

CHAPTER 7 – WATERSHED ACTION PLAN

This chapter outlines an implementation plan for the proposed Best Management Practices (BMPs) summarized in Chapter 6. The Watershed Action Plan explains BMPs that will be or are currently being implemented within the each county or municipality to reduce the discharge of pollutants in storm water runoff and minimize storm water runoff quantities.

7.1 Best Management Practice Implementation Schedule

The schedule for implementing BMPs will vary depending on the water quality, quantity, or other natural resource concerns in each community. In addition, cost, staff, and planning needs will also play into determining the schedule of implementation. For the purposes of this Watershed Management Plan, the BMPs are identified as being implemented currently, within a short-term or long-term commitment time frame, or as wish-list items. The time frames are as follows:

Short-Term Commitment: Each short-term commitment will be implemented within the first five (5) years. This time frame is recommended for BMPs that will address the critical areas in the watershed. The critical areas are the pollutants and issues most important to the watershed. Once many actions in this category begin to be implemented, they likely will be ongoing over the long-term.

Long-Term Commitment: This commitment time frame includes practices that will be implemented after five (5) years. Entities may select this implementation time frame for those actions that might demand higher costs and staffing allocations or include more in-depth planning strategies or design specifications to be researched and developed.

Wish-List Item: A wish-list item is an activity for which a community recognizes a need, but cannot or will not commit to them for reasons such as:

- They go beyond the scope of the storm water controls;
- They are not yet technologically feasible; or
- They cannot be implemented with the resources available.

It should be noted that just as the goals and objectives established in this WMP may change over time, the actions to achieve those goals and objectives may just as likely need to be modified as the physical, socioeconomic, and political landscape of the watershed changes. It is the hope that the planning and implementation process becomes self-sustaining with ever-increasing participation from stakeholders. The focus should be on implementing the most efficient and cost-effective strategies for protecting the watershed. The process of adaptive management is explained in more detail in Chapter 9.

7.2 Action Plan Matrix

This matrix provides a snapshot of the BMPs that are currently being implemented by counties and communities in the Belle River Watershed. Each entity also indicated whether they would be interested in implementing the BMPs in the short-term or long-term to address the short-term objectives and long-term goals established in this WMP.

The Action Plan Matrix was completed throughout the spring and summer of 2015 (Table 7.1) by outreach to municipal elected officials via mail, email and phone calls. Each community received two mailings of the matrix, two emails (when applicable) and follow-up phone calls. The SCCHD completed the matrix with each community over the phone. Three communities were unable or unavailable to complete their portion of the matrix for several reasons including board vacancies.

7.3 Priority Projects

A list of specific priority projects and actions has been developed to address the water quality issues in the Belle River Watershed and the six goals identified in this plan. These priority projects were compiled based on existing water quality data, non-point source pollutant surveys, pollutant-load modeling, and stakeholder input. The projects utilize many of the management alternatives described in Chapter 6. Table 7.2 includes measurable milestones, a timeline for implementation, and responsible parties for each project. Referenced within Table 7.2 are additional tables and figures that provide information for specific project sites and locations.

Figure 7.1 identifies priority sites where BMPs should be installed to reduce sediment and nutrient loading from source areas in the headwaters and in priority locations in the DO TMDL area. Table 7.3 provides further details for each of these sites, including sediment, nitrogen, and phosphorus reductions. Figure 7.2 identifies priority wetland restoration sites in the DO TMDL area. To improve DO levels, the important functions to restore are sediment and other particulate retention, nutrient transformation, streamflow maintenance, groundwater recharge, and stream shading. The highest priority functions are sediment and other particulate retention and nutrient transformation. Table 7.4 identifies projects to preserve critical ecosystems, Table 7.5 identifies specific projects to remove large woody material, and Table 7.6 identifies priority river restoration sites. More details are provided for many of these projects in Appendix J.

Table 7.1 Watershed Action Plan Matrix for the Belle River watershed. The letter following the BMP number indicates the pollutant(s) addressed: N=nutrients, P=pathogens, S=sediment, TDS= total dissolved solids, TP=toxic pollutant, A=All.

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		St. Clair County	Lapeer County	Macomb County	Berlin Township	Casco Township	China Charter Twp.	City of Marine City	City of Memphis	Columbus Township.	Cottrellville Twp.	E. China Charter Twp.	Emmett Township	Mussey Township	Riley Township	St. Clair Township	Village of Capac	City of Richmond	Richmond Township	Almont Township	Attica Township	Dryden Township	Imlay City	Imlay Township
1. Managerial & Structural Actions: Agricultural Runoff Controls																								
1 (N, P)	Encourage use of GAAMPs	C	C	C	C	C	Did not complete	N	N	L	Did not complete	N	S	C	S	Did not complete	S	L	C	C	W	C	S	C
2 (N, S)	Encourage conservation crop rotation with cover crop	C	C	C	C	N	Did not complete	N	N	N	Did not complete	N	S	C	S	Did not complete	S	N	C	N	W	N	N	W
3 (N, P)	Develop manure management plans	C	C	C	C	N	Did not complete	N	N	S	Did not complete	N	N	C	N	Did not complete	N	N	C	N	N	C	N	W
4 (N, S)	Install exclusion fencing	C	C	C	W	N	Did not complete	N	N	L	Did not complete	N	W	C	N	Did not complete	N	N	W	N	N	N	N	W
5 (N, S)	Promote conservation tillage practices and appropriate nutrient management practices (Crop*A*Syst)	C	C	C	C	N	Did not complete	N	N	C	Did not complete	N	C	C	S	Did not complete	N	N	S	W	N	N	S	W
6 (N, S)	Restore historic wetlands	W	W	W	W	W	Did not complete	N	W	L	Did not complete	N	W	N	W	Did not complete	W	W	W	W	W	W	W	W
2. Managerial & Structural Actions: Stream and Drain Runoff Controls																								
7 (S)	Continue stream/drain inventories throughout watershed	C	C	C	C	C	Did not complete	C	C	C	Did not complete	N	N	C	C	Did not complete	N	L	W	N	N	C	C	N
8 (S)	Implement tile drain controls	C	C	C	N	W	Did not complete	C	N	N	Did not complete	N	N	N	N	Did not complete	N	N	S	N	N	N	N	N
9 (A)	Prevent and remove streamflow obstructions	C	W	C	C	W	Did not complete	N	C	C	Did not complete	N	L	C	W	Did not complete	N	N	C	N	N	N	C	N
10 (S)	Utilize instream habitat restoration techniques	C	C	C	N	W	Did not complete	N	C	W	Did not complete	C	N	N	N	Did not complete	N	N	W	N	N	N	N	N
11 (N, S)	Implement alternative (two-stage) drain practices and rehabilitation	C	C	C	C	W	Did not complete	C	N	W	Did not complete	W	C	C	N	Did not complete	N	N	W	N	N	N	N	N
12 (S)	Install and maintain streambank stabilization measures	C	C	C	C	N	Did not complete	N	C	W	Did not complete	N	C	C	L	Did not complete	N	L	W	N	N	N	S	N
13 (S)	Install and maintain gauge stations	C	C	C	N	N	Did not complete	N	N	N	Did not complete	N	N	N	N	Did not complete	N	N	W	N	N	N	N	N

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3. Structural & Vegetative Actions: Post-Construction Stormwater Management																								
14 (S)	Replace undersized culverts/ repair misaligned or obstructed culverts	C	L	C	C	N		C	N	W		N	C	C	C		C	N	S	C	C	C	C	N
15 (A)	Install and maintain storm water management structures	C	L	C	N	N		C	W	W		N	N	N	N		C	N	W	W	N	C	C	N
16 (A)	Install and maintain detention/retention systems	C	L	C	C	C		C	W	C		N	C	C	W		W	W	N	W	N	C	W	C
17 (A)	Install and maintain storm water infiltration practices	C	L	C	W	N		C	W	N		W	W	W	N		W	L	N	W	N	C	W	W
18 (S, N)	Stabilize eroding road and bridge surfaces	C	C	C	N	C		C	S	W		N	N	N	N		C	W	W	W	W	N	W	N
19 (A)	Install and maintain native landscaping	C	C	C	S	N		W	S	W		S	L	S	W		S	W	W	N	N	S	S	S
20 (A)	Install and maintain riparian buffers	C	C	C	S	N		N	C	C		S	L	S	W		S	W	W	N	W	S	S	S
21 (A)	Implement invasive species control program	C	C	C	N	N		N	C	C		C	L	N	W		S	W	L	N	W	S	S	N
22 (N, S)	Perform curb/street sweeping	C	C	C	N	N		C	C	N		N	N	N	N		C	C	N	N	N	N	C	N
23 (N, P, S)	Perform retrofitting of stormwater management facilities	C	L	C	N	N		N	W	N		N	N	N	N		C	W	N	N	N	N	C	N
24 (A)	Implement catch basin cleaning program	C	L	C	N	N		C	W	N		C	N	N	N		C	C	N	N	N	C	C	N
25 (N, S)	Perform storm sewer system maintenance and drain cleaning	C	C	C	N	N		C	C	N		N	N	N	N		C	C	N	N	N	N	C	N
26 (S, TP)	Manage public facilities	C	C	C	N	N		C	C	N		N	N	N	N		C	C	N	N	N	C	C	N
27 (N, P)	Maintain sanitary sewer infrastructure	C	C	C	N	N		C	C	N		C	N	N	N		C	C	N	N	N	N	C	N
4. Managerial Actions: Illicit Discharge Elimination																								
28 (A)	Implement employee training programs	C	C	C	N	N		C	S	N		S	N	N	N		S	W	N	N	N	N	C	S

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29 (N, P)	Sanitary system planning – Manage lagoon systems and package wastewater treatment plants	C	C	C	N	N		N	C	N		N	C	N	N		C	C	N	N	N	N	C	N
30 (N, P)	Implement Illicit Discharge Elimination Plan (IDEP)	C	C	C	C	N		C	C	L		C	S	N	C		S	C	N	N	N	C	C	S
31 (N, P, TP)	Eliminate sanitary sewer overflow events	C	C	C	N	N		C	C	N		N	N	N	N		W	C	N	N	N	N	N	N
32 (N, P)	Implement St. Clair County public beach water quality monitoring program	C	N	N	N	N		C	N	N		N	N	N	N		N	N	N	N	N	N	N	N
5. Managerial Actions: Public Education, Outreach, and Participation																								
33 (A)	Distribute outreach materials on watershed awareness and storm water management	C	S	C	C	C		C	S	W		C	C	C	C		S	C	S	S	S	S	S	W
34 (A)	Promote the “Seven Simple Steps to Clean Water” campaign materials	C	S	C	C	W		C	S	W		C	C	C	C		S	C	S	S	S	S	S	W
35 (N)	Encourage reduced fertilizer, herbicide, pesticide use	C	C	C	S	W		C	S	S		C	S	C	C		S	C	C	N	S	S	S	N
36 (TP)	Encourage use of household hazardous waste disposal	C	C	C	S	W		W	S	S		C	S	C	C		S	C	C	C	S	C	S	S
37 (A)	Install watershed signage	C	W	C	L	W		W	S	N		C	L	S	S		S	W	S	S	S	S	S	N
38 (A)	Promote the county’s Adopt-A-Stream and Stream Leaders programs	C	N	C	S	W		W	C	C		C	S	S	C		S	W	S	S	S	S	C	N
39 (A)	Promote Adopt-A-County Road program	C	N	C	S	W		N	S	C		C	S	S	S		S	C	S	S	S	S	S	N
40 (N)	Provide information on soil testing program	C	C	C	S	W		W	S	W		C	S	C	S		S	W	S	S	S	S	S	N
41 (A)	Encourage participation in citizen planner program	C	S	C	S	W		C	S	W		C	S	C	S		S	C	C	S	S	C	S	W

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42 (N, P)	Provide education on identification of failing on-site septic disposal systems	C	C	C	S	W		N	S	C		C	S	C	C		S	N	S	S	S	S	S	N
43 (TDS)	Encourage reduced use of road salt and promote alternative deicers	C	C	C	S	N		W	S	W		C	S	S	S		S	W	S	N	S	S	C	N
44 (N)	Encourage golf course nutrient management	W	W	W	N	N		N	N	N		N	N	N	S		S	N	N	N	N	N	N	N
45 (A)	Encourage the use of conservation easements	C	C	C	S	W		N	S	W		C	S	C	S		S	N	N	N	S	S	S	N
46 (A)	Perform storm drain/catch basin marking	C	C	C	N	N		C	S	N		N	N	N	N		S	C	N	N	N	N	S	N
47 (A)	Seek input from public on development of water quality ordinances	C	S	C	S	C		C	S	W		L	S	L	S		S	W	S	W	N	S	S	S
48 (A)	Seek participation from public at WAG meetings	C	C	C	S	C		W	C	W		C	S	C	S		S	W	S	S	S	S	S	S
49 (A)	Promote the county's 24-hour water quality pollution reporting hotline	C	N	N	S	C		C	S	L		C	S	C	C		S	W	S	N	N	N	N	N
50 (A)	Seek participation from the public for St. Clair County's Earth Fair and River Day events	C	N	N	S	C		C	C	W		C	S	C	C		S	W	S	N	S	N	S	N
51 (A)	Seek participation from the public in river clean-up events	C	C	N	S	C		C	C	W		C	S	C	C		S	W	S	W	S	S	S	S
6. Managerial Actions: Ordinances and Policies																								
52 (A)	Develop aquatic (riparian) buffer ordinance	W	W	W	W	N		N	S	W		L	W	L	L		L	W	L	W	W	W	L	L
53 (A)	Develop floodplain management ordinance	W	W	W	W	W		N	S	C		L	W	C	L		L	N	S	W	W	N	L	L
54 (A)	Implement wetland protection ordinance	W	W	W	W	W		N	S	C		L	W	L	L		L	W	L	W	W	N	L	L
55 (A)	Implement woodlands/tree protection ordinance	W	W	W	W	N		C	S	C		L	W	L	L		L	C	S	W	W	N	L	L

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56 (S, N)	Develop agricultural buffer zoning ordinance	L	W	L	W	W		N	N	W		N	W	L	L		L	N	L	W	W	N	L	L
57 (A)	Develop rural clustering ordinance	W	W	W	W	C		N	N	C		N	W	C	L		L	N	C	W	C	G	L	L
58 (A)	Develop mixed-use zoning ordinance	C	W	C	W	C		C	S	C		C	W	L	L		L	C	N	W	C	N	L	L
59 (S)	Develop private road ordinance	W	W	W	W	C		N	N	N		N	W	N	L		C	N	N	W	C	C	L	W
60 (TP)	Develop illegal dumping ordinance	C	W	C	W	C		C	C	N		L	W	L	L		C	C	S	C	W	C	L	W
61 (N, P)	Develop illicit discharge elimination ordinance	C	L	C	W	N		C	W	W		C	W	L	L		L	W	L	C	N	N	C	N
62 (N, P)	Support county-wide onsite septic disposal system ordinance	N	N	C	N	N		N	N	W		C	N	N	L		L	N	S	W	N	C	L	W
63 (S, TP)	Develop post-construction stormwater management ordinance	L	L	C	N	N		C	L	N		C	N	L	L		L	W	N	W	W	N	L	N
64 (N, S)	Implement and enforce soil erosion and sedimentation control (SESC) ordinance and support the county SESC program	C	C	C	N	C		C	C	C		C	C	C	C		C	C	S	C	C	C	C	L
65 (A)	Encourage participation in purchase of development rights programs	C	C	C	L	W		W	W	W		N	L	C	W		L	N	C	W	W	W	L	W
66 (A)	Encourage participation in Farmland Preservation Program	C	C	C	L	W		N	N	W		N	L	C	W		L	N	C	C	W	W	L	W

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7. Managerial Actions: Studies and Plans																								
67 (A)	Update master plan to incorporate watershed management plan goals	L	S	L	L	W		W	W	W		W	L	W	S		S	W	S	W	W	S	S	W
68 (A)	Perform high-quality natural features inventories	W	W	C	N	C		N	W	W		N	N	N	N		N	W	C	N	N	N	N	N
69 (A)	Incorporate natural features inventory into Master Plan	C	C	C	N	C		N	C	W		W	N	W	L		C	C	C	C	C	C	L	C
70 (A)	Develop Resource Protection Overlay District Standards	W	C	W	W	W		N	W	W		W	W	W	W		W	W	S	N	W	N	W	N
71 (A)	Develop/update Natural Areas Plan	C	C	C	W	C		N	W	W		W	W	W	W		W	W	C	N	W	N	W	N
72 (A)	Identify areas for recreation enhancement	C	C	C	C	C		C	C	W		C	C	C	W		C	W	C	N	C	C	C	N
73 (A)	Develop/update recreation plans	C	C	C	C	C		C	C	W		C	C	C	W		C	C	C	C	C	C	C	C
74 (A)	Implement Greenway Corridor Vision Plans	C	W	C	N	W		C	W	W		W	N	W	W		W	W	S	N	N	W	C	W
75 (A)	Implement Blueways Trail Vision Plans	C	N	C	N	W		W	C	W		C	N	N	W		N	N	W	N	N	N	N	N
8. Watershed Plan Implementation																								
76 (A)	Implement financial solutions	S	S	S	W	W		W	W	W		S	W	W	S		S	W	W	W	W	W	W	S
77 (A)	Provide sufficient enforcement capacity	S	S	S	W	W		W	W	W		S	W	W	S		S	W	W	W	W	S	W	S
78 (A)	Implement institutional framework for watershed-wide actions	S	W	S	W	W		C	W	W		S	W	W	S		S	W	W	W	W	S	W	S

Table 7.2 Priority projects to address the goals of the Belle River Watershed Management Plan

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
<p>1. Restore dissolved oxygen levels to remove TMDL</p>	<p>1. Decrease sediment and nutrient loading in the TMDL area by implementing BMPs at critical source areas</p> <p>(Table 7.3 and Figure 7.1)</p>	<p>a. Identify land ownership b. Develop funding sources c. Engage citizens in restoration initiatives d. Implement BMPs</p>	<p>Short-term: Reduce 1,000,000 pounds per year of sediment loading in the headwaters to meet LA requirements in TMDL; obtain and maintain DO levels above 5mg/L</p> <p>Long-term: Reduce an additional 731,000 pounds per year of sediment loading in the headwaters to meet LA requirements in TMDL; obtain and maintain DO levels above 5mg/L</p>	<p>SCCDO, LCDO, NRCS, SCCD, LCD</p>	<p>Site-specific costs ranging from \$250-\$140,000. More details provided in Table 7.3 and Appendix J.</p>
<p>2. Restore hydrologic stability</p>	<p>1. Restore wetlands in critical areas in the TMDL reach area this will also decrease sediment and nutrient loading</p> <p>(Figure 7.2)</p>	<p>a. Identify specific priority wetland parcels mapped by MDEQ in the LLWFA b. Identify land ownership c. Seek funding sources d. Design projects e. Implement wetland restoration projects</p>	<p>Short-term: Restore approximately 1% (300-500 acres) of lost wetlands in the priority watersheds to improve wetland function and decrease sediment loading and <i>E. coli</i> concentrations</p> <p>Long-term: Restore an additional 1-2% of lost wetlands</p>	<p>Ducks Unlimited, NRCS, USFWS</p>	<p>Site-specific costs dependent on land acquisition. If partnered with the USFWS or NRCS, the costs will be less if land does not need to be purchased or a conservation easement does not need to be obtained. Donated land with no easements could cost between \$1,500 and \$3,000/acre. Design and construction costs average \$6,000 per acre.</p>

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
<p>2. Restore hydrologic stability</p>	<p>2. Restore floodplain connectivity by utilizing two-stage drains in the headwaters</p>	<p>a. Identify priority drains and tributaries in the headwaters b. Develop funding sources c. Build two-stage drains d. Provide education to agricultural producers about the benefits of two-stage drains</p>	<p>Short-term: Work with county drain commissions to identify priority drains; implement projects on 15,000 lineal feet of priority drains</p> <p>Long-term: Continue to implement two-stage drain projects in county drains on the additional 15 miles of identified drains; work with agricultural producers on similar projects</p>	<p>Local landowners, SCCDO, LCDO, NRCS, SCCD, LCD</p>	<p>Typical costs for two-stage construction are \$25 per linear foot. Costs may change based on depth of the ditch, width of the channel, number of tile outlets to be addressed, and other factors. Maintenance costs will be incurred by drain owners or drain districts. Several priority projects identified in Table 7.3.</p>
<p>3. Protect critical ecosystems</p>	<p>1. Protect priority parcels identified by Six Rivers Land Conservancy (Table 7.4)</p>	<p>a. Outreach to land owners in focus areas to gauge interest in conservation easements b. Work with landowners to procure conservation easements c. Conduct secondary assessments with windshield surveys to identify additional priority sites</p>	<p>Short-term: Outreach to 25-50 landowners in the focal areas already surveyed</p> <p>Long-term: Identify additional sites for preservation in focal areas not surveyed in 2013-2014; outreach to landowners identified in secondary assessment</p>	<p>SRLC, LCD, SCCD, land conservancies</p>	<p>Outreach costs include printing and mailing of outreach materials and staff time. Professional printing costs average \$10 per 50 flyers or \$15 per 25 brochures. Site-specific costs range from a few thousand for donated easements to hundreds of thousands if land must be purchased.</p>

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
3. Protect critical ecosystems	2. Develop and implement wetland protection ordinances throughout the watershed	a. Identify communities interested in developing new ordinances b. Develop wetland protection ordinances throughout the watershed	Short-term: Implement 2-3 wetland protection ordinances in communities throughout the watershed Long-term: Implement additional wetland protection ordinances in other communities	Local governments	Varies per unit of government. Anticipated costs from \$10,000-\$40,000 per ordinance.
	3. Develop an invasive species management program	a. Create subcommittee to work with SEMCOG b. Develop database for invasive species mapping to track invasive species populations and management c. Provide educational materials to public and private landowners d. Identify long-term funding sources e. Treat priority invasive sites	Short-term: Develop subcommittee or organizational structure; begin landowner outreach Long-term: Develop a watershed-wide database or mapping system	SEMCOG, subcommittee, local governments, individual communities	Costs to develop GIS database range from \$5,000-\$15,000. If GIS software and GPS units are needed, costs may be higher. To manage priority invasive species populations on a watershed level, costs will depend on scale.
4. Improve water quality knowledge and engagement of residents	1. Promote stormwater education materials (e.g. SEMCOG Seven Simple Steps to Clean Water)	a. Determine which communities are not currently promoting education campaigns based on Action Plan Matrix b. Provide communities with education and outreach resources c. Determine best locations for watershed road signage d. Conduct volunteer storm drain marking programs	Short-term: Provide education and outreach materials and identify ways to distribute these materials to watershed residents; install 6-10 watershed road signs Long-term: Distribute a public survey to determine if local watershed knowledge has increased; acquire storm drain marking materials	SCCHD, individual communities	Shared cost with existing county and state outreach material distribution and printing costs. SEMCOG materials (e.g. brochures, tip cards, posters) cost between \$0.01-\$0.10 for printing. These materials may also be available from SCCHD.

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
<p>4. Improve water quality knowledge and engagement of residents</p>	<p>2. Develop education and outreach materials about large woody material management</p>	<p>a. Develop education and outreach about large woody material management b. Distribute materials to interested communities</p>	<p>Short-term: Complete research on large woody material campaigns and develop new or utilize existing campaign materials</p> <p>Long-term: Distribute a public participation survey to determine if local watershed knowledge has increased</p>	<p>Conservation clubs, SCCHD, SCCDO</p>	<p>Costs will include researching existing programs (e.g. Macomb County has a campaign). Developing a new education campaign could cost \$5,000-\$10,000.</p>
	<p>3. Promote NRCS programs to agricultural community</p>	<p>a. Determine which communities are not currently promoting programs based on Action Plan Matrix b. Provide communities with education and outreach resources</p>	<p>Short-term: Provide communities with outreach tools to target agricultural producers in Zone 1 communities</p>	<p>NRCS, individual communities, MSUE, SCCD, LCD</p>	<p>Potential shared costs with NRCS and MSUE to promote outreach materials and programs. Costs are minimal and may include printing and distribution. Professional printing costs average \$10 per 50 flyers or \$15 per 25 brochures.</p>

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
<p>5. Implement a sustainable large woody material management program</p>	<p>1. Implement a program to identify large woody material issues and to coordinate river clean-up days</p>	<p>a. Create a committee responsible for tracking LWM organizing clean-up days b. Create a program or database to track large woody material issues and removal efforts</p>	<p>Short-term: Organize a committee or identify local organizations responsible for river clean-up days and create a system for tracking large wood problems; organize at least one clean up event per year Long-term: Continue to track and prioritize management of LWM</p>	<p>Committee, individual committees, conservation clubs, local governments, Friends of the St. Clair River</p>	<p>Program costs could vary based on scope of surveying effort and staff time of committee. Surveys will cost between \$50-\$100 per hour depending on staff time required and materials. See Priority Project 5.2 for actual removal efforts of minor and major logjams.</p>
	<p>2. Prioritize and complete removal efforts at logjam sites identified in 2013 and in the 14.5-mile Blueway Trail (Table 7.5 and Appendix I)</p>	<p>a. Determine if logjams identified and mapped in the 2013 LWM assessment are still of concern b. Prioritize logjam management efforts c. Plan and implement logjam management projects</p>	<p>Short-term: Survey existing log jam sites and prioritize management efforts; obtain funding and implement management projects that require heavy equipment at least one site per year Long-term: Manage logjams at lower priority sites</p>	<p>Committee, individual committees, conservation clubs, local governments, Friends of the St. Clair River</p>	<p>Minor logjam projects could cost from \$5,000 to \$10,000. Major projects could cost from \$25,000 to \$100,000.</p>
<p>6. Improve recreational opportunities</p>	<p>1. Install appropriate access points for recreationists</p>	<p>a. Generate a list of potential locations for new access points b. Design and implement access point projects c. Research land acquisition properties for access and other recreation</p>	<p>Short-term: Identify sites and install 2-3 new fishing and/or canoe/kayak access points Long-term: Continue to identify and install new access points and identify land acquisition properties</p>	<p>SCCPARC, SCCMPC, individual communities, Friends of Lapeer Polly Ann Trail, Land conservancies</p>	<p>Costs could range from \$15,000 to \$35,000 depending on access easements and property purchase costs.</p>

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
6. Improve recreational opportunities	2. Organize and promote recreational events that promote recreation on local waterways and stewardship of the river	a. Organize family-oriented recreational activities on the water (e.g. fishing, canoeing, etc.)	Short-term: Organize and implement one recreation event per year	SCCHD, SCCPARC, individual communities, local governments, conservation clubs, Friends of the St. Clair River	Costs vary depending on event, grant opportunities, donations, and the size and scope of the event. Support staff for planning and implementation \$50/hour. \$1,500-\$2,000
	3. Implement river restoration projects that increase aesthetics and water quality (Table 7.6 and Appendix J)	a. Select areas for river restoration based on water quality benefits and local interest; try to incorporate access points into designs b. Design and implement restoration projects	Short-term: Select 1-2 sites and implement restoration projects Long-term: Implement additional restoration projects	SCCPARC, individual communities, local governments	Costs range from \$50,000 to \$1,500,000 depending on site selection and project design.
	4. Support and promote Blueways Trail and Greenways Trail Routes	a. Promote outreach materials and events for the existing Belle River Route from China Township Park to Marine City b. Identify additional trails and limitations of existing trails (e.g. access points, large woody material) c. Research land acquisition and expansion opportunities for the Lapper Polly Ann Trail	Short-term: Promote materials and events about the existing trails; research opportunities for expansion of Greenways Trails Long-term: Identify additional sites for Blueways Trails in the watershed	Individual communities, Friends of PollyAnn Trail, land conservancies	Costs will be minimal if routes are promoted through websites and at local events and businesses. Costs to acquire land will vary greatly based on parcel size and land ownership. Printing costs: \$1,000 for 500 Blueways Trail maps.

Goal Addressed	Priority Projects to Achieve Goals	Interim Milestones	Timeline for Implementation	Potential Responsible Groups	Estimated Costs
<p>7. Reduce <i>E. coli</i> levels</p>	<p>1. Detect and correct illicit discharges and failed and high risk septic systems</p>	<p>a. Identify failing septic systems and illicit discharges in high risk areas b. Continue to monitor <i>E. coli</i> levels and implement SCCHD beach monitoring programs</p>	<p>Short-term: Eliminate the 46 identified failing septic systems and illicit discharges; monitor <i>E. coli</i> levels at recreation areas</p> <p>Long-term: Eliminate additional failing septic systems as they are identified</p>	<p>County governments, individual communities</p>	<p>Costs associated with field surveys of open channels and closed systems to detect illicit connections/discharges range from \$2,000-\$3,000 per lineal mile of channel or sewer and \$500-\$1,000 for individual buildings. Costs associated with identifying failing septic systems include visual tank inspections and dye tests which cost between \$500-\$1,500 per system.</p>

Table 7.3 Priority project sites to reduce sediment and nutrient loading in the TMDL area. Projects are prioritized based on the quantity of sediment load reduction. See project # in Appendix J for more details.

Project #	Site	Source Category	Sediment Load Rate (tons/yr)	BMP	Min. Cost	Max. Cost	Sediment Load Reduction (tons/yr)	Nitrogen Load Reduction (lb/year)	Phosphorus Load Reduction (lb/year)
23	S15-04	Streambank Erosion	296.32	Vegetative bank stabilization	\$37,800	\$55,550	166.7	N/A	N/A
26	L6-07	Nonpoint Agricultural Sources	162.1	25% filter strip; 75% restored wetland	\$31,389	\$47,000	111.4	136.8	41.3
27	L6-09	Nonpoint Agricultural Sources	180	2-stage ditch; restored wetland	\$93,200	\$140,000	111.4	136.9	103.0
25	S15-06	Streambank Erosion	59.26	Vegetative bank stabilization	\$6,670	\$11,110	53.33	N/A	N/A
30	L10-08	Nonpoint Agricultural Sources	70.1	Reduced tillage	\$500	\$1,000	52.6	231.6	73.0
12	L10-04	Inadequate Riparian Buffer	60.6	Riparian buffer – both banks	\$5,000	\$7,500	39.4	194.3	60.1
28	L6-14	Nonpoint Agricultural Sources	39.2	Reduced tillage	\$250	\$500	29.4	126.7	40.4
29	L10-02	Nonpoint Agricultural Sources	44.7	Filter strips – both banks	\$13,890	\$20,835	29.1	141.1	43.9
11	L10-02	Inadequate Riparian Buffer	44.1	Riparian buffer – both banks	\$27,750	\$41,625	28.6	139.0	43.3
19	S15-04	Inadequate Riparian Buffer	35.5	Riparian buffer – both banks	\$7,850	\$11,775	23.1	295.2	65.9

Project #	Site	Source Category	Sediment Load Rate (tons/yr.)	BMP	Min. Cost	Max. Cost	Sediment Load Reduction (lbs./yr.)	Nitrogen Load Reduction (lb/year)	Phosphorus Load Reduction (lb/year)
13	L6-06	Inadequate Riparian Buffer	33.1	Riparian buffer	\$3,600	\$5,400	21.5	102.9	32.2
16	S14-02	Inadequate Riparian Buffer	29.0	Riparian buffer – both banks	\$13,000	\$19,500	18.9	236.1	53.0
17	S15-01	Inadequate Riparian Buffer	24.5	Riparian buffer – right bank	\$10,600	\$15,900	15.9	195.3	44.0
31	S14-07	Nonpoint Agricultural Sources	13.9	Reduced tillage, 2-stage ditch	\$31,600	\$47,400	20.6	93.2	20.6
18, 32	S15-03	Inadequate Riparian Buffer; Nonpoint Agricultural Sources	15.5	Riparian buffer, 2-stage ditch	\$27,900	\$41,475	13.2	117.8	26.9
11	S11-01	Inadequate Riparian Buffer	7.1	Riparian buffer	\$7,200	\$10,800	4.6	49.7	11.6
20	S15-09	Inadequate Riparian Buffer	2.1	Riparian buffer	\$5,500	\$8,250	1.4	13.4	3.2
14	S10-05	Inadequate Riparian Buffer	0.31	Riparian buffer	\$1,000	\$1,500	0.03	1.0	0.2
Totals:							741.16 (1,482,320 lbs./yr.)*	2,211.0	662.6

*Additional sediment removal to meet the DO TMDL LA target for TSS will result from wetland restoration and river restoration sites (Table 7.6).

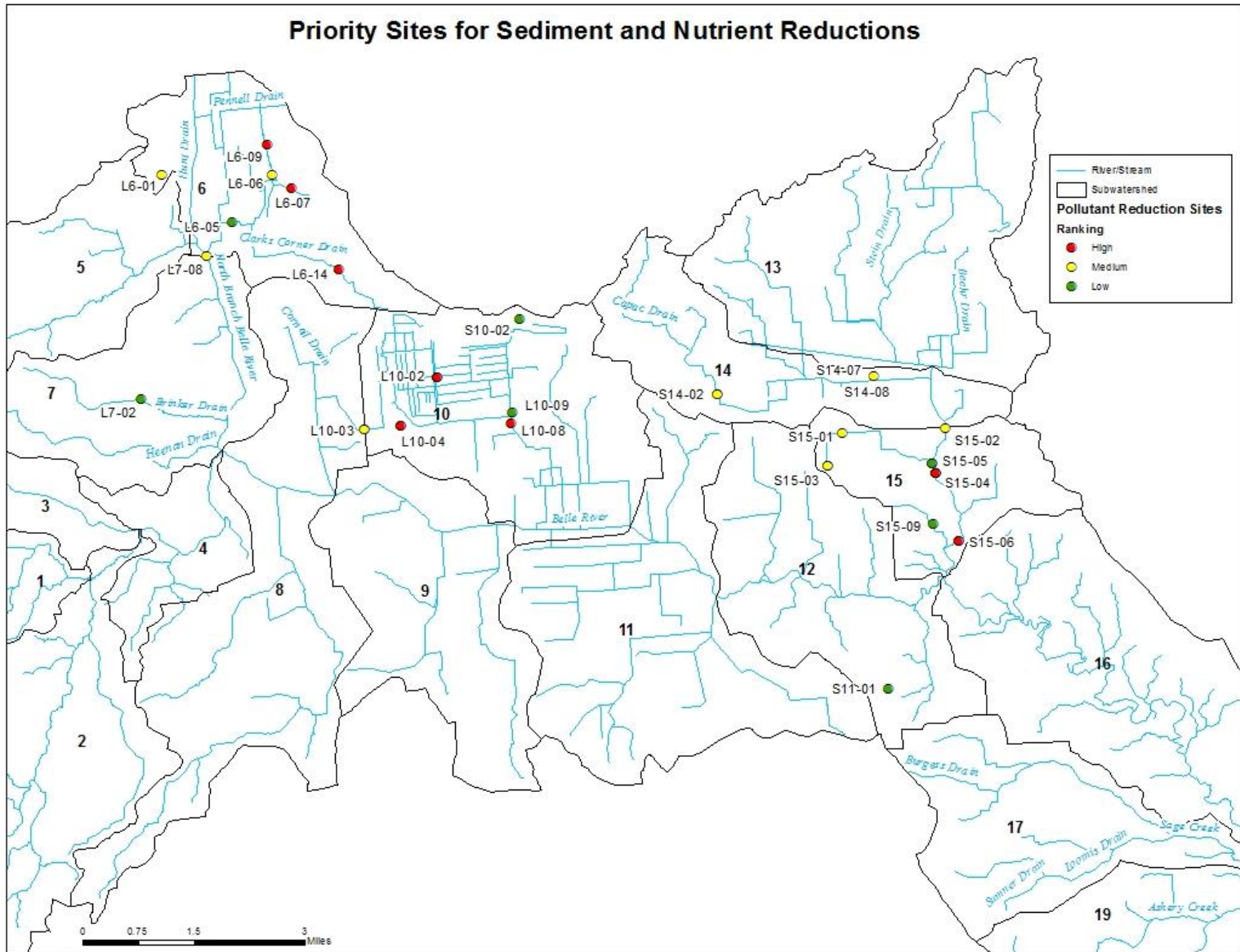


Figure 7.1 Priority reduction sites and priority subwatersheds for wetland restoration

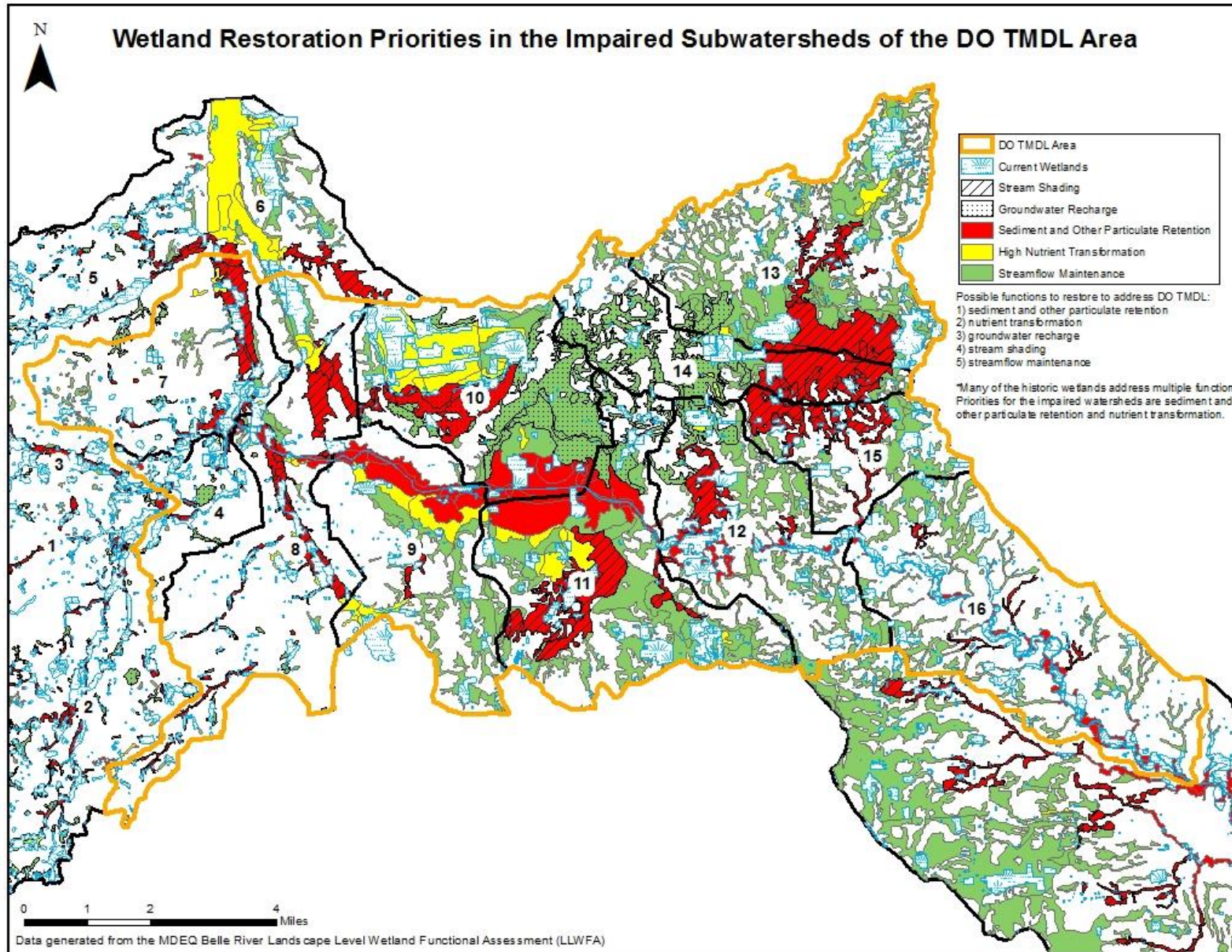


Figure 7.2 Priority wetland restoration sites in the DO TMDL area

Table 7.4 Priority projects for critical ecosystem conservation

Project	Site	Size	Minimum Cost*	Maximum Cost*
Informational mailing to property owners in preservation priority areas	Two focus areas for preservation	Approx. 100 parcels	\$200	\$600
Volunteer assessment and mailing to owners in the “other strategies” focus areas	Ten focus areas for other strategies	Approx. 400 parcels	\$500	\$1,200
Hold Community meetings in preservation priority areas	Two focus areas for preservation	Approx. two meetings	\$250	\$400
Perform secondary assessments in highest priority areas	Identified focus areas	Approx. 12 sites	\$500	\$800
Purchase or provide matching funds to acquire conservation easements on highest priority lands in the watershed	Identified high priority lands	Approx. 12 sites	\$160,000 for a site purchase or 25% match*	\$4.8 million for all sites*

*Costs for acquisition are estimates based on approved appraisals and match amounts based on individual grant programs.

Table 7.5 Large woody material management sites identified in the 2013 LWM assessment of the Belle River. See project # in Appendix J for more details.

Project #	Site	Problem	Recommendation	Min. Cost	Max. Cost
52	Blueway Paddling Route from King Road in China Township to the St. Clair River	4 cross spanning logs and one logjam reduce recreational navigability	Coordinate with landowner, provide non-motorized boat launches, and manage wood using the Clean and Open Method	\$5,000	\$25,000
53	Belle River downstream of Gratiot Ave.	Severe bank erosion and undermined trees	Coordinate with landowners, construct clay plugs within the 200yd cutoff channel, use wood for bank stabilization, and restore the river meander	\$200,000	\$350,000
54	Belle River Upstream of Weber Rd.	Three dominating logjams are located 4,000-8,500 feet upstream of the crossing. The wood may eventually cause problems at the bridge.	Anchor logs as toe wood revetment and manage the other wood using the Clean and Open Method	\$15,000	\$30,000
55	Belle River Upstream of St. Clair Highway	One extensive (D5) logjam is located 100yds upstream of St. Clair Highway	Anchor log as toe wood revetment and manage the other wood using the Clean and Open Method	\$1,500	\$4,500
56	Belle River upstream and downstream of Puttygut Rd.	Two extensive (D5) logjams are located upstream of the crossing and two dominating (D6) logjams are located downstream of the crossing. The wood may eventually cause problems at the bridge.	Anchor logs as toe revetment and manage the other wood using the Clean and Open Method	\$10,000	\$15,000
57	Belle River Park in Columbus Township	Hillslope failure is contributing 11 tons/year of sediment into the river	Coordinate with landowners. Anchor logs as toe wood revetment to stabilize the base of the slope.	\$30,000	\$40,000
58	Belle River in Memphis Upstream of Main St.	Hillslope failure is contributing >100 tons/year of sediment into the river	Coordinate with landowners. Stabilize the base of the slope with 100' toe wood revetment.	\$60,000	\$90,000

Table 7.6 Priority river restoration projects in or near existing parks on the Belle River. See project # in Appendix J for more details.

Project #	Site	Recommendation	Min. Cost	Max. Cost
39	Columbus County Park	Use a natural channel design approach to restore 10,000 ft. of river and adjacent floodplain wetlands. Increase river meandering, stabilize banks with toe wood and soil bioengineering, excavate pools, provide grade controls, connect river to floodplain habitats, and manage riparian vegetation. Integrate design into park recreation and access.	\$1,250,000	\$2,500,000
40	Belle River Park in Columbus Township	Restore 2,170 ft. of river using a natural channel design approach. Install toe wood along left bank, backfill with levee material to provide floodplain connectivity, and stabilize with transplants of existing dogwoods. Add grade control and pool habitat. Integrate design into park recreation and access.	\$500,000	\$750,000
43	China Township Park upstream of King Rd.	Phase 1: Stabilize 750 ft. of north bank using Priority 3 restoration approach (see Attachment B in Appendix H), electively thin the riparian corridor, and use grade control. Coordinate with landowners to install kayak launch to prevent future bank erosion from foot traffic. Phase 2: Conduct river morphology assessment and redesign ½ mile of channel meanders.	Phase 1: \$200,000 Phase 2: \$750,000	Phase 1: \$250,000 Phase 2: \$1,000,000
45	Memphis City Park	1) Construct 950 feet of narrow low flow (4-stage) channel downstream of Main St. 2) Construct 3,000 ft. of riffle-pool channel further downstream 3) Manage 7.5 acres of riparian vegetation 4) Remove riprap and hydraulically connect gravel pond into floodplain habitat 5) Integrate design into park recreation, access, and site amenities	1) \$250,000 2) \$600,000 3) \$75,000 4) \$200,000	1) \$375,000 2) \$900,000 3) \$100,000 4) \$350,000