Chapter 5
FLOODPLAIN REQUIREMENTS

5.1. Zoning Ordinance

Uses permitted within the floodplain shall be in accordance with Article V of Chapter 17.36 of the Metropolitan Code of Laws (Appendix A) and as summarized in Sections 5.2 and 5.3 of this manual. The regulations and controls set forth shall be applied within the areas designated on the zoning map or on special overlays (established by Ordinance No. 78-843) that are made a part of the Metropolitan Code of Laws and may be viewed upon request at the office of the Metropolitan Clerk. However, nothing contained herein shall prohibit the application of the Article V, Chapter 17.36 regulations to lands that can be demonstrated by competent engineering survey, using the adopted profiles from which the flood protection elevation is derived, to lie within any floodplain. Conversely, any lands that can be demonstrated by competent engineering to lie beyond the floodplain shall not be subject to the Article V, Chapter 17.36 regulations. Any lands within the areas designated as floodplains on the zoning map or special overlays shall be subject to the regulations on controls pertaining to floodplains as set forth in this manual. In addition, the floodplain shall be preserved and/or developed in accordance with Section 17.28.040 of the Metropolitan Code of Laws and as summarized in Section 5.4 of this manual.

5.2. Base Flood and Floodway Data

All applications for proposed projects within a special flood hazard area (SFHA) shall provide base flood elevations and floodway data to establish floodplain limits and lowest floor elevations and cut and fill quantities. The SFHA, along with base flood elevations and floodway data for streams in Metro are presented in the Flood Insurance Study (FIS) and on the Flood Insurance Rate Maps (FIRMs) for Davidson County. The FIS and FIRMs are available through FEMA's Map

Service Center or can be viewed at MWS. All proposed developments near streams included in FEMA flood studies must be designed in accordance with the provisions of these regulations.

If a project is located in or adjacent to an A zone, the applicant shall provide base flood elevation data as documented in a Floodplain Report. In addition, a Floodplain Report shall be required for areas upstream of A zones, when the stream has a tributary area of one square mile or greater. Approximate methods for flood level determination may be used if prior approval is granted by MWS. See Volume 2 for information on approximate methods.

The Floodplain Report shall consist of plan and profile data and water surface elevation calculations. The plan view shall show the floodway, floodplain limits, base line, cross section stations, and stream buffer limits. The profile should show stream invert, cross section stations, and computed water surface elevations. The report should also show the topographic divides on the plan and the ultimate zoning categories used.

Base flood elevation and floodway data submitted by the applicant for areas previously without such data or for areas not studied by FEMA shall be reviewed by MWS and, if acceptable, shall be processed for adoption as part of the official floodplain data. When the base flood elevation and floodway data submitted by the applicant result in a deviation from the data developed by FEMA, such deviation shall become official, following review and approval by both MWS and FEMA, and processed as an appropriate Letter of Map Change (LOMC). Acceptable methods and models are presented in Volume 2 of this manual.

5.3. General Standards

In all special flood hazard areas, the following provisions are required:

1. New construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
2. Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces.
3. New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
4. New construction and substantial improvements shall be constructed by methods and practices that minimize flood damage.
5. Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.
6. New and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

7. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

8. Onsite waste disposal systems shall be located and constructed to avoid impairment to or contamination from them during flooding.

8. Any alteration, repair, reconstruction, or improvements to a structure that is in compliance with the provisions of these regulations shall meet the requirements of "new construction" as contained in these regulations.

9. Any alteration, repair, reconstruction, or improvements to a structure that is not in compliance with the provisions of these regulations shall be undertaken only if said non-conformity is not furthered, extended, or replaced, and is further subject to the requirements for substantial damage or substantial improvement.

10. If a structure is “substantially damaged” or “substantially improved”, it must be brought into compliance with the requirements defined by the Stormwater Management Manual, Chapter 5 – Floodplain Requirements.

5.4. Preserved Floodplain

All development proposed on property that is not developed as defined herein, and encumbered by natural floodplain or floodway as of April 5, 2003, shall leave a minimum of fifty percent of the natural floodplain area, including all of the floodway area, or all of the floodway area plus fifty feet on each side of the waterway, whichever is greater, in its original, natural state. The preserved floodplain shall be adjacent to the floodway.

For purposes of this subsection, a portion of a lot shall be deemed to be developed if a grading or building permit has been issued or, if a portion of the lot has been disturbed by (approved) grading or if a portion of the total horizontal area of the lot is improved with any material that substantially reduces or prevents the infiltration of stormwater including, but not limited to, roofs, streets, sidewalks and parking lots paved with asphalt, concrete, compacted sand, compacted gravel, or clay. Evidence that a portion of the property is developed shall include grading or building permits and/or aerial photographs. Absent grading or building permits, a lot shall not be deemed developed under this section if the use of the property was for agricultural activities.

The undisturbed portion of water quality stream buffers, as defined in Section 6.9 of this manual, can count towards the preserved floodplain requirement.

5.5. Specific Standards

In all special flood hazard areas where base flood elevation data have been provided, the provisions detailed below are required. It is the intent of MWS that all construction, whether within or adjacent to delineated floodplains, shall be subject to the provisions of these regulations. All residential construction shall be elevated such that the lowest floor is no lower than 4 feet above the base flood elevation. The Director of MWS or his designee has the authority to approve improvements to buildings where the lowest floor elevation is at least 1 foot above base flood elevation and the improvement value does not exceed 50 percent of the building's pre-improvement value. To determine a building's pre-improvement value, an applicant can rely on the structure appraisal value available at the Tax Assessor's office or can obtain a separate appraisal. An applicant may request that the Stormwater Management Commission (SWMC) review the decision of the Director. Any request for review shall adhere to the procedural requirements put forth in Appendix C. The applicant shall be required to demonstrate to the SWMC that the required elevation is so conservative as to place an unreasonable burden upon developers or property owners. The SWMC shall not grant requests for review that place Metro in conflict with National Flood Insurance Program (NFIP) requirements. Improvements to buildings valued at more than 50 percent of the building's pre-improvement value are considered substantial improvements and therefore must comply with all floodplain requirements, including elevating the building as required in this Chapter.

5.5.1. Residential Construction

New construction or substantial improvement of any residential structure (or manufactured home) shall have the lowest floor, including basement, elevated no lower than four feet above the base flood elevation. If solid foundation perimeter walls are used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with the standards for enclosures described in Section 5.5.4.

5.5.2. Standards for Manufactured Homes and Recreational Vehicles

Manufactured homes and recreational vehicles shall meet the following provisions:

1. All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new construction, including elevation and anchoring.
2. All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision must be elevated so that:
    a. The lowest floor of the manufactured home is elevated no lower than four feet above the base flood elevation.

b. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than 36 inches in height above grade.

c. The manufactured home must be securely anchored to the adequately anchored foundation system to resist floatation, collapse, and lateral movement.

d. Any replacement of a manufactured home that has incurred "substantial damage" as the result of a flood shall meet the standards for elevation and anchoring listed above.

3. All recreational vehicles placed on sites must either:

a. Be fully licensed and ready for highway use, that is, it must be on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices and has no permanently attached structures; or

b. The recreational vehicle must meet all the requirements for new construction, including elevation and anchoring in items 1 and 2 above.

5.5.3. Non-Residential Construction

New construction or substantial improvement of any commercial, industrial, or non-residential structure (including manufactured structures) shall have the lowest floor, including basement, at least one foot above the level of the base flood elevation. Structures located in A and AE zones may be floodproofed pursuant to Section 5.5.8 in lieu of being elevated, provided that all areas of the structure below the required elevation are watertight, with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered engineer shall certify that these standards are satisfied.

5.5.4. Enclosures

All new construction or substantial improvements that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space. Design shall also allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls. Designs for complying with this requirement must be certified by a registered engineer, and meet the following minimum criteria:

1. A minimum of two openings on at least two exterior walls having a total net area of not less than one square inch shall be provided for every square foot of enclosed area subject to flooding.

2. The bottom of all openings shall be no higher than one foot above grade measured from the higher of the interior or exterior grade.

3. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided they permit the automatic flow of floodwaters in both directions.

4. Engineered openings must be ICC-ES certified. A copy of the ICC-ES evaluation report must be submitted as an attachment to the final Elevation Certificate.

The interior portion of such enclosed areas may only be partitioned to enclose storage and/or parking areas when additional openings are installed within these interior walls to allow the entry and exit of floodwaters. All interior walls, ceilings and floors below the base flood elevation shall be unfinished and constructed of flood resistant materials.

All electrical switches, outlets, equipment, HVAC units, ductwork, plumbing, and other utility connections shall be no less than one foot above the 1-percent annual chance base flood elevation (BFE). Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator).

A Non-Conversion Agreement, as provided in Appendix G, shall be signed by the applicant and recorded with the property deed whenever the Floodplain Administrator determines that the area below the first floor could be converted to a non-conforming use (generally applies to enclosed areas below base flood elevation that are 5 ft. high or more).

5.5.5. Accessory Structures - Garages and limited storage structures

Attached Garages.

1. A garage attached to a residential structure must be constructed with the garage floor slab one foot above the base flood elevation.
2. A garage attached to a non-residential structure must meet the above requirements or be dry floodproofed.

Detached garages and accessory structures.

1. An accessory structure, as defined in Appendix B, may be constructed such that its floor is below the base flood elevation, provided the structure is designed and constructed in accordance with the following requirements:
    a. Use of the accessory structure must be limited solely to parking or limited storage.
    b. The accessory structure must be adequately anchored to resist flotation, collapse and lateral movement.
    c. The portions of the accessory structure located below the base flood elevation must be unfinished.
    d. The accessory structure must be designed to allow for the automatic entry of flood waters in accordance with Section 5.5.4.
    e. Any mechanical and utility equipment in the accessory structure must be elevated or floodproofed to one foot above the base flood elevation.

f. The accessory structure must comply with floodway encroachment provisions in Section 5.5.6.

Detached garages and accessory structures not meeting the above standards must be constructed in accordance with all applicable standards in Section 5.5.3, Non-Residential Construction.

A Non-Conversion Agreement, as provided in Appendix G, shall be signed by the applicant and recorded with the property deed whenever the Floodplain Administrator determines that the garage or accessory structure could be converted to a non-conforming use.

5.5.6. Floodways

Areas designated as floodways are located within the SFHA. The floodway is an extremely hazardous area because of the velocity of floodwaters, which can carry debris and potential projectiles and have erosion potential. Floodways are also used as a base in determining the width of the required stream buffer as described in Section 6.9. Thus, the following provisions shall apply:

1. Encroachments, including fill, excavation, clearing, new construction, and other developments, are prohibited unless certification (with supporting technical data) by a registered engineer is provided demonstrating that encroachments shall not result in any increase in flood levels during occurrence of the base flood discharge and a buffer variance is granted through the SWMC.
2. If Item 1 above is satisfied, all new construction shall comply with all applicable flood hazard reduction provisions of these regulations.
3. The placement of manufactured homes is prohibited except in an existing manufactured home park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring, elevation, and encroachment standards of these regulations are met.

The floodway is a component of Zone 1 of Metro's stream buffer. Zone 1 is considered a "no disturb" area where only necessary disturbances are permitted. Allowable uses for and permissible disturbances to the floodway are outlined in Section 6.9.

5.5.7. Floodplain Alterations

All floodplain alterations that result in the filling or elimination of floodplain storage shall provide compensating storage capacity by dredging out at least an equal amount of volume as occupied by fill. All dredged or cut materials shall be removed from the site before fill materials can be delivered, unless all fill material is generated onsite. Dredging or cut volumes below the elevation of the two-year storm event shall not be included in the compensating storage capacity calculation. Every effort shall be made to preserve natural flow lines and to avoid situations that encourage sediment deposition in slack water areas.

All dredged or cut areas shall be stabilized immediately to prevent erosion. Areas to be filled must be cleared of standing trees, stumps, brush, downed timber, and all objects including structures on

and above the ground surface. Topsoil shall be removed and stockpiled, while all other spoil materials must be disposed of offsite in an approved manner on an approved site. Only acceptable fill material, defined as inert soil, rock, concrete no more than 24 inches in length without rebar, and/or brick rubble, shall be used. Fill material obtained offsite shall not be stockpiled onsite before grading cuts are completed. Fill material shall be placed in compacted layers and the minimum distance from the perimeter of any proposed building to the top of the slope shall be either 25 feet or twice the depth of fill at that point, whichever is greater. The fill material must not have slopes equal to or greater than 3:1 unless stabilization measures approved by the MWS are installed. All slopes shall be stabilized.

No alterations can be made to floodplain land and stormwater management channels without the approval of the Director of MWS or his designee. All applicable requirements of Ordinances No. 78-840 and 78-843 and, in addition, the following specific conditions must be met before such approval will be granted:

1. The construction of a levee, earth fill, building, or other structure that alters a floodplain area shall only be permitted based on a plan prepared by a registered engineer, showing existing and proposed elevations, existing and proposed stormwater management channels, and existing and proposed structures. The plan shall be approved by the Director of MWS or his designee certifying that the alteration and construction as proposed are in compliance with all applicable flood hazard reduction provisions of these regulations.

2. The proposed excavation, filling, or change of alignment of any existing channel under the jurisdiction of the U.S. Army Corps of Engineers shall be approved by same.

5.5.8. Floodproofing

Floodproofing measures such as those identified below are acceptable, provided they are certified by a registered engineer as being consistent with the base flood conditions for the particular area, and that floodproofing criteria for non-residential construction in Section 5.5.3 are met.

1. Anchoring to resist flotation and lateral movement.
2. Installation of watertight doors, bulkheads, and shutters.
3. Reinforcement of walls to resist water pressures.
4. Use of paints, membranes, or mortars to reduce seepage of water through walls.
5. Addition of mass or weight to structures to resist flotation.
6. Installation of pumps to lower water levels in structures.
7. Construction of water supply and waste treatment systems to prevent the entrance of floodwaters.
8. Pumping facilities for subsurface stormwater management systems for buildings to relieve external foundation wall and basement floor pressures.
9. Construction to resist rupture or collapse caused by water pressure or floating debris.

10. Cutoff valves on sewer lines or the elimination of gravity flow basement drains.

5.6. Standards for Streams Without Established Base Flood Elevations and/or Floodways

It is the intent of MWS that all construction whether within or adjacent to delineated floodplains, shall be subject to the provisions of these regulations. As an example, all residential construction shall be elevated such that the lowest floor is no lower than four (4) feet above the base flood elevation. Exceptions to this standard may be granted on appeal to the SWMC based on a demonstration that the regulatory elevation is so conservative as to place an unreasonable burden upon developers or property owners. Appeal procedures are presented in Appendix C.

For proposed developments located near small streams but where no base flood data or floodways have been provided or required under the National Flood Insurance Program or by Section 5.2 of these regulations, the following provisions apply:

1. Placement of fill material or structures within a water quality buffer, as defined by Section 6.9 of this Volume, require certification by a registered engineer that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. Encroachments must also be approved by the SWMC.
2. New construction or substantial improvements of residential structures shall have the lowest floor, including basement, elevated at least four (4) feet above the base flood elevation as determined by an appropriate approximate method. Information on approximate methods is presented in Volume 2.
3. New construction and substantial improvements of non-residential structures shall have the lowest floor, including basement, elevated at least two (2) feet above the highest adjacent grade; or, together with attendant utility and sanitary facilities, be completely flood-proofed to or above that level so that any space below that level is watertight, with walls substantially impermeable to the passage of water, and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy.

5.7. Subdivision Standards

All subdivision projects shall meet the following provisions:

1. Stormwater management systems shall provide adequate drainage to reduce exposure to flood hazards.
2. Design shall be consistent with the need to minimize flood damage.
3. Public utilities and facilities such as sewer, gas, electrical, and water systems shall be located and constructed to minimize flood damage.
4. Stormwater management facilities shall be provided to reduce exposure to flood hazards.
5. Base flood elevation and floodway data shall be provided as required in Section 5.2.

5.8. Nonconforming Uses

The existing lawful use of a structure or premise that is not in conformity with the floodplain requirements of this manual may be continued subject to the following conditions:

1. No such use shall be expanded or enlarged except in conformity with the provisions of this manual.
2. No structural alterations, additions to, or repairs to any nonconforming structure over the life of the structure shall exceed 50 percent of its assessed value at the time of its becoming a nonconforming use unless permanently changed.
3. If such use is discontinued for 12 consecutive months, any future use of the building and premises shall conform to the provisions of this manual.
4. Uses or adjuncts thereof which are nuisances shall not be permitted to continue as nonconforming uses.
5. Any alteration, addition to, or repair to any nonconforming structure permitted shall be protected by floodproofing measures pursuant to Section 5.5.7.

5.9. Dikes and Floodwalls

The design of dikes and floodwalls for flood protection purposes should consider several factors, including alternate compensating storage, possible surcharge in flood heights, overtopping, and failure.

Dikes are generally earth embankments that can extend around sections of a building. Fill material used in their construction should be dredged from the floodplain to aid in providing compensating storage. The fill material shall be placed on cleared ground, compacted in layers, and protected

from seepage. Buildings shall have a minimum setback from the base of the dike of 20 feet or twice the height of the embankment, whichever is greater.

Floodwalls are preferred for locations with limited space and can be constructed as cantilever I-type steel piles, cellular walls, buttress walls, or gravity walls. They shall be well founded with cutoffs installed to prevent seepage. Areas located behind a dike or floodwall should be drained by conduits installed with automatic flap gates to prevent backflow, or by manually operated valves that are closed during flooding, or by a combination of these methods.

This page left blank intentionally.