HARPETH RIVER WATERSHED ASSOCIATION

HARPETH RIVER/JONES CREEK
WATERSHED-BASED PLAN

Harpeth River Watershed Association
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The Harpeth River Watershed Association is a 501(c)(3), conservation organization with the purpose of protecting and restoring the ecological health of the Harpeth River and its tributaries and promoting water quality in the middle Tennessee region. As such, the Jones Creek Watershed-Based Plan has been developed by HRWA. Jones Creek is located in Dickson County and is a part of the Harpeth River Watershed.

1) Identification of Causes and Sources

The Tennessee Department of Environment and Conservation (TDEC) 303(d) List identifies the cause of degradation in Jones Creek and an unnamed tributary as siltation, organic enrichment other anthropogenic substrate alterations and pollutant sources such as land development, pasture grazing, golf course runoff and a municipal point source.

1.1 Unnamed Tributary to Jones Creek (TN05130204002-0500)

TDEC lists 0.5 miles of this segment for "other anthropogenic substrate alterations and siltation" associated with a golf course.

1.2 Jones Creek (TN05130204002-2000)

TDEC lists 7.0 miles of this segment for "organic enrichment, *E. coli*, and total fecal coliforms" associated with a municipal point source and pasture grazing.

1.3 Jones Creek (TN05130204002-3000)

TDEC lists 8.1 miles of this segment for "organic enrichment, and siltation" associated with a land development and pasture grazing.

2) Load Reduction Estimates

Load reduction estimates are based on the best available data for the management practice chosen and its ability to reduce pollutant loads based on the Center for Watershed Protection's Watershed Treatment Model. The two core field practices to address siltation and bacterial contamination are riparian restoration and streambank stabilization. In a suburban-urban environment, these practices would generally include riparian revegetation and streambank stabilization through cedar revetment installation, jetties and/or bank revegetation. In some cases the practice may include the creation of a recreational greenway. Finally, livestock exclusion, providing for alternative water supply or limited stream access watering points may be necessary to restore riparian zones in the more rural parts of the subwatershed. In addition, in suburban/urban

environments lawn care education and erosion control programs will be needed. Estimates of pollutant reductions for each practice are located in Table 1.

3) Description of Nonpoint Source Management Measures (BMPs)

The two primary nonpoint source management measures necessary to abate the pollutant sources and causes associated with the State's 303(d) listing of Jones Creek and tributaries in the Harpeth River Watershed are riparian restoration and stream bank stabilization.

Table 1 - Load Reduction Estimates

Practice/Pollutant	Sediment (lbs/year)	Nutrients (lbs/year)	Bacteria (*1)
Riparian Restoration	47,153*	739*	80%
Stream Bank Stabilization	4,715**	74**	1%
Erosion and Sediment Control Program	29,046***	4,357***	NA
Lawn Care Education Program	**NA**	2,311****	NA
Total Estimated Reductions	**80,914**	**7,481**	

* Estimate based on Watershed Treatment Model (WTM), 35-foot buffers, both banks, along 15.6 miles of stream

** Based on best professional judgment

*** Based on a 0.4 program discount 0.3 installation and maintenance discount (the lowest values possible)

**** Based on WTM (assuming source information is correct)

*1 Based on best professional judgment and communication with Dr. Frank Bailey of MTSU (assuming source information is correct)

3.1) Riparian Restoration consists of two basic activities: 1) removal of the cause of degradation and 2) restoration of the vegetative community. Additionally, some hydrologic conditions may need to be restored. Removal of the cause of degradation includes livestock exclusion and provision for alternative water supply. Livestock exclusion will be accomplished by fencing riparian zones. Alternative water supply may be provided by one of two mechanisms, placement of troughs or tanks outside the livestock exclusion zone or a limited stable access point allowing livestock to enter the creek. Based on conversations with district conservationists, water supply should be provided every 2,000 feet. Once livestock are excluded from the riparian zone and alternative water supply provided, riparian (buffer) restoration can occur.

The Natural Resources Conservation Service (NRCS) guidelines call for a minimum 35 foot-wide buffer along rivers and streams, however, other sources call for up to a 100 foot buffer (see Wenger, 1999). HRWA will promote as wide a buffer as seemingly possible, based on land conditions, landowner concerns and other factors that may apply. In an effort to leverage additional NRCS funds, buffers would need to be a minimum of 35 feet wide. However, because TDEC biologists (as per communication with James R. Smith) and others have observed improvements in water quality associated with one row of trees along creek banks, and because land owner objections often have to do with loss of land to graze, crop, etc., HRWA will advocate for as much width as possible, but in some cases work to reestablish minimal riparian zones (i.e. less than optimal). Revegetation may occur by two methods, including active planting and/or natural "volunteer" revegetation. While the latter is more cost-effective, it may not provide as desirable a mix of biodiversity.

Finally, in some cases it may be necessary to restore natural hydrology to the riparian zone. For example, in cases where aquatic systems are severely down cut or where channels have formed through the riparian zone, bypassing sheet flow, and thus pollutant load reductions associated with the filtration capacity of the riparian zone, natural hydrology may need to be restored.

3.2) Streambank Stabilization will be carried out along roughly 10% of stream banks. Streambank erosion is a significant problem in the Jones Creek subwatershed, so treating all streambanks is not cost-effective or practical. Stabilization projects will be prioritized based on protecting specific ecologic assets and treating the most significant problem areas. For example, streams with one row of or scattered trees on a highly erosive streambank would be treated in a effort to protect and save those trees, providing shade and detrital material (habitat and food) to the system (ecological asset). In systems impacted by sediment, long, highly erosive segments may be treated. This should provide for the greatest load reductions at the least cost.

The primary method utilized to treat eroding streambanks will be placement of cedar revetments, possibly with reshaping of banks, back fill and revegetation. HRWA has utilized cedar revetments to treat banks as high as 12 feet and generally found them effective in reducing stream bank erosion. HRWA utilizes a technique developed by Jen-Hill Construction for cedar revetments. The process is the same as that recommended by the Natural Resources Conservation Service, except cedar trees are bundled in jute prior to being attached to the streambank. The jute helps capture more sediment by allowing cedar tree branches to be more compact/dense. In addition the revetment can be backfilled and revegetated immediately following installation.

4) Cost Estimates

4.1) Technical and Financial Resource Estimates

HRWA, NRCS and HRWA's technical advisors will work with individual landowners to develop site-specific plans for stream restoration projects. Best

management practice (BMP) cost estimates are generally based on past experience and directly relate to stream miles impaired, causes and sources associated with the TDEC 303(d) listing. Thus, BMP cost estimates are for the entire subwatershed impaired and presented in Table 2.

Table 2 - Financial Resources Estimates

Activity/Cause/Source	Stream Miles in Need of Treatment	Practice	Cost ($) /mile	Total Cost ($)
Siltation, organic enrichment/low DO – land development / municipal point source	15.9	Riparian Restoration (includes recruitment of landowners, livestock fencing [$1.00/foot for 83,952'], alternative water supply [42 @ $4,000.00/], re-vegetation [@35' wide, 300 seedlings/1000' length]	34,637.00	550,729.00
	1.59	Stream bank Stabilization	244,765.00	389,176.00
Outreach and Education				335,680.00
Totals			**$279,402.00**	**$1,275,585.00**

HRWA will work with local officials on the implementation of the Erosion and Sediment Control Program (ESCP) and Lawn Care Education Program (LCEP). The LCEP will be carried out utilizing public service announcements in conjunction with the WaterWorks program at MTSU. The ESCP will be partially funded through participating municipalities. Dickson is currently a part of the state MS4 program and as such is required to establish an effective ESCP.

4.2) Sources of Technical and Financial Resources

HRWA will seek funds from multiple sources. Sources include State and EPA 319 grants, NRCS farm conservation programs, such as the Environmental Quality Incentives Program (EQIP), private and public foundations, private businesses and individual donors and landowners. HRWA has been successful in incorporating NRCS farm programs into agricultural BMP implementation costs and has seen as much as 75% of costs covered by those programs. However, limitations exist for these programs,

mainly limited funding and NRCS's ability to deliver the programs in a timely manner. Thus, while this is an excellent source of cost share dollars, its limitations must be considered. Most, if not all, site-specific BMP implementation will require a diverse source of funding. In the suburban–urban environments NRCS funds will not be available and thus other sources of financial resources must be sought. These include local governments, public and private foundations, private business and individual donors and landowners.

4.3) Authorities To Implement the Plan

The Harpeth River Watershed Association (HRWA), in partnership with local governments (Dickson and Dickson County) and the Natural Resources Conservation Service, will be the primary agency responsible for the implementation of the plan. In addition, HRWA will work with any other agencies or individuals identified with potential to impact the Jones Creek Watershed.

Established in 1999, the HRWA is a science and technically-based watershed conservation 501(c)(3) nonprofit agency focused on protecting and restoring the ecological health of the Harpeth River. HRWA work has focused on river restoration, education and outreach and statewide water quality policies that focus on proactive, cooperative efforts to improve long-term conservation of Tennessee's vast water resources. Our work leverages the scientific and technical experience of staff and advisors in addition to the efforts of a diverse corps of volunteers who represent a crucial link in every aspect of our program work.

Some accomplishments include work funded by four 319 grants (HRWA – 3, TSRA/HRWA – 1) to focus on reduction of nonpoint source pollution. The first in 2001, funded HRWA's Visual Stream Assessment (VSA) in which 25 volunteers logged over 550 hours, surveying 217 sites on 303(d) segments in the watershed. Data, including 800 photographs, were included in an Access database and a report produced, which is now used by staff to drive the restoration program.

With a second 319 grant in 2002, HRWA, in cooperation with the Tennessee Scenic Rivers Association's Duck River Opportunities Project (DROP), launched the Volunteer River Restoration Corps, an ongoing effort to engage citizens, schools, municipalities, farmers and others to improve long-term water quality of the Harpeth River and Duck River watersheds by improving stream and riparian habitat on a site by site basis. HRWA completed over 20 stream and riparian restoration projects, planting over 20,000 seedlings, and stablizing close to 1,500 feet of streambank since 1999. This could not have been accomplished without volunteer participation.

In the fall of 2003, HRWA began its third 319 grant focused on small subwatersheds to conduct a stakeholder-based watershed restoration planning and implementation process and began administering the DROP for TSRA. HRWA is currently working with a group of citizens in the headwaters of the Harpeth and in Rutherford Creek in the Duck River watershed to develop a stakeholder-based restoration

plan for each respective subwatershed.

5) Outreach/Education

HRWA, in conjunction with NRCS, may host workshops for agricultural operators and will work to have participating farmers present to and help recruit other farmers/landowners into the program for conservation. In addition, HRWA will continue to work with local schools and other youth groups interested in utilizing the Project WET and other curricula in an effort to: 1) add to data provided by TDEC and others, and 2) get students involved in identifying and implementing restoration projects. Thus, the core of the educational programs will be related to organizing locals to speak on behalf of restoration.

Secondly, and perhaps most importantly, HRWA will work with local officials and staff to help determine the best ways to meet water quality load reductions called for in the sediment TMDL on the Harpeth River. Our approach will be to utilize the basics of watershed science to help local officials and staff to develop effective short and long-term programs that protect watershed quality. One example might be to utilize the Watershed Treatment Model to help engineering staff understand the importance of maintaining less than 10% imperviousness, adequate riparian buffers within a subwatershed, or increasing the use of best management practices on developments to decrease sediment loss (siltation).

The Erosion and Sediment Control Program is primarily a function of local municipalities. However, HRWA will focus attention on the town of Dickson in an effort to educate local leaders, developers and contractors about the need for effective erosion and sediment control. In addition, HRWA will try to identify and work with developers on implementation of short-term practices to control sediment and long-term practices to promote natural hydrology post-construction.

HRWA will work with the Middle Tennessee State University's Center for Environmental Education's WaterWorks! Lawn Care Education Program (LCEP). The majority of public education and outreach will be accomplished via radio and through public speaking engagements with rotary clubs, church groups, etc. The message will be targeted toward homeowners and their lawn fertilization practices.

6) Schedule for Implementation - Total implementation time is estimated to be 20 years.

Activity	Year(s)
1) Identify and meet with project partners, landowners	1-10
2) Identify willing landowners	1-18
3) Develop LCEP outreach information in conjunction with MTSU	1-3
4) Work with city and county to develop protocol to educate Developers	1-3
5) Identify and train willing youth groups	1-20

6) Carry out pre-BMP information collection	1, 3, 5, 7, 9, 11, 13, as needed.
7) Develop site-specific BMP implementation plans	2-18
8) Implement BMPs	2-20
9) Carry out post-BMP information collection/assessment	4, 6, 8, 10, 12, 14, 16, 18, 20
10) Submit final report	19, 20

7) Watershed Restoration Milestones

Milestones	Year(s)
1) Site-specific BMP plan development	2-18
2) Youth groups collecting information in the watershed	1-20
3) One community meeting per year, articles to local newspaper (4/year)	1-20
4) Develop LCEP outreach information in conjunction w/ MTSU	1-3
5) Work with city and county to develop protocol to educate Developers	1-3
6) Collect information prior to BMP implementation	1, 3, 5, 7, 9, 11, 13, as needed.
7) Site-specific BMP implementation	2-20
8) BMP implementation assessment/analysis (survival, structure integrity)	4, 6, 8, 10, 12, 14, 16, 18, 20
9) Final report and public meeting	19, 20

8) Measures of Success

The long-term success of the program will be measured utilizing TDEC watershed data. TDEC is in the watershed every five years collecting data through their watershed cycle. Data include benthic macroinvertebrate (BMI), habitat and physical/chemical measures. Ecological health is defined/operationalized as the inclusion of benthic macroinvertebrate communities that are deemed by TDEC as fully supporting fish and aquatic life use of waters of the state as compared to the appropriate ecoregional reference site. HRWA staff will utilize TDEC data in addition to other data collected by professionals and volunteers to determine if the plan (or TMDL) needs revising.

The main criterion will be BMI collection, as many organizations including TDEC and U.S. EPA, consider this the primary characteristic of healthy aquatic systems. However, based on individual sampling plan data (e.g. TSS) associated with localized site work, it maybe determined that a specific practice, in a specific application or situation is not functioning as predicted. The practice may then be modified and/or excluded from the suite of practices being recommended. HRWA has and will continue to utilize the Watershed Treatment Model to make basic watershed load reduction predictions and the Georgia tool, developed by AMEC Environmental (currently being adapted for Middle Tennessee) to make site-level predictions. This will be followed up with field data in an effort to verify modeling results. If predictions are not verified, then

the plan (or TMDL) will be revised in an effort to increase the load reduction effectiveness of BMPs.

9) Monitoring Component to Evaluate Effectiveness

Three basic monitoring components will be utilized including: 1) benthic macroinvertebrate (BMI) data collected on the five year cycle by TDEC (sentinel data) and possibly collected by HRWA (staff and volunteers) (site-specific), 2) physical habitat and chemical data collected on specific sites, and 3) practice implementation data, such as stream miles fenced, numbers of trees planted/survival rates, erosion controls implemented and linear feet of stabilized stream banks.