

Table Br 4.1 Breakneck Creek - Sediment

HUC 041100020202

Problem Statement Br-2: sediment

While siltation has not been listed as a cause of non-attainment in Breakneck Creek, some tributaries exhibit embeddedness, eroding banks contribute nitrogen and phosphorous, and TSS levels were comparatively high at the mouth of Breakneck Creek during high flow (35 and 47 mg/l July 2007), which affects sediment levels in the Cuyahoga River. Siltation has been identified in the Cuyahoga River as a cause of non-attainment and is of concern in the shipping channel in Cleveland.

The STEP-L model indicates that the watershed generates 78,429 lb/yr of sediment from urban runoff, eroding banks, agricultural runoff, and failing septic systems. Alteration of at least 1,739 acres of wetland, 50% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, floodplain access) along an estimated 54 miles of watercourses has reduced the sediment uptake of the system. Further development and alteration of riparian vegetation 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 Br 1a Reduce non-point source pollution from urban runoff to reduce annual loading of sediment by 11.5 tons.			
Br 1a-1 Plant 12 ac.of deep-rooted riparian vegetation, reducing loading of sediment by 7 tons/yr Focus areas: large parcels single ownership, headwaters.			
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	
5 Construct and install signage	communities, partners,	\$300-500/sign	
6 Follow-up outreach (individualized guide to riparian zone) and publicize		funding for handouts/brochures	
Br 1a-2 Retrofit stormwater volume devices to treat 100 acres of commercial/institutional land and improve water quality, reducing loading of sediment by 4.5 tons/yr			
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 5 by 2022, 1 every 8 years afterward
Br 1a-3 Retrofit 2,000 lf of drainage with no-mow grass, daylighting, or grass swale as a demonstration project, reducing sediment loading by 0.2 tons per year			
1 Workshop on drainage improvements/ditch maintenance for water quality improvements	SWCD	Location, materials	
2 Identify site			
3 Seek funding			
4 Prepare site/install no-mow grass/retrofit			
5 outreach			

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Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Actions			
Br 1a-4 Review two development codes and update one to encourage use of green infrastructure in new developments.			
1 Submit grant application	WC		
2 Green infrastructure codes workshop	WC, partners, CSU, developers	Funding for outside assistance, location, materials	1 workshop series by 2015
3 Evaluate and update local ordinances for opportunities to reduce pavement, improve use of green infrastructure, conservation development, etc. in new/existing development	WC/communities	Volunteers/ interns can assist - outside funding could be used for consultant and/or work-shop - could be done with Portage zoning official meetings	2 code audits by 2017; update 1 code by 2018 (Kent/Portage??)*
4 Revisions to community development codes to better incorporate green infrastructure		partner communities, possibly funding for outside consultant	update 1 code by 2018
Br 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 EPA, KSU interns/classes	possibly funding for stipends, analysis, equipment	Sampling at 1 location every 3 years. 3 sample sets by 2022.
3 Survey of yard management practices	WC/partners		
4 Continue to develop stream database			
5 e-newsletter or article issued 3 times per year	wc	website, share with partners	
6 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
Br 1a-6 Increase/sponsor 25 stewardship activities related to non-point source pollution and watershed issues.			
1 Establish clean-up/monitoring/planting efforts at additional tributaries and lakes	WC, communities, parks, residents, home-owners' associations, lake associations	Funding or donation of trash disposal, refreshments, monitoring supplies, crew leaders, volunteers; training for monitoring/planting	1 new tributary or lake monitoring, clean-up, or other stewardship program by 2018
2 Distribute 250 rain barrels through workshops	SWCDs/ Communities	Space for workshop; rain barrel kits	5 workshops/50 rain barrels distributed
3 Survey of yard management practices	WC/partners		

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Objectives	Lead/ cooperating Organizations	Resources needed/cost	
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 Breakneck Creek Day (others?)	Portage Parks, partners		1 per year
8 Watershed "brand," logo, art project	WC, Kent State/ Standing Rock Gallery/River Day	Host for project, graphic design capabilities	1 logo or art project by 2015, then 1 every 3 years;
9 Create social network or google presence	WC		1 by 2014
Br 1a-7 Develop storm water management design manual for Portage County			
Storm water management design manual	Portage SWCD	In-house task	1 manual by 2014
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 sediment by 200 lb/year			
1 Work with communities to identify suitable target neighborhoods	WC, partners		
2 Workshops/meetings to gauge neighborhood support			
3 Determine/establish maintenance framework (e.g., easements, homeowner participation)	partner community		
4 Submit grant application			
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; per-meable concrete \$12-15/ sq. ft	1 project by 2022
6 Outreach, neighborhood participation			

Note: Select practices will be monitored for effectiveness

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Goals		Amount to complete, time frame (contingent on funding, resources, landowner willingness)	
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Actions			
Goal Br 1b Reduce bank erosion to reduce sediment loading by 79.5 tons/year.			
Br 1b-1 Stabilize 3,000 l.f. of eroding/incised/channelized bank, reducing sediment loading by 79.5 tons/yr			
<i>Focus areas, e.g., eroding stream banks with livestock access, headwaters, Brimfield Ditch, other ditches</i>			
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 Hold focus meetings to discuss areas of interest, including Wahoo Ditch, Brimfield Ditch, Breakneck headwaters, Feeder Canal	WC, partners		8 meetings to determine focus of restoration efforts along specified (and other) streams
3 Hold meetings with landowners to determine interest	WC, partners		
4 Submit grant applications	WC, partners		
5 Restore floodplain access/flood storage		design-build consultant	
6 Public outreach			
Br 1b-2 Restore 50 acre-feet of floodplain access/storage, reducing channel loading by 2,178,000 cu. Ft.. Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., Wahoo Ditch, Brimfield Ditch, Feeder Canal, Breakneck headwaters			
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 2014, revisit and update if necessary every 3 years
2 Hold meetings to determine landowner interest	WC, partners		
4 Submit grant application			
5 Restore floodplain access/flood storage	design-build consultant	funding for design-build consultant	
6 Public outreach			
Br 1b-3 Restore 80 acres of wetland thereby increasing storage by 76,000 cubic feet of water in a 3/4 inch storm.			
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 2014, revisit and update if necessary every 3 years
2 Hold meetings to determine landowner interest	WC, partners		
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

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Goals			Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Br 1b-4 Install 20,000 sq ft of rain garden, reducing channel loading by 3,750 cu ft in a 3/4 inch storm			
1 Identify partners and sites	WC, partners		
2 Submit grant application	WC/partners		
3 Workshop/installation	WC/partners	Small rain gardens: Approx. \$500 for materials for 100 rain garden of approx. 100 square feet, with amended soil. Cost depends on whether labor and materials are donated. Larger rain garden projects can be in the thousands or tens of thousands of dollars, depending on the level of engineering.	1 project or 300 square feet by 2022, an additional project in the following 5 years
Br 1b-5 Install 10,000 sq. ft. of biofiltration/permeable pavement in a developed site, reducing channel loading by 1,875 cu ft in a 3/4 in storm			
1 Identify parcel(s) and landowner(s) for project	partners, WC		
2 Grants	WC/partners		
3 Design/construct BMPs	outside consultant		
4, Green infrastructure workshops, code revision 5, 6	(see Br 1a-4)		
Br 1b-6 Facilitate installation of 250 rain barrels, thereby reducing stream channel loading by 1,376 cu ft in a 3/4-inch storm.			
1 Obtain funding			
2 Obtain rain barrel materials			
4 Workshop		space, rain barrel materials, outreach, staff time	
5 Outreach			
Br 1b-7 Plant 12 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 1,782 cu ft in a 3/4 inch storm .			
Actions: See Br 1a-1			
Goal Br 1c Reduce agricultural runoff to reduce annual loading of sediment by 620 tons			
Br 1c-1 Conduct survey of existing practices			
1 Develop survey of existing practices	WC, KSU?, NRCS		
2 Administer survey to willing landowners			
3 Windshield survey of visible practices			
4 Tally and summarize survey results			
5 Outreach with property owners based on survey			
Br 1c-2 Work with landowners to treat 100 acres of agricultural land with grassed waterways/vegetated filter strips, to reduce annual sediment loading by 177 tons			
1 Identify need and willing landowners			
2 Obtain funding			
3 Design/install			
4 Outreach			

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Goals		Amount to complete, time frame (contingent on funding, resources, landowner willingness)	
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Actions			
Br 1c-3 Work with landowners to install 100 ac of cover crops, reducing annual sediment loading by 101 tons.			
1 Identify need and willing landowners			
2 Obtain funding			
3 Install			
4 Outreach			
Br 1c-4 Work with landowners to use residue on 200 acres, to reduce annual sediment loading by 202 tons.			
1 Identify need and willing landowners			
2 Obtain funding			
3 Design/install			
4 Outreach			
Br 1c-5 Install 3,000 lf of livestock exclusion and accompanying measures to reduce sediment loading by 140 tons per year			
1 Contact landowners to determine willingness			
2 Submit proposal for grant funds			
3 Work with landowners to install measures			
4 Outreach			
Goal Br 1e Restore riparian features to reduce sedimentation by 108 tons/yr .			
Br 1e-1. Restore 80 ac of wetland, reducing loading of sediment by 80 tons/yr. Focus areas -altered wetlands in central watershed or headwaters.			
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 Hold meetings to determine landowner interest	WC, partners		
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
Br 1e-2 Restore 50 acre-feet of floodplain access/storage, reducing annual sediment loading by 22 tons/yr. Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., Brimfield Ditch, Collins Pond, Wahoo Ditch			
Actions: See Br 1b-2.			
Br 1e-3 Plant 12 ac.of deep-rooted riparian vegetation, reducing loading of sediment by 7 tons/yr Focus areas: large parcels single ownership, headwaters.			
Actions: See Br 1a-1			
Br 1e-4 Restore 3,000 lf of incised/channelized stream			
Actions: See Br 1b-1			

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Goals				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objectives	Lead/ cooperating Organizations	Resources needed/cost		
Actions				
Goal Br 1f Protect landscape features to prevent future sediment loading by 116 tons/yr.				
Br 1f-1 Protect 40,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks by 1, reducing loading of sediment by 16 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 Provide written 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	funding for outreach	brochure, workshops on enforcement, outreach to homeowners etc.	
Br 1f-2 Protect 100 acres of wetlands, preventing increased loading of sediment by 100 tons/yr				
1 Identify key areas for protection	Partners - Portage Park District			
2 Contact landowners/partner land trusts				
3 Submit grant proposal				
4 Acquire wetlands/easements				

Table Br 4.2 Breakneck Creek - Nitrogen

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Problem Statement Br-2: Nitrogen

Lake Hodgson, in the Breakneck Creek subwatershed, experiences algal blooms from excessive nutrients, with chl-A as high as 23 mg/l during the summer. Nitrogen levels in Breakneck Creek exceed state EOLP median (0.43 mg/l) and guidelines (1 mg/l) for WWH streams of this size, with levels ranging from 0.68 mg/l to 7.43 mg/l in 2007 at Summit Road. Upstream measurements from 2000 occasionally exceeded state median/guidelines, ranging from 0.29-0.64 mg/l. Communities in the northern portion of the subwatershed grew rapidly from 2000-2010, potentially increasing nitrogen loading from measured levels. The Middle Cuyahoga River downstream of Breakneck Cr. shows signs of slight nutrient enrichment, with large diurnal oxygen swings suggesting increased algal activity. Middle Cuyahoga River nitrate+nitrogen levels measured in 2007 frequently exceed 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 watershed generates 78,429 lb/yr of nitrogen from urban runoff, eroding banks, agricultural runoff, and failing septic systems. Alteration of at least 1,739 acres of wetland, 50% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, floodplain access) along an estimated 54 miles of watercourses has reduced the nitrogen uptake of the system. Further development and alteration of riparian vegetation 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 Br 2a Reduce non-point source pollution from urban runoff to reduce annual loading of nitrogen by 168.6 lb			
<i>Br 2a-1 Plant 12 a.c. of deep-rooted riparian vegetation, reducing loading of nitrogen by 93 lb/yr Focus areas: large parcels single ownership, headwaters.</i>			
Actions: See Br 1a-1			
<i>Br 2a-2 Retrofit stormwater volume devices to treat 100 acres of developed land and improve water quality, reducing loading of nitrogen by 70 lb/yr</i>			
Actions: See Br 1a-2			
<i>Br 2a-3 Retrofit 2,000 lf of drainage with no-mow grass/vegetated swale/daylighting to reduce nitrogen loading by 1.6 lb/yr.</i>			
Actions: See Br 1a-3			
<i>Br 2a-4 Review two development codes and update one to encourage use of green infrastructure in new developments.</i>			
Actions: See Br 1a-4			
<i>Br 2a-5 Install 20,000 sq ft of rain gardens to reduce nitrogen loading by 2 lb/yr</i>			
1 Identify partners	WC, partners		
2 Submit grant application	WC/partners		
3 Workshop/installation	WC/partners	Approx. \$500 for materials for 100 rain garden of approx. 100 square feet, with amended soil. Cost depends on whether labor and materials are donated. Larger rain garden projects can be in the thousands or tens of thousands of dollars, depending on the level of engineering.	1 project or 300 square feet by 2022, an additional project in the following 5 years
<i>Br 2a-6 Install 10,000 sq ft of biofiltration in a commercial/institutional site(s), to reduce nitrogen loading by 2 lb per year</i>			
1 Identify parcel(s) and landowner(s) for project	partners, WC		
2 Grants	WC/partners		
3 Design/construct BMPs	outside consultant		
4, 5, Green infrastructure workshops, code revision -			
6 see Br 1a-4			

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Goals			Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Br 2a-7 Develop storm water management design manual for Portage County			
Actions: See Br 1a-7			
Br 2a-8 Update, increase, and disseminate available information concerning nitrogen from urban runoff			
Actions: See Br 1a-5			
Br 2a-9 Increase/sponsor 25 stewardship activities related to non-point source pollution and watershed issues.			
Actions: See Br 1a-6			
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			
Actions: See previous listing, MCR 1			
Goal Br 2b Reduce bank erosion to reduce nitrogen loading by 300 lb/year.			
Br 2b-1 Stabilize 3,000 l.f. to reduce nitrogen loading by 300 lb/yr			
Focus areas, e.g., eroding streams with livestock access, headwaters, Brimfield Ditch, other ditches			
Actions: See Br 1b-1			
Br 2b-2 Restore 50 acre-ft of floodplain access/storage, reducing channel loading by 217,800 cu. Ft.. Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., Wahoo Ditch, Brimfield Ditch, Feeder Canal, Breakneck headwaters			
Actions: See Br 1b-2			
Br 2b-3 Restore 80 acres of wetland thereby increasing storage by 76,000 cubic feet of water in a 3/4 inch storm.			
Actions: See Br 1b-3			
Br 2b-4 Construct 20,000 square feet of rain gardens to reduce channel loading by 3,750 cu ft in a 3/4 inch event.			
Actions: See Br 1b-4			
Br 2b-5 Construct 10,000 sq ft of bioinfiltration/permeable pavement in an institutional/commercial use, thereby reducing channel loading by 1,875 cu ft in a 3/4 inch storm.			
Actions: See Br 1b-5			
Br 2b-6 Facilitate installation of 250 rain barrels, thereby reducing stream channel loading by 1,376 cu ft in a 3/4-inch storm.			
Actions: See Br 1b-6			
Br 2b-7 Plant 12 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 1,782 cu ft in a 3/4 inch storm.			
Actions: See Br 1b-7			
Goal Br 2c Reduce septic system failure to reduce annual loading of nitrogen by 933 lb			
Br 2c-1 Correct 3 failing HSDS per year, reducing nitrogen loading by 933 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 cause of failure and proximity of sewer service.	10 by 2022; 1 per year afterward

Table Br 4.2 Breakneck Creek - Nitrogen

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Goals			Amount to complete, time frame
Objectives	Lead/ cooperating Organizations	Resources needed/cost	(contingent on funding, resources, landowner willingness)
3 Continue to investigate funding sources	PCRPC, PCHD, wc		
4 Outreach:			
Goal Br 2d Reduce agricultural runoff to reduce annual loading of nitrogen by 1,466 lb			
<i>Br 2d-1 Conduct 1 approximately year-long nutrient survey along Breakneck Creek, Feeder Canal, Lake Hodgson, Congress Lake Outlet, and Potter Creek.</i>			
Actions: See Br 1c-1			
<i>Br 2d-2 Work with landowners to treat 100 acres of agricultural land with grassed waterways/vegetated filter strips, to reduce annual nitrogen loading by 466 lb</i>			
Actions: See Br 1c-2			
<i>Br 2d-3 Work with landowners to install 100 ac of cover crops, reducing annual nitrogen loading by 240 lb.</i>			
Actions: See Br 1c-3			
<i>Br 2d-4 Work with landowners to use residue on 200 acres, to reduce annual nitrogen loading by 480 lb.</i>			
Actions: See Br 1c-4			
<i>Br 2d-5 Install 3,000 lf of livestock exclusion and accompanying measures to reduce nitrogen loading by 280 lb per year</i>			
Actions: See Br 1c-5			
Goal Br 2e Restore riparian features to reduce nitrogen loading by 2,835 lb/yr.			
<i>Br 2e-1. Restore 80 ac of wetland, reducing loading of nitrogen by 2,240 lb/yr. Focus areas -altered wetlands in central watershed or headwaters.</i>			
Actions: See Br 1b-3			
<i>Br 2e-2 Restore 50 acre-ft 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., Brimfield Ditch, Collins Pond, Wahoo Ditch</i>			
Actions: See Br 1b-2.			
<i>Br 2e-3 Improve channel morphology, e.g., 2-stage ditch, by 1,000 lf to increase nitrogen uptake by 295 lb/yr. Focus areas: altered headwater channels.</i>			
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 Hold meetings to determine landowner interest	WC, partners		
4 Submit grant application			
5 Construct ditch improvements	design-build consultant	funding for design-build consultant	
6 Public outreach			
<i>Br 2e-4 Restore 3,000 lf of incised/channelized stream, e.g., Wahoo, Brimfield, Hudson ditches; Breakneck headwaters/channel</i>			
Actions: See Br 1b-1			

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Goals		Amount to complete, time frame (contingent on funding, resources, landowner willingness)	
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Actions			
Goal Br 2f Protect landscape features to prevent future nitrogen loading by 3,020 lb/yr.			
Br 2f-1 Protect 40,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks by 1, reducing loading of nitrogen by 220 lb/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 Provide written 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	funding for outreach	brochure, workshops on enforcement, outreach to homeowners etc.
Br 2f-2 Protect 100 acres of wetlands, preventing increased loading of nitrogen by 2,800 lb/yr			
1 Identify key areas for protection	Partners - Portage Park District		
2 Contact landowners/partner land trusts			
3 Submit grant proposal			
4 Acquire wetlands/easements			

Table Br-4.3 Breakneck Creek Phosphorous

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Problem Statement Br-3: Phosphorous

Breakneck Creek and the Cuyahoga River downstream of Breakneck are enriched in phosphorous. Lake Hodgson, in the Breakneck Creek subwatershed, experiences algal blooms from excessive nutrients. The STEP-L model indicates that the watershed generates 16,470 lb/yr of phosphorous from urban runoff, eroding banks, agricultural runoff, and failing septic systems. Alteration of at least 1,739 acres of wetland, 50% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, floodplain access) along an estimated 54 miles of watercourses has reduced the phosphorous uptake of the system. Potential loss of additional riparian vegetation through development could increase loading in the future.

Goals	Amount to complete, time frame
Objectives	(contingent on funding, resources,
Actions	landowner willingness)
Lead/ cooperating Organizations	Resources needed/cost
Goal Br 3a Reduce non-point source pollution from urban runoff to reduce annual loading of phosphorous by 28.7 lb	
<i>Br 3a-1 Plant 12 ac of deep-rooted riparian vegetation, reducing loading of phosphorous by 17 lb/yr Focus areas: large parcels single ownership, headwaters.</i>	
Actions - See Br 1a-1	
<i>Br 3a-2 Retrofit stormwater volume devices to treat 100 acres of commercial/institutional land and improve water quality, reducing loading of phosphorous by 10 lb/yr</i>	
Actions - See Br 1a-2	
<i>Br 3a-3 Retrofit 1,000 lf of roadside ditch with no-mow grass, vegetated swale, or daylighting to reduce phosphorous loading by 0.8 lb/yr</i>	
Actions - See Br 1a-3	
<i>Br 3a-4 Review two development codes and update one to encourage use of green infrastructure in new developments.</i>	
Actions - See Br 1a-4	
<i>Br 3a-5 Install 20,000 sq ft of rain gardens to reduce phosphorous loading by 0.5 lb/yr</i>	
Actions - See Br 2a-5	
<i>Br 3a-6 Install 10,000 sq ft of biofiltration/permeable pavement, to reduce phosphorous loading from a developed site by 0.4 lb per year</i>	
Actions: see Br 2a-6	
<i>Br 3a-7 Develop storm water management design manual for Portage County</i>	
Actions: See Br 1a-7	
<i>Br 3a-8 Update, increase, and disseminate available information concerning phosphorous from urban runoff</i>	
Actions: see Br 2a-8	
<i>Br 3a-9 Increase/sponsor 25 stewardship activities related to non-point source pollution and watershed issues.</i>	
Actions: see Br 2a-9	
<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 phosphorous by 25 lb/year</i>	
Actions - See TableBr 4.1	
Goal Br 3b Reduce bank erosion from overloaded channels/livestock access to reduce phosphorous loading by 38 lb/year.	
<i>Br 3b-1 Stabilize 3,000 l.f. of eroding streambank to reduce phosphorous loading by 112 lb/yr</i>	
Focus areas, e.g., headwaters, Brimfield Ditch, other ditches	
Actions: see Br 2b-1	
<i>Br 3b-2 Restore 50 acre-ft of floodplain access/storage, reducing channel loading by 217,800 cu. Ft.. Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., Wahoo Ditch, Brimfield Ditch, Feeder Canal, Breakneck headwaters</i>	

Table Br-4.3 Breakneck Creek Phosphorous
HUC 041100020202

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Goals			Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objectives	Lead/ cooperating Organizations	Resources needed/cost	
Actions Actions: See Br 1b-2			
Br 3b-3 Restore 80 acres of wetland thereby increasing storage by 76,000 cubic feet of water in a 3/4 inch storm.			
Actions: See Br 1b-3			
Br 3b-4 Construct 20,000 square feet of rain gardens to reduce channel loading by 3,750 cu ft in a 3/4 inch event.			
Actions: See Br 1b-4			
Br 3b-5 Construct 20,000 sq ft of bioinfiltration/permeable pavement in an institutional/commercial use, thereby reducing channel loading by 1,875 cu ft in a 3/4 inch storm.			
Actions: See Br 1b-5			
Br 3b-6 Facilitate installation of 250 rain barrels, thereby reducing stream channel loading by 1,376 cu ft in a 3/4-inch storm.			
Actions: See Br 1b-6			
Br 3b-7 Plant 12 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 1,782 cu ft in a 3/4 inch storm.			
Actions: See Br 1b-7			
Br 3a-8 Review two development codes and update one to encourage use of green infrastructure in new developments.			
Actions: See Br 1a-4			
Br 3a-9 Restore 3,000 lf of incised/channelized stream, e.g., Wahoo, Brimfield, Hudson ditches; Breakneck headwaters/channel			
Actions: See Br 1b-1			
Goal Br 3c Reduce septic system failure to reduce annual loading of phosphorous by 366 lb			
Br 3c-1 Correct 3 failing HSDS per year, reducing phosphorous loading by 366 lb/yr Focus areas: vicinity of water courses			
Actions: See Br 2c-1			
Goal Br 3d Reduce agricultural runoff to reduce annual loading of phosphorous by 526 lb			
Br 3d-1 Conduct 1 approximately year-long nutrient survey along Breakneck Creek, Feeder Canal, Lake Hodgson, Congress Lake Outlet, and Potter Creek.			
Actions: See Br 1c-1			
Br 3d-2 Work with landowners to treat 100 acres of agricultural land with grassed waterways/vegetated filter strips, to reduce annual phosphorous loading by 26 lb			
Actions: See Br 1c-2			
Br 3d-3 Work with landowners to install 100 ac of cover crops, reducing annual phosphorous loading by 120 lb.			
Actions: See Br 1c-3			
Br 3d-4 Work with landowners to use residue on 200 acres, to reduce annual phosphorous loading by 240 lb.			
Actions: See Br 1c-4			
Br 3d-5 Install 3,000 lf of livestock exclusion and accompanying measures to reduce phosphorous loading by 140 lb per year			
Actions: See Br 1c-5			
Goal Br 3e Increase uptake of phosphorous by riparian/in-stream features by 637 lb/yr.			
Br 3e-2 Restore 50 acre-ft of floodplain access/storage, reducing annual phosphorous loading by 41 lb. Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., Brimfield Ditch, Collins Pond, Wahoo Ditch			
Actions: see Br 1b-2			

Table Br-4.3 Breakneck Creek Phosphorous

HUC 041100020202

Goals		Amount to complete, time frame
Objectives	Lead/ cooperating Organizations	(contingent on funding, resources, landowner willingness)
Actions	Resources needed/cost	
Br 3e-2. Restore 80 ac of wetland, reducing loading of phosphorous by 505 lb/yr. Focus areas -altered wetlands in central watershed or headwaters.		
Actions: see Br 1b-3		
Br 3e-3 Improve channel morphology, e.g., 2-stage ditch, by 1,000 lf to treat increase phosphorous uptake by 91 lb/yr		
Actions: see Br 3e-3		
Goal Br 3f Protect landscape features to prevent future phosphorous loading by 711 lb/yr.		
Br 3f-1 Protect 40,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks by 1, reducing loading of phosphorous by 79 lb/yr		
Actions: see Br 2f-1		
Br 3f-2 Protect 100 acres of wetlands, preventing increased loading of phosphorous by 632 lb/yr		
Actions: see Br 2f-2		

Note: Select practices will be monitored for effectiveness

Table Br 4.4 Breakneck Creek - Groundwater

HUC 041100020202

Problem Statement Br-4: Groundwater, Public Water Supplies

The subwatershed contains two public water supplies, both of which are susceptible to contamination from surface spills and leaks to groundwater. Both public water supplies have source water protection plans, but their contributing surface and groundwater zones are largely privately owned and susceptible to contamination from uses or spills.

Goals		Amount to complete, time frame	
Objectives	Lead/ cooperating Organizations	Resources needed/cost	(contingent on funding, resources, landowner willingness)
Actions			
Goal Br 4a Increase community awareness of procedures, protective measures, and groundwater chemistry related to fracking			
Br 4a-1 Monitor groundwater chemistry at 4 sites up-gradient of public water supplies for chemicals associated with fracking			
1 Work with partners to identify sites and chemicals of concern			
2 Develop baseline profile			
3 Monitor 5 times by 2022			
Br 4a-2 Increase awareness of potential hazards and protective measures associated with fracking			
1 Coordinate with state agencies and communities concerning fracking and controls			
2 Coordinate with state agencies to receive notification of drilling permit requests			
3 Outreach to communities and property owners - website, brochures, etc.			
Goal Br 4a Reduce risks of groundwater contamination from land use, spills, or hazardous waste sites.			
Br 1a-1 Inventory brownfield sites in the Breakneck Creek subwatershed, focusing on Ravenna			
1 Submit grant proposal	wc/Portage County		
2 Compile available mapping		mapping, coordinate with city officials	
3 Conduct inventory			1 inventory by 2017
4 Identify likely site(s) for clean-up	County, cities, Ohio EPA, landowners	outside consultant	
Br 1b-1 Initiate clean-up of 1 existing brownfield site, focusing on areas near water supplies or water courses.			
1 Coordinate with state regulators concerning status of DERR-listed sites	WC		
2 Submit grant application	WC/Portage County agencies		
3 Consultant inventory of brownfield sites		outside consultant and funding	1 inventory

Table Br 4.4 Breakneck Creek - Groundwater
HUC 041100020202

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Goals				Amount to complete, time frame (contingent on funding, resources, landowner willingness)
Objectives	Lead/ cooperating Organizations	Resources needed/cost		
Actions				
3 Work with property owners and state regulators to identify site and conditions/plans for clean-up				
4 Submit grant application for clean-up funds	WC/Portage County			
5 Clean-up		outside consultant and funding, disposal		clean-up/cap one site
6 Redevelopment		development/use plan		
Br 4b-1 Provide public and agency outreach efforts to assist with implementation of 2 source water protection plans				
1 Coordinate with water suppliers concerning				
2 Apply for funding if needed				
3 Develop and disseminate outreach materials - written, website				
Br 4b-2 Update, increase, and disseminate available information concerning watershed protection				
Actions: See Br 1a-5, Table Br 4.1				
Br 4b-3 Increase/sponsor 25 stewardship activities related to non-point source pollution and watershed issues.				
Actions: See Br 1a-6, Table Br 4.1				

Table Br 4.5 Breakneck Creek - Flooding Problems

HUC 041100020202

Problem Statement Br-5: Flooding Problems

Areas within the subwatershed experience damaging flooding, including Brimfield Ditch near Route 261/Summit Rd., Wahoo Ditch, Breakneck Creek at Lakewood Rd., and Collins Pond. The watershed as a whole is 10% impervious, but the development is concentrated in the northern portion, which is approximately 17% impervious. Throughout the watershed, runoff from a 3/4 inch storm is increased by approx. 500,000 cu ft over an undeveloped watershed. The flood-management capacity along approximately 58 miles of stream channel has been reduced through alteration of watershed features, such as wetlands, riparian corridor, floodplain access, and stream morphology. Additional development or alteration will likely increase the total volume in streams.

Goals	Lead/ cooperating		Amount to complete, time frame
Objectives	Organizations	Resources needed/cost	(contingent on funding, resources, landowner willingness)
Actions			
Goal Br 5a Address flooding problems in one area by restoring altered watershed hydrology/watershed characteristics			
Br 5a-1 Conduct 1 stormwater management study focusing on flooding problem area to identify potential landscape restoration opportunities that will reduce problem flooding.			
1 Develop detailed maps for areas of interest identifying topography, existing and altered wetlands, drainage, and imperviousness.			
2 Conduct engineering study	Ravenna/Portage County	Outside funding for consultant	
3 Outreach with neighborhoods to discuss feasible approaches			
4 Submit grant proposal	wc/city or county staff		
5 Construct improvements		outside consultant	
Goal Br 5b Reduce runoff throughout the subwatershed by 29,600 cu ft in a 3/4 in storm to reduce flooding potential.			
Br 5b-1 Review two development codes and update one to encourage use of green infrastructure in new developments.			
Actions - See Br 2a-4			
Br 5b-2 Construct 20,000 square feet of rain gardens to reduce channel loading by 3,750 cu ft in a 3/4 inch event.			
Actions: See Br 1b-4			
Br 5b-2 Construct 20,000 sq ft of bioinfiltration/permeable pavement in an institutional/commercial use, thereby reducing channel loading by 1,875 cu ft in a 3/4 inch storm.			
Actions: See Br 1b-5			
Br 5b-4 Facilitate installation of 250 rain barrels, thereby reducing stream channel loading by 1,376 cu ft in a 3/4-inch storm.			
Actions: See Br 1b-6			
Br 5b-5 Plant 12 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 1,782 cu ft in a 3/4 inch storm .			
Actions: See Br 1b-7			
Br 5b-6 Update, increase, and disseminate available information concerning reducing runoff			
Actions - See Br 1a-5			
Br 5b-7 Increase stewardship activities related to runoff and watershed issues by 25 events/activities			
Actions - See Br 1a-6			

Goals	Objectives	Lead/ cooperating	Amount to complete, time frame
	Actions	Organizations	(contingent on funding, resources, landowner willingness)
	Resources needed/cost		
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 channel loading by 14,963 cu ft in a 3/4 in storm			
Actions - See Table Br 4.2			
Goal Br 5c Restore/improve altered watershed landscape features throughout watershed to increase flood storage			
by 295,582 cu ft in a 3/4 in storm.			
Br 5c-1 Restore 50 acre-ft of floodplain access/storage, reducing channel loading by 217,800 cu. Ft. . Focus areas - areas with modified floodplain access. and at/upstream of flooding problem areas, e.g., Wahoo Ditch, Brimfield Ditch, Feeder Canal, Breakneck headwaters			
Actions: See Br 1b-2			
Br 5c-3 Restore 80 acres of wetland thereby increasing storage by 76,000 cubic feet of water in a 3/4 inch storm.			
Actions: See Br 1b-3			
Br 5c-3 Improve channel morphology, e.g., 2-stage ditch by 1,000 lf. Storage at higher intensity storms than 3/4 inch would increase.			
Actions - See Br 1b-7			
Br 5c-4 Plant 12 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 1,782 cu ft in a 3/4 inch storm.			
Actions - See Br 1a-1			
Br 5c-5 Restore 3,000 lf of incised/channelized stream, e.g., Wahoo, Brimfield, Hudson ditches; Breakneck headwaters/channel			
Actions: See Br 1b-1			
Goal Br 5d Protect landscape features to prevent future channel loading by 67,760 cu ft in a 3/4 in storm.			
Br 5d-1 Protect 40,000 linear ft of riparian buffer by increasing use of riparian setbacks by 1 community, to reduce channel loading 3,960 cu ft in a 3/4 in storm			
Actions - See Br 2e-1			
Br 5d-2 Protect 100 acres of wetlands through purchase of land/easement, preventing increased channel loading of by 63,800 cu ft in a 3/4 in storm			
Actions - See Br 2e-1			

Table Br 4.6 Habitat

HUC 041100020202

Problem Statement Br-6: Habitat

Alteration of at least 1,739 acres of wetland, 50% of vegetated riparian corridor, and loss of riparian features (e.g., riparian zone, channel form, floodplain access) along an estimated 54 miles of watercourses has degraded riparian and wetland habitat in the subwatershed. Wahoo Ditch is in non-attainment of MWH status due to its extreme ditchlike nature, with recent QHEI scores of 44.5-55, rating as "poor." Causes/sources of non-attainment include poor habitat due to channelization. The lower portion of Breakneck Creek received QHEI scores of 56.5 and 59, due in part to channelization. Several tributaries have been highly channelized. The undisturbed riparian corridor and wetlands fringing Breakneck Creek have helped maintain high the high quality of the creek in spite of agricultural and urban influences. Remaining wetlands are at risk of degradation/encroachment from development. Three communities do not have riparian setbacks, placing remaining riparian vegetation at risk. The Breakneck riparian corridor and other areas are listed in the Portage County Watershed Plan as priorities for protection, and species of concern are found throughout this watershed..

Goals			Amount to complete, time frame
Objectives	Lead/ cooperating Organizations	Resources needed/cost	(contingent on funding, resources, landowner willingness)
Goal Br 6a Restore/improve 21.7 acres of altered habitat/stream channel morphology.			
<i>Br 6a-1 Plant 12 ac. of deep-rooted riparian vegetation. Focus areas: large parcels single ownership, headwaters.</i>			
Actions: See Br 1a-1			
<i>Br 6a-2 Restore/improve 80 acres of wetland habitat. Focus: altered wetlands.</i>			
Actions: See Br 1b-3			
<i>Br 6a-3 Restore 50 acre-ft of floodplain access/storage. Focus - areas with modified floodplain access. e.g., Wahoo Ditch, Brimfield Ditch, Collins Pond, Wahoo Ditch</i>			
Actions: See Br 1b-2			
<i>Br 6a-4 Improve channel morphology, e.g., 2-stage ditch, by 1,000 lf to increase floodplain access by 10,000 sq. feet.</i>			
Actions: See Br 2e-3			
<i>Br 6a-5 Restore 3,000 lf of incised/channelized stream, e.g., Wahoo, Brimfield, Hudson ditches; Breakneck headwaters/channel</i>			
Actions: See Br 1b-1			
Goal Br 6b Reduce bank erosion from overloaded channels.			
<i>Br 6b-1 Restore 50 acre-ft of floodplain access/storage, reducing channel loading by 217,800 cu. Ft.. Focus areas - areas with modified floodplain access. e.g., Wahoo Ditch, Brimfield Ditch, Feeder Canal, Breakneck headwaters</i>			
Actions: See Br 1b-2			
<i>Br 6b-2 Restore 80 acres of wetland thereby increasing storage by 76,000 cubic feet of water in a 3/4 inch storm.</i>			
Actions: See Br 1b-3			
<i>Br 6b-3 Improve channel morphology, e.g., 2-stage ditch by 1,000 lf. Storage at higher intensity storms than 3/4 inch would increase.</i>			
Actions - See Br 1b-7			
<i>Br 6b-4 Plant 12 ac of deep-rooted riparian vegetation, thereby reducing channel loading by 1,782 cu ft in a 3/4 inch storm.</i>			
Actions - See Br 1a-1			
Goal Br 6c Protect 128 acres of landscape features to prevent future habitat degradation.			
<i>Br 6c-1 Protect 40,000 linear feet of riparian buffer by increasing the number of communities using riparian setbacks by 1</i>			
Actions: See Br 1f-1			
<i>Br 6c-2 Protect 100 acres of wetlands through acquisition or easement. Focus areas: high value habitat identified in WAP or Portage County Watershed Plan.</i>			
Actions: See Br 1f-2			
<i>Br 6c-3 Update, increase, and disseminate available information concerning watershed habitats</i>			
Actions: See Br 1a-5			
<i>Br 6c-4 Increase/sponsor 25 stewardship activities related to stream channel health, non-point source, runoff, erosion, habitats, etc.</i>			
Actions: See Br 1a-6			

Note: Select practices will be monitored for effectiveness

Table Br 4.7 Breakneck Creek - Recreation

HUC 041100020202

Problem Statement Br-7: Recreation

Limited public recreational opportunities exist along Breakneck Creek. Parks districts and communities are actively seeking to increase recreational trails in the vicinity of the creek and Cuyahoga River. The Portage Park District property along Breakneck Creek is not yet open to the public. The Portage Bike/Hike Trail is planned and partially complete.

Goals		Amount to complete, time frame	
<i>Objectives</i>	Lead/ cooperating	(contingent on funding, resources, landowner willingness)	
Actions	Organizations	Resources needed/cost	
Goal Br 7a Increase/improve recreational opportunities related to Breakneck Creek and tributaries.			
Br 7a-1 Construct 1 mile of bike/hike trail (e.g., Portage bike-hike greenway).			
1 Submit grant proposal			
2 Develop design			
3 Construct link			
4 Develop and install informational signs			
5 Outreach, publicity			
Br 7a-2 Increase/improve access points along Breakneck Creek by 1 publicly accessible location			
1 Submit grant proposal			
2 Work with Portage Parks to design access			
3 Construct access points and related facilities (e.g., parking, signs, etc.) as appropriate			
Br 7a-3 Develop 2 quests or 1 virtual watershed tour			
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	
Goal Br 7b: Increase awareness of recreational opportunities, stewardship, and watershed issues.			
Br 7b-1. Economic impact study recreational uses		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			
Br 7b-2. Increase signage related to watershed at local parks by 18.			
1 apply for funding			
2 Design, install signs			
3 Continued outreach with local communities			
Br 7b-3 Update, increase, and disseminate available information concerning recreational opportunities and care of Breakneck Creek, its tributaries, and watershed.			
1 Web page of recreational opportunities/access	wc		
2 Other Actions - see Br 2a-5, Table Br 4.1			
Br 7b-4. Increase stewardship activities related to watershed issues			
1 Annual park clean-ups?			
Actions - See Br 2a-6, Table Br 4.1			

Problem Statement Br-8: Contaminants from brownfield sites and spills

The Breakneck Creek subwatershed has 11 sites of potential chemical releases, listed on the DERR database or otherwise known. Wahoo Ditch is in non-attainment due in part to legacy contaminants

Goals				Amount to complete, time frame
<i>Objectives</i>		Lead/ cooperating Organizations	Resources needed/cost	(contingent on funding, resources, landowner willingness)
Actions				
Goal Br-8a Address contamination at one site along Wahoo Ditch.				
<i>Br 8a-1 Inventory brownfield sites in the Breakneck Creek subwatershed, focusing on Ravenna</i>				
1 Submit grant proposal		wc/Portage County		
2 Compile available mapping			mapping, coordinate with city officials	
3 Conduct inventory				1 inventory by 2017
4 Identify likely site(s) for clean-up		County, cities, Ohio EPA, landowners	outside consultant	
Goal Br 8b Reduce risks of surface or groundwater contamination from toxic releases from 1 existing sites.				
<i>Br 8b-1 Initiate clean-up of 1 existing brownfield site, focusing on areas near water supplies or water courses.</i>				
1 Coordinate with state regulators concerning status of DERR-listed sites		WC		
2 Submit grant application		WC/Portage County agencies		
3 Consultant inventory of brownfield sites			outside consultant and funding	1 inventory
4 Work with property owners and state regulators to identify site and conditions/plans for clean-up				
5 Develop brownfields plan to identify priorities for clean-up		WC/Portage County agencies, cities	outside consultant and funding	1 plan (combine with inventory?)
6 Submit grant application for clean-up funds		WC/Portage County		
7 Clean-up			outside consultant and funding, disposal	clean-up/cap one site
8 Redevelopment			development/use plan	