplain, and requires the floodplain to be placed in deed restricted open space. Keeping new buildings and lots outside the floodplain is the ideal way to reduce flood risk. Any building in the floodplain has some risk of being damaged, and keeping floodplains in open space is the most effective way to minimize impacts to adjacent properties. Flood insurance is quite expensive for any buildings in the floodplain, and is often required by lenders when any portion of the lot is in the floodplain. Keeping new lots and buildings out of the floodplain will achieve a very high level of flood protection, reduce community impacts, and is already in practice in certain parts of Delaware.

Proposed Standard 13: Prohibit new non-water dependent structures in floodplains on new lots.

Current Criteria: The NFIP does not prohibit new buildings, development or lots from being built in floodplains.

Proposed Standard: New lots in major subdivisions, as defined by local governments, may be located in the floodplain as long as sufficient room outside the floodplain exists for future construction activities. All new structures within mapped floodplains shall be prohibited except buildings with water-dependent use. This standard does not apply to Minor Subdivisions as defined by local governments.



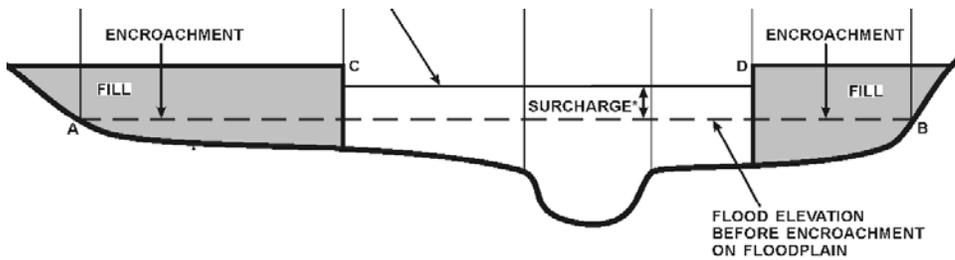
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	✓		✓	✓		✓	✓

Supporting Rationale: Keeping new buildings outside the floodplain is a widely accepted way to reduce flood risk and is a standard which already exists in many areas in Delaware. Any building in the floodplain has some risk of being damaged, and creates some impact to adjacent properties. Flood insurance is quite expensive for any buildings in the floodplain. Keeping buildings out of the floodplain will achieve a high level of flood protection, and reduce impacts.

Proposed Standard 14: Prohibit encroachments that would cause more than 0.1 foot of rise without compensation.

Current Criteria: In Zones AE with a floodway/flood fringe mapped, the NFIP allows encroachments in the flood fringe which result in up to one foot of flood increase in the base flood event. In floodplains where no floodway/flood fringe has been mapped no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

Proposed Standard: In non-tidal areas with delineated floodplains, encroachment in all floodplains that would increase flood heights by 0.1 foot or more is prohibited. Compensatory storage may be used to mitigate the effects of floodplain development actions to meet the requirement that flood height increase does not exceed 0.1 foot at any location.



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	✓	✓	✓	✓		✓	✓

Supporting Rationale: Current criteria allow encroachments to increase flood heights by up to one foot resulting in potentially severe impacts to neighboring properties. In most non-tidal floodplains (and in some cases tidal floodplains), obstructions to water flow or encroachments which reduce the flood storage capacity of a channel or floodplain, will result in higher flood heights. In many streams with detailed flood studies, FEMA has determined how much potential flood increase will occur due to encroachments, and it can exceed one foot in the base flood event. Many community floodplain regulations allow development to occur which will be impacted by these increases in flood heights. In addition, allowing floodplain encroachments violates the common law of avoiding actions which will negatively impact your neighbors and community. The illustration above shows the impact “surcharge” of encroachment. Allowing a small (0.1 foot) impact of encroachment will enable projects to be designed which might not be practical under a “no-rise” standard, but still ensure a minimum impact to neighboring properties, or public infrastructure.

Proposed Standard 15: Incorporate FEMA technical bulletins in local floodplain regulations.

Current Criteria: The NFIP does not require participating communities to explicitly adopt the technical bulletins in ordinance or codes. The NFIP does require compliance with these technical bulletins in NFIP communities.

Proposed Standard: For all new development and new structures or substantially improved structures (as defined by local governments), activities in the floodplain shall be performed in a manner which is consistent with the following FEMA Technical Bulletins:

- TB 11-01 Crawlspaces Construction
- TB 10-01 Ensuring That Structures Built on Fill In or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding
- TB 5-2008 Free-of-Obstruction Requirements
- TB 9-2008 Design and Construction Guidance for Breakaway Walls
- TB 1-2008 Openings in Foundation Walls and Walls of Enclosures
- TB 2-93 Flood-Resistant Materials Requirements
- TB 3-93 Non-Residential Flood proofing Requirements and Certification
- TB 4-93 Elevator Installation for Buildings Located in Special Flood Hazard Areas
- TB 6-93 Below-Grade Parking Requirements for Buildings Located in Special Flood Hazard Areas
- TB 7-93 Wet Flood proofing Requirements for Structures Located in Special Flood Hazard Areas
- TB 8-93 Corrosion Protection for Metal Connectors in Coastal Areas

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✓	✓	✓	✓	✓		✓	✓

Supporting Rationale: Per FEMA: “The Federal Emergency Management Agency Technical Bulletins provide guidance concerning building performance standards of the NFIP, contained in Title 44 of the U.S. Code of Federal Regulations at Section 60.3. The bulletins are intended for use primarily by state and local officials responsible for interpreting and enforcing NFIP regulations and by members of the development community, such as design professionals and builders. New bulletins, as well as updates of existing bulletins, are issued periodically, as necessary. The bulletins do not create regulation; rather, they provide specific guidance for complying with the minimum requirements of existing NFIP regulations.”

Additional Floodplain Recommendations

Recommendation #1: DNREC shall make it a priority to modernize floodplain maps.

Recommendation #2: Lending banks are currently required to review maps in FEMA's map service center and disclose flood risks at closing but this often does not occur. DNREC should meet with the Board of Realtors within six months to develop improved wording on seller disclosure forms, should investigate lending regulations to determine whether flood zone determinations are required in advance of settlement, and if so how far in advance.

Recommendation #3: A Certified Floodplain Manager should be on staff, under contract, or available for assistance at each agency to review floodplain activities. DNREC can provide assistance by providing training to assist staff in becoming Certified Floodplain Managers, and proctor the exam periodically.

Recommendation #4: Memoranda of Agreement (MOA) should be encouraged between counties or other larger governments and smaller cities or towns for enforcement of floodplain regulations where local capabilities are insufficient.

Recommendation #5: A separate plan review or building permit process specific to floodplain regulation will be required for all development or construction activities in floodplains. Site plan notes and building permit application documents will include floodplain information including but not limited to floodplain map used, flood zone, base flood elevation, lowest floor elevations, utility and machinery elevations.

Recommendation #6: Communities should adopt floodplain maps by utilizing "effective map as last revised" terminology so that new or updated maps from FEMA are automatically adopted as they are issued by FEMA.

Recommendation #7: Communities should review their codes for wording which undermines NFIP requirements or makes them difficult to understand. For example, phrases such as "no land below the level of the 100-year flood may be developed unless it complies with all applicable floodplain regulation" could remove high sand dune areas in a V-Zone from floodplain regulations which would be unwise, and would not be allowed under the minimum NFIP requirements.

Drainage Standards

Proposed Standard #1: Easements

Current Criteria: There is no current statewide standard. In many jurisdictions there are no or minimal easement requirements.

Proposed Standard: Easements of an adequate width as determined by local governments shall be required over drainage conveyance systems within any proposed subdivision. Easements shall clearly designate responsible parties. The maintenance responsibilities shall be included as part of the easement language.

Lot Scenarios				
Previously Recorded Lots	Minor Subdivision	Major Subdivision	Single Parcel Commercial	Multiple Parcel Commercial
	✓	✓		✓

Supporting Rationale: All drainage conveyance systems including open ditches and storm drains will need maintenance. Requiring easements over conveyance systems will allow future maintenance to be completed much more cost effectively. Additionally, declaring who is responsible for maintenance up front prevents surprises in the future.



There is a failing storm drain between two homes that are about 15' feet apart making repairs and or replacement expensive and difficult.

Proposed Standard #2: Obstructions

Current Criteria: There is no current statewide standard. In many jurisdictions there are no restrictions on the blocking of drainage conveyances.

Proposed Standard: The willful or negligent obstruction of any drainage conveyance shall be prohibited.

Lot Scenarios				
Previously Recorded Lots	Minor Subdivision	Major Subdivision	Single Parcel Commercial	Multiple Parcel Commercial
✓	✓	✓	✓	✓

Supporting Rationale: When one party willfully or negligently blocks a drainage conveyance system causing water to pond onto upstream lands, in many parts of the state, there is no recourse for the adversely impacted party other than civil litigation. This is costly and lengthy process that many people cannot afford to undertake. This language is similar the Tax Ditch Law (7 Del. C. §4186) which has been an effective state law since 1951.



Proposed Standard #3: Conveyance Systems

Current Criteria: There is no current statewide standard. It was mentioned at the February meeting that many jurisdictions already use this standard or something similar.

Proposed Standard: Drainage Conveyance systems within proposed subdivisions shall meet the minimum 10-year storm event.

Lot Scenarios				
Previously Recorded Lots	Minor Subdivision	Major Subdivision	Single Parcel Commercial	Multiple Parcel Commercial
	✓	✓		✓

Supporting Rationale: This will ensure that all new drainage conveyance systems will meet a consistent standard and provide at least protection in the 10 year storm.

Proposed Standard #4: Lot Grading

Current Criteria: There is no current statewide standard. Most jurisdictions do not have any lot grading requirements.

Proposed Standard: Lot grading shall be accomplished to ensure adequate drainage away from buildings and accessory structures without creating an adverse impact to adjacent structures or lands.

Lot Scenarios				
Previously Recorded Lots	Minor Subdivision	Major Subdivision	Single Parcel Commercial	Multiple Parcel Commercial
✓	✓	✓	✓	✓

Supporting Rationale: This standard will provide a level of detail that will assure permitting officials and adjacent property owners alike that the proposed building will be constructed in a manner that will minimize drainage problems that are a result of poor grading. It will also prevent landowner B from building up their property and draining water onto landowner A whose house is already built and the property graded.



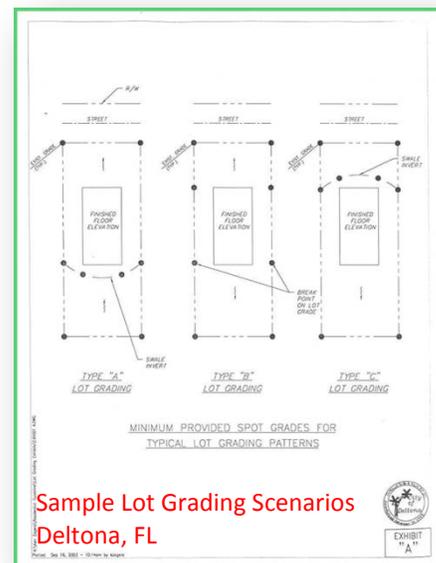
Proposed Standard #5: Topographic Plan

Current Criteria: There is no current statewide standard. Most jurisdictions do not have any topographic plan requirements.

Proposed Standard: A topographic plan submittal shall be required for all construction activity greater than 5,000 square feet. This submittal shall be required for all building permits exceeding the threshold. Information shall include finished floor elevation and grading to a point of positive conveyance. Finished floor elevations shall be higher than the road elevation unless adequate drainage away from structures, protection of mechanical systems, and no adverse impacts to adjacent structures can be demonstrated.

Lot Scenarios				
Previously Recorded Lots	Minor Subdivision	Major Subdivision	Single Parcel Commercial	Multiple Parcel Commercial
✓	✓	✓	✓	✓

Supporting Rationale: This standard simply means that grading should be done in manner that drains water away for the structure without negatively impacting that structure or other structures or lands. This will be a first step in preventing future problems with better planning and construction techniques.



Proposed Standard #6: As-Builts

Current Criteria: There is no current statewide standard. Most jurisdictions do not have any as-built requirements.

Proposed Standard: An as-built submittal shall be required for any construction with an approved topographic plan. Information to be shown shall include floor elevation, road elevation, and a sufficient number of ground elevations to clearly demonstrate adequate drainage away from structures, protection of mechanical systems, and no adverse impacts to adjacent structures or lands.

Lot Scenarios				
Previously Recorded Lots	Minor Subdivision	Major Subdivision	Single Parcel Commercial	Multiple Parcel Commercial
✓	✓	✓	✓	✓

Supporting Rationale: This standard will require as-builts to make sure that homes are graded in accordance with the approved topographic plan. This will provide assurance that the property is graded in a way that prevents damage to the property being constructed as well as adjacent structures or lands. A timely as-built will allow problems to be corrected while the contractor is still onsite.



Additional Drainage Recommendations

Recommendation #1: The review of existing drainage patterns should be included not only in the subdivision planning process but in the building permit process as well.

Recommendation #2: Permanent easements conveyed to a public entity should be considered whenever public dollars are spent to correct a drainage deficiency.

Recommendation #3: DNREC should oversee the preparation of a guideline similar to the Residential Lot Grading Guidelines from Deltona, Florida. County or municipal governments could then incorporate the guidelines into their codes and ordinances.