

# FLOODPLAIN AND DRAINAGE ADVISORY COMMITTEE

November 30, 2011 Meeting



[www.dnrec.delaware.gov/swc/Pages/FloodplainandDrainageCodeWorkGroupCommittee.aspx](http://www.dnrec.delaware.gov/swc/Pages/FloodplainandDrainageCodeWorkGroupCommittee.aspx)

## This Morning's Meeting

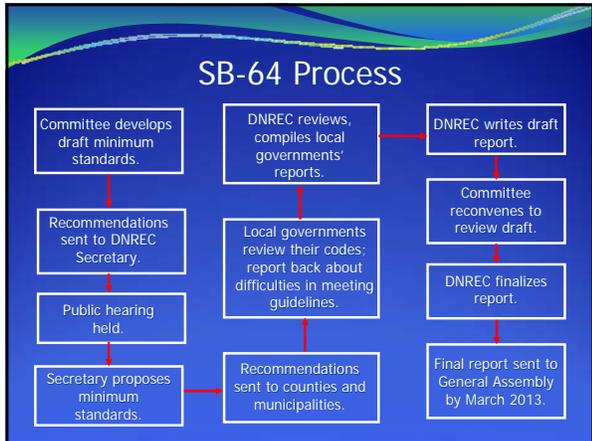
- Introductions
- Recap of previous meetings
- Stormwater / Drainage Terms and Concepts
- Top Drainage Issues in Delaware
- Continuation of Floodplain Issues
- Path Forward

## RECAP OF PREVIOUS MEETING (Check website for details)

[www.dnrec.delaware.gov/swc/Pages/FloodplainandDrainageCodeWorkGroupCommittee.aspx](http://www.dnrec.delaware.gov/swc/Pages/FloodplainandDrainageCodeWorkGroupCommittee.aspx)

## October 27, 2011 Meeting

- Recap of previous meeting
- Discussion of floodplain terms and concepts
- Top floodplain management issues in Delaware
  - Development in areas without sufficient mapping and data
  - Inadequate building standards
  - Inconsistent and / or minimum code provisions
- Committee discussion

## TERMS AND CONCEPTS

## Floodplain vs. Stormwater vs. Drainage

- Floodplain Management
- Stormwater Management
- Drainage

## Stormwater vs. Drainage

### Stormwater Management

- Management of increased runoff caused by a change in land use.
  - Agricultural Field → Residential Development
- Specific Storms are Analyzed
  - 2 year
  - 10 year
  - 100 year
- Management accomplished through the use of ponds and other BMP's

### Drainage

- Removal of runoff over an acceptable period of time.
- Typically 24-48 hours
- Drainage Improvements are accomplished by improving the conveyance system.
  - Swales
  - Ditches
  - Storm Drains

## Stormwater / Drainage Definitions

- **Stormwater Quality** – those characteristics of stormwater runoff from a land disturbing activity that relate to the chemical, physical, biological, or radiological integrity of water.
- **Stormwater Quantity** – those characteristics of stormwater runoff that relate to the rate, volume and duration of flow to downstream areas resulting from land disturbing activities.
- **Stormwater Conveyance** – the transport of runoff in open channels or through enclosed pipes.
- **Hydrology** – scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
- **Hydraulics** – physical science and technology of the static and dynamic behavior of fluids.
- **100-year Event** – hydrologic event having a 1 percent chance of happening in any given year.
- **25-year Event** – hydrologic event having a 4 percent chance of happening in any given year.

## Stormwater / Drainage Definitions

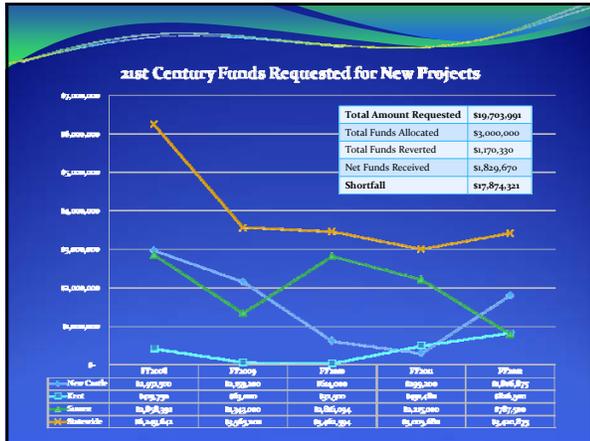
- **Adverse Impact** – a negative impact resulting from a construction or development activity that may include, but is not limited to, increased risk of flooding; degradation of water quality; increased sedimentation; reduced groundwater recharge; negative impacts on aquatic habitat; and threatened public health and safety.
- **Lines and Grades** – prepared plan usually depicting existing and proposed contours, building elevations, stormwater conveyances, property lines and easements, etc., intended to demonstrate no adverse impacts.
- **Easement** – a grant or reservation by the Owner of land for the use of such land by others for a specific purpose or purposes and which must be included in the conveyance of land affected by such easement.
- **Impervious surface** – means a surface which either prevents or retards the entry of water into the soil. Increases in impervious surface generally result in increases in runoff unless proper measures are taken.
- **Drainage Management** – assuring the adequate passage of surface water away from structures and towards major waterways (rivers and bays) over 24 to 48 hours.

## Committee Questions

Any questions about the stormwater / drainage terms and concepts?

## TOP DRAINAGE ISSUES IN DELAWARE





### Top Drainage Issues

- Disruption of Existing Drainage Patterns
- Inadequate Lot Grading
- Adverse Lot Grading
- Need for Proper Conveyance with Easements for Drainage Infrastructure
- Lack of Real Estate Disclosures
  - Combined with Floodplain Issue
- Lack of Enforcement of Existing Standards
  - Combined with Floodplain Issue

## Issue #1

### Disruption of Existing Drainage Patterns

### Case Study # 1

- Received drainage concern from property 1 in 2006.
- Received Drainage Concern from property on left in fall of 2009.
- Property 2 had standing water on rear of property and in garage and shed.

### Case Study # 1

- Image to the left is using LIDAR data to give elevation data. Accuracy is suitable for determining watershed characteristics.
- Yellow (high) -> Blue -> Pink -> White (low)
- Watershed is approximately 46 acres
- "Natural" flow path (dashed line) runs through 2 houses.

### Case Study # 1

- Drainage Program provided technical assistance including survey and design.
- Solution was to construct small ditch on neighbor's property to redirect water to ditch to the west (right).
- Some spoils used to build berm to provide additional protection.
- Landowner got neighbor's permission and hired private contractor.
- Construction cost about \$5,000.

## Case Study # 1

- Aerial photograph after construction shows new ditch, berm and spoils in low area of pasture.
- In 2012 a new landowner bought property 1 (top center)
- New landowner does not want to ditch through pasture and has filled in the ditch.
- Only recourse landowner 2 who paid for project has is to sue for damages the next time they flood.



## Best Practices

- Develop Drainage Codes that prevents the blocking of waterways.
  - Tax Ditch Law is a guideline
- Building Permit Process should include a review of existing drainage patterns.

## Tax Ditch Law Excerpts

§ 4186. Obstruction of or damage to tax ditch; civil and criminal liability.

- If any person willfully or negligently obstructs or damages any part of a tax ditch, and upon request of the ditch managers fails to remove the obstruction or to repair the damage at the person's own expense, the ditch managers shall see that the obstruction is removed and that the damage is repaired.
- The person so obstructing or damaging the tax ditch shall be liable for all loss or injury caused thereby and the expenses or charges for remedying the same, and said loss or injury, expenses or charges may be sued for and recovered by the ditch managers in the name of the tax ditch before any justice of the peace in the county where the obstruction or damage occurred.
- Whoever willfully obstructs or damages any part of a tax ditch, as specified in subsection (a) of this section, or willfully interferes in any way with tax ditch operations as provided for in this chapter or in a ditch order made pursuant to this chapter, shall be fined not more than \$100.
- As of July 17, 2008, if a permanent structure, whether existing or approved for construction, including but not limited to any residential, agricultural, or commercial structure, or any associated permanent accessory structure or septic system, driveway or parking area associated therewith still are found to be within a tax ditch right-of-way, that structure is exempt from the provisions of this chapter as a "legal nonconforming use".

## Committee Questions

Any questions on - Issue #1 Disruption of Existing Drainage Patterns

## Issue #2

### Inadequate Lot Grading

Lot grading done in such a way that runoff does not drain away from the home or other buildings. This can cause access problems during storms as well as damage to mechanical systems including electrical and HVAC.

## Case Study # 2



- Received initial concern in March of 2003, project was added as a 21<sup>st</sup> century fund project in FY 2004
- Also has called us with problems in 2006, 2009,, and 2011. (pictures are from 9/8/11)
- Property has had significant damages in 2006 and 2011. Landowner had to move into mother's home because of damages in 2011.
- Has reached out to Senator Booth, Representative Short, and the governors office since September.



## Case Study # 2

Pictures on previous slide were after 9.4" of rain fell in a 12 hr. period. It is important to note that water overtopped the road in locations indicated by red circles. This situation limits the solutions because we cannot cause or worsen flooding downstream of our projects.

## Case Study # 2

- The culverts under the railroad cause water to backup into the field in larger storm events.
- Runoff spills into sump (arrow) before the railroad is overtopped.
- Once water is in the sump it has no way out
- Ground adjacent to house is approx. 2' below the road.
- In 2011 approx. 7 acres were under water
- During low ground water periods there is some infiltration but water typically has to be pumped out.

## Another Example

Elevation of road is noticeably higher than ground adjacent to building.

## Best Practices

- Minimum Grading standards that insure adequate drainage away from homes and buildings and protection of mechanical systems such as electrical and HVAC.

## Issue #3

### Adverse Lot Grading

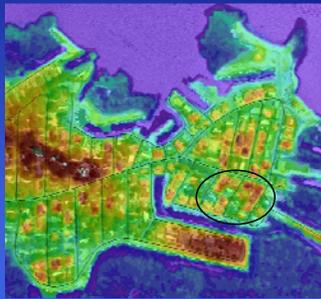
Lot Grading done in such a way that runoff adversely impacts adjacent properties causing damages.

## Case Study # 3

- Land lease community in Long Neck.
- As the lessors changed and new homes were brought in landowner filled lots to meet FEMA finish floor elevations with minimal considerations of the drainage.

### Case Study # 3

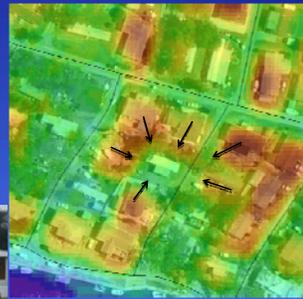
- The LiDAR shows the many lots that were filled.
- Look for the brown spots surrounded by green.



### Case Study # 3

The arrows show how the runoff has been directed to the unfilled lot.

The runoff has no way to get out so it ponds in the unfilled lot.



### Another Example



Ponding in back of lot and under shed.



Neighbor raised elevation of his home to prevent flooding.

### Best Practices

- Minimum Grading standards that insure adequate drainage without adversely impacting adjacent properties.

### Committee Questions

Any questions on - Issue #2 or #3 Inadequate and/or Adverse Lot Grading

### Issue #4

Need for Adequate Conveyance with Easements Sufficient Enough to Allow for Maintenance

### Case Study # 4

### Case Study # 4

- Property 1, under construction, had continuous ponding water throughout fall/winter of 2009/2010.
- Hedge Row creates natural dike preventing overland drainage.
- Solution required conveyance system to outlet ditch to north.
- Revisited plan to install storm drain in DeDOT right of way. Required property 2 to change mind.

### Case Study # 4

DeDOT maintenance forces installed new storm drain. Cost was \$27,000 plus labor.

### Need for Easements

- Conveyance Systems without sufficient easements cause hardships for future landowners when maintenance is needed.
- All Drainage Infrastructure require maintenance and have a useful service life.
- Homes and other buildings built too close to infrastructure are at risk if there is a failure such as a collapsed pipe.
- Landowners unaware of infrastructure often place outbuildings and landscaping. This makes getting agreements difficult and maintenance activities more expensive.

### Best Practices

- Insure there is an adequate conveyance system to handle runoff.
- Require adequate easements over conveyance systems.

### Committee Questions

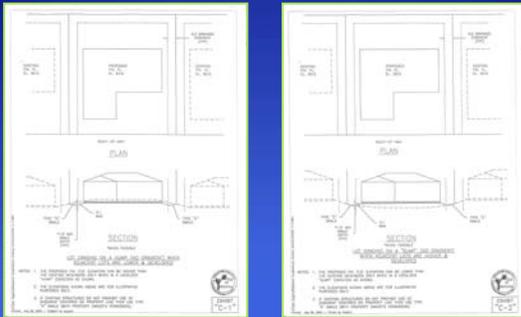
Any questions on - Issue #4 Need for Adequate Conveyance with Easements for Maintenance

# Examples of Drainage and Grading Standards

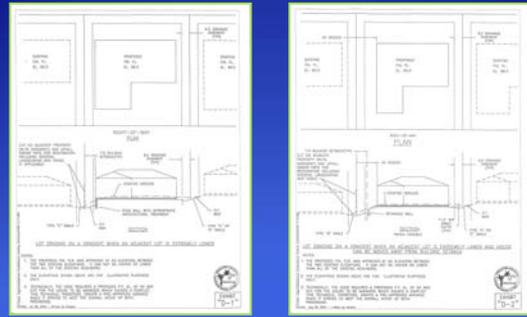
## Deltona, Florida Guidelines Exhibits



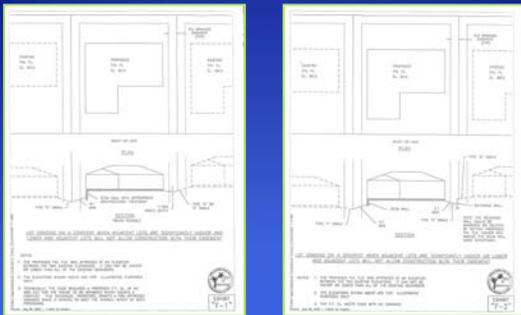
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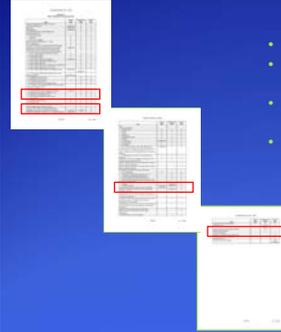


## New Castle County L&G Checklist



- Buildings in excess of 480 sq. ft. must demonstrate adequate conveyance.
- Existing and proposed contours at one (1) foot intervals. Topography shall extend off property to sufficient distance to depict potential impacts to and from adjacent properties.
- Existing and proposed spot elevations at all high and low points and elsewhere as necessary to illustrate drainage patterns and protective slopes for buildings.
- Delineation of fill/cut slopes greater than 3V:1H and assessment of impacts to adjacent properties and protected resources.

## Kent County Plan Requirements



- Maximum and minimum slope.
- Topography contours at one-foot intervals or less.
- Location of all proposed drainage facilities.
- Grading plan.

## Sussex County Code Excerpts

### Section 99-23 Information to be Shown on Plans

- **Topographic contours at one-foot intervals** and referenced to United States Geological Survey data or other commonly accepted data. Where unusual conditions, such as steep slopes, create problems in drafting contour lines, a greater interval may be used if other information is provided to adequately describe the true nature of the topography.
- The **proposed grading plan** when excavation, recontouring or similar work is to occur in conjunction with development of the subdivision
- The location of the **one-hundred-year floodplains** based on current Flood Insurance Rate Maps.

### Section 99-29 Minimum Installation Requirements

- Where subdivision and/or development results in increased quantities of stormwater runoff leaving the area to be developed, **the subdivider shall demonstrate that off-site drainage improvements are adequate to handle the additional water and that all new or expanded swales, pipes or other off-site improvements are located in dedicated easements** which permit efficient access for maintenance purposes. Minimum standards shall be those established by the County Engineer or by the State Division of Highways where it has jurisdiction.

## Municipal and County Code Generalities

### Kent County Surface Water Management Level of Service Study (2010)

**Yard flooding complaints are somewhat common.** This could be the result of the lack of a Lines and Grades Ordinance which could set floor elevations with respect to surrounding grounds. On the other hand, these may be a perception issue as residents may not understand that drainage conveyances are not always in rights-of-way. There is also concern that if the County had a more comprehensive Lines and Grades Ordinance, the County's responsibilities could increase and overwhelm existing resources such as inspectors.

Several of the organizations interviewed for this analysis noted that Kent County as well as **many of the cities and towns in the County do not have a Lines and Grades Ordinance.** Interviewees expressed concern that grading changes can be made on lots without any approval process or tracking mechanism which can cause effects on adjoining properties.

### Sussex County Surface Water Management Level of Service Study (2008)

Several of the organizations interviewed for this analysis noted that **Sussex County as well as many of the cities and towns in the County do not have a Drainage Code or a Lines and Grades Ordinance.** This same issue was discussed in the Stormwater Facility Maintenance Needs Assessment. Interviewees expressed concern that grading changes can be made on lots without any approval process or tracking mechanism which can cause effects on adjoining properties.

## City of New Castle Code Excerpts

### Section 215-4 Lines and Grades Plan Information for All New Construction Projects

- Existing site grades with a minimum one-quarter-foot contour interval for land with an average slope less than or equal to 1%; existing site grades with a minimum one-half-foot contour interval for land with an average slope greater than 1% and less than or equal to 2%; or existing site grades with a minimum one-foot contour interval for land with an average slope greater than 2%. **The existing topography shall extend at least 50 feet beyond the property lines in all directions.**
- All existing site topography, including drainage structures, existing streets, existing driveways, on-site buildings, off-site buildings within 200 feet of the property lines and general drainage patterns. **Enough information must be presented so that the impact of the proposed construction on adjacent properties can be determined.** Field survey or aerial topography shall be utilized to establish the existing topography.
- All proposed site topography, including new roads, all site clearing and proposed structures.
- **Proposed site grades with a minimum one-quarter-foot contour interval for land with an average slope less than or equal to 1%; proposed site grades with a minimum one-half-foot contour interval for land with an average slope greater than 1% and less than or equal to 2%; or proposed site grades with a minimum one-foot contour interval for land with an average slope greater than 2%. Proposed site grades must continue until they tie back into existing grades.**
- **Proposed structures' first floor elevations.**
- **Proposed spot grades** at all building corners, driveway or parking lot corners and all low and high spots created because of the proposed grading.
- **All proposed drainage structures,** including pipes, inlets, manholes, swales and ditches, along with runoff directional flow arrows.

## Millville Code Excerpts

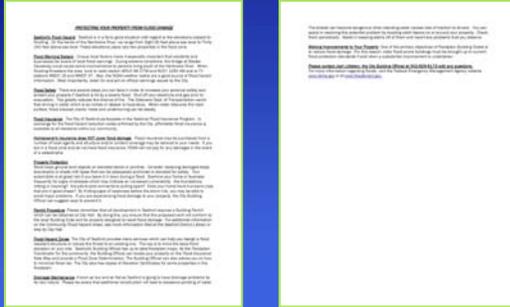
### Section 125-33 Inspection Consultant

- The Town Council shall **hire an inspection consultant** not associated with the subdivider or improvement contractors to oversee and certify that improvements meet the standards set forth in Article 11 of this chapter. **The inspection consultant's fee will be paid by the subdivider** in a manner consistent with the standards established by the Delaware Division of Highways, Sussex County, Delaware. If the Town Council feels the hiring of an inspection consultant is unwarranted because of minimal improvements required of a subdivision, it shall state on the approved final plat plan: "No inspection consultant needed."

### Section 125-36 Preliminary Site Plans

- **Contour lines at vertical intervals of two feet** except for lands with slopes of 4% or greater in which case intervals of five feet will be acceptable.
- Location of significant natural features, including bodies of water, wetlands, or forest areas.
- Areas subject to flooding as a result of a storm of one-hundred-year frequency.
- **Plans for any proposed grading, excavation or recontouring of the site.**
- **Plans for surface drainage of the site.**

## Seaford Guidelines



## TOP FLOODPLAIN ISSUES IN DELAWARE (CONTINUED)

## Issue #4

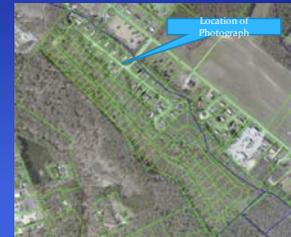
### Real Estate Disclosures

## Lack of Real Estate Disclosures

Yes	No	Unknown
<b>IV. MISCELLANEOUS (Continued)</b>		
28. The cost of repairing and paving the streets adjacent to the property is paid for by (check one)		
<input type="checkbox"/> the property owner(s), estimated fees: \$ _____ <input checked="" type="checkbox"/> Delaware Department of Transportation or the State of Delaware. <input type="checkbox"/> Unknown		
Note to Buyer: Repairing and repaving of the streets can be very costly. (6 Delaware Code § 2578) <input type="checkbox"/> 29. Is off street parking available for this property? If "Yes," number of spaces available: _____		
<b>V. ENVIRONMENTAL HAZARDS</b>		
<input checked="" type="checkbox"/> 30. Are there now or have there been any underground storage tanks (UST) in the property? (e.g., heating fuel, propane, septic) If "Yes" indicate location: <u>BEHIND BEDROOM / FIELD TO WALK HOOKED UP TO SEWER</u>		
<input type="checkbox"/> 31. Is urea-formaldehyde foam insulation present?		
<input type="checkbox"/> 32. Are asbestos-containing materials present?		
<input type="checkbox"/> 33. Are there any lead hazards? (e.g., lead paint, lead pipes, lead in soil)		
<input type="checkbox"/> 34. Has the property been tested for radon gas or any other toxic or hazardous substances? (Attach copy of each test report, if available.)		
<b>VI. LAND (SOILS, DRAINAGE AND BOUNDARIES)</b>		
<input type="checkbox"/> 35. Is there any fill soil or other fill material on the property?		
<input type="checkbox"/> 36. Are there any sliding, settling, earth movements, upheaval, earth stability, or methane gas release problems that have occurred on the property or in the immediate neighborhood?		
<input checked="" type="checkbox"/> 37. Is any part of the property located in a flood zone or considered a wetlands area?		
<input checked="" type="checkbox"/> 38. Are there any drainage or storm protection systems on the property?		
<input checked="" type="checkbox"/> 39. Do you currently carry flood insurance?		
<input type="checkbox"/> 40. Does the property have standing water in front, rear or side yard more than 48 hours after a heavy rain?		
<input type="checkbox"/> 41. Are there encroachments or boundary line disputes affecting the property?		
<input type="checkbox"/> 42. Are there any tax ditches crossing or bordering the property?		
<input type="checkbox"/> 43. Has the property ever been surveyed?		
<input type="checkbox"/> 44. Are the boundaries of the property marked in any way?		

## Lack of Real Estate Disclosures

Make it clear when a property is sold whether or not is part of a community with an approved stormwater system.



Prospective buyers should know whether or not their community has an approved stormwater plan with a designed drainage system.

4,5,6

1. New Floor in Kitchen
2. Flood Repair in SM Bedroom
3. Garage + back room Foundation sealed
4. Drain pipes + gutters installed
5. DEL DOT changed drainage to East side of Marsh Rd.
6. Went through Hurricane of 1999 (9 3/4" rain fall), and came through unscathed.

AFTER REPAIRS THERE HAS NEVER BEEN A PROBLEM WITH PROPERTY OR IN A FLOODPLAIN, OUT OF DRIVE TO WETLANDS

\* House SITS ABOVE HIGH FLOOD, INSURANCE NOT REQUIRED.

Village of Ardentown, Comm. ownership.

## Best Practices

- City of Newark – Floodplain is a zoning district.
  - Can't purchase property without being aware of flood zone status.
  - Can't change floodplain without meeting zoning district notification requirements.
- Buyer education.
  - Flood Zone information available online.
- Require improved wording on seller disclosure form.
- Prohibit non-official floodplain data on site plans.

## Committee Questions

Any questions on - Issue #4 Lack of Real Estate Disclosure?

## Issue #5

### Lack of Enforcement of Existing Standards

## Lack of Enforcement of Standards

- Local capacity and capability are concerns
- Communities in Delaware (with floodplains) which have been put on NFIP probation or suspension or are otherwise non-participating

Slaughter Beach Felton Woodside  
Bridgeville Arden Odessa

- Probation = increased rates
- Suspension = NFIP flood insurance unavailable

## Common enforcement issues

- Floodplain not on building permit.
- Not requiring finished construction elevation certificates.
- Not requiring certification of breakaway walls and pile foundations in V Zones.
- Substantial Improvement determinations not being done.
- Lack of staff becoming Certified Floodplain Managers.

## Non-compliant ground level living space.



Without adequate enforcement, even good standards will not reduce flood impacts.



Substantially improved house with basement floor 4 feet below the 100-year flood elevation.

## Best Practices

- Have a separate floodplain building permits for floodplain activities. (Different review process.)
  - Maryland – In addition to local permits, activities in the 100-year non-tidal floodplain require State Waterway Construction Permits.
- Require pre and post construction elevation certificates.
- Require compliance with FEMA technical bulletins.
- Follow FEMA's or Delaware's Substantial Improvement guidance document.

## Best Practices (continued)

- MOA between small towns and counties.
  - New Jersey – Has statewide floodplain regulations; enforced by communities.
- Require a CFM to be on staff to review floodplain activities.

## Committee Questions

Any questions on Issue #5 - Lack of enforcement?

## PUBLIC COMMENT

## Path Forward

- Dates/Times/Topics for next Committee meetings
  - January – Brainstorm / draft minimum standards
    - Friday 1/27/2012 Felton/Farmington Rm.
  - February – Review / debate minimum standards
    - Tuesday 2/21/2012 Felton/Farmington Rm.
  - March – Finalize proposed minimum standards
    - Wednesday 3/28/2012 Felton Farmington Rm.

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