

Table Fi 4.1 Fish Creek - Sediment
HUC 041100020305 (part)

DRAFT

Problem Statement Fi-1: Sediment

Siltation has been identified as a cause of non-attainment in the Middle Cuyahoga River. Excess sediment is of concern downstream in the shipping channel and in Lake Erie, because of the nutrients that enter the water with the sediment. The STEP-L model indicates that the watershed contributes 895 tons of sediment per year from runoff and 34 tons per year from eroding banks due to overloaded channels. Alteration of at least 737 acres of wetland, 76% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, floodplain access) along an estimated 15.5 miles of watercourses has reduced the natural sediment storage of the system. Potential loss of riparian vegetation in the undeveloped 30% of the riparian corridor could result in increased loading in the future.

Goal				Amount to complete, time frame
<i>Objective</i>	<i>Actions</i>	<i>Lead/ cooperating organizations</i>	<i>Resources needed/cost</i>	(contingent on funding, resources, landowner willingness)
Goal Fi-1a Reduce non-point source pollution from runoff to reduce annual loading of sediment by 17.5 tons.				
<i>Fi 1a-1. Plant 25 ac. of deep-rooted riparian vegetation, reducing loading of sediment by 13 tons/yr.</i>				
	1 Submit grant applications e.g., OEEF	WC/SWCDs/partners		
	2 Targeted outreach to public, institutional, and other owners of large properties	WC**/SWCDs/ Communities	Lists of golf courses, lake associations, homeowners' associations; maps of large parcels; printed outreach materials.	Target 1 group every 3 years (3 by 2022); improvements to best management practices or riparian management at one site every 4 years(2 sites by 2020); 2 outreach contacts per year
	3 Outreach to golf course owners encouraging Audubon-certification		labor, printing	
	4 Assist with plantings	SWCDs, master gardeners	native plants/trees and shrubs \$500-1,000/ac	25 ac
	5 Construct and install signage	communities, partners, volunteers (scouts?)	\$300-500/sign	
	6 Follow-up outreach (individualized guide to riparian zone) and publicize		funding for handouts/brochures	
<i>Fi 1a-2 Retrofit stormwater volume devices for water quality to treat 60 ac of residential use, reducing loading of sediment by 4.5 tons/year.</i>				
	1 Stormwater retrofit inventory		WC/NEFCO with communities	
	2 Submit grant application.			
	3 Design/construct retrofit for existing stormwater (volume) infra-structure to improve water quality	Communities	Varies, depending on treatment provided (e.g., \$400/acre treated to \$17,000 per acre treated)	Retrofit 3 by 2023 to treat 60 ac res., 1 every 3 years afterward
<i>Fi 1a-3 Retrofit 1,000 lf of drainage with no-mow grass/vegetated swale/daylighting to reduce sediment by 0.2 tons /yr</i>				
	1 Workshop on maintaining ditches/improving drainage for water quality improvements	SWCD/pipe		
	2 Install retrofit/no-mow grass along 1,000 lf			
<i>Fi 1a-4 Facilitate review and update of local codes to include measures for green infrastructure</i>				
	1 Green code audit workshop			
	2 Review codes in two communities for green infrastructure language	partners	volunteers/consultant	
	3 update code language		possibly outside consultant/funding	1 community by 2022

Goal				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objective	Actions	Lead/ cooperating organizations	Resources needed/cost	
Fi 1a-5 Update, increase, and disseminate available information concerning sediment from urban runoff				
	1 Continue to compile, centralize, and make available studies, data, information sources on the watershed, including recreational opportunities, volunteer needs, permitting or regulatory issues; green infrastructure information sources, etc.	WC	Website, technical information and outreach materials	Update and develop pages for website by Dec. 2013, then on-going
	2 Chemical or biological sampling/assessment along streams - volunteer, intern, or class	Community/partner sponsors, Ohio possibly stipends, analysis, equipment	EPA, KSU interns/classes	Sampling at 3 locations by 2022.
	3 Continue to develop stream database			
Fi 1a-6 Increase stewardship activities related to non-point source pollution and watershed issues by 21 activities				
	1 Establish clean-up/monitoring efforts at additional tributaries	WC, communities, parks, residents, home-owners' assoc.		1 new tributary or lake monitoring, clean-up (3 cleanups), or other stewardship program by
	2 Distribute 50 rain barrels through workshops	SWCDs/ Communities	Space for workshop; rain barrel kits	2 workshops/50 rain barrels distributed
	3 Survey of yard management practices	WC/partners		
	4 Develop/reproduce informational brochure or website article concerning topics of interest, including reducing runoff, recreational opportunities, private wells, septic systems etc.	WC, health depts, SWCDs	technical/outreach materials, possibly printing costs	10 by 2022; 1 each year
	5 Educational outreach workshops on topics of importance, including LID/green infrastructure, restoration, field trips for examples	Partners, WC, communities	Location, speaker, supplies	5 workshops by 2022; 1 every 2 years
	6 Work with schools or city day camps to develop/encourage use of watershed care activities/curricular items	WC, SWCDs, partners, schools		1 educational outreach program/curriculum item by 2018
	7 Watershed "brand," logo, art project	WC, Kent State/ Standing Rock Gallery/River Day communities	Host for project, graphic design capabilities	1 logo or art project by 2015, then 1 every 3 years;
	8 Create social network or google presence	WC		1 by 2014
Fi 1a-7 Develop stormwater management design manual for Portage County				
	1 Stormwater management design manual for Portage County	Portage SWCD	In-house task	1 manual by 2014
Fi 1a-8 Facilitate review and update of local codes to include measures for green infrastructure				
	1 Green code audit workshop			
	2 Review codes in two communities for green infrastructure language	partners	volunteers/consultant	
	3 update code language		possibly outside consultant/funding	1 community by 2022
MC-1 Establish 1 neighborhood-scale green infrastructure projects as demonstration within the developed areas of one of the Middle Cuyahoga River subwatersheds, where suitable neighborhoods are identified, reducing loading of nitrogen by 200 lb/year, phosphorous by 25 lb/yr, and sediment by 5 tons/yr				
	1 Work with communities to identify suitable target neighborhoods	WC, partners		
	2 Meetings to gauge neighborhood support			2 meetings

Goal				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objective	Actions	Lead/ cooperating organizations	Resources needed/cost	
	3 Determine/establish maintenance framework (e.g., easements, homeowner participation)	partner community		
	4 Get grant(s)			
	5 Design/build	outside consultant	Site, outside funding. Design ~\$25-50,000; Rain gardens \$15-20/sq. foot; Green street bump-outs \$20,000 each; permeable concrete \$12-15/ sq. ft	1 project by 2022
	6 Outreach, neighborhood participation			
Goal Fi 1b Restore altered riparian/watershed landscape to reduce sediment in the stream by 122 tons/yr.				
Fi 1b-1. Restore 100 ac of wetland, reducing loading of sediment by 100 tons/year.				
	1 Map target areas to investigate for wetland, floodplain, riparian, habitat, or stream corridor restoration/protection/ enhancement	WC, partners	available mapping - compile and build on previous efforts	1 map by 2013, revisit and update if necessary every 3 years
	2 Meetings with landowners to determine interest	WC, partners		2 meetings
	3 Identify wetland restoration site for clearinghouse	WC, Communities, other partners	meetings with landowners; readily available mapping, outside assistance from consultant, possible assistance from Kent State University wetland ecology class	5 concept plans by 2020; 1 every 2 years afterward.
	4 Submit grant application			
	5 Restore/protect/enhance wetlands	Partners	\$5,000-\$100,000 per acre, design/build consultant, sites -protection by easements would be at the low end of the range	20 ac by 2022; 10 ac every 5 years afterward
Fi 1b-2 Restore 50 acre-ft of floodplain access, to reduce annual sediment loading by 22 tons				
	1 Map target areas to investigate for wetland, floodplain, riparian, habitat, or stream corridor restoration/protection/ enhancement	WC, partners	available mapping - compile and build on previous efforts	1 map by 2013, revisit and update if necessary every 3 years
	2 Meet with landowners to determine interest	WC, partners		
	4 Submit grant application			
	5 Restore floodplain access/flood storage			
	6 Public outreach			
Fi 1b-3. Plant 25 ac. of deep-rooted riparian vegetation, reducing loading of sediment by 13 tons/yr.				
Actions: See Fi 1a-1.				
Goal Fi 1c Reduce bank erosion from overloaded channels to reduce sediment loading by 34 tons/yr.				
Fi 1c-1 Stabilize 200 lf. of 5-foot tall stream bank, reducing sediment loading by 34 tons/yr. Focus areas, e.g., Spaulding Ave. area				
	1 Map target areas to investigate for wetland, floodplain, riparian, habitat, or stream corridor restoration/protection/ enhancement			1 map by 2013, revisit and update if necessary every 3 years
	2 Meet with landowners to determine interest			
	4 Submit grant applications			
	5 Stabilize banks/restore floodplain access			200 lf bank
	6 Public outreach			

Goal				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objective	Actions	Lead/ cooperating organizations	Resources needed/cost	
Fi 1c-2 Install 6,000 square feet of rain gardens, to reducing channel loading by 262 cu ft in a 3/4 in storm				
	1 Identify partners	WC, partners		
	2 Submit grant application	WC/partners		
	3 Workshop/installation	WC/partners		
Fi 1c-3 Install biofiltration in a commercial/institutional site totaling 10,000 square feet and reducing runoff by 1,600 cubic feet in a 3/4-inch storm.				
	1 Identify parcel(s) and landowner(s) for project	partners, WC		
	2 Grants	WC/partners		
	3 Design/construct BMPs	outside consultant		
	4, 5, 6 Green infrastructure workshops, code revision	(see FI 1a-4)		
Fi 1c-4 Restore 50 acres of floodplain access, reducing volume by 2,178,000 cubic feet in a 3/4-inch storm.				
	Actions: See Fi 1a-3			
Fi 1c-5 Restore 100 acres of wetland, reducing volume by 65,000 cubic feet in a 3/4-inch storm.				
	Actions: See Fi 1b-1			
Fi 1c-6 Facilitate installation of 50 rain barrels, thereby reducing stream channel loading by 275 cu ft in a 3/4-inch storm.				
	1 Submit grant proposal/seek community funding			
	2 Obtain rain barrel materials		barrels, plumbing e.g., \$40 per barrel setup	
	4 Workshop			2 workshops
	5 Outreach			
MC 1 Establish 1 neighborhood-scale green infrastructure project as a demonstration within the developed areas of one of the Middle Cuyahoga River subwatersheds, where suitable neighborhood is identified, reducing volume of water by 32,670 cu ft in a 1-inch storm.				
	Actions - See MC 1 above			
Goal Fi 1d Protect riparian resources, thereby preventing future sediment loading by 89 tons/year				
Fi 1d-1 Protect 36,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks, reducing loading of sediment by 14 tons/yr				
	1 Workshops for community officials on developing/enforcing riparian setbacks	Portage County Regional Planning Commission	Workshops would occur during regularly scheduled zoning inspector meetings, etc.	2 workshops by 2015; additional workshops - included in general workshop series
	2 Comment on wetland alteration permit applications concerning impacts to watershed functions/riparian setbacks	WC and partners		on-going
	3 Increase the number of communities using riparian setbacks	WC, communities, Counties	Outreach	1 additional community with riparian setbacks by 2022
	4 Install signage for riparian areas in publicly visible places	Partners	\$200-\$500 per sign. Outside funding or community sign facility	Signs at 2 locations by 2022; signs at 1 additional location every 5 years afterward
	5 Continued outreach	Partners		brochure, workshops on enforcement, outreach to homeowners etc.
Fi 1d-2 Protect 75 acres of wetland/riparian corridor/conservation land through purchase of easement/wetlands, preventing increased loading of sediment by 75 tons/yr				
	1 Mapping			
	2 Contact landowners/partner land trusts			
	3 Submit grant proposal			
	4 Acquire wetlands/easements			

Table Fi 4.2 Fish Creek - Nitrogen

041100020305 (part)

Problem Statement Fi 2: Nitrogen

The 2000 TMDL determined that Fish Creek biological communities are stressed due to urban runoff. Nitrate+nitrogen levels in Fish Creek during/after a rain event in 2007 slightly exceeded state EOLP median values of 0.43 mg/l for WWH streams, with measurements of approx. 0.48 mg/l. Cuyahoga River nitrate+nitrogen levels measured in 2007 frequently the EOLP median (1.0 mg/l) and the state guidelines (1.5 mg/l), ranging from 0.9 mg/l to 6 mg/l. The STEP-L model indicates that the Fish Creek subwatershed generates 30,766 lb/year from non-point sources, including urban runoff, failing septic systems, and eroding stream banks. Alteration of at least 737 acres of wetland, 76% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, floodplain access) along an estimated 15.5 miles of watercourses has reduced the nitrogen uptake of the system. Potential loss of riparian vegetation in the undeveloped 30% of the riparian corridor could result in increased loading in the future.

Goals		Amount to complete, time frame	
Objectives	Lead/ cooperating Organizations	Resources needed/cost	(contingent on funding, resources, landowner willingness)
Actions			
Goal Fi 2a Reduce non-point source pollution from urban runoff to reduce annual loading of nitrogen by 273.2 lb			
<i>Fi 2a-1 Plant 25 ac of deep-rooted riparian vegetation, reducing loading of nitrogen by 200 lb/yr Focus areas: large parcels single ownership, headwaters.</i>			
Actions - See Fi 1a-1, Table Fi 4.1			
<i>Fi 2a-2 Retrofit stormwater volume devices to treat 60 acres of residential land and improve water quality, reducing loading of nitrogen by 70 lb/yr</i>			
Actions - See Fi 1a-2, Table Fi 4.1			
<i>Fi 2a-3 Retrofit 1,000 lf of drainage with no-mow grass/vegetated swale/daylighting, to reduce annual nitrogen loading by 0.8 lb.</i>			
Actions - See Fi 1a-3, Table Fi 4.1			
<i>Fi 2a-4 Install 6,000 sq. ft of rain garden to reduce annual nitrogen loading by 0.5 lb/yr</i>			
Actions - See Fi 1c-2, Table Fi 4.1			
<i>Fi 2a-5 Install 10,000 sq. ft of biofiltration in a developed site to reduce nitrogen loading by 2.2 lb per year</i>			
Actions - See Fi 1c-3, Table Fi 4.1			
<i>Fi 2a-6 Facilitate review and update of 2 local codes to include measures for green infrastructure</i>			
Actions - See Fi 1c-4, Table Fi 4.1			
<i>Fi 2a-7 Update, increase, and disseminate available information concerning phosphorous from urban runoff</i>			
Actions - See Fi 1a-5, Table Fi 4.1			
<i>Fi 2a-8 Increase stewardship activities related to non-point source pollution and watershed issues by 21 activities</i>			
Actions - See Fi 1a-6, Table Fi 4.1			
<i>Fi 2a-9 Facilitate review and update of local codes to include measures for green infrastructure</i>			
Actions - See Fi 1a-8, Table Fi 4.1			
<i>Fi 2a-10 Develop stormwater management design manual for Portage County</i>			
Actions - See Fi 1a-7, Table Fi 4.1			
<i>MCR 1 Establish 1 neighborhood-scale green infrastructure project as demonstration within the developed areas of one of the Middle Cuyahoga River subwatersheds, where suitable neighborhoods are identified, reducing loading of nitrogen by 200 lb/year</i>			
Actions - See MCR-1, Table Fi 4.1			
Goal Fi 2b Restore altered watershed landscape to reduce nitrogen in the stream by 3,100 lb/yr.			
<i>Fi 2b-1. Restore 100 ac of wetland, reducing loading of nitrogen by 2,800 lb/yr. Focus areas -altered wetlands in central watershed or headwaters.</i>			
Actions - See Fi 1b-1, Table Fi 4.1			

Table Fi 4.2 Fish Creek - Nitrogen

041100020305 (part)

Goals		Amount to complete, time frame (contingent on funding, resources, landowner willingness)	
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Actions			
Fi 2b-2 Restore 50 acre-foot of floodplain access/storage, reducing annual nitrogen loading by 300 lb. Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., upstream of McKinney Ave. neighborhood			
Actions - See Fi 1b-2, Table Fi 4.1			
Goal Fi 2c Reduce bank erosion from overloaded channels to reduce nitrogen loading by 34 lb/year.			
Fi 2c-1 Stabilize 200 l.f. of 5-foot tall stream bank, reducing nitrogen loading by 34 lb/yr. Focus areas, e.g., Spaulding Ave. area			
Actions - See Fi 1c-1, Table Fi 4.1			
Fi 2c-2 Plant 25 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 5,400 cu ft in a 3/4 inch storm .			
Actions - See Fi 1a-1, Table Fi 4.1			
Fi 2c-3 Restore 100 acres of wetland thereby reducing channel loading by 1,300,000 cubic feet of water in a 3/4 inch storm .			
Actions - See Fi 1b-1, Table Fi 4.1			
Fi 2c-4 Increase floodplain storage by 50 acre-ft, thereby reducing stream channel loading by 2,178,000 cubic feet.			
Actions - See Fi 1b-2, Table Fi 4.1			
Fi 2c-5 Construct bioinfiltration or permeable pavement demonstration projects totalling 10,000 square feet, to reduce channel loading by 1600 cu ft in a 3/4 inch storm.			
Actions - See Fi 1c-3, Table Fi 4.1			
Fi 2c-6 Construct 6,000 square feet of rain garden to reduce channel loading by 262 cu ft in a 3/4 inch event.			
Actions - See Fi 1c-2, Table Fi 4.1			
Fi 2c-7 Facilitate installation of 50 rain barrels, thereby reducing stream channel loading by 275 cu ft in a 3/4-inch or 1-inch storm .			
Actions - See Fi 1c-7, Table Fi 4.1			
Goal Fi 2d Reduce septic system failure to reduce annual loading of nitrogen by 300 lb			
Fi 2d-1 Correct 1 failing HSDS per year, reducing nitrogen loading by 300 lb/yr Focus areas: vicinity of water courses			
1 Inspect systems	PCHD		
2 Correct failing/discharging home sewage treatment systems	Portage County Health District, landowners	Continued inspection and enforcement of illicit discharge regulations. Remedies depend on	10 by 2022; 1 per year afterward
3 Continue to investigate funding sources	PCRPC, PCHD, wc		
4 Outreach:			
Goal Fi 2e Protect beneficial watershed features to prevent future nitrogen loading by 2,300 lb/yr.			
Fi 2e-1 Protect 36,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks by 1, reducing loading of nitrogen by 200 lb/yr			
Actions - See Fi 1d-1, Table Fi 4.1			
Fi 2e-2 Protect 75 acres of wetlands/riparian corridor/conservation land, preventing increased loading of nitrogen by 2100 lb/yr			
Actions - See Fi 1d-2, Table Fi 4.1			

Table Fi 4.3 Fish Creek - Phosphorous

HUC 041100020305 (part)

Problem Statement Fi 3: Phosphorous

The 2000 TMDL determined that Fish Creek biological communities are stressed due to urban runoff. In approximately half of the reported samples, total phosphorous levels in Fish Creek exceed state/EOLP median values of 0.08 and 0.05 mg/l, respectively, for WWH streams, with measurements in Fish Creek of 0.02 to 1.08 mg/l. The Cuyahoga River has shown signs of slight nutrient enrichment. The STEP-L model indicates that the Fish Creek subwatershed generates 5,810 pounds per year of total phosphorous from non-point sources, including urban runoff, eroding stream banks from overloaded channels, and failing septic systems. Alteration of at least 737 acres of wetland, 76% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, floodplain access) along an estimated 15.5 miles of watercourses has reduced the natural phosphorous removal capacity of the system. Potential loss of riparian vegetation in the undeveloped 30% of the riparian corridor could result in increased loading in the future.

Goal <i>Objective</i>	<i>Actions</i>	<i>Lead/ cooperating organizations</i>	<i>Resources needed/cost</i>	Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Goal Fi 3a Reduce non-point source pollution from urban runoff to reduce annual loading of phosphorous by 46 lb.				
<i>Fi 3a-1 Plant 25 ac of deep-rooted riparian vegetation, reducing loading of phosphorous by 35 lb/yr</i>				
<i>Actions - See Fi 1a-1, Table Fi 4.1</i>				
<i>Fi 3a-2 Retrofit stormwater volume devices to treat 60 acres of developed land and improve water quality, reducing loading of phosphorous by 10.2 lb/yr</i>				
<i>Actions - See Fi 1a-2, Table Fi 4.1</i>				
<i>Fi 3a-3 Retrofit 1,000 lf of drainage with no-mow grass/vegetated swale/daylighting, reducing loading of phosphorous by 0.4 lb/yr</i>				
<i>Actions - See Fi 1a-3, Table Fi 4.1</i>				
<i>Fi 3a-4 Install 6,000 sq ft of rain garden, to reduce phosphorous loading by 0.1 lb/yr</i>				
<i>Actions - See Fi 1c-2, Table Fi 4.1</i>				
<i>Fi 3a-5 Install demo project of 10,000 sq. ft. of biofiltration in a commercial/institutional site, to reduce phosphorous loading by 0.3 lb per year</i>				
<i>Actions - See Fi 1c-3, Table Fi 4.1</i>				
<i>Fi 3a-6 Facilitate review and update of local codes to include measures for green infrastructure</i>				
<i>Actions - See Fi 1a-4, Table Fi 4.1</i>				
<i>Fi 3a-7 Update, increase, and disseminate available information concerning phosphorous from urban runoff</i>				
<i>Actions - See Fi 1a-5, Table Fi 4.1</i>				
<i>FI 3a-6 Increase stewardship activities related to non-point source pollution and watershed issues by 21 activities</i>				
<i>Actions - See Fi 1a-6, Table Fi 4.1</i>				
<i>FI 3a-7 Develop stormwater management design manual for Portage County</i>				
<i>Actions - See Fi 1a-7, Table Fi 4.1</i>				
<i>MC 1 Establish 1 neighborhood-scale green infrastructure project as a demonstration within the developed areas of one of the Middle Cuyahoga River subwatersheds, where suitable neighborhoods are identified, reducing loading of phosphorous by 25 lb/year</i>				
<i>Actions - See MCR-1, Table Fi 4.1</i>				
Goal Fi 3b Restore altered riparian/watershed landscape to reduce phosphorous in the stream by 673 lb/yr.				
<i>Fi 3b-1. Restore 100 ac of wetland, reducing loading of phosphorous by 632 lb/yr</i>				

Table Fi 4.3 Fish Creek - Phosphorous
 HUC 041100020305 (part)

Goal			Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objective	Actions	Lead/ cooperating organizations	Resources needed/cost
	Actions - See Fi 1b-1, Table Fi 4.1		
Fi 3b-2 Restore	50 ac-ft of floodplain access/storage, reducing annual phosphorous loading by 41 lb.		
	Actions - See Fi 1b-2, Table Fi 4.1		
Goal Fi 3c Reduce bank erosion from overloaded channels thereby reducing phosphorous loading by 20 lb/year.			
Fi 3c-1 Stabilize	200 l.f. of 5-foot tall eroding stream bank, reducing phosphorous loading by 20 lb/year.		
	Actions - See Fi 1c-1, Table Fi 4.1		
Fi 3c-2 Plant	25 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 5,400 cu ft in a 3/4 inch storm .		
	Actions - See Fi 1a-1, Table Fi 4.1		
Fi 3c-3 Restore	100 acres of wetland, reducing volume by 65,000 cubic feet in a 3/4-inch storm.		
	Actions: See Fi 1b-1, Table Fi 4.1		
Fi 3c-4 Increase floodplain storage by	50 acre-ft, thereby reducing stream channel loading by 2,178,000 cubic feet.		
	Actions - See Fi 1b-2, Table Fi 4.1		
Fi 3c-5 Construct	10,000 sq ft of bioinfiltration or permeable pavement in a developed setting to reduce channel loading by 1,600 cu ft in a 3/4 in storm		
	Actions - See Fi 1c-3, Table Fi 4.1		
Fi 3c-6 Construct	6,000 square feet of rain garden as a demonstration project to reduce channel loading by 262 cu ft in a 3/4 inch event.		
	Actions - See Fi 1c-2, Table Fi 4.1		
Fi 3c-8 Facilitate installation of	50 rain barrels, thereby reducing stream channel loading by 275 cu ft in a 3/4-inch storm .		
	Actions - See Fi 1c-6, Table Fi 4.1		
Goal Fi 3d Reduce septic system failure to reduce annual loading of phosphorous by 122 lb			
Fi 3d-1 Correct	1 failing HSTS per year, reducing loading of phosphorous by 122 lb/yr		
	Actions - See Fi 2d-1, Table Fi 4.2		
Goal Fi 3e Protect beneficial watershed features to prevent future phosphorous loading by 509 lb/yr.			
Fi 3e-1 Protect	36,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks by 1, preventing an additional 35 lb/yr of phosphorous loading.		
	Actions - See Fi 1d-1, Table Fi 4.1		
Fi 3e-2 Protect	75 acres of wetlands/riparian corridor/conservation land through acquisition of land/easements, preventing increased loading of phosphorous by 474 lb/yr		
	Actions - See Fi 1d-2, Table Fi 4.1		

Table Fi 4.4 Damaging Floods

HUC 041100020305 (part)

Problem Statement Fi-4: Damaging Floods

Repeated flooding problems (flooding that affects structures or roads) occur along Fish Creek at McKinney Ave., Johnson Road, and along primary headwaters. The subwatershed is 21% impervious, generating excess runoff. Fish Creek has been straightened - 15.5 miles of the creek is channelized. At least 737 acres of wetlands on hydric soils and 75% of the 75-foot riparian buffer have been altered, and the channelized water courses can no longer access floodplain/wetland. Many of the headwater tributaries have been culverted. The combination of excess runoff and lost storage/absorption capacity in the watershed contributes to flooding. Continued development in the watershed will contribute further to the flooding problem unless these concerns are addressed.

Goal <i>Objective</i>	Actions	Lead/ cooperating organizations	Resources needed/cost	Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Goal Fi 4a Reduce stream channel loading by reducing runoff/increasing flood storage by 2,251,945 cubic feet in a 3/4-inch rain event				
<i>Fi 4a-1 Increase infiltration with 25 ac of deep-rooted riparian plantings/native species, reducing runoff by 5,400 cubic feet in a 3/4-inch storm.</i>				
Actions: see Fi 1a-1 Table Fi 4.1				
<i>Fi 4a-2 Restore 100 acres of wetland, reducing runoff by 65,000 cubic feet in a 3/4-inch storm</i>				
Actions: see Fi 1a-2 Table Fi 4.1				
<i>Fi 4a-3 Restore 50 acre-foot of floodplain access, reducing volume by 2,178,000 cubic feet in a 1-inch storm.</i>				
Actions: see Fi 1a-3 Table Fi 4.1				
<i>Fi 4a-4 Install 6,000 sq ft of rain garden, reducing stream channel loading by 150 cubic feet in a 3/4-inch storm.</i>				
Actions: see Fi 1c-2 Table Fi 4.1				
<i>Fi 4a-5 Install 10,000 sq ft of biofiltration/permeable pavement in a developed site to reduce runoff by 3,120 cubic feet in a 3/4-inch storm.</i>				
Actions: see Fi 1c-3 Table Fi 4.1				
<i>Fi 4a-7 Facilitate installation of 50 rain barrels, thereby reducing stream channel loading by 275 cu ft in a 3/4-inch storm .</i>				
Actions - See Fi 1c-6, Table Fi 4.1				
<i>Fi 4a-8 Facilitate review and update of local codes to include measures for green infrastructure</i>				
Actions - See Fi 1a-4, Table Fi 4.1				
<i>Fi 4a-9 Update, increase, and disseminate available information concerning urban runoff</i>				
Actions - See Fi 1a-5, Table Fi 4.1				
<i>Fi 4a-10. Increase stewardship activities related to watershed issues</i>				
Actions - See Fi 1a-6, Table Fi 4.1				
<i>MC-1 Establish 1 neighborhood-scale green infrastructure project as a demonstration within the developed areas of one of the Middle Cuyahoga River subwatersheds, where suitable neighborhood is identified, reducing volume of water by 32,670 cu ft in a 1-inch storm.</i>				
Actions: See MC-1 Table Fi 4.1				
Goal Fi 4b Reduce flooding in targeted area by improving/restoring function to watershed features				
<i>Fi 4b-1 Restore floodplain/wetland connection in one area of severe flooding, thereby reducing flooding problems</i>				
1 Conduct neighborhood/community meetings to determine interest				
2 Apply for funding				

Table Fi 4.4 Damaging Floods
HUC 041100020305 (part)

Goal				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
<i>Objective</i>	<i>Actions</i>	<i>Lead/ cooperating organizations</i>	<i>Resources needed/cost</i>	
	3 Flood reduction/watershed restoration study	outside consultant		
	4 Design-build watershed improvements			
	5 Neighborhood outreach during process	potential for tree planting		
Goal Fi 4c Protect beneficial watershed features to prevent future channel loading by 55,284 cu ft in a 3/4 inch storm.				
<i>FI 4c-1 Protect 36,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks, reducing channel loading by 6,534 cu ft in a 3/4 inch rain event.</i>				
Actions: See Fi 1d-1 Table Fi 4.1				
<i>FI 4c-2 Protect 75 acres of wetlands/riparian corridor/conservation land through acquisition of land/easements, preventing increased channel loading by 48,750 cu ft/yr</i>				
Actions - See Fi 1d-2, Table Fi 4.1				

Note: Select practices will be monitored for effectiveness

Problem Statement Fi-5: Habitat

Fish Creek, its tributaries, and watershed have been substantially altered, degrading habitat. Approx. 15.5 miles of the creek is channelized. At least 737 acres of wetlands on hydric soils and 75% of the 75-foot riparian buffer have been altered. Channelizing the creek has removed it from its adjacent wetlands. Many of the headwater tributaries have been culverted. Remaining wetlands have been degraded by urban encroachment and invasive species. Continued development in the watershed will contribute further to the degradation of the remaining habitat unless these concerns are addressed.

Goal				Amount to complete, time frame
<i>Objective</i>	<i>Actions</i>	<i>Lead/ cooperating organizations</i>	<i>Resources needed/cost</i>	(contingent on funding, resources, landowner willingness)
Goal Fi 5a Restore 22 acres of altered habitat.				
<i>Fi 5a-1 Plant 25 ac. of deep-rooted riparian plantings /native species, improving riparian habitat.</i>				
Actions: see Fi 1a-1 Table Fi 4.1				
<i>Fi 5a-2 Restore/enhance 100 acres of wetland. Focus areas - e.g., altered wetlands on hydric soils, wetlands along channelized sections, potentially at formerly farmed sites.</i>				
Actions: see Fi 1a-2 Table Fi 4.1				
<i>Fi 5a-3 Restore 50 acres of floodplain access. Target areas - headwaters, Johnson Rd.-McKinney</i>				
Actions: see Fi 1a-3 Table Fi 4.1				
<i>Fi 5a-4 Treat/remove invasive species in 40 acres of altered habitat.</i>				
<i>Fi 5a-5 Restore 3,000 lf of streambank/wetland-stream connection</i>				
Goal Fi 5b Protect 255 acres of intact habitat.				
<i>Target - intact wetlands, riparian corridor, areas with species of concern, larger intact or connected complexes</i>				
<i>Fi 5b-1 Protect 36,000 linear feet/ 180 acres of riparian buffer by increasing the number of communities using riparian setbacks.</i>				
Actions: See Fi 1d-1 Table Fi 4.1				
<i>Fi 5b-2 Protect 75 acres of wetlands/riparian corridor/conservation land through acquisition of land or easements.</i>				
Actions - See Fi 1d-2, Table 6.2-1				
<i>Fi 5b-3 Update, increase, and disseminate available information concerning care of the watershed and habitats.</i>				
Actions - See Fi 1a-4, Table 6.2-1				
<i>Fi 5b-4. Increase stewardship activities related to watershed issues</i>				
Actions - See Fi 1a-5, Table 6.2-1				
<i>Fi 5b-5. Continue to acquire 25 ac of conservation land in the planned Kent Parks Fish Creek loop.</i>				

Table Fi 4.6 Fish Creek - Recreation

HUC 041100020305 (part)

Problem Statement Fi-6: Recreational Opportunities

There are limited recreational opportunities along or related to Fish Creek. The City of Kent is developing a trail loop along Fish Creek.

Although some Kent parks are located along Fish Creek, the connection to the creek is not highlighted in the parks.

Goal				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objective	Actions	Lead/ cooperating organizations	Resources needed/cost	
Goal Fi-6a: Increase recreational opportunities along Fish Creek and in the subwatershed by 3 miles and 1 sites.				
<i>Fi 6a-1 Continue to develop 3 miles of the planned Kent Parks loop and trail centered on Fish Creek</i>				
	1 Submit grant proposal	City of Kent	funding, plans, design - Kent State University students could help with assessments, etc.	
	2 Wetland delineations		Assistance from KSU classes	
	3 Design/build			
	4 signs			
	5 Brochure/outreach			
<i>Fi 6a-2. Develop 1 River Quest or virtual watershed tour</i>				
	1 Determine appropriate River Quest structure (cuyahoga canalway or new one)	WC, partners, volunteers, parks	Permission to develop quests, printing costs	2 quests by 2017 or 1 watershed tour by 2017
	2 Public workshop concerning River quests			
	3 Seek quests from volunteer groups			
	4 Review, print, distribute		funding for printing, place on website	
<i>Fi 6a-3 Improve access points at 1 location</i>				
Goal Fi 6b: Increase awareness of recreational opportunities, stewardship, and watershed issues.				
<i>Fi 6b-1. Economic impact study recreational uses</i>				
		WC with KSU	outside funding	1 study by 2018
	1 Coordinate with KSU and others on study			
	2 Submit grant proposal			
	3 Conduct study			
	4 Publicize			
<i>Fi 6b-2. Increase signage related to Fish Creek at local parks by 6 signs.</i>				
	1 apply for funding			
	2 Design, install signs			
	3 Continued outreach with local communities			
<i>Fi 6b-3 Update, increase, and disseminate available information concerning recreational opportunities and care of Fish Creek, its tributaries, and watershed.</i>				
	1 Web page of recreational opportunities/access wc			
	2 Other Actions - see Fi 1a-6			
<i>Fi 6b-4. Increase stewardship activities related to watershed issues</i>				
	Actions - See Fi 1a-7			
<i>Fi 5b-5. Continue to acquire 25 ac conservation land in the planned Kent Parks Fish Creek loop.</i>				

Note: Select practices will be monitored for effectiveness