



Land Development News

Technical Bulletin

**Subject: Use of Existing Flood Hazard Data to
Delineate Floodplain Boundaries on Plans**

Date: October 15, 2012

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Summary: Existing flood hazard data may be used -- and in some instances must be used -- to delineate floodplain boundaries on Site Plans, Public Improvement Plans, Subdivision Plans, Infill Grading Plans, Rough Grading Plans and Resource Protection Area (RPA) Delineation Plans, if the flood elevations are still valid. There has been confusion regarding the reconciliation of flood hazard information available from multiple sources and proper use of that data with new topographic surveys for plans of various types. The department has prepared guidelines (*Guidelines for Delineation of Floodplain Boundaries Using Existing Flood Hazard Data*) to clarify use of this information consistent with Federal, State, and County requirements.

Effective Date: Immediately.

Background: The location of the water surface boundary of the 100-year flood event is required for demonstrating compliance with all applicable Federal, State and County floodplain regulations and must be accurately delineated on submitted plans. Typically, new topographic surveys are performed and utilized in the preparation of plans for proposed developments. Existing flood hazard data may be used -- and in some instances must be used -- to delineate floodplain boundaries on these plans if the flood elevations are still valid, i.e. accurately reflect current conditions. Existing flood hazard data is available from several sources, including floodplain studies performed by the United States Geological Survey (USGS), and the Federal Emergency Management Agency (FEMA) and approved floodplain studies that have been performed by engineers in conjunction with prior land development.

Historically, floodplain studies performed by the USGS and FEMA covered large areas and the accuracy standards were specified based on the target horizontal scale and contour interval of the final published maps. Floodplain boundaries for areas studied in detail were drawn using the computed 100-year flood elevations at field surveyed cross sections and best professional judgment to delineate the boundaries between cross sections on maps at scales of 1 inch = 200 feet or greater.

When the new topographic survey is more accurate than the topographic information that was used for the original floodplain study, slight differences in the horizontal location of the floodplain boundary can be expected. Typically, the extent of the horizontal difference is not discernible at the map scale of the original floodplain study. When these differences are more significant it is necessary to determine the cause (e.g., new road culverts, fill, or changes in stream morphology). If the original hydraulic analysis of the approved study no longer accurately reflects current flood hazard conditions, a new floodplain study is necessary to accurately delineate the floodplain boundary.

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If the approved flood hazard data (i.e., original hydraulic analysis) is still valid, the floodplain boundary may be drawn by plotting the calculated water surface elevations on the more detailed new topographic information. The delineation reconciles the floodplain boundaries with the site specific contours, so the information shown on the plan of development is consistent and compatible. When performing a delineation using existing flood hazard data, the original source information must be used. Floodplain boundaries depicted on maps generated by the County's Geographic Information System (GIS) are not survey products and should only be used as guides to identify areas for further review.

Guidelines: A detailed guidance document, *Guidelines for Delineation of Floodplain Boundaries Using Existing Flood Hazard Data*, is attached.

Please note that the applicability of these guidelines is limited, and will not be appropriate in all situations. Delineation of the floodplain boundary using the original water surface elevations is not acceptable when the approved hydraulic analysis is no longer valid or the new topographic survey is not compatible with requirements for performing floodplain studies, as determined by Department of Public Works and Environmental Services. Also, this process is not suitable for delineation of the floodplain required to be shown on a Record Plats, Conservation Plans, or building permits plats, because there is no topography required on these types of plans.

If you have any questions, please contact the Site Development and Inspection Division, at 703-324-1720, TTY 711.

Approved by: Michelle A. Brickner, P.E., Director
Land Development Services

Guidelines for Delineation of Floodplain Boundaries

Using Existing Flood Hazard Data

October 15, 2012

Introduction:

These guidelines describe how to use existing flood hazard data (e.g., previously approved floodplain studies), together with new topographic surveys, to delineate floodplain boundaries on Site Plans (SP), Public Improvement Plans (PI), Subdivision Plans (SD), Infill Grading Plans, Rough Grading Plans (RGP) and Resource Protection Area (RPA) Delineation Plans, but only if the calculated flood elevations are still valid.

Please note that the following procedure will not be applicable or appropriate in all situations. Delineation of floodplain boundaries using the original water surface elevations is not acceptable when the original hydraulic analysis is no longer valid or the new topographic survey does not meet requirements for performing floodplain studies, as determined by the Department of Public Works and Environmental Services (DPWES). Also, this procedure is not suitable for the delineation of floodplains directly on Record Plats, Conservation Plans, or building permits plats, because topography is not required on these types of plans.

Background:

The location of the 100-year floodplain boundary is essential for demonstrating compliance with Federal, State and County floodplain regulations and must be accurately delineated on submitted plans. Typically, existing flood hazard data is available from several sources, including floodplain studies performed by the United States Geological Survey (USGS), the Federal Emergency Management Agency (FEMA) or floodplain studies approved by the County in conjunction with prior land development. Historically, floodplain studies performed by USGS and FEMA covered large areas, and accuracy standards specified based on the horizontal scale and contour interval of the final published maps.

When the new topographic survey is more accurate than the topographic information that was used for the original floodplain study, slight differences can be expected. If the approved flood hazard data and study are still valid, the location of the floodplain boundary may be drawn by plotting the calculated water surface elevations on the more detailed topographic information. Typically, the extent of the horizontal difference is not discernible at the published map scale of the original floodplain study.

However, if the differences are more significant, it is necessary to determine the cause (e.g., fill, new road culverts, or natural stream morphology). If the original hydraulic analysis no longer reflects current flood hazard conditions, a new floodplain study is necessary to accurately delineate the floodplain boundary.

Procedure:

If a new topographic survey is more accurate than the topographic information that was used for the original floodplain study, and there have not been any physical changes since the approved study, and the flood hazard analysis is still valid, then the location of the floodplain boundary may be redrawn by plotting the calculated water surface elevations on the more detailed topographic information, subject to approval of DPWES.

Step 1. Research and review all available data.

- A) Review the new topographic survey to ensure that it meets the following requirements:
 - 1) Elevations are based on the National Geodetic Vertical Datum of 1929 (NGVD 29). All plans, not just floodplain studies, submitted to the County must use NGVD 29.
 - 2) A horizontal scale of 1 inch = 50 feet, or greater accuracy (e.g. 1 inch = 30 feet is greater) with a contour interval (CI) of two feet or greater (e.g. 1 ft. CI is greater).
 - 3) Description and location of Bench Marks are provided.
- B) Research all existing floodplain information for the stream, including, but not limited to, floodplains designated by FEMA, USGS, or the County. If more than one designated floodplain exists, then all studies must be considered. Obtain copies of all backup data, if available, such as original workmaps and hydraulic models.
 - 1) Contact FEMA for available back-up data, associated with areas designated Special Flood Hazard Areas (SFHAs) and Base (1-percent annual chance event) Flood Elevations (BFEs) on the Digital Flood Insurance Rate Maps (DFIRMs) and flood profiles in the Flood Insurance Study (FIS).
 - 2) USGS and Massey Engineers floodplain studies (adopted as part of Appendix A of The Code of the County of Fairfax, Virginia [County Code]) are at the County Geographic Information System & Mapping Services office. The plans and profiles are available. In addition, the cross sections, study base lines, roughness coefficients, discharge, and flood elevations in tabular format are available for the USGS studies.
 - 3) Other floodplain studies submitted to, and approved by, the County may be available through Site Records.
 - 4) If more than one designated floodplain exists, determine if they are actually based on the same original floodplain study. For example, many FEMA-designated SFHAs are based on the USGS studies (i.e., the flood elevations are the same), but due to various cartographic production methodologies employed over time, some slight variation in the delineations have occurred (e.g., the floodplains are the same general width and shape, but shifted horizontally). If the different floodplains are actually based on different hydraulic models, coordinate with DPWES to ascertain which floodplain study, if any, accurately reflects existing hydraulic conditions.
- C) Review the approved hydraulic analyses and topographic conditions to ensure that the elevations are valid, and reflect current physical conditions. The original analysis may not be valid if: there have been physical changes (e.g., fill has been placed, a bridge or culvert construction, or natural stream morphology), the site development includes a proposed alteration of the floodplain, or the original study contains significant errors in the computations, analysis or methodology, as determined by DPWES.

Step 2. If the original study is still valid and use of the data is appropriate and acceptable, then redraw the floodplain boundary using the approved water surface elevations from the original source information.

- A) Plot the baseline and all cross sections, with correct spatial orientation, used in the hydraulic model of the approved floodplain study, and the associated flood elevations, on the map. At each cross section, plot the location of the water surface boundary, based on the approved flood elevations, relative to the updated topography.
- B) Between the cross sections, delineate the floodplain boundaries using the updated topographic information. If necessary, spot elevations must be included to sufficiently define areas between contours.

Step 3. Review the shape and spatial orientation of the new boundary against the original floodplain study. The graphical comparison of all the floodplain boundaries is indispensable in determining if the original hydraulic information is still valid, or if a new floodplain study is needed, and therefore must be shown as part of the submitted plan.

- A) All deviations must be investigated and reconciled in a manner consistent with County and FEMA requirements. Sufficient justification and documentation must be provided.
- B) A significant difference may indicate physical changes have occurred, such as undocumented fill, and the original hydraulic analysis would no longer be valid.

Step 4. Documentation, narrative and certifications.

- A) Copies of the relevant portions of the original approved floodplain studies showing the floodplain boundary delineation, the locations and orientation of the cross sections, profile baseline and water surface elevations must be included on the plan.
- B) A narrative must be included on the plan that includes, at a minimum, the following:
 - 1) The title of the original floodplain study, who prepared the study, a county plan number (if assigned), the approval date of study, and information regarding the original topographic data (e.g., the date collected, and if it was field surveyed or aerial).
 - 2) The name of licensed surveyor who prepared the new topographic survey, the date the topographic survey was performed, whether the survey is aerial or field run, and bench marks used for the survey.
 - 3) A discussion of any significant differences between the plotted boundary from the original floodplain study and the plotted boundary on the new topography.
- C) The following certifications must be included on the plan:
 - 1) All plans for the property showing the redrawn floodplain boundary must be signed and sealed by the professional who prepared the plan and floodplain delineation. The submitting engineer must certify that they have reviewed the original approved floodplain study and the existing physical conditions of the stream and floodplain, and that, to the best of their knowledge and belief, there have been no physical changes that would affect the computed water surface elevations.
 - 2) Any work performed by other firms, or individuals not under the responsible charge of the licensed professional sealing the plan, shall be identified and sealed as appropriate, e.g. the detailed topographic data must be signed and sealed by the professional(s) who performed the survey.

Step 5. Submission, review and processing of plans.

The process for the submission, review and approval of the floodplain boundaries redrawn using this method, as well as the subsequent plans of development, will depend on the circumstances, and may be modified by DPWES on a case-by-case basis, as needed.

- A) If the redrawn floodplain is not significantly different, i.e. the map change is not discernible, the redrawn floodplain may be shown on, and reviewed as part of, the initial submitted plan for a site showing the more detailed topographic information.
- 1) For the purposes of these guidelines;
 - (a) A “discernible” map change is a horizontal difference between the delineations that is more than one-tenth of an inch (1/10”) at the original published map scale of the approved floodplain study.
 - (b) The “initial submitted plan” is the first plan for a site showing the more detailed topographic information and the redrawn floodplain boundary that is reviewed by the County. Typically, the initial submitted plan is the RPA Delineation Plan or an Infill Grading Plan. However, if there is no RPA with a major floodplain buffer component, the redrawn floodplain boundaries could be reviewed as part of a SP, Minor Site Plan (MSP), PI, Preliminary Plan, SD, or RGP.
 - 2) After the initial submitted plan has been reviewed and approved, all subsequent plans for the development must show the same redrawn floodplain boundary and include the initial submitted plan by name, county number, and approval date. Re-redrawing the floodplain boundary on subsequent plans for the same site will not be accepted.
 - 3) Redrawn floodplain boundaries will not be reviewed as part of Conservation Plans, Record Plats, or plats required for the issuance of building permits, because there is no field-run, surveyed certified topography on these types of plans.
 - 4) Redrawn floodplain boundaries will not be approved as part of Conceptual Development Plans, Final Development Plans, Generalized Development Plans, Special Exception Plats, Special Permit Plats or Variance Plats, because only the approximate delineation of the floodplain is required to be shown.
 - 5) The redrawn floodplain boundary is only applicable to the area within the limits of the initial submitted plan, since the floodplain boundaries cannot be extrapolated beyond the limits of the detailed topographic data.
- B) If the redrawn floodplain is significantly different, i.e. the change is discernible at the scale of the original floodplain study, the processing of plans vary depending on the approval authority of the original floodplain study.
- 1) If the floodplain is designated by FEMA, as shown on the Digital Flood Insurance Rate Map (DFIRM), a Letter of Map Change (LOMC) must be processed through FEMA to revise the floodplain;
 - (a) If FEMA has designated the SFHA as Zone AE (i.e., a detailed study with published BFEs), the County must regulate construction within the FEMA designated floodplain in accordance with the FEMA map and FIS profile. The published BFEs and SFHA delineation apply, and cannot be changed without FEMA approval.
 - (i) A LOMC must be issued by FEMA prior to any construction plan approval. A Letter of Map Revision (LOMR) is preferred, but a Letter of Map Amendment (LOMA) may be appropriate for an individual lot or structure.

- (ii) If the revised delineation is the basis for compliance with County floodplain related requirements (e.g., setback), the LOMC must be issued by FEMA prior to County approval of subsequent plans, e.g. Preliminary Plans.
- (b) If FEMA designated the SFHA as Zone A (i.e., an approximate study without published BFEs), then the County may review and utilize the best available flood elevation data for floodplain management purposes. Plans may proceed, prior to FEMA approval of a LOMC, subject to the following:
 - (i) The flood elevation data (i.e., Floodplain Study) must reflect expected flood conditions, be scientifically and technically correct, represent the best data available, and be approved by the County.
 - (ii) Prior to submission of the LOMC application to FEMA:
 - (1) RPA Delineation Plans and Preliminary Plans may be “approved as-noted,” subject to subsequent LOMC submission and FEMA approval.
 - (2) First submission of construction plans (i.e., SDs, SPs, PIs), may be submitted and reviewed, but will not be approved.
 - (iii) Once the LOMC request is received by FEMA, as evidenced by written acknowledgement from FEMA (e.g. FEMA 316-ACK letter, or equivalent) that the submitted application is complete:
 - (1) Second submission of construction plans (i.e., SDs, SPs, PIs), may be submitted and reviewed.
 - (2) Infill Grading Plans, RGPs, and MSPs may be submitted, reviewed and approved as-noted.
- 2) County contracted floodplain studies (i.e., Massey Engineers and USGS) were adopted by the Board of Supervisors (Board) as part of Appendix A of the County Code. Irrespective of whether the study was adopted by FEMA, the flood elevations and/or flooding limits shown on these maps and studies may be approved by DPWES only if physical changes have occurred which have rendered these maps inaccurate, or if physical changes are proposed within the existing floodplain (e.g., new road crossing). Changes to the floodplain boundaries or elevations not caused by physical changes (e.g., new detailed topography) may only be approved by the Board as an amendment to Appendix A.
- 3) If the original floodplain study was previously approved for an individual parcel, typically the scale of the original study is greater, and the original map scale is not a determining factor. For such studies not adopted by FEMA, DPWES will consider other criteria in determining whether a new floodplain study is required.

If there are existing or proposed physical changes, or the flood hazard analysis is no longer valid, a new floodplain study will be necessary, as described below.

**Guidelines for When There are Physical Changes,
or the Existing Flood Hazard Data is No Longer Valid**

If there have been man-made or natural physical changes (e.g. road culverts, fill, natural stream erosion, etc.), or proposed changes, such that the original hydraulic analysis of the approved study no longer accurately reflects current flood hazard conditions, or the existing flood hazard data is no longer valid, as determined by DPWES, then the existing flood elevations may not be used to delineate floodplain boundaries. In such cases, a new floodplain study is required.

The processing of the new floodplain study, and subsequent plans, will depend on the nature of the physical changes, as well as the approval authority of the original floodplain study.

- D) For FEMA designated SFHAs, as shown on the DFIRM:
- a) If the floodplain change is to incorporate previous physical changes that were not the result of any action of the owner, e.g. prior road or culvert project, the County will work together with the owner to correct the FEMA DFIRM. If the owner prepares the necessary application forms and hydraulic analysis;
 - 1) the County may act as the revision requestor with respect to the FEMA submissions,
 - 2) the County may subsidize the FEMA submission fees,
 - 3) the County may (depending on the location, size and scope of the development project, e.g. the proposed development will qualify as a permitted use in the floodplain) approve subsequent plans upon receipt of written acknowledgement from FEMA that the application is complete (i.e. FEMA 316-ACK letter, or equivalent).
 - b) If the floodplain change is due to any reason that is caused by, or at the direction of the current or prior owner(s), including, but not limited to, prior or unapproved construction or disturbance of the subject property (e.g. fill or grading), or off-site changes (e.g. frontage improvements), as determined by DPWES, then:
 - 1) The owner is responsible for all submissions to FEMA, as well as all associated fees.
 - 2) Except for the floodplain study and the Community Acknowledgement Form necessary for the FEMA submissions, the FEMA map change must be submitted, approved and effective prior to any other County approval.
 - c) If the floodplain change is based on proposed conditions related to the development, e.g. on-site fill, or off-site changes to satisfy an obligation or requirement of the development of the parcel (e.g. frontage improvements), then approval of a Conditional Letter of Map Revision (CLOMR) from FEMA will be required.
 - 1) The owner will be responsible for all submissions to FEMA, and any associated fees.
 - 2) Floodplain Studies, RPA Delineation Plans and Preliminary Plans for the proposed project may be conditionally approved upon receipt of writing acknowledgement from FEMA that the application is complete (i.e. FEMA 316-ACK letter, or equivalent). Any plans approved prior to approval of the CLOMR will be “as-noted”, i.e., conditioned upon FEMA approval of the proposed map change.
 - 3) Construction plans may be submitted and reviewed, however;
 - (i) Prior to plan approval, FEMA approval of the CLOMR will be required.

- (ii) As a post-approval condition, a LOMR based on the as-built conditions must be approved by FEMA within six months of the construction within the floodplain, or prior to bond release, whichever comes first.
- II) County contracted floodplain studies (i.e. Massey Engineers and USGS) adopted by the Board as part of Appendix A of the County Code. Irrespective of whether the study was adopted by FEMA, the flood elevations and/or flooding limits shown on these maps and studies may be approved by DPWES only if physical changes have occurred which have rendered these maps inaccurate, or if physical changes are proposed within the existing floodplain (e.g. new road crossing). The owner must have a new floodplain study prepared and submitted in accordance with the Public Facilities Manual (PFM) for review by DPWES. Changes to the floodplain boundaries or elevations not caused by physical changes, e.g. new detailed topography, may only be approved by the Board as an amendment to Appendix A.
- III) Site specific studies must be revised, or a new floodplain study for the entire reach must be submitted, as determined by DPWES.

Limitations/reminders:

Any use in the floodplain is also subject to a written determination by DPWES whether such use or development may be permitted in accordance with the provisions of Section 2-903 of the Zoning Ordinance and the standards and criteria set forth in the PFM, or requires the approval of a Special Exception by the Board.

Please understand that it is not possible for these guidelines to address every possible scenario. When unique circumstances are encountered, adjustments and variations to these procedures, as determined by DPWES, may be warranted based on the specifics of the various situations.

Check the Datum! All plans submitted to Fairfax County must use NGVD 29 (not NAVD 88). FEMA published the BFEs shown on the Fairfax County DFIRM and flood profiles in the FIS referenced to NGVD 29.

The dashed line, labeled "F.P.L." on the parcel identification, tax, or other county maps, or the digital GIS data, is for information only, and must never be used as the actual floodplain boundary delineation. The County maps and GIS data are not survey products, and should only be used as guides to identify areas for further review and research. Also, some "F.P.L." lines approximate recorded Floodplain and Storm Drainage Easements, which may be significantly wider than the actual floodplain limits.