Chapter 7

FLOODPLAIN MANAGEMENT

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7.1 INTRODUCTION

The City of Raleigh (City) is a participating community in Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP), which is administered through the North Carolina Floodplain Mapping Program (NCFMP). The State created and maintains the Flood Insurance Study (FIS) for all North Carolina communities, rather than the Federal government. The City, NCFMP and FEMA have identified more than 23 square miles of floodplain, otherwise known as floodprone areas or Special Flood Hazard Areas (SFHA), within Raleigh's jurisdictional area. Flooding primarily occurs in three major watersheds: the Neuse River, Crabtree Creek and Walnut Creek. The implementation and enforcement of the City's Floodplain Management Program has far-reaching effects, including the amount that citizens must pay for flood insurance under the NFIP.

The responsibility for reducing flood losses is shared by the local, state and federal government, as well as the private sector. To fulfill this responsibility, landowners and/or professionals planning any development activity within the SFHA shall have the knowledge and skills to plan, design and construct their project in compliance with SFHA. For purposes of floodplain management, "development" means any man-made change to improved and unimproved real estate, including but not limited to, buildings or other structures, mining, dredging, filling, grading, paving or excavating or drilling operations.

7.2 TYPES OF SPECIAL FLOOD HAZARD AREAS

The City currently recognizes three types of floodplains as SFHA: those identified as FEMA-designated, those identified by a drainage basin study and those identified by flood hazard soils. Any development within one of these three areas is subject to the City's SFHA regulations.

7.2.1 FEMA-Designated SFHA

FEMA illustrates SFHAs using the Digital Flood Insurance Rate Maps (DFIRM) database, which shows areas that have the potential to be inundated with flood waters during the 100-year storm event. The FEMA SFHA includes the floodway, the floodway fringe and future conditions flood hazard areas. FEMA mapping includes only areas with a contributing drainage area of at least one square mile (640 acres).

7.2.2 SFHA Based on Drainage Basin Study Maps

The City completes drainage basin studies that will produce maps to supplement the DFIRMs. The City Drainage Basin Study Maps use the same criteria as DFIRMs to illustrate SFHAs with a contributing drainage area of less than one square mile (640 acres) and at least 100 acres. A list of all completed drainage basin studies may be found on the City's website.

7.2.3 SFHA Based on Flood Hazard Soils

Flood hazard soils are soil types illustrated on the published Wake County or Durham County Soil Survey Map. The City considers the soil types in **Table 7.2.3** to be floodprone or flood hazard soils:

TABLE 7.2.3 **FLOOD HAZARD SOILS IDENTIFIED IN THE CITY UDO**	
Soil Name	*Map Symbol*
Altavista fine sand loam, 0-4% slopes	AfA
Augusta fine sandy land	Au
Buncombe soils	Bu
Chewacla soils	Cm
Congaree fine sandy loam	Co
Congaree silt loam	Cp
Mantachie soils	Me
Roanoke fine sandy loam	Ro
Wehee fine sandy loam	Wh
Wehadkee silt loam	Wn
Wehadkee and Bibb soils	Wo

A North Carolina licensed soil scientist shall establish presence, highest elevation and extent to which the flood hazard soils exist on the project site. Alternatively, a North Carolina licensed surveyor may survey and seal the extent of flood hazard soils, either as determined by a soil scientist or as verified from the published Wake County or Durham County Soil Survey Map. A Flood Study may be used in lieu of a soil scientist at the discretion of the Stormwater Development Review staff. More guidance on flood hazard soils may be found in UDO Section 9.3.2.

7.3 FLOODPLAIN DEVELOPMENT REQUIREMENTS

To reduce vulnerability during future flood events, the SFHA regulations for the City exceed FEMA minimum floodplain management standards. Adoption of these higher standards reduces the risk of loss of life and decreases the amount of damage in future floods. The existence of these higher standards also provides reduced flood insurance premiums for all policyholders in the community.

Any allowable development within an SFHA must comply with applicable regulations and procedures. *Floodplain Development Permits* are required for all allowable development activities conducted on property located within an SFHA and must be approved by Stormwater Development Review staff. Specific guidance on SFHA regulations can be found in UDO Article 9.3.

7.4 PERMIT APPLICATION

An application for a *Floodplain Development Permit* shall be made to City Development Services prior to the start of any allowable development activities proposed within any SFHA, as specified

in UDO Article 9.3. As part of the application for a *Floodplain Development Permit*, the following criteria shall apply:

- A sealed engineering report shall be required for projects within the floodway of any SFHA which add any new obstructions. Exclusions include light duty fences, poles, and other similar projects.
- SFHAs shall be based on the engineering data that most accurately reflects the existing field and hydrologic conditions.
- Construction of any structure that will impede flow shall not be allowed within the floodway.
- During permitting, the SFHA must be delineated if no current delineation exists and the boundary of the delineation shall be staked during construction.
- Development in the SFHA must ensure the lowest floor, including the basement, as well as any mechanical, electrical, heating, ventilation, air conditioning and other service facility must be located above the Regulatory Flood Protection Elevation (RFPE) to attain a permit, as shown in **Table 7.4**. The RFPE must be noted on the permit application and shall use the NAVD-88 datum, as noted in the "conditions/comments" area of the permit.

TABLE 7.4
MINIMUM RFPE ELEVATIONS FOR SFHA

Location of Development	*Elevation Requirement*
Areas with approved flood studies (including FEMA and watershed studies)	Base Flood Elevation (BFE) + two vertical feet)
Areas located within flood hazard soils and areas without established flood elevations adjacent to watercourses that drain one square mile or more	Five vertical feet above the elevation of the outermost boundary elevation of the flood hazard soils
Areas located within flood hazard soils and areas without established flood elevations within watercourses that drain one square mile or less	Two vertical feet above the elevation of the outermost boundary elevation of the flood hazard soils

- In no event shall floodway modifications increase the water surface elevation unless approved by Stormwater Development Review staff and FEMA.
- Floodway realignments may be approved by the City. If a floodway realignment is being requested, the applicant shall submit all necessary data for review, as per the *Flood Study Submittal Checklist*.
- The applicant must submit a Letter of Map Revision (LOMR) to the City and FEMA after construction within the SFHA has been completed to reflect as-built final grading within the SFHA.

- The floodway fringe within each parcel shall not exceed 50% obstruction, as described in UDO Section 9.3.5.C. The proposed obstruction must be permitted by Stormwater Development Review staff.
- New or redeveloped parking lots must be elevated to ensure the elevation of the lowest parking space is no more than six inches below the RFPE. This provision does not apply to single-family lots.
- In areas of habitable buildings, at a minimum, one entry/exit road shall be raised to an elevation that allows access during flood events. This criterion is referred to as dry land access. Dry land access shall be provided for safe vehicular access to habitable structures to allow emergency responders and vehicles access during flood events. Dry land access roads shall be at or above the RFPE. This applies to new or substantially improved buildings within SFHAs. If the property does not have access to a dry public street, the applicant may request a design exception.

7.4.1 Process for Allowable Development in SFHA

Unlike other stormwater development permitting requirements, permits related to SFHA may involve activities that are separate from other development processes and permits. In addition, development projects within the SFHA require multiple certifications and inspections throughout the project life that require a robust process to streamline the timing and communication between the development and the City.

7.4.1.1 Requirements

The general process for permitting and development in SFHA is as follows:

1. The applicant submits all relevant information necessary for a *Floodplain Development Permit* to Development Services under the appropriate review process/type, including submittal checklists, review fee and Flood Study (as applicable) with associated modeling information.
2. The City reviews and comments on the submittal. Note that review of a flood study submittal is 30 days, regardless of the overall benchmark review date for the overall project submittal.
3. The applicant responds to the City's comments and resubmits as necessary until all comments have been resolved. A *Floodplain Development Permit* is then issued.
4. Floodway and/or floodplain limits are demarcated in the field, as required by any issued floodplain permits.
5. A North Carolina licensed land surveyor establishes a pre-construction benchmark in the field by showing the RFPE elevation, after which the initial floodplain inspection is scheduled through the City Permitting and Development Portal.
6. A North Carolina licensed land surveyor provides a mid-construction, Elevation Certificate, after the building framing inspection but prior to the rough-in inspection(s).
7. The City conducts a mid-construction floodplain inspection to ensure that the

structure(s) and proposed mechanical/electrical equipment will be elevated at or above the RFPE.

8. The applicant submits required information, such as elevation certificates and/or floodproofing certificates, upon the completion of the project.
9. The applicant schedules the final floodplain inspection through the City Permitting and Development Portal, once the required information (FEMA Elevation Certificate, Floodproofing Certificate, Lowest Floor Certificate, etc.) is approved by the City.
10. The City closes out the *Floodplain Development Permit*. If the *Floodplain Development Permit* is not closed the Certificate of Occupancy will not be issued.
11. Applicant must submit a LOMR (as applicable) to the City within six months of the Certificate of Occupancy or completion of construction, whichever occurs first.

If a Flood Study is submitted along with any development plans, the applicant shall schedule a pre-submittal meeting with Stormwater Development Review staff prior to submittal of the Flood Study for review.

7.5 FLOOD STUDY REQUIREMENTS

Flood Study requirements may be found on the *Flood Study Submittal Checklist*. A Flood Study is required in several situations, including but not limited to:

- Projects proposed within flood hazard soils
- Projects within the floodway fringe, proposing greater than 50% fill
- Any changes to the floodway or any unstudied areas, in accordance with FEMA requirements

7.5.1 Hydrologic/Hydraulic Analyses

In situations where a sealed engineering report is required, as stated in Section 7.4 above, a hydrologic/hydraulic analysis is required. Hydrologic and/or hydraulic (H&H) studies associated with development activity within the SFHA, such as the addition or modification of structures or location within the SFHA or any other man-made changes occurring therein, generally require an accurate evaluation of the impacts of that development on a system's capacity to convey flood waters (e.g. bridge analysis, no-rise analysis, etc.).. The analysis is used to analyze the impact of the proposed project on the existing water surface elevation (WSEL) in an adjoining watercourse. The analysis shall verify the proposed project will not cause a change in WSEL for the 100-year storm event.

7.5.2 CLOMR/LOMR/LOMA

To make changes to the adopted maps within FEMA floodprone areas, the applicant must complete an application for a Conditional Letter of Map Revision (CLOMR), LOMR or Letter of Map Amendment (LOMA), where appropriate.

A CLOMR may be granted when a proposed project will, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source, thus, resulting in the modification of the existing regulatory floodway, the effective BFEs or the SFHA. The CLOMR does not revise an effective DFIRM; however, it indicates that the project, if built as proposed, will revise the effective DFIRM. Administrative approval is required prior to submitting a CLOMR to FEMA. A public hearing must be held for the City Council to approve the flood map change. This public hearing cannot be scheduled until after obtaining Administrative Approval from Stormwater Review Staff. City Council and FEMA approval can run concurrently, and the project can be approved once all three approvals have been obtained. Each CLOMR must be followed by a LOMR confirming that the project was built as designed.

A LOMR is FEMA's official modification to an effective DFIRM and shall be submitted within six months of the completion of construction or Certification of Occupancy, whichever occurs first.

A LOMA is a letter that reflects an official revision and/or an amendment to an effective DFIRM. If a property owner thinks their property has been mapped in an SFHA in error, they may submit a request to the City and FEMA for a LOMA. Note that a LOMA may not necessarily need a Flood Study and may be based on surveyed data.

7.5.3 No-Rise/No Impact

Any project in a floodway shall be reviewed to determine if the project will increase flood elevations. If there is no impact to the published flood elevations then staff can administratively approve the project with a detailed engineering analysis. This detailed engineering analysis must be conducted and approved by staff before a permit can be issued. The City's permit file must have a record of the results of this analysis, which shall be in the form of a No-Impact Certification. This No-Impact Certification must be supported by technical data and sealed by a North Carolina licensed professional engineer. The supporting technical data shall be based on the standard step-backwater computer model used to develop the 100-year annual floodway shown on the DFIRM or Flood Boundary and Floodway Map (FBFM).

7.5.4 Additional Requirements for the Establishment of Flood Elevations

The RFPE shall be established for each lot for multiple lot developments or at the upstream and downstream property lines for parcels with more than 400 feet of adjacent stream bank. The RFPEs shall be established at preliminary or permitting review, whichever occurs first.

7.6 ELEVATION CERTIFICATE PROCESS

The purpose of the final floodplain inspection is to verify that construction meets elevation and floodproofing requirements. The following certifications, if required, must be received, reviewed and approved prior to the final inspection. All required documentation shall be submitted to the City prior to scheduling final floodplain inspection.

7.6.1 City of Raleigh Lowest Floor Certificate

For structures located within non-FEMA-delineated floodplains, a Lowest Floor Certificate providing elevation and flood vent information shall be completed and submitted prior to the final

inspection. A mid-point construction inspection is required to confirm that the elevation of the structure and associated equipment is at or above the RFPE elevation. The applicant must schedule this inspection with City staff to provide elevation information of structure(s)/equipment in relationship to the RFPE benchmark established prior to construction. If the elevation of the structure/equipment is below the RFPE, the applicant must elevate above the RPFE. Upon completion of elevating the structure/equipment, new elevations must be obtained by a North Carolina licensed land surveyor and submitted to the City to confirm the structure/equipment is at or above the RFPE.

7.6.2 FEMA Elevation Certificate

For structures located within FEMA-designated floodplain areas, a FEMA Elevation Certificate providing elevation and flood vent information shall be completed and submitted prior to the final inspection. The Elevation Certificate (FEMA Form 81-31) is an important administrative tool for the NFIP, as it is used to determine the proper flood insurance premium rate, to document elevation information necessary to ensure compliance with SFHA regulations and to support a request for a Letter of Map Change (LOMC). The certification process is as follows:

1. A mid-point construction inspection is required to confirm that the elevation of the structure and associated equipment is at or above the RFPE elevation. The applicant must schedule this inspection with City staff to provide elevation information of structure(s)/equipment in relationship to the RFPE benchmark established prior to construction. If the elevation of the structure/equipment is below the RFPE, the applicant must elevate above the RPFE. Upon completion of elevating the structure/equipment, new elevations must be obtained by a North Carolina licensed land surveyor and submitted to the City to confirm the structure/equipment is at or above the RFPE.
2. A Final Elevation Certificate (FEMA Form 81-31 or Lowest Floor Certification) is required after construction is complete and prior to Certificate of Compliance/Occupancy issuance. It shall be the duty of the permit holder to submit to the City a certification of final as-built construction of the elevation or floodproofed elevation of the reference level and all attendant utilities. The certification shall be prepared by or under the direct supervision of a North Carolina licensed land surveyor or professional engineer and certified by the same. Failure to submit required certificates shall be cause to withhold the issuance of a Certificate of Compliance/Occupancy.
3. If a manufactured home is placed within Zone AE, A, AO or X (Future) and the elevation of the chassis is above 36 inches in height, an Engineered Foundation Certificate is required.
4. The following structures, if located within Zone AE, A, AO or X (Future), are exempt from the elevation/floodproofing certification requirements specified above:
    a. Recreational vehicles meeting applicable requirements in UDO Section 6.4.5.
    b. Temporary structures meeting applicable requirements in UDO Section 11.4.6.

7.7 FLOODPROOFING CERTIFICATE

New construction or substantial improvement of nonresidential or residential accessory structures located in SFHA areas may incorporate floodproofing measures. Residential buildings may not be floodproofed and must be elevated to or above the RFPE.

A separate Floodproofing Certificate is required for floodproofing. A floodproofed building is a building that has been designed and constructed to be substantially impermeable to floodwaters below the RFPE. The floodproofing allows a new or substantially improved nonresidential building in an A zone (Zone A, AE, A 1-A30, AR, AO or AH) to have a lowest floor below the RFPE, provided the building has been designed, constructed and certified to be floodproofed and to meet established criteria. When floodproofing is used, the certification shall be prepared by or under the direct supervision of a North Carolina licensed professional engineer or architect and certified by same. The Floodplain Administrator shall review the certificate data submitted. Deficiencies identified during the review shall be corrected by the permit holder prior to Certificate of Compliance/Occupancy issuance.

7.8 SUBSTANTIAL IMPROVEMENT OR SUBSTANTIAL DAMAGE

If the cumulative cost of improvements and repairs to a structure is greater than or equal to 50% of the market value of the structure over any five-year period, that structure is considered substantially impacted and must be brought fully into compliance with current City SFHA regulations. Market value will be determined by the tax value of the structure, per the Wake County Real Estate records, if the applicant does not provide a North Carolina licensed real estate appraisal of the structure (building only, no land value). In equation format a substantial improvement or substantial damage property is shown in **Equation 7.8.**

[EQ 7.8]
$$\frac{\mathbf{5}-\textit{year Cumulative Cost of Improvements and Repairs}}{\textit{Pre}-\textit{Improvement or Pre}-\textit{Damage Market Value Condition of Building}} \geq \mathbf{50}\%$$

This requirement related to substantial improvement or substantial damage does not include:

1. Any project for improvement of a structure to correct existing violations of state or local health, sanitary or safety code specifications that have been identified by the local code enforcement official and that are the minimum necessary to assure safe living conditions.
2. Any alterations of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.