

# ARTICLE VII

## ENVIRONMENTAL REGULATIONS

### 7-1 WATERSHED DISTRICTS

#### 7-1.1 Establishment of Watershed District

The Watershed Protection District is hereby established as an overlay district. The designated watersheds under this Ordinance are divided into two overlay sub-districts:

- (A) Watershed Area: The Watershed Area, hereafter referred to as “WA”, consisting of the stream/river basin catchment draining into the municipal water supply reservoir; and
- (B) Watershed Critical Area: The Watershed Critical Area, hereafter referred to as “WCA”, consisting of the direct drainage area around the reservoir.

Land use within the Watershed Protection District must comply with all the requirements of both the underlying zoning district and the applicable watershed overlay district.

#### 7-1.2 Incorporation of Watershed Map

This Section incorporates by reference the Guilford County Watershed Map dated July 7, 1986, showing the following designated watersheds in the county and the municipalities: Reidsville, Greensboro, High Point, Randleman, Randleman Dam, and Burlington.

#### 7-1.3 Approval of Plans

The Enforcement Officer is not authorized to approve any plans or issue any permits for any land in a watershed protection district unless a Watershed Control Plan is in compliance with the requirements of this Section. For the purpose of evaluating the design of all development within the designated municipal watersheds, site plans, plot plans, and subdivision plans shall be submitted in compliance with the requirements of this Article.

#### 7-1.4 Applicability

This Section shall apply to Section 7-2 (Watershed Areas) and Section 7-3 (Watershed Critical Areas), and to all watershed areas within the county and the municipal jurisdictional areas, except as provided herein. These requirements shall not apply to a single family residence or residential accessory buildings on a lot of record. Also, developments participating in a public regional lake program may be exempt from runoff control requirements but not other requirements of this Section.

## 7-2 WATERSHED AREAS

### 7-2.1 General Provisions

- (A) Watershed Area: These districts shall protect the entire area which drains into any designated municipal water supply reservoir from any activity which could degrade water quality in the reservoirs.
- (B) Stream Channelization: Channelization of streams in a WA district shall not occur except by the approval of the Planning Board.

### 7-2.2 Watershed Control Plan

- (A) Plan Required: A Watershed Control Plan shall be required for all development in a designated municipal watershed, and shall be submitted to the Enforcement Officer. The Watershed Control Plan shall include all applicable information listed in Appendix 2 (Map Standards) of this Ordinance.
- (B) Plan Approval: The Enforcement Officer may approve a Watershed Control Plan in accordance with the performance standards found in Table 7-2-1.

### 7-2.3 Improvements

- (A) Construction of Improvements: The construction of all improvements designed for watershed protection and shown on an approved watershed control plan shall be completed prior to the issuance of any building permit, plat recordation, or pavement installation.
- (B) Maintenance Required: When runoff control measures are part of a development, and such measures serve more than one lot, an owners association or binding maintenance contract for the purpose of ownership and maintenance shall be required.
- (C) Maintenance of Control Measures: maintenance of runoff control measures shall be performed at such time as the sediment storage volume of the retention/detention measure has been lost to sediment or a part of the installation is not functioning as originally designed. The Jurisdiction shall have the responsibility to inspect and notify the owner of the land on which the runoff control measure is located. All maintenance shall be performed within ninety (90) days of the date the Jurisdiction gives such notice. Failure by the property owner(s) to perform the required maintenance or repair within the stated period shall enable the Jurisdiction to perform, and recover the cost of, such maintenance and repairs from the property owners.

(D) Recording of Permanent improvements: All permanent improvements including approved access/ maintenance easement(s) (specific or general at the owners option) shall be recorded on a final plat, and a mechanism to insure the maintenance of the facilities shall be established concurrent with, or prior to, plat recordation. In the event a plat recordation is not required, any improvement, filtration/infiltration area, or owners association required by this Section shall be submitted for approval to the Enforcement Officer, and duly recorded after said approval.

TABLE 7-2-1  
WATERSHED PERFORMANCE  
STANDARDS

Development Type	Schedule
1) Residential Development with two and one-half (2.5) or fewer dwelling units per gross acre.	<u>Residential Scoresheet</u> (Table 7-2-2). A score of one hundred (100) or more is required for passing;
	or
2) Institutional, Commercial, Recreational, and Industrial development with thirty (30%) percent or less impervious surface coverage;	<u>Engineering Certification</u> by registered professional engineer, with seal (Table 7-4-4) certification of control of the first one-half (1/2) inch of runoff from impervious surface coverage.
	or
Residential development with greater than two and one-half (2.5) dwelling units per gross acre and with thirty (30%) percent or less impervious surface coverage.	<u>Institutional, Commercial, Recreational, Industrial, and High Density Residential Scoresheet</u> (Table 7-2-3). A score of 100 or more is required for passing;
	or
3) All development with more than thirty (30%) percent but less than fifty (50%) percent of impervious surface coverage.	<u>Engineering Certification</u> by registered professional engineer, with seal (Table 7-4-4) certification of control of the first one-half (1/2) inch of runoff from impervious surface coverage.
	or
4) All development with fifty (50%) percent or more impervious surface coverage.	<u>Engineering Certification</u> by registered professional engineer, with seal (Table 7-4-4) certification of control of the first one (1) inch of runoff from impervious surface coverage.

Note: The owner, developer, or person submitting the Watershed Control Plan shall indicate which Performance Standard shall be used for review and approval.

Table 7-2-2  
RESIDENTIAL SCORESHEET

MAXIMUM POINTS	FACTOR	POINT VALUE	POINTS EARNED
20	1. Zone		
		AG OR RS-40	10
		PUD-R (Single-Family Detached & Cluster)	15
		PUD-R (Cluster Exclusively)	20
25	2. Impervious Surface		
		0-3%	25
		3-7%	20
		7-10%	15
		10-15%	10
25	3. Proximity to Floodway as Defined By The Federal Insurance Administration		
		More than 2000 Feet	25
		1000-2000 Feet	20
		500-1000 Feet	15
		100-500 Feet	10
		50-100 Feet	5
10	4. Soil Type As Defined on Pg. 29 and Table 7, Pg. 57 Guilford County Soil Survey		
		Slight	10
		Moderate	5
25	5. Drainage- Protect and Use Natural Drainageways		
		Piped or Improved Drainage With Rip-Rap	5
		Dispersed Drainage Or Protected Drainageways	10
		Dispersed Drainage and Protected Drainageways	20
		Enhanced and Protected Natural Drainageways	25
25	6. Slope- Low Percentage of Slope		
		0-6% Average Slope of Subdivision of Lot	25
		6-10%	20
		10-15%	5
25	7. Land Cover- High Percentage of Natural and Stabilizing Vegetation		
		Natural or stabilizing vegetation alone drainage and on 25% of lot	25
		Natural or stabilizing vegetation alone drainage and on 15-25% of lot.	20
		Natural or stabilizing vegetation alone drainage and on 10-15% of lot.	15
		Natural or stabilizing vegetation between units and water	10
		Ornamental lawn on >5% of the lot	5
		Vegetation on <5% of the lot	0
25	8. Run-off Control Strategies		
		Maximum Runoff Retention	25
		Moderate Runoff Retention	15
		Runoff detention in excess of minimum requirements of Erosion Control Ordinance	10
		Run-off detention equal to minimum requirements	5
10	9. Sewage Disposal		
		Public Sewer System	10
10	10. Road & Driveway Design		
		Impermeable Road Surface With Vegetated Ditches	10
		Impermeable Roads With Piped Drainage and/or Curb and Gutter and Energy Dissipaters	5
Total: 200		Total:	

Notes: 1) All plans must have 100 or more points and meet all other requirements to be accepted.  
2) Do not use this table if gross density exceeds 2.5 dwellings units per acre.

## SUBMISSION REQUIREMENTS

SINGLE FAMILY: Rate prior to approval of a Preliminary Plat. Individual homes on individual lots are not rated.

MULTI-FAMILY: Rated prior to approval of a site plan.

## RATING SYSTEM DEFINITIONS

1. Conditional use rezoning will be given the appropriate bonus points if the use and site plan conditions meet the requirements of the bonus zone, such as clustering development on the best soils and terrain of the site.
2. A gravel parking area is not considered impervious surface.
3. Proximity to floodway is determined by measuring or scaling the distance from the floodway to the closest boundary of the tract.
4. Self explanatory.
5. Protected Drainageway means drainage is channeled by pervious devices such as sod waterways, berms, channels or swales which have been constructed to resist soil erosion by either vegetating, netting, rip-rapping or a combination of those, and which allows infiltration of water into the soil.  
Dispersed Drainage means spread out, as opposed to collecting the runoff in channels, so as to effect increased sheet flow and overland flow.  
Improved Drainage way means channeled by impervious surfaces such as curb and gutter or concrete (gahnite, bituminous, etc.) channels.  
Enhanced Drainage means carried by existing natural drainage ways which have been enhanced to resist soil erosion, including stream bank degradation.
6. All slopes are before development.
7. If all or part of an existing lot containing natural or stabilizing vegetation is dedicated to the public for park and open space purposes; such land will count in computing the score.

Along Drainage means the area parallel to and within fifty (50) feet of the drainage channel.

Stabilizing Vegetation means any vegetation that protects the soil against erosion.

8. Maximum Runoff Retention means approximately one hundred (100%) percent of channelized runoff must pass through permanent retention or wet detention pond(s).  
Moderate Runoff Retention means at least seventy-five (75%) percent of runoff must pass through permanent retention and/or wet detention pond(s).  
Runoff Detention in Excess of Erosion Control Ordinance means at least fifty (50%) percent of runoff must pass through permanent detention pond(s).  
Runoff Detention Equal to Minimum Requirements means velocity control of runoff.  
Detention Pond means a pond which collects storm water runoff, filters the water and releases it slowly over a period of hours or days. It does not have a permanent pool and is sometimes referred to as a dry pond.  
Wet Detention Pond means a pond that has a permanent pool and also collects storm water runoff, filters the water and releases it slowly over a period of days.  
Retention Pond means a pond that has a permanent pool.
9. No points will be allowed for on-site septic tank systems or private sewage treatment systems.
10. Self Explanatory.

TABLE 7-2-3  
 INSTITUTIONAL, RECREATIONAL, COMMERCIAL, INDUSTRIAL, AND HIGH DENSITY RESIDENTIAL  
 SCORESHEET

MAXIMUM POINTS	FACTOR	VALUE	POINTS EARNED
10	1. Impervious Surface		
		<7.5% Impervious	10
		7.5-15%	5
25	2. Proximity to Floodway as defined by the FEMA		
		2000 Feet and Greater	25
		1000-2000 Feet	20
		500-1000 Feet	15
		100-500 Feet	10
		50-100 Feet	5
15	3. Soil- Hydrologic Soil Group (When 50% or more of the site remains undisturbed.)		
		B	15
		C	5
20	4. Drainage Ways		
		Vegetated Waterways (Swales)	10
		Minor Channels With Rip-Rap	10
		Preserve Natural Drainage Ways	10
		Preserve and Protect Natural Drainage Ways	20
25	5. Land Slope (Where 50% or more of site remains undisturbed.)		
		0-6% Average Slope of Subdivision or Lot	25
		6-10%	20
		10-15%	5
25	6. Undisturbed Area		
		Greater than 50% Undisturbed	25
		30-50% Undisturbed	15
		20-30% Undisturbed	10
10	7. Permanent Erosion Control		
		Revegetating Bare Soil Areas	5
		Revegetation and Protecting Concentrated Flow Areas	10
60	8. Permanent Run-off Control Strategies		
		Natural Infiltration of Required Runoff From:	
		100% of Impervious Surfaces	60
		75% of Impervious Surfaces	45
		50% of Impervious Surfaces	30
		Wet Detention Pond Meeting Performance Standards Controlling Pollutants From:	
		100% of Impervious Area	50
		75% of Impervious Area	40
		50% of Impervious Area	25
		Vegetative Filter for Sites with less than 25% Impervious Surface Coverage Meeting Performance Standards	15
		Dry Detention Pond	10
10	9. Sewage Disposal		
		Public Sewer System	10
15	10. Road and Driveway Design		
		Water from roadside swales or curb cuts directed into natural infiltration	15
		Impermeable Road Surface with Vegetated Ditches	10
		Impermeable Roads with Piped Drainage and/or Curbs and Gutter and Energy Dissipators	5
Total: 215		Total	
Notes:	1) All plans must have 100 or more points and meet all other requirements to be accepted;		
	2) Do not use this Table if impervious surface coverage exceeds thirty (30%) percent.		

## SUBMISSION REQUIREMENTS

RESIDENTIAL/ COMMERCIAL/ INDUSTRIAL SUBDIVISIONS: Rated prior to approval of preliminary plat.

RESIDENTIAL/ INTITUTIONAL/ COMMERCIAL/ INDUSTRIAL SITE PLANS: Rated prior to approval of site plan unless lot was prequalified by subdivision.

COMMERCIAL/ INDUSTRIAL PROJECTS WITHOUT SITE PLANS: Rated prior to approval of the building permit.

### DEFINITIONS, EXPLANTIONS AND STANDARDS

1. Impervious surface coverage includes: paved parking lots, driveways, roads and streets; buildings or other structures which cover the soil. A gravel parking area is not considered as impervious surface coverage. It is computed by the equation: Acres impervious surface divided by total acres in the tract times one-hundred (100%) percent.
2. Proximity floodway is determined by measuring or scaling the distance from the floodway to the closest boundary of the tract.
3. Hydrologic Soil Groups as defined on pg. 35 of the USDA- SCS Guilford County Soil Survey (12/19/77) and referenced in Table 15.
4. Vegetated waterways: (swales) are to be constructed according to USDA- SCS specifications or equivalent methods, and includes installation of channel liners (plastic, juts, or excelsior) where expected flow velocity (10yr. storm) exceeds three (3) feet per second  
Rip-rap lined channels: are to meet Guilford County specifications.  
Preserving natural drainage ways: shall mean no disturbance of natural drainageways by cutting, filling, channelization or destroying natural vegetation.  
Preserve and protect natural drainageways: shall mean protecting natural channels against stream bank erosion by rip-rap, or revegetated buffer strip of twenty-five (25) feet or more on each side of the stream.
5. Slope shall mean the maximum inclination of the land surface from the horizontal as measured in percentage slope. The average slope shall be determined for the entire lot, tract or subdivision.
6. Undisturbed area shall be that portion of a lot, tract or subdivision not occupied by any structure and which has not or will not be graded to change the existing contours nor to destroy existing vegetation.
7. Revegetating bare soil areas shall mean providing a stabilizing vegetation cover on those areas disturbed by grading of the site where no other land cover (structure, etc.) are to located.
8. All runoff control methods or devices shall meet or exceed Guilford County design specification. Retention ponds will be considered in lieu of wet detention ponds on a case by case basis.
9. No points will be allowed for on-site septic tank systems or private sewage treatment systems.
10. Self Explanatory.

Table 7-2-4

ENGINEER'S CERTIFICATION

The engineering certification required on Water Control Plans or construction plan drawing shall be of the following form:

ENGINEER'S CERTIFICATION

I certify that this plan will control the first **1/2** / **1** (choose one) inch of runoff from all impervious surfaces shown hereon, and that the water quality control measures show on this plan meets or exceed the guidelines issued by Guilford County dated \_\_\_\_\_.

SEAL \_\_\_\_\_

Signature

\_\_\_\_\_  
Registration Number

## 7-3 WATERSHED CRITICAL AREAS

### 7-3.1 General Provisions

- (A) Protection Provided: Watershed Critical Area Districts (WCA) shall protect those portions of designated watersheds which lie closest to existing and proposed water supply reservoirs from activities which could degrade water quality in the reservoirs.
- (B) Channelization of Streams: Channelization of streams in a WCA District shall not occur except by the approval of the Planning Board.
- (C) Required Minimum Standards: All minimum standards set forth in Section 7-2.2 (Watershed Control Plan) shall apply to CA districts.
- (D) Required Improvements: All required improvement set forth in Section 7-2.3 (Improvements) shall apply to WCA districts.

### 7-3.2 Watershed Critical Area Applicability

Requirements of WCA Districts shall apply to:

- (A) All development, excluding individual single family lots except as provided herein; and
- (B) All road construction within the WCA District.

### 7-3.3 Extent of WCA District

- (A) Boundary of WCA: The WCA extends to the ridgeline of the reservoir basin, or in the case of major streams feeding the reservoir (Little Alamance Creek, Big Alamance Creek, and Rock Creek), to the nearest identifiable major feature which crosses the stream, and which is at least two-thousand seven-hundred and fifty (2,750) feet upstream of the reservoir.
- (B) Identifiable Major Feature: The identifiable major feature specified in Section 7-3.3(A) (Boundary of WCA) may be a street, railroad, easement or similar travel way which is capable of being used by emergency personnel to respond to spills.
- (C) Boundary Closure: For the purposes of WCA boundary closure, a connecting line(s) is drawn the outer boundary ridge line and the line extending along and parallel to the identifiable major identifiable feature.

### 7-3.4 Divisions within the Watershed Critical Area

The WCA consists of four divisions as follows:

- (A) Tier 1
  1. Tier 1 consists of those lands within two hundred (200) feet of the normal pool elevation.

2. Tier 1 areas are intended for public purpose and should remain undisturbed.

(B) Tier 2

1. Tier 2 consists of those land lying within an area bounded by Tier 1 and a line parallel to and seven hundred and fifty (750) feet in distance from the normal pool elevation.
2. Tier 2 area surrounding Lake Mackintosh) is not intended for public purpose unless and until more than twenty-five (25%) percent of the WCA for the reservoir becomes urban in character, by meeting any of the tests defined in NCGS Section 160A-48(c).

(C) Tier 3

1. Tier 3 consists of those land lying within an area bounded by Tier 2 and a line parallel to and three thousand (3000) feet in distance from the normal pool elevation.
2. Tier 3 areas shall not exceed the WCA Boundary.

(D) Tier 4

1. Tier 4 consists of those lands lying in the area between Tier 3 and the WCA Boundary.

### 7-3.5 Runoff Minimization

The density and impervious surface coverage limits defined in Table 7-3-1 shall apply within the WCA.

### 7-3.6 Land Disturbance Minimization

(A) Erosion Control Plan:

1. An Erosion Control Plan will be required if any land disturbing activity:
  - a) Exceeds one (1) acre;
  - b) Will take place on highly erodible soils with a “k” factor greater than .36;
  - c) If a pond or retention structure is to be installed; or
  - d) Will take place in Tier 1 or Tier 2.
2. Agricultural activities shall be exempt from erosion control plan requirements under this Section.

(B) Street Standards: Refer to Article V (Subdivision: Procedures and Standards) for minimum street standards.

Table 7-3-1

DENSITY AND IMPERVIOUS SURFACE COVERAGE LIMITS

Residential Density Limits<sup>1</sup>

(expressed as dwelling units/ gross acre)

	Tier 1	Tier 2	Tier 3	Tier 4
No Public sewer	NA	1 du/5 ac	1 du/3 ac	1 du/1 ac
Public sewer	NA	1 du/5 ac	2 du/1 ac	2.5 du/1 ac

Impervious Surface Coverage Limits

(Expressed as % Maximum)

(for use with institutional, commercial, and industrial uses)<sup>2</sup>

	Tier 1	Tier 2	Tier 3	Tier 4
No public sewer	NA	2.5%	4.0%	12.0%
Public sewer	NA	2.5%	24.0% <sup>3</sup>	30.0% <sup>3</sup>

Notes:

1. The above residential densities shall not apply to property in the Jurisdiction zoned for lot sizes less than forty thousand (40,000) square feet on the effective date of this Ordinance.
2. Impervious surface coverage limits shall not apply to property in the Jurisdiction zoned for institutional, commercial, or industrial purposes on or before April 1, 1987, the original adoption date of the Watershed Critical Area Ordinance.
3. Impervious surface coverages may be increased in Tier 3 and Tier 4, when the development is served by public sewer, by ten (10%) percent for institutional, commercial and industrial areas if the owners provide for on-site control of the first one (1) inch of runoff from impervious surfaces in accordance with this Ordinance.

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3. Construction trades;
4. Manufacture of chemicals and allied products, dairy products, fats and oils, leather tanning, meat and poultry packing, paper and allied products, petroleum and related industries, primary metals, rubber and plastics, and concrete products;
5. Hazardous waste storage or treatment;
6. Junkyards and auto wrecking;
7. Petroleum bulk stations;
8. Trucking terminals and automotive maintenance facilities;
9. Automotive dealers, truck sales, service stations, and convenience stores which sell fuel;
10. Fuel oil dealers;
11. Auto rental and repair shops;
12. Sanitary landfills and construction debris landfills, except on-site construction debris landfills of less than three (3) acres.

(B) Containment Structures

1. Storage tanks for fuels and chemicals shall be diked for the containment of spills.
2. Such dikes shall be of sufficient volume to contain one hundred (100%) percent of all the tank(s) contents stored in the area and shall have a leak detection system installed.
3. The containment system shall be approved by the Fire Marshal.
4. Such tanks and containment structures shall not be placed closer than one thousand (1,000) feet to the normal pool elevation.

(C) Underground Storage Tanks: Underground storage tanks shall not be permitted except as approved by the Planning Board.

(D) Point Source Discharges

1. No expansion of any existing private wastewater facilities or establishment of any new public wastewater treatment plants of any kind shall be permitted except on-site individual septic systems.
2. Industrial pre-treatment facilities which prepare wastewater for discharge into a public sewer system shall be permitted in WCA districts.

### 7-3.8 Storm Water Management

(A) Control of Run-Off: Control of run-off from impervious surfaces shall be controlled as follow:

1. If the impervious surface is thirty (30%) percent or less, the resultant runoff from the first one-half (1/2) inch of rainfall shall be controlled;
  2. If the impervious surface is greater than thirty (30%) percent, the resultant runoff from the first one (1) inch of rainfall shall be controlled.
- (B) Control Measures: Run-off control measures may include:
1. On-site infiltration through undisturbed vegetated areas.
  2. Engineered infiltration measures such as trenches, retention ponds (wet ponds) or wet detention ponds that reduce the total quantity of runoff.
  3. Detention structures that reduce the rate and total quantity of runoff.
  4. A fee in lieu of construction where public retention structures are available.
- (C) Design Approval
1. All designs for run-off management structures, including those referred to in Section 7-3.8(B) (Control Measures), shall be subject to approval of the Enforcement Officer.
  2. Such approval will be granted only if the design of the structure will be effective in removing sediment from the runoff.
  3. The Enforcement Officer may recommend, and the Technical Review Committee may require, that a given facility be relocated on a site to improve water quality protection.

### 7-3.9 Appeals and Waivers

- (A) Conditions for Appeal or Waiver: Where because of the size of the tract to be developed, its topography, the condition or nature of adjoining areas; or the existence of other unusual conditions, or for other reasons of equity, strict compliance with the provisions of this Ordinance would cause an unusual and unnecessary hardship on the developer, waiver of the requirements set forth herein may be requested. Waiver of these requirements shall be made to the Planning Board.
- (B) Procedures: Approvals and appeals under this Section shall follow the procedures set forth in this Ordinance.
- (C) Granting Waiver: In granting waivers, the Planning Board may require such conditions as will secure, insofar as practicable, the objectives of the requirement waived. The Planning Board's action shall be advisory, and final action will be by the Governing Body after making findings of fact which show good and justifiable cause for a waiver.
- (D) Record of Waiver: Any waiver(s) authorized shall be entered in the minutes of the Planning Board together with the circumstances that justified the waiver(s) granted and the conditions upon which the waiver(s) was granted.

## 7-4 SOIL EROSION AND SEDIMENTATION CONTROL

### 7-4.1 General Requirements

- (A) Plan Required: No person shall initiate any land-disturbing activity without an erosion control plan approved by the Jurisdiction, if the land-disturbing activity:
- 1) Exceeds one (1) acre;
  - 2) Will take place on highly erodible soils with a “k” factor greater than .36 in a watershed critical area;
  - 3) Includes a pond or retention structure in a watershed critical area; and
  - 4) Will take place in Tier 1 or Tier 2 of a watershed critical area.
- (B) Protection of Property: Persons conducting land-disturbing activity shall take all reasonable measures to protect all public and private property from damage or nuisance caused by such activity.
- (C) More Restrictive Rules Shall Apply: Whenever conflicts exist between federal, state, or local laws, ordinances, or rules, the more restrictive provision shall apply.

### 7-4.2 Basic Control Objectives

The basic control objectives which are to be considered in developing and implementing an erosion and sedimentation control plan are to:

- (A) Identify Critical Areas: On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention;
- (B) Limit Time of Exposure: All land-disturbing activity is to be planned and conducted to limit exposure to the shortest feasible time;
- (C) Limit Exposed Areas: All land-disturbing activity is to be planned and conducted to minimize the size of the area to be exposed at any one time;
- (D) Control Surface Water: Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure;
- (E) Control Sedimentation: All land-disturbing activity is to be planned and conducted so as to prevent off-site sedimentation damage and nuisances to adjacent properties, streets or streams; and
- (F) Manage Storm Water Runoff: When the increase in the velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving watercourse, plans are to include measures to control the velocity at the point of discharge so as to minimize accelerated erosion of the site and increased sedimentation of the stream.

### 7-4.3 Mandatory Standards for Land-disturbing Activity

No land-disturbing activity subject to the control of this Ordinance shall be undertaken except in accordance with the following mandatory standards:

- (A) Buffer Zone: No land-disturbing activity shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the twenty-five (25%) percent of the buffer zone nearer the land-disturbing activity, provided, that this subsection (A) shall not apply to a land-disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse; and
- (B) Graded Slopes and Fills: The angle for graded slopes and fills shall be no steeper than two (2) to one (1) slope if they are to be stabilized with vegetative cover. Slopes or fills steeper than two (2) to one (1) must be protected by structures. In any event, slopes left exposed will, within thirty (30) days of completion of any phase of grading, be planted or otherwise provided with ground cover, devices, or structures sufficient to restrain erosion;
- (C) Ground Cover: Whenever land-disturbing activity is undertaken on attract comprising more than one acre, if more than one contiguous acre is uncovered, the person conducting the land-disturbing activity shall install such sedimentation and erosion control devices and practices as are sufficient to retain the sediment generated by the land-disturbing activity within the boundaries of the tract during construction upon and development of said tract, and shall plant or otherwise provide a permanent ground cover sufficient to restrain erosion after completion of construction or development within thirty (30) working days or one hundred and twenty (120) calendar days following completion, whichever period is shorter;
- (D) Prior Plan Approval: No person shall initiate any land-disturbing activity if more than one contiguous acre is to be uncovered unless, thirty (30) or more days, prior to initiating the activity, an erosion and sedimentation control plan for such activity is filed and approved by the Jurisdiction.

### 7-4.4 Design and Performance Standards

Erosion and sedimentation control measures, structures, and devices shall be so planned, designed, and constructed as to provide protection from the calculated maximum peak rate of runoff from the ten (10)- year storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices", or other acceptable calculation procedures.

#### 7-4.5 Permanent Downstream Protection of Stream Banks and Channels

- (A) Intent: Stream banks and channels downstream from any land-disturbing activity shall be protected from increased degradation by accelerated erosion caused by increased velocity of runoff from the land-disturbing activity.
- (B) Performance Standards: The land-disturbing activity shall be planned and conducted so that the velocity of storm water runoff in the receiving watercourse at the point of discharge resulting from a ten (10)- year storm after development shall not exceed the greater of:
- 1) the velocity as determined from Table 7-4-1; or
  - 2) the velocity in the receiving watercourse determined for the ten (10)- year storm prior to development.
- (C) Acceptable Management Measures: Measures applied alone or in combination to satisfy the intent of this Section are acceptable if there are no objectionable secondary consequences. The Jurisdiction recognizes that the management of stormwater runoff to minimize or control downstream channel and bank erosion is a developing technology. Innovative techniques and ideas will be considered and may be used when shown to have the potential to produce successful results.
- Some alternatives are to:
- 1) Avoid increases to surface runoff volume and velocity by including measures to promote infiltration to compensate for increased runoff from areas rendered impervious;
  - 2) Avoid increases in stormwater discharge velocities by using vegetated or roughened swales and waterways in lieu of closed drains and high velocity paved sections;
  - 3) Provide energy dissipaters at outlets of storm drainage facilities to reduce flow velocities at the point of discharge. These may range from simple rip-rapped sections to complex structures; or
  - 4) Protect watercourses subject to accelerated erosion by improving cross sections and/or providing erosion-resistant lining.
- (D) Exceptions: This rule shall not apply where it can be demonstrated that stormwater discharge velocities will not create an erosion problem in the receiving watercourse.

**TABLE 7-4-1  
MAXIMUM PERMISSIBLE VELOCITY FOR STORMWATER DISCHARGES**

Material	Maximum Permissible Velocities	
	F.P.S.	M.P.S
Fine Sand (noncolloidal)	2.5	0.8
Sandy loam (noncolloidal)	2.5	0.8
Silt Loam (noncolloidal)	3.0	0.9
Ordinary firm loam	3.5	1.1
Fine Gravel	5.0	1.5
Stiff clay (very colloidal)	5.0	1.5
Graded, loam to cobbles (noncolloidal)	5.0	1.5
Graded, silt to cobbles	5.5	1.7
Alluvial silts (noncolloidal)	3.5	1.1
Alluvial silts (colloidal)	5.0	1.5
Coarse gravel (noncolloidal)	6.0	1.8
Cobbles and shingles	5.5	1.7
Shale and hard pans	6.0	1.8

Source- Adapted from recommendations by Special Committee on Irrigation Research, American Society of Civil Engineers, 1926, for channels with straight alignment. For sinuous channels, multiply allowable velocity by 0.95 for slightly sinuous, by 0.9 for moderately sinuous channels, and by 0.8 for highly sinuous channels.

#### 7-4.6 Borrow and Waste Areas

When the person conducting the land-disturbing activity is also the person conducting the borrow or waste disposal activity, areas from which borrow is obtained and which are not regulated by the provisions of the Mining Act of 1971, any waste areas for surplus materials other than landfills regulated by the Department of Human resources, Division of Health Services, shall be considered as part of the land-disturbing activity where the borrow material is being used or from which the waste material originated. When the person conducting the land-disturbing activity is not the person obtaining the borrow and/or disposing of the waste, these areas shall be considered a separate land-disturbing activity.

#### 7-4.7 Access and Haul Roads

Temporary access and haul roads, other than public roads, constructed or used in connection with any land-disturbing activity shall be considered a part of such activity.

#### 7-4.8 Operations in Lakes or Natural Watercourses

Land-disturbing activity in connection with construction in, on, over, or under a lake or natural watercourse shall be planned and conducted in such a manner as to minimize the extent and duration of disturbance of the stream channel. The relocation of a stream, where relocation is an essential part of the proposed activity, shall be planned and executed so as to minimize changes in the stream flow characteristics, except when justification for significant alteration to flow characteristic is provided. The U.S. Army Corps of Engineers shall be notified by the developer of any planned operation in lakes or natural watercourses for possible issuance of Section 404 or other permits.

#### 7-4.9 Responsibility for Maintenance

During the development of a site, the person conducting the land-disturbing activity shall install and maintain all temporary and permanent erosion and sedimentation control measures as required by the approved plan, by any provision of this Ordinance, or by any ordinance adopted pursuant to this Ordinance. After site development, the land owner or person in possession or control of the land shall install and/or maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road or street right-of-way or easement accepted for maintenance by a governmental agency.

#### 7-4.10 Additional Measures

Whenever the Jurisdiction determines that significant sedimentation is occurring as a result of land-disturbing activity, despite application and maintenance of protective practices, the person conducting the land-disturbing activity will be required to and shall take additional protective action.

#### 7-4.11 Existing Uncovered Areas

- (A) Applicability: All uncovered areas existing on the effective date of this Ordinance which are the result of land-disturbing activity, which exceed one (1) contiguous acre, which are subject to continued accelerated erosion, and which are causing off-site damage from sedimentation, shall be provided with a ground cover or other protective measures, structures, or devices sufficient to restrain accelerated erosion and control off-site sedimentation.
- (B) Notice of Violation: The Jurisdiction will serve upon the landowner a written notice of violation by registered or certified mail, return receipt requested. the notice will set forth the measures needed to comply and will state the time within which such measures must be completed. In determining the measures required and the time allowed for compliance, the authority serving notice shall take into consideration the economic feasibility, technology, and quantity of work required, and shall set reasonably attainable time limits for compliance.
- (C) Requiring Erosion Control Plan: The Jurisdiction reserves the right to require preparation and approval of an erosion control plan in any instance where extensive control measures are required.
- (D) Exemption: This rule shall not require ground cover on cleared land forming the future basin of a planned reservoir.

#### 7-4.14 Erosion and Sedimentation Control Plans

- (A) Applicability: An erosion control plan shall be prepared for all land-disturbing activities subject to this Ordinance whenever the proposed activity is to be undertaken on a tract comprising more than one (1) acre, if more than one (1) contiguous acre is to be uncovered.
- (B) Preparation of Plan: The erosion control plan shall be prepared by, and shall bear the seal and signature of a registered professional engineer, architect, landscape architect, or a registered surveyor to the extent permitted by North Carolina laws, at a scale not smaller than one (1) inch equals two hundred (200) feet. The plan shall be filed with the Jurisdiction, and the Guilford Soil and Water Conservation District, thirty (30) days prior to the commencement of the proposed activity.
- (C) Submission of plans: Persons conducting land-disturbing activity which covers one or more contiguous acres shall file five (5) copies of the erosion control plan with the Jurisdiction, at least thirty (30) days prior to beginning of such activity, and shall keep another copy of the plan on file at the job site. If the Jurisdiction, either upon review of

such plan or on inspection of the job site, determines that a significant risk of accelerated erosion or off-site sedimentation exists, the Jurisdiction will require a revised plan. Pending the preparation of the revised plan, work shall cease or shall continue under conditions outlined by the appropriate authority.

- (D) Financial Responsibility Statement: Erosion control plans shall be accompanied by an authorized statement of financial responsibility and ownership. This statement shall be signed by the person financially responsible for the land-disturbing activity or his attorney in fact. The statement shall include the mailing and street addresses of the principal place of business of the person financially responsible and of the owner of the land or their registered agents. If the person financially responsible is not a resident of North Carolina, a North Carolina agent must be designated in the statement for the purpose of receiving notice of this compliance or non-compliance with the plan, this Ordinance, or rules or orders adopted or issued pursuant to this Ordinance.
- (E) Conservation District Review: The Guilford Soil and Water Conservation District within twenty (20) days of receipt of any plan, shall review such plan and submit its comments and recommendations to the Jurisdiction. Failure of the Soil and Water Conservation District to submit its comments and recommendations within these twenty (20) days will not delay final action on the plan.
- (F) Local Jurisdiction Review: The Jurisdiction will review each plan submitted to them and within thirty (30) days of receipt thereof will notify the person submitting the plan that it has been approved, approved with modifications, approved with performance reservations, or disapproval. Failure to approve or disapprove a complete erosion and sedimentation control plan within thirty (30) days of receipt shall be deemed approval. Denial of the plan must specifically state in writing the reasons for denial. The jurisdiction must approve or deny a revised plan within fifteen (15) days of receipt, or it is deemed to be approved. If, following commencement of a land-disturbing activity pursuant to an approved plan, the Jurisdiction determines that the plan is inadequate to meet the requirements of this Ordinance, the Jurisdiction may require such revisions as are necessary to comply with this Ordinance.
- (G) Plan Requirements: The plan required by the Section shall contain architectural and engineering drawings, maps, assumptions, calculations, and narrative statements as needed to adequately describe the proposed development of the tract and the measures proposed to ensure compliance with the requirements of this Ordinance. Plan content may vary to meet the needs of specific site requirements. Detailed guidelines for plan preparation can be found in Appendix 2 (Map Standards) of this Ordinance.
- (H) Application Amendments: Applications for amendments of an erosion control plan in written and/or graphic form may be made at any time under the same conditions as the original application. Until such time as said amendment is approved by the Jurisdiction, the land-disturbing activity shall not proceed except in accordance with the erosion control plan as originally approved.

- (I) Work Conducted from Approved Plan: Any person engaged in land-disturbing activity who fails to file a plan in accordance with this Ordinance, or who conducts a land-disturbing activity except in accordance with provisions of an approved plan shall be deemed in violation of this Ordinance.
- (J) Plan Approval Required for Permit: No building or location permits, approvals or other documents relating to land or building development or improvement shall be issued or granted under applicable zoning, building, subdivision and other laws and ordinances of the Jurisdiction, unless and until an erosion control plan, as required by this Ordinance, has been submitted to the Jurisdiction, a grading permit has been issued, and a Certificate of Erosion Control Performance has been issued by jurisdiction, indicating the initial erosion control devices have been installed and are functioning properly.
- (K) Work Completed Before Final Subdivision Approval: No final subdivision plat approval nor any Certificate of Occupancy shall be issued or granted where required under applicable zoning, building, subdivision and other laws and ordinances unless and until work at the site has been completed in accordance with a valid grading permit, or an improvement security or performance bond has been approved and accepted as required by this Ordinance.
- (L) Surety: The applicant for a grading permit to grade one (1) acre or more may be required to file with the Jurisdiction an improvement security or bond in the form of an escrow account or other instruments satisfactory to the Jurisdiction attorney in the amount deemed sufficient by the Jurisdiction to cover all costs of protection of the site against erosion and off-site sedimentation according to requirements of this Ordinance. The amount of such surety requirement shall be determined by the Jurisdiction in consultations with the Soil and Water Conservation District and with disinterested private contractors. Such surety shall be valid until the work is completed in accordance with the grading permit and until same is released by the Jurisdiction. Applicable surety shall be forfeited upon violation of this Ordinance and shall be used to establish protective cover on the site, to control the velocity of runoff, and/or prevent off-site sedimentation. Any monies in excess of the cost of providing protective measures shall be refunded to the applicant. Surety shall be released when the Jurisdiction has certified that the requirements of this Ordinance has been met.

## 7-5 FLOOD CONTROL

### 7-5.1 Statutory Authorization

The Legislature of the State of North Carolina has in NCGS 143-21(6), NCGS 153-A-18(3&4), NCGS 153-A-6, NCGS 160-A-19(3, 5, & 8), and NCGS 160-A-8, delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfares of its citizenry.

### 7-5.2 Finding of Fact

(A) Cause for Flood Hazard Areas: The flood hazard areas of the Jurisdiction are subject to periodic inundation which could result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

(B) Causes of Flood Loses: These flood losses are caused by the cumulative effect of:

- 1) obstructions in flood plains causing increases in flood heights and velocities; and
- 2) occupancy in flood hazard areas of uses vulnerable to floods or hazardous to other lands and uses which are inadequately elevated, inadequately floodproofed, or otherwise unprotected from flood damages.

### 7-5.3 General Provisions

(A) Lands to Which this Ordinance Applies: This Ordinance shall apply to all areas of special flood hazard within the Jurisdiction.

(B) Basis for Establishing the Areas of Special Flood Hazard: The areas of special flood hazard identified by the Federal Emergency Management Agency in its Flood Insurance Study dated **XX,XX,XXXX**, with accompanying maps and other supporting data, and any revision thereto are adopted by reference and declared to be a part of this Ordinance.

(C) Floodway Zone:

- 1) Permitted Uses: The following uses shall be permitted within the floodway zone to the extent that they are otherwise permitted by this Ordinance and provided that they do not employ structures or fill except as specified herein:
  - a) General farming, pasture, outdoor plant nurseries, horticulture, forestry, wildlife sanctuary, game farm, and other similar agricultural, quarrying, wildlife and related uses;
  - b) Ground level loading areas, ground level automobile parking areas, rotary aircraft ports and other similar industrial and commercial uses;
  - c) Tractor-trailer parking, provided that no trailers shall be detached from tractors;
  - d) lawns, gardens, play areas, and other similar uses;
  - e) golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, parks, swimming pools, hiking or horseback riding trails, open space and other similar private and public recreational uses;
  - f) Streets, bridges, utility lines, storm drainage facilities, sewage or waste treatment facilities, water supply facilities, and other similar public or private utility uses, but only if the proposed activity combined with allowable encroachment of the floodway fringe and with any previously placed or previously approved encroachment in the floodway will not increase the base flood elevation by more than one (1) foot. The increase in base flood elevation due to allowable encroachment of the floodway

fringe is listed in the Floodway Date Table in the *Flood Insurance Study* prepared by the Federal Emergency Management Agency (FEMA). Fill material for utilities shall be permitted only if approved by the

**XXXXXXXXXX**;

- g) Temporary facilities such as displays, circuses, carnivals, or similar transient amusement enterprises;
  - h) Boat docks, ramps, piers, or similar structures;
  - i) Dams;
  - j) Grading but not fill; and
  - k) Cantilevered portions of structures, provided that foundation and supports are located outside the floodway zone and the underside of the cantilevered portion is at least one (1) foot above the base flood elevation.
- 2) Prohibited uses: Storage or processing of materials that are flammable, corrosive, toxic, or explosive, or which could otherwise be injurious to human, animal or plant life in time of flood is prohibited in the floodway zone.

**(D) Floodway Fringe Zone**

1) Permitted uses

The following uses shall be permitted within the floodway fringe zone to the extent that they are otherwise permitted by this Ordinance:

- a) Uses permitted below flood protection elevation:
  - i) Any use as permitted and regulated in the floodway zone.
  - ii) Fill material graded too drain, provided such is protected against erosion. Any fill material on which a structure is to be located shall be extended at grade ten (10) feet beyond the limits of the structure foundation, and shall have a side slope no steeper than two (2) feet horizontal to one (1) foot vertical.
  - iii) Structure foundations and supports, provided such are firmly anchored to prevent flotation.
- b) Uses permitted above flood protection elevation:
  - i) Any residential or nonresidential use permitted by this Ordinance provided that the finished floor elevation of any structure is located one (1) foot or more above base flood elevation. Heating and electrical equipment installed below flood protection elevation shall be floodproofed.
  - ii) Any nonresidential use permitted by this Ordinance provided that all portions of the structure are floodproofed, as provided in this Article, to an elevation at least one (1) foot above base flood elevation.

- iii) Heating and electrical equipment installed below flood protection elevation shall be floodproofed. Non-residential structures may floodproof this equipment if placed below the base flood elevation, but the floodproofing must be certified by a professional engineer registered in North Carolina.
- 2) Prohibited Uses: Uses that are prohibited below the flood protection elevation are the storage or processing of materials that are flammable, corrosive, toxic, or explosive, or which could otherwise be injurious to human, animal or plant life in time of flood.

#### 7-5.4 Warning and Disclaimer of Liability

The degree of flood protection required by this Ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This Ordinance does not imply that land outside the areas of special flood hazard or uses permitted within such areas will be free from flooding or flood damages. This Ordinance shall not create liability on the part of the Jurisdiction or any officer or employee thereof for any flood damages that result from reliance on this Ordinance or any administrative decision lawfully made hereunder.

#### 7-5.5 Flood Plain Development Application, Permit and Certification Requirement

- (A) Application for Permit: Application for a Flood Plain Development Permit shall be made in accordance with Section 3-3.5 (Flood Plain Development Permit).
- (B) Certificate of Floor Elevation/Floodproofing: When a property is located in a flood hazard area or when a structure is floodproofed, a certificate shall be provided in accordance with Section 3-8.4 (Certificate of Flood Elevation/Floodproofing).

#### 7-5.6 Provisions for Flood Hazard Reduction

- (A) General Standards: In all areas of special flood hazard the following provisions are required:
  - 1) All new construction or 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) All new construction or substantial improvements shall be constructed with materials and utility equipment resistant to flood damage;
  - 4) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damages;

- 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) All new or replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
- 7) New or replacement sanitary sewerage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters;
- 8) On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding; and
- 9) Any alteration, repair, reconstruction or improvements to a structure which is in compliance with the provisions of this Ordinance, shall meet the requirements of “new construction” as contained in this Ordinance.

(B) Specific Standards: In all areas of special flood hazard where base flood elevation data has been provided, the following provisions are required:

- 1) Residential Construction: New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated no lower than one (1) foot above the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movement of flood waters shall be provided.
- 2) Non-Residential Construction: New construction or substantial improvements of any commercial, industrial, or non-residential structure shall have the lowest floor, including basement, elevated no lower than one (1) foot above the level of the base flood elevation. Structures located in A-zones may be floodproofed in lieu of elevation provided that all areas of the structure below the required elevation are water tight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification shall be provided to the official as set forth in this Ordinance.
- 3) Manufactured Housing
  - a) Manufactured homes shall be anchored.
  - b) For new manufactured home parks and manufactured home subdivisions; for expansion to existing manufactured home parks and manufactured home subdivisions; for existing manufactured home parks and manufactured home subdivisions where the repair, reconstruction, or improvements of the streets, utilities, and pads equals or exceeds fifty (50%) percent of the value of the streets, utilities, and pads before the repair, reconstruction or improvements has commenced; and for mobile

homes not placed in a mobile home park or mobile home subdivision, the following requirements must be met:

- i) Stands or lots must be elevated on compacted fill or on pilings so that the lowest floor of the manufactured home will be at least one (1) foot above the base flood elevation;
    - ii) Adequate surface drainage and access for a hauler must be provided;
    - iii) If the home is on pilings, the lot must be large enough to permit steps and the pilings must be placed in stable soil.
  - 4) **Elevated Buildings:** New construction or substantial improvements of elevated buildings 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 and designed to allow for the entry and exit of floodwaters so as to automatically equalize hydrostatic flood forces on exterior walls.
    - a) Designs for complying with this requirement must be certified by a professional engineer or architect.
    - b) 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).
    - c) The interior portion of such enclosed area shall not be partitioned or finished into separate rooms, except to enclose storage areas.
  - 5) **Floodways:** The floodways is an extremely hazardous area due to the velocity of flood waters which carry debris and potential projectiles and has erosion potential. Except for streets, bridges, and utilities as permitted in Section 7-5.3(C)1)f (Floodway Zone), no encroachments, including fill, new construction, substantial improvements or other developments shall be permitted unless certification (with supporting technical data) by a registered professional engineer is provided, demonstrating that such encroachments shall not result in any increase in flood levels during occurrence of the base flood discharge.
- (C) **Standards for Streams Without Established Floodways or Base Flood Elevations:** Within the areas of the special flood hazard established in the Article are small streams where no base flood data has been provided or where no floodways have been identified. The following provisions apply within such areas:
- 1) Except street, bridges, and utilities as permitted in Section 7-5.3(C)1)f (Floodway Zone), no encroachments shall be permitted in drainage easements as required by Article V (Subdivisions: Procedures and Standards). Fill, new construction, substantial improvements or development shall be permitted within the distance from the stream centerline designated in Table 7-5-1 or twenty (20) feet each side from the top of the stream bank, whichever is greater, unless

certification (with supporting technical data) by a registered professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

TABLE 7-5-1  
STREAM NON-ENCROACHMENT WIDTHS

Cubic Feet/Second in 100-year Storm	Required Distance from Stream Centerline
5 – 17 cfs <sup>1</sup>	15 Ft.
17 – 70 cfs <sup>1</sup>	30 Ft.
70 or more cfs <sup>1</sup>	50 Ft. plus ½ channel width

<sup>1</sup>cfs =Cubic Feet per Second

- 2) If base flood elevation data is available from other sources, all new construction and substantial improvements within such areas shall comply with all applicable flood hazard ordinance provisions of this Article and shall be elevated or floodproofed in accordance with elevations established in this Article.
- 3) When base flood elevation data is not available from a federal, state, or other source, and the flow is five hundred (500) cubic feet per second (cfs) or greater for a one hundred (100) year storm, the lowest floor including the basement shall be elevated at least one foot above the one hundred (100) year flood elevation certified by a professional registered engineer.
- 4) When base flood elevation data is not available from a federal, state, or other source, and the flow is less than five hundred (500) cfs for a one hundred (100)- year storm, the lowest floor including the basement shall be elevated at least two (2) feet above the highest adjacent grade.

(D) Standards for Areas of Shallow Flooding (AO Zones): Located within the area of special flood hazard established in this Article are areas designated as shallow flooding. These areas have special flood hazards associated with base flood depths of one to three feet (1'-3') where a clearly defined channel does not exist and where the path of flooding is unpredictable and indeterminate. The following provisions shall apply within such areas:

- 1) All new construction and substantial improvements of residential structures shall have the lowest floor including the basement elevated to the depth number specified on the Flood Insurance Rate Map, in feet, above the highest adjacent grade. If no depth number is specified, the lowest floor including the basement shall be elevated at least two (2) feet above the highest adjacent grade.
- 2) All new construction and substantial improvements of non-residential structures shall:
  - a) have the lowest floor including the basement elevated to the depth number specified on the Flood Insurance Rate Map, in feet, above the highest adjacent grade. If no depth number is specified, the lowest floor including

the basement shall be elevated at least two (2) feet above the highest adjacent grade; or

- b) be completely floodproofed, together with attendant utility and sanitary facilities, 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 effects of buoyancy.