11 Best Management Practices

A wide variety of structural and non-structural implementation practices exist that we can select to help us protect and restore our watershed. A list of potential strategies was reviewed by the steering committee to help identify which practices were deemed the most appropriate and likely to succeed in addressing the watershed goals. The list of implementation strategies is not meant to be static or exhaustive as new approaches or practices may come to our attention over time and evaluation may show that certain practices were not as effective as we originally thought they would be.

11.1 Urban Area BMPs

Urban development is the most common human land use in the watershed, accounting for nearly 45% of its land area. The highest concentrations of development are located in the north western half of the watershed around Crown Point, Gary, Hobart, Merrillville and Portage. Urban development contributes an estimated 66% of the runoff volume, 40% of the nitrogen loads, 26% of the phosphorus loads, 59% of the biological oxygen demand loads, and 59% of the sediment loads in the watershed.

The following list of BMPs have been identified for implementation in the watershed. Descriptions of the individual practices are included in the appendices. The focus is to 1) Encourage the use of Low Impact Development (LID) design principles with new development or redevelopment; 2) Retrofit existing sites or practices to provide or improve water quality benefits and enhance storage for downstream channel protection (i.e. erosion) using LID practices; and 3) restore riparian corridors and native vegetation in upland areas to improve storage, water quality and habitat benefits.

- Bioretention (Rain Gardens)
- Capture Reuse (Rain Barrels & Cisterns)
- Constructed Filter
- Detention Basin
- Infiltration Practices
- Low Impact Development Site Design
- Native Revegetation
- Pervious Pavement w/ Infiltration
- Planter Boxes
- Riparian Buffer Restoration
- Vegetated Filter Strip
- Vegetated Roof (Green Roof)
- Vegetated Swale
- Water Quality Devices

Two resources were primarily consulted in identifying urban BMP list above and BMP selection considerations below: The Center for Watershed Protection's URBAN SUBWATERSHED RESTORATION MANUAL SERIES and the LOW IMPACT DEVELOPMENT MANUAL FOR MICHIGAN. Low Impact Development (LID) is a comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. Low Impact Development mimics a site's pre-development hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Because LID utilizes a variety of useful techniques for controlling runoff, designs can be customized according to local regulatory and resource protection requirements, as well as site constraints.

11.1.1 LID Best Management Practice Selection Considerations

Selecting which BMPs accomplish as many storm water functions as possible is important. At the same time, meeting a certain function or level of pollution or storm water volume control can require multiple BMPs integrated at the site, creating a "treatment train." Treatment trains direct storm water to or through multiple BMPs in order to achieve quantity and/or quality storm water management objectives. Additionally, implementing BMPs as part of a treatment train can also provide a level of backup, which provides additional assurance if one BMP does not work as designed (e.g., maintenance problems, large storm event).

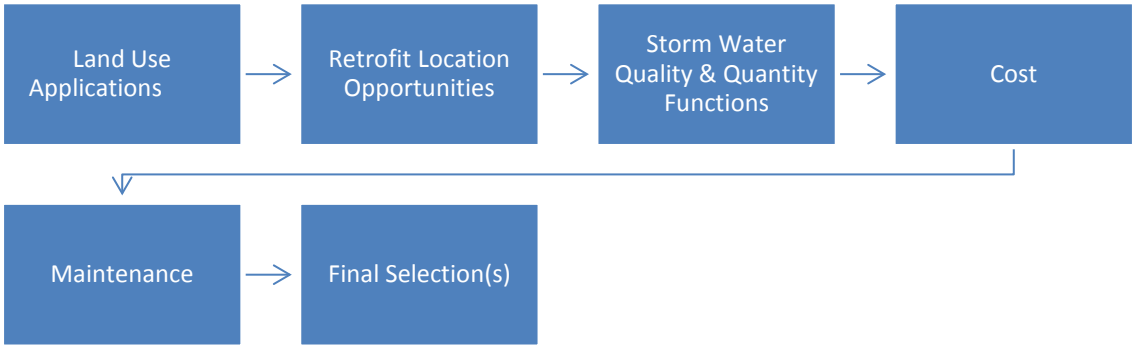

Figure 223 Decision making process for BMP selection

The following table, adapted from the LID Manual for Michigan, is intended to help identify which BMP(s) would be most suitable for a given land use. In many instances a combination of BMPs can be used at a site to improve pollutant removal and storm water volume reduction efficiency. Typical applications include modifying existing detention ponds, storage in transportation rights-of-way, parking lot retrofits, and landscapes/hardscapes.

Best Management Practice	Residential	Commercial	Ultra-Urban	Industrial	Transportation Rights-of-Way	Recreational	Retrofit
Bioretention	Yes	Yes	No	No	Yes	Yes	Yes
Capture Reuse	Yes	Yes	Yes	Yes	No	Yes	Yes
Constructed Filter	Limited	Yes	Yes	Yes	Yes	Yes	Yes
Detention- Dry Pond	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Detention- Wet Pond	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Detention- Constructed Wetland	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Infiltration- Dry Well	Yes	Yes	Yes	Limited	No	No	Yes
Infiltration- Basin	Yes	Yes	Limited	Yes	Limited	No	Limited
Infiltration- Berm	Yes	Yes	Limited	Yes	Yes	Yes	Yes
Infiltration- Trench	Yes	Yes	Yes	Yes	Yes	No	Yes
Infiltration- Subsurface Bed	Yes	Yes	Yes	Yes	Limited	No	Yes

Native Revegetation	Yes	Yes	No	Yes	Limited	Yes	Yes
Pervious Pavement	Yes	Yes	Yes	Yes	Limited	Yes	Yes
Planter Box	Yes	Yes	Yes	Limited	No	Limited	Yes
Riparian Buffer Restoration	Yes	Yes	Yes	Yes	Limited	Yes	Yes
Vegetated Filter Strip	Yes	Yes	Limited	Limited	Yes	Yes	Yes
Vegetated Roof	Limited	Yes	Yes	Yes	No	Yes	Yes
Vegetated Swale	Yes	Yes	Limited	Yes	Yes	Yes	Yes
Water Quality Device	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 123 Suitability of LID practices in various urban land uses

The following list of retrofit opportunities comes from the Center for Watershed Protection's URBAN SUBWATERSHED RESTORATION MANUAL SERIES- 3. URBAN STORMWATER RETROFIT PRACTICES. Opportunities can be broadly categorized as either storage or onsite retrofits. In general storage retrofits treat larger drainage areas, typically are constructed on public land, and tend to be more cost effective.

Retrofit location opportunities:

- Existing storm water ponds (SR-1)
- Storage above roadway crossings (SR-2)
- New storage below outfalls (SR-3)
- Treatment in conveyance system (SR-4)
- Transportation rights-of-way (SR-5)
- Large parking lots (SR-6)
- Hotspot operations (OS-7)
- Small parking lot retrofits (OS-8)
- Individual streets (OS-9)
- Individual rooftops (OS-10)
- Little retrofits (OS-11)
- Landscapes-hardscapes (OS-12)

SR = storage retrofit, treat drainage areas ranging from 5-500 acres

OS = onsite retrofit, treat drainage areas < 5 acres

Table 124 , primarily adapted from the LID Manual for Michigan, compares storm water quantity and quality functions, cost and maintenance for the various structural LID BMPs recommended. The ability of a practice to treat pathogens is based on a literature review conducted by Schueler (2000). As noted previously a combination of BMPs can be used at a site to improve pollutant removal and storm water volume reduction efficiency.

Best Management Practice	Volume	Peak Rate	Sediment	Phosphorus	Nitrogen	Pathogens*	Cost	Maintenance
Bioretention	M/H	M	H	M	M	X	M	M
Capture Reuse	H	L	M	M	M		L/M	M
Constructed Filter	L	L	H	M	M		M/H	H

Detention- Dry Pond	L	H	M	M	L		H	L/H
Detention- Wet Pond	L	H	H	M	M	X	H	L/M
Detention- Constructed Wetland	L	H	H	M	M	X	H	L/M
Infiltration- Dry Well	M	M	H	M/H	L/M	X	M	L/M
Infiltration- Basin	H	H	H	M/H	M	X	L/M	L/M
Infiltration- Berm	L/M	M	M/H	M	M	X	L/M	L/M
Infiltration- Trench	M	L/M	H	M/H	L/M	X	M	L/M
Infiltration- Subsurface Bed	H	H	H	M/H	L	X	H	M
Native Revegetation	L/M/H	L/M	H	H	M/H		L/M	L
Pervious Pavement	H	M/H	H	M/H	L		M	H
Planter Box	L/M	M	M	L/M	L/M		M	M
Riparian Buffer Restoration	L/M	L/M	M/H	M/H	M/H		L/M	L
Vegetated Filter Strip	L	L	M/H	M/H	M/H		L	L/M
Vegetated Roof	M/H	M	H	H	H		H	M
Vegetated Swale	L/M	L/M	M/H	L/H	M		L/M	L/M
Water Quality Device	NA	NA	Varies	Varies	Varies		Varies	Varies

Table 124 Function, cost, and maintenance of LID practices

L= Low, M= Medium, H= High, X= Yes

11.2 Agricultural Area BMPs

Agriculture is the second common human land use in the watershed, accounting for nearly 28% of its land area. The highest concentrations of agricultural land are located in the southeastern portion of the watershed. An estimated 53% of the nitrogen loads, 68% of the phosphorus loads, 32% of the biological oxygen demand loads, and 40% of the sediment loads in the watershed originate from agricultural production.

The following best management practices have been identified from the NRCS Field Office Technical Guide (FOTG) for Indiana to control sediment, nutrients, and pathogens from row crop production and livestock operations on agricultural lands. The selection of which BMPs are most appropriate for a field or site is based on a Conservation Plan which is developed between the NRCS district conservationist and landowner. A Conservation Plan must be in place for a landowner to eligible for Farm Bill programs or Section 319 Cost-Share program funding.

- Access Control
- Alternative Watering Systems
- Conservation Cover
- Cover Crops
- Critical Area Planting
- Denitrifying Bioreactor
- Drainage Water Management
- Fencing
- Field Border
- Filter Strips
- Forage and Biomass Planting
- Stabilization Structures
- Grassed Waterway
- Manure Management Planning
- Manure Storage Facilities
- Nutrient Management
- Open Channel (Two-Stage Ditch)
- Prescribed Grazing
- Riparian Herbaceous Cover
- Riparian Forest Cover
- Residue and Tillage Management, No Till
- Residue and Tillage Management, Reduced Till
- Saturated Buffer

11.3 Priority Preservation Areas BMPs

The priority preservation area includes a mix of urban and agricultural land uses adjacent to or near sensitive natural areas. All of the BMPs referenced above for urban and agricultural areas still apply to the priority preservation area. However there are some additional measures that are very important and specific to this area.

Conservation Planning

Conservation planning includes identifying key natural areas within the landscape, assessing the conservation value of each parcel identified, establishing conservation targets for the parcel, landowner education on the value of land preservation, and identifying conservation options to landowners.

Dam Removal or Modification

Dam removal or modification can help restore fish passage, sediment and nutrient transport, riverine habitat characteristics, and stream flows.

Natural Area Preservation

Natural area preservation can include acquisition, conservation easements, or land donation of key natural area parcels.

Natural Area Restoration

Natural area restoration can vary greatly depending on the level of disturbance at a site. For more heavily disturbed sites, or portions of sites, restoration activities may include more intensive measures such as conversion back to natural land cover (ex. agricultural to forest or grassland) or restoring hydrology (ex. wetland or floodplain restoration). Natural area restoration can also include ongoing activities such as invasive species control, fire reintroduction for fire-dependent communities (ex. prairies), or opening the tree canopy (ex. oak savanna).

11.4 Watershed-Wide BMPs

These practices can be used throughout the watershed.

- Education and Outreach
- Floodplain Reconnection/Two-Stage Ditch
- Native Revegetation
- Riparian Buffer Restoration
- Septic system maintenance
- Streambank Stabilization & Shoreline Protection
- Wetland Restoration

11.5 BMP Recommendations for Critical Areas

The following table includes recommended BMPs for Tier 1 critical areas in the watershed. The table also includes information on why the catchment area was critical and the human land cover area potentially available for treatment by the BMPs. The recommendations are not intended to be exhaustive or prescriptive. Any number or combination of implementation activities might contribute to water quality improvement, whether applied at sites where the actual impairment was noted or other locations where sources contribute indirectly to the water quality impairment.

Catchment Area	Reasons for Being Critical	Urban (ac.)	Cropland (ac.)	Pasture (ac.)	Suggested BMP
3	E. coli Nutrients Sediment Physical Habitat Aquatic Life	1,556	1,490	97	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Native revegetation
					Bioretention
					Capture Reuse
					Infiltration practices
					Vegetated swale
					Constructed wetland
					Wet pond
					Pervious pavement
					Cover crop
					Conservation tillage
					Grassed waterway
					Filter strips/Field border
					Nutrient management
					Septic system maintenance

Catchment Area	Reasons for Being Critical	Urban (ac.)	Cropland (ac.)	Pasture (ac.)	Suggested BMP
					Education and outreach
21	E. coli Dissolved Oxygen Nutrients Sediment Ammonia Physical Habitat Aquatic Life	351	2,605	509	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Native revegetation
					Wetland restoration
					Bioretention
					Capture Reuse
					Cover crop
					Conservation tillage
					Grassed waterway
					Filter strips/Field border
					Conservation cover
					Nutrient management
					Manure management
					Drainage water management
					Septic system maintenance
					Education and outreach
24	E. coli Dissolved Oxygen Nutrients Sediment Ammonia Physical Habitat Aquatic Life	1,437	6	29	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Native revegetation
					Bioretention
					Capture reuse
					Detention basin
					Pervious pavement
					Planter boxes
					Dry wells
					Infiltration trenches
					Subsurface infiltration beds
					Septic system maintenance
					Education and outreach
25	E. coli Dissolved Oxygen Nutrients Sediment Ammonia Physical Habitat Aquatic Life	282	964	73	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Native revegetation
					Wetland restoration
					Detention basin
					Cover crop
					Conservation tillage

Catchment Area	Reasons for Being Critical	Urban (ac.)	Cropland (ac.)	Pasture (ac.)	Suggested BMP
					Grassed waterway
					Filter strip/Field border
					Conservation cover
					Nutrient management
					Manure management
					Drainage water management
					Saturated buffer
					Septic system maintenance
					Education and outreach
26	E. coli Dissolved Oxygen Nutrients Sediment Physical Habitat Aquatic Life	513	745	291	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Native revegetation
					Wetland restoration
					Detention basin
					Cover crop
					Conservation tillage
					Grassed waterway
					Filter strip/Field border
					Conservation cover
					Nutrient management
					Manure management
					Drainage water management
					Saturated buffer
					Septic system maintenance
					Education and outreach
27	E. coli Dissolved Oxygen Nutrients Sediment Physical Habitat Aquatic Life	733	651	11	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Native revegetation
					Wetland restoration
					Detention basin
					Cover crop
					Conservation tillage
					Grassed waterway
					Filter strip/Field border
					Conservation cover
					Nutrient management
					Manure management
					Drainage water management

Catchment Area	Reasons for Being Critical	Urban (ac.)	Cropland (ac.)	Pasture (ac.)	Suggested BMP
					Saturated buffer
					Septic system maintenance
					Education and outreach
36	E. coli Dissolved Oxygen Nutrients Sediment Ammonia Physical Habitat Aquatic Life	3,081	338	73	Floodplain reconnection
					Streambank stabilization
					Riparian buffer restoration
					Wetland restoration
					Native revegetation
					Bioretention
					Capture reuse
					Detention basin
					Pervious pavement
					Planter boxes
					Dry wells
					Infiltration trenches
					Subsurface infiltration beds
					Cover crop
					Conservation tillage
					Grassed waterway
					Filter strip/Field border
					Conservation cover
					Septic system maintenance
					Education and outreach

Table 125 BMP recommendations for tier 1 critical areas

11.6 Estimated Load Reductions from BMPs

The following table provides a general overview of the load reductions anticipated from implementing some of the various practices recommended in the previous sections. These load reductions were estimated using the EPA Region 5 spreadsheet model. This model likely be used the most frequently in assessing site specific load reductions during implementation.

Practice (Contributing Area)	Estimated Load Reduction			
	Nitrogen (lb/year)	Phosphorus (lb/year)	BOD (lb/year)	Sediment (t/year)
Urban/Rural Development Areas				
Bioretention	179	44	2,274	31
Detention- Dry Pond (100 ac.)	269	26	975	23
Detention- Wet Pond	492	69	2,599	34
Detention- Constructed Wetland (100 ac.)	179	44	2,274	31
Infiltration- Basin	537	66	NA	30
Infiltration- Trench	492	60	NA	30

Pervious Pavement	761	66	NA	36
Vegetated Filter Strip (100 ac.)	358	46	1,823	29
Vegetated Swale (100 ac.)	90	25	1,083	26
Water Quality Device	NA	NA	NA	NA
Agricultural Areas				
No-Till/Strip-Till (100 ac.)	435	218	NA	167
Cover Crops (100 ac.)	271	136	NA	94
Filter Strips (100 ac.)	340	171	NA	110
Grassed Waterway (100 ft.)	34	17	NA	17
Critical Area Planting (100 ac.)	324	162	NA	107
Watershed-Wide				
Conservation Cover	324	162	NA	107
Two-Stage Ditch	46	23	NA	23
Wetland Restoration (10 ac.)	252	126	NA	89
Riparian Forest Buffer (100 ac.)	148	74	NA	56
Riparian Herbaceous Cover (100 ac.)	324	162	NA	107
Streambank Stabilization (100 ft.)	46	23	NA	23

Table 126 Summary of load reductions anticipated with each BMP

The STEPL model was used to approximate load reductions and progress towards meeting load reduction goals anticipated from a few of the key recommend BMPs watershed wide and within each catchment area. The BMPs selected for this general analysis were considered to have broad applicability throughout the watershed and their pollutant removal efficiencies were readily available in the model. The following tables are formatted to show progress (increasing rates) in implementation over time. For example, the first table shows increasing adaptation of cover crops on cultivated land. Rows highlighted in red correspond to the Tier 1 critical areas.

		10% Coverage (~2,500 ac)			25% Coverage (~6,500 ac)			50% Coverage (~13,000 ac)			75% Coverage (~19,500)		
Site	Row Crop	N	P	S	N	P	S	N	P	S	N	P	S
	Acres	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year
1	825	198	79	5	495	197	12	989	395	24	1,484	592	36
2	5	2	1	0	6	2	0	12	4	0	18	5	0
3	1,499	731	243	9	1,828	607	22	3,656	1,214	43	5,483	1,821	65
5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	66	16	6	0	40	16	1	79	32	2	119	48	3
7	384	187	62	2	469	156	6	937	311	11	1,406	467	17
8	729	356	118	4	889	295	11	1,778	590	21	2,666	886	32
9	898	438	145	5	1,095	364	13	2,190	727	26	3,285	1,091	39
10	968	472	157	6	1,180	392	14	2,360	784	28	3,540	1,176	42
11	2,289	1,116	371	13	2,791	927	33	5,582	1,854	66	8,373	2,781	99
12	1,456	710	236	8	1,775	589	21	3,549	1,179	42	5,324	1,768	63
13	576	281	93	3	703	233	8	1,405	467	17	2,108	700	25
14	2,215	1,080	359	13	2,700	897	32	5,401	1,794	64	8,101	2,691	96
15	221	108	36	1	270	90	3	540	179	6	809	269	10
16	222	108	36	1	270	90	3	540	179	6	810	269	10
17	541	264	88	3	660	219	8	1,320	438	16	1,980	658	24
18	2,840	1,385	460	16	3,463	1,150	41	6,926	2,300	82	10,389	3,450	123
19	1,403	684	227	8	1,710	568	20	3,421	1,136	41	5,131	1,704	61
20	938	457	152	5	1,143	380	14	2,287	760	27	3,430	1,139	41
21	2,605	1,270	422	15	3,176	1,055	38	6,352	2,110	75	9,528	3,164	113
22	49	24	8	0	60	20	1	120	40	1	181	60	2
23	262	128	42	2	319	106	4	639	212	8	958	318	11
24	6	4	1	0	10	3	0	20	6	0	30	9	0
25	964	470	156	6	1,175	390	14	2,350	780	28	3,525	1,171	42
26	745	363	121	4	908	302	11	1,816	603	22	2,724	905	32
27	651	317	105	4	793	263	9	1,587	527	19	2,380	790	28
28	2	2	1	0	6	2	0	12	3	0	17	5	0
29	78	19	7	0	47	19	1	94	37	2	140	56	3
30	6	6	2	0	15	4	0	29	8	0	44	12	0
31	176	86	28	1	214	71	3	428	142	5	643	213	8
32	1,096	534	178	6	1,336	444	16	2,672	888	32	4,009	1,331	48
33	336	164	54	2	410	136	5	820	272	10	1,230	408	15
34	130	63	21	1	158	53	2	317	105	4	475	158	6
35	292	178	57	2	444	142	4	888	283	8	1,331	425	13
36	338	206	66	2	514	164	5	1,028	328	10	1,542	492	15
Total	25,810	12,428	4,138	149	31,071	10,344	374	62,142	20,688	747	93,213	31,033	1,121
Reduction Needed		2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866
% Meet		>100%	4%	4%	>100%	11%	10%	>100%	22%	19%	>100%	32%	29%

Table 127 Anticipated load reductions from cover crops

		10% Coverage (~2,500 ac)			25% Coverage (~6,500 ac)			50% Coverage (~13,000 ac)			75% Coverage (~19,500)		
Site	Row Crop	N	P	S	N	P	S	N	P	S	N	P	S
	Acres	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year
1	825	291	111	9	728	277	22	1,455	554	45	2,183	830	67
2	5	3	1	0	8	2	0	17	5	0	25	7	0
3	1,499	1,040	301	16	2,600	751	41	5,200	1,503	81	7,800	2,254	122
5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	66	23	9	1	58	22	2	117	44	4	175	67	5
7	384	267	77	4	666	193	10	1,333	385	21	1,999	578	31
8	729	506	146	8	1,264	365	20	2,529	731	40	3,793	1,096	59
9	898	623	180	10	1,557	450	24	3,115	900	49	4,672	1,350	73
10	968	671	194	11	1,679	485	26	3,357	970	53	5,036	1,455	79
11	2,289	1,588	459	25	3,970	1,147	62	7,941	2,295	124	11,911	3,442	186
12	1,456	1,010	292	16	2,524	730	40	5,049	1,459	79	7,573	2,189	119
13	576	400	116	6	999	289	16	1,999	578	31	2,998	866	47
14	2,215	1,536	444	24	3,841	1,110	60	7,682	2,220	120	11,524	3,330	180
15	221	154	44	2	384	111	6	768	222	12	1,151	333	18
16	222	154	44	2	384	111	6	768	222	12	1,152	333	18
17	541	376	109	6	939	271	15	1,878	543	29	2,816	814	44
18	2,840	1,970	569	31	4,926	1,424	77	9,852	2,847	154	14,779	4,271	231
19	1,403	973	281	15	2,433	703	38	4,866	1,406	76	7,299	2,109	114
20	938	651	188	10	1,626	470	25	3,253	940	51	4,879	1,410	76
21	2,605	1,807	522	28	4,518	1,306	71	9,035	2,611	141	13,553	3,917	212
22	49	34	10	1	86	25	1	171	49	3	257	74	4
23	262	182	53	3	454	131	7	909	263	14	1,363	394	21
24	6	6	1	0	14	4	0	28	7	0	42	11	0
25	964	668	193	10	1,671	483	26	3,342	966	52	5,014	1,449	78
26	745	517	149	8	1,292	373	20	2,583	747	40	3,875	1,120	61
27	651	451	130	7	1,129	326	18	2,257	652	35	3,386	978	53
28	2	3	1	0	8	2	0	16	4	0	24	5	0
29	78	28	10	1	69	26	2	138	52	4	207	79	6
30	6	8	2	0	20	4	0	41	9	0	61	13	0
31	176	122	35	2	305	88	5	609	176	10	914	264	14
32	1,096	760	220	12	1,901	549	30	3,801	1,099	59	5,702	1,648	89
33	336	233	67	4	583	169	9	1,166	337	18	1,750	506	27
34	130	90	26	1	225	65	4	450	130	7	676	195	11
35	292	251	68	3	627	170	8	1,254	340	16	1,882	509	24
36	338	291	79	4	727	197	9	1,453	393	18	2,180	590	28
Total	25,810	17,687	5,132	280	44,217	12,829	701	88,435	25,658	1,401	132,652	38,487	2,102
Reduction Needed		2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866
% Meet		>100%	5%	7%	>100%	13%	18%	>100%	27%	36%	>100%	40%	54%

Table 128 Anticipated load reductions from reduced tillage

		1% Coverage			5% Coverage			10% Coverage			15% Coverage		
Site	Commercial	N	P	S	N	P	S	N	P	S	N	P	S
	Acres	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year
1	524	5	1	704	24	5	3,518	48	11	7,035	7	2	1,082
2	92	1	0	135	5	1	676	8	2	1,218	13	3	1,894
3	186	3	1	391	12	3	1,760	24	5	3,520	38	8	5,475
5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	221	2	0	271	10	2	1,488	20	5	2,976	31	7	4,465
7	47	1	0	98	3	1	391	7	1	978	9	2	1,369
8	84	1	0	196	5	1	782	11	2	1,564	17	4	2,542
9	109	1	0	196	7	1	978	15	3	2,151	22	5	3,129
10	103	1	0	196	7	1	978	13	3	1,955	20	4	2,933
11	32	0	0	59	2	0	293	4	1	587	7	1	978
12	-	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	-
15	10	0	0	20	1	0	98	1	0	196	1	0	196
16	5	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-
18	1,948	26	6	3,715	131	29	18,967	261	57	37,933	393	86	57,095
19	11	0	0	20	1	0	98	1	0	196	2	0	293
20	5	-	-	-	0	0	59	1	0	98	1	0	98
21	11	0	0	20	1	0	98	1	0	196	1	0	196
22	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-
25	34	0	0	59	2	0	293	4	1	587	7	1	978
26	15	0	0	20	1	0	147	2	0	293	3	1	391
27	37	0	0	59	3	1	391	5	1	704	7	1	978
28	78	1	0	156	5	1	782	10	2	1,525	16	4	2,346
29	-	-	-	-	-	-	-	-	-	-	-	-	-
30	26	0	0	39	2	0	244	3	1	489	5	1	782
31	155	2	0	293	10	2	1,515	20	4	2,933	31	7	4,497
32	54	1	0	98	4	1	518	7	2	1,036	11	2	1,564
33	425	5	1	782	28	6	4,106	57	12	8,212	86	19	12,514
34	26	0	0	39	2	0	244	3	1	489	4	1	587
35	-	-	-	-	-	-	-	-	-	-	-	-	-
36	31	0	0	64	2	0	320	4	1	640	7	1	960
Total	25,810	52	12	7,626	267	59	38,744	533	117	77,509	739	163	107,340
Reduction Needed		2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866
% Meet		2%	<1%	>100%	10%	<1%	>100%	21%	<1%	>100%	29%	<1%	>100%

Table 129 Anticipated load reductions from bioretention

		1% Coverage			5% Coverage			10% Coverage			15% Coverage		
Site	Row Crop	N	P	S	N	P	S	N	P	S	N	P	S
	Acres	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year
1	825	34	13	1	171	65	4	341	130	8	512	195	12
2	5	0	0	0	2	1	0	4	1	0	6	2	0
3	1,499	127	40	1	635	201	7	1,271	402	14	1,906	603	21
5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	66	3	1	0	14	5	0	27	10	1	41	16	1
7	384	33	10	0	163	52	2	326	103	4	489	155	5
8	729	62	20	1	309	98	3	618	195	7	927	293	10
9	898	76	24	1	381	120	4	761	241	8	1,142	361	13
10	968	82	26	1	410	130	5	820	259	9	1,231	389	14
11	2,289	194	61	2	970	307	11	1,941	614	22	2,911	921	32
12	1,456	123	39	1	617	195	7	1,234	390	14	1,851	585	21
13	576	49	15	1	244	77	3	488	154	5	733	232	8
14	2,215	188	59	2	939	297	10	1,877	594	21	2,816	891	31
15	221	19	6	0	94	30	1	188	59	2	281	89	3
16	222	19	6	0	94	30	1	188	59	2	282	89	3
17	541	46	15	1	229	73	3	459	145	5	688	218	8
18	2,840	241	76	3	1,204	381	13	2,408	762	27	3,612	1,142	40
19	1,403	119	38	1	595	188	7	1,189	376	13	1,784	564	20
20	938	79	25	1	397	126	4	795	251	9	1,192	377	13
21	2,605	221	70	2	1,104	349	12	2,208	698	25	3,312	1,048	37
22	49	4	1	0	21	7	0	42	13	0	63	20	1
23	262	22	7	0	111	35	1	222	70	2	333	105	4
24	6	1	0	0	3	1	0	7	2	0	10	3	0
25	964	82	26	1	408	129	5	817	258	9	1,225	388	14
26	745	63	20	1	316	100	4	631	200	7	947	300	11
27	651	55	17	1	276	87	3	552	174	6	827	262	9
28	2	0	0	0	2	1	0	4	1	0	6	2	0
29	78	3	1	0	16	6	0	32	12	1	48	18	1
30	6	1	0	0	5	1	0	10	3	0	15	4	0
31	176	15	5	0	74	24	1	149	47	2	223	71	2
32	1,096	93	29	1	464	147	5	929	294	10	1,393	441	15
33	336	29	9	0	143	45	2	285	90	3	428	135	5
34	130	11	3	0	55	17	1	110	35	1	165	52	2
35	292	31	9	0	154	47	1	309	94	3	463	141	4
36	338	36	11	0	179	54	2	358	109	3	537	163	5
Total	25,810	2,160	685	24	10,800	3,424	121	21,600	6,849	243	32,400	10,273	364
Reduction Needed		2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866	2,554	95,699	3,866
% Meet		85%	1%	1%	>100%	4%	3%	>100%	7%	6%	>100%	11%	9%

Table 130 Anticipated load reductions from conservation cover

	1/4-Mile	1-Mile	3-Miles	5-Miles
Site	S	S	S	S
	t/year	t/year	t/year	t/year
1	38	151	453	755
2	34	137	412	686
3	29	117	350	583
5	34	137	412	686
6	34	137	412	686
7	31	124	371	618
8	29	117	350	583
9	29	117	350	583
10	29	117	350	583
11	29	117	350	583
12	29	117	350	583
13	29	117	350	583
14	29	117	350	583
15	29	117	350	583
16	29	117	350	583
17	29	117	350	583
18	29	117	350	583
19	29	117	350	583
20	29	117	350	583
21	29	117	350	583
22	29	117	350	583
23	29	117	350	583
24	29	117	350	583
25	29	117	350	583
26	29	117	350	583
27	29	117	350	583
28	29	117	350	583
29	38	151	453	755
30	29	117	350	583
31	29	117	350	583
32	27	110	329	549
33	29	117	350	583
34	31	124	371	618
35	31	124	371	618
36	29	117	350	583
Total	1,057	4,228	12,685	21,141
Reduction Needed	3,866	3,866	3,866	3,866
% Meet	27%	>100%	>100%	>100%

Table 131 Anticipated load reductions from streambank stabilization