Kent Creek Watershed Assessment

Introduction

Material presented in the following summary documents current stormwater management and flooding issues for the Kent Creek Watershed. Information presented is based on a review of available information related to current conditions in the drainage basin. No comprehensive analysis of stormwater management and flooding issues in the watershed has been performed in the last 20 years.

Watershed Description

Description and Land Use

The Kent Creek watershed is located in the northern part of the City of Rockford on the west side of the Rock River. The watershed drains approximately 29,977 acres at its mouth. Roughly 26% of the watershed is located within the City of Rockford. The remaining 74% of the watershed extends into unincorporated Winnebago County. Kent Creek watershed is the largest watershed in the area, containing almost a quarter of the City of Rockford. It is large and rounded in shape due to the fact its receiving streams have many tributaries. These streams originate in large rural areas and flow through the city where they serve as natural drainage channels for urban areas.

Watershed Statistics: Kent Creek	
Total Area:	29,977 ac.
Total Area within City:	7,861 ac.
% of City within Watershed:	20%
Other Stakeholders:	Village of Winnebago*
No. of Detention Facilities	15
No. of Outfalls	28

The Kent Creek watershed is less than 40% developed, with almost all development being located to the east of Springfield Ave. Even a superficial study of the probable expansion of West Rockford shows that most growth with inevitably occur in this watershed. The majority of the current development has occurred in the southeast and central portions of the watershed. There are still large swaths of land in the west and northwest sections of the watershed devoted primarily to agriculture. As you approach the Rock River from the west, residential land use is dominant, and at the River's west bank there is an area of commercial and light industrial development. Many homes within the watershed have not been built adjacent to the creek, rather the land adjacent to the Creeks has been devoted to natural park land, save for the section of the North Kent Creek that flows through the City center. The City anticipates that development will

extend to the relatively undeveloped northwestern corner of the watershed area within the City limits in the coming years. There is also a great deal of land in the watershed not currently within the City limits that may be annexed in the future.

Topography and Soils

The topography of the Kent Creek watershed is typical of the long, narrow watersheds within the eastern part of the City of Rockford. Ground elevations within the watershed range from about 900 feet above mean sea level NAVD near in the far western regions where the creeks originate, to about 700 feet NAVD near the creek's confluence with the Rock River.

Soils within the Kent Creek watershed consist primarily of type B soils, with thin pockets of type C and D soils surrounding the creek bed. Type B soils are soils with moderately low runoff potential when thoroughly wet. Water can be transmitted through these soils without impediment. Type B soils typically have less than 20 percent clay, and between 50 and 90 percent sand with a loamy sand or sandy loam textures. These soils have moderately fine to moderately coarse textures. Type C soils, on the other hand, have moderately high runoff potential when wet. Soils in this category have slow infiltration rates and consist of moderately fine textured soils, often with a layer that stops downward movement. These soils can contain anywhere from 20 to 40% clay. Type D soils are characterized by properties that restrict water movement through the soil. Type D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. They have high runoff potential when thoroughly wet.[17]

The predominance of type B soils in the Kent Creek watershed should facilitate infiltration of rainfall in pervious areas, thereby contributing to lower runoff volumes and rates than in basins with less pervious soil types. However, it is troublesome that there is a large section of more impervious soils exactly where the heaviest urbanization has occurred in the watershed. These soils could exacerbate any flooding events.

Primary Receiving Stream

Kent Creek is the primary receiving stream for the Kent Creek watershed. The creek is broken down into five (5) different tributaries. The largest is North Kent Creek, which receives flow from Kilburn Creek. In the southern portion, there is South Kent Creek and the Unnamed Tributary to South Kent Creek (UTSKC). The shortest section, after the confluence of all aforementioned branches, runs through the City center to the Rock River and is simply referred to as Kent Creek. Creeks are shown on Fig KnC-3 on the following page.

[17] Burke, Christopher and Thomas Burke. HERPICC Stormwater Drainage Manual. West Lafayette, Indiana: Purdue Research Foundation, 1994.

Figure KnC-3
KENT CREEK WATERSHED- CREEK IDENTIFICATION

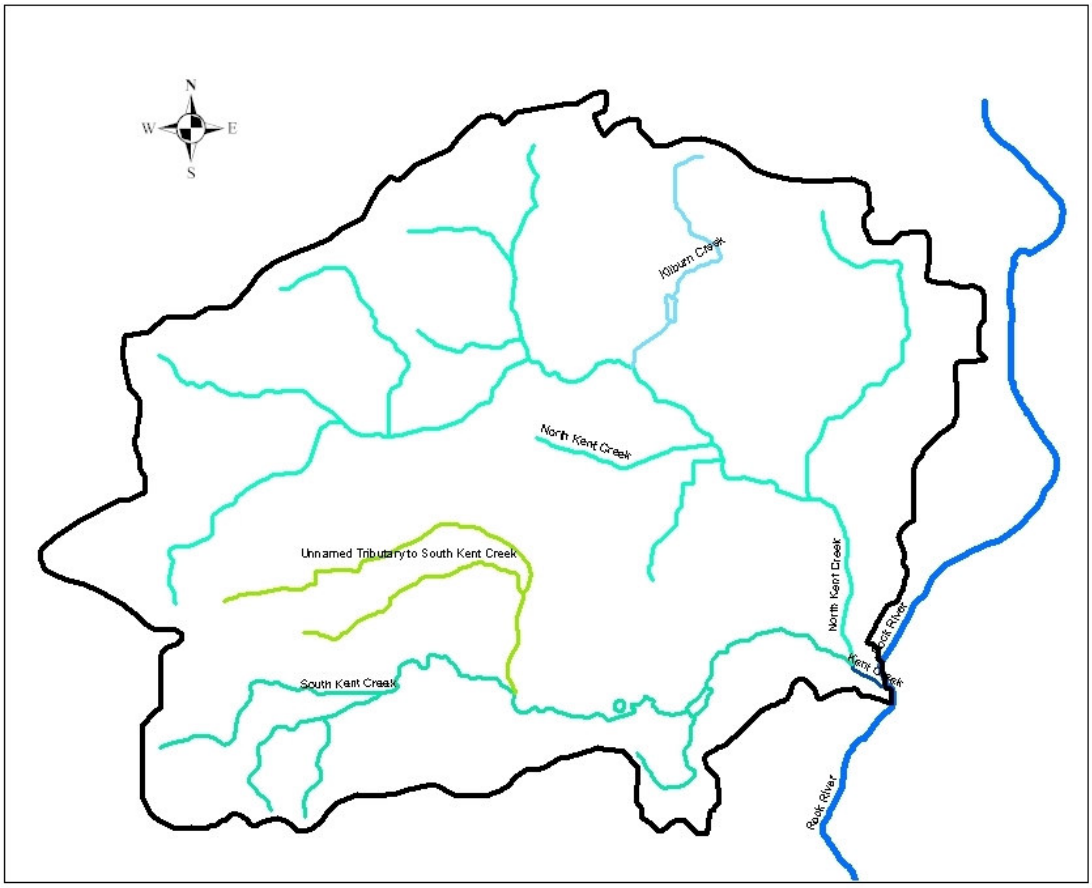

Table KnC-1
SUMMARY LISTING – CREEK LENGTHS

Creek	Length (ft)	Length (mi)
North Kent Creek	56,700	10.7
Kilburn Creek	9,150	1.7
Unnamed Tributary to South Kent Creek	9,750	1.8
South Kent Creek	37,200	7.1
Kent Creek	2,500	0.47

The Creeks' lengths are noted above, in Table KnC-1, and in total Kent Creek watershed contains over 21 miles of Creek channel, more than any other Rockford watershed. Most of the creeks exist in essentially a natural state with certain areas having been reinforced with concrete bank walls and riprap bank stabilization to minimize erosion, especially downstream. Encroachments and natural overgrowth have crowded portions of the South Branch and North Branch, especially in the undeveloped areas. Overall, the Kent Creek system has a stream bed elevation of about 687 feet (NAVD) at its confluence with the Rock River, and peak bed elevation at the origin of North Kent Creek, around 795 feet (NAVD). The South Branch, Kilburn and the UTSKC have origins elevations in the 780-790 foot range. This means the slopes of these creeks are very flat, with an average drop of only 9 feet per mile. The profiles of the streams are shown in the Flood Profile maps extracted from the 2006 Flood Insurance Study for Winnebago County and Incorporated Areas.

There are significant impoundments along Kilburn, South and North Kent Creeks. Immediately north of State Route 70, there is a dam along Kilburn Creek. The Lakewood Hills Dam creates Monoa Lake behind it, serving as an aesthetic and recreational area for the surrounding residents, as well as absorbing peak flow rates from wet weather events and preventing surcharging downstream. North Kent Creek has two small dams immediately downstream from it's confluence with Kilburn Creek, and the Park Road Dam immediately upstream from its confluence with Kilburn Creek. None of these impoundments create significant storage. Levings Dam along South Kent Creek after its confluence with UNTSKC creates Levings Lake south of Cunningham Rd., east of Harrison Ave.

There are no USGS gauging stations along the Kent Creek system.

Readily available flow data for the Kent Creek watershed is presently limited to calculated flood flows published in the Flood Insurance Study for Winnebago County and Incorporated Areas are summarized in Table KnC-2 below. It is important to note that these flows are based on analyses performed more than 30 years ago and likely do not reflect current conditions in the watershed.

Table KnC-2
FLOOD INSURANCE STUDY FLOWS (1976)
KENT CREEK WATERSHED, ROCKFORD, ILLINOIS

	50-year Flow		100-year Flow	
Cross Section Location	**Flow (cfs)**	**Flow (cfs/acre)**	**Flow (cfs)**	**Flow (cfs/acre)**
North Kent Creek At confluence w/ Kent Creek	1,500	0.071	1,800	0.085
North Kent Creek Downstream of confluence w/ Kilburn Creek	1,050	0.074	1,250	0.088
North Kent Creek Upstream of Page Park Dam	1,020	0.093	1,225	0.111
South Kent Creek Above Levings Dam	1,470	0.187	1,730	0.220
South Kent Creek At a Point 2,000' Upstream from Levings Dam	1,450	0.197	1,710	0.232
Unnamed Tributary to South Kent Creek At Confluence w/ South Kent Creek	540	0.352	610	0.397
Unnamed Tributary to South Kent Creek At a Point 1,200' Downstream of State Street	100	0.521	120	0.625

Source: Flood Insurance Study, Winnebago County and Incorporated Areas, Federal Emergency Management Agency. 2006. Flows based on 1976 analysis.

Given the gentle sloping character of the watershed, flooding within Kent Creek is of a gradual nature. Localized flooding along the creek is aggravated by the number of small bridges, vegetative debris and trees along the stream channel. As shown in Figure KnC-1, the floodplain along Kent Creek can be extensive along portions of upstream lengths, but is narrow and unobtrusive as the creeks approach the urbanized City center. Overall, the land use in watersheds seems well planned out, with almost all the floodplain area being parkland or agricultural space. Areas where the mapped floodplain appears to include developed properties include:

- Marchesano Drive and S. Main Street
- Riverside Blvd. and Rockton Ave.

Records maintained by the Federal Emergency Management Agency (FEMA), indicate that several letters of map revision (LOMRs) have been issued for development projects in the Kent Creek watershed during the past 30 years. Table KnC-4 included at the end of this narrative provides a listing of approved LOMRs for Kent Creek.

Water Quality and NPDES Discharges

Kent Creek is a clear, spring-fed stream. The waters are generally cool and clear, with sedimentation has occurred in certain portions of the creek, indicating that the stream is susceptible to impacts resulting from erosion of upstream agricultural lands.

Within the Kent Creek watershed four sites have been monitored under the SCORE sampling program from 2003-2008. Two sites (T1 and T2) are the locations of a full suite of water quality analyses and bioassessments (macroinvertebrate). One site (T6) is the location of fecal coliform monitoring by SCORE and stream use support by Illinois EPA. The fourth site (R1) is a storm water sampling site. Table KnC-3 provides metadata for each sampling site. Figure KnC-4 shows the location of the sampling sites.

Figure KnC-4
WATER QUALITY SAMPLING SITES
KENT CREEK WATERSHED, ROCKFORD, ILLINOIS

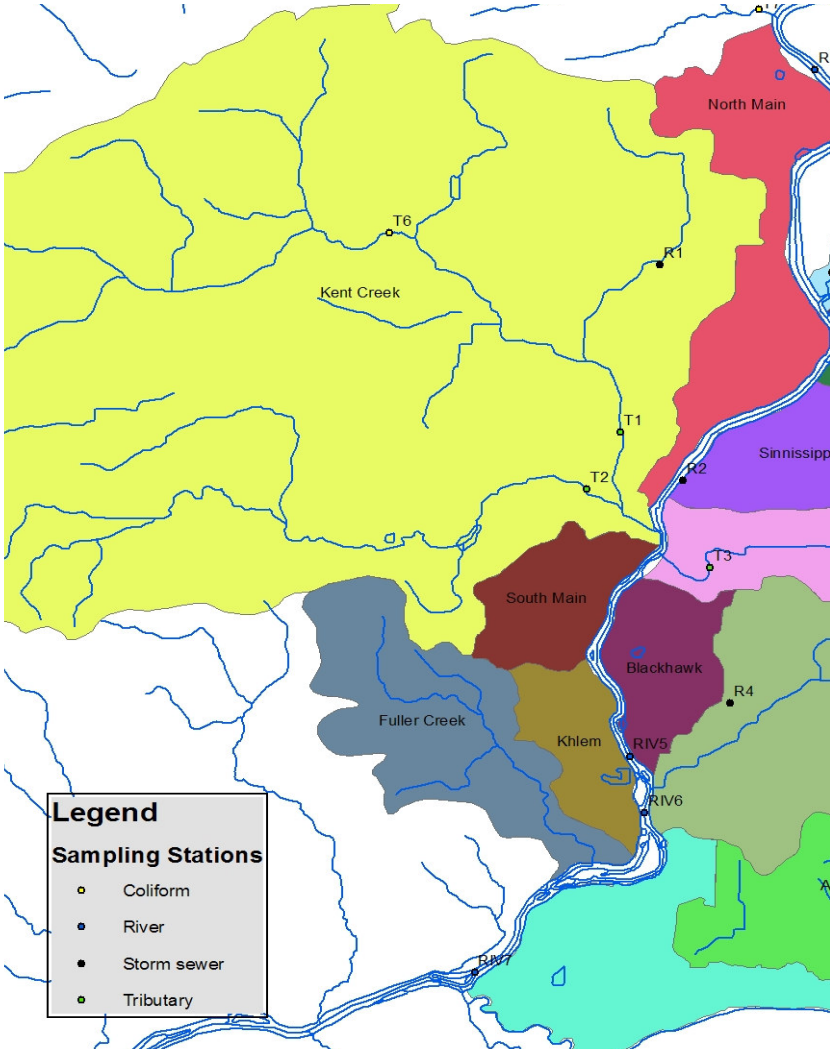

Table KnC-3
SAMPLING SITES
KENT CREEK WATERSHED, ROCKFORD, ILLINOIS

Station	Location	Station Type	Number of Samples (2003-2008)	Parameters Measured
T1	North Kent Cr. at Fairgrounds Park	Full water quality analyses & bioassessment	44	DO, pH, Temp, Conductivity, Fecal Coliform, BOD, COD, TSS, TDS, Hardness, Ammonia-N, Nitrate-N, P, Discharge
T2	South Kent Cr. Near Tay and Corbin Sts.	Full water quality analyses & bioassessment	45	DO, pH, Temp, Conductivity, Fecal Coliform, BOD, COD, TSS, TDS, Hardness, Ammonia-N, Nitrate-N, P, Discharge
T6	North Kent Cr. At Anna Page Park (IEPA site IL_PSB-01)	Coliform	35	DO, pH, Temp, Conductivity, Fecal Coliform by SCORE; multiple parameters by IEPA
R1	Paradise Boulevard	Storm water	8	pH, Fecal Coliform, BOD, COD, TSS, TDS, FOG, Hardness, Ammonia-N, Nitrate-N, TKN, P, Cyanide, Cu, Cd, Zn, Pb, phenol

Field measures at T1 and T2 showed that Kent Creek was in compliance with General Use Water Quality Standards for DO and pH. Kent Creek was also in compliance with the water quality standards for TSS and TDS during the 6-year sampling period.

Nitrogen, as Nitrate N, was highest at T1 and second highest at T2 in comparison to the other MS4 tributary streams. Total phosphorus concentrations were similar to the other tributary streams sampled. At the storm water sampling site, R1, the lowest concentrations of Nitrate N were observed. The highest ammonia concentrations were observed at Station R1, in comparison to the other storm water sampling sites. This station monitors a 225-acre drainage of residential and park land. High ammonia nitrogen concentrations can be an indicator of sewage, so the City continues to pay particular attention to this drainage to ascertain whether or not there are illicit connections upstream of R1. Measures of chemical oxygen demand (COD) and biological oxygen demand (BOD) indicate that runoff from R1 is higher in oxygen demanding substances than the other sewersheds.

Figures KnC-5 and KnC-6 are fecal coliform load duration curves for North Kent Creek and South Kent Creek[18]. In 2006, North Kent Creek and South Kent Creek were added to the impaired waters list because of high fecal coliform levels and non-support of recreation use in these streams. The SCORE study results showed that at T1, North Kent Creek, 11 of 18 load measurements exceeded the water quality standard for fecal coliform. The tributary monitoring efforts have been intentionally biased to monitoring during wet weather. While additional data are desirable, particularly during dry weather or droughty conditions, it appears that there are dry and wet weather sources of coliform bacteria contaminating North Kent Creek. At T2, 12 of 19 load measurements exceeded the water quality standard. Again, additional data are desirable to characterize water quality during dry conditions, but, there are clearly wet weather sources of fecal coliform bacteria in the South Kent Creek watershed. Wet weather sources include those associated with storm water, such as pet wastes and Canada geese.

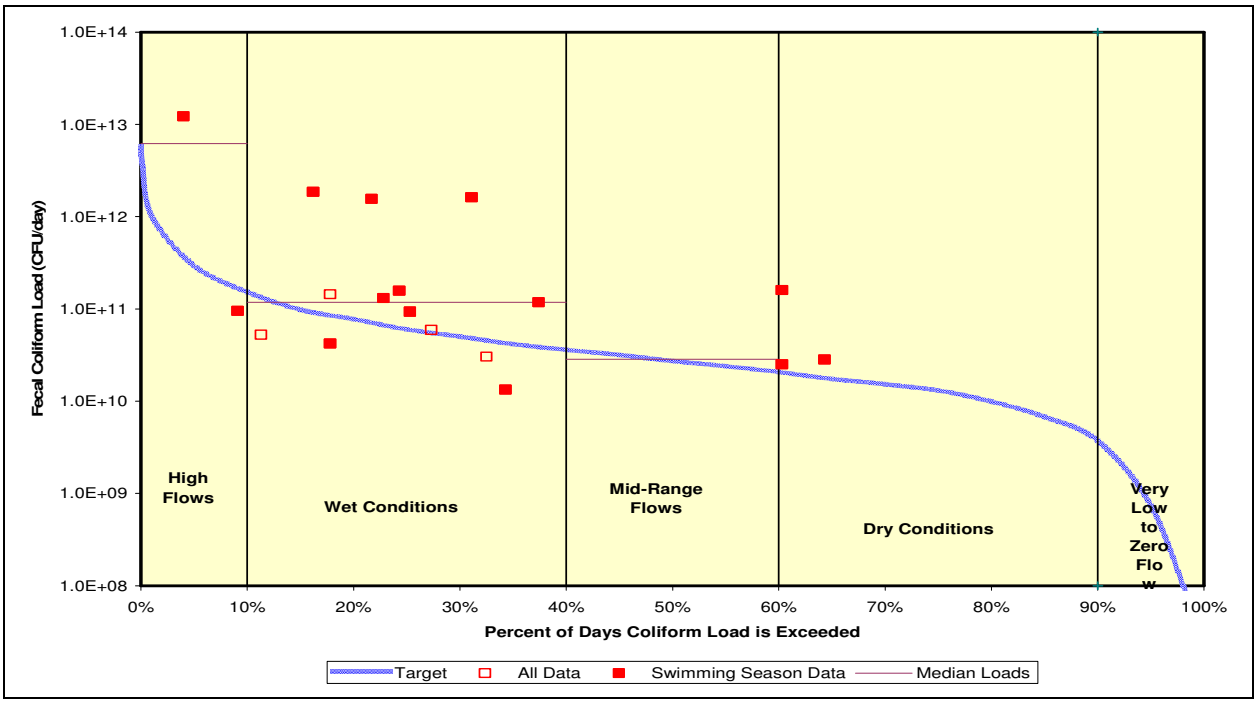

Figure KnC-5. Fecal Coliform Bacteria Load Duration Curve, Site T1, North Kent Creek, 2005-2007

[18] Streamflow measurements have been made along with sample collections since October2005. From this data, load duration curves were prepared for Keith Creek. The target load duration curves for monitoring stations T1 and T2 were developed from flow records of the decommissioned USGS gage on Keith Creek at 8th Street.

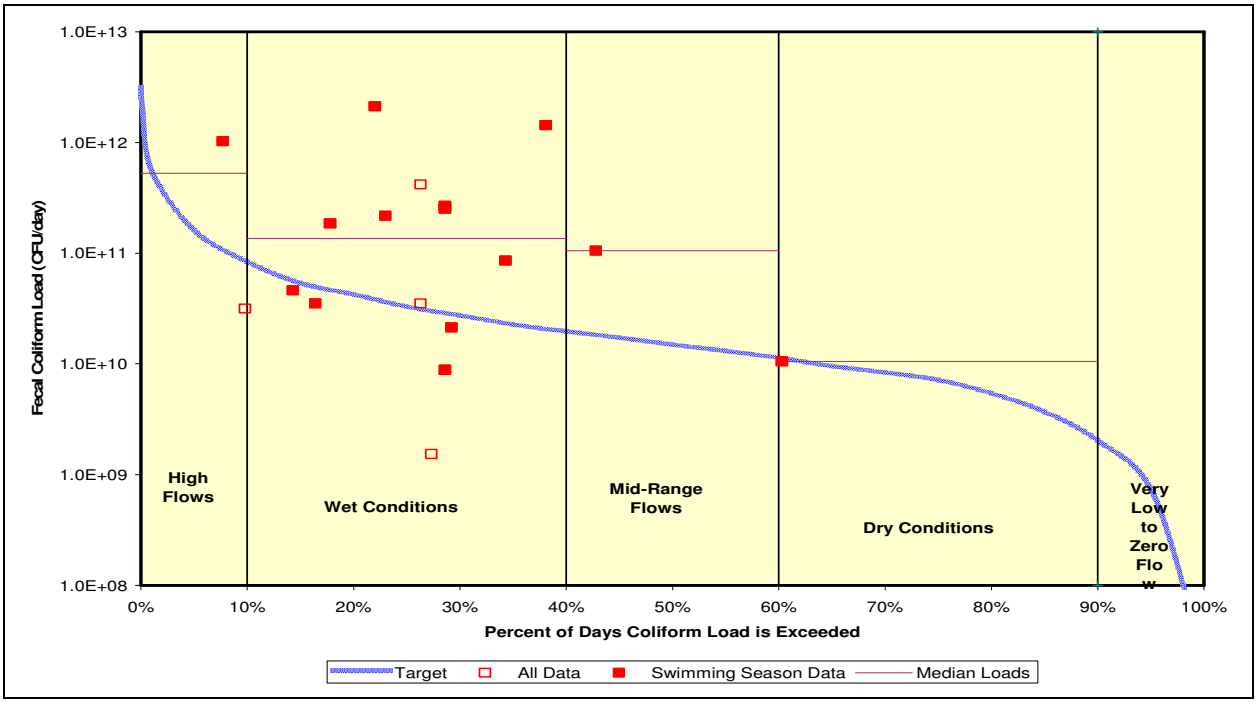

Figure KnC-6. Fecal Coliform Bacteria Load Duration Curve, Site T2, South Kent Creek, 2005-2007

Table KnC-4 provides the NPDES-permitted point sources in the watershed.

Table KnC-4
NPDES POINT SOURCES LOCATED WITHIN THE KENT CREEK WATERSHED ROCKFORD, ILLINOIS

NPDES Permit #	Facility Name	Receiving Water
IL0003301	1300 Rock Street Building Acct.	Rock River
IL0003344	Amerock Corporation	North Branch Kent Creek
IL0003654	Twin Disc Incorporated	S.Br. Kent Creek
IL0003841	Dean Foods – Rockford	North Branch Of Kent Creek
IL0046752	Sun Heat Treating, Inc.	Not listed
IL0049255	Gordon Bartels Company	Not listed
IL0050318	Rockford Machine Tool Company	Rock River
IL0052710	Lorine Manufacturing Company	Not listed
IL0060496	Roper Whitney, Inc.	Not listed

NPDES Permit #	Facility Name	Receiving Water
IL0061816	Rock Plastic Products	Kent Creek
IL0061891	Rockford Bold & Steel Company	Rock River
IL0063819	Lindberg Corporation	Kent Creek
IL0067911	Tote Cart Company	Kent Creek South
IL0073580	Rockford Memorial Hospital	Rock River via storm sewer
ILR10H979	Rockford Mass Trans-Bus Barn	Not listed
ILR10H712	Swift Car Wash	Not listed

Runoff from industrial sites is a potential pollutant source for receiving waters. Table KnC-5 lists the industrial sites within the Kent Creek watershed. Three CERCLA, or Superfund, sites are listed within the watershed. None are included on the NPL. These sites are owned by: Klemm Tank Lines (or Kaney Transportation) located on Cunningsham Road, by Amerock Corp. on Auburn Street, and by Smith Oil Corp. on Auburn Street.[19] No site descriptions are reported by Envirofacts for these three sites.

Table KnC-5
INDUSTRIAL SITES LOCATED WITHIN THE KENT CREEK WATERSHED
ROCKFORD, ILLINOIS

Name	Street	Land Use Code (LUC)	LUC Description
Wesley Willows	Rockton Ave.	8061	Nursing Homes
Pierce Biotechnology, Inc.	Meridian Rd.	2800	Pnt. Chem. Oil & Grease – Mfg. & Reclm.
Dyna Kleen of Rockford	Kilburn Ave.	7000	Miscellaneous Services
Kemper Manor	Kilburn Ave.	R040	Not listed
Ole Saltys	Summerdale Ave.	2000	Food & Related Products
Family Medical Center	Edgemont St.	6513	Medical Center
Rockford Clinic	Rockton Ave.	6513	Medical Center
Rockford Memorial Hospital	Rockton Ave.	8060	Hospital
Davita Dialysis Clinic	Rockton Ave.	6513	Medical Center
Roper Whitney, Inc.	Huffman Blvd.	3400	Fabricated Metal Prod. (wet)

[19] Source: U.S. EPA. Envirofacts website. www.epa.gov/enviro/html/cerclis/cerclis_query.html. Accessed 12/11/08.

Name	Street	Land Use Code (LUC)	LUC Description
Specialty Screw Corporation	Huffman Blvd.	3400	Fabricated Metal Prod. (wet)
Rockford American Plating	Wallin Ave.	3400	Fabricated Metal Prod. (wet)
Dean Illinois Dairies, LLC	Kilburn Ave.	2000	Food & Related Products
Los Rochas c/o Rigoberto Ortega	Kilburn Ave.	4100	Transportation Services
Pals Sports Bar	Auburn St.	7990	Rcrtn – Amsnt – Scl & Flgs w/o S-Fac
Midwest Dairymen's Company	State St.	9999	Unclassifiable
Kona Liquor	State St.	5000	Wholesalers & Retail Outlets
Rib Shak N More, Inc	State St.	5815	Fast Food/Short Order Restaurants
Liebovich Brothers	Preston St.	3450	Fabricated Metal Prod. (dry)
Murphy Kullins Warehouse	Independence Ave.	4100	Transportation Services
Tote Cart	Preston St.	3400	Fabricated Metal Prod. (wet)
Advanced Finishing	Selden St.	3400	Fabricated Metal Prod. (wet)
MC Chemical	Cedar St.	2800	Pnt. Chem. Oil & Grease – Mfg. & Reclm.
Rockford Fastener	South St.	3450	Fabricated Metal Prod. (dry)
Rockford Bolt & Steel	Mill St.	3400	Fabricated Metal Prod. (wet)
Rockford Foundries	Mill St.	3300	Foundries, Mills & Heat Treat

Existing Drainage Network

Drainage within the Kent Creek watershed occurs through a mix of surface drainage paths, storm sewers, and creek channels. In the less developed northwestern part of the watershed, surface drainage is the entire mode of stormwater conveyance. The eastern edge of the Kent Creek watershed is drained by extensive networks of storm sewers as shown in Figure KnC-2. These differences in drainage mechanisms are analogous with the respective development in these sections of the watershed. In the urban area there is a stormwater conveyance system, and in 75% of the watershed there is little to no man-made drainage system.

Figure KnC-2 also shows the general location of identified detention basins and storm sewer outfalls within the Kent Creek watershed. The Kent Creek watershed has 15 identified detention facilities not including Monoa Lake. These facilities are distributed through the eastern part of the watershed. The 28 identified storm sewer outfalls within the watershed are located generally east of Centerville Road, with the largest number concentrated along the downstream area of North Kent Creek.

Available Data Resources

Previous Drainage Studies
A review of available data identified no recent, comprehensive studies of drainage issues within the Kent Creek watershed. Previous drainage studies that included consideration of the watershed are listed below:

"A Master Drainage Plan for the Rockford Regional Area: Rockford-Winnebago County Regional Drainage Plan and Study." Espey, Huston & Associatse, Inc. November 1981.

"City of Rockford Comprehensive Storm Drainage Plan and Report." Warren & Van Praag, Inc. November 1955.

Historic Flow Data
No source of historic flow data has been identified for the Kent Creek watershed.

Historic Water Quality Data
No source of historic water quality data has been identified for the Kent Creek watershed.
(pending input from David Pott)

Other
Floodplain and Floodway:
Flood Insurance Study: Winnebago County and Incorporated Areas, (FEMA, 2006)

Soil Characteristics:
"Soil Survey Geographic (SSURGO) database for Winnebago County, Illinois."
Fort Worth: U.S. Department of Agriculture, Natural Resources Conservation Service, 2007. URL:<http://SoilDataMart.nrcs.usda.gov/>

Drainage Issues

Table KnC-6 (on the following page) provides a summary listing of current identified drainage issues and projects within the Kent Creek watershed. The general locations of these issues and projects are shown on Figure KnC-1.

The most significant stormwater management/flood control problems in the Kent Creek Watershed are localized flooding of creek-side in the urbanized area. In recent history, there has been one 150 year storm that occurred in 1952, that inundated the residential area along North Kent Creek up to houses' roofs. The same storm produced wet weather flooding that closed

industrial and commercial establishments along both North and South Kent Creeks. Continuing urbanization of the basin, meandering creek flow paths and poorly maintained channels (see Table KnC-6 #6) are contributions to Kent Creek's flooding problem.

With the opportunity for increased residential development upstream along the Creek, the City should be proactive in its efforts to preclude future development activities that would contribute to further flooding or property loss along the creek. It is imperative that residential and other vulnerable development not occur within the floodway or floodplain areas, as development spreads to the west. Where construction within a floodplain is warranted, appropriate compensatory storage must be provided. Consistent application of these principles will reduce the potential for future increases in flooding and flood-related damages, and the need for costly flood control projects.

The City addressed flood concerns in Kent Creek through previous channel widening and paving in the previous decades. However, these improvements and existing drainage channel infrastructure has not always been maintained. Further evaluation of site-specific stormwater management/flood control improvement needs is required to provide a basis for effective planning, budgeting, and prioritization of potential projects.

Table KnC-6
SUMMARY OF STORMWATER/FLOOD CONTROL ISSUES AND PROJECTS
KENT CREEK WATERSHED, ROCKFORD, ILLINOIS

		Issue Type				Action			
#	Brief Description of Issue	Over-bank Flooding	Major Surface Flooding	Localized/Nuisance Flooding	Water Quality Impacts	Improvements Completed	Maintenance Required	Future Project	Proposed Project
1	**Safford Road and Springfield Avenue** - Future 400-acre mixed use development.							•	
2	**Riverside Boulevard and Rockton Avenue** - Future development.							•	
3	**Rockton Avenue and John Wesley Road** - Potential regional detention facility.							•	
4	State Street In-Kind Culvert Replacement - Performed by IDOT.					•			
5	COE Channel Widening - Constructed in the 1980's, the existing channel was widened along the North and South Branches of Kent Creek to a 15-foot wide bottom.					•			
6	COE Channel Widening - Constructed in the 1960's- 1970's the northwest channel was widened to a 15-foot wide bottom. The channel is currently in severe disrepair.						•		
7	COE Diversion channel/levee.					•			

Table KnC-4
SUMMARY LISTING – LETTERS OF MAP CHANGE
KENT CREEK WATERSHED, ROCKFORD, ILLINOIS

Flooding Source	Community	Date Issued	Type
South Kent Creek	Winnebago County	8/22/2001	LOMR

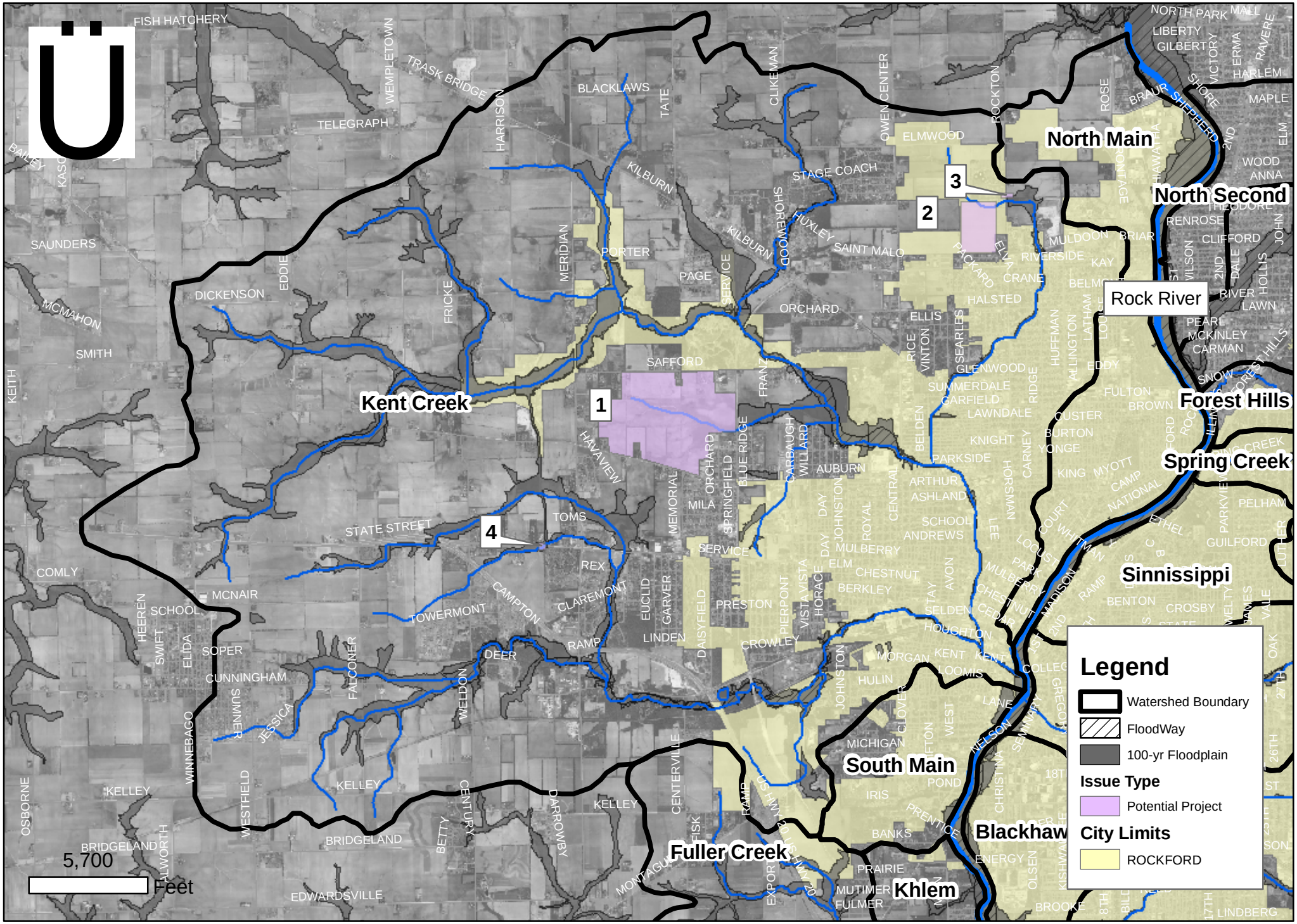

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Figure KnC - 1

Kent Creek Watershed Flooding Issues
City of Rockford, Illinois
Autumn 2008

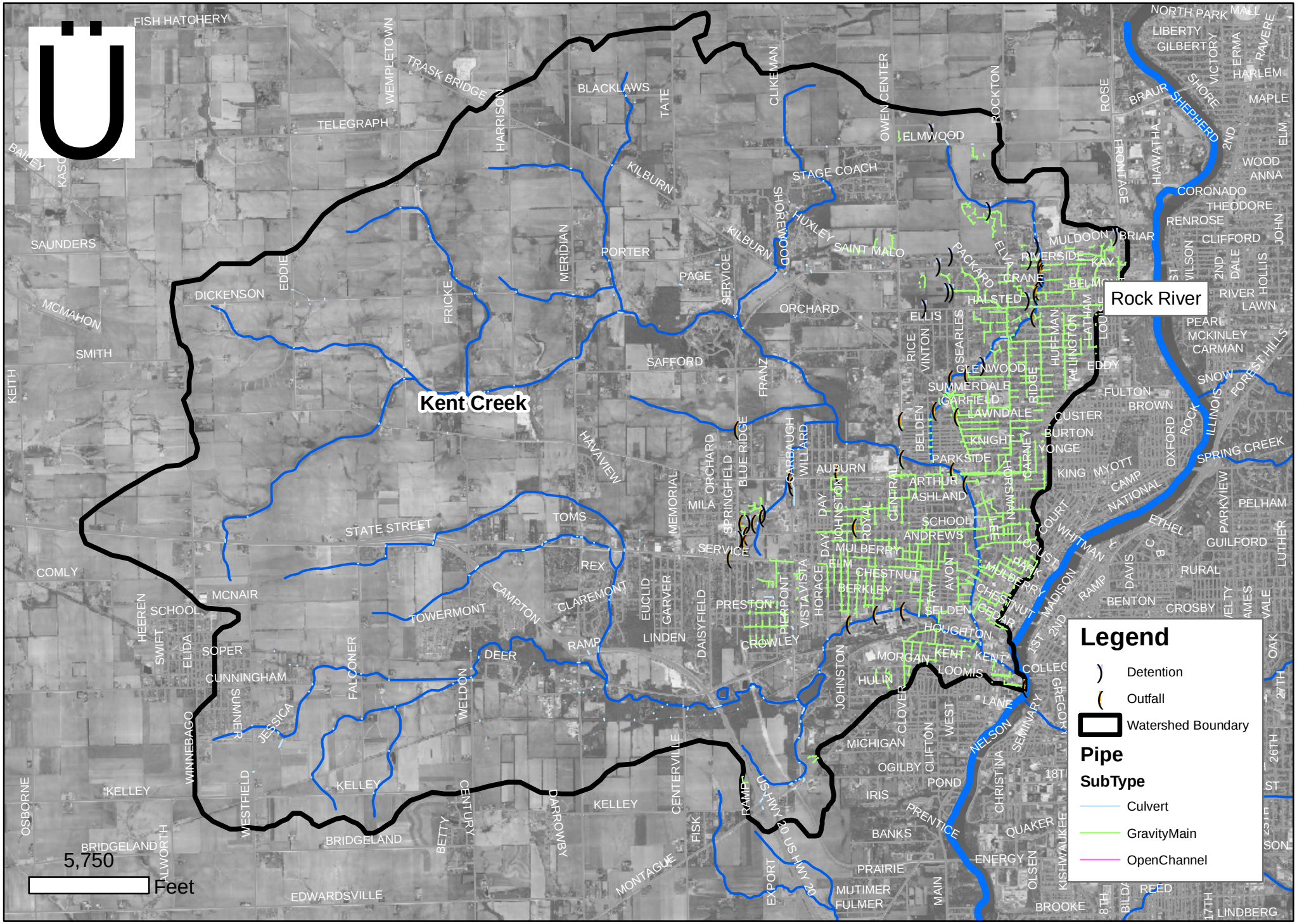

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Figure KnC - 2

Kent Creek Outfalls, Detention, and Storm Sewer
City of Rockford, Illinois
Current Data as of Autumn 2008