



CITY OF FLORENCE KENTUCKY





Stormwater Master Plan Update

Prepared for:City of Florence, Ky Public Services Department

July 2005



EXECUTIVE SUMMARY

This update to the City of Florence Storm Water Drainage Master Plan discusses changes in regulations, outlines a series of suggested policy statements, provides specific guidance on stream repair, and suggests some possible location for new regional storm water basins.

Two significant regulatory changes have occurred since the 1990 Storm Water Drainage Master Plan was developed:

- i. The City of Florence is covered under a NPDES storm water permit as a small municipality.
- ii. Activities in streams are being more tightly regulated through the implementation of the Clean Water Act Sections 401 and 404.

The City's storm water permit requires the implementation of six minimum measures as ways to improve the quality of the storm water discharged from the city's storm drains. These measures are: public education, public involvement, identification of illicit (nonstorm water) discharges, construction runoff, runoff following development, and pollution prevention. Each of these measures is related to the quality of the storm water (and the reduction of pollutants); however, several measures can help prevent flooding, scour, erosion, and sediment deposition. Thus, any capital improvement plans or requirements for developers related to the control of storm water must be considered in conjunction with the goals and objectives of the Phase II storm water program.

Sections 401 and 404 regulate any activities that discharge fill material into waters of the US. (Water of the US is defined in Chapter 2.) Where possible, avoidance and minimization of impact is required. When loss of waters (or "function", such as habitat for fish) over a threshold occurs, compensatory mitigation is required to replace the functions lost. This lengthens the permitting process, requires public notice, and expands the original project into one of stream replacement.

In the mid 1990s, the concept of natural channel design became popular as a way to preserve and enhance the natural environment. It is viewed as the preferred way to mitigate stream loss. Other beneficial ways to mitigate stream loss involve partial restoration of degraded streams, such as bank and floodplain plantings, bank stabilization (to reduce erosion), and placement of natural features to provide aquatic habitat.

In consideration of the regulatory changes, and also to clarify responsibilities of the City, a set of policy statements have been proposed. These statements define Waters of the City of Florence, prioritization of maintenance requests, and other measures to facilitate improvements in quality and quantity control.

i

TABLE OF CONTENTS

Executive Su	immaryi					
Chapter 1:	Introduction1					
Chapter 2:	Definitions					
Chapter 3:	Existing Storm Water Regulations					
	3.0 City of Florence7					
	3.1 Boone County Planning Commission					
	3.2 Commonwealth of Kentucky10					
	3.3 U.S. Army Corps of Engineers11					
	3.4 Other Agencies					
Chapter 4:	Storm Water Policy Statement					
	4.0 Waters of the City of Florence14					
	4.1 Drainage Easement15					
	4.2 Drainage Maintenance Agreements16					
	4.3 Maintenance Requests16					
	4.4 Water Quality Detention Credit16					
	4.5 Post -Construction Water Quality Stream17					
	4.6 Stabilization / Restoration17					
	4.7 Stream Mitigation					
	4.8 Construction Erosion and Sediment Control18					
	4.9 Watershed Studies / Floodplains					

Chapter 5:	Stream Repair Practices	
	5.0 Introduction	20
	5.1 Stream Repair Practices	20
Chapter 6:	Regional Storm Water Control Facilities	22

LIST OF TABLES

Table 1	Corps of Engineers Nationwide Permits	12
Table 2	Regional Detention Basin	22

APPENDICES

Appendix A	Storm Water Permit Activities Schedules
Appendix B	Kentucky Division of Water Information & Contacts
Appendix C	Louisville Corps of Engineers Information & Contacts
Appendix D	Storm water Facility Maintenance Agreement
Appendix E	Stream Repair Details
Appendix F	Example Stream Designations

CHAPTER 1

INTRODUCTION

In 1990, the City of Florence completed its Surface and Storm Water Drainage Master Plan which was adopted by the City Council. Elements of the Plan have been and are currently being implemented by the Public Services Department. The improvements identified in the Plan are nearing completion. The creation of the storm water utility was an instrumental part of the City's implementation, enabling the funding of storm water activities.

Since 1990, the regulatory climate and emphasis on storm water quality has increased significantly. Also, development has been occurring at a very rapid pace in the City and Boone County. Development alters storm water volumes and rates of run off. Storm water management has reached a new phase. The City has recognized the need to review and update the 1990 Plan. This update includes research and policy development with an update of the capital improvement plan to follow.

The two major regulatory changes affecting storm water management are the City's NPDES storm water permit and the changes in permitting for activities in the waters of the US. (NPDES and Waters of the US are defined in Chapter 2). Each of these regulatory programs is explained below, and further discussed in Chapter 3.

In 2003, as an operator of a municipal separate storm sewer system (referred to as MS4), the City of Florence submitted a permit application for a KPDES storm water permit. (The Kentucky Division of Water has primacy from EPA for administering the NPDES program.) Rather than defining discharge pollutant limits (like a wastewater treatment plant permit), the Kentucky Division of Water allowed small municipalities to be covered under a "General Permit" for storm water discharges. This permit required the City to prepare a Storm Water Management Plan detailing programs to reduce pollutants to the maximum extent practical, and to report on success annually.

Florence's Storm Water Management Plan includes six measures specified by EPA. These measures are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

The success of the program is tracked on an on-going basis with a spreadsheet maintained by the city works department. An example of this spreadsheet (titled "Activity Implementation Schedule") is included in Appendix A. More details on the how the storm water permit conditions affect drainage is provided in Chapter 3.

Clean Water Act Sections 401 (water quality certification) and 404 (discharges of fill material into waters of the US) are implemented by the Army Corps of Engineers (COE) and the Kentucky Division of Water. These regulations are important because construction activities that alter streams of any size must be permitted. Permits range from simple (abide by good housekeeping) to very complex (requiring examination of avoidance/ minimization alternatives and implementing compensatory mitigation for unavoidable impacts). Nationwide Permits (with general conditions) are the common, simple permits for minor impacts. These were reissued, some with significant changes, in 2002. If a NWP cannot be used, the Individual Permit may take over a year to obtain and in some cases, make the construction project unaffordable. These regulations affect the City of Florence as it reviews development plans as well as when it seeks to construct its own projects. More details are provided in Chapter 3.

As a result of the changes in regulations and the need for improved drainage facilities to accommodate growth, the City wishes to consider a set of policy statements to define its role in maintaining drainage facilities and to provide guidance for long-term accomplishment of objectives pertaining to both storm water quantity and quality.

The tasks undertaken in this update include:

- Review of related local ordinances and regulations.
- Review of applicable regulations on the Federal and State level.
- Research of storm water strategies implemented by other communities.
- Develop policy statements to guide the City when dealing with storm water issues.
- Develop map of regulated streams to be included in the Boone County GIS.
- Develop typical stream repair strategies.
- Determine appropriate locations for regional detention basins.

Chapter 2 provides definitions of terms used in this plan. Chapter 3 details the pertinent regulations. Chapter 4 contains suggested policy statements, written after consideration of strategies implemented by Louisville Metropolitan Sewer District and Sanitation District No. 1. Chapter 5 discussed stream repair strategies using natural stream design elements and Chapter 6 contains a listing of potential locations for future regional storm water basins.

CHAPTER 2

DEFINITIONS

The following definitions apply throughout this Plan. The definitions may not be defined in precisely this manner in other publications.

Best Management Practices (BMP) – Policies, practices, procedures, or structures which are designed to minimize the effects on water quality from storm water runoff.

Blue Line Stream – A stream shown on the USGS topographical 7.5 minute quadrangle map as a solid blue line. Generally, solid blue lines denote perennial streams.

Compensatory Mitigation – Replacement or enhancement of a resource to compensate for impacts.

Dashed Blue Line Stream – A stream shown on the USGS topographical 7.5 minute quadrangle map as a broken, or dashed, blue line. Generally, dashed blue lines denote intermittent streams.

Drainage Easement - An easement, or right to access, an area reserved for drainage. Drainage easement are dedicated to City and shown on the property plat or deed.

Ephemeral Stream – A stream that flows only during a rainfall event and for a short time after. Ephemeral streams will generally have a defined bank and are located above the water table. These are generally not shown on USGS maps.

Hard Bank Stabilization – Streambank repair and stabilization which includes installation of structural systems to protect banks from further erosion. These are generally used where erosion threatens structures, available space for repairs is a constraint, or highly erosive velocities are present.

Individual Permit – A permit issued after a case-by-case evaluation of a specific project and a determination that that the proposed structure or work is in the public interest.

In-lieu Fee – A payment made to a mitigation trust fund when compensatory mitigation is determined to be not feasible. Monies collected are to be used for mitigation projects administered by the agency.

Intermittent Stream – A stream that does not flow year-round but flows only during wet periods when it receives base flow from groundwater in addition to surface runoff. These are generally shown as dashed blue lines on USGS maps.

Geographic Information System (GIS) – Interactive digital mapping and geographic data base. The Boone County Planning Commission maintains the GIS for the County. The City of Florence is a participant in the GIS.

Kentucky Division of Water – A division of the Department of Environmental and Public Protection Cabinet which has the responsibility of regulation of water issues in Kentucky including storm water. This includes permitting for Floodplain Construction, Dam Construction, Water Quality Certification (Section 401 of the Clean Water Act) and KPDES.

Kentucky Pollutant Discharge Elimination System (KPDES) – Regulations which require a permit for the discharge of pollutants from any point source into Waters of the Commonwealth. The permit is issued by the Kentucky Division of Water. The most common permit is for storm water discharges associated with industrial activity (construction activities) which is covered under a general permit.

Major Storm Water System – The portion of the drainage system that conveys storm water runoff that exceeds the capacity of the minor system due to the severity of the rainfall event or blockage of the minor system. The system normally includes open channels and streams, road culverts, and local streets. This system is normally designed for a 100-year storm event such that no buildings or facilities would be flooded. Minimal local street or parking lot flooding may be allowed in some instances.

Minor Storm Water System – The portion of the drainage system that conveys frequently-occurring storm water runoff in a controlled manner. This system normally includes street gutters, storm sewer inlets and pipes, smaller open channels and detention or retention facilities.

Nationwide Permit – A type of COE general permit that represents District Administrator authorization issued by regulation for certain activities nationwide. If certain conditions are met, the specified activities can take place without the need for an individual or regional permit.

Perennial Stream – A stream that flows year-round due to surface runoff and groundwater discharge. A perennial stream is generally lower than the surrounding water table. These are generally shown as solid blue lines on USG maps.

Phase II National Pollutant Discharge Elimination System (NPDES) – The U.S. Environmental Protection Agency's permitting program for storm water discharges from municipal separate storm sewer systems (MS4's) to benefit water quality. The City of Florence was included in the final regulations issued in 1999.

Private Drainage System – The constructed or natural portion of the drainage system including pipes, channels, basins, etc. which convey storm water runoff primarily through private property and not critical to the operation of the storm water system in the

prevention of flooding. The private property owner is responsible for maintenance of this system.

Public Drainage System – The constructed or natural portion of the drainage system including pipes, channels, basins, etc. which convey storm water runoff which has been defined as facilities critical to the operation of the Waters of the City of Florence. The public drainage may be located on public or private property, however, where located on private property, an adequate right-of-way or easement should be dedicated to the City of Florence. The City will provide maintenance services for the public drainage system based on a prioritization of the adverse effects of the storm water issue.

Soft Bank Stabilization – Streambank repair and stabilization methods which include a combination of slope control, vegetation, and biodegradable erosion control products that create a stable but deformable bank.

Storm Frequency – The storm frequency or return period represents the likelihood that a storm of that magnitude will occur. The term "100-year flood" is misleading. It is not the flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1-percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The 25-, 10-, 5-, and 2-year floods have a 4-, 10-, 20-, and 50-percent chance respectively of occurring in any year. To put this in perspective, a home within the 100-year floodplain has a 26 percent chance of suffering flood damage during the term of a 30 year mortgage.

Storm Water Detention – The temporary storage of storm water runoff in a basin or other structure for the purposes of delaying and attenuating the peak flows from a system. A detention basin is dry except during rainfall events.

Storm Water Retention – The temporary storage of storm water runoff, generally in a pond, for the purposes of delaying and attenuating the peak flows from a system. A retention basin is "wet" or holds runoff at all times for the purposes of aesthetics or storm water quality.

U.S Army Corps of Engineers (COE) – The branch of the Federal government charged with the responsibility of planning, designing, building and operating the nation's water resources and permitting activities that would affect these resources. The City of Florence is within the Louisville District of the COE.

Water Quality Volume – A computed volume of water that must be treated to meet water quality goals.

Waters of the Commonwealth of Kentucky – Streams shown as solid or dashed blue lines on the most recent version of the USGS 7.5' topographic map. The solid blue lines are generally defined as perennial streams and the dashed blue lines as intermittent streams.

Waters of the City of Florence – That portion of the public drainage system which is regulated by the City of Florence and more precisely defined in this Plan. These include, at a minimum, the Waters of the United States and the Waters of the Commonwealth.

Waters of the United States – The precise definition is found in the Federal Code of Regulations. In general, these are the waters under jurisdiction of the U.S. Army Corps of Engineers (COE) under the Clean Water Act. The COE generally interprets this to include all perennial, intermittent and ephemeral streams and wetlands.

Watershed – The land area that drains to a specific point of interest. Also called a drainage basin.

Wetland – An area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support vegetation that is typically adapted for saturated soil conditions. These include swamps, marshes, ponds and similar areas.

CHAPTER 3

EXISTING STORM WATER REGULATIONS

City of Florence storm water is governed by a series of ordinances and regulations with different agencies responsible for various activities. The City, the county (Boone), the state of Kentucky, and the federal government each have regulations and responsibilities relating to storm water. This chapter describes the responsibilities of each agency and the governing regulations.

3.0 City of Florence

The Florence Public Services Department has the following responsibilities with respect to storm water:

- Phase II NPDES/KPDES storm water permit compliance
- Capital Improvement Projects to public drainage systems
- Storm Facility Maintenance of public drainage systems
- Code Enforcement
- Customer Complaint / Request
- GIS Mapping
- Inspection of erosion control and drainage facilities as part of approved subdivisions or within proposed or existing easements
- Inspection and maintenance of five regional detention basins and three regional retention basins
- Annual inspection of approximately 100 private detention basins
- Collection of storm impact fees

Storm water permit compliance activities are organized under the six minimum measures mandated by EPA. These are described as follows:

- 1. Public Education and Outreach: distribution of public education materials about steps individuals can take to reduce pollutants. Project SIGNS (Signs Inspire Great Neighborhood Streams) is one such program. Tips and more information are provided on the City's web site.
- 2. Public Participation/Involvement: Banklick Watershed Council is one of the ways the public can participate in storm water activities. The Great American Clean Up day is another example.
- 3. Illicit Discharge Detection and Elimination: identification of illegal or improper connections and discharges to the storm drainage system. Monitoring of storm outfalls (discharge points) during dry weather is one

technique for identifying illicit discharges. Enforcement of ordinances and sewer repair can eliminate these discharges.

- 4. Construction Site Runoff Control: controlling of erosion and sedimentation. A Best Management Practices guide for developers presents practical ways erosion can be prevented. Other tools are site plan review, site inspections during construction, and a community hotline.
- 5. Post-Construction Runoff Control is best accomplished by practices that are constructed during development. One way this is accomplished is a thorough site plan review. Following completion of construction, storm water facilities (such as detention basins and catch basins) must be inspected and maintained.
- 6. Pollution Prevention/Good Housekeeping: activities such as street sweeping and spill response can reduce pollutants in storm water.

Measures 4 and 5 are most closely linked with storm water drainage and flooding issues. Paramount is the City's control of construction through the site plan review process and maintenance of storm water drainage facilities.

The following regulations and ordinances address storm water issues in the City:

- Florence Ordinance Chapter 51 Storm Water Detention Regulations
- Florence Ordinance Chapter 54 Storm Water Drainage System
- Florence Ordinance Chapter 153 Subdivision Regulations
- Florence Ordinance Chapter 155 Flood Damage Prevention
- Florence Surface and Storm Water Drainage Master Plan 1990 (adopted by City)

Maintenance of drainage facilities is addressed as follows:

Paragraph 54.05 Authority Over Design, Maintenance and Inspection

- Exclusive jurisdiction for design and maintenance of public storm facilities in the City.
- Exclusive jurisdiction for maintenance, repair, etc. of facilities on all city streets, etc. and other public ways and easements.

Florence Surface and Storm Water Drainage Master Plan (1990)

In addition to the creation of a storm water utility to enable collection of storm impact fees, certain policy statements were adopted. These are:

- The property owner shall be responsible for maintenance of facilities located on their land unless modified or dedicated and accepted. City shall have the right to enter said land for maintenance if necessary and be reimbursed for costs.
- The City shall assume maintenance responsibilities for regional basins to the greatest extent possible with equitable method for recovering costs of maintenance with users.
- Maintenance agreements for basins shall be cross-referenced to plats.
- Drainage easements shall be provided for construction, maintenance and repair.
- Every basin shall be legally defined in either deed or plan and the maintenance responsibilities specified.
- 3.1 Boone County Planning Commission

The Boone County Planning Commission has the following responsibilities with respect to storm water:

- Plan review and approval with technical comments provided by Florence City Engineer.
- Inspection of erosion control and drainage facilities related to individual lots by Boone County Building Inspector (may be transferred to Florence).
- Inspection of erosion control and drainage facilities related to commercial and industrial development

The following regulations and ordinances address storm water issues in Boone County. Florence regulations and ordinances would supersede Boone County regulations in instances of discrepancy.

- Boone County Comprehensive Plan.
- Boone County Zoning Regulations.
- Boone County Subdivision Regulations.

These regulations address basic design criteria of storm water systems, runoff control facilities (detention), and erosion control.

• Boone County Street, Storm and Sidewalk Specifications.

These specifications address storm water pipe and structure materials and installation.

The following regulations and ordinances address storm water issues in the County:

Boone Co. Subdivision Regulations

Storm Water Management, Drainage and Residential Lot Grading

• Property owner shall be responsible for facilities located on private property where runoff is principally collected within that property and minimally discharged over a larger area before the storm water naturally drains on adjacent properties.

Maintenance of Retention/Detention Basins

- In all commercial and industrial developments, the owner of each lot and/or the developer shall be responsible for maintaining each retention/detention areas.
- In residential subdivision, all Detention Basins shall be deeded to the appropriate legislative body.
- For any Retention ponds, only the appropriate easement around inlet structures and outlet structures, and a retention easement over the area of the fifty-year storm event shall be dedicated to the appropriate legislative body.
- Maintenance shall be noted on Improvement Plan.
- 3.2 Commonwealth of Kentucky Division of Water (DOW)

The primary responsibilities of the Division of Water with respect to storm water involve the following:

• Section 401 Water Quality Certification of all 404 permitting of activities within the Waters of the Commonwealth - generally defined as Perennial Streams (blue line on USGS quad), Intermittent Streams (dashed blue line on quad) or wetlands. See Section 3.3 below.

The Division of Water requires compensatory mitigation for all permanent stream losses greater than 200 feet in length or wetland greater than 1 acre.

- KPDES stormwater permitting of construction activities disturbing greater than 1 acre.
- KPDES storm water permitting of certain industrial activities.

- KPDES stormwater permitting for municipal storm systems (described at beginning of this section).
- Flood Plain Construction permitting of fill or structure in flood plain if drainage area is greater than 1 square mile.
- Dam Construction permitting of dams if distance from toe to top of dam is 25 feet or greater or impounds 50 acre-feet.
- Dam Safety inspection, maintenance and repair of existing dams.

The following publications offer guidance with respect to these issues:

Kentucky Division of Water Best Management Practices for Construction Activities

Kentucky Department of Highways Drainage Guidance Manual

Contact information for the Division of Water is provided in Appendix B.

3.3 United States – U.S. Army Corps of Engineers (COE)

The primary responsibility of the Corps of Engineers with respect to storm water involve the permitting of activities within the Waters of the U.S. generally defined as perennial streams (blue line on USGS quad), intermittent streams (dashed blue line on quad) and ephemeral Streams (streams with defined streambed and banks) or wetlands [Individual 404 Permit or Nationwide Permit].

Certain activities can be covered with a nationwide permit (much like a "general" permit). Because 401 water quality certifications must be issued for every 404 permit, the Corps and Division of Water requirements must both be met. The following table outlines these requirements for nationwide permits.

Table 1Corps of Engineers Nationwide PermitsStorm Water Management and Related Activities

NWP No.	Activity	COE Requirement	DOW Requirement
3	Maintenance	< 200' of stream, PCN	< 200' of stream or
			< 1 acre wetland
7	Outfall Structures	Only disturb immediate	Non-sewage, non-
		area, PCN	Outstanding Resource
			Water
12	Utility Line	< 0.5 acres loss of	< 2 times stream
		waters	width
13	Bank Stabilization	< 500' of stream and	< 200' stream
		< 1 cu yd fill/l f	
14	Transportation (linear)	< 0.5 acres loss of	< 200' stream in
		waters, PCN	watershed < 250 ac
18	Minor Discharges	< 25 cu yd; PCN if	None additional
		> 10 cu yd	
19	Minor Dredging	< 25 cu yd	None additional
31	Maintenance of Existing Flood	Establish maintenance	< 200'
	Control Facilities	baseline	
33	Temporary Construction Access	PCN	None additional
	and Dewatering		
39	Residential, Commercial and	< 0.5 acres loss of	< 200'
	Institutional Developments	waters or < 300' stream	
41	Reshaping Drainage Ditches	PCN if > 500'	None additional
43	Storm water management facilities	< 0.5 acre or 300'	Not in solid blueline
		stream	stream

PCN: preconstruction notification

Each Nationwide Permit has specific terms. Consult Appendix C for more information. If a project exceeds the thresholds in the table, an individual permit is required.

• COE – requires compensatory mitigation for aquatic resource impacts that are adversely impacted by issuance of permit. This supports the policy for "no overall net loss" of wetland and other waters of the U.S.

Compensatory mitigation can include:

-Creation	-Out-of-kind mitigation
-Restoration	-Buffers
-Enhancement	-Upland areas
-Preservation	-Riparian areas
-Structure removal	-Mitigation banks
-On-site mitigation	-In-lieu fees
-Off-site mitigation	-In-kind mitigation

Contact information for the Louisville District Corps of Engineers is provided in Appendix C.

- 3.4 Other Agencies
 - Federal Emergency Management Agency (FEMA)
 - Flood Plain administered by Boone County Building Inspector for determination of building lot.
 - Map amendments and revisions go through FEMA.
 - Boone County Conservation District
 - Public education and information
 - Florence Fire/EMS Department

- Hazardous waste

• Boone County Department of Emergency Management

- Hazardous material discharges

- EPA
 - Hazardous material discharges. Florence is required to notify EPA of any spills.
 - Phase II NPDES is administered in Kentucky by the Division of Water.

CHAPTER 4

STORM WATER POLICY STATEMENTS

To address the recent changes in regulations, to clarify responsibilities, and to plan storm water drainage facilities that will accommodate future growth, the following policy statements are suggested.

4.0 Waters of the City of Florence

The City seeks to define public water for the purpose of providing consistency when responding to requests for storm water maintenance while still supporting public health, safety, the environment, economic feasibility, legal liability and regulatory responsibility.

Public waters of the City of Florence shall be defined as follows:

- Waters of the Commonwealth of Kentucky ... these are streams delineated as blue lines (perennial streams) or dashed blue lines (intermittent streams) on the U.S. Geological Survey quadrangle maps. These streams are also classified as Waters of the United States. Waters of the U.S. also include ephemeral streams which will likely be included as Waters of the City of Florence under the criteria below. However, ephemeral streams will not automatically be included as Waters of the City of Florence.
- Curbs, gutters and other storm water conveyances located within City of Florence rights-of-way.
- Regional storm water basins owned and maintained by the City of Florence.
- All storm water pipes or channels located within an drainage easement dedicated to and accepted by the City of Florence. This does not include drainage easements between lots or along property lines where no defined storm water conveyance has been constructed. The purpose of these drainage easements is to prevent obstructions to the natural drainage paths.
- Any ephemeral stream or defined channel having a drainage area greater than or equal to 25 acres.

Exceptions include:

- Privately owned and maintained pond or drainage basins.
- State highway rights-of-way or storm drainage systems (these are the responsibility of the Department of Highways).
- Drainage areas greater than or equal to 25 acres when located entirely within one lot or a single commercial or industrial development.
- Drainage area greater than or equal to 25 acres when no land-use other than agricultural lies upstream.

Inclusion of a storm water conveyance as Waters of the City of Florence does not relieve the property owner of:

- Routine maintenance to include mowing, trash and debris removal.
- No placement of any obstruction within the Waters of the City of Florence.

Waters of the City of Florence shall include dedicated easements as well as that area necessary for the conveyance of the 100-year, 24-hour storm event and a 10-foot buffer zone on either side of this flood plain.

4.1 Drainage Easement

The City seeks to identify which storm water conveyance systems will be accepted by the City for maintenance. All systems which convey Waters of the City of Florence should be dedicated to the City. All facilities must meet the standards of construction for the City and be formally accepted through a recorded plat or deed of easement. Any systems conveying Waters of the City of Florence which are not currently in a drainage easement must be dedicated to the City prior to maintenance work being performed, except in the case of emergencies. Initially, it is recommended that the City not proactively pursue acquisition of easements but include this in the process as complaints and other maintenance requests require further action.

It is incumbent on the developer/builder to note the 100-year flood elevation and the minimum (building) opening elevation on each property plat and subsequent building permit to reduce the risk of basement flooding. Both filling and excavation are prohibited within a drainage easement.

It is important to distinguish between drainage easements in which a storm water facility is constructed and requires maintenance versus a drainage easement along a property line to preserve the natural drainage paths. These easements will not be maintained by the City. It should be noted that no excavation or filling of these is permitted.

4.2 Drainage Maintenance Agreements

The City seeks to formalize the process of a development accepting maintenance of their privately-owned storm water systems. The purpose is to more clearly define and set out the duties and responsibilities of the owner in maintenance of their facilities in lieu of plan notes which are forgotten and generally not enforceable. A sample agreement is included in Appendix D. As described in the sample agreement, the City may inspect private facilities as deemed necessary and seek corrections to deficiencies. If safety issues become apparent, the City will notify the appropriate regulatory authority.

4.3 Maintenance Requests

The Public Services Department will respond to requests for maintenance involving Waters of the City of Florence. The responses shall be prioritized to best utilize the available resources. Resource constraints will determine the timing and manner of responses to maintenance requests. The priorities should be ranked in the following order:

- 1. Erosion affecting public safety
- 2. Building flooding
- 3. Basement flooding
- 4. Erosion affecting public improvements
- 5. Erosion affecting property improvements
- 6. Street flooding
- 7. Sedimentation or debris affecting storm water capacities
- 8. Maintenance of storm water basins
- 9. Maintenance of storm water structures
- 10. Nuisance yard flooding
- 11. Erosion affecting aesthetics or general property maintenance
- 4.4 Water Quantity Detention Credits

With the implementation of the Storm Drainage Service Charge, the City began a program of allowing for drainage charge credit adjustments up to 85% for all properties other than single-family residential. At the time, detention requirements were based on the 1988 Boone County Subdivision Regulations. The City of Florence has since added detention requirements to its ordinances and Boone County has revised its subdivision regulations to more stringent criteria.

Since detention is a requirement of both the City of Florence and Boone County regulations, and has been in place for over 15 years, it may be appropriate to make adjustments to this credit by one or more of the following methods:

1. Elimination of credit for water quantity.

- 2. Reduction of the credit.
- 3. Additional credits for detention exceeding requirements.
- 4. Additional credits for water quality controls. (see item 4.5)
- 5. Credits for preparation of watershed studies or other studies which benefit the City in its implementation of the Phase II NPDES program.
- 6. Credit for utilization of a regional detention basin.
- 7. Differential credits for new versus existing development.

It is recommended that these be studied further and estimates prepared for the effect on storm drainage revenues. Northern KY Sanitation District No. 1 instituted a new credit policy in 2004 which should be reviewed for consistency within the region.

4.5 Post-Construction Water Quality

The City seeks to improve water quality of storm water runoff by establishing incentives and/or requirements for control and removal of pollutants after construction and stabilization of a development. Issues that will be reviewed in the development of these incentives and/or requirements will include:

- 1. Adding the computation of a water quality volume (defined as that quantity of water that must be treated to a specified level).
 - a. Water quality volume based on impervious area, or
 - b. Water quality volume based on first-flush rainfall (0.5 to 1 inch).
- 2. Allow credit on storm water utility user fee for water quality controls such as:
 - a. infiltration,
 - b. bioretention
 - c. constructed wetland
 - d. sand filter
 - e. other techniques

4.6 Stream Stabilization / Repair

The City seeks to identify methods of stream bank stabilization that are compatible with the natural environment. Traditional hard bank stabilization methods such as riprap, gabions and concrete require long-term maintenance and generally are not compatible with restoring the stream to its natural condition.

The City will encourage the use of soft bank stabilization methods as the primary means of streambank repair. Hard bank stabilization methods shall be used only in cases where existing area constraints or velocities preclude the use of other methods. Soft methods shall include herbaceous ground covers, shrubs and trees suitable for the application. Structural reinforcement of banks can be done with root wad revetment, coir fiber log revetment, log crib revetment, live cribwall, log crib revetment, and others as appropriate. If installed properly, these techniques will reinforce the bank and allow vegetation to grow and restore the channel to natural conditions. Non-structural bank repair can include regarding to less the 3:1 slope, and plantings of willow stakes.

More details are provided in Section 5.

4.7 Stream Mitigation

The City seeks to restore Waters of the City of Florence using in-lieu fees. (In lieu fees are those collected to compensate for loss of Waters as part of a COE permit. Northern Kentucky University and the Kentucky Department of Fish and Wildlife Resources are two agencies that manage and allocate in-lieu funds.)To Use this funding, degraded streams should be identified which would benefit from restoration, restoration activities should be planned, and the necessary easements should be acquired. These streams will be prioritized and listed as eligible for stream restoration. The City will work with local groups to identify projects than discuss potential projects with Northern Kentucky University and Kentucky Fish and Wildlife.

The City will work with developers to first avoid existing streams and minimize development requiring mitigation and second to encourage mitigation projects with the City of Florence or its watersheds.

4.8 Construction Erosion and Sediment Control Practices

Construction erosion and sediment control practices are covered in the Boone County Subdivision Regulations. Erosion and sediment control are important elements of the Phase II storm water permit. The City is working on this issue with the Kentucky MS4 work group to develop a Best management practices manual as well as a model ordinance. Once completed, this manual and ordinance should be adopted by the City.

4.9 Watershed Studies / Floodplains

Watershed and flooplain studies could allow the City to better review site development plans, anticipate cumulative effects, and plan for future growth. The FEMA Flood Insurance Study for the City of Florence is very limited. It covers only a portion of Utterback Creek and does not include flood elevations. As a result, there is very little information on the locations of floodplains within the City. Watershed studies should be undertaken to create the following:

- Establish the post-development 100-year flood plains.
- Develop a storm water management plan for each watershed to minimize further drainage problems and reduce existing problems.

Without a comprehensive study of each watershed, the impact of small developments and drainage improvements cannot be fully assessed. This is a large undertaking and should be phased in and budgeted for in the long term. After the watershed study is completed, it can be used to model new developments and drainage projects.

CHAPTER 5

STREAM REPAIR PRACTICES

5.0 Introduction

Natural streams are dynamic systems that are constantly changing in an effort to maintain balance of storm flow, sediment load, soil and rock characteristics, vegetation, etc. In order to maintain this balance, streams change their physical dimensions with respect to alignment, width, depth, and slope. These changes can be accelerated by increased flow in the streams due to development of impervious areas.

As urban development has encroached on streams, these physical changes can cause damaging effects to the adjacent lands. There are several objectives that are pursued when looking at stream repair projects. These include:

- Clean Up Stream Corridor removal of trash and debris enhances the aesthetic appeal of streams, improves hydraulic characteristics, and benefits water quality.
- Create More Natural Stream Corridor this enhances the aesthetic appeal of streams, but also provides aquatic habitat, and improves water quality.
- Minimize Structural Damage erosion which gets out of hand can threaten roads, utilities, and even buildings.
- Prevent Streambank Erosion and Improve Channel Stability creation of a more balanced stream system will minimize the need for future repair projects.
- Improve the Quality of the Stream and Support Aquatic Life a natural channel and floodplain are the first steps towards restoration of aquatic habitat and life.
- 5.1 Stream Repair Practices
 - Hard Bank Stabilization includes installation of structural systems to protect banks from further erosion. These are generally used where erosion threatens structures, available space for repairs is a constraint, or

highly erosive velocities are present. Hard bank stabilization practices include:

- Riprap
- Boulder revetment
- Concrete walls or slopes
- Gabion mattresses or baskets
- Pre-fabricated concrete structures
- Piping
- Soft Bank Stabilization includes a combination of slope control, vegetation, and biodegradable erosion control products that create a stable but deformable bank. These are preferable and should be the basis for repair in non-emergency situations. If necessary, they can be used in conjunction with hard stabilization. Soft bank stabilization practices include:
 - Streambank shaping
 - Coir fiber logs (for toe of slope stabilization)
 - Natural material revetments (such as root wads and cribwalls)
 - Erosion control fabrics
 - Live stakes (for very small slumps or for newly created channel)
 - Live fascines (for moderate slumps or newly created channels)
 - Brush mattresses
 - Vegetation establishment

Appendix E contains descriptions of many stream restoration practices.

CHAPTER 6

REGIONAL STORM WATER CONTROL FACILITIES

Regional storm water control facilities, generally detention or retention basins, provide better control of the peak discharge than smaller, randomly placed basins. Regional basins are encouraged in the Boone County Subdivision Regulations for commercial and industrial development and required for residential development. Regional basins can also play a role in reducing flooding within existing developments if suitable locations can be found and the land acquired.

As part of this Plan update, potential regional basin locations were investigated. The locations of these basins are listed below as well as shown on the Boone County GIS mapping. There are numerous issues that must be addressed in further detail to assess the feasibility of constructing basins in these locations. These include effectiveness of basin in reducing flows, construction costs, maintenance costs, availability of land and permitting if constructed on Waters of the U.S. or Waters of the Commonwealth.

			Maximum	Maximum	
Basin		Drainage	Storage	Surface	Maximum
No.	Name	Area (ac)	(ac-ft)	Area (ac)	Height (ft)
1	Fowlers Fk. Rd	66	102	12	40
2	Skyview Dr.	166	82	7	40
3	Dilcrest	53	99	10	30
4	Saddlebrook	72	66	9	20
5	Wetherington Blvd	187	86	9	25
6	Industrial Rd	376	22	2	20
7	Dream St.	218	36	4	15
8	Florence Mall	221	59	12	10
9	Mall Rd.	160	163	9	25

Table 2Potential Regional Detention Basins

Detention basins that impound less than 300 linear feet of an intermittent stream (shown as a dashed blue line on the USGS topographical map) qualify for coverage under a Nationwide Permit (see Table 1). Impacts on a perennial stream require an individual water quality certification from the Division of Water. Impacts on any stream greater than 300 linear feet (or 0.5 acres) require an individual 404 permit and water quality certification.

APPENDIX A

STORM WATER PERMIT ACTIVITY SCHEDULES

Minimum Control Measure 1 Public Education & Outreach	Kentucky DEP General Permit Section Number	No.	вмр	Year 1 Stated Activities	Year 2 Stated Activities	Year 3 Stated Activities	Year 4 Stated Activities	Year 5 Stated Activities	Measurable Goals	Responsible Party
				Update the City web site to include storm water information	Maintain and expand stormwater section of City web site	Maintain and expand stormwater section of City web site	Maintain and expand stormwater section of City web site	Maintain and expand stormwater section of City web site	Number of web site hits	City of Florence
				Publish Storm Water article in "What's Happening in Boone County"	Publish Storm Water article in "What's Happening in Boone County"	Publish Storm Water article(s) in local media	Publish Storm Water article(s) in local media	Publish Storm Water article(s) in local media	Number of articles published Circulation number of publication	City of Florence
KDEP REQUIREMENT: Implement a public education program to distribute educational materials to the community or conduct ecuivation outreach activities about the immacts	KDEP Permit KYG200000 Section		Develop / Distribute torm Water				Develop and distribute new education materials to City households	Develop and distribute new education materials to City households	Number of materials distributed	City of Florence
of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.	A(1)	- ≥ 8	Education laterials for ineral Public			Develop spots for general public for visual media	Run general public visual media spots	Run general public visual media spots	Number of visual media spots	City of Florence
			I		Develop storm water messages for quarterly water bills	Post storm water messages on quarterly water bills	Post storm water messages on quarterly water bills	Post storm water messages on quarterly water bills	Number of messages posted	City of Florence
						Develop and distribute materials about City storm water hotline	Distribute materials about City storm water hotline	Distribute materials about City storm water hottine	Number of materials distributed	City of Florence
KDEP REQUIREMENT- Immement a public					Develop outreach materials for commercial functions	Distribute commercial materials	Develop outreach materials for commercial functions	Distribute commercial materials	Number of materials distributed	City of Florence
event in construction in the advance of the advance	KDEP Permit KYG200000 Section A(1)	12	Conduct Education utreach for commercial Activities			Expand City's community education program to include commercial housekeeping	Continue commercial housekeeping component of community education program	Continue commercial housekeeping component of community education program	Number of establishments contacted	City of Florence
politutaris in storm water runor.						Develop spots for commercial establishments for Visual Media	Run Commercial visual media spots	Run Commercial visual media spots	Number of visual media spots	City of Florence
KDEP REQUIREMENT: Implement a public				Develop classroom education materials - elementary level	Distribute classroom materials to elementary schools	Distribute classroom materials to elementary schools	Distribute classroom materials to elementary schools	Distribute classroom materials to elementary schools	Number of classrooms using educational materials	City of Florence
eucation program to usuration euclarional materials to the community or conduct equivalent outreach activities about the impacts of storm water discrigages on water bodies and the stars that the outlic can take to reduce	KDEP Permit KYG200000 Section A(1)	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	Provide laterials For Classroom Education			Develop classroom education materials - secondary level	Distribute classroom materials to secondary schools	Distribute classroom materials to secondary schools	Number of classrooms using educational materials	City of Florence
pollutants in storm water runoff.							Develop classroom education materials - high school level	Distribute classroom materials to high schools	Number of classrooms using educational materials	City of Florence

Appendix A

Activity Implementation Schedule

City of Florence, KPDES Annual Report

City of Florence, KPDES Annual Report

Appendix A

Minimum Control Measure 2 Public Involvement	Kentucky DEP General Permit Section Number	No	BMP	Year 1 Stated Activities	Year 2 Stated Activities	Year 3 Stated Activities	Year 4 Stated Activities	Year 5 Stated Activities	Measurable Goals	Responsible Party	
KDEP REOUREMENTS. At a minimum, compty with State, Tritibal. and local public notice requirements when implementing a public involvement participation program.	KDEP Permit	č	Conduct Stream	Participate and support "Great American Clean-up day"	Number of paticipants	City of Florence					
Activities may include representation on local storm water management voy groups, public hearings, education volunteers, assisting with program coordination and monitoring efforts.	A(2) 364001		Cleanup Programs			Develop local stream (clean-up program	Conduct stream clean- up event	Conduct stream clean- up event	Number of participants	City of Florence	
KDEP RECUIREMENTS: At a minimum, compty with State, Tribal, and local public noibic requirements when implementing a minibic involvement barticipation nordam.	KDEP Permit		Establish Volunteer			Develop volunteer	Conduct volumteer	Conduct volunteer	Number of volunteers	City of Florence	
Activities may include representation on local storm water management work groups, public hearings, education volunteers, assisting with program coordination and monitoring efforts.	KY G200000 Section A(2)	22	Stream Monitoring Program			monitoring program	monitoring	monitoring	Number of volunteer monitoring sites	City of Florence	
KDEP REQUIREMENTS: At a minimum, comply with State. Tripal, and local public notice requirements when implementing a public involvement participation program.	KDEP Permit	0 2	onduct Storm Drain	Continue storm drain stenciling/ marking	Number of storm drains stenciled/ marked per year	City of Florence					
Activities may include representation on local storm water management work groups, public hearings, education v olunteers, assisting with program coordination and monitoring efforts.	A 7 020000 360101	2. 2.	Program			Develop plan for new group involvement	Promote group involvement	Promote group involvement	Number of groups/ organizations involved	City of Florence	
KDEP REQUIREMENTS: At a minimum, comply with State, Tribal, and local public nocle requiremist when implementing a public involvement participation program.	KDEP Permit		Establish	Expand City hottine to include storm water issues	Continue to maintain City storm water hotline	Continue to maintain City storm water hottine	Continue to maintain City storm water hottine	Continue to maintain City storm water hottine	Number of hotine calls per year	City of Florence	
Activities may include representation on local som water management work groups, public hearings, education volunteers, assisting with program coordination and monitoring efforts.	KYG20000 Section A(2)	4 4	Hotlines		Expand City web site to include citizen reporting				NA	City of Florence	
KDEP REQUIREMENTS: At a minimum, compty with State, Tribal, and local public notice requirements when implementing a public involvement participation program.	KDEP Permit		Conduct Community	Conduct two (2) clean, up projects	Conduct two (2) clean- up projects	Number of residents utilizing program	City of Florence				
Activities may include representation on local norm water management work groups, public hearings, education volunteers, assisting with program coordination and monitoring efforts.	A 1320000 36000	S.	Clean-Up Projects	Participate and support "Great American Clean-up day"	Number of paticipants	City of Florence					
KDEP REQUIREMENTS: At a minimum, comply with State, Tribal, and local public notice requirements when implementing a public involvement participation program. Activities may include representation on local stom water management work groups, public	KDEP Permit KYG200000 Section A(2)	2.6	Conduct Stream Bank Protection Workshops			Develop workshop materials	Conduct workshops	Conduct workshops	Number of workshops conducted	City of Florence	
program coordination and monitoring efforts.											

Minimum Control Measure 3 Illicit Discharge Detection	Kentucky DEP General Permit Section Number	ů V	BMP	Year 1 Stated Activities	Year 2 Stated Activities	Year 3 Stated Activities	Year 4 Stated Activities	Year 5 Stated Activities	Measurable Goals	Responsible Party
KDEP REQUIREMENT: Develop, implement	KDEP Permit		Repair	Continue to repair	Continue to repair	Continue to repair	Continue to repair	Continue to repair	Number of leaks found per year	City of Florence
and enforce a program to defect and eniminate illicit discharges into your system	KY GZUUUUU, SECIION A(3)(i)	ی ۲	Sewer Lines	sewer leaks	sewer leaks	sewer leaks	sewer leaks	sewer leaks	Number of linear feet of pipe replaced	City of Florence
KDEP REQUIREMENT: Develop, implement	KDEP Permit	000	Conduct Regular Storm	Continue to clean catch basins	Continue to clean catch basins	Continue to clean catch basins	Continue to clean catch basins	Continue to clean catch basins	Number of catch basins cleaned	City of Florence
an enous a program to verex and emminate illicit discharges into your system	A(3)(i)	3.0	Sewer System Cteaning	Continue to clean sewer pipes	Continue to clean sewer pipes	Continue to clean sewer pipes	Continue to clean sewer pipes	Continue to clean sewer pipes	Number of linear feet of pipe cleaned	City of Florence
KDEP REOUIREMENT: Develop and implement a plan to detect and address non-	KDEP Permit	Ċ	Conduct Inspection of	Conduct CCTV inspections	Conduct CCTV inspections	Conduct CCTV inspections	Conduct CCTV inspections	Conduct CCTV inspections	Number of linear feet inspected	City of Florence
storm water discharges, including illegal dumping, to your system	A(3)(iv)	2	Sanitary Sewer System			Conduct manhole inspections	Conduct manhole inspections	Conduct manhole inspections	Number of manholes inspected	City of Florence
KDEP REOUREMENT: Develop and implement a plan to detect and address non- storm water disonarges, including illegal dumping, to your system	KDEP Permit KYG200000, Section A(3)(iv)	3.4	Determine Sources of Sanitary Sewer Overflows	Search and monitor for illicit discharges (sanitary sewer overflows)	Search and monitor for illicit discharges (sanitary sewer overflows)	Search and monitor for S Illicit discharges (sanitary sewer overflows)	Search and monitor for Illicit discharges (sanitary sewer overflows)	Search and monitor for illicit discharges (sanitary sewer overflows)	Number of overflows per year	City of Florence
KDEP RECUIFEMENT: To the extent allowable under State. Tribal or local law, effectively pohibit, through or obriance or other regulatory mechanism, non-storm water discharges into your storm sever system and implement appropriate enforcement procedures and actions	KDEP Permit KYG200000, Section A(3)(iii)	3.5	Expand Sewer Use Ordinance		Review current sewer use ordinance	Develop IDDE ordinance		NA	Modified ordinance to incorporate illicit discharge provisions	City of Florence
KDEP REOUIREMENT: Develop, if not already completed, a storm sever system map, strowing the location of all waters of the United States that receive discharges from those outfalls	KDEP Permit KYG200000, Section A(3)(ii)	3.6	Continue Storm Sewer Map Development		Update storm sewer maps within GIS	Update storm sewer maps within GIS	Update storm sewer maps within GIS	Update storm sewer maps within GIS	Number of outfalls mapped	City of Florence
KDEP REOUREMENT: Develop and implement a plan to detect and address non-	KDEP Permit KYG200000, Section				Develop program to eliminate connections/ discharges	Develop program to eliminate connections/ discharges	Identify area and conduct annual search	Identify area and conduct annual search	Square miles evaluated for illicit connections	City of Florence
dumping, to your system	A(3)(iv)						Search system for illicit connections	Search system for illicit connections	Number of illicit connections found	City of Florence
		3.7	Elimination Program (IDEP)			Develop internal class materials	Conduct IDEP training classes	Conduct IDEP training classes	Number of training classes held	City of Florence
KDEP REQUIREMENT: Inform public employees, businesses, and the general public of hazards associated with illegal discharges	KDEP Permit KYG200000, Section A(3)(v)					Develop brochure for IDEP	Distribute brochure on IDEP	Distribute brochure on IDEP	Number of materials distributed	City of Florence
and improper disposal of waste				Continue with Health Dept. inspection program	Continue with Health Dept. inspection program	Continue with Health Dept. inspection program	Continue with Health Dept. inspection program	Continue with Health Dept. inspection program	Number of septic tanks inspected	City of Florence

Responsible Party	City of Florence	City of Florence	City of Florence	City of Florence	City of Florence	City of Florence	City of Florence	City of Florence
Measurable Goals	Number of site plans reviewed	Number of BMPs inspected	Number of construction sites visited	E A A	Number of manuals distributed	Number of workshops held	Implementation of consistent with requirements of Minimum Control Measure	Y N
Year 5 Stated Activities	Continue to review site plans	Continue to inspect existing BMP's	Continue to visit construction sites		Distribute BMP Manual	Conduct workshop on BMP manual	Continue to evaluate and implement until a level of continuity is reached of megards to MCM4	
Year 4 Stated Activities	Continue to review site plans	Continue to inspect existing BMPs	Continue to visit construction sites		Distribute BMP Manual	Conduct workshop on BMP manual	Continue to evaluate and implement until a level or contruity is reached in regards to MCM4	
Year 3 Stated Activities	Continue to review site plans	Continue to inspect existing BMPs	Continue to visit construction sites		Distribute BMP Manual	Develop workshop on BMP manual	Confinue to evaluate and implement until a level of continuity is reached of continuity is MCM4	
Year 2 Stated Activities	Continue to review site	Continue to inspect existing BMPs	Continue to visit construction sites	Develop Site Construction BMP Manual			Evaluate city regulations and ordinances	Expand City hotline to include construction site runoff issues
Year 1 Stated Activities	Continue to review site plans	Continue to Inspect existing BMPs	Continue to visit construction sites					
BMP	Construction Plan Review	BMP Inspection and Maintenance	Continue to Conduct Site Inspections		Develop Site Construction BMP Manuel		Ordinances and BMP Requirements for Construction Site Runoff	Community Hotlines
er No.	on 4.1	۲ 4 2	on 4.3		C) 4.4		C) 4	tion 4.6
Kentucky DE General Perm Section Numb	KDEP Permit KYG200000, Secti A(4)(ii)(D)	KDEP Permit KVC200000, Secti A(4)(ii)(F)	KDEP Permit KYG200000, Secti A(4)(ii)(F)		KDEP Permit KYG200000, Sect A(4)(ii)(A, B, and		KDEP Permit KYG20000, Sect A(4)(ii)(A, B, and	KDEP Permit KYG200000, Sec A(4)(ii)(E)
Minimum Control Measure 4 Construction Site Runoff Control	KDEP REQUIREMENT: Your program must include the development and implementation of Procedures for site plan review which incorporate consideration of potential water quality impacts	KDEP REQUIREMENT: Your program must include the development and implementation of Procedures for site inspection and enforcement of control measures	KDEP RECUIREMENT: Your program must include the development and implementation of Procedures for site inspection and enforcement of control massures	KDEP REOUREMENT: Your program must include the development and implementation of(A) An ordinarios or other regulatory mechanism to require erosion and sediment	compoliance, to the extern allowable under State. Tribal, or local law, (B) Requirements for constructions the operators in implement appropriate encision and sediment control best management practices; and (C) Requirements	to constructions rate operators to control waste such as discarded building materials, concrete truck washour, chemicals, litter and sanitary waste at the construction site that may cause adverse impacts to water quality	KDEP REQUIREMENT: Your program must include the development and implementation of (A) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctoris to ensure controls, as well as sanctoris to ensure controlions site operatory to ensure tribal, or local law; (B) Requirements for construction site operatory to implement appropriate erosion and sedimentation appropriate erosion appropriate erosion and sedimentation appropriate erosion appropriate erosion appropriate appropriate erosion appropriate erosion appropriate erosion appropriate appropriate erosion appropriate erosion appropriate erosion appropriate appropriate erosion appropriate erosion appropriate erosion appropriate appropriate erosion appropri	KDEP RECUIREMENTS: Your program must include the decopment and implementation oi Procedures for receipt and consideration of information submitted by the public.

Minimum Control Measure 5 Post Construction Runoff Control	Kentucky DEP General Permit Section Number	ġ	BMP	Year 1 Stated Activities	Year 2 Stated Activities	Year 3 Stated Activities	Year 4 Stated Activities	Year 5 Stated Activities	Measurable Goals	Responsible Party
KDEP REQUIREMENT: Develop, implement and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre that are part of a larger common plan of development or sale, that discharge into the small MS4	KDEP Permit KYG20000 Section A(5)(i)	<mark>د هد</mark> ۲:	r IP Inspection and	Expand inspection/ naintenance of storm water BMPs	Continue inspection/ maintenance of storm water BMPs	Continue inspection/ maintenance of storm water BMPs	Continue inspection/ maintenance of storm water BMPs	Continue inspection/ maintenance of storm water BMPs	No. of BMP's inspected	City of Florence
KDEP REQUIREMENT: Ensure adequate long term operation and maintenance of BMPs	KDEP Permit KYG200000 Section A(5)(iv)			Conduct visual inspections of all privately owned detention/retention basins	Number of basins visually inspected	City of Florence				
					Review/ enhance development ordinance	Review/ enhance development ordinance			N/A	City of Florence
KDEP REQUIHEMENT: Use an ordinance or other regulatory mechanism to address post- construction runoff from new development and redevelopment projects	KDEP Permit KYG200000 Section A(5)(iii)	<u><u></u> <u></u></u>	rdinance for - Post onstruction unoff Zoning	Continue with site plan	Continue with site plan	Continue with site plan (Continue with site plan	Continue with site plan	Number of site plan reviews Number of new onsite	City of Florence City of Florence
				reviews	reviews	reviews	reviews	reviews	retention/detention basins	
									Number of fenced ponds	City of Florence
KDEP REQUIREMENT: Develop and implement strategies that include a combination of structural and or non-structural best	KDEP Permit KYG20000 Section	5.3 5.3	Develop Educational Aaterials for	Distribute runoff control materials	Number of materials distributed	City of Florence				
management practices (BMPs)	(a)(c)t		Developers	Develop developers mailing list	Update mailing list	Update mailing list	Update mailing list	Update mailing list	Number of developers contacted	City of Florence

City of Florence, KPDES Annual Report

Appendix A

Responsible Party	City of Florence City of Florence City of Florence City of Florence City of Florence City of Florence			City of Florence	City of Florence	City of Florence City of Florence		City of Florence		City of Florence			
Measurable Goals	Number of miles of streets cleaned Number of catch basins cleaned inspected system cleaned system cleaned Number of events Number of eains				Number of staff trained per year	Galions of used oil	recycled per year Gallons of used	antifreeze recycled per year	Number of sites using guidelines	Number of staff trained per year	Number of staff trained per year		
Year 5 Stated Activities	Conduct street sweeping on all streets	Conduct catch basin cleaning	Conduct storm system inspection	Conduct storm drainage system cleaning	Continue to inspect and clean storm inlets after every rain event	Perform detention basin maintenance (City owned basins)	Conduct classes on spill response and groundwater protection plan	Collect used oil	Collect read	antifreeze	Apply Storage Guidelines to City Site	Conduct classes on hazardous materials storage	Conduct classes on illegal dumping control
Year 4 Stated Activities	Conduct street sweeping on all streets conduct catch basin cleaning inspection drainage system drainage system cleaning				Conduct classes on spill response and groundwater protection plan	Collect used oil	Collact nead	antifreeze	Apply Storage Guidelines to City Site	Conduct classes on hazardous materials storage	Conduct classes on illegal dumping control		
Year 3 Stated Activities	Conduct street sweeping on all streets	Conduct catch basin cleaning	Conduct storm system inspection	Conduct storm drainage system cleaning	Continue to inspect and clean storm inlets after every rain event	Perform detention basin maintenance (City owned basins)	Develop class materials for city start	Collect used oil	Collect read	antifreeze	Apply Storage Guidelines to City Site	Conduct classes on hazardous materials storage	Develop class materials for city staff
Year 2 Stated Activities	Conduct street sweeping on all streets	Conduct catch basin cleaning	Conduct storm system inspection	Conduct storm drainage system cleaning		Perform detention basin maintenance (City owned basins)		Collect used oil		antifreeze	Apply Storage Guidelines to City Site	Conduct classes on hazardous materials storage	
Year 1 Stated Activities	Conduct street sweeping on all streets	Conduct catch basin cleaning	Conduct storm system inspection	Conduct storm drainage system cleaning		Perform detention basin maintenance (City owned basins)		Collect used oil				Develop class materials for city staff	
. BMP	Storm Drain System Cleaning					Spill Response and Prevention / Groundwater Protection Plan]	Used Used Automotive Fluids Recycling		4 Hazardous Materials Storage		6 Illegal Dumping	
Kentucky DEP General Permit No Section Number	KDEP Permit KYG20000 Section 6.1 A(6)					KDEP Permit KYG20000 Section 6.2 A(6)		KDEP Permit KYG200000 Section 6.: A(6)		KUGEP Permit KYG200000 Section 6. A(6)		KDEP Permit KYG200000 Section 6. A(6)	
Minimum Control Measure 6 Pollution Prevention and Good Housekeeping	KDEP REQUIREMENTS: Develop and implement an operation and maintenance and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations					KDEP REQUIREMENTS: Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations	KDEP REQUIREMENTS: Develop and implement an operation and maintenance program that includes a training component and has the utilimate goal of preventing or reducing pollutant runoff from municipal operations		reducing poliurant runori irom municipal operations	KDEP REQUIREMENTS: Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant unoff from municipal operations		KDEP REQUIREMENTS: Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant rundif from municipal operations	

City of Florence, KPDES Annual Report

Appendix A

Responsible Party	City of Florence		City of Florence City of Florence								
Measurable Goals	Linear feet of roadside ditch cleaned	Linear feet of ditchline rechannelized	Cubic yards of leaf litter collected	Number of materials distributed per year							
Year 5 Stated Activities	Continue to maintain	program	Continue with City wide leaf collection program	Distribute roadside maintenance education materials							
Year 4 Stated Activities	Continue to maintain	program	Continue with City wide leaf collection program	Distribute roadside maintenance education materials							
Year 3 Stated Activities	Continue to maintain	program	Continue with City wide leaf collection program	Distribute roadside maintenance education materials							
Year 2 Stated Activities	Continue to maintain	program	Continue with City wide leaf collection program	Coordinate with public education to develop residential education materials for roadside maintenance							
Year 1 Stated Activities	Expand roadside ditch	maintenance program	Continue with City wide leaf collection program								
BMP	Lawn Care										
Kentucky DEP General Permit No Section Number	KDEP Permit KYG200000 Section A(6)										
Minimum Control Measure 6 Pollution Prevention and Good Housekeeping		KDEP REQUIREMENTS: Develop and thement an operation and maintenance ogram that includes a training component and has the ultimate goal of preventing or reducing polulatin tunoff from municipal operations									

APPENDIX B

KENTUCKY DIVISION OF WATER INFORMATION & CONTACTS
ENVIRONMENTAL AND PUBLIC PROTECTION CA DEPARTMENT FOR ENVIRONMENTAL PROTEC DIVISION OF WATER
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			RESOURCE PLANNING & PROG SUPPORT Ron Price	RESOURCE PLANNING Larry Dusak	PROGRAM SUPPORT Linda Duncan	FINANCIAL MGMT. & BUDGET Tim Miller	PROJECT ADMINISTRATION Kelli Rice			
NMENTAL AND PUBLIC PROTECTION CABINET RTMENT FOR ENVIRONMENTAL PROTECTION DIVISION OF WATER			WATERSHED MANAGEMENT BRANCH Margaret Shanks	BASIN COORDINATION Kay Harker	NONPOINT SOURCE Corrine Wells	WATER QUANTITY MANAGEMENT Bill Caldwell				
			GROUNDWATER BRANCH Peter Goodmann	DATA DATA MANAGEMENT & SUPPORT John Shuttleworth	TECHNICAL SERVICES Jim Webb	PERMITS Beverly Oliver				
			WATER RESOURCES BRANCH Art Clay	FLOODPLAIN MANAGEMENT Ali Daneshmand	DAM SAFETY Ron Dutta					
	DIRECTOR David Morgan ASSISTANT DIRECTOR Sandy Gruzesky		DRINKING WATER BRANCH Donna Marlin	PERMITS & PLANS REVIEW Mike Riley	DISTRIBUTION Vacant	FACILITY PLANNING & COMPLANCE Lora Gowins	L TECHNICAL ASST. & OUTREACH Julie Roney			
			FIELD OPERATIONS BRANCH Tom Gabbard	LOUISVILLE Mike Mudd FRANKFORT Massoud Shoa	HAZARD Roger Martin LONDON	Keith Blair MADISONVILLE Ed Carroll	BOWLING GREEN William Baker COLUMBIA Sara Sproles	PADUCAH Vince Priddle	MOREHEAD Danny Fraley	FLORENCE Todd Giles
ENVIRC			WATER QUALITY BRANCH Tom VanArsdall	STANDARDS & SPECIFICATIONS Randall Payne	ECOLOGICAL SUPPORT John Brumley	WATER QUALITY CERTIFICATION Vacant	TMDL Vacant			
			FACILITIES CONSTRUCTION BRANCH Shafiq Amawi	MUNICIPAL PLANNING William Chlebowy	MUNICIPAL DESIGN & CONSTRUCTION Vacant	WASTEWATER FACILITIES REVIEW John Shupp				
			KPDES BRANCH Jory Becker	MUNICIPAL & COMMERCIAL Barry Elmore	INDUSTRIAL Vacant	INVENTORY & DATA MANAGEMENT Courtney Seitz				

Effective 1/15/2005

Dam Construction: http://www.water.ky.gov/permitting/damconstr/.

Last Updated on 9/29/2004.

Information related to obtaining a permit to construct a dam, applicable statutes, regulations and contact information.

Water Resources Branch Dam Safety Section

The Dam Safety and Floodplain Compliance Section shares responsibility with the Floodplain Management Section for the review and permitting of dams and hazardous impoundments as defined in KRS 151.100 and 401 KAR 4:030. A dam is defined as any impounding structure that is either 25 feet in height, measured from the downstream toe to the crest, or has a maximum impounding capacity of 50 acre-feet of water. Structures which fail to meet these criteria but have the potential to cause significant property damage or pose a threat to loss of life in the downstream area are regulated in the same manner as dams. All such structures except federal dams and those permitted by the Department for Surface Mining Reclamation and Enforcement must be reviewed by this office. Design criteria, hazard classification information and submittal requirements can be found in the publication, "Design Criteria for Dams and Associated Structures."

After the Floodplain Management Section issues a construction permit, responsibility for construction shifts to the Dam Safety and Floodplain Compliance Section. Construction inspections are performed periodically and during critical stages of work. Upon completion of construction, the owner submits a notice of completion and as-constructed drawings. When as-constructed drawings are received, a final inspection is conducted. If all work is satisfactory, the owner is granted permission to impound water, and the completed dam is placed on the inventory of dams kept by the Section.

For More Information Contact:

Ramendra Dutta 14 Reilly Road Frankfort, KY 40601 Phone: (502) 564-3410 Fax: (502) 564-9003 E-mail: <u>ramendra.dutta@ky.gov</u> Floodplain Construction: http://www.water.ky.gov/permitting/floodconstr/

Last Updated on 9/29/2004

Information on obtaining a permit to construct along a stream, applicable statutes and regulations, publications and contact information.

Water Resources Branch Floodplain Management Section

The Floodplain Management Section has the primary responsibility for the approval or denial of proposed construction and other activities in the 100-year floodplain of all streams in the Commonwealth. Typical activities permitted are dams, bridges, culverts, residential and commercial buildings, placement of fill, stream alterations or relocations, small impoundments and water and wastewater treatment plants.

In addition, activities which result in physical disturbances to wetlands or streams may also require a Water Quality Certification Permit. Visit the <u>Water Quality Certification</u> homepage for more information on how to obtain this permit.

The process for obtaining a permit begins with the submittal of a completed application with a location map, plans of the proposed construction and the addressing of public notice. If there is existing flood data on the proposed site (i.e., National Flood Insurance Program flood maps, Corps of Engineers flood studies or previous permit data), then a permit review may begin. If there is no existing data, the submittal of survey information is required in order to perform an in-house flood study of the area.

Section engineers use the Corps of Engineers HEC-2 and HEC-RAS computer programs to analyze the effects of the proposed construction on existing flood conditions. Use of this program (or flood studies if they are available) enables the establishment of expected 100-year flood heights and the delineation of the floodway (a portion of the floodplain that is restricted to little or no construction). From this analysis, construction limits for fills and buildings and required elevations for finished floors or floodproofing can be provided. For all construction, especially bridges and culverts, a check is made to ensure that the project has only minimal impacts on existing flood levels. Regulations limit the effect to a maximum of one foot. If the proposed project is unacceptable based on the review, the applicant is sent a denial letter with possible options.

If the reviewer determines the project meets regulatory requirements and all deficiencies have been corrected and all necessary modifications to the drawings have been made, a draft permit is written to be reviewed by the supervisor and branch manager. If they concur that the proposal meets all state floodplain laws, regulations and standards, the permit is prepared and signed. Appropriate requirements and limitations are listed on the permit. The permit also bears the condition that construction must begin within one year of the date of signature. If started within that one-year period, the permit is valid until project completion. If objections to the project have been raised, letters to those objecting are also sent with instructions as to their rights for a hearing under the statutes. The Floodplain Management Section will notify the applicant, in writing, within 20 working days from the date of receipt of the completed application whether the permit will be approved or denied. If deficiences are noted in the application, the applicant will be notified of them. The 20-day time period does not begin until a complete application package is submitted.

For More Information Contact:

Ali Daneshmand 14 Reilly Road Frankfort, KY 40601 Phone: (502) 564-3410 Fax: (502) 564-9003 Water Quality Certification: http://www.water.ky.gov/permitting/wqcert/

Last Updated on 5/20/2005

Anyone proposing to conduct activities that result in physical disturbances to wetlands or streams may need a Water Quality Certification (WQC) to ensure Kentucky Water Quality Standards will not be violated. This site contains information about obtaining a WQC and other program requirements.

401 WQC process

- Combined Application for Water Quality Certification and Permit to Construct Along or Across a Stream <u>MS Word Format</u>, <u>PDF Format</u>
- Instructions for Completing an Application <u>MS Word Format</u>, <u>PDF Format</u>
- <u>General Conditions for Water Quality Certifications</u>
- <u>Certification of Nationwide Permits</u>

Working in Streams

- December 2002 Draft Stream Mitigation Guidelines
- Suggested Riparian Vegetation <u>MS Word format</u>, <u>PDF Format</u>
- Guidelines for Gravel Excavation for Consumptive Use <u>MS Word format</u>, <u>PDF</u>
 <u>Format</u>
- Guidelines for the Removal of Stream Flow Obstructions <u>MS Word Format</u>, <u>PDF</u> <u>Format</u>

Working in Wetlands

• KDOW Mitigation Requirements

For More Information Contact:

Jennifer Garland 14 Reilly Road Frankfort, KY 40601 Phone: (502) 564-3410 Fax: (502) 564-0111 E-mail: jenni.garland@ky.gov

APPENDIX C

LOUISVILLE CORPS OF ENGINEERS INFORMATION & CONTACTS

Louisville District Corps of Engineers Regulatory Branch

South Section, Chief (503) 315-6692 US Army Corps of Engineer District Louisville ATTN: CELRL-OP-F PO Box 59 600 Dr. Martin Luther King Jr. Place Louisville, KY 40201-0059

Office of Regulatory Affairs website: http://www.lrl.usace.army.mil/orf/

Nationwide Permit Guidance: http://www.usace.army.mil/inet/functions/cw/cecwo/reg/nationwide_permits.htm

Applicant Information

General Information

Authority for the Regulatory Program Explanation of Some Commonly used Terms Questions That Are Frequently Asked

The Permit Application

General

Typical Processing Procedure for a Standard Individual Permit Evaluation Factors Forms and Permits Instructions for Preparing an Application Sample Application

Drawings

General Information Vicinity Map Plan View Elevation and/or Cross Section View Notes on Drawings

General Information

Authority for the Regulatory Program

The US Army Corps of Engineers has been regulating activities in the nation's waters since 1890. Until the 1960's the primary purpose of the regulatory program was to protect navigation. Since then, as a result of laws and court decisions, the program has been broadened so that it now considers the full public interest for both the protection and utilization of water resources.

The regulatory authorities and responsibilities of the Corps of Engineers are based on the following laws:

- <u>Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)</u> prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers.
- <u>Section 404 of the Clean Water Act (33 U.S.C. 1344)</u>. Section 301 of this Act prohibits the discharge of dredged or fill material into waters of the United States without a permit from the Corps of Engineers.
- <u>Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972</u>, as amended (33 U.S.C. 1413) authorizes the Corps of Engineers to issue permits for the transportation of dredged material for the purpose of dumping it into ocean waters.

Other laws may also affect the processing of applications for Corps of Engineers permits. Among these are the National Environmental Policy Act, the Coastal Zone Management Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Deepwater Port Act, the Federal Power Act, the Marine Mammal Protection Act, the Wild and Scenic Rivers Act, and the National Fishing Enhancement Act of 1984.

Explanation of Some Commonly Used Terms

Certain terms which are closely associated with the regulatory program are explained briefly in this section. If you need more detailed definitions, refer to the Code of Federal Regulations (33 CFR Parts 320 through 330) or contact a Corps district regulatory office.

Activity(ies) as used in this pamphlet includes structures (for example a pier, wharf, bulkhead, or jetty) and work (which includes dredging, disposal of dredged material, filling, excavation or other modification of a navigable water of the United States).

Navigable Waters of the United States are those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past or may be susceptible to use to transport interstate or foreign commerce. These are waters that are navigable in the traditional sense where permits are required for certain activities pursuant to <u>Section</u> <u>10 of the Rivers and Harbors Act</u>. This term should not be confused with the term *waters of the United States* below.

Waters of the United States is a broader term than navigable waters of the United States defined above. Included are adjacent wetlands and tributaries to navigable waters of the United States and other waters where the degradation or destruction of which could affect interstate or foreign commerce. These are the waters where permits are required for the discharge of dredged or fill material pursuant to <u>Section 404 of the Clean Water Act</u>.

Pre-application Consultation is one or more meetings between members of the district engineer's staff and an applicant and his agent or his consultant. A pre-application consultation is usually related to applications for major activities and may involve discussion of alternatives, environmental documents, National Environmental Policy Act procedures, and development of the scope of the data required when an environmental impact statement is required.

Public Hearings may be held to acquire information and give the public the opportunity to present views and opinions. The Corps may hold a hearing or participate in joint public hearings with other Federal or state agencies. The district engineer may specify in the public notice that a hearing will be held. In addition, any person may request in writing during the comment period that a hearing be held. Specific reasons must be given as to the need for a hearing. The district engineer may attempt to resolve the issue informally or he may set the date for a public hearing. Hearings are held at times and places that are convenient for the interested public. Very few applications involve a public hearing.

The Public Interest Review is the term which refers to the evaluation of a proposed activity to determine probable impacts. Expected benefits are balanced against reasonably forseeable detriments. All relevant factors are weighed. Corps policy is to provide applicants with a timely and carefully weighed decision which reflects the public interest.

Public Notice is the primary method of advising interested public agencies and private parties of the proposed activity and of soliciting comments and information necessary to evaluate the probable impact on the public interest. Upon request, anyone's name will be added to the distribution list to receive public notices.

Waterbody is a river, creek, stream, lake, pool, bay, wetland, marsh, swamp, tidal flat, ocean, or other water area.

Questions That Are Frequently Asked

Various questions are often asked about the regulatory program. It is hoped that these answers will help you to understand the program better.

Q. When should I apply for a Corps permit?

A. Since two to three months is normally required to process a routine application involving a public notice, you should apply as early as possible to be sure you have all required approvals before your planned commencement date. For a large or complex activity that may take longer, it is often helpful to have a "pre-application consultation" or informal meeting with the Corps during the early planning phase of your project. You may receive helpful information at this point which could prevent delays later. When in doubt as to whether a permit may be required or what you need to do, don't hesitate to call a district regulatory office.

Q. I have obtained permits from local and state governments. Why do I have to get a permit from the Corps of Engineers?

A. It is possible you may not have to obtain an individual permit, depending on the type or location of work. The Corps has many general permits which authorize minor activities without the need for individual processing. Check with your Corps district regulatory office for information on general permits. When a general permit does not apply, you may still be required to obtain an individual permit.

Q. What will happen if I do work without getting a permit from the Corps?

A. Performing unauthorized work in waters of the United States or failure to comply with the terms of a valid permit can have serious consequences. You would be in violation of Federal law and could face stiff penalties, including fines and/or requirements to restore the area.

Enforcement is an important part of the Corps regulatory program. Corps surveillance and monitoring activities are often aided by various agencies, groups, and individuals, who report suspected violations. When in doubt as to whether a planned activity needs a permit, contact the nearest district regulatory office. It could save a lot of unnecessary trouble later.

Q. How can I obtain further information about permit requirements?

A. Information about the regulatory program is available from any Corps district regulatory office. Information may also be obtained from the water resource agency in your state.

Q. Why should I waste my time and yours by applying for a permit when you probably won't let me do the work anyway?

A. Nationwide, only three percent of all requests for permits are denied. Those few applicants who have been denied permits usually have refused to change the design, timing, or location of the proposed activity. When a permit is denied, an applicant may redesign the project and submit a new application. To avoid unnecessary delays pre-application conferences, particularly for applications for major activities, are recommended. The Corps will endeavor to give you helpful information, including factors which will be considered during the public interest review, and alternatives to consider that may prove to be useful in designing a project.

Q. What is a wetland and what is its value?

A. Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas. A significant natural resource, wetlands serve important functions relating to fish and wildlife; food chain production; habitat; nesting; spawning; rearing and resting sites for aquatic and land species; protection of other areas from wave action and erosion; storage areas for storm and flood waters; natural recharge areas where ground and surface water are interconnected; and natural water filtration and purification functions.

Although individual alterations of wetlands may constitute a minor change, the cumulative effect of numerous changes often results in major damage to wetland resources. The review of applications for alteration of wetlands will include consideration of whether the proposed activity is dependent upon being located in an aquatic environment.

Q. How can I design my project to eliminate the need for a Corps permit?

A. If your activity is located in an area of tidal waters, the best way to avoid the need for a permit is to select a site that is above the high tide line and avoids wetlands or other waterbodies. in the vicinity of fresh water, stay above ordinary high water and avoid wetlands adjacent to the stream or lake. Also, it is possible that your activity is exempt and does not need a Corps permit or that it has been authorized by a nationwide or regional general permit. So, before you build, dredge or fill, contact the Corps district regulatory office in your area for specific information about location, exemptions, and regional and nationwide general permits.

The Permit Application

General

The application form used to apply for a permit is Engineer Form 4345, *Application of a Department of the Army Permit*. You can obtain the application from one of the Corps of Engineers district regulatory offices or download the fillable PDF file. Some offices may use a slightly modified form for joint processing with a state agency; however, the required information is basically the same. It is important that you provide the complete information in the requested format. This information will be used to determine the appropriate form of authorization, and to evaluate your proposal.

Some categories of activities have been previously authorized by nationwide or regional permits, and no further Corps approvals are required. Others may qualify for abbreviated permit processing, with authorizations in the form of letters of permission, in which a permit decision can usually be reached in less than 30 days. For other activities, a Public Notice may be required to notify Federal, state, and local agencies, adjacent property owners, and the general public of the proposal to allow an opportunity for review and comment or to request a public hearing. Most applications involving Public Notices are completed within four months and many are completed within 60 days.

The district engineer will begin to process your application immediately upon receipt of all required information. You will be sent an acknowledgement of its receipt and the application number assigned to your file. you should refer to this number when inquiring about your application. Your proposal will be reviewed, balancing the need and expected benefits against the probable impacts of the work, taking into consideration all comments received and other relevant factors. This process is called the *public interest review*. The Corps goal is to reach a decision regarding permit issuance or denial within 60 days of receipt of a complete application. However, some complex activities, issues, or requirements of law may prevent the district engineer from meeting this goal.

For any specific information on the evaluation process, filling out the application forms, or the status or your application, you should contact the regulatory branch of the Corps of Engineers district office which has jurisdiction over the area where you plan to do the work.

Typical Processing Procedure for a Standard Individual Permit

- 1. Pre-application consultation (optional)
- 2. Applicant submits ENG Form 4345 to district regulatory office*
- 3. Application received and assigned identification number
- 4. Public notice issued (withing 15 days of receiving all information)
- 5. 15 to 30 day comment period depending upon nature of activity
- 6. Proposal is reviewed** by Corps and:
 - Public
 - Special interest groups
 - Local agencies
 - State agencies
 - Federal agencies
- 7. Corps considers all comments
- 8. Other Federal agencies consulted, if appropriate
- 9. District engineer may ask applicant to provide additional information
- 10. Public hearing held, if needed
- 11. District engineer makes decision
- 12. Permit issued
 - or

Permit denied and applicant advised of reason

* A local variation, often a joint federal-state application form may be submitted.

** Review period may be extended if applicant fails to submit information or due to requirements of certain laws.

Evaluation Factors

The decision whether to grant or deny a permit is based on a public interest review of the probable impact of the proposed activity and its intended use. Benefits and detriments are balanced by considering effects on items such as:

conservation economics aesthetics general environmental concerns wetlands cultural values flood hazards floodplain values food and fiber production navigation shore erosion and accretion recreation water supply and conservation water quality energy needs safety needs and welfare of the people considerations of private ownership

The following general criteria will be considered in the evaluation of every application:

- the relative extent of the public and private need for the proposed activity;
- the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed activity; and
- the extent and permanence of the beneficial and/or detrimental effects which the proposed activity is likely to have on the public and private uses to which the area is suited.

Section 404(b)(1) of the Clean Water Act

If your project involves the discharge of dredged or fill material, it will be necessary for the Corps to evaluate your proposed activity under the <u>Section 404(b)(1)</u> guidelines prepared by the <u>Environmental</u> <u>Protection Agency</u>. The guidelines restrict discharges into aquatic areas where less environmentally damaging, practicable alternatives exist.

Forms and Permits

The following forms apply to the permit process:

Application

The form that you will need to initiate the review process is ENG Form 4345 or a joint Federal-state application that may be available in your state. The appropriate form may be obtained from the district regulatory office which has jurisdiction in the area where your proposed project is located.

Individual Permits

An individual permit may be issued as either ENG Form 1721, the standard permit, or as a Letter of Permission.

- A standard permit is one processed through the typical review procedures, which include public notice, opportunity for a public hearing, and receipt of comments. It is issued following a case-by-case evaluation of a specific activity.
- If work is minor or routine with minimum impacts and objections are unlikely, then it may qualify for a Letter of Permission (LOP). An LOP can be issued much more quickly than a standard permit since an individual public notice is not required. The District Engineer will notify you if your proposed activity qualifies for an LOP.

General Permits

In many cases the formal processing of a permit application is not required because of general permits already issued to the public at large by the Corps of Engineers. These are issued on a regional and nationwide basis.

Separate applications may not be required for activities authorized by a general permit; nevertheless, reporting may be required. For specific information on general permits, contact a district regulatory office.

ENG Form 4336

The third form, ENG Form 4336, is used to assist with surveillance for unauthorized activities. The form, which contains a description of authorized work, should be posted at the site of an authorized activity. If the Corps decides it is appropriate for you to post this form, it will be furnished to you when you receive your permit.

Fees

Fees are required for most permits. \$10.00 will be charged for a permit for a non-commercial activity; \$100.00 will be charged for a permit for a commercial or industrial activity. The district engineer will make the final decision as to the amount of the fee. **Do not send a fee when you submit an application**. When the Corps issues a permit, you will be notified and asked to submit the required fee payable to the Treasurer of the United States. No fees are charged for transferring a permit from one property owner to another, for Letters of Permission, or for nay activities authorized by a general permit or for permits to governmental agencies.

Instructions for Preparing a Department of the Army Application

A representation of the Application follows the instructions, or you may also download the fillable PDF file from our site. Be sure to specify "Save to Disk" when you select the files.

Blocks 1 through 4. To be completed by Corps of Engineers.

Block 5 - Applicant's Name. Enter the name of the responsible party or parties. If the responsible party is an agency, company, corporation or other organization, indicate the responsible officer and title. If more than one party is associated with the application, please attach a sheet with the necessary information marked *Block 5*.

Block 6 - Address of Applicant. Please provide the full address of the party or parties responsible for the application. If more space is needed, attach an extra sheet of paper marked *Block*.

Block 7 - Applicant Telephone Number(s). Please provide the number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed if you choose to have an agent.

Block 8 - Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, or any other person or organization. *Note: An agent is not required*.

Blocks 9 and 10 - Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where he/she can be reached during normal business hours.

Block 11 - Statement of Authorization. To be completed by applicant if an agent is to be employed.

Block 12 - Proposed Project Name or Title. Please provide name identifying the proposed project (i.e., Landmark Plaza, Burned Hills Subdivision, or Edsall Commercial Center).

Block 13 - Name of Waterbody. Please provide the name of any stream, lake, marsh, or other waterway to be directly impacted by the activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14 - Proposed Project Street Address. If the proposed project is located at at site having a street address (not a box number), please enter here.

Block 15 - Location of Proposed Project. Enter the county and state where the proposed project is located. If more space is required, please attach a sheet with the necessary information marked *Block 15*

Block 16 - Other Location Descriptions. If available, provide the Section, Township, and Range of the site and/or the latitude and longitude. You may also provide description of the proposed project location, such as lot numbers, tract numbers, or you may choose to locate the proposed project site from a known point (such as the right descending bank of Smith Creek, one mile down from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed project site, if known.

Block 17 - Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site.

Block 18 - Nature of Activity. Describe the overall activity or project. Give appropriate dimensions of structures such as wingwalls, dikes (identify the materials to be used in construction, as well as the methods by which the work is to be done), or excavations (length, width, and height). Indicate whether discharge of dredged or fill material is involved. Also, identify any structure to be constructed on a fill, piles, or float supported platforms.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked *Block 18*.

Block 19 - Proposed Project Purpose. Describe the purpose and need for the proposed project. What will it be used for and why? Also include a brief description of any related activities to be developed as the result of the proposed project. Give the approximate dates you plan to both begin and complete all work.

Blocks 20 through 22. To be completed if dredged and/or fill material is to be discharged.

Block 20 - Reason(s) for Discharge. If the activity involves the discharge of dredged and/or fill material into a wetland or other waterbody, including the temporary placement of material, explain the specific purpose of the placement of the material (such as erosion control).

Block 21 - Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards. Describe the material to be discharged and amount of each material to be discharged withing Corps jurisdiction. Please be sure this description will agree with your illustrations. Discharge material includes: rock, sand, clay, concrete, etc.

Block 22 - Surface Area of Wetlands or Other Waters Filled. Describe the area to be filled at each location. Specifically identify the surface areas, or part thereof, to be filled. Also include the means by which the discharge is to be done (backhoe, dragline, etc.). If dredged material is to be discharged on an upland site, identify the site and the steps to be taken (if necessary) to prevent runoff from the dredged material back into a waterbody. If more space is needed, attach an extra sheet of paper marked *Block 22*.

Block 23 - Is Any Portion of the Work Already Complete? Provide any background on any part of the proposed project already completed. Describe the area already developed, structures completed, any dredged or fill material already discharged, the type of material, volume in cubic yards, acres filled, if a wetland or other waterbody (in acres or square feet). If the work was done under an existing Corps permit, identify the authorization if possible.

Block 24 - Names and Addresses of Adjoining Property Owners, Lessees, etc., Whos Property Adjoins the Project Site. List complete names and full mailing addresses of the adjacent property owners (public and private) lessees, etc., whose property adjoins the waterbody or aquatic site where the work is being proposed so that they may be notified of the proposed activity (usually by public notice). If more space is needed, attach an extra sheet of paper marked *Block 24*.

Information regarding adjacent landowners is usually available through the office of the tax assessor in the county or counties where the project is to be developed.

Block 25 - Information about Approvals or Denials by Other Agencies. You may need the approval of other Federal, state, or local agencies for your project. Identify any applications you have submitted and the status, if any (approved or denied) of each application. You need not have obtained all other permits before applying for a Corps permit.

Block 26 - Signature of Applicant or Agent. The application must be signed by the owner or other authorized party (agent). This signature shall be an affirmation that the party applying for the permit possesses the requisite property rights to undertake the activity applied for (including compliance with special conditions, mitigation, etc.).

A Sample Application

Please Note: The sample application that follows is a crude representation of ENG FORM 4345 and is intended for instructional purposes.

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT Authority: 33 USC 401, Section 10: 1413, Section 404. Principal Purpose: These laws require authorizing activities in, or affecting, navigable waters of the United States, the discharge or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

l.	Application	No.		2.	Field	Office	Code	۱	3.	Date	Received	I	4.	Date	Applicati	on
Com	pleted															
			Ι					ł								
			I					ł				I				

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. Applicant's	Name	8 	. Authorized	d Agent's	Name	and	Title
6. Applicant's	Address	9 	. Agent's Ad	ldress			

a. Residence		a.	Residence
b. Business		b.	Business

STATEMENT OF AUTHORIZATION

I hereby authorize _______ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Applicant's Signature

Date

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. Project Name or Title (see instructions)

13.	Name of Wa	terbody,	if Kno	wn		14.	Project	Street	Address	
15.	Location o	f Project								
					1					
	County			State						

16. Other Location Descriptions, if Known (Section, Township, Range, Lat/Lon, and/or Assessor's Parcel Number, for example.)

17. Directions to the Site

18. Nature of Activity (Description of project, include all features)

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

23. Is Any Portion of the Work Already Complete? Yes _____ No _____ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY TYPE APPROVAL* IDENTIFICATION NUMBER DATE APPLIED DATE APPROVED DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Signature of Applicant Date

Signature of Agent DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

Drawings

General Information

Three types of drawings - Vicinity, Plan, and Elevation - are required to accurately depict activities.

Submit one original, or good quality copy, of all drawings on $8\frac{1}{2} \times 11$ inch white paper (tracing cloth or film may be used). Submit the fewest number of sheets necessary to adequately show the proposed activity. Drawings should be prepared in accordance with the general format of the samples, using block style lettering. Each page should have a title block. See check list below. Drawings do not have to be prepared by an engineer, but professional assistance may become necessary if the project is large or complex.

Leave a 1-inch margin at the top edge of each sheet for purposes of reproduction and binding.

In the title block of each sheet of drawings identify the proposed activity and include the name of the body of water; river mile (if applicable); name of county and state; name of applicant; number of the sheet and total number of sheets in set; and date the drawing was prepared.

Since drawings must be reproduced, use heavy dark lines. Color shading cannot be used; however, dot shading, hatching, or similar graphic symbols may be used to clarify line drawings.

Vicinity Map

The vicinity map you provide will be printed in any public notice that is issued and used by the Corps of Engineers and other reviewing agencies to locate the site of the proposed activity. You may use an existing road map or US Geological Survey topographic (scale 1:24,000) as the vicinity map. Please include sufficient details to simplify locating the site from both the waterbody and from land. Identify the source of the map or chart from which the vicinity map was taken and, if not already shown, add the following:

- location of activity site (draw an arrow showing the exact location of the site on the map).
- latitude, longitude, river mile, if known, and/or other information that coincides with Block 6 on the application form.
- name of waterbody and the name of the larger creek, river, by, etc., that the waterbody is immediately tributary to.
- names, descriptions and location of landmarks.
- name of all applicable political (county, parish, borough, town, city, etc.) jurisdictions
- name of and distance to nearest town, community, or other identifying locations
- names or numbers of all roads in the vicinity of the site.
- north arrow.
- scale.

Plan View

The plan view shows the proposed activity as if you were looking straight down on it from above. your plan view should clearly show the following:

- Name of waterbody (river, creek, lake, wetland, etc.) and river mile (if known) at location of activity.
- Existing shorelines.
- Mean high and mean low water lines and maximum (spring) high tide line in tidal areas.
- Ordinary high water line and ordinary low water line if the proposed activity is located on a nontidal waterbody.
- Average water depths around the activity.
- Dimensions of the activity and distance it extends from the high water line into the water.
- Distances to nearby Federal projects, if applicable.
- Distance between proposed activity and navigation channel, where applicable.
- Location of structures, if any, in navigable waters immediately adjacent to the proposed activity.
- Location of any wetlands (marshes, swamps, tidal flats, etc.)
- North arrow.
- Scale.
- If dredged material is involved, you must describe the type of material, number of cubic yards, method of handling, and the location of fill and spoil disposal area. The drawing should show proposed retention levees, weirs, and/or other means for retaining hydraulically placed materials.
- Mark the drawing to indicate previously completed portions of the activity.

Elevation and/or Cross Section View

The elevation and/or cross section view is a scale drawing that shows the side, front, or rear of the proposed activity. If a section view is shown, it represents the proposed structure as it would appear if cut internally for display. Your elevation should clearly show the following:

- Water elevations as shown in the plan view.
- Water depth at waterward face of proposed activity or, if dredging is proposed, dredging and estimated disposal grades.
- Dimensions from mean high water line (in tidal waters) of proposed fill or float, or high tide line for pile supported platform. Describe any structures to be built on the platform.
- Cross section of excavation or fill, including approximate side slopes.
- Graphic or numerical scale.
- Principal dimensions of the activity.

Notes on Drawings*

- Names of adjacent property owners who may be affected. Complete names and addresses should be shown in Block 5 on ENG Form 4345.
- Legal property description: Number, name of subdivision, block, and lot number. Section, Township, and Range (if applicable) from plot, deed, or tax assessment.
- Photographs of the site of the proposed activity are not required; however, pictures are helpful and may be submitted as part of any application.
- While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.

* Drawings should be as clear and simple as possible (i.e. not too "busy").

APPENDIX D

STORM WATER FACILITY MAINTENANCE AGREEMENT

STORM WATER FACILITY MAINTENANCE AGREEMENT CITY OF FLORENCE, KENTUCKY

THIS AGREEMENT, made and entered into this _____ day of ______, by and between _______ hereinafter called the "Landowner", and the City of Florence, KY, hereinafter call the City. WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as ______ as recorded in ______ of the Boone County Clerk's Office, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site/Subdivision Plan known as ______, hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the City and County, provides for storm water management facilities with the confines of the property; and

WHEREAS, the City and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of the City of Florence, require that on-site storm water management facilities be constructed and maintained on the Property; and

WHEREAS, the City requires that on-site storm water management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

- 1. The on-site storm water management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.
- 2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the storm water management facilities. This includes all pipes, channel or other conveyances built to convey storm water to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of storm water. Adequate maintenance is herein defined as good working conditions so that these facilities are performing their design functions. The Maintenance Checklists are to be used to establish what good working condition is acceptable to the City.
- 3. The Landowner, its successors and assigns, shall inspect the storm water management facility and submit an inspection report annually. The pupose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, pond areas, access roads, etc. Deficiencies shall be noted in the inspection report.

- 4. The Landowner, its successors and assigns, hereby grant permission to the City, its authorized agents and employees, to enter upon the Property and to inspect the storm water management facilities whenever the City deems necessary. The purpose of the inspection is to follow-up on reported deficiencies and/or respond to citizen complaints. The City shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with repairs if necessary.
- 5. In the event the Landowner, its successors and assigns, fails to maintain the storm water management facilities in good working condition acceptable to the City, the City may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the City to erect any structure of permanent nature on the land of the Landowner outside of the easement for the storm water management facilities. It is expressly understood and agreed that the City is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the City.
- 6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the storm water management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.
- 7. In the event the City pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work of labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assignees, shall reimburse the City upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the City hereunder.
- 8. This Agreement impose no liability of any kind whatsoever on the City and the Landowner agrees to hold the City harmless from any liability in the event the storm water management facilities fail to operate properly.
- 9. This Agreement shall be recorded in the Boone County Clerk's Office and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

WITNESS the following signatures:

Company

APPENDIX E

STREAM RESTORATION DETAILS

Source: Federal Interagency Stream Restoration Working Group (FISRWG) (10/1998). *Stream Corridor Restoration: Principles, Processes, and Practices.* GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3.

FISRWG is composed of staff from 15 agencies of the US Government.

For more information see: http://www.nrcs.usda.gov/technical/stream_restoration/newgra.html

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Bank Shaping and Planting



Regrading streambanks to a stable slope, placing topsoil and other materials needed for sustaining plant growth, and selecting, installing and establishing appropriate plant species.

Branch Packing

Alternate layers of live branches and compacted backfill which stabilize and revegetate slumps and holes in streambanks.

Applications and Effectiveness

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 Most successful on streambanks where moderate erosion and channel migration are anticipated.

- · Reinforcement at the toe of the embankment is often needed.
- · Enhances conditions for colonization of native species.
- Used in conjunction with other protective practices where flow velocities exceed the tolerance range for available plants, and where erosion occurs below base flows.
- Streambank soil materials, probable groundwater fluctuation, and bank loading conditions are factors for determining appropriate slope conditions.
- Slope stability analyses are recommended.

Applications and Effectiveness

- Commonly used where patches of streambank have been scoured out or have slumped leaving a void.
- · Appropriate after stresses causing the slump have been removed.
- Less commonly used on eroded slopes where excavation is required to install the branches.
- Produces a filter barrier that prevents erosion and scouring from streambank or overbank flows.
- · Rapidly establishes a vegetated streambank.
- · Enhances conditions for colonization of native species.
- Provides immediate soil reinforcement.
- · Live branches serve as tensile inclusions for reinforcement once installed.
- Typically not effective in slump areas greater than four feet deep or four feet wide.

Brush Mattresses

Combination of live stakes, live facines, and branch cuttings installed to cover and physically protect streambanks; eventually to sprout and establish numerous individual plants.

Coconut Fiber Roll

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Cylindrical structures composed of coconut husk fibers bound together with twine woven from coconut material to protect slopes from erosion while trapping sediment which encourages plant growth within the fiber roll.

Applications and Effectiveness

- Form an immediate protective cover over the streambank.
- Capture sediment during flood flows.
- · Provide opportunities for rooting of the cuttings over the streambank.
- Rapidly restores riparian vegetation and streamside habitat.
- Enhance conditions for colonization of native vegetation.
- Limited to the slope above base flow levels.
- Toe protection is required where toe scour is anticipated.
- Appropriate where exposed streambanks are threatened by high flows prior to vegetation establishment.
- Should not be used on slopes which are experiencing mass movement or other slope instability.

Applications and Effectiveness

- Most commonly available in 12 inch diameter by 20 foot lengths.
- Typically staked near the toe of the streambank with dormant cuttings and rooted plants inserted into slits cut into the rolls.
- Appropriate where moderate toe stabilization is required in conjunction with restoration of the streambank and the sensitivity of the site allows for only minor disturbance.
- Provide an excellent medium for promoting plant growth at the water's edge.
- · Not appropriate for sites with high velocity flows or large ice build up.
- · Flexibility for molding to the existing curvature of the streambank.
- Requires little site disturbance.
- · The rolls are buoyant and require secure anchoring.
- · Can be expensive.
- · An effective life of 6 to 10 years.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streamside vegetation.
- Enhances conditions for colonization of native vegetation.

Dormant Post Plantings



Plantings of cottonwood, willow, poplar, or other species embedded vertically into streambanks to increase channel roughness, reduce flow velocities near the slope face, and trap sediment.

Applications and Effectiveness

- Can be used as live piling to stabilize rotational failures on streambanks where minor bank sloughing is occurring.
- Useful for quickly establishing riparian vegetation, especially in arid regions where water tables are deep.
- Will reduce near bank stream velocities and cause sediment deposition in treated areas.
- · Reduce streambank erosion by decreasing the near-bank flow velocities.
- Generally self-repairing and will restem if attacked by beaver or livestock; however, provisions should be made to exclude such herbivores where possible.
- · Best suited to non-gravely streams where ice damage is not a problem.
- · Will enhance conditions for colonization of native species.
- Are less likely to be removed by erosion than live stakes or smaller cuttings.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streamside vegetation.
- Unlike smaller cuttings, post harvesting can be very destructive to the donor stand, therefore, they should be gathered as 'salvage' from sites designated for clearing, or thinned from dense stands.

Vegetated Gabions



Wire-mesh, rectangular baskets filled with small to medium size rock and soil and laced together to form a structural toe or sidewall. Live branch cuttings are placed on each consecutive layer between the rock filled baskets to take root, consolidate the structure, and bind it to the slope.

Applications and Effectiveness

- Useful for protecting steep slopes where scouring or undercutting is occurring or there are heavy loading conditions.
- Can be a cost effective solution where some form of structural solution is needed and other materials are not readily available or must be brought in from distant sources.
- Useful when design requires rock size greater than what is locally available.
- · Effective where bank slope is steep and requires moderate structural support.
- Appropriate at the base of a slope where a low toe wall is needed to stabilize the slope and reduce slope steepness.
- · Will not resist large, lateral earth stresses.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation.
- · Require a stable foundation.
- · Are expensive to install and replace.
- Appropriate where channel side slopes must be steeper than appropriate for riprap or other material, or where channel toe protection is needed, but rock riprap of the desired size is not readily available.
- Are available in vinyl coated wire as well as galvanized steel to improve durability.
- Not appropriate in heavy bedload streams or those with severe ice action because of serious abrasion damage potential.

For More Information

• Consult the following references: Nos. 11, 18, 34, 56, 77.

Joint Plantings



Live stakes tamped into joints or openings between rock which have previously been installed on a slope or while rock is being placed on the slope face.

Applications and Effectiveness

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- Appropriate where there is a lack of desired vegetative cover on the face of existing or required rock riprap.
- Root systems provide a mat upon which the rock riprap rests and prevents loss of fines from the underlying soil base.
- Root systems also improve drainage in the soil base.
- Will quickly establish riparian vegetation.
- Should, where appropriate, be used with other soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation.
- Have few limitations and can be installed from base flow levels to top of slope, if live stakes are installed to reach ground water.
- Survival rates can be low due to damage to the cambium or lack of soil/ stake interface.
- Thick rock riprap layers may require special tools for establishing pilot holes.

Live Cribwalls



Hollow, box-like interlocking arrangements of untreated log or timber members filled above baseflow with alternate layers of soil material and live branch cuttings that root and gradually take over the structural functions of the wood members.

Applications and Effectiveness

- Provide protection to the streambank in areas with near vertical banks where bank sloping options are limited.
- Afford a natural appearance, immediate protection and accelerate the establishment of woody species.
- · Effective on outside of bends of streams where high velocities are present.
- Appropriate at the base of a slope where a low wall might be required to stabilize the toe and reduce slope steepness.
- Appropriate above and below water level where stable streambeds exist.
- Don't adjust to toe scour.
- Can be complex and expensive.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation.
Live Stakes



Live, woody cuttings which are tamped into the soil to root, grow and create a living root mat that stabilizes the soil by reinforcing and binding soil particles together, and by extracting excess soil moisture.

Applications and Effectiveness

• Effective where site conditions are uncomplicated, construction time is limited, and an inexpensive method is needed.

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- Appropriate for repair of small earth slips and slumps that are frequently wet.
- Can be used to stake down surface erosion control materials.
- · Stabilize intervening areas between other soil bioengineering techniques.
- · Rapidly restores riparian vegetation and streamside habitat.
- Should, where appropriate, be used with other soil bioengineering systems and vegetative plantings.
- Enhance conditions for colonization of vegetation from the surrounding plant community.
- Requires toe protection where toe scour is anticipated.

Live Fascines



Dormant branch cuttings bound together into long sausage-like, cylindrical bundles and placed in shallow trenches on slopes to reduce erosion and shallow sliding.

Applications and Effectiveness

- Can trap and hold soil on streambank by creating small dam-like structures and reducing the slope length into a series of shorter slopes.
- Facilitate drainage when installed at an angle on the slope.
- Enhance conditions for colonization of native vegetation.
- Should, where appropriate, be used with other soil bioengineering systems and vegetative plantings.
- · Requires toe protection where toe scour is anticipated.
- Effective stabilization technique for streambanks, requiring a minimum amount of site disturbance.
- Not appropriate for treatment of slopes undergoing mass movement.

Log, Rootwad, and Boulder Revetments

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Boulders and logs with root masses attached placed in and on streambanks to provide streambank erosion, trap sediment, and improve habitat diversity.

Applications and Effectiveness

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- Will tolerate high boundary shear stress if logs and rootwads are well anchored.
- · Suited to streams where fish habitat deficiencies exist.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation.
- Will enhance diversity in riparian areas when used with soil bioengineering systems.
- Will have limited life depending on climate and tree species used. Some species, such as cottonwood or willow, often sprout and accelerate colonization.
- Might need eventual replacement if colonization does not take place or soil bioengineering systems are not used.
- Use of native materials can sequester sediment and woody debris, restore streambanks in high velocity streams, and improve fish rearing and spawning habitat.
- Site must be accessible to heavy equipment.
- Materials might not be readily available at some locations.
- Can create local scour and erosion.
- · Can be expensive.

Riprap



A blanket of appropriately sized stones extending from the toe of slope to a height needed for long term durability.

Applications and Effectiveness

- Can be vegetated (see joint plantings).
- Appropriate where long term durability is needed, design discharge are high, there is a significant threat to life or high value property, or there is no practical way to otherwise incorporate vegetation into the design.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation.
- Flexible and not impaired by slight movement from settlement or other adjustments.
- Should not be placed to an elevation above which vegetative or soil bioengineering systems are an appropriate alternative.
- Commonly used form of bank protection.
- Can be expensive if materials are not locally available.

Stone Toe Protection

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A ridge of quarried rock or stream cobble placed at the toe of the streambank as an armor to deflect flow from the bank, stabilize the slope and promote sediment deposition.

Tree Revetments



A row of interconnected trees attached to the toe of the streambank or to deadmen in the streambank to reduce flow velocities along eroding streambanks, trap sediment, and provide a substrate for plant establishment and erosion control.

Applications and Effectiveness

- Should be used on streams where banks are being undermined by toe scour, and where vegetation cannot be used.
- Stone prevents removal of the failed streambank material that collects at the toe, allows revegetation and stabilizes the streambank.

- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerated source of streamside vegetation.
- Can be placed with minimal disturbance to existing slope, habitat, and vegetation.

Applications and Effectiveness

- Design of adequate anchoring systems is necessary.
- Wire anchoring systems can present safety hazards.
- Work best on streams with streambank heights under 12 feet and bankfull velocities under 6 feet per second.
- · Use inexpensive, readily available materials.
- Capture sediment and enhances conditions for colonization of native species particularly on streams with high bed material loads.
- · Limited life and must be replaced periodically.
- · Might be severely damaged by ice flows.
- Not appropriate for installation directly upstream of bridges and other channel constrictions because of the potential for downstream damages should the revetment dislodge.
- Should not be used if they occupy more than 15 percent of the channel's cross sectional area at bankfull level.
- Not recommended if debris jams on downstream bridges might cause subsequent problems.
- Species that are resistant to decay are best because they extend the establishment period for planted or volunteer species that succeed them.
- Requires toe protection where toe scour is anticipated.
- Should, where appropriate, be used with soil bioengineering systems and vegetative plantings to stabilize the upper bank and ensure a regenerated source of streamside vegetation.

Vegetated Geogrids

Alternating layers of live branch cuttings and compacted soil with natural or synthetic geotextile materials wrapped around each soil lift to rebuild and vegetate eroded streambanks.

Applications and Effectiveness

- Quickly establish riparian vegetation if properly designed and installed. •
 - Can be installed on a steeper and higher slope and has a higher initial tolerance of flow velocity than brush layering.
- Can be complex and expensive. ٠
- Produce a newly constructed, well-reinforced streambank. ٠ •
 - Useful in restoring outside bends where erosion is a problem.
 - Capture sediment and enhances conditions for colonization of native species.
- Slope stability analyses are recommended. ٠
- Can be expensive. ٠

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Require a stable foundation. 4

APPENDIX F

EXAMPLE STREAM DESIGNATIONS

The following are five (5) streams examples where the criteria for designation as Waters of the City of Florence have been used.

New Uri Avenue

This stream has a drainage area greater than 25 acres and would appear to be classified as an ephemeral stream by the COE. This should be designated as Waters of the City of Florence. Erosion does not appear to be affecting any structures other than pedestrian bridges which should be the responsibility of the homeowner. Also, homes appear to be well above the floodplain. Work on this stream would most likely be a low priority.



The Lakes

This area includes three (3) man-made ponds which were built for aesthetics and are not stormwater management facilities. They are private property and should not be included in the Waters of the City of Florence. However, the stream both upstream and downstream of the ponds have a drainage area greater than 25 acres and should be included in the Waters of the City of Florence.



Valley Circle Drive

This stream has a drainage area of less than 25 acres and should not be included in the Waters of the City of Florence. It does not appear to have excessive erosion and the homes appear to be well above the floodplain.



Village of Cross Creek

This stream has a drainage area greater than 25 acres and would appear to be classified as an ephemeral stream by the COE. This should be designated as Waters of the City of Florence. Erosion could threaten the roadway in the future and should be monitored. Work on this stream would most likely be a higher priority than New Uri Avenue.



West Dillcrest Drive

This stream has a drainage area greater than 25 acres and would appear to be classified as an intermittent stream by the COE. This should be designated as Waters of the City of Florence. Erosion is fairly severe but does not appear to be affecting any structures at this time.

