

5.0 General Recommendations

(Note- Many of the recommendations listed below would be best applied universally throughout the upper-Schoharie basin, so therefore may be recommended for the entire basin)

While the earlier sections of this Stream Management Plan (SMP) provided reach by reach recommendations for management of the Manor Kill stream system, there are a significant number of recommendations that will be more effective if implemented on a watershed, community or even programmatic scale. These recommendations were set forth using best judgment, and attempt to think broadly and provide a framework for watershed stakeholders to refine specific actions. In the following sections, the Manor Kill SMP sets forth a fairly detailed list of recommendations related to Education and Outreach, Flood Prevention, Water Quality, Public Enjoyment, Fisheries, Riparian Buffers, Stream Management and Programmatic issues.

Recommendation Structure

In the sections that follow, recommendations include short descriptive narratives, any important background or justification data and a series of standard tables which summarize individual recommendations in each subject area. In each section, information on issues such as funding sources and partnerships represents the range of possible opportunities based on past support or knowledge of funding sources. The listing of any specific agency or group does not represent a commitment by any one entity. You will note that the priority of each recommendation has been left blank. It is the intention of the Manor Kill Project Team to complete this section of each recommendation upon the completion of an extensive public review process and the development of an annual prioritized action plan. The following information is provided in the recommendation tables that follow;

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| <i>Recommendation</i> | Narrative description of the actual recommendation |
| <i>Funding Source</i> | Identifies possible funding source, does not reflect commitment of any individual entity. Funding must be sought on project by project basis. |
| <i>Task Leader</i> | Identifies lead agency for the project. Based on typical roles of listed entities, or past involvement in similar activities. Does not represent a |

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| | commitment by any individual entity to assume such a role. |
| <i>Task Partners</i> | Identifies range of potential partners. Based on project team knowledge of programs and interests of various agencies or groups. May include other entities not specifically listed. |
| <i>Estimated Costs</i> | In many cases, costs are listed as undetermined. In instances when a cost is provided it represents a preliminary estimate. Costs will be better defined in the prioritized annual action plan. |
| <i>Schedule</i> | Schedule is to be considered tentative as best. Final schedule will depend on priorities, funding source and other factors. The schedule will be more specific in the prioritized annual action plan. |
| <i>Notes</i> | Provides supplemental information on related on-going or planned activities |

5.1 Flood Protection

In the Manor Kill watershed, flooding has been a concern since the early settlement of the valley. Of course it is impossible to prevent floods, but watershed stakeholders can work proactively to reduce or prevent flooding impacts on the community. As discussed in Section 2.4, the Manor Kill is highly prone to flooding activities and historically has resulted in significant damages and the expenditure of significant resources to repair these damages. Flood related damages and recovery expenditures strain local resources and disrupt the fragile economy of these small rural communities. The impact of floods on private property, public infrastructure and the quality of life is one of the primary concerns of many watershed stakeholders. The recommendations of the following section represent projects both on-going and proposed initiatives which could be implemented to reduce flood impacts. The recommendations are broken into flood mapping & regulation, educations and outreach, and miscellaneous categories.

Flood Mapping and Review of Floodplain Management Regulations

Revised flood maps (Flood Insurance Rate maps, or FIRMs) for the Manor Kill were initiated under the leadership of NYSDEC working in partnership with the NYCDEP, SCSWCD the Army Corp of Engineers and the Federal Emergency Management Agency. The new flood hazard maps have integrated the latest digital map production and presentation technologies to produce highly accurate maps which are very user-friendly. While older FIRM maps often made it difficult to locate a specific location or structure, the

new FIRM maps are based on detailed aerial photography and terrain maps. This next-generation of FIRM maps was finalized for the Manor Kill in 2007.

While accurate flood maps are a valuable planning tool, they are only effective when used in conjunction with local regulations. In the Schoharie watershed, many towns have local floodplain ordinances in place as a requirement of participation in the National Flood Insurance Program (NFIP). These local regulations are generally over 20 years old, and regular review of the rules helps serve both landowner and community interests. All floodplain ordinances should be updated to reflect the new and improved maps and other technologies, as well as to better reflect local conditions and needs. Additionally, training and on-going technical support will be a major factor in the use of this new mapping tool.

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| 5.1.1 | Digital FIRM Maps | | |
| Recommendation | Watershed communities should adopt the new digital flood maps for the Manor Kill Watershed, adopt a new floodplain protection ordinance and actively participate in training and outreach efforts. | | |
| Priority | High | Task Leader | NYSDEC - Flood Protection |
| Funding Sources | ACOE - WRDA Grant NYCDEP (project/in-kind) SCSWCD (in-kind) | Task Partners | SCSWCD NYCDEP Municipalities SC Planning Dept. |
| Estimated Cost | Undetermined | Schedule | Dependent on map production schedule |
| Notes | | | |

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| 5.1.2 | FIRM Technical Support | | |
| Recommendation | The SCSWCD should support local municipalities in the use of the new FIRM maps. | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | NYCDEP Schoharie County Municipalities | Task Partners | NYCDEP NYSDEC Municipalities SC SWCD |
| Estimated Cost | Not Determined | Schedule | On-going |
| Notes | SCSWCD and NYCDEP will review tasks and determine level of support appropriate. Additional funds will be sought as necessary to support technical assistance. | | |

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| 5.1.3 | Flood Ordinance Review | | |
| Recommendation | Municipalities in the Watershed should conduct a review of current floodplain ordinances and adopt revisions as appropriate. Revisions should reflect current building trends, new technologies compliance and integrate broader community plans as appropriate. | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | NYCDEP SCSWCD Schoharie County Municipalities FEMA/SEMO | Task Partners | SCSWCD Watershed Municipalities NYCDEP NYSDEC - Flood SC Emergency Services FEMA/SEMO |
| Estimated Cost | Not Determined | Schedule | To Be Determined |
| Notes | The SCSWCD will provide technical and administrative support to the review process. Additional partners such as NYSDEC and the Schoharie County Planning Department should be consulted as appropriate. | | |

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| 5.1.4 | Community Rating System | | |
| Recommendation | Watershed municipalities should evaluate participation in the FEMA Community Rating System. | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | FEMA SEMO Municipalities NYSDOS Schoharie County | Task Partners | SCSWCD Watershed Municipalities NYSDEC NYCDEP FEMA/SEMO NYS/National FPM Association |
| Estimated Cost | Not Determined | Schedule | On-going |
| Notes | Municipalities may be able to reduce flood insurance premium rates under the Community Rating System. The Municipalities are strongly encouraged to adopt a “No Rise/Good Neighbor” clause in their revised floodplain ordinance. | | |

Education and Outreach

In general, there is a need to provide landowners, municipal officials, planners, developers and other stakeholders in the watershed with information regarding floodplain locations, floodplain function, flood mapping and the impact of floodplain development on

stream conditions. The following summary of possible education and outreach initiatives represents only some possible programs or activities.

Flood Damage Prevention Library

FEMA, the National Association of Floodplain Managers and others have developed extensive materials to assist watershed stakeholders in making sound development decisions related to flooding and flood damage prevention. These materials can only be effective if they are readily available to a wide audience. The Manor Kill Project Team recommends that a local repository for these types of publications be developed in several locations in the watershed. Local libraries in the watershed may be willing to provide shelf space for publications in accordance with NFIP standards. Annually, a notice should be published in local newspapers providing notification on the availability of the flood damage prevention library.

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| 5.1.5 | Flood Prevention Library | | |
| Recommendation | Access to flood prevention/protection information should be established at multiple repositories in the Manor Kill watershed. | | |
| Priority | Medium | Task Leader | SC Planning Dept |
| Funding Sources | FEMA - HMGP FEMA - FMAP NYC DEP | Task Partners | Watershed Municipalities Local Libraries SCSWCD |
| Estimated Cost | \$2,500 | Schedule | To Be Determined |
| Notes | FEMA and others make many of these publications available for free. Funding is needed to allow for person to coordinate ordering of publications, arranging a location for the flood library, and working with the municipalities to coordinate. Project would make a good summer intern project. Town code enforcement office could serve as a repository. | | |

Special Flood Hazard Zone Notification

In many instances, landowners are uncertain as to the presence and location of Special Flood Hazard Areas (SFHA) (designated on FIRM Maps) on their property. Knowledge of flood prone areas can help landowners make informed decisions regarding flood risk when considering development and use of their property. Landowners also require

accurate knowledge of SFHA when seeking financing from lending institutions. Recent digitization of the real property tax parcels in the NYC watershed, and the development of digital flood maps by NYSDEC can be integrated into a database which would allow for notification of landowners regarding the presence of SFHA on or near their property or business. The database can be used to develop a mailing list of properties with a SFHA present, and periodically a direct mailing can be made to each property owner.

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| 5.1.6 | SFHA Notification | | |
| Recommendation | Watershed municipalities should facilitate periodic notification to landowners who have special flood hazard areas (SFHA) located on their property. | | |
| Priority | Medium | Task Leader | To be determined |
| Funding Sources | Municipalities Schoharie County FEMA/SEMO Private Foundations | Task Partners | SCSWCD Watershed Municipalities SC Planning Department NYSDEC – floodplain SEMO/FEMA SC Real Property Office |
| Estimated Cost | Not Determined | Schedule | Dependent on funding availability |
| Notes | Program must integrate GIS based data base to be effective. | | |

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| 5.1.7 | Flood Hazard Education Sessions | | |
| Recommendation | Watershed municipalities, working with local and state agencies, should support periodic training sessions on flood related issues. Audience should include municipal leaders, code enforcement staff, planning boards, landowners, realtors, lending institutions and others. | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | NRCS - rehabilitation funds Grants NYCDEP | Task Partners | Watershed Municipalities SCSWCD NYCDEP NYSDEC Schoharie County (various agencies) Cornell Cooperative Extension |
| Estimated Cost | Not Determined | Schedule | Dependent on funding availability |
| Notes | NYSDEC and NYSDOS have established education programs geared to local municipalities. | | |

Flood Damage Data Base

Documenting flood damages costs can provide multiple benefits to a community. Areas that demonstrate repetitive damage can be prioritized for mitigation because this cumulative cost damage data provides justification for mitigation grant program funding. Often, funding is based on a cost/benefit analysis which requires extensive documentation of past damages.

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| 5.1.8 | Flood Damage Database | | |
| Recommendation | Watershed municipalities should facilitate development of a flood damage reporting system to track types of flooding, their location and the costs associated with flood damage. | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | Schoharie County Municipalities FEMA-HMGP NYCDEP NYSDEC | Task Partners | SCSWCD Municipalities SC Highway Department SC Emergency Services Office Landowners |
| Estimated Cost | Not Determined | Schedule | Dependent on funding availability |
| Notes | Database development should attempt to collect records on past floods to get started; all flooding damages should be reported even if localized. Program will require training, and administrative support to insure success. | | |

Flood Mitigation Planning

In 2000, the Disaster Mitigation Act (DMA) resulted in significant changes in the mitigation programs offered by FEMA. Under the 2000 DMA, local communities seeking funding under the Hazard Mitigation Grant Program and Flood Mitigation Assistance Program will be required to have an All Hazards Mitigation Plan approved by FEMA to be eligible for these funds. These plans are designed to reduce repeat flood damages within a community and can improve a community's Community Rating within the National Flood Insurance Program. As previously mentioned, improvements in the Community Rating can reduce local flood insurance rates to individuals and businesses.

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| 5.1.9 | Hazard Mitigation Plans | | |
| Recommendation | Manor Kill watershed communities are encouraged to participate in the implementation of the county-wide All Hazards Mitigation Plan. | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | FEMA - HMGP In-kind SCSWCD In-kind SC Planning In-kind SC Emergency Svc NYCDEP Schoharie County | Task Partners | Municipalities SCSWCD NYSDEC - Dam Safety SEMO/FEMA NYCDEP SC Emergency Services, Law enforcement, various Landowners and Others |
| Estimated Cost | \$25,000 Est. | Schedule | To Be Determined |
| Notes | FEMA has Mitigation Planning Guidance Documents available at www.fema.gov/plan/mitplanning/planning_resources.shtm | | |

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| 5.1.10 | Establish Bank Erosion Monitoring Sites | | |
| Recommendation | Identify, monument, and survey selected sites of bank erosion, assess their relative stability, and make prioritized recommendations for their treatment | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | | Task Partners | NYCDEP Watershed Municipalities Project Advisory Committees |
| Estimated Cost | Not Determined | Schedule | To Be Determined |
| Notes | In 2008, six bank erosion monitoring sites were proposed along the Manor Kill mainstem. A cross-section and long profile survey, particle size distribution, and bank erosion hazard index data may be collected at each site. | | |

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| 5.1.11 | Identify infrastructure threatened by flooding or erosion | | |
| Recommendation | Identify locations where roads, bridges, or culverts may be threatened by bank erosion, or are otherwise unstable or threatened, and make prioritized recommendations for their treatment. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | NYCDEP | Task Partners | Watershed Municipalities NYCDEP SC Highway Departments SC Planning Dept |
| Estimated Cost | Not Determined | Schedule | To Be Determined |

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| 5.1.12 | Identify infrastructure threatened by flooding or erosion | | |
| <i>Recommendation</i> | Identify locations where improved or residential areas may be threatened by bank erosion, and make prioritized recommendations for their treatment. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |
| <i>Funding Sources</i> | NYCDEP | <i>Task Partners</i> | Watershed Municipalities NYCDEP SC Planning Dept |
| <i>Estimated Cost</i> | Not Determined | <i>Schedule</i> | To Be Determined |
| <i>Notes</i> | | | |

5.2 Public Recreation

Historically, the Catskills have been a draw for the wide range of recreational activities they provide. Hiking, camping, fishing and family vacations at the former great resorts have all drawn people from the surrounding metropolitan areas. Tourism has changed since the hay days of the grand resorts in the Catskills, and there is hope in the new emphasis on “eco-tourism.” While the Manor Kill watershed has much to offer its visitors, the Project Team would propose several recommendations that could enhance public use and enjoyment of the stream system.

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| 5.2.1 | Water Temperature Impacts on Fisheries Study | | |
| <i>Recommendation</i> | Conduct a study to monitor summer season stream temperatures along the Manor Kill and associated impacts on fisheries. Even streams with good water quality, high water temperature during summer low flow periods can stress some species and alter coldwater fish communities. This study will assess if coldwater fish communities are thermally limited, and locate areas where habitat improvements might mitigate these impacts, and areas of thermal refuge that may need protected. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |

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| <i>Funding Sources</i> | NYSDEC NYCDEP Trout Unlimited | <i>Task Partners</i> | NYCDEP NYSDEC USGS Trout Unlimited Rod & Gun Clubs Schoharie River Center |
| <i>Estimated Cost</i> | Not Determined | <i>Schedule</i> | To be determined |
| <i>Notes</i> | NYCDEP has automatic sampling equipment available to collect stream temperature data. | | |

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| 5.2.2 | Public Fishing Access | | |
| <i>Recommendation</i> | Public access for fishing should be enhanced along the Manor Kill stream corridor. Additional public access, as well as improvements to parking and access trails, is representative of the type of activities which may be possible. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | NYSDEC/SCSWCD |
| <i>Funding Sources</i> | NYSDEC NYCDEP Trout Unlimited other grants | <i>Task Partners</i> | Local Municipalities Trout Unlimited Schoharie Watershed Advisory Committee (SWAC) Landowners Schoharie River Center |
| <i>Estimated Cost</i> | Not determined | <i>Schedule</i> | To be determined |
| <i>Notes</i> | The Manor Kill watershed presents multiple opportunities for enhancing public access for fishing. While there appears to be adequate overall access, handicapped access is limited. | | |

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| 5.2.3 | Streamside Recreational Trails | | |
| <i>Recommendation</i> | Investigate opportunities to develop multi-use, low impact trail systems along the stream corridor. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | Watershed Municipalities |
| <i>Funding Sources</i> | NYSDEC CWC Other grants | <i>Task Partners</i> | SCSWCD NYCDEP SC Promotion Dept. Local Chambers of Commerce SWAC Landowners Schoharie River Center |
| <i>Estimated Cost</i> | Not determined | <i>Schedule</i> | Not determined |

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| <i>Notes</i> | Trails for hiking, biking, cross country skiing and snowshoeing can provide multiple benefits, including drawing visitors to local resorts and increasing user awareness of stream management issues. Trails should be integrated with interpretive signage. Trail development efforts must be addressed as a cooperative effort of multiple municipalities and on the watershed scale. Trail systems should be integrated with NYSDEC trail system. Low impact, passive trail use will not impact water quality, and in fact may provide long term benefits through increased public awareness. |
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| 5.2.4 | Economic Analysis of Fishing based Tourism | | |
| <i>Recommendation</i> | Feasibility of developing a fishing based tourism business should be studied, including an economic analysis and review of resource limitations/needs | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD SC Promotions Dept |
| <i>Funding Sources</i> | CWC NYS Economic Development NYS I Love NY Program Foundation Grants Local Business SC Promotion/tourism depts. | <i>Task Partners</i> | NYCDEP NYSDEC Local business owners Local municipalities Landowners |
| <i>Estimated Cost</i> | Not determined | <i>Schedule</i> | Not determined |
| <i>Notes</i> | Studies of fisheries based tourism in the lower Catskills have found these activities to have a significant benefit to the local economy. A study should address stream conditions, resource limitations and the status of support industries such as tackle shops. | | |

5.3 Water Quality

In the Manor Kill watershed, the protection of water quality must be recognized as having benefits to local stakeholders as well as New York City. While City residents may rely on the Manor Kill to meet their drinking water needs, it is also a critical resource to local communities. Maintaining high water quality in the Manor Kill, and its tributaries, is important to recreational activities, drinking water and ecological health of the stream system. The following recommendations are made based upon an awareness of on-going efforts in the NYC watershed, and in some cases may require further investigations and analysis to refine the scope of any proposed activities.

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| 5.3.1 | Community Stormwater Management Plans | | |
| Recommendation | Watershed communities should develop and implement comprehensive stormwater management plans which will protect water quality as well as reduce impacts on stream morphology. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | CWC - Stormwater Grants NYSDOS - Planning Grants NYCDEP – WQ Grants FEMA - HMGP | Task Partners | Watershed Municipalities CWC NYCDEP NYSDEC NYSDOT SC Highway SC Planning Dept |
| Estimated Cost | Undetermined | Schedule | To be determined |
| Notes | Watershed Municipalities should take advantage of CWC funds to complete these plans. | | |

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| 5.3.2 | Watershed Agricultural Program | | |
| Recommendation | The SCSWCD should continue to facilitate participation in the Watershed Agricultural Program. WAP activities should be integrated with the goals and recommendations of the Manor Kill Stream Management Plan. | | |
| Priority | Low | Task Leader | Watershed Agricultural Council |
| Funding Sources | Watershed Ag Program NYS Ag & Markets | Task Partners | SCSWCD WAP NRCS |
| Estimated Cost | Varies by project | Schedule | On-going |
| Notes | There are a few farms in the Manor Kill basin which may qualify for participation in the Watershed Agricultural Program Small Farms Program. | | |

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| 5.3.3 | Critical Area Seeding Program | | |
| Recommendation | Local municipalities, Schoharie County Highway Departments and NYSDOT, should place a priority on vegetation management on critical areas such as roadside ditches and steep slopes. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | CWC NYCDEP NYSDEC Schoharie Highway Dept Watershed Municipalities | Task Partners | SC Planning Dept CWC NYCDEP NYSDEC Watershed Municipalities |
| Estimated Cost | Unknown | Schedule | On-going |

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| 5.3.4 | On-site Waste Water Systems | | |
| <i>Recommendation</i> | Riparian landowners should be encouraged to participate in CWC sponsored program to test and repair failing septic systems. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | CWC |
| <i>Funding Sources</i> | CWC - Septic Program | <i>Task Partners</i> | CWC SCSWCD Health department Watershed Municipalities |
| <i>Estimated Cost</i> | Undetermined | <i>Schedule</i> | When program opens again |
| <i>Notes</i> | <p>(a) The CWC Septic Rehab and Replacement Program is available to landowners who have septic systems located close to the stream.</p> <p>(b) Landowners should also be provided ready access to information on management of their septic systems. Development of a guide book, and perhaps a printed file folder to hold cleaning/repair records should also be investigated.</p> | | |

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| 5.3.5 | Road Abrasives Program | | |
| <i>Recommendation</i> | Watershed municipalities should evaluate winter road abrasive procedures to address abrasive quality, application methods and spring sweeping. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | Municipalities/County |
| <i>Funding Sources</i> | Municipalities CWC NYCDEP NYSDEC | <i>Task Partners</i> | CWC NYSDEC NYCDEP SCSWCD SC Highway Departments NYS DOT SC Planning Dept |
| <i>Estimated Cost</i> | Undetermined | <i>Schedule</i> | Undetermined |
| <i>Notes</i> | (a) Winter road abrasive materials containing high silt/clay content can have a direct impact on water quality. Municipalities should be encouraged to use high quality washed sand materials. Cost share funding may be needed to provide incentive to use more highly priced materials. | | |

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| 5.3.6 | Watershed Forestry Programs | | |
| Recommendation | Watershed landowners should be encouraged to participate in the NYC DEP Watershed Forestry Program when conducting timber harvesting and other forest management activities. | | |
| Priority | High | Task Leader | NYC DEP Watershed Forestry Program |
| Funding Sources | NYSDEC WFP USFS | Task Partners | SCSWCD CFA NYSDEC Landowners |
| Estimated Cost | Determined on case by case basis | Schedule | On-going |
| Notes | The NYC DEP Watershed Forestry Program offers a number of services to watershed landowners. The SCSWCD may assist the WFP in promoting the WFP to watershed landowners. | | |

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| 5.3.7 | Stormwater Retrofits | | |
| Recommendation | Watershed Municipalities should participate in the CWC Stormwater Retrofits Grant Program to address stormwater quality issues. | | |
| Priority | High | Task Leader | Watershed Municipalities |
| Funding Sources | CWC ACOE NYSDEC USFWS others | Task Partners | NYCDEP NYSDEC, NYSDOH USEPA CWC Landowners Local Municipalities SCSWCD SC Planning Dept |
| Estimated Cost | Project Specific | Schedule | On-going |
| Notes | Watershed communities can address water quality impacts from stormwater facilities by undertaking retrofit projects. Projects may have added benefit of addressing flooding and other issues of direct interest to the municipality. | | |

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| 5.3.8 | Watershed Assessment of Major Manor Kill Tributaries | | |
| Recommendation | Complete a watershed assessment of major Manor Kill tributaries that have yet to be assessed (1/09). These tributaries should be studied to identify sediment sources, erosion hazards, and potential water quality impairments and associated treatment opportunities. The tributary requiring further assessment and possibly a management plan is the Bear Kill. | | |

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| Priority | High | Task Leader | SCSWCD |
| Funding Sources | NYCDEP | Task Partners | NYCDEP GCSWCD Schoharie River Center |
| Estimated Cost | Not Determined | Schedule | To be determined |
| Notes | | | |

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| 5.3.9 | Map and Prioritize Dump Sites on Manor Kill | | |
| Recommendation | Complete a map of existing dump sites on Manor Kill and prioritize for remediation. In addition to degrading the creek aesthetically, dump sites may also impair water quality by leaching contaminants into the stream. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | NYCDEP | Task Partners | NYCDEP Schoharie River Center |
| Estimated Cost | Not Determined | Schedule | To Be Determined |
| Notes | | | |

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| 5.3.10 | Review Existing Water Quality Data | | |
| Recommendation | Review existing water quality data and identify, to the extent possible, the most significant water quality impairments. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | NYCDEP | Task Partners | NYCDEP Watershed Municipalities Schoharie River Center |
| Estimated Cost | Not Determined | Schedule | On-going |
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| 5.3.11 | Identify Locations of Potential Water Quality Impairments | | |
| Recommendation | Identify locations of potential water quality impairments including; sources of pollution from upland areas and within the stream channel such as significant glacial lack clay exposures, and sources of contaminants from road runoff and households, and make prioritized recommendations for their mitigation. | | |
| Priority | High | Task Leader | SCSWCD |

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| <i>Funding Sources</i> | NYCDEP | <i>Task Partners</i> | NYCDEP Watershed Municipalities CCE Schoharie River Center |
| <i>Estimated Cost</i> | Not Determined | <i>Schedule</i> | To Be Determined |
| <i>Notes</i> | Potential impairments to water quality can come from many non-point sources affecting both surface and ground water supplies. | | |

5.4 Education and Outreach

Increasing public awareness about the importance of the Manor Kill watershed is critical to the success of this SMP. The willingness of watershed stakeholders to work together depends on an understanding of the importance of the watershed ecosystem and how it relates to their daily lives. Ultimately, people will protect what they care about, and they care about things that they understand and appreciate. In the previous sections of this Stream Management Plan, many new concepts related to stream and watershed management have been introduced. In addition to these new concepts, the SMP has identified several areas where local audiences would benefit from technical or awareness training in a variety of topics. The following recommendations identify just some of the possible recommendations for public education and outreach.

Stakeholder Workshops

In the Manor Kill watershed, the range of stakeholders with a direct or indirect interest in the health and function of the stream corridor is as diverse as the watershed itself. Stakeholders include private interests such as the landowners who live along the stream, and various constituencies which prize the Catskills streams for their recreational value. On the other hand, stakeholders also include a myriad of local, state and federal interests having responsibility for management and protection of community and natural resources. While the development of a detailed Education & Outreach Plan would refine target audiences, the Project Team has identified three primary audiences. Additional participants or sub-audiences will be identified as these recommendations are moved forward.

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| Private Parties | a. Landowners (residential and business) b. Recreational users |
| Municipalities | a. Legislative Bodies (town boards, legislature) b. Planning Board and Code Enforcement Office c. Highway Department |
| Business Sector | a. Realtors/Bankers/Insurance Agents b. Developers & Contractors c. Contractors |

While a planning team will develop the specific details of the workshop program, the Manor Kill SMP has identified several broad categories of workshops recommended for specific target audiences. Workshops should include indoor sessions, as well as field trip and practical exercises. The following list is not inclusive of all possible workshops.

1. Riparian Landowners - Sessions need to provide basic understanding of fluvial process, factors impacting stability/water quality, and management decisions for the promotion of a healthy stream. Sessions should provide landowners with training in effective stream protection actions for their own property.

2. Municipal Leaders - Sessions need to address the importance of local management of the watershed and stream resources. Municipal leaders also need to understand basic fluvial process, with an emphasis on how local decision makers can support stream health through their leadership. Sessions must address the multiple benefits which can be realized by protecting stream and watershed health. Field tours highlighting issues and specific problems with municipal leaders can provide an excellent forum for exchange between the leaders, the public and the resource managers.

3. Planning Boards & Code Enforcement Personnel - Stream awareness/innovative development technique sessions should be targeted at this important group of local decision makers. Planning boards have a significant ability to effect change in land use practices which may impact stream health. Likewise, they have a wealth of experience from their reviews to share with the resource managers. After planning decisions are made, the local CEO is charged with oversight of development activities and they in turn must understand the impact of development activities on the stream system. Their input to the resource managers will help direct the manager toward the most practical solutions.

4. Local/County/State Highway Department - This group has the most direct ability to

impact stream health. Day to day activities in the maintenance of the road systems and other public infrastructure frequently involves local waterways, and often actions which may seem harmless can create extreme instability problems that grow in size by moving up or downstream and become very costly to repair. This group of stakeholders must not only have a knowledge of basic stream process, but they must also have the ability to recognize what changes are occurring in a problem area, as well as the potential impact of any management action they may take. This training would not be a substitution for highways departments seeking technical advice from experienced stream managers on a case by case basis, but would help.

5. Banks/Realtors/Insurance - Many landowner inquiries involve floodplains and the flood insurance program. A joint workshop session for the financial, real estate and insurance businesses would be an effective vehicle to address flood insurance, lending regulations and other issues related to these industries.

5. Contractors & Developers - Local contractors should receive training to allow them to make better decisions regarding impacts to streams. Contractors can benefit from training on new methodologies for addressing stream stability, the permitting process and project construction issues such as water quality protection. Contractor training should also address stormwater management as well as sediment and erosion control.

This list is not inclusive of all possible audiences and/or workshop topics. An Education and Outreach working group is suggested as a vehicle to develop a detailed strategy for conducting workshops in the Manor Kill watershed. Many of these workshops will be more effective if conducted over a broader area, such as the West-of-Hudson NYC Watershed.

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| 5.4.1 | Education and Outreach Working Group | | |
| Recommendation | The SCSWCD will facilitate the formation of an Education & Outreach working group to develop a detailed E&O strategy which would address the number, type, subjects, instructors, logistics and other details of conducting stakeholder workshops. | | |
| Priority | High | Task Leader | To be determined |

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| <i>Funding Sources</i> | NYCDEP (project/in-kind) Grants CWC NYSDEC NYSDOS | <i>Task Partners</i> | SCSWCD NYCDEP Watershed Municipalities SC Planning Dept. Catskill Center NYSDEC, NYSDOS Schoharie Watershed AC Schoharie River Center Others |
| <i>Estimated Cost</i> | Unknown | <i>Schedule</i> | To be determined |
| <i>Notes</i> | A priority focus should be placed on landowners, municipal leaders and local planners. E&O efforts should integrate the Manor Kill Watershed Committee as a resource for watershed landowners. | | |

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| 5.4.2 | Community Networking | | |
| <i>Recommendation</i> | Develop a centralized source, such as a non-profit group or regional agency, to distribute information and curriculum about the watershed from a location centrally located in the watershed; and establish a network among community groups by creating a Manor Kill Watershed Resource Book or website that describes each organization and how to contact them. Finally, develop routine methods to educate new landowners about water issues. For example, provide realtors and town halls with brochures, such as the “Catskill Streams and You” brochure, or other information available from local resource partners. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |
| <i>Funding Sources</i> | NYCDEP | <i>Task Partners</i> | NYCDEP Watershed Municipalities SC Planning Dept. Catskill Center NYSDEC, NYSDOS Schoharie Watershed AC Others |
| <i>Estimated Cost</i> | Unknown | <i>Schedule</i> | |
| <i>Notes</i> | | | |

Educational Resources

In addition to organized workshops and on-going school based programs, watershed stakeholders should have ready access to timely and accurate information on stream management issues. Educational resources may include access to Manor Kill geomorphic data for engineers and project designers, or landowner access to guidelines and other

technical documents.

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| 5.4.3 | Web Based Outreach | | |
| Recommendation | Develop a watershed web site to provide information to watershed stakeholders. Upgrade site to allow landowners interaction such as reporting stream changes, problems etc. | | |
| Priority | High | Task Leader | SCSWCD/Buffer Outreach Group |
| Funding Sources | NYCDEP NYSDEC CWC other grants | Task Partners | NYCDEP SC CCE Others |
| Estimated Cost | Not determined | Schedule | On-going |
| Notes | The SCSWCD proposes that the internet can be an effective resource for watershed stakeholders. The site should provide access to publications and project updates. The site exists – www.catskillstreams.org | | |

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| 5.4.4 | News Media Outreach | | |
| Recommendation | Stream managers in the Catskills should work cooperatively to develop a series of columns for publication in watershed newspapers. In addition, advertise the benefits and values of the Creek by publishing maps, guides and telephone numbers for stream information in local newspapers and magazines. | | |
| Priority | Medium | Task Leader | To be determined |
| Funding Sources | Not applicable | Task Partners | SCSWCD SC Planning Dept NYCDEP |
| Estimated Cost | No cost, use existing staff | Schedule | To be determined |
| Notes | Existing staff at watershed SWCDs, NYCDEP and other programs could contribute to a column that would be distributed under an established banner. Goal is to develop an identity for the information source. Columns can address general concepts, but should also provide timely updates on floods, program activities, etc. | | |

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| 5.4.5 | Stream Management Publications | | |
| Recommendation | Develop a series of publications focused on stream management which can be provided to watershed stakeholders and/or used in training workshops | | |
| Priority | High | Task Leader | NYCDEP – SMP |

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| <i>Funding Sources</i> | CWC Educational Grants NYCDEP/NYSDEC Other Grants | <i>Task Partners</i> | SCSWCD Catskill Center CWC SC CCE Others |
| <i>Estimated Cost</i> | Not determined | <i>Schedule</i> | Unknown |
| <i>Notes</i> | Currently, there is a lack of publications on stream management readily available to watershed stakeholders. Fact sheets, landowner stream management guidelines, and other topics should be the focus of such publications. Publications may include existing work as well as resources developed for the broader NYC watershed area. | | |

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| 5.4.6 | Watershed Health Reports | | |
| <i>Recommendation</i> | Annually, publish a “Watershed Health” report that can be distributed to stakeholders. The report will present updates on stream restoration projects, results of monitoring efforts and other relevant information. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | NYCDEP-SMP |
| <i>Funding Sources</i> | CWC NYCDEP NYSDEC Other Grants | <i>Task Partners</i> | SCSWCD Catskill Center NYSDEC NYSDOS USEPA CWC Schoharie River Center Others |
| <i>Estimated Cost</i> | \$5,000 annually | <i>Schedule</i> | To be determined |
| <i>Notes</i> | NYCDEP should continue to work with watershed stakeholders and develop annual reports on a sub basin basis. | | |

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| 5.4.7 | Conduct Watershed Survey | | |
| <i>Recommendation</i> | Conduct a survey of watershed residents to determine their concerns, interests and current stewardship practices | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |
| <i>Funding Sources</i> | CWC NYCDEP NYSDEC Other Grants | <i>Task Partners</i> | NYCDEP Catskill Center NYSDEC NYSDOS USEPA CWC Others |
| <i>Estimated Cost</i> | | <i>Schedule</i> | To be determined |

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| <i>Notes</i> | The Survey may need to be targeted to various interest groups (e.g. highway Superintendents, landowners, municipal officers, etc). The survey should also determine the needs of various stakeholder groups for technical assistance and information and education. |
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| 5.4.8 | Additional Education Recommendations |
| <i>Recommendations</i> | <ul style="list-style-type: none"> <li data-bbox="516 264 1464 632">➤ Develop an interesting, hands-on display and accompanying presentation that could travel with staff or volunteers to public places such as stores, festivals, community days, teen centers, churches, senior centers or scout meeting places. Include the definition of a watershed, how people affect the watershed in their daily lives, the importance of a healthy watershed and what they can do to help improve water quality; <li data-bbox="516 674 1464 768">➤ Create a video based on the hands-on display and presentation that could be purchased or loaned out to school and community groups. <li data-bbox="516 810 1464 905">➤ Host a "Manor Kill Watershed Week" in late April or early May with various events planned and business sponsors. <li data-bbox="516 947 1464 1209">➤ Implement neighborhood workshops focusing on integrated pest management, best management practices for lawn care, maintenance of riparian buffers (vegetation along streams), residential stormwater and wetland protection to reduce pollutant loading from pesticides, toxins, sediment and nutrients. <li data-bbox="516 1251 1464 1514">➤ Send out a teacher survey asking what they currently teach related to watershed protection, and what they would like to have available. Based on the response, recommend the resources noted above or develop additional materials to meet their needs. Finally, support on-going school-based watershed education programs. <li data-bbox="516 1556 1464 1818">➤ Work at the state level to integrate environmental education into the base curriculum for public schools in a practical and creative way. Encourage or mandate the state board of public education and local school boards to add to programs and provide more time, funding and encouragement for environmental education. |

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| <i>Priority</i> | Medium | <i>Task Leader</i> | SCSWCD |
| <i>Funding Sources</i> | CWC NYCDEP NYSDEC Other Grants | <i>Task Partners</i> | NYCDEP Catskill Center NYSDEC NYSDOS USEPA CWC Schoharie River Center Others |
| <i>Estimated Cost</i> | | <i>Schedule</i> | To be determined |
| <i>Notes</i> | | | |

5.5 Programmatic Approaches

It is unlikely that any other watershed in the country has been the subject of the detailed level of watershed management that is ongoing in the Catskill Mountain watersheds of the City of New York water supply. Since its inception in 1997, this comprehensive effort to advance water quality protection has achieved significant success. In the six years since the historic watershed MOA, a comprehensive program focused on stream restoration, septic system replacements, stormwater projects, farm management, community planning, and municipal waste water system development, has been initiated and is making significant progress in watershed protection.

To provide further coordination and to move forward with implementation of the Manor Kill Management Plan, a number of programmatic recommendations are presented in the text below. In most cases, the Manor Kill Project Team proposes that these issues be addressed on a major watershed basis (i.e. Schoharie, Esopus etc). Given the number of recommendations, the diversity of interests and the magnitude of the effort required, mobilization of the public, and coordination of the agencies/interest groups is necessary to avoid conflict and redundancy. Recommendations are also provided below to assist landowners and municipalities with stream related problems, especially to provide guidance through the permitting process and during the planning phase of stream related construction projects.

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| 5.5.1 | Stream Permitting Activities | | |
| Recommendation | NYSDEC, USACOE and other regulators should review permit applications for consistency with the recommendations presented in the Manor Kill Stream Management Plan. The SWCDs could also advise municipalities and the public on the permit process in an effort to improve projects and minimize public hardships/discontent. | | |
| Priority | High | Task Leader | NYSDEC/ACOE |
| Funding Sources | Minimal added cost for copying SWCD's with permit applications | Task Partners | SCSWCD NYCDEP |
| Estimated Cost | Undetermined | Schedule | ASAP |
| Notes | Development of the stream corridor management plans in the NYC watershed has resulted in a significant commitment to staff training and stream condition assessment. To insure the SMP will be effective, NYSDEC and the ACOE should provide local SWCD's (or other local stream managers) the opportunity to review and comment on permit applications. The local SWCD's would complete a review concurrent and in coordination with NYSDEC to ensure timely response to the applicants. A coordinated review by the NYSDEC/ACOE and local watershed managers will provide access to a broader range of technical resources, and will facilitate coordination of management efforts on a watershed scale. | | |

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| 5.5.2 | Flood Response Technical Resources | | |
| Recommendation | Guidelines, which integrate stream form and function, should be developed for use during post flood response. | | |
| Priority | Very High | Task Leader | SEMO/NYSDEC/ACOE |
| Funding Sources | FEMA NYSEMO NYSDEC NYCDEP | Task Partners | FEMA/SEMO Local Highway Departments NYSDOT/NYSDEC Local SWCDs State & Local Emergency Services NYS Floodplain Managers Association others |
| Estimated Cost | Undetermined | Schedule | Establish Working group 2007 1 st draft of guidelines 2007 Final guidelines 2008 |

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| <i>Notes</i> | <p>During periods of post-flood response, municipalities need information and technical support to minimize impacts on stream system stability. Guidelines for “repairs” of flood damaged streams and drainage systems would greatly reduce risk of further instability. While these guidelines would be appropriate at the state level, the NYC watershed may be an ideal location for development of the guidelines due to data availability (i.e. regional curves). Additionally, FEMA field staff (including reserve positions) should be trained in basic fluvial geomorphology concepts and use of the Guidelines. These methods should be integrated to the greatest extent possible on all Public Assistance (PA) projects.</p> |
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| 5.5.3 | Local Land Use Regulations | | |
| <i>Recommendation</i> | <p>Watershed municipalities should evaluate their existing land use regulations, and adopt provisions which will protect stream corridor resources. For example, many municipalities have adopted ordinances that establish overlay maps that identify zones along watercourses or wetlands where certain development activities are subject to additional local review. Special consideration by local planning boards of development activity within these special hazard zones is intended to help protect public safety.</p> | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SC Planning Department |
| <i>Funding Sources</i> | <p>NYSDOS CWC</p> | <i>Task Partners</i> | <p>SCSWCD NYCDEP NYSDEC Catskill Center SC Planning Department Watershed Municipalities</p> |
| <i>Estimated Cost</i> | Undetermined | <i>Schedule</i> | Undetermined |
| <i>Notes</i> | <p>Locally developed and managed ordinances related to land use issues are often one of the most effective methods for protection of critical stream resources. Sound management of stream corridors has a direct public benefit associated with reduced impacts on public infrastructure, improved water quality, and enhanced recreational values. In the Manor Kill watershed, municipalities would benefit from integrating a strong emphasis on stream corridor management in their community comprehensive plans, site plan review laws, zoning or other appropriate local ordinances.</p> | | |

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| 5.5.4 | Water Quality Regulations | | |
| Recommendation | A watershed-wide evaluation of regulations, including ordinances and zoning laws, should be undertaken. The evaluation should seek to identify regulatory gaps and determine if the current laws and ordinances adequately protect the watershed. The evaluation should also analyze current municipal zoning regulations for impervious surface/sprawl inducing aspects; in addition, various studies commonly conducted by municipalities, such as master plans, land-use studies, and build-out analyses are very useful to watershed protection efforts. An effort should be made to identify which of these studies need to be conducted/updated and encourage municipalities to do so. | | |
| Priority | High | Task Leader | SC Planning Department |
| Funding Sources | NYSDOS CWC DEP | Task Partners | SCSWCD NYCDEP NYSDEC Catskill Center Watershed Municipalities |
| Estimated Cost | Undetermined | Schedule | Undetermined |
| Notes | | | |

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| 5.5.5 | Program Review | | |
| Recommendation | All projects and procedures endorsed by the Schoharie Watershed Advisory Committee should be evaluated to determine whether or not they are effective. Ineffective projects must be modified or abandoned. The Committee should encourage other entities working within the watershed to evaluate their project effectiveness as well. | | |
| Priority | High | Task Leader | Project Advisory Committee |
| Funding Sources | DEP | Task Partners | SWAC Members |
| Estimated Cost | Undetermined | Schedule | Annually |
| Notes | | | |

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| 5.5.6 | Technical Advisory Committee | | |
| Recommendation | NYCDEP should facilitate a watershed wide Technical Advisory Committee (TAC) to provide for routine networking between stream managers and interested local, state and federal parties. The TAC would work with any Watershed Associations and the Project Advisory Committee (SWAC) | | |

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| Priority | Medium | Task Leader | NYCDEP |
| Funding Sources | NYCDEP | Task Partners | SCSWCD NYS - DOH, DOT, DEC, DOS, SEMO SC Planning Department SC Highway Departments ACOE NRCS Local Districts Municipalities Others |
| Estimated Cost | Undetermined | Schedule | On-going |
| Notes | With many local, state and federal agencies conducting activities within the watershed, a technical stream working group would provide an effective vehicle for networking between the groups as well as to address technical issues related to the stream management plans, restoration projects and stream maintenance activities. The group should represent all agencies, as well as their various departments, who have any role in stream management. The group should meet at least quarterly. | | |

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| 5.5.7 | Watershed Associations | | |
| Recommendation | Promote a Manor Kill Watershed Association. | | |
| Priority | High | Task Leader | Watershed Stakeholders |
| Funding Sources | NYCDEP Private Foundations | Task Partners | Watershed Municipalities SCSWCD NYCDEP Schoharie River Center |
| Estimated Cost | \$5,000 seed money | Schedule | On-going |
| Notes | The WA can represent the diverse interests of watershed stakeholders and take a proactive position on management of the stream corridor. They can take an investigative role in monitoring the source of problems in the watershed, and coordinating neighborhoods in response to concerns, or organizing volunteers for a variety of efforts. | | |

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| 5.5.8 | Project Advisory Committee | | |
| Recommendation | Establish and support a Project Advisory Committee consisting of representatives of all significant stakeholder groups to coordinate the development and implementation of the plan | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | NYCDEP Private Foundations | Task Partners | Watershed Municipalities Private Consultants SC Planning Department NYCDEP Watershed Residents |
| Estimated Cost | | Schedule | Established in Spring, 2007 |
| Notes | | | |

5.6 Fishery Habitat

Historically, the Manor Kill has been characterized as a thriving trout stream and a popular stream to fish. The recommendations below for continued monitoring and improvement in fish cover are related to other recommendations in this section that emphasize riparian buffers and storm water protection measures. Continued monitoring will provide a measure of the success of these initiatives in terms of the fishery.

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| 5.6.1 | Restoration Project Fisheries Monitoring | | |
| Recommendation | The SCSWCD should continue to support the NYCDEP/USGS effort to evaluate fisheries benefits associated with restoration projects. | | |
| Priority | Medium | Task Leader | USGS/NYCDEP/DEC |
| Funding Sources | NYCDEP | Task Partners | SCSWCD Schoharie River Center |
| Estimated Cost | Not Determined | Schedule | On-going |
| Notes | The SCSWCD should continue to provide technical support to assist the USGS and NYCDEP in conducting post-construction monitoring of fisheries habitat conditions at restoration project sites. Monitoring will confirm fisheries benefits. USGS/DEC/DEP should build local capacity to monitor aspects of these projects and fisheries in the remainder watershed. | | |

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| 5.6.2 | Characterize Current Stream Ecosystem | | |
| Recommendation | Characterize the status of stream ecosystem utilizing existing fish and insect population data, and outlining the general threats to ecosystem health and integrity | | |
| Priority | High | Task Leader | To be determined |
| Funding Sources | NYSDEC NYCDEP Trout Unlimited - EAS grants USFWS - PFW Program | Task Partners | NYCDEP SCSWCD Trout Unlimited NYSDEC Landowners Sportsman Schoharie River Center Others |
| Estimated Cost | Not Determined | Schedule | To Be Determined |
| Notes | | | |

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| 5.6.3 | Conduct Fisherman Surveys | | |
| Recommendation | Conduct fisherman surveys to determine perceived trends, and document any management by local angling groups and NYS DEC | | |
| Priority | Medium | Task Leader | To be determined |
| Funding Sources | NYSDEC NYCDEP Trout Unlimited - EAS grants USFWS - PFW Program | Task Partners | NYCDEP SCSWCD Trout Unlimited NYSDEC Landowners Sportsman Others |
| Estimated Cost | Not Determined | Schedule | To Be Determined |
| Notes | | | |

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| 5.6.4 | Conduct Watershed Aquatic Habitat Study | | |
| Recommendation | Conduct a watershed aquatic habitat study including; mapping habitats and associated characteristics throughout Manor Kill, characterization of fish species presence or absence in those habitats, establish target fish community structure based on regional and historic fish community data, and make recommendations for improvement of habitat for target community. | | |
| Priority | High | Task Leader | To be determined |

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| <i>Funding Sources</i> | NYSDEC NYCDEP Trout Unlimited - EAS grants USFWS - PFW Program | <i>Task Partners</i> | NYCDEP SCSWCD Trout Unlimited NYSDEC Landowners Sportsman Schoharie River Center Others |
| <i>Estimated Cost</i> | Not Determined | <i>Schedule</i> | To Be Determined |
| <i>Notes</i> | | | |

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| 5.6.5 | Habitat Improvement Projects | | |
| <i>Recommendation</i> | A habitat assessment should be conducted in the Manor Kill and major tributaries, with particular attention paid to thermal refuge for cold water fish. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | To be determined |
| <i>Funding Sources</i> | NYSDEC NYCDEP Trout Unlimited - EAS grants USFWS - PFW Program | <i>Task Partners</i> | NYCDEP SCSWCD/UCSWCD Trout Unlimited NYSDEC Landowners Sportsman Schoharie River Center Others |
| <i>Estimated Cost</i> | Not Determined | <i>Schedule</i> | To be determined |
| <i>Notes</i> | Habitat assessment studies in the Stony Clove noted the need for better woody debris management as well as improved stream cover. | | |

5.7 Riparian Zone Management

The role of vegetated riparian buffers in water quality protection and the promotion of stream stability can not be overstated. Healthy, well vegetated riparian buffers filter upland pollutants; provide rooting mass for bank stability and lower stream water temperatures. As noted previously in this SMP, overall riparian condition along the Manor Kill would benefit from enhanced protection and management in many sections of the stream corridor. While some riparian vegetation is present throughout most of the stream corridor, often the size and structure of the buffer (buffer width, plant density, plant size distribution and diversity of plant species) is inadequate to ensure long term protection of the stream. As such, the Manor Kill SMP has developed a series of recommendations regarding riparian buffers. These

recommendations are address preservation/protection of buffers, establishment or enhancement of buffers and control of invasive species.

On numerous occasions, local stream managers have observed everyday activities carried out by private landowners that may damage their riparian area and lead to stability problems in the future. These landowners may not be aware of the potential impacts of their actions. In fact, the Manor Kill project team has found that landowners often feel that these activities actually may benefit stream health. This accentuates the need for increased awareness of the role riparian vegetation in stream health. The following activities, while not inclusive of all potential impacts, addresses the predominate concerns noted by the Manor Kill project team.

Vegetation Maintenance - Often, in an attempt to maintain their view of the stream, landowners will remove all (or most) of the woody vegetation, and will maintain their lawn right up to the top of the streambank. While the grass vegetation may provide adequate buffering of upland water quality impacts, the loss of shrubs, understory trees, and other woody vegetation results in a dramatic reduction in the deep rooted vegetation critical to bank stability. The lack of the taller woody cover also makes it difficult to maintain the cooler stream temperatures vital to trout survival.

In general, stream side landowners should make every attempt to maintain a diverse and healthy buffer of at least 50' to 100' along the entire corridor. In these buffer areas, make every attempt to maintain the naturally occurring vegetation as it is best adapted to local climate conditions. Native plants also require less maintenance and have a better natural reproduction rate. Landowners are advised to be selective in their management of riparian vegetation. Significant gains in buffer restoration and stream stability may be made by limiting mowing and practicing selective pruning of trees and shrubs.

Yard Waste Disposal - Frequently, landowners favor the riparian zone for disposal of their yard waste. Grass clippings, leaves and woody brush are often disposed of by dumping over the streambank, with some landowners indicating that they thought this would help protect the streambank from erosion. Corridor assessments have shown that debris piles are more likely to suppress vegetative growth and in fact reduce streambank stability. The dense piles of woody cuttings “smother” all living vegetation. While the debris may provide surface

protection from rainfall impact and runoff, the materials provide no value to protection from erosive stream flows.

Landowners should evaluate their disposal of yard waste materials and seek locations outside of the desired buffer width. In cases where alternate disposal locations are limited, yard waste should be well distributed, and spread out and not densely piled. Distribution of the material will hasten decomposition, and may actually have a positive benefit by adding organic material to the soil. Watershed municipalities may want to investigate the feasibility of developing a public composting facility in the watershed area for safe disposal of these materials. Once composted, the material could be sold by the municipality, or provided free to residents.

Streamside Access - The Manor Kill Project Team recommends that all riparian landowners evaluate potential impacts to the riparian buffer related to their access to the stream. This is of special concern in cases where landowners must access the stream from a high bank or terrace. Repetitive use of a “trail” has been observed to concentrate surface runoff resulting in localized gully erosion. Often, this condition continues to worsen over time, with the gully getting deeper and the stream-side vegetation being undermined. The instability generally continues to worsen, eventually expanding from a localized problem to a broader impact on the buffer zone. The project team has observed sites in the Catskills where a single short trail down a steep streambank resulted in a major slope failure over 600 feet in length. Landowners should manage their access to the stream such that it prevents erosion and loss of riparian vegetation.

The following represents a series of specific recommendations proposed by the Manor Kill Project Team. These recommendations address education, review of buffer impacts and potential revised or new regulations which would focus on protecting riparian vegetation.

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| 5.7.1 | Technical Resources | | |
| <i>Recommendation</i> | Provide streamside landowners and others detailed technical information on the establishment and maintenance of riparian buffers. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |

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| Funding Sources | NYCDEP NYSDEC other grants WFP TNC | Task Partners | NYCDEP Catskill Center Cooperative Extension Watershed Forestry Program Catskill Forest Owners Assoc |
| Estimated Cost | Not Determined | Schedule | 2009 |
| Notes | To promote effective buffer management, detailed technical information on vegetation management (mowing, pruning), planting methods, plant selection and other topics is essential. Landowners will benefit from a series of fact sheets which present this information in a clear and concise manner. Information on maintaining buffers as a “landscape” feature, such as selecting plants with aesthetic value as well as growth habits that allow a view without compromising rooting structure, are examples of the information that is needed. In areas with high residential pressure, landowners should come to value their buffers as “stream-side gardens.” Access to local technical resources will help landowners evaluate their property and develop site specific recommendations. | | |

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| 5.7.2 | Forested Buffers | | |
| Recommendation | Efforts should be make to protect/enhance the stream corridor through the establishment of effective forested buffers. Stream buffers will offer some measure of protection against encroaching land uses and act to protect public and private property. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | | Task Partners | WAP NYCDEP Landowners |
| Estimated Cost | Not determined | Schedule | |
| Notes | GCSWCD has characterized and mapped riparian vegetation within the 300ft stream buffer. | | |

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| 5.7.3 | Agricultural Buffers | | |
| Recommendation | The Watershed Agricultural Program Small Farms program should evaluate livestock farms in the Manor Kill watershed for participation in the WAC small farms program. | | |
| Priority | Medium | Task Leader | Watershed Agricultural Council |
| Funding Sources | Watershed Ag Program USDA-CREP Program USFS/FWS | Task Partners | SCSWCD Watershed Ag. Council Landowners |
| Estimated Cost | Not determined | Schedule | |

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| <i>Notes</i> | There are several small livestock farms in the Manor Kill watershed. These operations may be eligible for participation in the WAP small farms program. Fencing along streams, and improvements of buffer vegetation may be an appropriate management practice. |
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| 5.7.4 | Riparian Technical Assistance | | |
| <i>Recommendation</i> | Watershed Managers should work to provide stakeholders ready access to technical assistance for riparian buffer problems. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |
| <i>Funding Sources</i> | NYCDEP NYSDEC USDA NRCS USFWS USEPA Landowners | <i>Task Partners</i> | NYCDEP WAP CFA NYSDEC Landowners |
| <i>Estimated Cost</i> | Undetermined | <i>Schedule</i> | Undetermined |
| <i>Notes</i> | While agricultural operations and large woodlot owners have ready access to technical assistance and funding programs for riparian buffers, residential properties are not eligible for most of these services at this time. Technical assistance must be closely aligned with on-going SMP efforts and integrate stream morphology assessment. This requires technical staff that is knowledgeable in evaluating local stability as well as buffer management issues. Assistance should include site evaluations, development of site buffer management plans, and facilitation of access to watershed programs which support buffer establishment. Technical assistance should be aggressively marketed to riparian landowners using direct contracts, press and home visits. | | |

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| 5.7.5 | Land Use Ordinance | | |
| <i>Recommendation</i> | Watershed municipalities should evaluate local ordinances such as comprehensive plans, zoning regulations, site plan review laws, subdivision laws and floodplain ordinances to determine if adequate consideration is given to riparian buffers impacts. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SC Planning Department |
| <i>Funding Sources</i> | NYCDEP NYSDOS CWC Municipalities | <i>Task Partners</i> | SCSWCD NYCDEP SC Planning Department Catskill Center Watershed Municipalities |
| <i>Estimated Cost</i> | Not determined, minimal | <i>Schedule</i> | Not determined |

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| Notes | Watershed municipalities will receive multiple benefits from buffer management in their communities. These benefits are far more effective when integrated into all appropriate levels of land use considerations. |
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| 5.7.6 | Watershed Forestry Program | | |
| Recommendation | Stream side landowners who practice forest harvest in the watershed should be made aware of the opportunity to participate in the NYC Watershed Forestry Program (WFP) to ensure timber harvesting operations use appropriate methods to reduce or eliminate impacts to the riparian buffer and improve its condition whenever possible. | | |
| Priority | High | Task Leader | Watershed Forestry Program |
| Funding Sources | WFP U.S. Forest Service | Task Partners | SCSWCD NYCDEP CFA NYSDEC - Forestry/Watersheds Landowners |
| Estimated Cost | Undetermined | Schedule | Not determined |
| Notes | <ol style="list-style-type: none"> 1. SCSWCD will facilitate landowner access to the WFP. 2. If a Riparian Buffer Specialist position is created, that person should be familiar with WFP programs and encourage landowner participation. | | |

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| 5.7.7 | Riparian Conservation Easements | | |
| Recommendation | Provide long-term riparian buffer protection through permanent conservation easements for both currently degraded and intact buffer areas. | | |
| Priority | High | Task Leader | To be determined |
| Funding Sources | NYCDEP WAP NYSDEC other grants | Task Partners | SCSWCD NYCDEP - SMP NYCDEP - Land Acquisition NYSDEC - Forestry/Watersheds Catskill Center WAP Landowners |
| Estimated Cost | Undetermined - needs further study | Schedule | <p>Establish program development committee in 2009</p> <p>Develop draft strategy for increasing easement programs(s) by 2010</p> |

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| <i>Notes</i> | It is strongly recommended that a committee of interested parties be convened. The committee should review all existing options to obtaining easements, evaluate roadblocks to increasing landowner participation and develop an easement program which will result in the greatest participation by interested sellers. |
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| 5.7.8 | Landowner Incentives | | |
| <i>Recommendation</i> | Develop landowner incentive programs which would encourage participation in riparian buffer protection programs, and pilot the effort in the Manor Kill watershed. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | Undetermined |
| <i>Funding Sources</i> | NYS - EPF Other sources | <i>Task Partners</i> | NYS NYSDEC Local SWCD's Others |
| <i>Estimated Cost</i> | Not determined | <i>Schedule</i> | Not determined |
| <i>Notes</i> | The SCSWCD has done past research on programs in other states which have developed state-wide riparian buffer protection incentives similar to New York's Forest Tax Law to provide tax relief incentives for participation in riparian protection programs. The maintenance of healthy buffer zones provides multiple benefits to the public as a whole, and should be a priority of local, state and federal policies. | | |

Riparian Vegetation Establishment/Enhancement

While protection programs can go along way to meeting riparian buffer objectives, current conditions on the Manor Kill would benefit from a proactive approach to restoration and/or enhancement of riparian vegetation. In some places, allowing natural succession to generate woody vegetation may be desirable, while in many other places new plantings will be required. In several areas, stream channel morphology must be adjusted to a more stable form in order to create the conditions necessary for the success of riparian plantings. Riparian restoration strategies must be capable of addressing what is sometimes a highly fragmented buffer condition, with many landowners involved within a very short stream distance. Unlike most agricultural buffer programs where larger plantings may be possible because only one landowner is involved, buffers on the Manor Kill will often require smaller patches of plantings on multiple properties.

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| 5.7.9 | Characterization of Current Riparian Vegetation Management | | |
| Recommendation | Characterize current riparian vegetation management in the watershed and make prioritized recommendations for changes that can improve ecosystem integrity. | | |
| Priority | High | Task Leader | SCSWCD |
| Funding Sources | | Task Partners | NYCDEP Local Municipalities |
| Estimated Cost | Not determined | Schedule | Not determined |
| Notes | Field surveys of selected riparian vegetation should be conducted as part of this effort to make prioritized recommendations for management and further study of the riparian zone. | | |

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| 5.7.10 | Watershed Buffer Cost-Share Program | | |
| Recommendation | Seek local, state or federal funding to initiate a riparian buffer program on lands currently not covered by watershed programs. | | |
| Priority | High | Task Leader | NYCDEP |
| Funding Sources | NYCDEP NYSDEC ACOE/USFS/USFWS | Task Partners | SCSWCD NYSDEC USFS/USFWS/NRCS Landowners |
| Estimated Cost | Not Determined | Schedule | Not determined |
| Notes | <p>While watershed agricultural lands have ready access to cost-share programs for riparian vegetation establishment/enhancement, there is currently no program available to non-agricultural landowners. DEP should work with its partners to develop riparian buffer restoration cost-share programs to assist landowners with planting and maintenance of new buffer plantings.</p> <p>Develop a program to provide interested landowners free, or low cost, plant materials appropriate for use as riparian vegetation. There is a certain segment of the riparian community which would take advantage of free plant materials and provide labor to improve their buffer areas.</p> | | |

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| 5.7.11 | In Lieu Compensatory Mitigation | | |
| Recommendation | NYSDEC and the ACOE should evaluate buffer restoration projects as a possible mitigation requirement on projects with smaller scale disturbances. | | |
| Priority | High | Task Leader | NYSDEC/ACOE |
| Funding Sources | Project Sponsors | Task Partners | SCSWCD NYCDEP Landowners Project Sponsors |

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| <i>Estimated Cost</i> | Not Determined | <i>Schedule</i> | Not determined |
| <i>Notes</i> | In recent years, NYSDEC and the ACOE have increasingly allowed alternate mitigation activities when applicants have minor impacts they have to address, or if site and/other conditions do not allow “replacement” mitigation. The Manor Kill project team strongly recommends that the regulatory agencies give greater consideration to requiring applicants to fund, or undertake, riparian buffer restoration projects as “in lieu” mitigation when appropriate.. | | |

Invasive Species

As noted previously in this SMP, the Manor Kill is impacted by the presence of the invasive species Japanese knotweed. The knotweed presents a serious threat to riparian buffer health and at this time it is our understanding that it must be addressed if any long term success in re-establishing buffers is expected.

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| 5.7.12 | Knotweed Management Resources | | |
| <i>Recommendation</i> | Watershed municipalities should manage knotweed areas in a manner that will prevent the spread and further infestation of the watershed stream corridor. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD/NYCDEP/CRISP |
| <i>Funding Sources</i> | NYCDEP Others | <i>Task Partners</i> | Hudsonia Schoharie Watershed PAC Schoharie River Center Landowners |
| <i>Estimated Cost</i> | Undetermined | <i>Schedule</i> | To be determined |
| <i>Notes</i> | (a) The Batavia Kill pilot project provided preliminary recommendations for knotweed management in 2005. (b) A publication, providing clear and concise information in knotweeds life cycle and how to manage it should be prepared for the entire NYC watershed. | | |

5.8 General Stream Management Activities

Throughout history, humans have exerted their influence on stream systems in many ways. Whether it’s a dam, a bridge, a roadway or home, human activities frequently impact streams. As stream managers, we struggle to find an effective balance between the needs of the community, and the needs of the stream system. The activities of people in the Manor Kill watershed as a whole will long be the primary factor in the health of the stream. Long

range stream management strategies must therefore emphasize the human element.

The Project Team is encouraged by the success to date in increasing watershed stakeholder awareness of how streams respond to damaging management activities. The following recommendations have been formulated based on the project team’s observations, as well past experiences with watershed landowners, regulators, municipal leaders and others with stream management responsibilities. For the purpose of this SMP, “stream management activities” should be considered to be those actions that in some way impact the stream corridor. In many cases these recommendations are general in nature and will require a coordinated effort of many interests to bring to fruition.

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| 5.8.1 | Stream Management Guidelines | | |
| Recommendation | Develop detailed, science based guidelines to stream management which are readily available to those entities responsible for stream activities in the Manor Kill watershed. Guidelines must emphasize natural channel stability and function. | | |
| Priority | High | Task Leader | SCSWCD/NYCDEP |
| Funding Sources | NYCDEP NYSDEC | Task Partners | NYSDEC/ACOE Municipalities - leaders, highway Landowners |
| Estimated Cost | Not determined | Schedule | Not determined |
| Notes | Guidance should include items like problem assessment methods, regional hydraulic geometry curves, construction methods, environmental protection standards and other resources required for planning an effective project. Guidance must be readily available to project designers and sponsors, and continually updated as new data is collected. Guidelines should include items such as typical drawings, specifications, permitting instructions and other information that a project sponsor would need. Guidance will be useful in routine activities as well as emergency situations. | | |

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| 5.8.2 | Technical Assistance | | |
| Recommendation | Provide long-term access to technical assistance to landowners and municipalities for assessment of their stream-related problems, development of effective management strategies and to supervise stream project implementation. | | |
| Priority | High | Task Leader | SCSWCD |

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| <i>Funding Sources</i> | NYCDEP NYSDEC Schoharie County Local Municipalities others | <i>Task Partners</i> | NYCDEP NYSDEC Schoharie County Local Municipalities Landowners |
| <i>Estimated Cost</i> | Undetermined | <i>Schedule</i> | Undetermined |
| <i>Notes</i> | The SCSWCD, NYCDEP and local municipalities should evaluate how to insure long-term availability of the high levels of technical resources currently available in the Watershed. | | |

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| 5.8.3 | Highway Activities | | |
| <i>Recommendation</i> | The Town and County Highway Departments and NYSDOT should integrate geomorphology principles in all new projects and routine maintenance activities related to the Manor Kill basin. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | SCSWCD |
| <i>Funding Sources</i> | Schoharie County Municipalities Federal Highway Admin FEMA NYS-CHIP | <i>Task Partners</i> | Schoharie County Local Municipalities NYCDEP NYSDEC ACOE Landowners |
| <i>Estimated Cost</i> | Varies by project | <i>Schedule</i> | On-going |
| <i>Notes</i> | Activities related to maintenance of highway infrastructure accounts for the vast majority of stream management activities. Whether it is routine maintenance, new construction, or flood response, highway departments as well as private landowners must maintain their roadways and attendant structures. The goals of the highway departments/landowners are not necessarily in conflict with sound stream management. While compromise must be made at times, highway activities can greatly benefit from consideration of stream process. Demonstration restoration projects to date have included several infrastructure components. These projects should continue be used to promote use of Natural Channel Design methods by highway departments and landowners. | | |

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| 5.8.4 | Public Lands | | |
| <i>Recommendation</i> | Governmental landowners in the Manor Kill watershed should manage their lands using natural channel stability concepts, and should serve as a model for other watershed landowners. | | |
| <i>Priority</i> | High | <i>Task Leader</i> | Governmental Landowners |
| <i>Funding Sources</i> | Project specific | <i>Task Partners</i> | NYCDEP NYSDEC Local Municipalities Landowners |
| <i>Estimated Cost</i> | Project Specific | <i>Schedule</i> | Undetermined |

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| Notes | NYSDEC, NYCDEP, municipalities and local institutions (i.e. School District), should each conduct an evaluation of all riparian lands, and identify protection, restoration and management needs. Protection, restoration and management recommendations as set forth in this SMP should be implemented as appropriate. |
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| 5.8.5 | Community Stormwater Plans | | |
| Recommendation | Integrate the evaluation of stormwater impacts on stream systems in the development of community based Stormwater Management Plans (SWMP). | | |
| Priority | High | Task Leader | SC Planning Dept |
| Funding Sources | CWC - Stormwater Retrofits NYSDEC - EPF ACOE - WRDA NYSDOT - Environmental Benefits Municipalities | Task Partners | CWC NYCDEP - multiple sections NYSDEC NYSDOT Schoharie County Landowners SCSWCD |
| Estimated Cost | Undetermined | Schedule | 2008-2009 |
| Notes | A high priority should be placed on participating in the new stormwater planning program. | | |

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| 5.8.6 | Practical Training | | |
| Recommendation | Provide municipal highway departments and local contractors with hands-on training in various stream management activities. Conduct field days, workshops and demonstration projects to meet this goal. | | |
| Priority | Very High | Task Leader | NYCDEP |
| Funding Sources | NYCDEP NYSDEC NYSDOT Federal Highway Admin | Task Partners | SCSWCD Local Municipalities Schoharie County Cornell Local Road Program NYS Association Highway Highway Supers NYSDEC ACOE (regulatory) NYSDOT |
| Estimated Cost | Undetermined | Schedule | 2008-2010 |
| Notes | The Project Team recommends that a comprehensive “hands-on” training program be developed for those entities that are actively involved in stream management activities. The training would provide information on construction methods, stream stabilization “tools” (i.e. rock structures). Workshops must promote hands-on or site based training. | | |

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| 5.8.7 | Stream Stability Restoration | | |
| Recommendation | Secure funding commitments for additional unfunded restoration projects on the Manor Kill. | | |
| Priority | Very High | Task Leader | NYCDEP/SCSWCD |
| Funding Sources | NYCDEP NYSDEC ACOE USEPA Municipalities Landowners | Task Partners | NYSDEC ACOE Landowners others |
| Estimated Cost | Not determined | Schedule | Not determined |
| Notes | Potential restoration sites should be prioritized, ranked and funding sought. | | |

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| 5.8.8 | Stream Stability Restoration and Temperature Protection | | |
| Recommendation | Work with local highway departments to minimize the negative effects of bank armor through the use of vegetation within and above the armor. Replant existing rip rap. This will both increase the effectiveness and strength of the rip rap and cool water temperatures through shading and reducing the thermal effects of heated rock. | | |
| Priority | Very High | Task Leader | SCSWCD/NYCDEP |
| Funding Sources | NYCDEP NYSDEC ACOE USEPA Municipalities Landowners | Task Partners | Highway Departments SCHD Landowners |
| Estimated Cost | Not determined | Schedule | Not determined |
| Notes | | | |