


Looking Towards the Future

Mapping Georgia's Future Conditions Floodplains



A property inundated and residential home isolated after storm event



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With 90 percent of Georgia's counties experiencing categorically "severe to extreme" drought, flooding is likely far from the minds of our citizens. But for Georgia's regional and state agencies, our State's water resources are certainly at the top of the list. Historically, local regulatory agencies have approached flood mitigation with a reactive, rather than proactive stance. But through ongoing cooperative efforts of the Metropolitan North Georgia Water Planning District (District) and the Environmental Protection Division (EPD) of the

Georgia Department of Natural Resources, all that is changing dramatically.

The Federal Emergency Management Agency (FEMA) defines floodplain management as "the operation of a community program of corrective and preventative measures for reducing flood damage". These "preventative measures" are the focus of this article, specifically as they relate to our local governments' efforts to manage and regulate their floodplains to a higher, more conservative standard. Over 20,100 Georgia communities have chosen to participate in FEMA's National Flood Insurance Program (NFIP), which requires communities to adopt and enforce a floodplain management ordinance. As a participating commu-

nity in the NFIP, federally subsidized flood insurance is made available to citizens. These ordinances must meet FEMA's minimum requirements for flood loss reduction and establishes building standards for development. However, many communities have chosen to adopt requirements that go above and beyond the minimum requirements. These stricter standards often include requiring residential buildings constructed with their first floor being located at or more than the one foot above the Base Flood Elevation (BFE), the minimum required by FEMA.

The Ordinance

The Metropolitan North Georgia Water Planning District (District) includes 16 metro Atlanta counties and 95 cities, covering 5,250 square miles, in which almost half of the state's population resides. The District has approved three comprehensive water resource plans: the District-wide Watershed Management Plan, the Water Supply and Water Conservation Management Plan, and the Long-term Wastewater Management Plan. Six model stormwater management ordinances were established within the Watershed Management Plan. These stormwater management ordinances include a "Model Floodplain Management/ Flood Damage Prevention Ordinance" (Ordinance), adopted in February 2006, which requires the establishment of "future conditions" floodplains.

According to the District's Watershed Management Plan,

the three conditions of the Ordinance that must be met are:

1. Future-conditions floodplains for streams with a drainage area of one square mile (640 acres) and greater in size are to be delineated by the local jurisdiction. As required in the District-wide Watershed Management Plan, cities and counties are expected to model and map at least 10 percent of their area each year until future-conditions floodplains have been established for the entire community.
2. For streams with a drainage area between 100 acres and 640 acres, the local jurisdiction shall model and map the future-conditions floodplains, or, require the future-conditions floodplains be determined on a per development basis by the applicant.
3. For development projects in watersheds of any size where future conditions floodplains have not yet been established, the applicant will be required to determine the future conditions floodplain boundaries located on their property.

Local government adoption of the District's model ordinance is mandatory under state law, with EPD serving as the enforcement arm. Subsequently, the auditing process began last year. EPD is confirming local District governments are in compliance with all respective District plans prior to issu-

ing permits that will result in an increased water withdrawal, a new or increased discharge, or for a MS4 permit.

Successful administration of the Ordinance involves community officials helping educate citizens and local agencies in understanding the key difference between the FEMA-regulatory 100-year floodplain and the future conditions 100-year floodplain. FEMA regulates, and the Federal Insurance Administration (FIA) bases flood insurance premiums, on the EXISTING conditions floodplain. While the Ordinance requires local agencies to regulate development by a stricter standard than required by FEMA, a policyholder's insurance rate is not affected negatively by the determination of the future floodplain limits. In fact, communities that adopt and administer the Ordinance are eligible for credit points under the NFIP's Community Rating System (CRS), ultimately resulting in reduced insurance premiums for policyholders in the community. The Map Modernization program's ongoing updates of Georgia's regulatory FEMA floodplains provide opportunity for communities to piggyback upon this effort to create their future conditions floodplains. Communities under mandate to comply with the District's plans, as well as the overall need for more accurate mapping, has spurred new floodplain mapping efforts that meet the requirements for both programs, resulting in a win-win situation.

Methods and Options of Determination

Future conditions floodplains are determined by modeling the streams, roadway crossings, and dams within a watershed using future conditions hydrology. A hydrologic model of the watershed is constructed to estimate peak flows from stormwater runoff. This model incorporates future conditions land use to establish the runoff potential for a watershed. A community's comprehensive land use plan is commonly used as the future conditions land use. These plans are readily available, have been approved by the community, and provide a good indication of where new development will occur over the next 10 to 20 years.

Peak flow rates calculated within the hydrologic model are input into a hydraulic model to determine water surface elevations along a stream. Existing hydraulic models, such as ones constructed as part of a FEMA Flood Insurance Study, may be modified to evaluate future conditions. However, the engineer should carefully review these models to ensure they accurately depict the riverine system. Older models may not include culvert or bridge upgrades, new roads, fill from development, or geomorphologic changes within the stream. Often, some level of field survey is required to properly update these models.

When existing models are not available, a new hydraulic model will need to be constructed. There are several options available to create an accurate model that estimates



flood elevations along a stream, including detailed, limited detailed, and approximate studies. With each of these methods, as the field survey effort decreases, the cost and level of accuracy decrease accordingly. However, with the use of GIS and digital terrain data, such as LIDAR, approximate methods are remarkably more accurate than they were when the original FEMA flood maps were created back in the 1970s. In general, more urbanized areas will require detailed modeling while rural areas can employ a "limited detailed" approach that establishes a reasonably accurate floodplain. These "limited detailed" models can be built upon in the future and ultimately converted to detailed models by performing field survey of the streams and structures.

Automated GIS tools utilized throughout the process facilitate the development of the hydrologic and hydraulic models and map the resultant floodplains. These tools greatly

improve the speed and accuracy of today's flood studies and have reduced the cost burden on communities.

Some of the District's communities have opted to require developers to assist in the determination of the future conditions floodplains. Under the District's ordinance, communities are only required to map future conditions floodplains for all streams up to a drainage area of 640 acres (one square mile). For streams that lie within the 100 and 640-acre drainage area, each community has the choice to map this area or require developers to submit a flood study for approval prior to developing along these stream reaches. While the second option is less expensive for the community, it does increase the requisite plan/study review needed by staff or an outside consultant. Additionally, if on-staff expertise is not available to review flood studies, the likelihood is increased that studies may be approved which do not

adequately protect these new developments from future flood hazards.

Furthermore, the Ordinance requires that developers submit a "no-rise" analysis for any development proposed within the future conditions floodplain. This hydraulic analysis must demonstrate that proposed grading will not increase water surface elevations. In addition, developers are required to provide compensatory storage for any fill placed within the future conditions floodplain, such that the overall floodplain storage volume is maintained.

Status of local implementation

As is the nature of large-scale studies, available funding is a key component in a community's ability to complete its mapping. Some counties have opted to complete the future conditions mapping within incorporated city limits as well as unincorporated areas. In other cases, financial resources have been allotted within a city's budget for its mapping well in advance of the surrounding county's schedule. The Cities of Decatur and Alpharetta are two examples of municipalities who have funded their own mapping efforts. For larger communities, funding is not the only key driver. Political boundaries, large undeveloped areas with pending anticipated growth and areas with considerably older floodplain maps are also important factors during the project scoping process.

To date, approximately one half of the sixteen District

counties have completed or plan completion of their future conditions mapping by the end of 2011. Many communities are well ahead of schedule, mapping far more than the "minimum" 10 percent a year required by the Ordinance. Steve Haubner, of the Atlanta Regional Commission, encourages communities to do more than the minimum. Mr. Haubner stated, "It is advantageous for a community, particularly for those experiencing heavy growth, to meet this ordinance as soon as possible. This will allow local government officials to regulate new development with the best available data."

Georgia's Ongoing Commitment and Efforts to Prevent Flood Losses

The State of Georgia has made impressive progress in the area of floodplain management. In addition to the District, EPD, FEMA and local communities' commendable efforts, 2006 also brought us the establishment of the Georgia Association of Floodplain Management (GAFM). Already boasting over 130 members, the association has 116 Certified Floodplain Managers (CFMs) and is rapidly growing in active membership. "High Ground", a publication of EPD's Georgia Floodplain Management Office, states the purpose of the GAFM is to "forward the cause of sound floodplain management throughout the State of Georgia via educational and technical information". Now, more than ever, that is a cause worth supporting. ♦