RESOURCE MANAGEMENT PLAN

Prepared For The

City Of Kaukauna

Outagamie County, Wisconsin

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CHAPTER 1 - INTRODUCTION

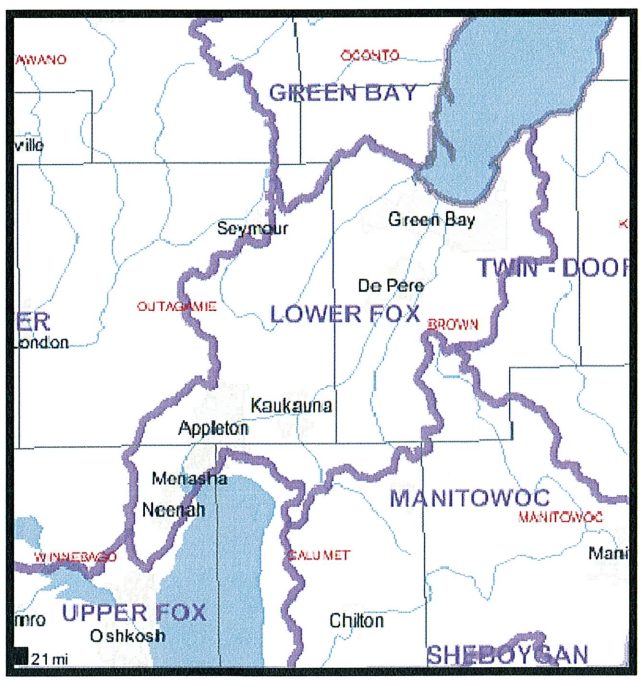
The City of Kaukauna obtained a WPDES Municipal Stormwater Discharge Permit from the Wisconsin Department of Natural Resources (DNR). The purpose of the permit is to control urban non-point source pollution by regulating discharges from municipal separate storm sewer systems (MS4). This plan identifies resource management priorities within the City of Kaukauna. These resource management priorities will assist the City with implementation of its municipal stormwater program during the next ± 5 years.

CHAPTER 2 – RESOURCE MANAGEMENT ASSESSMENT

The City of Kaukauna is located along the Lower Fox River. The State of Wisconsin estimates the City of Kaukauna's population was 14,217 on January 1, 2005. The City is located within Outagamie County, Wisconsin. The City's corporate limits and MS4 jurisdiction are depicted in Figure A.

Basins

The Wisconsin Department of Natural Resources (DNR) divided the state into 24 water management units or basins. The City of Kaukauna is located within the Lower Fox River Basin.



Watersheds

The DNR divided the Lower Fox River Basin into 6 watersheds. The City is located in three of these watersheds: Apple & Ashwaubenon Creeks Watershed (LF02), Plum & Kankapot Creeks Watershed (LF03), and Fox River - Appleton Watershed (LF04).

Sub-Watersheds

For purposes of this resource management plan, the DNR watersheds were divided into eight sub-watersheds. The sub-watersheds are depicted in Figure B.

Natural Resources

Natural resource features include surface waters (lakes, rivers, streams) and wetlands. Natural resource features located in the City of Kaukauna are depicted in Figure B. Some of these natural resource features are protected with a special regulatory designation such as outstanding resource water, exceptional resource water, or 303(d) impaired water. Natural resource features located in the City of Kaukauna with one of these special regulatory designations are identified below.

Outstanding and exceptional resource waters are pristine surface waters which are not significantly impacted by human activities and provide valuable fisheries, unique hydrological or geological features, outstanding recreational opportunities, or unique environmental settings. For example, cold water trout streams and natural waterfalls are typically classified as an outstanding or exceptional resource waters. The City of Kaukauna does not discharge stormwater runoff into any outstanding resource waters or exceptional resource waters.

Impaired water bodies are degraded surface waters which are not meeting water quality standards or their potential uses, such as fishing and swimming, due to pollutants and poor water quality. The US EPA requires each state to update its 303(d) impaired waters list every two years, including Wisconsin. The City of Kaukauna's MS4 discharges stormwater runoff into the following 303(d) water bodies which are impaired by non-point source pollution:

- Apple Creek: Apple Creek is a 303(d) impaired water due to non-point source pollution. Pollutants of concern include phosphorus and sediment. Impairments include contaminated fish tissue, degraded habitat, elevated temperature, and dissolved oxygen.

- Kankapot Creek: Kankapot Creek is a 303(d) impaired water due to a blend of non-point source pollution and point source pollution. Pollutants of concern include phosphorus and sediment. Impairments include contaminated fish tissue and degraded habitat.

- Plum Creek: Plum Creek is a 303(d) impaired water due to a blend of non-point and point source pollution. Pollutants of concern include phosphorus and sediment. Impairments include contaminated fish tissue, degraded habitat, and temperature.

- Fox River: The Fox River is a 303(d) impaired water due to a blend of non-point source pollution and point source pollution. Pollutants of concern include PCBs and phosphorus. Impairments include fish consumption advisory and low dissolved oxygen.

Drinking / Source Water Resources

The City obtains drinking water from groundwater aquifers using five municipal wells. Well 4 (BG574), Well 5 (BG575), Well 8 (HJ196), Well 9 (BG578) and Well 10 (BG576) currently do not have a wellhead protection plan and ordinance. According to the DNR, the Kaukauna Utilities system is susceptible to contamination by volatile organic compounds (VOCs), nitrate, beryllium, and microbes. The system has moderate susceptibility to contamination by synthetic organic compounds (SOCs). The system has low susceptibility to ethylene dibromide (EDB).

Protection activities should focus on obtaining additional information on the potential sources of contamination in the area to evaluate and manage their risk. Other efforts should include implementing a wellhead protection plan, and identifying and managing improperly abandoned wells or other features that may provide direct pathways for contamination of the aquifer.

The Lower Fox River Basin Integrated Mangement Plan

Lower Fox River Basin Integrated Mangement Plan (WT-666-2001) recommends the following:

- Significantly reduce phosphorus and sediment delivery to waterways.
- Educate the public on construction site erosion and storm water management problems.
- Educate the public on wildlife habitat restoration and preservation.
- Increase riparian habitat to sustain a suitable diversity of plants and wildlife.
- Prevent the spread and introduction of exotic species.
- Increase wetland restoration activities.

City of Kaukauna – Stormwater Quality Analysis

A stormwater quality analysis was prepared to quantify urban non-point source pollutant loads discharging into Apple Creek, Kankapot Creek, Plum Creek, and the Fox River from the City of Kaukauna. The analysis was prepared using the Source Loading and Management Model (SLAMM version 9.2.1). SLAMM is a stormwater quality model that predicts runoff volumes and non-point source pollution loads within urban areas. The stormwater quality analysis is based on the series of small rainfall events that occurred between March 29, 1969 and November 25, 1969 in Green Bay, Wisconsin. The 1969 historic rainfall series was determined by the DNR to represent an average year of rainfall within Northeast Wisconsin.

The stormwater quality analysis is based on soil information from the *Outagamie County Soil Survey,* Natural Resource Conservation Service, U.S. Department of Agriculture. The U.S. Department of Agriculture has classified soil types into four hydrologic soil groups (HSG). The four hydrologic soil groups (i.e. A, B, C and D) are classified according to the minimum infiltration rate of the soil column. Group A soils have the highest permeability rate or lowest runoff potential, whereas Group D soils have the lowest permeability rate or highest runoff potential. Hydrologic soil groups are depicted in Figure C.

The stormwater quality analysis is based on the standard land uses files developed by the DNR for SLAMM modeling. The standard land use files and existing land uses are depicted in Figure D. Existing land uses include urban areas developed on or before October 1, 2004. Undeveloped in-fill sites less than 5 acres are shown to be developed based on adjoining land uses. Undeveloped in-fill sites greater than 5 acres and future growth areas are shown as either agriculture, woods, or undeveloped open space, as appropriate.

Results of the stormwater quality analysis for the City's developed urban area and MS4 jurisdiction are summarized in Tables 1, 2, 3, 4 and 5. The pollutant loads contained in Tables 1 through 5 exclude any stormwater quality benefits associated with existing and proposed best management practices (BMP). The pollutant loads are for the baseline condition.

The source area identifiers contained in Tables 1 through 4 are depicted in Figure E. As shown in Tables 1 through 4, the source area identifiers were ranked from highest to lowest priority based on the phosphorus load discharging to the water body. The priority rankings within each sub-watershed are based on the total phosphorus (TP) load. Total phosphorus was selected as the priority pollutant due to the 303(d) impairment for Apple Creek, Kankapot Creek, Plum Creek, and the Fox River.

CHAPTER 3 – RESOURCE MANAGEMENT PRIORITIES

As part of its stormwater program, the City's goal is to develop and implement the following best management practices to reduce the amount of solids, phosphorus, heavy metals, and bacteria discharged to Apple Creek, Kankapot Creek, Plum Creek, and the Fox River. Program development and implementation will depend on the availability of funds, grants, and additional public input.

- Public education and involvement are recommended to increase awareness of storm water pollution impacts, to encourage changes in behavior, and to increase public support.
- Illicit discharge ordinances, practices, storm sewer system mapping, routine inspections, and outfall field screening activities are recommended to reduce dry weather pollutants.
- Construction site erosion control ordinances, practices, plan reviews, and site inspections are recommended to reduce pollutants discharged from construction sites.
- Stormwater management ordinances, development standards, plan reviews, and site inspections are recommended to reduce pollutants discharged from post-construction sites.
- Nutrient management practices are recommended to reduce phosphorus pollutant loads.
- Leaf and grass clipping practices are recommended to reduce pollutant loads from the MS4.
- Street sweeping practices and a parking control ordinance are recommended to reduce pollutant loads from public streets, particularly in the spring during snowmelt.
- Structural BMP retrofits are recommended to reduce pollutant loads discharged from the developed urban area in accordance with the City's MS4 Permit. The phosphorus rankings provided in Tables 1 through 4 can be used to target source areas located within the top 50% of the ranked source areas.
- Streambank / shoreline protection projects are recommended to repair erosion problems.
- Prairie grasses, wildflowers, wetlands, shrubs, and trees are recommended for wet ponds and along streambanks / shorelines to create buffers, improve habitat, improve hydrology, restore wetlands, remove pollutants, discourage geese, and reduce BMP operation costs.
- Recreational and public safety amenities are recommended for wet ponds and other BMPs.
- Modeling and/or monitoring are recommended to evaluate success in meeting project goals, including nuisance wildlife (e.g. geese, muskrats, etc.) and exotic / invasive species control.
- Planning activities, ordinances, dedicated funding sources, best management practices, and regional cooperation are recommended to control pollutants discharged to wetlands, surface waters, and public drinking water supplies.

Table 1: Apple Creek Total Phosphorus (TP) Ranking

TP Ranking	Apple Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
1	PBMP-A6c	285.64	114,702	242.83
2	PBMP-A5	52.68	26,252	46.41
3	PBMP-A6d	38.88	18,242	35.84
4	PBMP-A11	35.26	16,945	31.44
5	PBMP-A13a1	17.88	9,060	19.34
6	ODS-A15	24.09	5,056	19.27
7	PBMP-A16a	14.87	3,181	12.18
8	ODS-A4a	12.65	5,937	11.59
9	PBMP-A14b	9.05	4,529	9.56
10	ODS-A3a	10.37	4,307	9.16
11	PBMP-A6b	9.21	4,650	9.04
12	PBMP-A13a2	7.99	4,044	8.62
13	PBMP-A14a2	4.91	2,488	5.31
14	PBMP-A10b	4.28	2,199	3.91
15	PBMP-A13c1	3.58	1,817	3.88
16	ODS-A12a	3.65	1,468	3.13
17	ODS-A16	3.12	647	2.36
18	PBMP-A13b	1.79	908	1.94
19	PBMP-A16b	0.54	118	0.45
	Totals:	540.45	226,548	476.24

** Excludes: Ag land, OSUD, Water, Wetlands, Woods, Internally Drained Areas, and other MS4 Jurisdictions within City's UPB*

*** Average Annual Pollutant Load*

Table 2: Fox River / Garners Creek Total Phosphorus (TP) Ranking

TP Ranking	Fox River / Garners Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
1	PBMP-F5d2	142.67	39,325	111.45
2	PBMP-F36c	94.05	27,731	84.30
3	PBMP-F13b8	99.35	21,927	75.90
4	PBMP-F5d1	83.98	18,457	67.20
5	PBMP-F24b	79.17	16,144	61.62
6	ODS-F19	92.91	12,832	55.36
7	PBMP-F11	68.80	15,967	54.30
8	PBMP-F1d	61.86	23,467	52.51

Table 2 Continued: Fox River / Garners Creek Total Phosphorus (TP) Ranking

TP Ranking	Fox River / Garners Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
9	ODS-F17b	51.87	23,992	38.88
10	ODS-F17c	49.11	22,712	36.81
11	PBMP-F23d	46.31	9,333	36.44
12	PBMP-F4c3	49.91	17,925	35.74
13	PBMP-F24g	34.31	7,191	27.74
14	PBMP-F27b	41.25	6,607	27.16
15	PBMP-F8	31.86	9,380	26.62
16	PBMP-F26b	34.18	6,199	25.25
17	PBMP-G3b	29.55	7,257	25.09
18	PBMP-C5	26.38	5,145	20.38
19	PBMP-F24k	23.28	5,039	19.22
20	PBMP-F23b	23.08	4,651	18.20
21	PBMP-F12	21.40	5,456	18.14
22	ODS-F26a	24.06	4,309	17.65
23	ODS-G2a	21.86	4,637	17.55
24	PBMP-F13b1	19.35	4,185	15.97
25	ODS-G3c-G4a	17.58	4,632	14.45
26	ODS-F5f	18.99	3,925	14.41
27	PBMP-G2f	16.65	3,547	13.58
28	ODS-F6-F7	18.13	3,755	13.17
29	ODS-F13a	17.96	3,173	12.85
30	ODS-F20	19.40	3,236	12.62
31	PBMP-F43	15.77	3,250	12.61
32	PBMP-F1b1	13.97	6,645	12.58
33	ODS-F39	12.03	3,422	12.10
34	ODS-F40-42	11.82	2,995	10.92
35	PBMP-F5d3	17.06	2,360	10.40
36	PBMP-G2e	11.33	2,457	9.36
37	ODS-F23a	12.00	2,299	9.16
38	ODS-F1-F3	10.96	4,297	8.77
39	ODS-F34	9.94	3,476	8.56
40	PBMP-F13b11	10.30	2,312	8.38
41	ODS-C2a	10.64	2,069	8.25
42	PBMP-F9	8.32	3,448	7.69
43	ODS-F38a	9.60	2,481	7.64
44	PBMP-G2d	8.93	1,872	7.21
45	PBMP-F13b3	9.06	1,858	6.99

Table 2 Continued: Fox River / Garners Creek Total Phosphorus (TP) Ranking

TP Ranking	Fox River / Garners Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
46	ODS-F28-33	8.07	2,410	6.87
47	ODS-F14	10.89	1,514	6.71
48	ODS-F15	8.26	1,704	6.60
49	PBMP-G3a	8.05	1,650	6.40
50	ODS-G1b	7.49	1,787	6.32
51	PBMP-F23c	7.63	1,658	6.32
52	ODS-F35-36	7.26	2,023	5.35
53	ODS-F5a	8.31	1,672	5.30
54	ODS-F4a	7.32	1,278	5.20
55	ODS-F17p	6.57	3,038	4.92
56	ODS-F27a	9.59	1,146	4.91
57	PBMP-F5d4	8.57	1,069	4.88
58	PBMP-F13b10	5.76	1,215	4.68
59	ODS-F10a-b	5.64	1,579	4.33
60	PBMP-F13b9	4.98	1,023	3.96
61	ODS-F44	4.29	924	3.53
62	PBMP-G1a	4.26	759	3.09
63	PBMP-F24e4	3.70	716	2.84
64	ODS-C4	4.34	573	2.75
65	PBMP-G2c	1.18	236	0.92
	Totals:	1,663.11	415,350	1,287.05

** Excludes: Ag land, OSUD, Water, Wetlands, Woods, Internally Drained Areas, and other MS4 Jurisdictions within City's UPB*
*** Average Annual Pollutant Load*

Table 3: Kankapot Creek Total Phosphorus (TP) Ranking

TP Ranking	Kankapot Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
1	PBMP-K3b	326.08	79,921	285.27
2	PBMP-K4l	240.67	52,627	196.08
3	PBMP-K4m4	123.64	31,121	106.74
4	PBMP-K8a2	41.59	10,314	35.52
5	PBMP-K2e	34.70	10,186	33.83
6	PBMP-K6b	37.13	10,934	32.26
7	PBMP-K5e	43.57	8,015	31.98
8	ODS-K5a	46.87	7,056	29.16

Table 3 Continued: Kankapot Creek Total Phosphorus (TP) Ranking

TP Ranking	Kankapot Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
1	PBMP-K8c	27.52	8,448	25.86
2	PBMP-K8a3	23.34	5,007	19.12
3	ODS-K6a	30.30	4,033	17.10
4	PBMP-K9a	16.22	6,190	14.01
5	PBMP-K5f1	19.70	3,363	13.59
6	ODS-K2a	19.88	2,850	11.83
7	PBMP-K7c3	12.21	4,234	11.31
8	PBMP-K4m5	9.65	4,667	9.47
9	ODS-K1a	13.86	2,617	9.47
10	ODS-K7	12.73	2,208	9.13
11	PBMP-K8f	11.83	2,237	8.95
12	PBMP-K9c	9.11	3,783	8.12
13	ODS-K8d	13.61	1,836	8.06
14	PBMP-K7c2	5.80	2,756	6.06
15	PBMP-K7c1	5.88	2,503	5.71
16	PBMP-K3a	6.08	1,143	4.04
17	PBMP-K8d1	1.02	222	0.84
	Totals:	1,132.97	268,270	933.54

** Excludes: Ag land, OSUD, Water, Wetlands, Woods, Internally Drained Areas, and other MS4 Jurisdictions within City's UPB*
*** Average Annual Pollutant Load*

Table 4: Plum Creek Total Phosphorus (TP) Ranking

TP Ranking	Plum Creek Source Area ID's	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System** (lbs)	TP Load Before Drainage System** (lbs)
1	PBMP-P2a1	13.08	2,702	10.47
2	ODS-P1	11.19	1,600	7.04
3	ODS-P2a1	8.06	1,316	5.58
4	PBMP-P2c	0.50	108	0.41
	Totals:	32.82	5,726	23.51

** Excludes: Ag land, OSUD, Water, Wetlands, Woods, Internally Drained Areas, and other MS4 Jurisdictions within City's UPB*
*** Average Annual Pollutant Load*

Table 5a: Average Annual Pollutant Load Summary by Sub-Watershed

Sub-Watershed	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System (lbs)	TP Load Before Drainage System (lbs)
Apple Creek	540.45	226,548	476.24
Fox River / Garners Creek	1,663.11	415,350	1,287.05
Kankapot Creek	1,132.97	268,270	933.54
Plum Creek	32.82	5,726	23.51
Totals:	3,369.35	915,894	2,720.34

** Excludes: Ag land, OSUD, Water, Wetlands, Woods, Internally Drained Areas, and other MS4 Jurisdictions within City's UPB*

Table 5b: Average Annual Pollutant Load Summary by Sub-Watershed (Unit Area Load)

Sub-Watershed	City of Kaukauna's Developed Urban Area* (acres)	TSS Load Before Drainage System (lbs/acre)	TP Load Before Drainage System (lbs/acre)
Apple Creek	540.45	419	0.88
Fox River / Garners Creek	1,663.11	250	0.77
Kankapot Creek	1,132.97	237	0.82
Plum Creek	32.82	174	0.72
Totals:	3,369.35	272	0.81

** Excludes: Ag land, OSUD, Water, Wetlands, Woods, Internally Drained Areas, and other MS4 Jurisdictions within City's UPB*