Feasibility Study for Regional Wastewater Treatment

Deerfield, Cambridge, and Rockdale Urban Service Areas
Thompson Correctional Institute Limited Service Area
Dane County, Wisconsin

FINAL DRAFT

May 2000

Prepared by the Dane County Regional Planning Commission Staff

DANE COUNTY REGIONAL PLANNING COMMISSION

Ken Golden, Chair
David Wiganowsky, Vice Chair
Rick Roll, Secretary
Karen Cornwell, Treasurer
Lyman Anderson
Barry Ashenfelter
Nelson Eisman
Kristopher Hampton
Tom Hovel
Rob Kennedy
Judy Olson
Rodney Scheel
Wendy Sinnott

Commission Staff

William Lane, Acting Executive Director, and Director of Environmental Resources Planning
Thomas Smiley, Director of Community and Regional Development Planning
William Preboski, Senior Community Assistance Planner
Christopher Gjestson, Program Assistant
Michael Kakuska, Environmental Resources Planner
Virginia Koster, Program Assistant
*Kamran Mesbah, Environmental Engineer
Steven Wagner, Graphics Specialist

*Principal Project Staff Contact

The preparation of this document has been financially aided by funds from the Wisconsin Department of Natural Resources

TABLE OF CONTENTS

1. Introduction

During the second half of 1998, the Villages of Deerfield and Rockdale started the process of facilities planning for their wastewater treatment plants. Concurrently, an engineering needs study was being prepared for the Cambridge wastewater treatment plant, serving the Village of Cambridge and the Town of Oakland (Jefferson County) Sanitary District No. 1. The Dane County Regional Planning Commission is the designated areawide water quality planning agency for the Dane County region, and is required to prepare and maintain an areawide water quality management plan in this role. One of the elements of such a plan is that "the most cost-effective regional wastewater systems for all urban areas shall be identified over a 20-year planning period based upon an analysis of alternative waste treatment system configurations.... This analysis shall be consistent with s. NR 110.09, and shall include a cost-effectiveness analysis of regional versus individual treatment plants for the outlying areas including subsurface waste disposal systems" (s. NR 121.05 (2) (g)). This report is an evaluation of the cost-effectiveness of a regional wastewater treatment plant serving the Cambridge, Deerfield, and Rockdale Urban Service Areas, the Town of Oakland Sanitary District No. 1 and the Thompson Correctional Institute service areas.

The purpose of this cost-effectiveness analysis is different from the fiscal impact analysis or even the economic analysis performed by consultants for individual communities. The analysis presented in this report is focused on establishing costs on equal footings to allow an equivalent comparison of individual and regional options. These costs represent regional or societal expenditure of resources, and the impacts of each option are similarly viewed in a regional context.

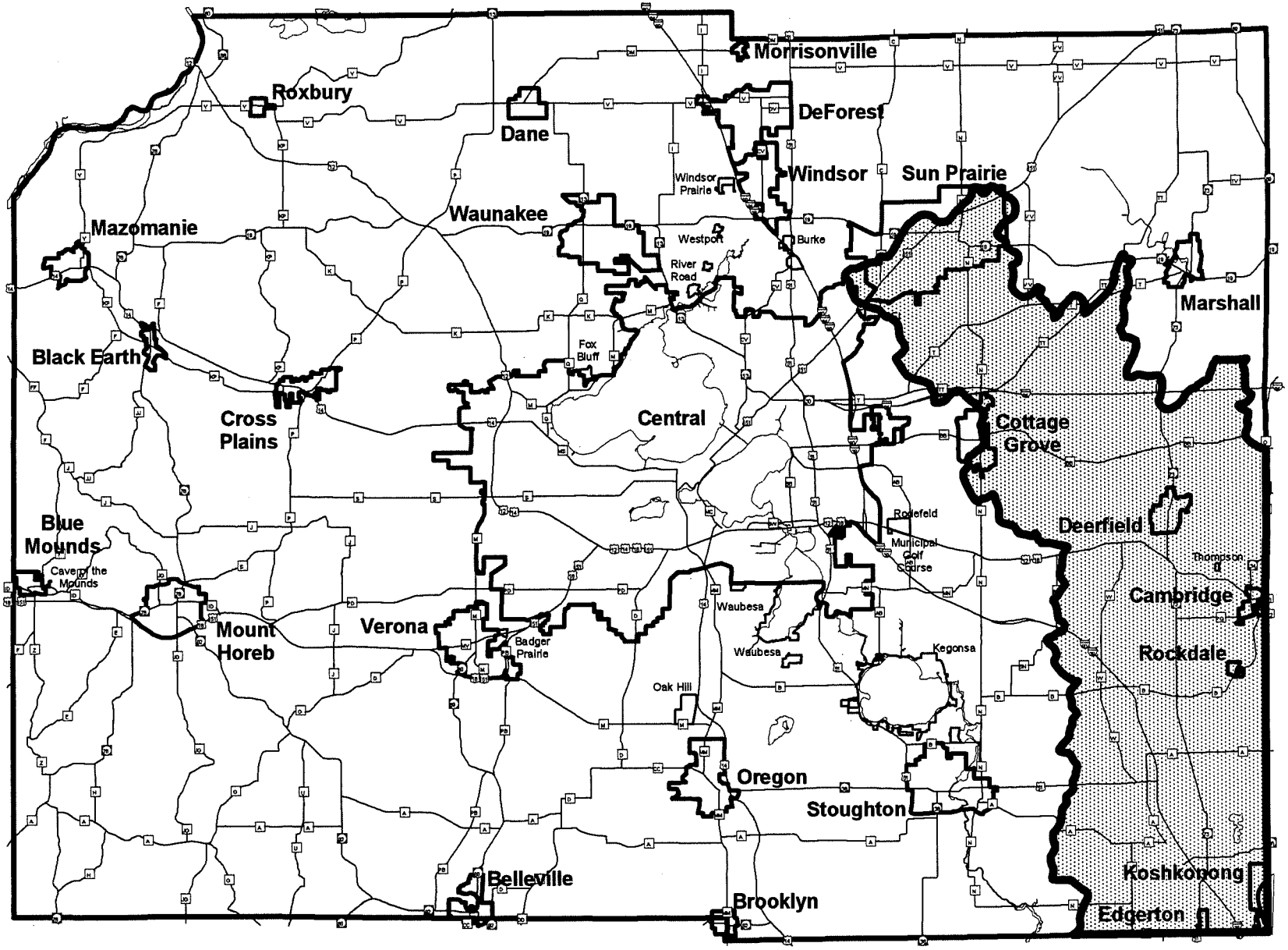
The report is organized to present the existing conditions in the watershed and for each community and treatment plant first. Future conditions and objectives are presented next. Finally, various options and the methodology used for the cost-effectiveness analysis is presented, followed by the findings and conclusions of the analysis. Supporting data and calculations are located in the appendices.

2. Existing Conditions

General Background on Environment

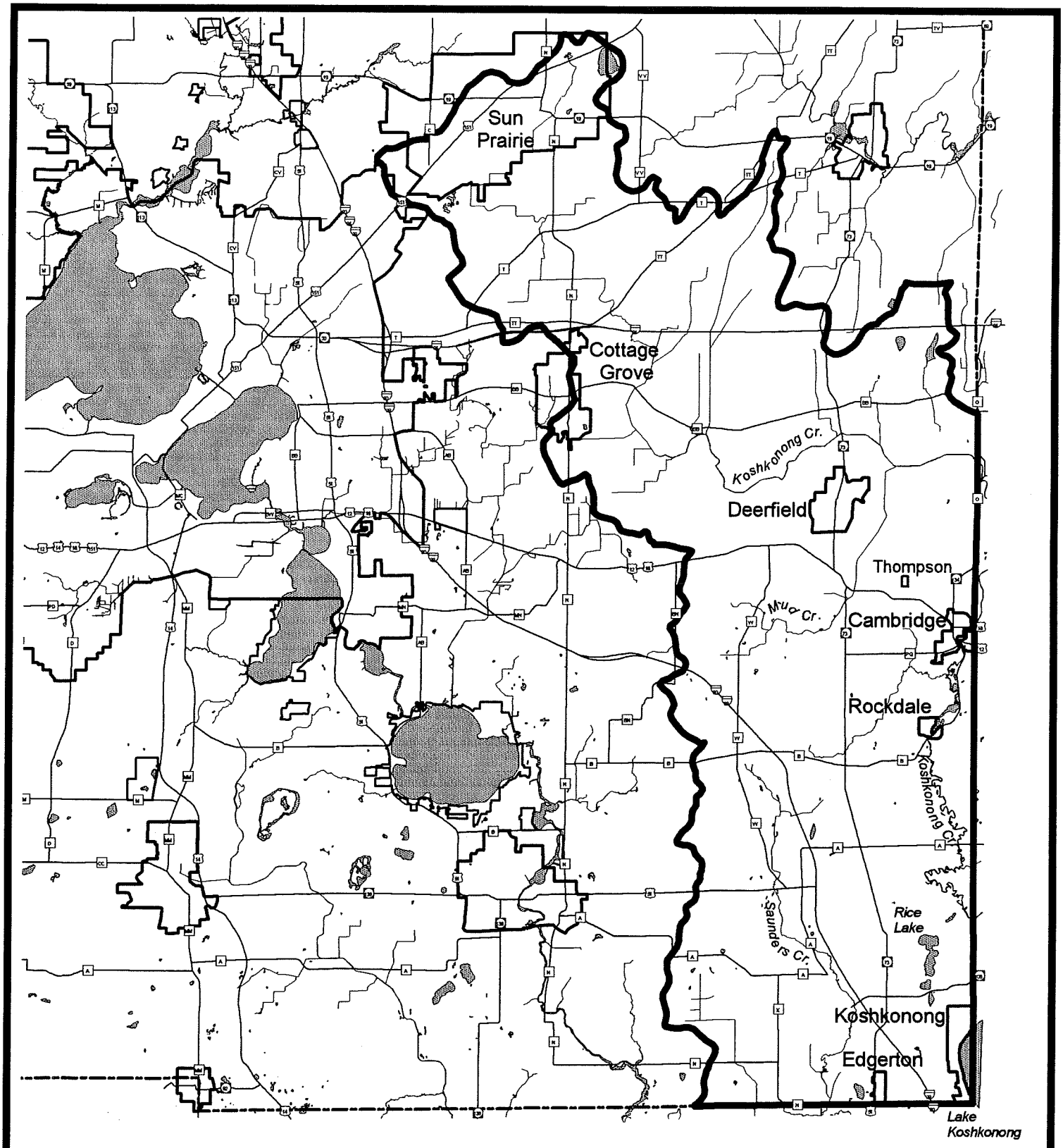
The Koshkonong Creek watershed is in the drumlin and marsh physiographic area of eastern Dane County and drains 138 square miles of land within the county. The creek originates near the City of Sun Prairie, and flows 42 miles southeast through the Villages of Cambridge and Rockdale to join the Rock River at Lake Koshkonong (see Maps 1&2). The drumlin and marsh physiographic region of Dane County is characterized by large areas of interconnected wetlands drained by sluggish streams that are bounded by low hills of glacial till. Baseflow in the streams of this area is generally low and water temperatures are warm because groundwater recruitment is minimal. The creek is presently classified as a warm water sport fishery from CTH "T" downstream to the county line.

The fishery and water quality conditions of streams in the watershed are limited by natural background conditions, including low baseflow, flat gradient, warm temperatures, and high inputs of nutrients and sediment from the fertile agricultural lands. The low flow ($Q_{7,10}$) of the stream below the dam at Rockdale is 9.2 cfs. Biotic indexes determined in 1988 for the stream at CTH "T" generally reflect a fairly poor water quality for Koshkonong Creek.



Map 1
Koshkonong Creek Watershed and Service Areas of Dane County, Wisconsin

N
12/99
0 3
Miles
Prepared by staff of THE DANE COUNTY REGIONAL PLANNING COMMISSION



Map 2
Koshkonong Creek Watershed

12/30/99

N

0 3

miles

Prepared by staff to the DCRPC.

Baseflow water chemistry monitoring conducted at Bailey Road and Hoopen Road near Rockdale in 1996 indicates that Koshkonong Creek is substantially impacted by pollutants, but stream water quality also shows steady improvement in most categories since 1979. Most of the improvement appears to be caused by improved wastewater treatment in the watershed. Figure 1 shows water quality trends for certain parameters over the last three decades. Appendix D contains the results of water quality monitoring for two locations on Koshkonong Creek. This baseflow monitoring does not indicate any water quality standard violation in recent years.

Nonpoint source pollution is also significant in the watershed. This consists of heavy loads of sediment and associated pollutants from farm fields and construction sites. Some sediment and pollutants are also washed off the streets, roofs and urban lands in the Villages of Cambridge, Rockdale, and Deerfield, and the City of Sun Prairie. Urban stormwater quality management measures and construction site erosion control ordinances instituted since the early 90s are expected to improve this portion of the sediment load. Other sediment originates from bank erosion and the thick silt deposits in the bottom of the creek. A substantial amount of sediment is deposited in the Rockdale Millpond and other smaller impoundments of the creek.

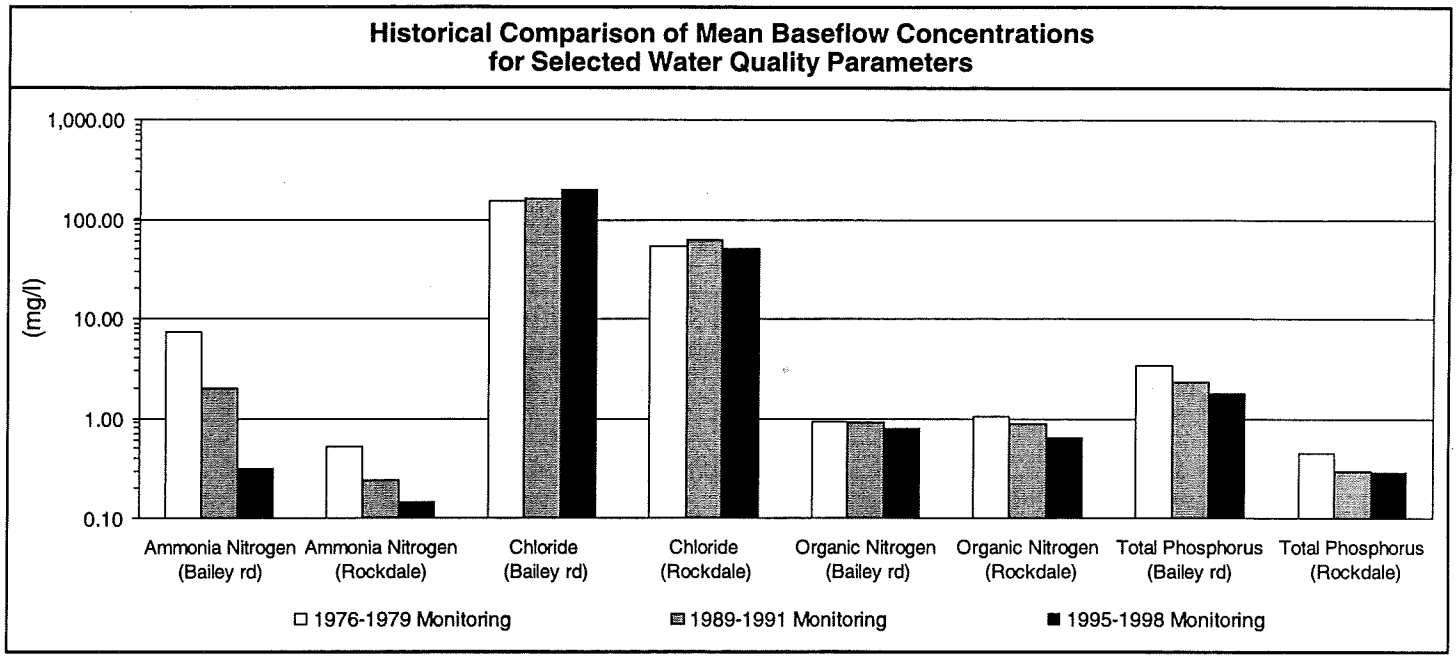
Agriculture is the primary land use in the watershed, consisting of about 72% of the land area of the watershed according to the 1990 land use inventory (see Table 1 for land use composition in the watershed). The major soils in the valleys of the watershed are in the Batavia-Houghton-Dresden association. This association is comprised of well drained and poorly drained, deep and moderately deep silt loams and mucks formed in glacial outwash, underlain by silt, sand, and gravel. The upland soils are formed on sandy loam glacial till, and are of the Dodge-St. Charles-McHenry association with a smaller area of Plano-Ringwood-Griswold association. These soils are comprised of well drained and moderately well drained deep silt loams and loams.

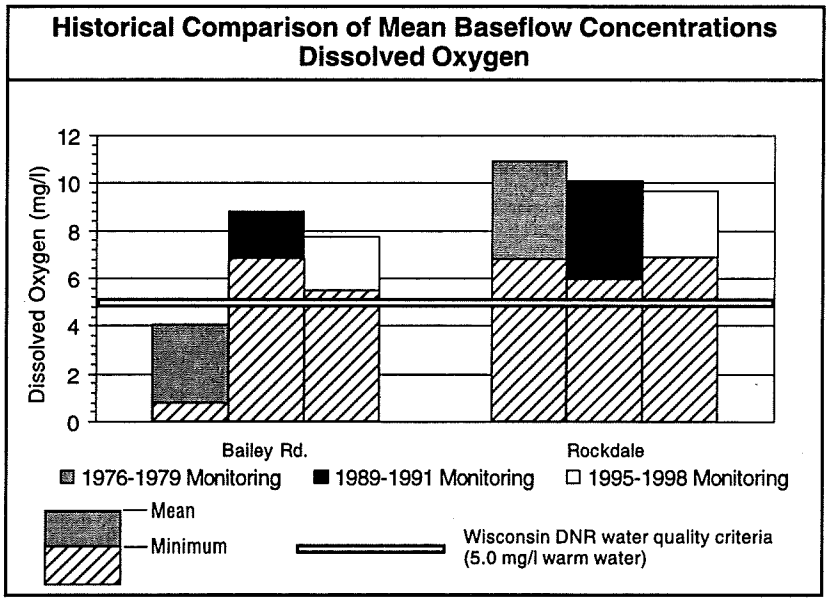
Table 1
Land Use in the Koshkonong Watershed: 1990

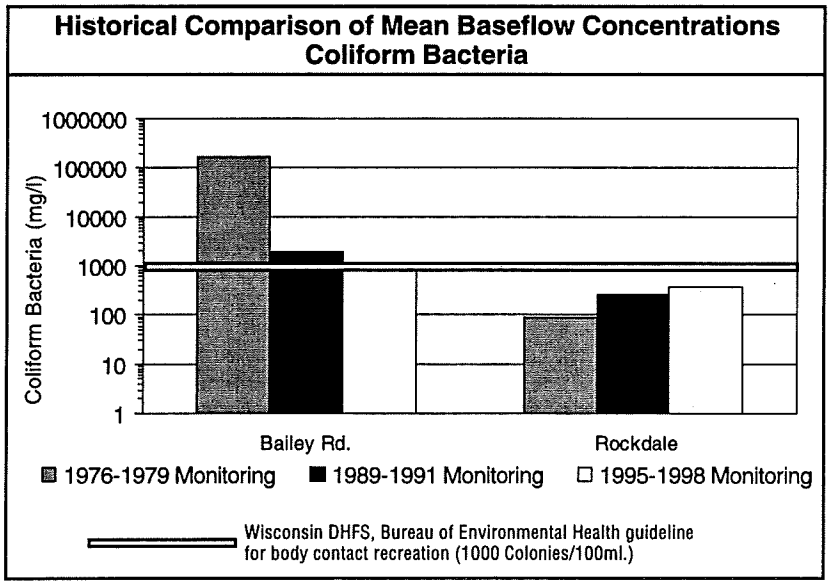
Area in Acres	Residence	Business	Row	Public	Developed	Crop & Pasture	Other Undev.	Total
Albion T.	898	94	987	375	2,354	16,408	4,208	22,970
Christiana T.	723	60	869	286	1,938	17,503	3,266	22,707
Deerfield T.	601	22	678	158	1,458	15,660	4,874	21,992
Sun Prairie T.	881	62	709	243	1,895	16,329	1,804	20,028
Cambridge V.	98	32	52	23	205	43	63	311
Deerfield V.	150	51	77	83	361	246	77	684
Rockdale V.	31	2	19	8	59	57	44	160
Sun Prairie C.	1,195	320	605	400	2,520	1,495	516	4,531
Total by Category	4,576	642	3,996	1,576	10,791	67,740	14,852	93,383
Percent of Total	4.9%	0.7%	4.3%	1.7%	11.6%	72.5%	15.9%	100.0%

Source: Dane County Regional Planning Commission

FIG 1


Historical Comparison of Mean Baseflow Concentrations
for Selected Water Quality Parameters
1,000.00
100.00
10.00
1.00
0.10
(mg/l)
Ammonia Nitrogen (Bailey rd)
Ammonia Nitrogen (Rockdale)
Chloride (Bailey rd)
Chloride (Rockdale)
Organic Nitrogen (Bailey rd)
Organic Nitrogen (Rockdale)
Total Phosphorus (Bailey rd)
Total Phosphorus (Rockdale)
1976-1979 Monitoring
1989-1991 Monitoring
1995-1998 Monitoring


Historical Comparison of Mean Baseflow Concentrations
Dissolved Oxygen
12
10
8
6
4
2
0
Dissolved Oxygen (mg/l)
Bailey Rd.
Rockdale
1976-1979 Monitoring
1989-1991 Monitoring
1995-1998 Monitoring
Mean
Minimum
Wisconsin DNR water quality criteria
(5.0 mg/l warm water)


Historical Comparison of Mean Baseflow Concentrations
Coliform Bacteria
1000000
100000
10000
1000
100
10
1
Coliform Bacteria (mg/l)
Bailey Rd.
Rockdale
1976-1979 Monitoring
1989-1991 Monitoring
1995-1998 Monitoring
Wisconsin DHFS, Bureau of Environmental Health guideline
for body contact recreation (1000 Colonies/100ml.)

General Background on Communities

Cambridge

The Village of Cambridge is located about 20 miles east of the City of Madison on Koshkonong Creek and at the eastern border of Dane County (see Map 1). The village was founded in 1847 by Joseph Keyes, his son Abel Keyes, and Beloit businessman Alvin Carpenter. One year after the platting and creation of the village, its population had grown to 500, supporting a saw mill, a grist mill, two hotels, and several other businesses. Soon, Cambridge became the economic hub of the surrounding farming area. Towards the end of 1800s, Lake Ripley, located immediately east of Cambridge in Jefferson County, became a popular summer visiting spot, with the first lodges and cottages on the lake built in the 1880s.

The Cambridge Urban Service Area was established in 1977, for the portion of the village located in Dane County (see Map 3). The 1990 Census population for the Village of Cambridge is 963 (80 persons resided in the portion of the village located outside Dane County), and the 1990 Census population for the Oakland Sanitary District No. 1 (Jefferson County) is 1,218. The estimated 1999 population for the Cambridge Urban Service Area is 1,057. Environmental corridors for the Cambridge Urban Service Area were delineated and adopted in 1997.

Thompson Correctional Center Limited Service Area

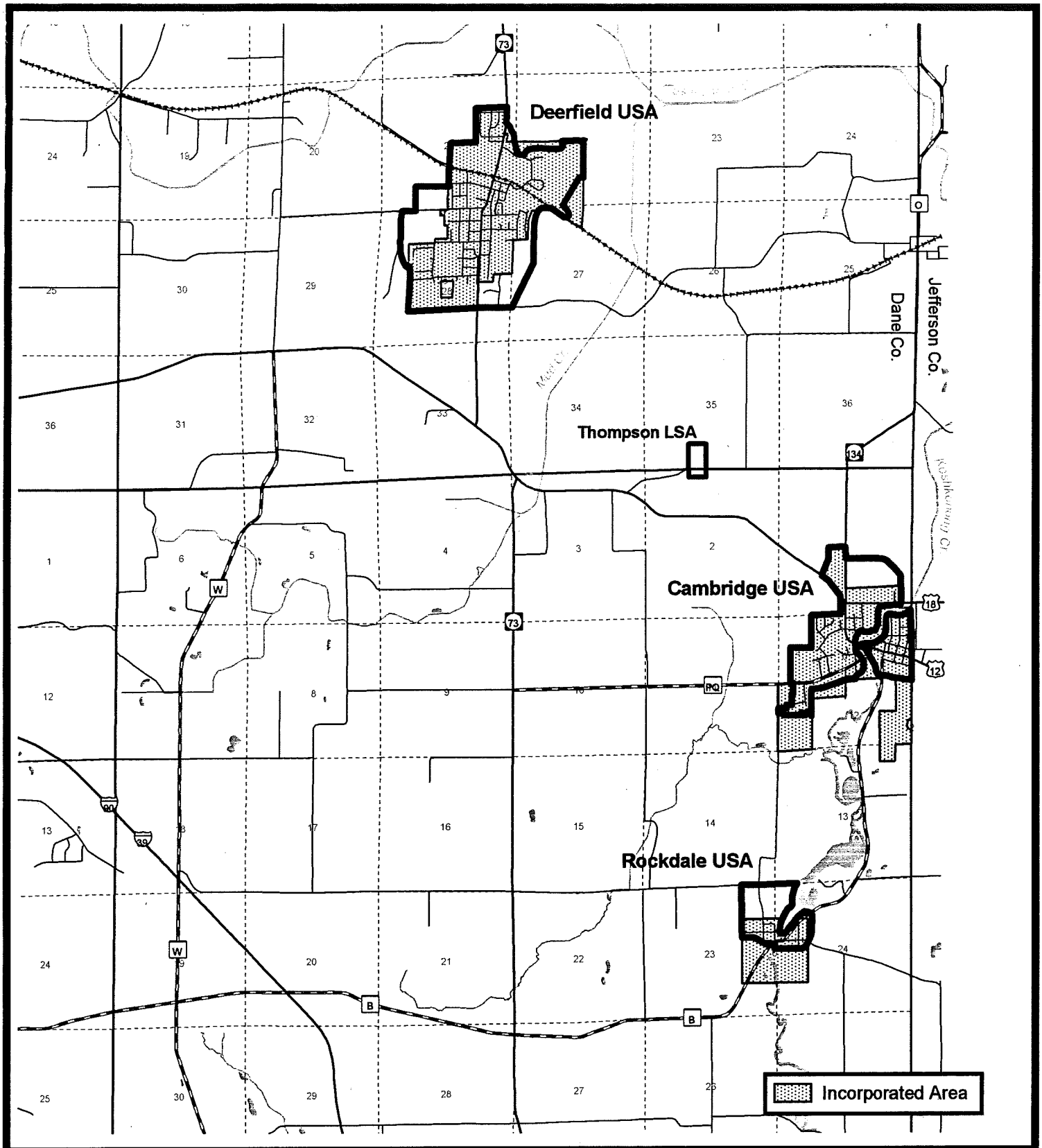
The Thompson Correctional Center is a minimum security correctional facility operated in the Town of Deerfield by the Wisconsin Department of Corrections. The facility houses 90 inmates with a wastewater flow of 11,000 gpd.

In 1991, the Thompson Correctional Center Limited Service Area (LSA) was created to make the provision of public wastewater treatment possible for the center. This is achieved by a 10,000-foot-long forcemain connection between the Center and the Village of Cambridge Wastewater Collection System. The forcemain conveys wastewater from the Correctional Center to the Village where it flows to the Cambridge wastewater treatment plant for treatment and discharge. Map 3 shows the location of the Thompson LSA in relation to the Cambridge Urban Service Area.

Deerfield

The Village of Deerfield is located approximately 15 miles east of Madison in the east central part of Dane County (see Map 1). The original Village of Deerfield was built at the intersection of Highways 73 and BB as a stage coach stopping place in the 1840s. The old village had a hotel, a blacksmith shop, grocery, schoolhouse, and a church and cemetery. In 1882, the first train on the Chicago and Northwestern Railroad steamed into what is now the Village of Deerfield, 1 mile south of the old village. Within a year, the Deerfield Post Office was transferred to the new site, and in 1891 the Village of Deerfield was incorporated at its present site with a population of 375 people. Boosted by the railroad, the new village became an economic center for the area by the turn of the century.

The Deerfield Urban Service Area was established in 1977 (see Map 3). The 1990 Census population for the Village of Deerfield is 1,617. Environmental corridors for the Deerfield Urban Service Area were delineated and adopted in 1991. The estimated 1999 population for the Deerfield Urban Service Area is 1,913.



Map 3
Deerfield, Cambridge, Rockdale
Urban Service Areas
Dane County, Wisconsin

12/23/99

N

0 1

Miles

(Original RF Scale 1:63,360)

Prepared by staff to the DCRPC.

Rockdale

The Village of Rockdale was originally platted in 1837 as Clinton, located about three miles south of the Village of Cambridge on Koshkonong Creek (see Map 1). Clinton was one of the 19 competing locations for the capitol of the territory of Wisconsin (Madison was selected). The Town of Christiana post office was transferred to the village in 1849, and because there already was a Clinton in Wisconsin, a name change for the village from Clinton to Rockdale became necessary. A mill was constructed on the creek in 1848, with the mill pond remaining today at the center of the village.

The Rockdale Urban Service Area was established in 1978 (see Map 3). The 1990 Census population for the Village of Rockdale is 235. Environmental corridors for the Rockdale Urban Service Area were delineated and adopted in 1991. The estimated 1999 population for the Rockdale Urban Service Area is 229.

Status of Wastewater Treatment Facilities

Cambridge

The Cambridge wastewater treatment facility is a two cell aerated lagoon treatment facility with disinfection. The facility is a 1982 upgrade of a two cell facultative lagoon originally built in the early 1960's. The facility is rated for an average daily flow of 0.355 MGD and a peak flow of 0.982 MGD. The facility is rated for an average BOD load of 870 pounds per day, and an average TSS load of 675 pounds per day. The plant serves the Village of Cambridge, the Oakland Sanitary District No. 1 (Jefferson County), and the Thompson Correctional Institute located 2.2 miles northwest of the village in the Town of Christiana (the Institute generates 11,000 gallons per day of wastewater which is pumped via a forcemain to the Village of Cambridge collection system). At present, monthly average flows exceed permit limits about 50% of the time, although the plant has been meeting the WPDES effluent limits for BOD and TSS. Treated effluent from the Cambridge wastewater treatment plant is discharged to Koshkonong Creek. The existing WPDES permit expires on March 31, 2004. Table 2 shows the loadings to the Cambridge wastewater treatment plant.

Table 2
Cambridge WWTP Loading Characteristics

Year	Service Area Population Estimate	Average Annual Flow (MGD)	Average Annual BOD (lbs./day)	Average Annual Suspended Solids (lbs./day)
1996	2,629	0.3916	618	461
1997	2,672	0.3657	525	536
2-year average		0.3787	572	498
Design Capacity		0.355	870	675

Source: Wisconsin Department of Administration; Dane County Regional Planning Commission; Engineering Report for Wastewater Treatment Plant Modification, Cambridge Regional Wastewater Facility, 1998, Town and Country Engineering

Deerfield

The Village of Deerfield wastewater treatment facility is an activated sludge secondary treatment operation with no disinfection. The facility includes an aerated sludge storage tank, and the generated sludge is land spread. The facility was constructed in 1983 and is rated for an average daily flow of 0.195 MGD, an average BOD load of 407 pound per day and TSS load of 375 pounds per day.

Flow as well as influent BOD and TSS loads have exceeded design values for the plant, although WPDES permit effluent limits have been adequately met. Treated effluent from the Deerfield wastewater treatment plant is discharged to Mud Creek, a tributary of Koshkonong Creek. Mud Creek is classified as a warm water forage fishery. The WPDES permit for the plant will expire on December 31, 2004. Table 3 shows the loadings to the Deerfield wastewater treatment plant.

Table 3
Village of Deerfield WWTP Loading Characteristics

Year	Service Area Population Estimate	Average Annual Flow (MGD)	Average Annual BOD (lbs./day)	Average Annual Suspended Solids (lbs./day)
1995	1,787	0.1720	478	417
1996	1,835	0.1818	557	514
1997	1,815	0.1856	525	470
1998	1,905	0.1839	509	532
4-year average		0.1808	517	483
Design Capacity		0.195	407	375

Source: Wisconsin Department of Administration; Dane County Regional Planning Commission; Facility Plan for Wastewater System Upgrade, Town & Country Engineering

Rockdale

The Village of Rockdale wastewater treatment facility is an activated sludge package plant with a 0.35 acre polishing pond. The facility lacks adequate sludge storage capacity and is in need of improvements to its sampling and flow measurement capabilities. The facility was constructed in 1970 with a design capacity of 25,000 gallons per day and 22.5 pounds of BOD per day. The plant poses some difficulties for the operator because of its small size and design.

Flow and loading to the plant have been well below the design capacity of the plant and it has been meeting its WPDES discharge limits consistently. Treated effluent from the Rockdale wastewater treatment plant is discharged to Koshkonong Creek. The Village of Rockdale has voluntarily undertaken facility planning and needs assessment. The WPDES permit for the plant expired on December 31, 1999 and is in the process of being reissued. Table 4 shows the loadings to the Rockdale wastewater treatment facility.

Table 4
Village of Rockdale WWTP Loading Characteristics

Year	Service Area Population Estimate	Average Annual Flow (MGD)	Average Annual BOD (lbs./day)	Average Annual uspended Solids (lbs./day)
1994	244	0.015	15	72
1995	239	0.016	14	47
1996	236	0.016	14	27
3-year average		0.016	14.3	49
Design Capacity		0.025	22.5	NA

Source: Wisconsin Department of Administration; Dane County Regional Planning Commission; Wastewater Facility Planning, Village of Rockdale, August 1998, MSA Professional Services

3. Future Needs and Objectives

Stream Classifications, Conditions, and Management Objectives

The lower portion of Koshkonong Creek (downstream of CTH "T") is classified as a warm water sport fishery. The fishery and water quality conditions of the streams in the watershed are limited by natural background conditions, including low baseflow, flat gradient, warm temperatures, and high inputs of nutrients and sediment from the fertile agricultural watershed. However, the low baseflow and marginal background water quality of the streams in the watershed make them relatively sensitive to pollution. During the past three decades, improvements to wastewater treatment facilities in the watershed has resulted in substantial improvement in water quality for those pollutants typically contributed by point source wastewater discharge (ammonia nitrogen, organic nitrogen, dissolved oxygen, and chloride). The main source of nonpoint source pollution in the watershed is erosion from cropland.

Management objectives in the watershed include reduction of sedimentation from agricultural land uses, reduction of sedimentation from urban land uses, restoration of converted wetlands, and review of water quality standards for those streams which receive discharge from wastewater treatment plants (done prior to WPDES permit reissuance for each treatment plant).

Water Quality Standards and Effluent Limits

Water quality standards for various chemical and biological constituents in surface water are contained in Wisconsin Administrative Code NR 102 (Water Quality Standards for Surface Waters) and are used to determine effluent standards for wastewater treatment plants. Biological Oxygen Demand (BOD) is a measure of the amount of oxygen consumed by living organisms (mainly bacteria) while utilizing organic matter in the water. There are no in-stream water quality standards for BOD, although BOD levels affect in-stream dissolved oxygen (DO) levels. DO standard for warm water fishery streams is 5.0 mg/l. Other standards such as pH, fecal coliform, suspended solids, residual chlorine, and ammonia are also imposed on treated effluent from wastewater treatment plants as needed for meeting in-stream water quality standards. The Cambridge treatment plant has a preliminary effluent limit for ammonia nitrogen which could be

applied in the future. This limit is 5.28 mg/l of ammonia nitrogen for summer months, with no limit for winter months (based on an effluent flow of 0.499 mgd).

Administrative Code NR 217 imposes a 1.0 mg/l total phosphorus limit on municipal wastewater discharges. Phosphorus limit may apply to the Cambridge treatment plant and would apply to the Deerfield and any regional treatment plant. Phosphorus limits would not apply to the Rockdale treatment plant due to its small size.

Effluent limitations are contained in WPDES permits for each individual wastewater treatment plant and are included in Appendix A of this report.

Population Forecasts and Urban Service Area Boundaries

In Dane County, the 1980s witnessed a faster rate of population growth compared to the 1970s. Population for Dane County as a whole grew by 11.5% between 1970 and 1980, and by 13.5% between 1980 and 1990. Table 5 shows the population growth rates for the villages of Cambridge, Deerfield, and Rockdale for the 1970-1980, 1980-1990 (Census data), and 1990-1999 (DOA estimates).

Table 5
Population Trends

Urban Service Area	1970	1980	% Change 70-80	% Average Annual 70-80	1990	% Change 80-90	% Average Annual 80-90	1999 Estimate	% Average Annual Estimate 1990-99
Cambridge*	682	791	16.0%	1.6%	890	12.5%	1.2%	1,057	2.0%
Deerfield	1,067	1,497	31.9%	3.2%	1,657	10.7%	1.1%	1,913	1.5%
Rockdale	175	209	19.4%	1.9%	235	12.4%	1.2%	229	-0.3%

* Shows only the Cambridge Urban Service Area population (the portion of the sewer service area which is in Dane County)

Source: Dane County Regional Planning Commission

The population data shows that the three service areas have growth trends opposite the county-wide trends. All three villages had a higher growth rate in the 70s compared to the 80s. The growth rate has decreased for Rockdale during the 1990-1999 period, and the growth rate for the villages of Cambridge and Deerfield has increased for this same period as compared to the 1980-1990 decade (it should be noted that the 1999 population figures are estimates and the 2000 Census may show a different actual trend and conclusion).

The Wisconsin Department of Administration (DOA) develops county-wide population forecasts for the state. The Dane County Regional Planning Commission allocates population growth for individual municipalities and urban service areas based on DOA overall population projections for the county. Figures 2, 3, and 4 show the population trends and the official DCRPC population forecasts for the Cambridge, Deerfield, and Rockdale urban service areas respectively. These population forecasts are to be used for wastewater facilities planning purposes per NR 110.09(2)(j)1.

Fig. 2 Population Trends for the Cambridge Urban Service Area

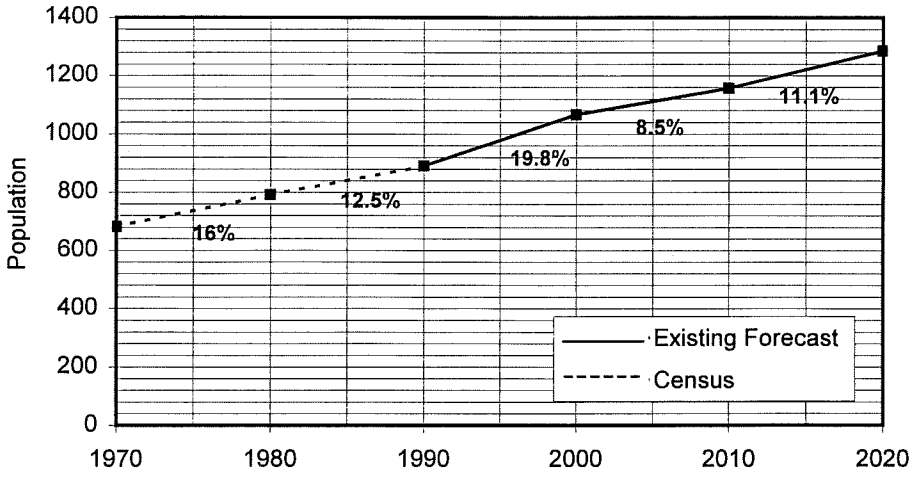


Fig. 3 Population Trends for the Deerfield Urban Service Area

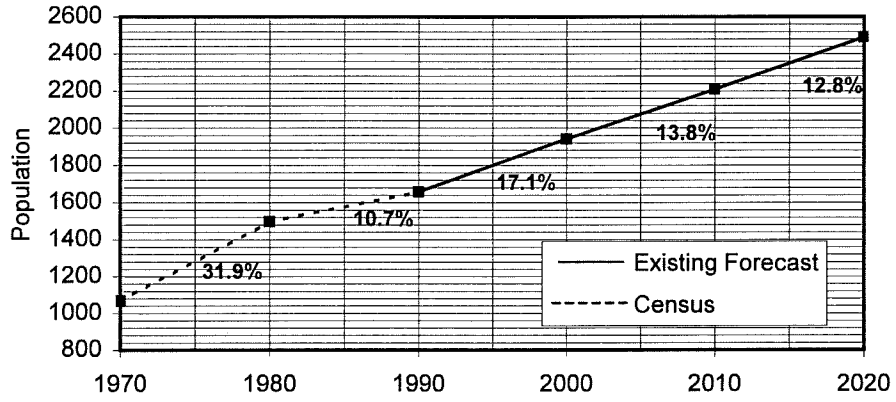
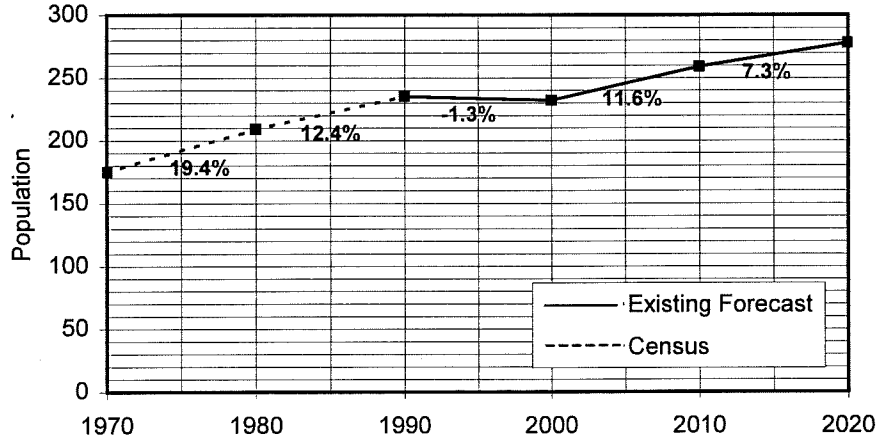
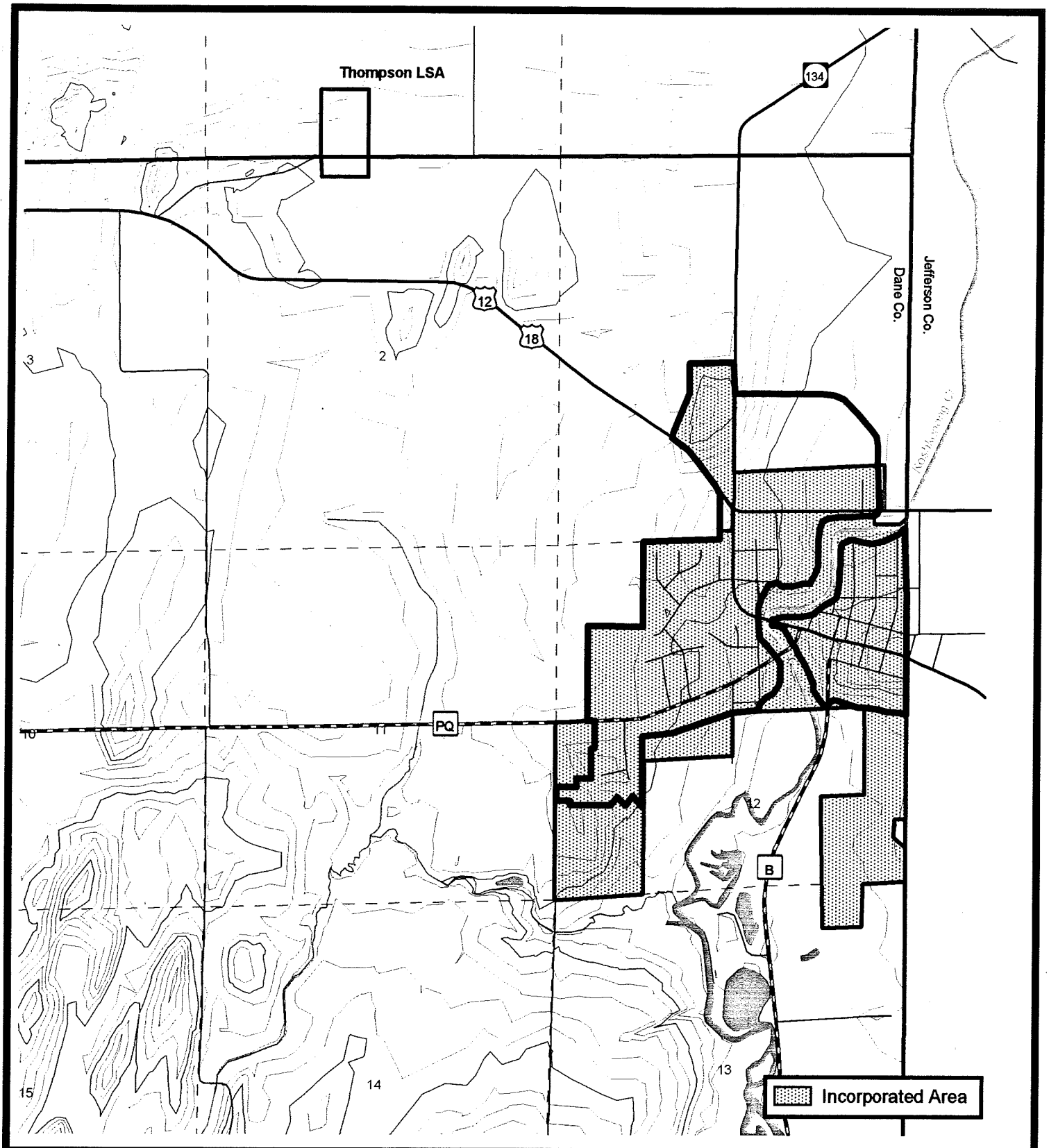


Fig. 4 Population Trends for the Rockdale Urban Service Area





Map 4
Cambridge
Urban Service Area

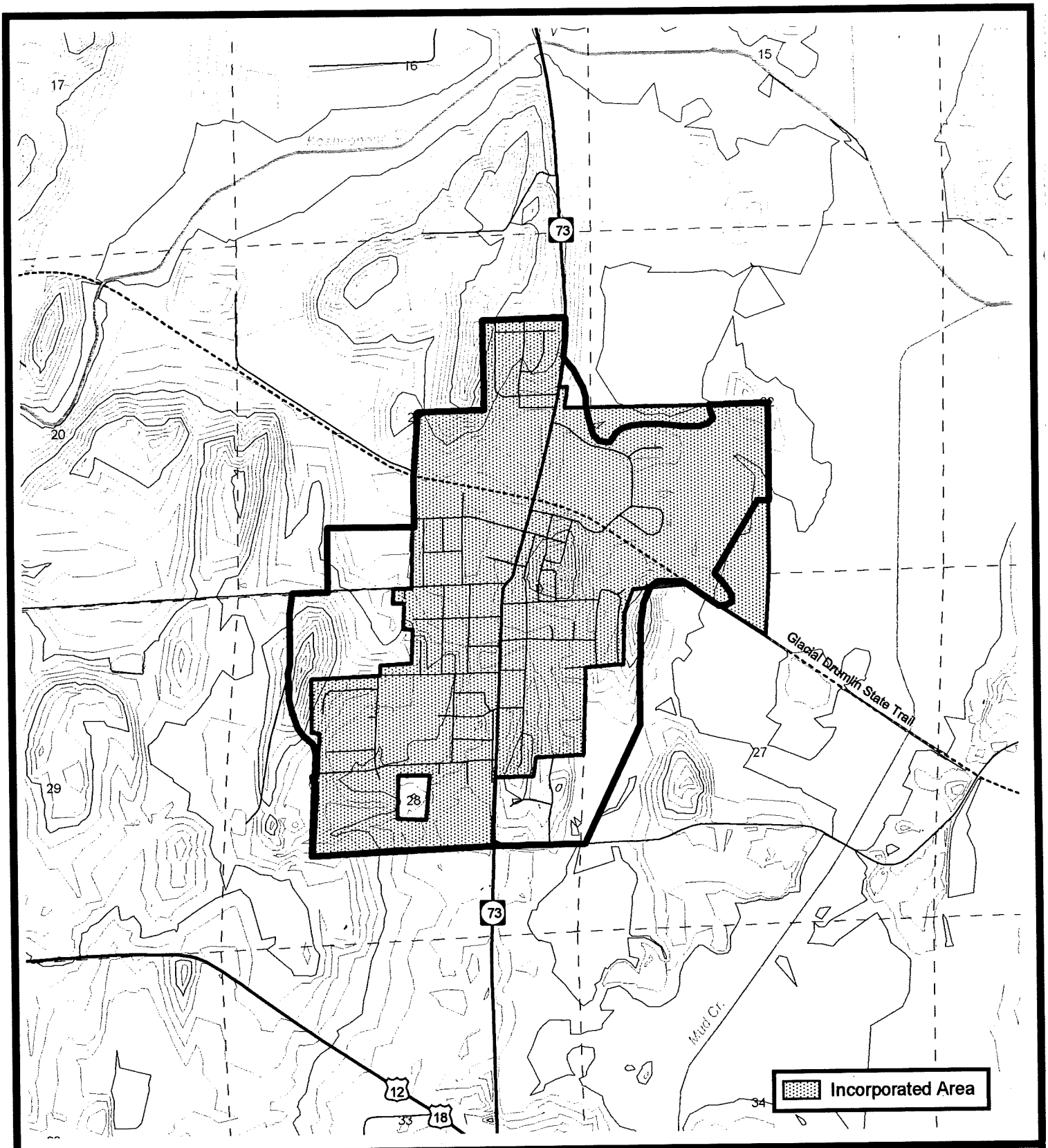
Existing Urban Service Area Boundary

N 12/23/99

0 2000

Feet

10 Foot Contour Interval
(Original RF Scale 1:24,000)
Prepared by staff
to the DCRPC.



Map 5
Deerfield
Urban Service Area

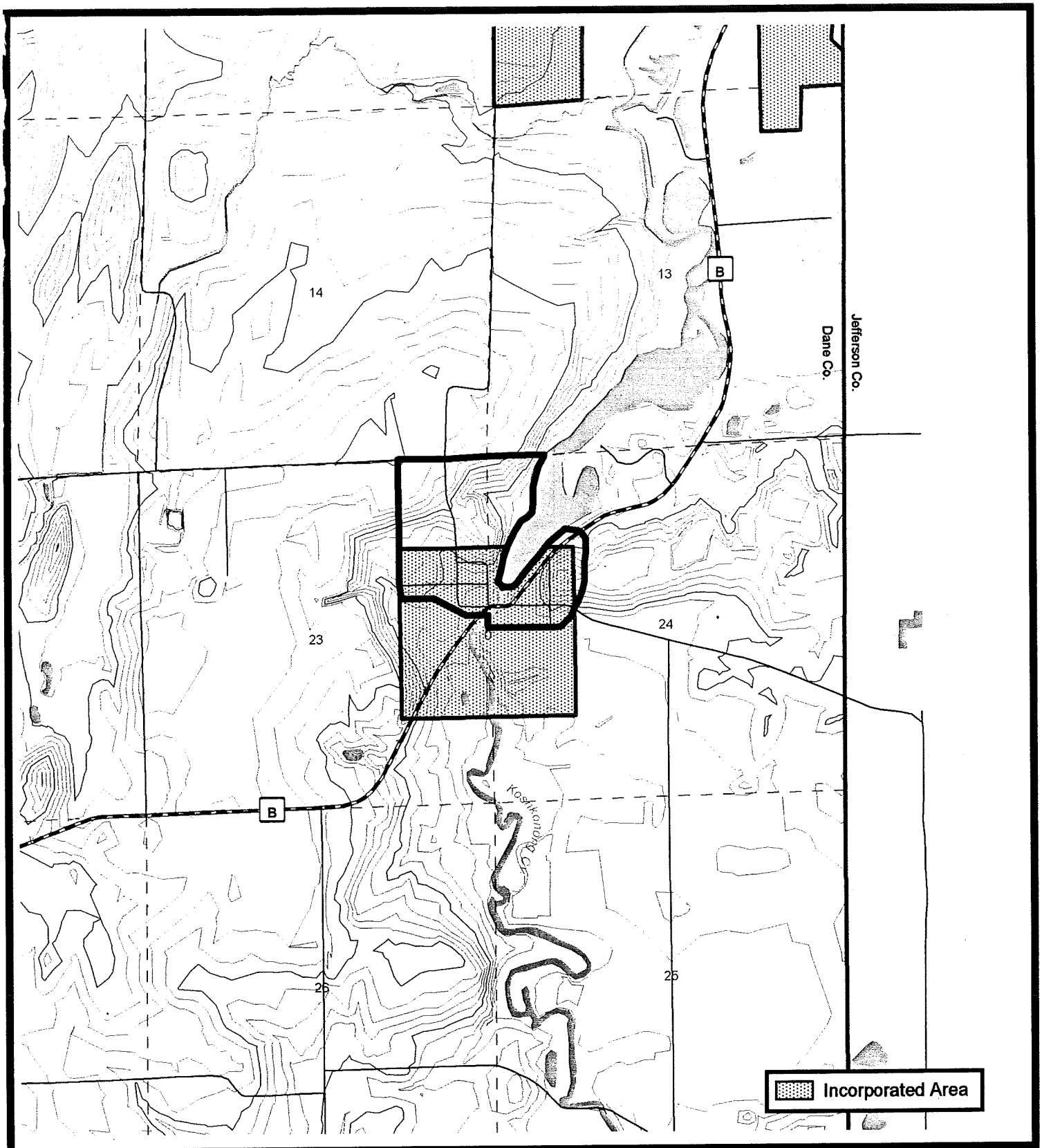
Existing Urban Service Area Boundary

N 12/23/99

0 2000

Feet

10 Foot Contour Interval
(Original RF Scale 1:24,000)
Prepared by staff
to the DCRPC.



Map 6
Rockdale
Urban Service Area

Existing Urban Service Area Boundary

N

12/23/99

0 2000

Feet

10 Foot Contour Interval
(Original RF Scale 1:24,000)

Prepared by staff
to the DCRPC.

Maps 4, 5, and 6 show the year 2020 Urban Service Areas for Cambridge (and Thompson Correctional Institute service area), Deerfield, and Rockdale respectively. These represent areas designated for urban development and municipal sewer service in Dane County for these communities. The adopted regional plans (Dane County Water Quality Plan, Dane County Land Use and Transportation Plan) and local plans call for directing future urban growth and publicly sewered development into urban service areas. The limited amount of development expected outside of urban service areas is expected to be primarily rural in character, intended to be served by on-site wastewater disposal and water supply systems. None of the plans propose any publicly sewered or urban development between the villages along the route of potential transmission mains to a regional wastewater treatment plant. There has been no indication of either need or feasibility of extending public sewer service to any of the existing rural uses located between the three subject urban service areas.

This study is based on the intent expressed in adopted plans to provide public sewer service only to areas within urban service areas. The alternatives considered in this report do not provide for service to, or support any future publicly sewered development between the three communities.

Regional water quality and land use policies provide for considering extension of sewer service to existing development outside of urban service areas, where existing on-site systems are failing and extension of municipal sewer service is the most cost-effective solution. A Limited Service Area needs to be established in the Water Quality Plan to allow service to such areas, as has been done for the Thompson Correctional Institute, for example.

Tables 6, 7, and 8 summarize housing and land use trends and forecasts for Cambridge, Deerfield, and Rockdale respectively. As should be expected, Deerfield and Cambridge are more similar in their size and land use characteristics among the three.

Wastewater Flow and Loading

To estimate wastewater flow and loadings for each service area for the design year (2020) the following general methodology is used:

The average flow and loading for 2 to 4 recent (representative) years is used as existing base flow and loading.

1. Based on population representing the base calculated in #1 for each service area, per capita flow and loadings are calculated.
2. Per capita flow and loadings (based on #2) are applied to the forecast population increase between base year and year 2020, to calculated the forecast increases to existing flow and loadings.
3. Allowance for unplanned industrial development is calculated as 10 percent of #3.
4. Future (2020) wastewater flow and loadings are calculated as the sum of #1, #3, and #4, and any known additional new flow not accounted for.

Table 9 reflects future flow and loading values for each service area as outlined above. The Thompson Correctional Institute flow is already reflected in existing Cambridge flows and loadings.

Based on water quality standards and objectives noted earlier in this section, and design flows (per individual facility plans), effluent limits were provided by DNR. These limits apply to discharges for different locations on Koshkonong Creek and are shown in Table 10. The treatment unit designs and cost estimates generated for each facility plan are based on these effluent limits.

Table 6: Cambridge Urban Service Area Housing Unit and Land Use Analysis

Data Item	Within the Municipality*					Forecast	
	1970	1980	1990	1970-90	1999	1990-2020	2020
1) Total Population	689	844	963	274	1,132	322	**1,285**
2) Population Per Housing Unit	2.93	2.44	2.48		2.38		2.27
2) Total Housing Units	235	346	389	154	480	177	**566**
3) Single Family % of Total Hsng. Units				56%	61%	60%	
3) No. of Single Family Units	185	246	271	86	295	106	**377**
3) Multifamily as % of Total Hsng. Units				44%	39%	40%	
3) No.of Multifamily Units	50	100	118	68	185	71	**189**
Number of Single Family Units	185	246	271	86		106	377
4) Land Use Area (Acres)	51	79	91	40		35	**126**
4) Residential Density (Units/Acre)				2.2		3.0	
3) Number of Multifamily Units	50	100	118	68		71	
5) Land Use Area (Acres)	2	7	14	12		7	**21**
5) Residential Density (Units/Acre)				5.7		10.0	
6) Commercial Land Use (Ac)	5	14	16	11		14	**30**
6) Acres / 1,000 Persons				40.1		43.5	
7) Industrial Land Use (Ac)	5	5	15	10		12	**27**
7) Acres / 1,000 Persons				36.5		37.3	
8) Street R-O-W Land Use (Ac)	36	54	55	19		18	**73**
8) Percent of Developed Area: 4-7				26%		26%	
9)Transportation, Com. & Utl. (Ac)	0	3	3	3		4	**7**
9) Acres / 1,000 Persons				10.9		12.4	
10) Institutional Land Use (Ac)	49	48	56	7		9	**65**
10) Acres / 1,000 Persons				25.5		28.0	
11) Recreation Land Use (Ac)	3	4	4	1		5	**9**
11) Acres / 1,000 Persons**				3.6		15.5	
Developed Land Area (Acres)	151	214	254	103		104	**358**
Vacant Land Area (Acres)	178	135	107				
13) Other Development not shown above							**14**
14) Environmental Corridor not including Recreation Land above							**19**
15) Flexibility Margin: 100% of 1990-2020 Land Demand							**104**
16) Maximum 2020 Urban Service Area							**496**
17) Adopted Urban Service Area							**391**
18) Maximum USA Addition							**105**

**This includes both Dane and Jefferson Counties.*

***The 15 acres of recreation land per 1,000 persons reflects locally adopted standards*

Source: U.S. Bureau of the Census and Dane County Regional Planning Commission 11/1/99

Table 7: Deerfield Urban Service Area Housing Unit and Land Use Analysis

	Within the Municipality						Forecast	
	Census			Change	Estm	Change	Change	
Data Item	1970	1980	1990	1970-90	1999	1970-99	1990-2020	2020
1) Total Population	1,067	1,466	1,617	550	1,873	806	873	**2,490**
2) Persons / Housing Unit	3.17	2.86	2.70		2.56			2.60
2) Total Housing Units	337	512	599	262	733	396	359	**958**
3) % of Total Housing Units				68%		70%	70%	
3) No. of One Family Units	254	357	431	177	532	278	251	**682**
3) % of Total Housing Units				32%		30%	30%	
3) No. of Multifamily Units	83	155	168	85	201	118	108	**276**
3) No. of One Family Units	254	357	431	177			251	
4) Housing Land Area (Ac)	76	124	136	60			84	**220**
4) Density (Housing Unt/Ac)				3.0			*3.0*	
3) No. of Multifamily Units	83	155	168	85			108	
5) Housing Land Area (Ac)	3	10	14	12			15	**29**
5) Density (Housing Unt/Ac)				7.4			*7.4*	
6) Commercial Land (Ac)	5	12	13	8			12	**25**
6) Acres / 1,000 Persons				14.5			*13.7*	
7) Industrial Land (Ac)	11	32	39	28			40	**79**
7) Acres / 1,000 Persons				50.0			*45.8*	
8) Street ROW Land (Ac)	54	71	77	23			38	**114**
8) Percent of 1-4 Land Area				22%			25%	
9) Trans., Com. & Utl. (Ac)	19	17	13	(6)			6	**19**
9) Acres / 1,000 Persons				-11.6			*6.9*	
10) Institutional Land (Ac)	33	36	37	4			6	**43**
10) Acres / 1,000 Persons				7.3			*6.9*	
11) Recreation Land (Ac)	3	24	33	31			13	**46**
11) Acres / 1,000 Persons*				55.5			*15.0*	
12) Developed Land Area (A	203	325	361	158			213	**574**
13) Other Development not shown above (31 homes & 2 acres business)								**42**
14) Environmental Corridor not including Recreation Land above								**62**
15) Flexibility Margin: 100% of 1990-2020 Land Demand								**213**
16) Maximum 2020 Urban Service Area								**891**
17) Adopted Urban Service Area								**800**
18) Maximum USA Addition								**91**

**Local recreation standard.* *All steps are numbered and assumptions are italized.*

** Other development includes 31 housing units (31 acres), 9 acres ROW and 2 acres of business

Source: U.S. Bureau of the Census and Dane County Regional Planning Commission 11/1/99

Table 8: Rockdale Urban Service Area Housing Unit and Land Use Analysis

Data Item	Within the Municipality						Forecast	
	1970	1980	1990	1970-90	1999	1970-99	1990-2020	2020
1) Total Population	172	200	235	63	229	57	43	**278**
2) Population Per Housing Unit	2.73	2.50	2.55		2.36			*2.36*
2) Total Housing Units	63	80	92	29	97	34	26	**118**
3) One Family as % of Total H.U.s				79.3%		82.4%	*85.0%*	81.4%
3) Number of Single Family Units	51	70	74	23	79	28	22	**96**
3) Multifamily as % of Total H.U.s				20.7%		17.6%	*15.0%*	18.6%
3) Number of Multifamily Units	12	10	18	6	18	6	4	**22**
3) Single Family Housing (Units)	51	70	74	23			22	
4) Single Family Land Area (Ac)	13	17	29	16			7	**37**
4) Single Family Density (Unt/Acre)				1.4			*3.0*	
3) Multifamily Housing (Units)	12	10	18	6			4	
5) Multifamily Land Area (Ac)	1	1	2	1			0	**2**
5) Multifamily Density (Units/Acre)				12.0			*12.0*	
6) Commercial Land (Ac)	1	1	1	0			1	**2**
6) Acres / 1,000 Persons				4.8			*23.3*	
7) Industrial Land (Ac)	1	0	0	-1			0	**0**
7) Acres / 1,000 Persons				-7.9			*0.0*	
8) Street Right-of-Way (Ac)	23	18	19	-4			2	**21**
8) Percent of Developed Area:4-7				-25%			*25%*	
9) Transport, Com. & Utl. (Ac)	0	3	2	2			0	**2**
9) Acres / 1,000 Persons				31.7			*0.0*	
10) Institutional Land (Ac)	5	3	3	-2			1	**4**
10) Acres / 1,000 Persons				-28.6			*23.3*	
11) Recreation Land (Ac)*	0	2	3	3			1	**3**
11) Acres / 1,000 Persons				39.7			*15.0*	
12) Developed Land Area (Ac)	44	46	59	15			12	**71**
13) Other Development not shown above**								**-2**
14) Environmental Corridor not including Recreation Land above								**34**
15) Flexibility Margin: 100% of 1990-2020 Land Demand								**12**
16) Maximum 2020 Urban Service Area								**116**
17) Adopted Urban Service Area								**116**
18) Maximum USA Amendment								**(0)**

**The 15 acres of recreation land per 1,000 persons reflects adopted standards*

** Includes the net total of +3.5 acres of town development in the USA & -5.5 acres of village development, All assumptions are in ITALICS

Source: U.S. Bureau of the Census and Dane County Regional Planning Commission 11/1/99

Table 9
Year 2020 Wastewater Flow & Loading
Cambridge/Oakland Sanitary District 1, Deerfield, Rockdale Service Areas

	Existing Conditions				Per Capita[1]			Population	2020 Conditions[2]		
	Flow (gpd)	BOD lbs./day	TSS (lbs./day)	Service Area Pop.	Flow (gpcd)	BOD lbs./cd	TSS lbs./cd	Growth Increment	Flow gpd	BOD lbs./day	TSS lbs./day
Cambridge/ Oakland[3]	378,700	572	498	2,650[4]	143 (143)	0.22 (0.2)	0.19 (0.2)	737[5]	495,000	719	645
Deerfield[6]	180,800	517	483	1,815[7]	100 (100)	0.28 (0.2)	0.27 (0.2)	675[8]	353,000[9]	871[12]	837[12]
Rockdale	16,000	14.3	49	239[10]	67 (100)	0.06 (0.2)	0.2 (0.2)	39[11]	21,000	22	57
Regional Plant									869,000	1,612	1,539

[1]Figure in parenthesis is used for future growth increment
[2]A factor of 1.1 has been applied to total increment growth figures
[3]1996 & 1997 data are used to derive "existing conditions"
[4]1996 used as base year
[5]1996-2020
[6]1995 through 1998 data are used to derive "existing conditions"
[7]1997 used as base year
[8]1997-2020
[9]Includes 105,000 gpd for new industrial development instead of 10% unplanned industrial development
[10]1995 used as base year
[11]1995-2020
[12]Includes 219 lbs./day of BOD and TSS for new industrial development

Source: Dane County Regional Planning Commission
Facility for Wastewater System Upgrade, Village of Deerfield, 1999, Town & Country Engineering;
Wastewater Facility Plan, Village of Rockdale, 1998, MSA Professional Services;
Engineering Report for Wastewater Treatment Plant Modifications, Cambridge Regional Wastewater Treatment Facility, 1998, Town & Country Engineering

Table 10
Wastewater Effluent Limits
Cambridge, Deerfield, and Rockdale Treatment Facilities

Parameter		Separate Treatment at Cambridge	Separate Treatment at Deerfield	Separate Treatment at Rockdale	Regional Treatment at Cambridge (preliminary)
Average Design Flow used as basis		575,000 gpd	393,000 gpd	26,000 gpd	958,000
BOD	monthly avg. weekly avg.	30 mg/l 45 mg/l	20 mg/l 30 mg/l	30 mg/l 45 mg/l	30 mg/l 33 mg/l
TSS	monthly avg. weekly avg.	60 mg/l ——	20 mg/l 30 mg/l	30 mg/l 45 mg/l	30 mg/l 33 mg/l
pH		6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0
Dissolved Oxygen	daily min.	7.0 mg/l	4.0 mg/l	5.0 mg/l	7.0 mg/l
Total P	monthly avg.	1.0 mg/l	1.0 mg/l	——	1.0 mg/l
NH3-N, Summer		4.45 mg/l	3.4 mg/l	——	2.98 mg/l
NH3-N, Winter		——	33 mg/l	——	28.32 mg/l
Fecal Coliform		400/100 ml	——	400/100 ml	——
Chlorine Residual		37 mg/l	——	38 mg/l	——
Sludge Storage		180 days	180 days	180 days	180 days

Source: Wisconsin Department of Natural Resources:
Facility Plan for Wastewater System Upgrade, Village of Deerfield, 1999, Town & Country Engineering;
Wastewater Facility Plan, Village of Rockdale, 1998, MSA Professional Services;
Engineering Report for Wastewater Treatment Plant Modifications, Cambridge Regional Wastewater Treatment Facility, 1998, Town & Country Engineering.

4. Alternatives

The most effective approach to the evaluation of a regional wastewater alternative is to do so as an integrated part of facility planning for the communities. This integrated approach ensures that the regional alternative and the individual treatment plant options are evaluated in a similar or equivalent manner so they are readily comparable with one another. Unfortunately, in the case of Cambridge, Deerfield, and Rockdale treatment plants, facilities plans were already in draft stage when the issue of regional treatment alternative arose, though regionalization was addressed in the final Deerfield facilities plan. The present study is an independent endeavor and fulfills the area-wide water quality management responsibilities of the Regional Planning Commission.

Wastewater Treatment Plant Locations

The facility plan for the Village of Deerfield wastewater treatment plant identifies treatment units in the existing plant that can be salvaged and used in the upgrade. The Deerfield plant is therefore going to be located at the present treatment plant site.

The facility plan for the Village of Rockdale wastewater treatment plant identifies space near the existing plant for a new recirculating sand filter system. The new Rockdale plant is therefore going to be located at the present treatment plant as well.

The engineering report for the Cambridge wastewater treatment plant modification identifies interim options for improving the plant so it can be operated for five or ten more years. The site can also accommodate a new mechanical plant for Cambridge/Oakland San. Dist. 1 service area or a regional plant serving Deerfield and Rockdale as well.

However, the Department of Natural Resources has determined that the interim upgrade option is not realistic when potential future compliance with limits, upgrading schedules, and other uncertainties are taken into account (see their letter of March 24, 2000, in Appendix C). The Department has concluded that "reasonable assumptions for the regional analysis are to assume use of the existing facility for a period of 5 years, and a period of 10 years, and then construction of a new oxidation ditch facility." The Interim 5 and Interim 10 options in this study refer to these two scenarios, postponing the construction of a Cambridge mechanical plant for 5 years and 10 years with no interim upgrade cost.

The option of locating the regional treatment plant in Deerfield was considered but not pursued in great detail. The reason for considering Deerfield as a regional treatment plant site is to benefit from existing treatment units which could be used in the new plant. The reasons for not evaluating a regional plant in Deerfield are the following:

- The effluent standards would be more restrictive (see Table 10)
- The operation cost of pumping would be more due to larger volume of wastewater being generated by Cambridge/Oakland and Rockdale combined compared to Deerfield.
- Possibility of needing larger diameter forcemain and larger pumps to convey wastewater to Deerfield.
- Inadequacy of the existing Deerfield treatment site to accommodate a regional treatment facility (see Appendix E for the site analysis).

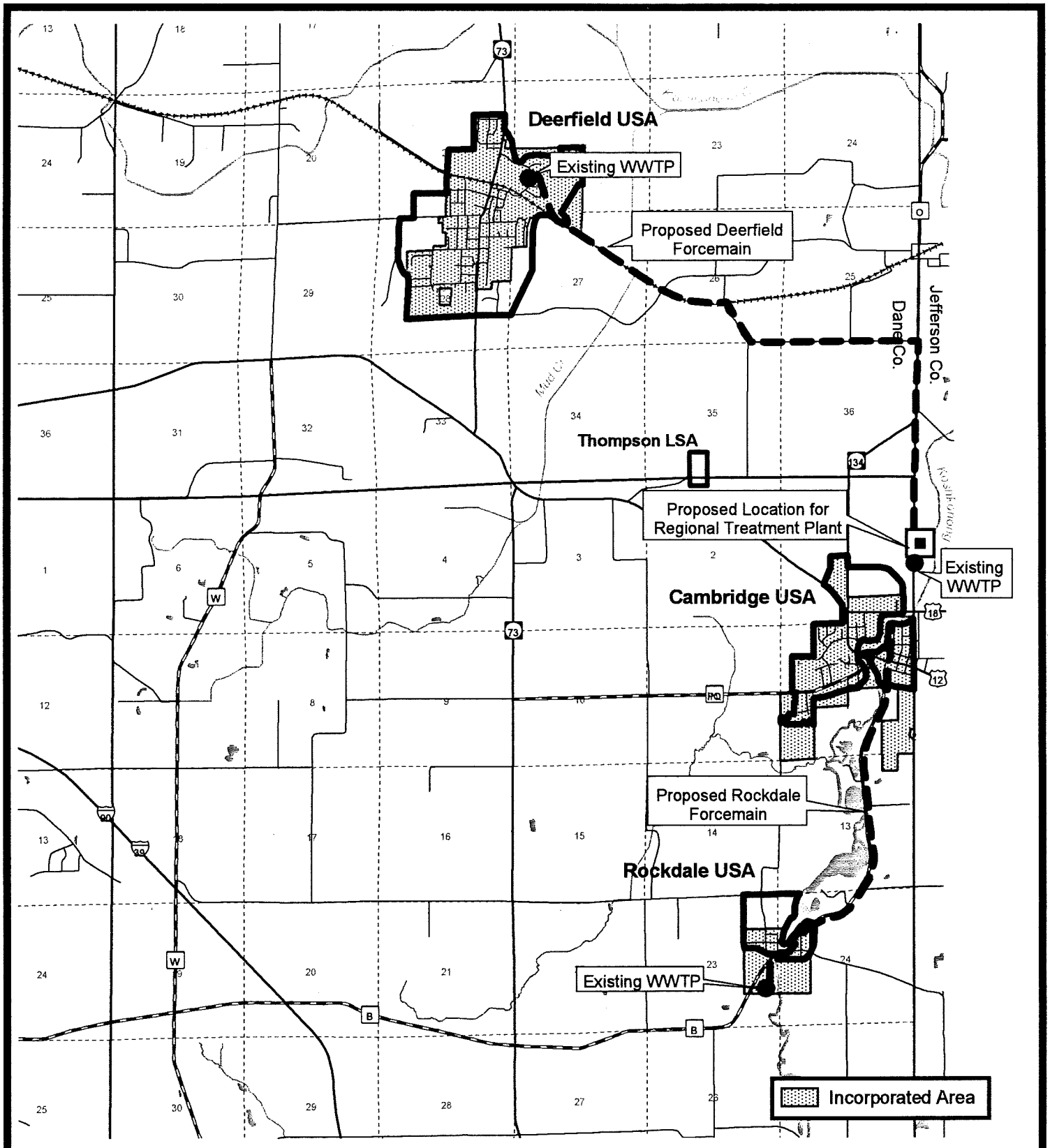
Description

1. Joint Treatment - New Regional Treatment Plant Near Cambridge, Forcemain Transmission

   This option would result in the abandonment of the Cambridge, Rockdale and Deerfield treatment plants. Wastewater from Rockdale and Deerfield would be pumped via pump stations and forcemains (one for Deerfield and one for Rockdale) to a new regional treatment

plant near Cambridge for treatment and discharge to Koshkonong Creek. The wastewater generated from the Thompson Correctional Institute would continue to be pumped to the Cambridge wastewater collection system, and treated at the new regional treatment plant.

Map 7 shows the location of the regional treatment plant and the forcemain route.



Map 7
Regional Wastewater Treatment Alternative:
Deerfield, Cambridge, Rockdale
Urban Service Areas
Dane County, Wisconsin

2/1/2000

N

0 1

Miles

(Original RF Scale 1:63,360)

Prepared by staff to the DCRPC.

2. Separate Treatment - New Individual Treatment Plants for Cambridge, Deerfield, and Rockdale

This option would result in the abandonment of the existing treatment facilities and their replacement with new treatment plants. Deerfield would be an "upgrade" because some of the existing treatment units can be used in the new facility. The Deerfield upgrade would be comprised of a new package plant using existing sludge storage and clarifier facilities. The new treatment plant for Rockdale would be comprised of a recirculating sand filter system. The new treatment plant for Cambridge would be an activated sludge mechanical plant.

3. Separate Treatment - New Individual Treatment Plants for Deerfield and Rockdale, and an Interim Solution for Cambridge

This option is the same as option 2, however the construction of the Cambridge mechanical plant is postponed for 5 (Interim 5) or 10 years (Interim 10), with no improvements during the interim period.

4. Separate Treatment – New individual Treatment Plant for Deerfield, and Interim Solutions for Rockdale and Cambridge

This option is the same as 3, however the construction of the Rockdale new plant is postponed for 5 or 10 years by providing necessary repairs and improvements to the existing plant now so its useful life can be extended. These repairs include providing sludge storage, improvements to the waste flow through some of the treatment units to prevent short-circuiting, and improved sampling and measurement capability for the existing plant.

5. Methodology

Description

Cost estimates are based on treatment options, unit costs, and design life information from facilities planning documents for each of the three communities and are presented in Appendix B. Two of these planning reports have been prepared by Town and Country Engineering, Inc. (Deerfield and Cambridge), and one by MSA, Inc. (Rockdale). The analyses are based on a twenty-year planning horizon using a discount rate of 7%.

Because the cost estimates provided in facilities plans are from different consultants and contain different levels of conservatism associated with design and cost engineering, it is necessary to develop cost estimates that are readily comparable and equivalent in terms of conservatism. Table 11 shows a comparison of unit costs of various options and two actual treatment plant bids. The present worth costs for each option shown in Table 11, is for treatment plants only, for the sizes developed in individual facilities plans, and do not include allowances for engineering, legal, contingency, and administrative expenses. The bid values have been corrected using construction cost indices to reflect cost increases which have occurred since the date of each bid.

A comparison of the two populations columns (DCRPC Pop. & Fac. Plan Pop.) shows the deviation of the population forecasts used in facilities plans from the official (DCRPC) population forecasts. NR 110.09 (2)(j)1 states that "population projections for facilities planning shall be in conformance with those contained in applicable approved areawide waste treatment management plans and rules adopted pursuant to ss. 16.96, 144.24(4)(b), Stats." The Dane County Regional Planning Commission is the areawide water quality planning agency for the subject treatment plants, and the Dane County Water Quality Plan is the areawide water quality planning document containing waste treatment management plans for the area. Consequently, the population forecasts to be used in facilities plans need to be in conformance with the DCRPC official forecasts.

The higher population forecasts used in facilities plans when combined with additional levels of conservatism in per capita waste generation result in higher flows and loads for the treatment plants. This is evident by comparing facilities plan flow forecasts with DCRPC flow forecasts, and by comparing per capita BOD loads in Table 11 with the typical per capita load of 0.21 lbs./cd. The portion of Table 11 under the heading "Facilities Planning Unit Cost Comparisons" shows per capita, per gallon treated, and per pound BOD treated values for the present worth capital costs and present worth operation and maintenance costs for the various plants, and, where available, for the two bids. In comparing the bid plants with those of Deerfield and Cambridge, it should be noted that the Brodhead plant appears to receive a substantial volume of clear water. This would tend to decrease the per gallon waste treated values and increase the per pound BOD treated values, requiring adjustments to the unit costs to more closely reflect typical facility values.

Table 12 shows the derivation of adjusted present worth capital and O&M costs based on comparisons in Table 11, and based on official population projections and flow and loading forecasts. Facilities plan present worth capital and operation and maintenance costs are shown for comparison. Deerfield and Rockdale New projects do not show an adjustment (the adjusted costs are the same as the facility plan costs) because the facilities plan costs are based on population forecasts which are close to official forecasts. The regional plant adjusted total present worth cost includes costs for the needed forcemains (Rockdale to Cambridge, and Deerfield to Cambridge), consequently the total cost is more than the sum of capital and O&M costs for the plant alone.

Table 13 shows a summary of the cost-effectiveness of different wastewater treatment options on a regional scale. A new regional plant near Cambridge has a total present worth which is 4.4% higher than the Cambridge Interim 5 option but 11% lower than the Cambridge New option. Cambridge Interim 10 option has been calculated only for informational purposes. The Cambridge WWTP is not at present violating any of its effluent limits and has been issued a new WPDES permit which will be reissued in 5 years. However, the DNR has determined that the existing Cambridge wastewater facility would likely be required to meet new effluent limits or fail to meet its existing limits in the next few years, making an interim 10 scenario unlikely. The most cost-effective option would be for Cambridge to adopt a 5-year interim approach and Rockdale a 10-year interim approach to their existing treatment facilities. This option is 5.2% more cost-effective than the regional option.

Achievement of Water Quality Objectives

All of the treatment options included in this cost-effectiveness analysis appear to meet current water quality standards for Koshkonong Creek. The regional option will result in a decrease in stream baseflow, and an improvement in water quality and temperature for the reach of Koshkonong Creek and Mud Creek between the Deerfield WWTP effluent outfall and the Cambridge WWTP outfall. The magnitude of these impacts is not likely to significantly affect the fishery or stream uses.

The low flow ($Q_{7,10}$) for Mud Creek at the Deerfield WWTP outfall is 1 cfs, and the low flow for Koshkonong Creek at its confluence with Mud Creek is 4.4 cfs. The Deerfield treatment plant average daily flow in 1998 was 0.28 cfs. Removal of the Deerfield effluent flow from Mud Creek would reduce the low flow by 28%. Mud Creek is classified as a warm water forage fishery. The forecast year 2020 flow for the Deerfield WWTP is 0.55 cfs. Removal of the Deerfield effluent flow from Koshkonong Creek would reduce the low flow by 6.4% between the Mud Creek confluence and the Cambridge treatment plant outfall.

Table 11 - Comparison of Unit Costs for Various Options and Two Bids

PROJECT	Facilities Plan Wet Weather Flow gallons	DCRPC 2020 Flow gallons	DCRPC Pop.	Fac. Plan Pop.	WWTP only Fac. Plan PW Capital	WWTP only Fac. Plan PW O&M	WWTP only Fac. Plan PW Total	Fac. Plan BOD Load lbs./day	Fac. Plan Per capita BOD	Facilities Planning per capita PW Capital	Facilities Planning per gallon PW Capital	Unit Cost Comparisons per capita PW O&M	Unit Cost Comparisons per gallon PW O&M	Unit Cost Comparisons per lb. BOD PW O&M	Unit Cost Comparisons per capita PW Total	Unit Cost Comparisons per lb. BOD PW Total	Unit Cost Comparisons per lb. BOD PW Capital
Deerfield Expansion	385,000	353,000	2,490	2,750	3,656,900	1,646,096	5,302,996	940	0.34	1,330	9.5	599	4.3	1,751	1,928	5,641	3,890
Cambridge New	575,000	495,000	3,387	4,582	6,833,118	2,461,409	9,294,527	1,062	0.23	1,491	11.9	537	4.3	2,318	2,028	8,752	6,434
Cambridge Interim 5	575,000	495,000	3,387	4,582	4,412,358	1,740,554	6,152,912	1,062	0.23	963	7.7	380	3.0	1,639	1,343	5,794	4,155
Cambridge Interim 10	575,000	495,000	3,387	4,582	2,509,372	1,226,523	3,735,895	1,062	0.23	548	4.4	268	2.1	1,155	815	3,518	2,363
Rockdale New	26,000	21,000	278	308	380,227	207,600	587,827	48	0.16	1,235	14.6	674	8.0	4,325	1,909	12,246	7,921
Regional	1,005,700	869,000	6,155	7,640	8,341,897	3,619,865	11,961,762	2,050	0.27	1,092	8.3	474	3.6	1,766	1,566	5,835	4,069
Brodhead WWTP Bid	980,000			4,835	4,784,410			821	0.17	990	4.9						5,828
Marshall WWTP Bid	580,000		4,027	4,250	5,430,000			850	0.20	1,278	9.4						6,388

NOTES:

All per capita figures reflect facilities plan population forecasts not official year 2020 DCRPC population forecasts. DCRPC population and flow forecasts are shown in this table for comparison purposes.

All capital costs exclude contingency, engineering, administration, and legal allowances. This is to allow comparisons with bid data which also exclude these allowances.

Deerfield Facilities plan uses a BOD load of 940 lbs/d as design basis. This was derrived by using the highest three current months, adding unsewered areas, industrial contributions, and 12 lbs/d for school expansion, resulting in an overall load of 0.34 lb/cd. The growth increment contribution is 0.48 lb/cd. Actual Deerfield loads are 517 lbs/day or 0.27 lb/cd based on a 1998 population of 1905. Even without industrial contributions, the current load to the plant is 0.21 lb/cd.

The New Cambridge plant design is based on a load of 1062 lb/d, or an overall load of 0.23 lb/cd. The load to the plant was 618 lbs/day (0.198 lb/cd) in 1996 and 525 lbs/day (0.164 lb/cd) in 1997 for an average of 0.18 lb/cd.

Version 5/15/00

Table 12 - Derivation of Adjusted Present Worth Costs for Various Options

PROJECT	DCRPC 2020 Flow gallons	DCRPC Pop.	Fac. Plan PW Capital	Adjusted PW Capital	Fac. Plan PW O&M	Adjusted PW O&M	WWTP only Fac. Plan PW Total	Adjusted PW Total	Adjusted per capita PW Total
Deerfield Expansion	353,000	2,490	3,656,900	**3,656,900**	1,646,096	**1,646,096**	5,302,996	**5,302,996**	**2,130**
Cambridge New	495,000	3,387	6,833,118	**4,525,000**	2,461,409	**2,129,000**	9,294,527	**6,654,000**	**1,965**
Cambridge Interim 5	495,000	3,387	4,412,358	**3,226,300**	1,740,554	**1,536,800**	6,152,912	**4,763,100**	**1,406**
Cambridge Interim 10	495,000	3,387	2,509,372	**2,300,000**	1,226,523	**1,114,500**	3,735,895	**3,414,500**	**1,008**
Rockdale New	21,000	278	380,227	**380,000**	207,600	**207,600**	587,827	**587,600**	**2,114**
Rockdale Interim 5	21,000	278		**356,700**		**228,100**		**584,800**	**2,104**
Rockdale Interim 10	21,000	278		**275,700**		**242,800**		**518,500**	**1,865**
Regional	869,000	6,155	8,341,897	**6,130,000**	3,619,865	**3,128,400**	11,961,762	**11,121,000 (includes F.M.)**	**1,807**

NOTES:

To derive more consistent costs for the Cambridge New plant, Marshall unit costs will be used. These are based on bid information for Marshall (from Table 11) which has flow and loading similar to Cambridge.
Per capita capital cost of 1278 applied to the Cambridge 2020 forecast population of 3387 results in a PW Capital Cost of $4,329,000.
Per gallon capital cost of 9.4 applied to the Cambridge 2020 forecast flow of 495,000 gpd results in a PW Capital Cost of $4,653,000.
Per pound BOD removed cost of 6,388 applied to the Cambridge forecast BOD loading of 719 lbs/d (from Table 9) results in a PW Capital Cost of $4,593,000.
The average of the above three is $4,525,000 and O&M PW of 4.3X495,000=$2,129,000 and results in a Total PW of $6,654,000.
This total PW is reflected in the Adjusted PW column and amounts to $1,965 per capita.

Cambridge Interim 5 and Interim 10 options use Cambridge New capital costs and discount them to the present over 5 and 10 years respectively. Pertinent 20-year life-cycle O&M and salvage values have been used. See tables B-7 and B-8.

Rockdale Interim 5 and Interim 10 options use Rockdale New costs and discount them to the present over 5 and 10 years respectively. Pertinent 20-year life-cycle O&M and salvage values have been used as well as pertinent interim repair costs. See tables B-1 and B-2.

To derive more consistent costs for the regional plant, Brodhead unit costs are tried. These are based on bid information for Brodhead which has flow similar to the regional plant.
Per gallon capital cost of 4.9 applied to the regional 2020 flow forecast of 869,000 gpd results in a PW Capital Cost of $4,258,000; TOO LOW (especially when compared to the New Cambridge plant)! This is probably because Brodhead seems to have high amounts of clearwater in its influent, thus reducing the per gallon capital cost down.
Using an average of the unit costs of the regional plant facilities plan and Brodhead results in a per gallon cost of 6.6, and a PW Capital Cost of $5,736,000 (when applied to the DCRPC flow forecast).
Per capita capital cost of 990 for Brodhead, applied to the 2020 DCRPC population forecast for the regional plant results in a PW Capital Cost of $6,094,000.
Applying the per pound BOD removed unit cost from the regional plant cost estimate (provided by consultant) to the DCRPC BOD load forecast results in a capital PW cost of $4.069X1.612=$6,559,000.
The average of the above is $6,130,000; adding O&M PW of 3.6X869,000=3,128,400 results in a Total PW of $9,258,400 for the regional plant alone (no forcemains included).
The total PW cost for the regional option includes $1,862,985 in forcemain capital and O&M. The resulting total is shown in the Adjusted PW Total column with a notation "(includes F.M.)" for clarification.

Version 5/15/00

Table 13 - Summary of Regional Cost-Effectiveness of Various Options

OPTION	Adjusted [1] PW Capital	Adjusted PW O&M	Adjusted PW Total
Cambridge New [2]	8,562,000	3,983,000	12,545,000
Cambridge Interim 5 [3]	7,263,000	3,390,500	10,653,500
Cambridge Interim 10 [4]	6,337,000	2,968,000	9,305,000
Cambridge & Rockdale Interim 5 [5]	7,240,000	3,411,000	10,651,000
Cambridge & Rockdale Interim 10 [6]	6,233,000	3,003,000	9,236,000
Cambridge Interim 5, Rockdale Interim 10 [7]	7,159,000	3,411,000	10,570,000
Cambridge Regional [8]	6,130,000	3,128,000	11,121,000

NOTES:

1- The figures in this table do NOT include the typical 35% addition for "engineering, administration, contingencies, and legal" costs.

2- Cambridge New option includes new WWTPs for Deerfield, Rockdale, and Cambridge Urban Service Areas.

3- Cambridge Interim 5 options is the same as above, but delays the construction of the new Cambridge WWTP for 5 years.

4- Cambridge Interim 10 option is the same as 3 above, but delays the construction of the new Cambridge WWTP for 10 years.

5- Cambridge & Rockdale Interim 5 option is the same as Cambridge Interim 5 except this option also delays construction of the new Rockdale WWTP for 5 years by performing minor repairs on the existing plant.

6- Cambridge & Rockdale Interim 10 option is the same as 5 but delays the construction of new plants for 10 years.

7- This optin includes a new WWTP for Deerfield, postpones construction of the new Cambridge WWTP for 5 years with no capital expenditure on the existing plant, and postpones the construction of the new Rockdale WWTP for 10 years by performing minor repairs on the existing plant.

8- Cambridge Regional option replaces all existing WWTPs with a regional treatment plant near Cambridge serving all three Urban Service Areas. Cambridge Regional option includes O&M and capital costs of forcemains necessary to convey wastewater from Rockdale and Deerfield to the regional plant.

Version 5/15/00

Town and Country Engineering prepared a report titled *Engineering Report for Wastewater Treatment Plant Modification* outlining interim options for the Cambridge wastewater treatment plant. The report proposed to complete an existing but incomplete third cell and utilize it as a facultative treatment and polishing pond to meet potential ammonia limits during warm weather months. (May-October).

With regards to meeting phosphorus limits, the Engineering Report assumes that economic variance currently in effect will be continued through the interim period. The Engineering Report assumes that ammonia limits will not be imposed on the plant for the interim upgrade.

The DNR has concluded that these assumptions are not realistic. Consequently, the Village of Cambridge withdrew its upgrading proposal on February 3, 2000. Therefore, this feasibility study assumes that the existing Cambridge treatment plant will be operated, and will perform, as it has been, for the next 5 years (interim 5), with its existing discharge limits.

Other Environmental Impacts

- **Treatment Plant Construction**

  Construction of the various treatment plants considered as viable options will have minimal environmental impact if construction erosion reduction measures are put in place. The DNR requires construction erosion measures as part of its approval process for facilities construction.

- **Forcemain Construction**

  Forcemains are typically smaller pipes and can be buried in shallow ground without regard to the slope and grade of the ground. The trenching required is narrow and shallow, resulting in less disturbance than gravity sewers. Construction erosion reduction measures are required for sewer main construction.

- **Creek Crossings**

  One creek crossing would be required for a forcemain between Deerfield and Cambridge. The forcemain from Rockdale to Cambridge may not require any creek crossing. Creek crossings can generally be done through bi-directional tunneling under the creek bed without disturbing the creek. If tunneling proves impracticable, trenching across a creek can result in temporary construction impacts. These impacts are typically not expected to be significant or lasting if reasonable construction erosion control practices are observed.

- **Energy Consumption Impacts**

  The net energy consumption impact of the various options is difficult to determine at this preliminary stage of planning. A regional treatment options typically results in significantly lower energy consumption for treatment and plant operation, due to economies of scale and avoiding duplication of facilities and functions, compared to separate treatment options. These energy savings are offset by the higher energy consumption for pumping wastewater from each service area to the regional plant.

- **Other Advantages and Disadvantages**

  A separate treatment option provides more autonomy for each community. However, this autonomy comes at the cost of foregoing the economies of scale and size which a regional plant provides. Furthermore, involved parties can jointly establish policies and institutional frameworks which can provide equitable decision-making regarding the regional facility. A regional facility, because of the larger base with which it operates, is usually better maintained, resulting in a better functioning treatment plant.

  From a land use viewpoint, the regional treatment option may result in increased pressure for development along the transmission route unless specific safeguards are instituted.

Scattered development is never beneficial from an urban service provision standpoint because the distances involved make the provision of services such as water, police, and fire protection expensive and unattainable. Scattered development uses up treatment capacity for unplanned development at the expense of planned urban development, which is the basis of the present analysis.

If a forcemain is used for the transmission of wastewater from Deerfield and Rockdale to Cambridge, there will be better protection from undesirable land use impacts from unplanned development along the route. A forcemain is more difficult to tap into and, in addition to governmental and institutional measures to discourage scattered development, will provide some measure of protection. Separate treatment options do not require such protection against scattered development.

6. Conclusions and Recommendations

Seven options have been evaluated in this feasibility study combining different wastewater treatment methods for the subject communities. These options are shown in Table 14 where they have been numbered 1-7. Two of these options involve postponing the construction of a new Cambridge treatment plant by 10 years. Because DNR has determined that the existing Cambridge WWTP is unlikely to function satisfactorily for the next 10 years, these two options (Option 3 and Option 5) are not viable.

Building new wastewater treatment plants immediately to replace each existing treatment plant, has the highest total present worth among the options and is 18.7% more costly than the least costly viable option (Option 6). The option of building a regional plant to replace all three existing facilities (Option 7) is 11% more cost effective than building three new treatment facilities (Option 1), and 5.2% more costly than the least costly viable option (Option 6).

Three of the options (Option 2, Option 4, and Option 6) are very similar in their present worth, clustered within 1% of one another. All three postpone building a new Cambridge wastewater facility for five years. The difference between the three options is in the construction of a new Rockdale wastewater facility. Rockdale would realize cost savings by extending the useful life of its existing facility by 10 years by conducting minor repairs to the plant to improve its performance.

The option of Rockdale regionalizing with Cambridge should be noted, although it has not been evaluated separately in this study. The total present worth cost of the forcemain from Rockdale to Cambridge is $531,000 (Table B-10, excluding engineering, legal, etc.). The total present worth cost of a new Rockdale treatment plant is $588,000.

Rockdale forecast 2020 flow is 4% of the Cambridge forecast 2020 flow. Some assumptions regarding Rockdale's share of the Cambridge capital cost and the operation and maintenance of the treatment plant needs to be made to allow a comparison between a Rockdale new plant and regionalization with Cambridge. The Rockdale Wastewater Facility Plan (MSA Professional Services 1998) calculates a connection charge by prorating the new treatment plant cost based on population ratios. Using the flow ratio instead, a connection charge of $192,000 can be calculated. The Rockdale facility plan also uses an annual O&M charge of $10,000, which equals to a PW cost of $106,000. Thus, the total present worth of regionalizing with Cambridge is $829,000, compared to $588,000 for a new Rockdale facility. Clearly, regionalization with Cambridge is not cost effective.

In summary, it appears that the most cost effective approach to wastewater treatment in the subject communities is to proceed immediately with building a new Deerfield treatment facility, to start construction of a new Cambridge facility in about 5 years, and to perform minor repairs on the existing Rockdale treatment plant to extend its useful life for another 10 years, and to replace the plant in about 10 years.

Table 14 - Summary of Regional Cost-Effectiveness of Various Options

OPTION	Adjusted [1] PW Capital	Adjusted PW O&M	Adjusted PW Total	Ratio to Lowest Cost Alternative	Rank
Cambridge New [2]	8,562,000	3,983,000	12,545,000	1.187	5
Cambridge Interim 5 [3]	7,263,000	3,390,500	10,653,500	1.008	3
Cambridge Interim 10 [4]	6,337,000	2,968,000	9,305,000	NA [9]	NA [9]
Cambridge Interim 5 & Rockdale Interim 5 [5]	7,240,000	3,411,000	10,651,000	1.008	2
Cambridge Interim 10 & Rockdale Interim 10 [6]	6,233,000	3,003,000	9,236,000	NA [9]	NA [9]
Cambridge Interim 5 & Rockdale Interim 10 [7]	7,159,000	3,411,000	10,570,000	1	1
Cambridge Regional [8]	6,130,000	3,128,000	11,121,000	1.052	4

NOTES:

1- The figures in this table do NOT include the typical 35% addition for "engineering, administration, contingencies, and legal" costs.

2- Cambridge New option includes new WWTPs for Deerfield, Rockdale, and Cambridge Urban Service Areas.

3- Cambridge Interim 5 options is the same as above, but delays the construction of the new Cambridge WWTP for 5 years.

4- Cambridge Interim 10 option is the same as above, but delays the construction of the new Cambridge WWTP for 10 years.

5- Same as Cambridge Interim 5 except this option also delays construction of the new Rockdale WWTP for 5 years by performing minor repairs on the existing Rockdale WWTP.

6- Same as Cambridge Interim 10 except this option also delays construction of a new Rockdale WWTP for 10 years by performing minor repairs on the existing Rockdale WWTP.

7- Same as Cambridge Interim 5 except this option also delays construction of the New Rockdale WWTP for 10 years by performing minor repairs on the existing Rockdale WWTP.

8- Cambridge Regional option replaces all existing WWTPs with a regional treatment plant near Cambridge serving all three Urban Service Areas and the Town of Oakland Service Area (Jefferson County). Cambridge Regional option includes O&M and capital costs of forcemains necessary to convey wastewater from Rockdale and Deerfield to the regional plan.

9- Cambridge Interim 10 options have not been included in the ranking since this option may not meet water quality standards.

Version 5/15/00

Appendix A

WPDES Permits

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary
Ruthe E. Badger, Director

South Central Region Hdqrtrs.
3911 Fish Hatchery Road
Fitchburg, WI 53711-5397
TELEPHONE 608-275-3266
FAX 608-275-3338
TDD 608-275-3231

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO: 3400

Ms. Barbara Winters, Clerk/Treasurer
Village of Cambridge
200 Spring Street
P.O. Box 89
Cambridge, WI 53523

SUBJECT: WPDES Permit No. WI-0026948-6
Permit Reissuance

Dear Ms. Winters:

Your application for reissuance of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit has been processed by this Department. The conditions of the attached permit number WI-0026948-6, were determined using the permit application, information from your WPDES permit file, comments received during the public notice period, Wisconsin Administrative Codes NR 102, NR 105, NR 106, NR 200, NR 203, NR 204, NR 205, NR 207, NR 208, NR 210, NR 211, NR 217, NR 218 and NR 219.

The attached WPDES permit covers the discharge from the facility located at W½, Section 6, T6N, R13E, Oakland Township, Jefferson County into Koshkonong Creek (Lower Koshkonong Creek Watershed, LR11 - Lower Rock River Basin) in Jefferson County. All discharges from this facility and actions or reports relating thereto shall be in accordance with the terms and conditions of this permit.

In accordance with this permit, discharge monitoring report forms are required to be submitted by you to the Department on a periodic basis. Blank copies of these report forms and instructions for completing them will be mailed to you under separate cover.

The attached permit contains water quality based effluent limitations which are necessary to ensure that the water quality standards for Koshkonong Creek are met. You may apply for a variance from the water quality standard used to derive the limitations pursuant to s. 283.15, Wis. Stats. (formerly s. 147.05, Wis. Stats.), by submitting an application to: Al Shea, Director, Bureau of Watershed Management, P.O. Box 7921, Madison, Wisconsin 53707

within 30 days after the date of reissuance of this permit. Within 30 days of receipt of your application for variance, the Department will notify you of the specific information you must provide to complete your application. Once your application is complete, the Department will issue a public notice of receipt of your application for variance, which will include a 30 day comment period. A tentative decision on your application for variance will be issued within 120 days after receipt of the complete application. A final decision on your application will be issued within 90 days of the expiration of the 30 day comment period provided in the notice of the tentative decision.

The final decision of the Department may be to approve your request for a variance, in whole or in part, or to deny the request. In order to obtain a variance, you must demonstrate by the greater weight of the credible evidence, at least one of the following:

1. Naturally occurring pollutant concentrations prevent the attainment of the standard.

2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the standard, unless these conditions may be compensated for by the discharge of sufficient volume of effluent without violating water conservation requirements.

3. Human caused conditions or sources of pollution prevent the attainment of the standard and cannot be remedied or would cause more environmental damage to correct than to leave in place.

4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the standard, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the standard.

5. Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses.

6. The standard, as applied to the permittee, will cause substantial and widespread adverse social and economic impacts in the area where the permittee is located.

The WPDES permit program has been approved by the Administrator of the U.S. Environmental Protection Agency pursuant to Section 402(b) of the Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. Section 1342 (b)). The terms and conditions of this permit are accordingly subject to enforcement under Sections 283.91 and 283.89, Wis. Stats., (formerly 147.21 and 147.29, Wis. Stats.), and Section 309 of the Federal Act (33 U.S.C. Section 1319).

The Department has the authority under Chapters 283 and 160, Wis. Stats., to establish effluent limitations, monitoring requirements, and other permit conditions for discharges to groundwater and surface waters of the State. The Department also has the authority to issue, reissue, modify, suspend or revoke WPDES permits under Chapter 283, Wis. Stats., (formerly Chapter 147,

Wis. Stats.), and has adopted Wis. Adm. Code Chapters NR 102, NR 105, NR 106, NR 200, NR 203, NR 204, NR 205, NR 207, NR 208, NR 210, NR 211, NR 217, NR 218 and NR 219 under this authority.

To challenge the reasonableness of or necessity for any term or condition of the attached permit, Section 283.63, Wis. Stats., (formerly Section 147.20, Wis. Stats.), and Chapter NR 203, Wis. Adm. Code require that you file a verified petition for review with the Secretary of the Department of Natural Resources within 60 days of the date of this letter. This notice is provided pursuant to Section 227.48, Wis. Stats., as renumbered by 1985 Wisconsin Act 182.

Sincerely,

for RB

Ruthe Badger
South Central Region Director

Dated: 3/30/99

RAS:ras
wwcambrg.clt

Enclosures

cc: Cyndi Barr - WT/2 - WW Permits File
Larry Benson - SCR
Ms. Janet Smith, U.S. Fish and Wildlife Service, 1015 Challenger Court, Green Bay, WI 54311
SCR - WW Program Assistant
Mr. Kenneth Raymond, Operator, Village of Cambridge WWTF, 200 Spring Street, P.O. Box 89, Cambridge, WI 53523
Mr. William N. Lane, Director, ERP, Dane County Regional Planning Commission, 217 South Hamilton Street, Suite 403, Madison, WI 53703

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 283, Wisconsin Statutes [formerly Chapter 147],

THE CAMBRIDGE WATER AND SEWER UTILITY

is permitted to discharge from a facility located at

W½ SECTION 6, T6N, R13E, OAKLAND TOWNSHIP, JEFFERSON, COUNTY

to KOSHKONONG CREEK (LOWER KOSHKONONG CREEK WATERSHED, LR11 - LOWER ROCK RIVER BASIN) IN JEFFERSON COUNTY

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____ for RB
Ruthe Badger
Regional Director

3/30/99
Date of Signature

WISCONSIN
DEPT. OF NATURAL RESOURCES

EFFECTIVE DATE: APRIL 1, 1999

EXPIRATION DATE: MARCH 31, 2004

TABLE OF CONTENTS

A. Monitoring Requirements - Influent

INFLUENT SAMPLING POINT: influent channel.

Parameters	Units	Sample Frequency	Sample Type
Flow	MGD	Continuous	
BOD_5	mg/L	1x Weekly	24-hr. Composite (flow proportional)
Suspended Solids	mg/L	1x Weekly	24-hr. Composite (flow proportional)

B. Monitoring Requirements and Limitations - Effluent

EFFLUENT SAMPLING POINT: Outfall #001, prior to the chlorine contact chamber for Composite samples and after dechlorination for Grab samples, prior to discharge to the receiving stream.

The concentration limitations are based on an annual average design flow of 0.355 MGD and the Chlorine Residual mass limitation is based on an maximum day design flow of 0.76 MGD.

Parameters	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Sample Frequency	Sample Type
Flow					(MGD) Continuous	
BOD_5			45 mg/L	30 mg/L	1x Weekly	24-hr Comp. (flow proportional)
Suspended Solids				60 mg/L	1x Weekly	24-hr Comp. (flow proportional)
Chlorine Residual	38 µg/L (0.24 lb/d)				Daily	Grab
Fecal Coliforms				400/100ml	1x Weekly	Grab
Ammonia-N May - October			Monitoring Only mg/L		1x Weekly	24-hr Comp. (flow proportional)
pH	9.0 s.u.	6.0 s.u.			Daily	Grab
Phosphorus, Total				5.3 mg/L	1x Weekly	24-hr Comp. (flow proportional)

C. Monitoring Requirements - Whole Effluent Toxicity

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, Edition 1" (PUBL-WW-033-096*, as required by NR 219.04, Table A, parameters 9 & 10, footnote 8, Wis. Adm. Code), and the clarifications listed below.

Effluent samples shall be taken from Outfall #001, after all treatment processes as a flow proportional Composite sample.

Primary Control Water: Koshkonong Creek

Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

Test Species: *Ceriodaphnia dubia* and the fathead minnow (*Pimephales promelas*).

MONITORING SCHEDULE:

Sample for acute toxicity between:	Results due by:
October - December, 1999	February 15, 2000
January - March, 2001	May 15, 2001
April - June, 2002	August 15, 2002
July - September, 2003	November 15, 2003

DETERMINATION OF POSITIVE RESULTS: An acute toxicity test shall be considered positive if the LC_{50} for either species is calculated to be < 100% effluent concentration.
REPORTING: Results shall be reported on the "Whole Effluent Toxicity Test Report Form" (page 40 of the "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, Edition 1*"). One copy for each test shall be sent to the Biomonitoring Coordinator, WT/2, Bureau of Watershed Management, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of completing the test.

NOTIFICATION OF A POSITIVE RESULT AND ADDITIONAL TESTING ("RETEST") REQUIREMENTS: The permittee shall notify the Department within 21 days of test end if a test result is positive. Within 90 days of the test which showed positive results, the permittee shall submit the results of at least 2 retests. The retests shall be completed in accordance with the requirements specified above for the original test.

D. Monitoring Requirements and Limitations - Sludge

SLUDGE OUTFALL: #002

Lagoon Sludge Management - All Sludge management activities shall be conducted in compliance with the Domestic Sewage Sludge Management Code, Wisconsin Administrative Code NR 204. The permittee shall contact the Department prior to recycling/disposing of any sludge.

The Permittee shall monitor for LIST 1 during the 2nd year of the permit (2000). Sludge monitoring results for LIST 1 shall be submitted by January 31, 2001.

LIST 1

Parameter	Unit	Limit	High Quality Limit
Total Solids	%	-	-
Arsenic	mg/kg (dry weight)	75	41
Cadmium	mg/kg (dry weight)	85	39
Copper	mg/kg (dry weight)	4300	1500
Lead	mg/kg (dry weight)	840	300
Mercury	mg/kg (dry weight)	57	17
Molybdenum	mg/kg (dry weight)	75	-
Nickel	mg/kg (dry weight)	420	420
Selenium	mg/kg (dry weight)	100	100
Zinc	mg/kg (dry weight)	7500	2800

E. Schedules of Compliance

(1) Ammonia

After the Department has completed the process of codifying ammonia requirements, final regulatory limits will be imposed. The Department will provide the CAMBRIDGE WATER AND SEWER UTILITY with potential effluent limitations for ammonia for informational purposes only. In the interim, the CAMBRIDGE WATER AND SEWER UTILITY shall take the following steps:

Required Action	Date Due
(a) Reach a conclusion regarding the plant's ability to meet potential limits and inform the Department in writing of that conclusion. If the conclusion is that potential limits are currently being met, parts (b) and (c) below will not be required. If potential limits are not being met the permittee shall implement plant process control changes to optimize the ammonia treatment capabilities.	April 30, 2000
(b) If further actions are required to meet potential limits, submit a plan of investigations to indicate how various alternatives will be evaluated, including dates, which may allow the permittee to meet potential limits or insure attainment of water quality standards for ammonia.	October 31, 2000
(c) Submit a report detailing results of efforts made or which are ongoing to meet potential limits and/or water quality standards.	March 31, 2003

F. Standard Requirements

(1) NR 205: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

REPORTING AND MONITORING REQUIREMENTS

(2) MONITORING RESULTS: Monitoring results obtained during the previous month shall be summarized and reported on a **WPDES Discharge Monitoring Report (DMR), #3200-28**, postmarked no later than the 15th day of the month following the completed reporting period. The original and regional copies of Form #3200-28 shall be submitted to your DNR regional office. The facility copy shall be retained by the permittee. Sludge monitoring shall be reported on Characteristic Form 3400-49 by January 31, following the year sludge analysis is performed.

(a) If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included in the calculations and reporting. The data shall be submitted on the DMR or sludge reporting form.

(b) The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

(c) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the department in this permit.

(d) Upon written request to the department and subject to the department's approval, a permittee may submit electronic discharge monitoring reports provided the permittee signs and submits an electronic discharge monitoring agreement certifying that the information was gathered and prepared under his or her supervision and, based on inquiry of the people directly under his or her supervision, that to the best of his or her knowledge the information is true, accurate and complete. The party signing the agreement shall make a similar certification when submitting subsequent information by electronic media or electronic transmission. Electronic reporting shall be an alternative to written reports.

(3) WATER QUALITY SAMPLING AND TESTING PROCEDURES: Sampling and laboratory testing procedures shall be performed by a laboratory certified in accordance with the requirements of ch. 149. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, then the method with the lowest limit of detection shall

be selected. Additional test procedures may be specified elsewhere in this permit.

(4) **RECORDING OF RESULTS**: For each effluent measurement or sample taken, the permittee shall record the following information.

(a) The date, exact place, method and time of sampling or measurements;
(b) The individual who performed the sampling or measurements;
(c) The date the analysis was performed;
(d) The individual who performed the analysis;
(e) The analytical techniques or methods used; and
(f) The results of the analysis.

(5) **REPORTING OF MONITORING RESULTS**: The permittee shall use the following conventions when reporting effluent monitoring results:

(a) Effluent concentrations less than the level of detection shall be reported as < (less than) the value of the level of detection. For example, if a substance is not detected at a detection level of 0.1 mg/L, report the effluent concentration as <0.1 mg/L.

(b) Effluent concentrations equal to or greater than the level of detection, but less than the level of quantitation, shall be reported and the level of quantitation shall be specified.

(c) For the purposes of calculating an average or a mass discharge value, the permittee may substitute a 0 (zero) for any effluent concentration that is less than the level of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

(6) **DETERMINING COMPLIANCE WITH A WATER QUALITY BASED EFFLUENT LIMITATION**:

(a) When the water quality based effluent limitation is less than the limit of detection, levels less than the limit of detection are in compliance with the effluent limitation.

(b) When the water quality based effluent limitation is less than the limit of detection, effluent levels greater than the limit of detection, but less than the limit of quantitation are in compliance with the effluent limitation except when analytically confirmed and statistically confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

(c) When the water quality based effluent limitation is greater than the limit of detection, but less than the limit of quantitation, levels less than the limit of detection or less than the limit of quantitation are in compliance with the effluent limitation.

F. Standard Requirements (cont.)

(d) When the water quality based effluent limitation is expressed in the permit as a daily maximum or average mass limitation, compliance is determined according to the provisions of paragraphs (a), (b) and (c) after converting the limit of detection and limit of quantitation to mass values using appropriate conversion factors and the actual daily effluent flow (or actual average effluent flow for the averaging period).

(7) **APPLICABILITY OF ALTERNATIVE WET WEATHER MASS LIMITATIONS**:

(a) An alternative wet weather mass limitation applies when:

1) The applicable mass limitation (based on annual average design flow) is exceeded; and
2) The permittee demonstrates to the satisfaction of the Department that the discharge exceedance is caused by and occurs during a wet weather event. For the purposes of this demonstration, a wet weather event occurs during and immediately following periods of precipitation or snowmelt, including but not limited to rain, sleet, snow, hail or melting snow during which water from the precipitation, snowmelt or elevated groundwater enters the sewerage system through infiltration or inflow, or both. The permittee shall present demonstrations to the Department by attaching them to Discharge Monitoring Reports.

Note: In making this demonstration, the permittee may want to consider presenting a discussion of normal effluent flow rates, the effluent flow rates that resulted in the exceedance and identification of the event, including intensity and duration, which caused the high flow rates. A graph of effluent flow over time may also be helpful.

(8) **COMPLIANCE MAINTENANCE ANNUAL REPORTS**: Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater treatment and conveyance system. The CMAR shall be **submitted by the Permittee on or before March 31 of each year** on a report form provided by the Department. The CMAR shall be completed and signed by a duly authorized representative. In the case of a publicly owned treatment works, the municipality's governing body shall submit a resolution accompanying the CMAR, that deals with how the permittee will address the problems identified.

(9) **RECORDS RETENTION**: The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or ch. NR 204, shall be retained for a minimum of 5 years.

(10) **OTHER INFORMATION**: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a

F. Standard Requirements (cont.)

permit application or in any report to the department, it shall promptly submit such facts or correct information to the department.

SYSTEM OPERATING REQUIREMENTS

(11) NONCOMPLIANCE NOTIFICATION:

(a) The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance.

1) Any noncompliance which may endanger health or the environment.
2) Any violation of an effluent limitation resulting from an unanticipated bypass.
3) Any violation of an effluent limitation resulting from an upset.
4) Any violation of a discharge limitation for any of the pollutants listed by the department in the permit, either for effluent or sludge.

(b) A written report describing the noncompliance reported in (a) shall be submitted to the Department's regional office within 5 days after the permittee becoming aware of the noncompliance. The Department may waive the written report on a case-by-case basis based on the oral report received within 24 hours. The written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

(12) FLOW METERS: Flow meters shall be calibrated annually, as per s. NR 218.06.

(13) RAW GRIT AND SCREENING: All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under ch. NR 500-520.

(14) PROHIBITED WASTES: Under no circumstances may the introduction of wastes prohibited by s. NR 211.10 be allowed into the waste treatment system. Prohibited wastes include those:

(a) Which create a fire or explosion hazard in the treatment work;

(b) Which will cause corrosive structural damage to the treatment work;

(c) Solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;

(d) Wastewaters at a flow rate of pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; or

F. Standard Requirements (cont.)

(e) Changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

(15) **UNSCHEDULED BYPASSING**: Any unscheduled diversion or bypass of wastewater at the treatment work or collection system is prohibited except in the following cases:

(a) An inadvertent bypass resulting from equipment damage or temporary power interruption;

(b) An unavoidable bypass necessary to prevent loss of life or severe property damage; or

(c) A bypass of excessive storm drainage or runoff which would damage any facilities necessary for compliance with the effluent limitations and prohibitions of the permit.

(d) In the event of an unscheduled bypass, the permittee shall immediately notify the Department regional office by telephone within 24 hours after an occurrence. In addition, the permittee shall notify the Department by letter within 5 days after each such unscheduled diversion or unscheduled bypass. The written notification shall at a minimum include reasons for such unscheduled bypass including dates, length of bypass and steps taken or planned to correct and eliminate such occurrences.

(16) **SCHEDULED BYPASSING**: Any construction or normal maintenance which results in a bypass of wastewater from a treatment system is prohibited unless authorized by the Department in writing. If the Department determines that there is significant public interest in the proposed action, the Department may schedule a public hearing or notice a proposal to approve the bypass. Each request shall specify the following minimum information:

(a) Proposed date of bypass;
(b) Estimated duration of the bypass;
(c) Alternatives to bypassing; and
(d) Measures to mitigate environmental harm caused by the bypass.

(17) **PROPER OPERATION AND MAINTENANCE**: The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of the permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2). Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114 and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

SURFACE WATER REQUIREMENTS

F. Standard Requirements (cont.)

(18) **VISIBLE FOAM OR FLOATING SOLIDS**: There shall be no discharge of floating solids or visible foam in other than trace amounts.

(19) **PERCENT REMOVAL**: During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively.

(20) **APPROPRIATE FORMULAS**: The permittee shall use the following formulas for calculating averages and mass limits:

Mass Limits:

Weekly/Monthly average concentration = the sum of all daily results for that week/month, divided by the number of results during that time period.

Weekly Average Mass Discharge (lbs/day) -
(a) Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34 lbs/gal
(b) Average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day) -
(c) Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34 lbs/gal
(d) Average the daily mass values for the month.

(21) **FECAL COLIFORMS**: The limit for fecal coliforms shall be expressed as a monthly geometric mean.

(22) **DISINFECTION**: Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection, the limitation for residual chlorine shall apply when the chlorination equipment is in use. A dechlorination process shall be in operation for the period of chlorine use.

(23) **TOTAL RESIDUAL CHLORINE**: Compliance with the total chlorine residual limitation shall be demonstrated.

(a) Sample results which show no detectable levels using approved test methods will be considered in compliance with the limit. These test results shall be reported on Discharge Monitoring Reports as "< 100 μg/L". (Note: 0.1 mg/L converts to 100 μg/L)

(b) Samples showing detectable traces of chlorine shall be considered in compliance if measured at less than 100 μg/L, unless there is a consistent pattern of detectable values in this range. These values shall also be reported on Discharge Monitoring Reports as "< 100 μg/L." The facility operating staff shall record actual readings on logs maintained at the plant, shall take action to determine the reliability of detected results (such as re-sampling and/or calculating dosages), and shall adjust the chemical feed system if necessary to reduce the chances of detects.

F. Standard Requirements (cont.)

(c) Samples showing detectable levels greater than 100 µg/L shall be considered as exceedances, and shall be reported as measured.

(d) To calculate average or mass discharge values, a "0" (zero) may be substituted for any test result less than 100 µg/L. Calculated values shall then be compared directly to the average or mass limitations to determine compliance.

(24) **WHOLE EFFLUENT TOXICITY IDENTIFICATION**: In the event of serious or repeated toxicity, the permittee may obtain approval from the Department to postpone retests in order to investigate the source(s) of toxicity. In order to postpone these tests, the permittee must provide the following information to the Department in writing, within 21 days of the end of the test which showed a positive result:

(a) A description of the investigation to be used to identify potential sources of toxicity. Treatment efficiency, housekeeping practices, and chemicals used in operation of the facility should be included in the investigation.

(b) Who will conduct a toxicity identification evaluation (TIE), if required.

Once the above investigation has been completed, the permittee must conduct the postponed test(s) to demonstrate that toxicity has been reduced/eliminated.

(25) **FILL AND DRAW SYSTEMS:** The permittee shall notify the Department at least 7 days prior to an anticipated discharge from a fill and draw system. The pond contents shall be sampled prior to any discharge to assure that adequate stabilization has taken place.

Appendix A: Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Report	Date	Page
Acute WETOX Results	February 15, 2000	3
Acute WETOX Results	May 15, 2001	3
Acute WETOX Results	August 15, 2002	3
Acute WETOX Results	November 15, 2003	3
AMMONIA - Compliance Schedule: Submit conclusions	April 30, 2000	5
Ammonia - Submit a plan of investigations	October 31, 2000	5
Ammonia - Submit report detailing results	March 31, 2003	5
WPDES Discharge Monitoring Report (DMR), #3200-28	no later than the 15th day of the month following the completed reporting period	6
Compliance Maintenance Annual Reports (CMAR)	submitted by the Permittee on or before March 31 of each year	8
Sludge monitoring results for LIST 1	January 31, 2001	4

All reports and submittals required by this permit except compliance schedule reports, whole effluent toxicity test results and sludge reports shall be sent to the South Central Regional Headquarters. Compliance schedule reports, whole effluent toxicity test results and all sludge reports shall be sent to the Bureau of Watershed Management. The addresses are:

WI Department of Natural Resources
South Central Regional Headquarters
3911 Fish Hatchery Road
Fitchburg, WI 53711

WI Department of Natural Resources
Bureau of Watershed Management
P.O. Box 7921
Madison, WI 53707-7921

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES
PUBLIC NOTICE OF INTENT TO REISSUE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES) PERMIT #WI-**0023744-6**

Proposed Expiration Date: **DECEMBER 31, 2004**

Permittee: **VILLAGE OF DEERFIELD, 4 North Main Street, Deerfield WI 53531**

Discharge Facility Location: **201 INDUSTRIAL PARK DRIVE, DEERFIELD, WISCONSIN**

Receiving Water: **UNNAMED TRIBUTARY OF MUD CREEK (UPPER KOSHKONONG CREEK WATERSHED, LR12 - LOWER ROCK RIVER BASIN) IN DANE COUNTY**

Brief Facility Description and Summary of Proposed Changes: **This facility is a package activated sludge plant designed to operate in extended air mode. Final clarification is accomplished in a single clarifier in the center of the concentric ring which forms the aeration chamber. Waste activated sludge is stored in an aerated storage tank prior to land spreading on agricultural land. Annual mass limits are no longer applicable based on current policy so, they will not be retained in the reissued permit. Chloride monitoring during the permit term indicates they are below calculated effluent limitations so, limitations or additional monitoring is not warranted at this time. Phosphorus monitoring indicates that they are over the threshold so a compliance schedule is included to meet an alternative or a 1.0 mg/L limitation.**

The Department has tentatively decided that this WPDES permit shall be reissued. Limitations and conditions which the Department believes adequately protect the receiving water are included in the proposed permit.

Persons wishing to comment on or object to the proposed permit, or to request a public hearing, may write to: Roger Schlesser, Municipal Permits Unit, South Central Region Headquarters, 3911 Fish Hatchery Road, Fitchburg, WI 53711. All comments or suggestions received no later than 30 days after the publication date of this notice will be considered along with other information on file in making a final decision regarding the permit. Where designated as a reviewable surface water discharge permit, the U.S. Environmental Protection Agency is allowed up to 90 days to submit comments or objections regarding this permit determination.

Land Application of sludge will be done in accordance with this permit and ch. NR 204, Wis. Adm Code. All application sites shall be approved prior to their use. If any person wishes to receive a list of approved sites, they may contact their regional sludge specialist.

A public informational hearing may be held if response to this notice indicates significant public interest pursuant to s. 283.49, Wis. Stats. [formerly s. 147.13, Wis. Stats.], or if a petition requesting a hearing is received from 5 or more persons. Requests for public informational hearings shall state the following: the name and address of the person(s) requesting the hearing; the interest in the proposed permit of the person(s) requesting the hearing; the reasons for the request; and the issues proposed to be considered at the hearing.

Information on file for this permit may be inspected and copied at the address above, or at the following address: Larry Benson, Lower Rock GMU, South Central Region Headquarters, 3911 Fish Hatchery Road, Fitchburg, WI 53711, (608) 275-3203, Monday through Friday (except holidays), between 9:00 a.m. and 3:30 p.m. Information on this permit may also be obtained by calling (608) 275-3284 or by writing the Department. Reasonable costs (usually 10 cents per page) will be charged for copies of information in the file other than the public notice and fact sheet. This information is also available for downloading from the internet using a world wide web browser at: http://www.dnr.state.wi.us/org/water/wm/ww/. Pursuant to the Americans with Disabilities Act, reasonable accommodation, including the provision of informational material in an alternative format, will be made available to qualified individuals upon request.

NAME AND ADDRESS OF PUBLISHING NEWSPAPER: Independent (The), 1 South Main Street, Deerfield, WI 53531
Date Notice Issued: September 23, 1999

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 283, Wisconsin Statutes [formerly Chapter 147],

THE VILLAGE OF DEERFIELD

PROPOSED
Subject to
Revision

is permitted to discharge from a facility located at

201 INDUSTRIAL PARK DRIVE, DEERFIELD, WISCONSIN

to an UNNAMED TRIBUTARY OF MUD CREEK (UPPER KOSHKONONG CREEK WATERSHED, LR12 - LOWER ROCK RIVER BASIN) IN DANE COUNTY

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Ruthe Badger
Regional Director

WISCONSIN
DEPT. OF NATURAL RESOURCES

_____
Date of Signature

EFFECTIVE DATE: JANUARY 1, 2000

EXPIRATION DATE: DECEMBER 31, 2004

TABLE OF CONTENTS

Page No.

A. Monitoring Requirements - Influent

INFLUENT SAMPLING POINT: after the comminutor.

Parameters	Units	Sample Frequency	Sample Type
Flow	MGD	Continuous	
BOD_5	mg/L	3x Weekly	24-hr. Composite (flow proportional)
Suspended Solids	mg/L	3x Weekly	24-hr. Composite (flow proportional)

B. Monitoring Requirements and Limitations - Effluent

EFFLUENT SAMPLING POINT: Outfall #001, after the final clarifier, prior to discharge to the receiving stream.

Parameters	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Sample Frequency	Sample Type
BOD_5			30 mg/L	20 mg/L	3x Weekly	24-hr Comp. (flow proportional)
Suspended Solids			30 mg/L	20 mg/L	3x Weekly	24-hr Comp. (flow proportional)
Dissolved Oxygen		4.0 mg/L			3x Weekly	Grab
pH	9.0 s.u.	6.0 s.u.			5x Weekly	Grab
Phosphorus, Total**				1.0 mg/L	3x Weekly	24-hr Comp. (flow proportional)

** Phosphorus monitoring and the limitation is effective October 1, 2003

C. Monitoring Requirements and Limitations - Sludge

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

Land Application of Sludge - All Sludge management activities shall be conducted in compliance with the Domestic Sewage Sludge Management Code, Wisconsin Administrative Code NR 204.

SLUDGE OUTFALL(S): #002, Aerobically digested, Liquid, Class B
#003, Other, Liquid, Class B

The discharge shall be monitored as follows. All instances of non-compliance shall be reported within 24 hours of discovery.

TESTING REQUIREMENT	MONITORING FREQUENCY/REQUIREMENT
List 1,3,4	Once per year (including list 2 just prior to land application)
List 2	Analyzed just prior to each land application season

SLUDGE OUTFALL # 002

TESTING REQUIREMENT	MONITORING FREQUENCY/REQUIREMENT
PCBs	Once during the year of 2001
Radium-226	Once per year

PCBs: The permittee shall analyze the sludge for total PCBs one time during the second year of the permit. Minimum level of detection in all cases shall be 10 mg/kg (on a dry weight basis). PCB Results shall be submitted by January 31, 2002.

Multiple Sludge Outfalls:

(1) If there are multiple sludge outfalls, but the sludges are not subject to different sludge treatment processes, then a separate "List 2" analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be determined for each sludge type. In this case, List 1, 3, & 4 need only be analyzed on a single sludge type, at the frequency specified above.

(2) If there are multiple sludge outfalls, due to multiple treatment processes, List 1, 2, 3, & 4 shall be analyzed for each outfall at the frequency stated in the table above.

Less Frequent Monitoring: Less frequent monitoring may be requested in writing to the Department. Granting such a request does not require a permit modification.

C. **Monitoring Requirements - Sludge** (cont.)

Changes in Feed Sludge Characteristics: If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, List 1, 2, 3 & 4 shall be reanalyzed each time such change occurs.

C. **Monitoring Requirements - Sludge** (cont.)

LIST 1

Parameter	Unit	Limit	High Quality Limit
Total Solids	%	-	-
Arsenic	mg/kg (dry weight)	75	41
Cadmium	mg/kg (dry weight)	85	39
Copper	mg/kg (dry weight)	4300	1500
Lead	mg/kg (dry weight)	840	300
Mercury	mg/kg (dry weight)	57	17
Molybdenum	mg/kg (dry weight)	75	-
Nickel	mg/kg (dry weight)	420	420
Selenium	mg/kg (dry weight)	100	100
Zinc	mg/kg (dry weight)	7500	2800

LIST 2 - NUTRIENTS

The parameters in List 2 shall be analyzed just prior to each land application season.

Parameter	Units
Total Solids (dry weight)	%
Total Kjeldahl Nitrogen (dry weight)	%
Ammonia Nitrogen (dry weight)	%
Total Phosphorus (dry weight)	%
Total Potassium (dry weight)	%

C. **Monitoring Requirements - Sludge** (cont.)

LIST 3

The permittee may select a different option as listed in list 3 at any time without modifying the permit. The Department shall be notified when an alternative option is utilized.

The following requirements shall be met prior to land application of sludge:

PATHOGEN DENSITIES FOR CLASS B SLUDGE

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion		Air Drying
Anaerobic Digestion		Composting
Alkaline Stabilization		PSRP Equivalent Process
* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.		

C. **Monitoring Requirements - Sludge** (cont.)

LIST 4 - VECTOR ATTRACTION REDUCTION

The permittee may select a different option as listed in list 4 at any time without modifying the permit. The Department shall be notified when an alternative option is utilized.

One of the following shall be satisfied prior to, or at the time of land application as specified in list 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

D. Schedules of Compliance

(1) Phosphorus

Required Action	Date Due
If an alternative effluent limitation is being requested, submit information in accordance with NR 217.04(2).	October 1, 2001
Complete all action necessary to comply with the 1.0 mg/L (or approved alternative) total phosphorus limitation.	October 1, 2003

E. Standard Requirements

(1) **NR 205**: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

REPORTING AND MONITORING REQUIREMENTS

(2) **MONITORING RESULTS**: Monitoring results obtained during the previous month shall be summarized and reported on a **WPDES Discharge Monitoring Report (DMR), #3200-28**, postmarked no later than the 15th day of the month following the completed reporting period. The original and regional copies of Form #3200-28 shall be submitted to your DNR regional office. The facility copy shall be retained by the permittee. Sludge monitoring shall be reported on Characteristic Form 3400-49 by January 31, following the year sludge analysis is performed.

(a) If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included in the calculations and reporting. The data shall be submitted on the DMR or sludge reporting form.

(b) The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

(c) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the department in this permit.

(d) Upon written request to the department and subject to the department's approval, a permittee may submit electronic discharge monitoring reports provided the permittee signs and submits an electronic discharge monitoring agreement certifying that the information was gathered and prepared under his or her supervision and, based on inquiry of the people directly under his or her supervision, that to the best of his or her knowledge the information is true, accurate and complete. The party signing the agreement shall make a similar certification when submitting subsequent information by electronic media or electronic transmission. Electronic reporting shall be an alternative to written reports.

(3) **WATER QUALITY SAMPLING AND TESTING PROCEDURES**: Sampling and laboratory testing procedures shall be performed by a laboratory certified in accordance with the requirements of ch. 149. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the

E. Standard Requirements (cont.)

methods available in NR 219, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified elsewhere in this permit.

(4) **RECORDING OF RESULTS**: For each effluent measurement or sample taken, the permittee shall record the following information.

(a) The date, exact place, method and time of sampling or measurements;
(b) The individual who performed the sampling or measurements;
(c) The date the analysis was performed;
(d) The individual who performed the analysis;
(e) The analytical techniques or methods used; and
(f) The results of the analysis.

(5) **REPORTING OF MONITORING RESULTS**: The permittee shall use the following conventions when reporting effluent monitoring results:

(a) Effluent concentrations less than the level of detection shall be reported as < (less than) the value of the level of detection. For example, if a substance is not detected at a detection level of 0.1 mg/L, report the effluent concentration as <0.1 mg/L.

(b) Effluent concentrations equal to or greater than the level of detection, but less than the level of quantitation, shall be reported and the level of quantitation shall be specified.

(c) For the purposes of calculating an average or a mass discharge value, the permittee may substitute a 0 (zero) for any effluent concentration that is less than the level of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

(6) **DETERMINING COMPLIANCE WITH A WATER QUALITY BASED EFFLUENT LIMITATION**:

(a) When the water quality based effluent limitation is less than the limit of detection, levels less than the limit of detection are in compliance with the effluent limitation.

(b) When the water quality based effluent limitation is less than the limit of detection, effluent levels greater than the limit of detection, but less than the limit of quantitation are in compliance with the effluent limitation except when analytically confirmed and statistically confirmed by a sufficient number of analyses of multiple samples and use of appropriate statistical techniques.

(c) When the water quality based effluent limitation is greater than the limit of detection, but less than the limit of quantitation, levels less than the limit of

E. Standard Requirements (cont.)

detection or less than the limit of quantitation are in compliance with the effluent limitation.

(d) When the water quality based effluent limitation is expressed in the permit as a daily maximum or average mass limitation, compliance is determined according to the provisions of paragraphs (a), (b) and (c) after converting the limit of detection and limit of quantitation to mass values using appropriate conversion factors and the actual daily effluent flow (or actual average effluent flow for the averaging period).

(7) **APPLICABILITY OF ALTERNATIVE WET WEATHER MASS LIMITATIONS**:

(a) An alternative wet weather mass limitation applies when:

1) The applicable mass limitation (based on annual average design flow) is exceeded; and
2) The permittee demonstrates to the satisfaction of the Department that the discharge exceedance is caused by and occurs during a wet weather event. For the purposes of this demonstration, a wet weather event occurs during and immediately following periods of precipitation or snowmelt, including but not limited to rain, sleet, snow, hail or melting snow during which water from the precipitation, snowmelt or elevated groundwater enters the sewerage system through infiltration or inflow, or both. The permittee shall present demonstrations to the Department by attaching them to Discharge Monitoring Reports.

Note: In making this demonstration, the permittee may want to consider presenting a discussion of normal effluent flow rates, the effluent flow rates that resulted in the exceedance and identification of the event, including intensity and duration, which caused the high flow rates. A graph of effluent flow over time may also be helpful.

(8) **COMPLIANCE MAINTENANCE ANNUAL REPORTS**: Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater treatment and conveyance system. The CMAR shall be **submitted by the Permittee on or before March 31 of each year** on a report form provided by the Department. The CMAR shall be completed and signed by a duly authorized representative. In the case of a publicly owned treatment works, the municipality's governing body shall submit a resolution accompanying the CMAR, that deals with how the permittee will address the problems identified.

(9) **RECORDS RETENTION**: The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or ch. NR 204, shall be retained for a minimum of 5 years.

E. Standard Requirements (cont.)

(10) **OTHER INFORMATION**: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the department, it shall promptly submit such facts or correct information to the department.

SYSTEM OPERATING REQUIREMENTS

(11) **NONCOMPLIANCE NOTIFICATION**:

(a) The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance.

1) Any noncompliance which may endanger health or the environment.
2) Any violation of an effluent limitation resulting from an unanticipated bypass.
3) Any violation of an effluent limitation resulting from an upset.
4) Any violation of a discharge limitation for any of the pollutants listed by the department in the permit, either for effluent or sludge.

(b) A written report describing the noncompliance reported in (a) shall be submitted to the Department's regional office within 5 days after the permittee becoming aware of the noncompliance. The Department may waive the written report on a case-by-case basis based on the oral report received within 24 hours. The written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

(12) **FLOW METERS**: Flow meters shall be calibrated annually, as per s. NR 218.06.

(13) **RAW GRIT AND SCREENING**: All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under ch. NR 500-520.

(14) **PROHIBITED WASTES**: Under no circumstances may the introduction of wastes prohibited by s. NR 211.10 be allowed into the waste treatment system. Prohibited wastes include those:

(a) Which create a fire or explosion hazard in the treatment work;

(b) Which will cause corrosive structural damage to the treatment work;

(c) Solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;

E. Standard Requirements (cont.)

(d) Wastewaters at a flow rate of pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; or

(e) Changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

(15) **UNSCHEDULED BYPASSING**: Any unscheduled diversion or bypass of wastewater at the treatment work or collection system is prohibited except in the following cases:

(a) An inadvertent bypass resulting from equipment damage or temporary power interruption;

(b) An unavoidable bypass necessary to prevent loss of life or severe property damage; or

(c) A bypass of excessive storm drainage or runoff which would damage any facilities necessary for compliance with the effluent limitations and prohibitions of the permit.

(d) In the event of an unscheduled bypass, the permittee shall immediately notify the Department regional office by telephone within 24 hours after an occurrence. In addition, the permittee shall notify the Department by letter within 5 days after each such unscheduled diversion or unscheduled bypass. The written notification shall at a minimum include reasons for such unscheduled bypass including dates, length of bypass and steps taken or planned to correct and eliminate such occurrences.

(16) **SCHEDULED BYPASSING**: Any construction or normal maintenance which results in a bypass of wastewater from a treatment system is prohibited unless authorized by the Department in writing. If the Department determines that there is significant public interest in the proposed action, the Department may schedule a public hearing or notice a proposal to approve the bypass. Each request shall specify the following minimum information:

(a) Proposed date of bypass;
(b) Estimated duration of the bypass;
(c) Alternatives to bypassing; and
(d) Measures to mitigate environmental harm caused by the bypass.

(17) **PROPER OPERATION AND MAINTENANCE**: The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of the permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2). Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114 and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

E. Standard Requirements (cont.)

SURFACE WATER REQUIREMENTS

(18) **VISIBLE FOAM OR FLOATING SOLIDS**: There shall be no discharge of floating solids or visible foam in other than trace amounts.

(19) **PERCENT REMOVAL**: During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively.

(20) **APPROPRIATE FORMULAS**: The permittee shall use the following formulas for calculating averages and mass limits:

Mass Limits:

Weekly/Monthly average concentration = the sum of all daily results for that week/month, divided by the number of results during that time period.

Weekly Average Mass Discharge (lbs/day) -
(a) Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34 lbs/gal
(b) Average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day) -
(c) Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34 lbs/gal
(d) Average the daily mass values for the month.

SLUDGE MANAGEMENT REQUIREMENTS

(21) **SLUDGE MANAGEMENT PROGRAM STANDARDS AND REQUIREMENTS BASED UPON FEDERALLY PROMULGATED REGULATIONS**:

NEW FEDERAL REGULATIONS. In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

(22) **GENERAL SLUDGE MANAGEMENT INFORMATION**: The General Sludge Management Information Form 3400-48 shall be submitted with your WPDES permit application. This form shall also be updated and submitted prior to any significant sludge management changes.

(23) **SLUDGE CHARACTERISTICS**: Each report shall consist of a Sludge Characteristic Form 3400-49 and Lab Report, unless approval for not submitting the lab reports has been given.

(24) **OTHER METHODS OF DISPOSAL OR DISTRIBUTION REPORT**: The permittee shall submit Report Form 3400-52 by January 31, following each year sludge is hauled to another facility, landfilled, incinerated, distributed or land applied.

E. **Standard Requirements** (cont.)

(25) **APPROVAL TO LAND APPLY**: Bulk non-exceptional quality sludge as defined in s. NR 204 may not be applied to land without a written approval letter or form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with ch. NR 204.06 (6). Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in ch. NR 204.07(3) (l), and is not allowed once 180 day storage is provided.

(26) **LAND APPLICATION SITE EVALUATION**: For non-exceptional quality sludge, as defined in s. NR 204 a Land Application Site Evaluation Form 3400-53 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

(27) **LAND APPLICATION REPORT**: Land Application Report Form 3400-55 shall be submitted by January 31, following each year non-exceptional sludge is land applied.

CLASS B PATHOGEN CONTROL

(28) **FECAL COLIFORM DENSITY - SLUDGE OUTFALL #002, #003**: Compliance with this requirement shall be demonstrated by calculating the geometric mean of at least 7 separate samples. The geometric mean shall be less than 2,000,000 MPN or CFU/gTS.

VECTOR CONTROL

(29) **INJECTION - SLUDGE OUTFALL #002, #003**: No significant amount of the sewage sludge shall be present on the land surface within one hour after the sludge is injected.

(30) **INCORPORATION - SLUDGE OUTFALL #002, #003**: Class B sludge shall be incorporated within 6 hours, or as approved by the Department.

(31) **NR 204.08 LANDFILL DISPOSAL**

(a) GENERAL. Sewage sludge may not be disposed of in a municipal solid waste landfill unless the landfill meets the requirements of chs. NR 500 to 536 and is an approved facility as defined in s. 289.01(3) Wis. Stats. [formerly s. 144.441(1)(a), Wis. Stats.]. Any facility accepting sewage sludge shall be approved by the Department in writing to accept sewage sludge. Disposal of sewage sludge in a municipal solid waste landfill shall be in accordance with ss. NR 506.13 and 506.14. Sewage sludge may not be disposed of in a surface disposal unit as defined in s. NR 204.03(62).

(b) APPROVAL. The permittee shall obtain approval from the Department prior to the disposal of sludge at a Wisconsin licensed landfill.

E. Standard Requirements (cont.)

(32) **LANDFILLING REPORTS**. The permittee shall report the volume of sludge disposed of at any landfill facility on form 3400-52. The permittee shall include the name and address of the landfill, the Department license number or other state's designation or license number for all landfills used during the report period and a letter of acceptability from the landfill owner. In addition, any permittee utilizing landfills as a disposal method shall submit to the Department any test results used to indicate acceptability of the sludge at a landfill. Form 3400-52 shall be submitted annually by January 31, following each year sludge is landfilled.

(33) **SLUDGE HAULING**: If sludge is hauled to another facility, the permittee is required to submit form 3400-52 to the Department. Information shall include the quantity of sludge hauled, the name, address, phone number, contact person, and permit number of the receiving facility. Form 3400-52 shall be submitted annually by January 31, following each year sludge is hauled.

(34) **LAND APPLICATION OF SLUDGE WHICH CONTAINS ELEVATED LEVELS OF RADIUM - 226**: Criteria for the land application of sludge containing Radium-226 are specified in s. NR 204.07(3)(n).

Appendix A: Summary of Reports Due

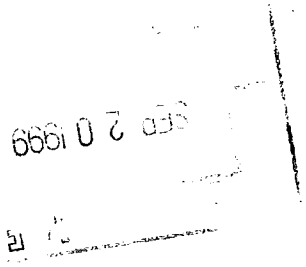
FOR INFORMATIONAL PURPOSES ONLY

Report	Date	Page
PCB Results	January 31, 2002	3
PHOSPHORUS - Compliance Schedule: Alternative effluent limitation request	October 1, 2001	8
Phosphorus - Complete all action necessary to comply with the Phosphorus limitation	October 1, 2003	8
WPDES Discharge Monitoring Report (DMR), #3200-28	no later than the 15th day of the month following the completed reporting period	9
Compliance Maintenance Annual Reports (CMAR)	submitted by the Permittee on or before March 31 of each year	11
Land Application Report Form 3400-55	January 31, following each year non-exceptional sludge is land applied	15
General Sludge Management Information Form 3400-48	updated and submitted prior to any significant sludge management changes	14
Sludge Characteristic Form 3400-49 and Lab Report	Both reports shall be submitted by January 31 following each year of analysis	14
Report Form 3400-52	January 31, following each year sludge is hauled to another facility, landfilled, incinerated, distributed or land applied	16

All reports and submittals required by this permit except compliance schedule reports, whole effluent toxicity test results and sludge reports shall be sent to the South Central Regional Headquarters. Compliance schedule reports, whole effluent toxicity test results and all sludge reports shall be sent to the Bureau of Watershed Management. The addresses are:

WI Department of Natural Resources
South Central Regional Headquarters
3911 Fish Hatchery Road
Fitchburg, WI 53711

WI Department of Natural Resources
Bureau of Watershed Management
P.O. Box 7921
Madison, WI 53707-7921



WISCONSIN
DEPT. OF NATURAL RESOURCES
George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Southern District Headquarters
3911 Fish Hatchery Road
Fitchburg, Wisconsin 53711
TELEPHONE 608-275-3266
TELEFAX 608-275-3338

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO: 3400

Mr. Robert Smithback, Village President
Village of Rockdale
148 East Adams Street - Rockdale
Cambridge, WI 53523

SUBJECT: WPDES Permit No. WI-0026352-5 JAN

Dear Mr. Smithback:

Your application for reissuance of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit has been processed by this Department. The conditions of the attached permit number WI-0026352-5, were determined using the permit application, information from your WPDES permit file, comments received during the public notice period, Wisconsin Administrative Codes NR 102, NR 105, NR 106, NR 200, NR 203, NR 204, NR 205, NR 207, NR 208, NR 210, NR 211, NR 217, NR 218, and NR 219.

The attached WPDES permit covers the discharge from the facility located at CTH "B" Rockdale Wisconsin into Koshkonong Creek in the Lower Rock River Basin in Dane County. All discharges from this facility and actions or reports relating thereto shall be in accordance with the terms and conditions of this permit.

In accordance with this permit, discharge monitoring report forms are required to be submitted by you to the Department on a periodic basis. Blank copies of these report forms and instructions for completing them will be mailed to you under separate cover.

The attached permit contains water quality based effluent limitations which are necessary to ensure that the water quality standards for Koshkonong Creek are met. You may apply for a variance from the water quality standard used to derive the limitations pursuant to s. 147.05, Wisconsin Statutes, by submitting an application to: George E. Meyer, Secretary, Department of Natural Resources, P.O. Box 7921, Madison, Wisconsin 53707 within 30 days after the date of reissuance of this permit. Within 30 days of receipt of your application for variance, the Department will notify you of the specific information you must provide to complete your application. Once your application is complete, the Department will issue a public notice of receipt of your application for variance, which will include a 30 day comment period. A tentative decision on your application for variance will be issued within 120 days after receipt of the complete application. A final decision on your

application will be issued within 90 days of the expiration of the 30 day comment period provided in the notice of the tentative decision.

The final decision of the Department may be to approve your request for a variance, in whole or in part, or to deny the request. In order to obtain a variance, you must demonstrate by the greater weight of the credible evidence, at least one of the following:

1. Naturally occurring pollutant concentrations prevent the attainment of the standard.

2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the standard, unless these conditions may be compensated for by the discharge of sufficient volume of effluent without violating water conservation requirements.

3. Human caused conditions or sources of pollution prevent the attainment of the standard and cannot be remedied or would cause more environmental damage to correct than to leave in place.

4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the standard, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the standard.

5. Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses.

6. The standard, as applied to the permittee, will cause substantial and widespread adverse social and economic impacts in the area where the permittee is located.

The WPDES permit program has been approved by the Administrator of the U.S. Environmental Protection Agency pursuant to Section 402(b) of the Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. Section 1342 (b)). The terms and conditions of this permit are accordingly subject to enforcement under Sections 147.21 and 147.29, Wis. Stats., and Section 309 of the Federal Act (33 U.S.C. Section 1319).

The Department has the authority under Chapters 147 and 160, Wisconsin Statutes, to establish effluent limitations, monitoring requirements, and other permit conditions for discharges to groundwater and surface waters of the State. The Department also has the authority to issue, reissue, modify, suspend or revoke WPDES permits under Chapter 147, Wisconsin Statutes and has adopted Wis. Adm. Code Chapters NR 102, NR 105, NR 106, NR 200, NR 203, NR 204, NR 205, NR 207, NR 208, NR 210, NR 211, NR 217, NR 218, NR 219 under this authority.

To challenge the reasonableness of or necessity for any term or condition of the attached permit, Section 147.20, Wis. Stats., and Chapter NR 203, Wis. Adm. Code require that you file a verified petition for review with the

Secretary of the Department of Natural Resources within 60 days of the date of this letter. This notice is provided pursuant to Section 227.48, Wis. Stats., as renumbered by 1985 Wisconsin Act 182.

Sincerely,

Floyd F. Stauty

for Ruth Badger
District Director

Dated: January 13, 1995

RAS:ras
ww1rockd.ale

Enclosures

cc: WW/2 Permits
Madison Area Office
U.S. Fish and Wildlife Service, 1015 Challenger Court,
Green Bay, WI 54311
SDH/WW - Program Assistant
WWTF Operator
Dane County RPC

Permit No. WI-0026352-5

PERMIT TO DISCHARGE UNDER THE
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 147, Wisconsin Statutes,

THE VILLAGE OF ROCKDALE

is permitted to discharge from a facility located at

CTH "B", ROCKDALE, WISCONSIN

to KOSHKONONG CREEK IN THE LOWER ROCK RIVER BASIN IN DANE COUNTY.

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit shall become effective on the date of signature.

This permit to discharge shall expire at midnight, December 31, 1999.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit in accordance with the requirements of Chapter NR 200, Wis. Adm. Code, at least 180 days prior to this expiration date.

State of Wisconsin Department of Natural Resources
For the Secretary

By Floyd F. Stauty

for Ruthe Badger
District Director

Dated January 13, 1995

TABLE OF CONTENTS

All reports required in Parts I and II of this permit shall be submitted to:

Wisconsin Department of Natural Resources
WPDES Permits - Municipal
Southern District Headquarters
3911 Fish Hatchery Road
Fitchburg, WI 53711

MONITORING REQUIREMENTS AND EFFLUENT LIMITATIONS

Reporting

Monitoring results obtained during the previous month shall be summarized and reported on a WPDES Discharge Monitoring Report Form, number 3200-28, postmarked no later than the 15th day of the month following the completed reporting period. The original and district copies of 3200-28 shall be submitted to your DNR district office. The facility copy is to be retained by the permittee.

Monitoring reports shall be signed by a principal executive officer, a ranking elected official, or other duly authorized representative.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be reported.

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code.

A. INFLUENT MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting until December 31, 1999, the permittee is required to perform the following monitoring.

Samples taken in compliance with the monitoring requirements specified below shall be taken from the wet well.

PARAMETER	UNITS	SAMPLE FREQUENCY	SAMPLE TYPE
Flow(1,2)	MGD	Daily	Total Daily
BOD_5	mg/l	1x Weekly	Grab
Suspended Solids	mg/l	1x Weekly	Grab

(1) Flow measurement of the wastewater volume received at the treatment plant, including any bypassed flow, shall be monitored continuously.

(2) When flow is measured by time clocks on lift station pumps, the pumps shall be calibrated annually. Calibration reports shall be submitted to the Department by June 30 of each year.

MONITORING REQUIREMENTS AND EFFLUENT LIMITATIONS

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting until December 31, 1999, the permittee is authorized to discharge from outfall serial number 002.

This discharge shall be limited and monitored by the permittee as specified below. Limits are based on a design flow of 0.025 MGD.

There shall be no discharge of visible or floating solids in other than trace amounts.

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively.

Samples shall be taken at the effluent manhole.

	EFFLUENT LIMITATIONS		MONITORING REQUIREMENTS	
EFFLUENT CHARACTERISTIC	Concentration Limits	Mass Limits[6]	Sample Frequency	Sample Type
Flow (MGD)	-	-	Daily	Total Daily
BOD_5	Monthly Avg. 30 mg/l Weekly Avg. 45 mg/l	Total Annual 2,283 lbs/yr	1x Weekly	Grab
Suspended Solids	Monthly Avg. 30 mg/l Weekly Avg. 45 mg/l	Total Annual 2,283 lbs/yr	1x Weekly	Grab
pH	Daily Min. 6.0 s.u. Daily Max. 9.0 s.u.	-	Daily	Grab
Residual Chlorine[1,3,4]	Daily Max. 37 ug/l	Total Annual 2.8 lbs/yr	Daily	Grab
Fecal Coliforms[1,2]	Monthly Geo. Mean 400/100 ml	-	1x Weekly	Grab
Total Phosphorus[5]	(Monitoring Only - 1998)	-	Quarterly	Grab

(1) Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Monitoring requirements and the limitation for residual chlorine apply whenever the chlorination equipment is in use. When chlorine is used for disinfection, a dechlorination process shall be in operation for the period of chlorine use.

(2) The limit for fecal coliforms is a monthly geometric mean.

(3) The chlorine annual mass limit has been calculated based on year-round chlorination even though disinfection is only required from May 1 to September 30 of each year.

(4) Concentration limits for chlorine residual are now set to protect water quality. Since present testing equipment may not measure as low as these limits accurately, compliance can be demonstrated as follows:

(a) Management practices: Chlorination and dechlorination equipment must be operated to effectively comply with the limit for fecal coliform, and neutralize all residual chlorine prior to discharge.

(b) Test methods: One of the following test methods must be used to measure chlorine residual: the iodometric back titration (EPA method 330.2) using amperometric

MONITORING REQUIREMENTS AND EFFLUENT LIMITATIONS

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (cont.)

endpoint detection, the DPD spectrophotometric method (EPA method 330.5), and the specific ion electrode method (Orion Research Instruction Manual, Electrode Model 97-70, 1977).

(c) Determining compliance and reporting:

- Sample results which show no detectable levels using one of the above test methods will be considered in compliance with the limit. These values shall be reported as "<100 µg/l."
- Samples showing detectable traces of chlorine shall be considered in compliance if measured at less than 100 µg/l, unless there is a consistent pattern of detectable values in this range. These values shall also be reported as "<100 µg/l." The facility operating staff must take action to determine if the detected result is accurate, and adjust the chlorine neutralization system if necessary.
- Samples showing detectable levels greater than 100 µg/l shall be considered as exceedances, and shall be reported as measured.
- To calculate average concentrations and monthly or annual mass discharge values a "0" (zero) may be substituted for any value less than 100 µg/l.

(5) Total phosphorus quarterly monitoring shall begin March 1, 1998, and continue until December 31, 1998, for a total of 4 sample results. Samples shall be collected for the months of March, June, September, and December. The test method used shall be in accordance with Chapter NR 219, Wis. Adm. Code.

(6) For purposes of determining compliance with mass limits, mass discharge values shall be calculated:

Monthly Average Concentration - as follows:
(a) The sum of all daily results for the month, divided by the number of results.

Total Annual Mass Discharge (lbs/year) - as follows:
(a) Monthly mass (lbs/month) = Monthly average concentration (mg/l) x total monthly flow (MG) x 8.34
(b) Total the monthly mass values for the entire year and report it on the December DMR.

SPECIAL REPORT REQUIREMENTS

A. COMPLIANCE MAINTENANCE ANNUAL REPORTS

Compliance Maintenance Annual Reports (CMAR) shall be completed on information obtained over each calendar year regarding the wastewater treatment and conveyance system. The CMAR shall be submitted by the permittee on or before March 31 of each year on a report form provided by the Department. The CMAR shall be completed and signed by a duly authorized representative. In the case of a publicly owned treatment works a resolution from the municipality's governing body shall accompany the CMAR.

B. SLUDGE MANAGEMENT REQUIREMENTS

All sludge management activities shall be conducted in compliance with the Municipal Sludge Management Code, Wisconsin Administrative Code NR 204 and 40 CFR 503 Federal Register. A violation of NR 204 constitutes a violation of this permit. All instances of noncompliance must be reported to the Department.

This permit may be reopened and modified to include additional monitoring or limits based on data collected or changes in Wisconsin Administrative Code NR 204.

Adequate facilities must be available to accept and treat septage generated within the respective sewer service areas, holding tank service areas, or planning areas as described in NR 113.08.

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they must be licensed under NR 500-520.

The sludge management forms and records as described below and required by this permit shall be retained for at least five years.

(1) GENERAL SLUDGE MANAGEMENT INFORMATION

The General Sludge Management Information Form 3400-48 shall be submitted by January 31 of even numbered years (e.g., 1996, 1998). This form shall also be updated and submitted prior to any significant sludge management changes. Significant changes include, but are not limited to: sending sludge to another facility for disposal, significant addition to actual flow, significant change in sludge storage capacity, and use of a new disposal or recycling method.

(2) SLUDGE CHARACTERISTICS

Sludge #01, Aerobically digested, liquid, shall be sampled and analyzed as described below. Representative samples shall be collected from the aerated digester in the manner described in the

SPECIAL REPORT REQUIREMENTS

B. SLUDGE MANAGEMENT REQUIREMENTS (cont.)

General Sludge Management Report (1994). The permittee shall make changes in the sampling location or procedure if this would result in a more representative sample. The permittee shall follow the procedures described in the DNR publication "Sludge Sampling Guidance, June 1988" which is available from the sludge coordinator, Southern District Headquarters. Any changes in sampling shall be reported with the subsequent sludge analysis report.

The sludge shall be sampled and analyzed annually for List 1. The permittee shall contact the DNR Southern District Sludge Coordinator at 3911 Fish Hatchery Road, Fitchburg, WI 53711, prior to recycling/disposing of any sludge that is not hauled by the contract hauler directly to another WWTF. If sludge is landspread directly from the Rockdale WWTF, additional monitoring is required. Reports shall be submitted by November 30, annually.

Each report shall consist of a Sludge Characteristics Form 3400-49 and a copy of the lab report. The lab report shall contain (for each parameter) the Department's parameter number, wet weight results, detection limit, %TS of sample analyzed, dry weight result, date of analysis and the test method used. If an additional cleanup technique is used beyond the minimum required in the method, a footnote stating the cleanup method should be included.

Sludge samples shall be preserved using recommended Department procedures. If any sludge parameter is analyzed more frequently than required by this permit using approved methods, then all analytical results shall be reported to the Department.

The parameters which require analysis and reporting may be changed by the Department on a case-by-case basis depending upon at least two years of test results.

List 1

Parameter[1]	Abbreviation	Units
Total Solids	TS	%
Total Kjeldahl Nitrogen	TKN	%
Ammonium Nitrogen	NH_4-N	%
Total Phosphorus	P	%
Total Potassium	K	%
Arsenic, Total	As	mg/kg
Cadmium, Total	Cd	mg/kg
Copper, Total	Cu	mg/kg
Chromium, Total	Cr	mg/kg
Lead, Total	Pb	mg/kg
Mercury, Total	Hg	mg/kg

SPECIAL REPORT REQUIREMENTS

B. SLUDGE MANAGEMENT REQUIREMENTS (cont.)

Molybdenum, Total	Mo	mg/kg
Nickel, Total	Ni	mg/kg
Selenium, Total	Se	mg/kg
Zinc, Total	Zn	mg/kg

[1] All parameters other than percent solids shall be calculated on a dry weight basis.

(3) ADDITIONAL REQUIREMENTS FOR LAND APPLICATION

Land application of sludge shall comply with the requirements of NR 204.07.

Agricultural practices at sludge landspreading fields shall minimize the entry of nutrients to surface and ground waters, and maintain or improve soil characteristics. Fields that are approved for landspreading must be referenced in a conservation plan developed by the Soil Conservation Service, U.S. Department of Agriculture, or be managed to minimize nutrient contamination of water resources (Refer to "Nutrient and Pesticide Best Management Practices for Wisconsin Farms", 1989, WDATCP Technical Bulletin ARM-1).

The permittee shall provide at least 180 days of sludge storage capacity. Winter landspreading (i.e., Dec. 1 through Mar. 31 of any year) of sludge shall be minimized, and is prohibited during this period whenever sludge storage capacity is available. Winter landspreading of sludge is permitted on an emergency basis when the sludge storage capacity is exceeded. The permittee must obtain emergency approval from the Southern District sludge coordinator, Wastewater section before landspreading during winter.

A Landspreading Site Evaluation Form 3400-53 shall be submitted to the Department as new sites for land application are proposed. Upon submission, the Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. If the site is approved, a written approval letter or Landspreading Approval Form 3400-122 will be issued by the Department. **SLUDGE MAY NOT BE APPLIED TO LAND WITHOUT A WRITTEN APPROVAL LETTER OR FORM 3400-122 FROM THE DEPARTMENT.** All conditions attached to the approval letter or Form 3400-122 must be complied with pursuant to NR 204.07. A violation of the standard or special conditions of approval constitutes a violation of this permit.

Activities involving the transportation, recycling or disposal of sludge shall be recorded in a log book. The log book shall be

SPECIAL REPORT REQUIREMENTS

B. SLUDGE MANAGEMENT REQUIREMENTS (cont.)

maintained on a daily basis when sludge activities are under way. These records shall be kept on file for five years and shall be available for inspection by Department representatives. The log book shall, at a minimum, contain the following information:

- Location of disposal, recycling or storage site
- Type of sludge activity (e.g., landspreading, landfilling)
- Type of sludge
- Amount of sludge hauled (given in dry tons, cubic yards, or gallons)
- Date of activity

Sludge Disposal-Land Application Report Form 3400-55 must be submitted by **JANUARY 31, ANNUALLY.** These forms contain a record of each site where sludge was land applied during the previous year and the total volume of sludge applied. The volume of sludge applied annually on a site may not exceed that which is necessary to supply the needs of the crop grown on that site. If approved sludge application rates or loading limits are exceeded, the site approval shall be rescinded and site and crop monitoring may be required.

In accordance with NR 204.06(4)(c), a soil test shall be completed and submitted to the Department at least after every 3 years of site use.

(4) SLUDGE DISPOSAL AT LICENSED LANDFILLS

Disposal of sludge at a sanitary landfill shall comply with the requirements of NR 204.09. The permittee shall obtain approval from the Department prior to disposal of sludge at a licensed sanitary landfill. If sludge is landfilled, a Landfill/Public Distribution Form 3400-52 is required to be submitted to the Department by **JANUARY 31, ANNUALLY.**

(5) SLUDGE DISPOSAL BY PUBLIC DISTRIBUTION OR MARKETING

Recycling of sludge by public distribution or marketing shall comply with the requirements of NR 204.08. Approval must be obtained from the Department prior to any distribution or marketing. The Department will require salmonella or other pathogen monitoring prior to approval. If sludge is distributed or marketed to the public, a Landfill/Public Distribution Form 3400-52 is required to be submitted to the Department by **JANUARY 31, ANNUALLY.**

GENERAL CONDITIONS

1. Duty to comply. The permittee shall comply with all conditions of the permit. Any permit noncompliance is a violation of the permit and is grounds for enforcement action, permit revocation or modification, or denial of a permit reissuance application.

2. Permit actions. As provided in s. 147.03, Stats., after notice and opportunity for a hearing the permit may be modified or revoked and reissued for cause. If the permittee files a request for a permit modification, revocation or reissuance, or a notification of planned changes or anticipated noncompliance, this action by itself does not relieve the permittee of any permit condition.

3. Property rights. The permit does not convey any property rights of any sort, or any exclusive privilege. The permit does not authorize any injury or damage to private property or any invasion of personal rights, or any infringement of federal, state or local laws or regulations.

4. Inspection and entry. The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to:

   a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are required under the conditions of the permit;

   b. Have access to and copy, at reasonable times, any records that are required under the conditions of the permit;

   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under the permit; and

   d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance, any substances or parameters at any location.

5. Recording of results. For each effluent measurement or sample taken, the permittee shall record the following information.

   a. The date, exact place, method and time of sampling or measurements;
   b. The individual who performed the sampling or measurements;
   c. The date the analysis was performed;
   d. The individual who performed the analysis;
   e. The analytical techniques or methods used; and
   f. The results of the analysis.

6. Records retention. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement,

GENERAL CONDITIONS

report or application. The Department may request that this period be extended by issuing a public notice to modify the permit to extend this period.

7. Signatory requirement. All applications, reports or information submitted to the Department shall be signed for a corporation by a responsible corporate officer including a president, secretary, treasurer, vice president or manager; and for a municipality by a ranking elected official; or other person authorized by one of the above and who has responsibility for the overall operation of the facility or activity regulated by the permit. The representative shall certify that the information was gathered and prepared under his or her supervision and based on inquiry of the people directly under his or her supervision that, to the best of his or her knowledge, the information is true, accurate and complete.

8. Compliance schedules. Reports of compliance or noncompliance with interim and final requirements contained in any compliance schedule of the permit shall be submitted in writing within 14 days after the schedule date, except that progress reports shall be submitted in writing on or before each schedule date for each report. Any report of noncompliance shall include the cause of noncompliance, a description of remedial actions taken and an estimate of the effect of the noncompliance on the permittee's ability to meet the remaining schedule dates.

9. Transfers. A permit is not transferable to any person except after notice to the Department. In the event of a transfer of control of a permitted facility, the prospective owner or operator shall file a new permit application and shall file a stipulation of permit acceptance with the Department WPDES permit section. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and to reflect the requirements of ch. 147, Stats.

10. Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities an systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of the permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2). Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114 and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

11. Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any adverse impact on the waters of the state resulting from noncompliance with the permit.

12. Duty to provide information. The permittee shall furnish the Department, within a reasonable time, any information which the

GENERAL CONDITIONS

Department may request to determine whether cause exists for modifying, revoking or reissuing the permit or to determine compliance with the permit. The permittee shall also furnish the Department, upon request, copies of records required to be kept by the permittee.

13. Planned changes. All permittees shall provide adequate advance notice to the Department of the following changes. This written notice shall provide information on the quality and quantity of influent introduced into the POTW, and any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

    a. Any new introduction of pollutants into a POTW from an indirect discharger which would be subject to s. 147.02, Stats., if it were directly discharging those pollutants; and

    b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of permit issuance.

14. Prohibited wastes. Under no circumstances may the introduction of wastes prohibited by s. NR 211.10 be allowed into the waste treatment system. Prohibited wastes include those:

    a. Which create a fire or explosion hazard in the treatment work;

    b. Which will cause corrosive structural damage to the treatment work;

    c. Solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;

    d. Wastewaters at a flow rate of pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; or

    e. Changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

15. Pretreatment. The permittee shall require any industrial user of the permitted facility to meet pretreatment standards established under s. 147.07(2), Stats., and to provide records or reports, or all information related to compliance with pretreatment standards.

16. Unscheduled bypassing. Any unscheduled diversion or bypass of wastewater at the treatment work or collection system is prohibited except in the following cases:

    a. An inadvertent bypass resulting from equipment damage or temporary power interruption;

GENERAL CONDITIONS

b. An unavoidable bypass necessary to prevent loss of life or severe property damage; or

c. A bypass of excessive storm drainage or runoff which would damage any facilities necessary for compliance with the effluent limitations and prohibitions of the permit. In the event of an unscheduled bypass, the permittee shall immediately notify the Department district office by telephone within 24 hours after an occurrence. In addition, the permittee shall notify the Department by letter within 5 days after each such unscheduled diversion or unscheduled bypass. The written notification shall at a minimum include reasons for such unscheduled bypass including dates, length of bypass and steps taken or planned to correct and eliminate such occurrences.

d. Discharges reported under this provision are not authorized by this permit and the Department may initiate legal action regarding such discharges. Such action is authorized by Section 147.29, Wis. Stats.

17. Scheduled bypassing. Any construction or normal maintenance which results in a bypass of wastewater from a treatment system is prohibited unless authorized by the Department in writing. If the Department determines that there is significant public interest in the proposed action, the Department may schedule a public hearing or notice a proposal to approve the bypass. Each request shall specify the following minimum information:

a. Proposed date of bypass;
b. Estimated duration of the bypass;
c. Alternatives to bypassing; and
d. Measures to mitigate environmental harm caused by the bypass.

18. Unscheduled sludge removal. Any disposal of grit, screenings, scum, sludges or other solids generated as a result of wastewater treatment processes shall be prohibited unless such disposal is authorized by a WPDES permit or other Department license or approval.

19. Groundwater Quality Impacts. Except as explicitly provided, nothing in this permit allows the permittee to discharge any substance in a concentration which would cause groundwater standards in ch. NR 140, Wis. Adm. Code, to be exceeded. Should a groundwater enforcement standard, preventive action limit or alternative concentration limit be exceeded, the Department will seek a response in accordance with ch. NR 140, Wis. Adm. Code. In accordance with ss. 147.02(3)(f), 160.23, and 160.25, Stats., the permittee shall comply with the groundwater quality standards contained in ch. NR 140, Wis. Adm. Code.

Appendix B

Present Worth Cost Estimates

Table B-1
Village of Rockdale
Alternative 1—Upgrade Existing Activated Sludge System
Replace with Recirculating Sand Filter in 5 Years
Economic Analysis

Capital Costs Phase I (years 1-5)

Item	Unit Cost	Qty	Units	Capital Costs	Design Life	Salvage Value
Sludge Pump and Controls	$12,000	1	ls	$12,000	15	$8,000
Blowers (2)	$9,000	2	ls	$18,000	15	$12,000
Influent Flowmeter	$4,000	1	ls	$4,000	15	$2,666
Effluent Flowmeter	$4,000	1	ls	$4,000	15	$2,666
Auto Samplers	$6,000	2	ls	$12,000	15	$8,000
Baffle in Contact Tank	$500	1	ls	$500	20	$0
New Influent Piping and Valves	$2,000	1	ls	$2,000	20	$0
Electrical (10%)	$4,000	1	ls	$4,000		$0
Mob./Demob., Bonding/Ins. (7.5%)	$3,000	1	ls	$3,000		$0
Sludge Storage	$80,000			$80,000	20	$0
Subtotal				$139,500		$33,332
Engr., Admin., Contingencies, and Legal (35%)				$48,825		
Total Estimated Capital Cost				$188,325		

Operation and Maintenance Costs Phase I (years 1-5)

	Annual Cost
Labor (16 hrs/wk @ $20/hr)	$16,600
Electricity @ $0.05/k W-hr	$2,000
Miscellaneous Maintenance	$2,500
Sampling and Analysis	$1,000
Sludge Disposal	$2,500
Annual O & M Cost	$24,600

Present Worth Phase I (years 1-5)

	Actual Cost	Present Worth
	PWF:	4.100 (P/A 5) 0.7130 (P/F 5)
Initial Capital Cost	$188,325	$188,325
Annual O & M Cost	$ 24,600	$100,860
Salvage Value	($33,332)	($23,766)

TOTAL ESTIMATE OF PRESENT WORTH—PHASE I	**$265,419**

Note: Present Worth estimated using discount rate = 7%

Table B-1 Continued
Village of Rockdale
Replacement RSF Plant in Year 5
Economic Analysis

Capital Costs Phase II (years 11-20)

Item	Capital Costs at Year 5	Design Life	Salvage Value At Year 20
Lagoon Abandonment	$15,000		0
Flow Meters	$8,000	15	0
Samplers	$12,000	15	0
Septic Tank	0		0
Earthwork	$7,000	40	$4,375
Structural	$62,000	40	$38,750
Planking and Hatches	$10,000	20	$2,500
Dosing Tank	0		0
Structural	$12,000	40	$7,500
Planking and Hatches	$3,000	20	$750
Splitter/Valve Vault	0		0
Structural	$8,000	40	$5,000
Grating	$3,000	20	$750
Weir Plates	$1,000	20	$250
RSF System	0		0
Earthwork	$12,000	40	$7,500
Filter Liner	$5,000	40	$3,125
Coarse Filter Media	$5,000	40	$3,125
Fine Filter Media	$18,000	40	$11,250
Underdrain Piping	$18,000	20	$4,500
Filter Piping	$15,000	20	$3,750
Land	$4,000	40	$2,500
Pumps and Controls	$30,000	15	0
Control Building	$25,000	30	$12,500
UV Disinfection	$30,000	20	$7,500
Fencing	$5,000	20	$1,250
Yard Piping (5%)	$15,000	40	$9,375
Site Work (5%)	$15,000	40	$9,375
Electrical	$31,000	20	$7,750
Mob./Demob.,Bonding/Ins. (7.5%)	$23,000	20	$5,750
Subtotal	$392,000		$149,125
Contingencies, Engr., Admin, and Legal (35% of Subtotal)	$137,200		
Total Estimated Capital Cost	$529,200		

Operation and Maintenance Costs (years 6-20)	Annual Cost
Labor (8 hours/week @ $20/hour)	$8,300
Electricity ($0.05/KW-hr)	$1,300
Miscellaneous Maintenance	$1,500
Sampling and Analysis	$6,000
Sludge Disposal	$2,500
Annual O & M Cost	$19,600

Present Worth Phase II (years 11-20)	Actual Cost	Present Worth @ Year 5
	PWF:	0.3624 (P/F, 15) 9.108 (P/A, 15)
Capital Cost at year 5	$529,200	$529,200
Annual O & M (year 6-20)	$19,600	$178,517
Salvage Value at Year 5	($149,125)	($54,043)

TOTAL ESTIMATE OF PRESENT WORTH PHASE II @ Year 5	$653,674
TOTAL PW FOR PHASES I AND II = $653,674 x 0.7130 + $265,419 =	**$731,500**

Note: Present Worth estimated using discount rate = 7%

Table B-2
Village of Rockdale
Alternative 2—Upgrade Existing Activated Sludge System
Replace with Recirculating Sand Filter in 10 Years
Economic Analysis

Capital Costs Phase I (years 1-10)

Item	Unit Cost	Qty	Units	Capital Costs	Design Life	Salvage Value
Sludge Pump and Controls	$12,000	1	ls	$12,000	15	$4,000
Blowers (2)	$9,000	2	ls	$18,000	15	$6,000
Influent Flowmeter	$4,000	1	ls	$4,000	15	$1,333
Effluent Flowmeter	$4,000	1	ls	$4,000	15	$1,333
Auto Samplers	$6,000	2	ls	$12,000	15	$4,000
Baffle in Contact Tank	$500	1	ls	$500	20	$0
New Influent Piping and Valves	$2,000	1	ls	$2,000	20	$0
Electrical (10%)	$4,000	1	ls	$4,000		$0
Mob./Demob., Bonding/Ins. (7.5%)	$3,000	1	ls	$3,000		$0
Sludge Storage	$80,000			$80,000	20	$0
Subtotal				$139,500		$16,666
Engr., Admin., Contingencies, and Legal (35%)				$48,825		
Total Estimated Capital Cost				$188,325		

Operation and Maintenance Costs Phase I (years 1-10)

	Annual Cost
Labor (16 hrs/wk @ $20/hr)	$16,600
Electricity @ $0.05/k W-hr	$2,000
Miscellaneous Maintenance	$2,500
Sampling and Analysis	$1,000
Sludge Disposal	$2,500
Annual O & M Cost	$24,600

Present Worth Phase I (years 1-10)

	Actual Cost	Present Worth PWF: 7.024 (P/A, 10) 0.5083(P/F,10)
Initial Capital Cost	$188,325	$188,325
Annual O & M Cost	$ 24,600	$172,800
Salvage Value	($16,666)	($8,500)

TOTAL ESTIMATE OF PRESENT WORTH—PHASE I	**$352,600**

Note: Present Worth estimated using discount rate = 7%

Table B-2 Continued
Village of Rockdale
Replacement RSF Plant in Year 10
Economic Analysis

Capital Costs Phase II (years 11-20)

Item	Capital Costs at Year 10	Design Life	Salvage Value At Year 20
Lagoon Abandonment	$15,000		0
Flow Meters	$8,000	15	$2,667
Samplers	$12,000	15	$4,000
Septic Tank	0		0
Earthwork	$7,000	40	$5,250
Structural	$62,000	40	$46,500
Planking and Hatches	$10,000	20	$5,000
Dosing Tank	0		0
Structural	$12,000	40	$9,000
Planking and Hatches	$3,000	20	$1,500
Splitter/Valve Vault	0		0
Structural	$8,000	40	$6,000
Grating	$3,000	20	$1,500
Weir Plates	$1,000	20	$500
RSF System	0		0
Earthwork	$12,000	40	$9,000
Filter Liner	$5,000	40	$1,250
Coarse Filter Media	$5,000	40	$1,250
Fine Filter Media	$18,000	40	$4,500
Underdrain Piping	$18,000	20	$9,000
Filter Piping	$15,000	20	$7,500
Land	$4,000	40	$3,000
Pumps and Controls	$30,000	15	$10,000
Control Building	$25,000	30	$16,667
UV Disinfection	$30,000	20	$15,000
Fencing	$5,000	20	$2,500
Yard Piping (5%)	$15,000	40	$11,250
Site Work (5%)	$15,000	40	$11,250
Electrical	$31,000	20	$15,500
Mob./Demob.,Bonding/Ins. (7.5%)	$23,000	20	$11,500
Subtotal	$392,000		$211,084
Contingencies, Engr., Admin, and Legal (35% of Subtotal)	$137,200		
Total Estimated Capital Cost	$529,200		

Operation and Maintenance Costs (years 11-20)	Annual Cost
Labor (8 hours/week @ $20/hour)	$8,300
Electricity ($0.05/KW-hr)	$1,300
Miscellaneous Maintenance	$1,500
Sampling and Analysis	$6,000
Sludge Disposal	$2,500
Annual O & M Cost	$19,600

Present Worth Phase II (years 11-20)	Actual Cost	Present Worth @ Year 10
	PWF:	0.5083 (P/F, 10) 7.024 (P/A, 10)
Capital Cost at year 10	$529,200	$529,200
Annual O & M (year 11-20)	$19,600	$137,670
Salvage Value at Year 10	($149,125)	($107,294)
TOTAL ESTIMATE OF PRESENT WORTH PHASE II @ Year 10		$559,600
TOTAL PW FOR PHASES I AND II = $559,600 x 0.5083 + $352,600 =		**$637,000**

Note: Present Worth estimated using discount rate = 7%

Table B-3
Village of Rockdale
Alternative 3—Upgrade Existing Activated Sludge System
Economic Analysis

Capital Costs

Item	Unit Cost	Qty	Unit	Capital Cost	Design Life	Replace. Cost	Salvage Value
RAS Pump/Controls	$12,000	1	ls	$12,000	15	$12,000	$8,000
Sludge Pump/Controls	$12,000	1	ls	$12,000	15	$12,000	$8,000
Raw Lift Pump/Controls	$12,000	2	ls	$24,000	15	$24,000	$16,000
Blowers	$9,000	2	ls	$18,000	15	$18,000	$12,000
Sludge Storage Tank	$80,000	1	ls	$80,000	20	$0	$0
New Clarifier	$53,000	1	ls	$53,000	20	$0	$0
New Mechanical Bar Screen	$25,000	1	ls	$25,000	20	$0	$0
Influent Flowmeter	$4,000	1	ls	$4,000	15	$4,000	$2,667
Effluent Flowmeter	$4,000	1	ls	$4,000	15	$4,000	$2,667
Auto Samplers	$35	2	ls	$12,000	15	$12,000	$8,000
Baffle in Contact Tank	$8,500	1	ls	$500	15	$0	$0
New Influent Piping and Valves	$20	1	ls	$2,000	20	$0	$0
New Control Building	$150	1	ls	$50,000	30	$0	$16,667
Yard Piping (5%)	$20	1	ls	$11,000	30	$0	$5,500
Site Work (5%)	$15	1	ls	$11,000	40	$0	$5,500
Electrical	$2	1	ls	$22,000	20	$0	$0
Mob./Demob., Bonding/Ins. (7.5%)	$20,000	1	ls	$16,000	20	$0	$0
Subtotal				$356,500		$86,000	$85,001
Engr., Admin., Contingencies and Legal (35% of Subtotal)				$124,775			
Total Estimated Capital Cost				$481,275			

Operation and Maintenance Costs

	Annual Costs
Labor (16 hrs/wk @ $20/hr.)	$16,600
Electricity @ $0.05/k W-hr	$2,500
Miscellaneous Maintenance	$2,500
Sampling and Analysis	$1,000
Sludge Disposal	$3,000
Annual O & M Cost	$25,600

20 Year Present Worth

	Actual Cost	Present Worth
	PWF:	10.594 (P/A)
		0.3624 (P/F, 15)
		0.2584 (P/F, 20)
Initial Capital Cost	$481,275	$481,275
Annual O & M Cost	$25,600	$271,200
Replacement Cost (15 year)	$86,000	$31,166
Salvage Value	($85,001)	($21,964)

TOTAL ESTIMATE OF PRESENT WORTH	**$761,700**

Note: Present Worth estimated using discount rate = 7%

Table B-4
Village of Rockdale
Alternative 4—Recirculating Sand Filter
Economic Analysis

Capital Costs

Item	Capital Costs	Design Life	Replace. Cost	Salvage Value At Year 20
Lagoon Abandonment	$15,000	20	0	0
Flow Meters	$8,000	15	$8,000	$5,333
Samplers	$12,000	15	$12,000	$8,000
Septic Tank	0			0
Earthwork	$7,000	40		$3,500
Structural	$62,000	40		$31,000
Planking and Hatches	$10,000	20		0
Dosing Tank	0			0
Structural	$12,000	40		$6,000
Planking and Hatches	$3,000	20		0
Splitter/Valve Vault	0			0
Structural	$8,000	40		$4,000
Grating	$3,000	20		0
Weir Plates	$1,000	20		0
RSF System	0			0
Earthwork	$12,000	40		$6,000
Filter Liner	$5,000	40		$2,500
Coarse Filter Media	$5,000	40		$2,500
Fine Filter Media	$18,000	40		$9,000
Underdrain Piping	$18,000	20		0
Filter Piping	$15,000	20		0
Land	$4,000	40		$2,000
Pumps and Controls	$30,000	15	$30,000	$20,000
Control Building	$25,000	30		$8,333
UV Disinfection	$30,000	20		0
Fencing	$5,000	20		0
Yard Piping (5%)	$15,000	40		0
Site Work (5%)	$15,000	40		$7,500
Electrical	$31,000	20		0
Mob./Demob.,Bonding/Ins. (7.5%)	$23,000	20		0
Subtotal	$392,000		$50,000	$115,686
Contingencies, Engr., Admin, and Legal (35% of Subtotal)	$137,200			
Total Estimated Capital Cost	$529,200			

Operation and Maintenance Costs	Annual Cost
Labor (8 hours/week @ $20/hr.)	$8,300
Electricity ($0.05/KW-hr)	$1,280
Miscellaneous Maintenance	$1,500
Sampling and Analysis	$6,000
Sludge Disposal	$2,500
Annual O & M Cost	$19,600

20 Year Present Worth	Actual Cost	Present Worth PWF: 10.594 (P/A) 0.3624 (P/F, 15) 0.2584 (P/F, 20)
Capital Cost	$529,200	$529,200
Annual O & M	$19,600	$207,600
Replacement Fund	$50,000	$18,120
Salvage Value	($115,686)	($29,893)
TOTAL ESTIMATE OF PRESENT WORTH		**$725,000**

Note: Present Worth estimated using discount rate = 7%

1/13/00

Table B-5
Village of Deerfield
Alternative 1—Package Plant with Biological Phosphorus Removal
Located on Present Site (Pista Grit Removal-New Headworks)
Economic Analysis

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	15-Year Cost	Salvage Value
Bonding and General Conditions		$112,060				
Screening						
Concrete/Building	40	$8,170				$4,090
Railings/Valves/Gratings	20	$48,950		$2,450		
Equipment	20	$70,000	$2,100	$4,900	$2,100	
Installation		$14,000				
Plumbing/HVAC	20	$17,420		$870		
Piping	20	$0				
Electrical	20	$18,300		$920		
Grit Removal						
Concrete Building	40	$11,320				$5,660
Railings/Valves/Gratings	20	$22,310		$1,120		
Equipment	20	$84,000	$2,520	$5,880	$2,520	
Installation		$16,800				
Plumbing/HVAC	20	$19,060		$950		
Piping	20	$24,780		$1,240		
Electrical	20	$20,020		$1,000		
Aeration Basin		0				
Concrete/Building	40	$274,540				$137,270
Railings/Valves/Gratings	20	$77,790		$3,890		
Equipment (including dome)	20	$239,030	$14,340	$14,340	$14,340	
Installation		$63,360				
Plumbing/HVAC	20	$0				
Piping	20	$133,530		$6,680		
Electrical	20	$107,850		$5,390		
Selector Basins						
Concrete/Building	40	$120,840				$60,420
Railings/Valves/Gratings	20	$79,730		$3,990		
Equipment	20	$60,000	$3,000	$15,000	$3,000	
Installation		$12,000				
Plumbing/HVAC	20	$0				
Piping	20	$47,020		$2,350		
Electrical	20	$37,980		$1,900		
Sludge Handling Building						
Concrete/Building	40	$332,700				$166,350
Railings/Valves/Gratings	20	$33,270		$1,660		
Equipment	20	$340,000	$10,200	$20,400	$10,200	
Installation		$85,000				
Plumbing/HVAC	20	$134,540		$6,730		
Piping	20	$174,900		$8,750		
Electrical	20	$191,270		$9,560		
Existing Service Building Modifications						
Concrete/Modifications	40	$35,000				$17,500
Railings/Valves/Gratings	20	$3,500		$180		
Equipment	20	$49,000	$490	$2,450	$490	
Installation		$3,900				
Plumbing/HVAC	20	$20,000		$1,000		
Piping	20	$65,000		$3,250		
Electrical	20	$50,000		$2,500		

Table B-5 Continued

Telemetering	$75,000				
General Site Work	$150,000				
Site Conditions (Dewatering/soils)	$113,720				
Outfall Pipe	$35,750				
Power Service	$15,000				
Land	$0				
Maintenance Vehicle	$0				
CONSTRUCTION SUBTOTAL	$3,657,410	$32,650	$129,350	$32,650	$391,290
Contingency, Engr, Legal, Admin, (35% of Subtotal)	$1,280,093				
TOTAL COST (INCLUDING BONDING)	**$4,937,503**				**$391,290**

PRESENT WORTH OF CAPITAL COSTS		
CAPITAL COST	**PWF**	$4,937,503
5-YEAR COST	0.7130	$23,279
10-YEAR COST	0.5083	$65,749
15-YEAR COST	0.3624	$11,832
SALVAGE VALUE	0.2584	($93,021)
TOTAL PRESENT WORTH OF CAPITAL COSTS		**$4,945,000**

OPERATION AND MAINTENANCE COST	**ANNUAL COSTS**	**PWF=**	**PW ANNUAL** 10.594	
Labor	$64,050		$678,546	
Power	$41,050		$434,884	
Chemical-Sludge	$2,700		$28,604	
Chemical-Phos	$3,500		$37,079	
Laboratory	$4,000		$42,376	
Maintenance	$10,580		$112,084	
Sludge Hauling	$29,500		$312,523	
TOTAL	**$155,380**		**$1,646,096**	
TOTAL PRESENT WORTH COSTS				**$6,591,000**

Note: Present Worth estimated using discount rate of 7%

Table B-6
Village of Cambridge
Alternative 1—Oxidation Ditch Mechanical Plant
Present Worth Cost Analysis
(With Biological Phosphorus Removal and Thickening
Located on Site Near Existing Cambridge WWTF)

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	15-Year Cost	Salvage Value
Bonding and General Conditions		$210,170				
Screening						
Concrete/Site/Modifications	40	$54,165				$27,080
Railings/Valves/Gratings	20	$7,330		$370		
Equipment	20	$70,000	$2,100	$4,900	$2,100	
Installation	20	$14,000				
Plumbing/HVAC	20	$24,830		$1,240		
Piping	20	$32,280		$1,610		
Electrical	20	$26,070		$1,300		
Grit Removal						
Concrete/Site/Modifications	40	$22,270				$11,140
Railings/Valves/Gratings	20	$24,100		$1,120		
Equipment	20	$87,000	$2,610	$6,090	$2,610	
Installation	20	$17,400				
Plumbing/HVAC	20	$26,670		$1,330		
Piping	20	$34,680		$1,730		
Electrical	20	$28,010		$1,400		
Aeration Basin		0				
Concrete/Site/Modifications	40	$651,800				$325,900
Railings/Valves/Gratings	20	$46,100		$2,310		
Equipment (including dome)	20	$150,000	$4,500	$10,500	$4,500	
Installation		$30,000				
Plumbing/HVAC	20	$0				
Piping	20	$189,900		$9,500		
Electrical	20	$153,380		$7,670		
Selector Basins						
Concrete/Site/Modifications	40	$142,935				$71,470
Railings/Valves/Gratings	20	$80,510		$4,030		
Equipment	20	$67,500	$3,380	$16,880	$3,380	
Installation	20	$13,500				
Plumbing/HVAC	20	$0				
Piping	20	$54,710		$2,740		
Electrical	20	$44,190		$2,210		
Digester						
Concrete/Site/Modifications	40	$180,970				$97,490
Railings/Valves/Gratings	20	$20,260		$1,010		
Equipment	20	$117,000	$4,680	$10,530	$4,680	
Installation	20	$23,400				
Plumbing/HVAC	20	$0				
Piping	20	$77,470		$3,870		
Electrical	20	$62,570		$3,130		
Clarifier						
Concrete/Site/Modifications	40	$168,320				$84,160
Railings/Valves/Gratings	20	$86,400		$4,320		
Equipment	20	$196,550	$5,900	$11,790	$5,900	
Installation		$39,310				
Plumbing/HVAC	20	$0		$0		
Piping	20	$127,550		$6,380		
Electrical	20	$103,020		$5,150		

Table B-6 Continued

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	15-Year Cost	Salvage Value
Sludge Handling Building						
Concrete/Site/Modifications	40	$373,680				$186,840
Railings/Valves/Gratings	20	$37,370		$1,870		
Equipment	20	$340,000	$10,200	$20,400	$10,200	
Installation		$85,000				
Plumbing/HVAC	20	$142,740		$7,140		
Piping	20	$185,560		$9,280		
Electrical	20	$149,870		$7,490		
Sludge Storage Tank						
Concrete/Site/Modifications	40	$242,360				$121,180
Railings/Valves/Gratings	20	$9,260		$460		
Equipment	20	$120,000	$2,400	$4,800	$2,400	
Installation		$24,000				
Plumbing/HVAC	20	$0		$0		
Piping	20	$102,860		$5,140		
Electrical	20	$83,080		$4,150		
Main Building & Laboratory						
Concrete/Site/Modifications	40	$600,760				$300,380
Railings/Valves/Gratings	20	$60,080		$3,000		
Equipment	20	$95,000	$950	$4,750	$950	
Installation		$0				
Plumbing/HVAC	20	$139,150		$6,960		
Piping	20	$0		$0		
Electrical	20	$146,110		$7,310		
Disinfection						
Concrete/Site/Modifications	40	$55,960				$27,980
Railings/Valves/Gratings	20	$42,250		$2,110		
Equipment	20	$65,700	$1,970	$4,600	$1,970	
Installation		$13,140				
Plumbing/HVAC	20	$0				
Piping	20	$0				
Electrical	20	$37,180		$1,860		
General Site Work		$150,000				
Demolition of Abandoned Structures		$50,000				
Site Conditions (Dewatering/soils)		$10,000				
Outfall Pipe		$39,000				
Power Service		$25,000				
Land		$75,000				
Maintenance Vehicle		$0				
CONSTRUCTION SUBTOTAL		$7,006,430	$38,690	$214,430	$38,690	$1,253,620
Contingency, Engr, Legal, Admin, (35% of Subtotal)		$2,452,250				
TOTAL COST (INCLUDING BONDING)		**$9,458,680**				

PRESENT WORTH OF CAPITAL COSTS		
CAPITAL COST	**PWF**	$9,458,680
5-YEAR COST	0.7130	$27,586
10-YEAR COST	0.5083	$109,016
15-YEAR COST	0.3624	$14,021
SALVAGE VALUE	0.2584	($323,935)
TOTAL PRESENT WORTH OF CAPITAL COSTS		**$9,285,368**

Table B-6 Continued

OPERATION AND MAINTENANCE COST	ANNUAL COSTS	PWF=	PW ANNUAL 10.594	
Labor	$82,270		$871,568	
Power	$76,810		$813,725	
Chemical-Sludge	$4,200		$44,495	
Chemical-Phos	$5,150		$54,559	
Laboratory	$5,000		$52,970	
Maintenance	$13,410		$142,065	
Sludge Hauling	$45,500		$482,027	
TOTAL	**$232,340**		**$2,461,409**	
TOTAL PRESENT WORTH COSTS				**$11,746,800**

Note: Present Worth estimated using discount rate of 7%

Table B-7
Village of Cambridge
Alternative 2—Replaced Existing Plant by Oxidation Ditch Mechanical Plant in 5 Years
Economic Analysis

OPERATION AND MAINTENANCE COST FOR INTERIM 5 YEARS	ANNUAL COST	PWF=	PRESENT WORTH 4.100	
Labor	$32,760		$134,316	
Power	$19,050		$78,105	
Chemical-Sludge	$0		$0	
Chemical-Phos	$0		$0	
Laboratory	$3,000		$12,300	
Maintenance	$1,710		$7,011	
Sludge Hauling				
TOTAL	**$56,520**		**$231,738**	
TOTAL PRESENT WORTH COSTS—PHASE I (year 1-5)				**$231,738**

Table B-7 Continued
Village of Cambridge
Alternative 1—Phase II (year 6-20)
Present Worth Cost Analysis-Cambridge Plant
Oxidation Ditch with Biological Phosphorus Removal and Thickening
Located On Site Near Existing Cambridge WWTF)

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	Salvage Value
Bonding and General Conditions		$210,170			$52,542
Screening					
Concrete/Site/Modifications	40	$54,165			$33,853
Railings/Valves/Gratings	20	$7,330		$370	$1,832
Equipment	20	$70,000	$2,100	$4,900	$17,500
Installation		$14,000			$3,500
Plumbing/HVAC	20	$24,830		$1,240	$6,207
Piping	20	$32,280		$1,610	$8,070
Electrical	20	$26,070		$1,300	$6,517
Grit Removal					
Concrete/Site/Modifications	40	$22,270			$13,919
Railings/Valves/Gratings	20	$24,100		$1,120	$6,025
Equipment	20	$87,000	$2,610	$6,090	$21,750
Installation	20	$17,400			$4,350
Plumbing/HVAC	20	$26,670		$1,330	$6,668
Piping	20	$34,680		$1,730	$8,670
Electrical	20	$28,010		$1,400	$7,002
Aeration Basin					
Concrete/Site/Modifications	40	$651,800			$407,375
Railings/Valves/Gratings	20	$46,100		$2,310	$11,525
Equipment (including dome)	20	$150,000	$4,500	$10,500	$37,500
Installation	20	$30,000			$7,500
Plumbing/HVAC		$0		$0	$0
Piping	20	$189,900		$9,500	$47,475
Electrical	20	$153,380		$7,670	$38,345
Selector Basins (Includes Gates/Weirs)					
Concrete/Site/Modifications	40	$142,935			$89,334
Railings/Valves/Gratings	20	$80,510		$4,030	$20,128
Equipment	20	$67,500	$3,380	$16,880	$16,875
Installation	20	$13,500			$3,375
Plumbing/HVAC		$0		$0	$0
Piping	20	$54,710		$2,740	$13,678
Electrical	20	$44,190		$2,210	$11,048
Digester					
Concrete/Site/Modifications	40	$180,970			$113,106
Railings/Valves/Gratings	20	$20,260		$1,010	$5,065
Equipment	20	$117,000	$4,680	$10,530	$29,250
Installation	20	$23,400			$5,850
Plumbing/HVAC		$0		$0	$0
Piping	20	$77,470		$3,870	$19,368
Electrical	20	$62,570		$3,130	$15,642
Clarifier					
Concrete/Modifications	40	$168,320			$105,200
Railings/Valves/Gratings	20	$86,400		$4,320	$21,600
Equipment	20	$196,550	$5,900	$11,790	$49,138
Installation	20	$39,310			$9,828
Plumbing/HVAC	20	$0		$0	$0
Piping	20	$127,500		$6,380	$31,888
Electrical	20	$103,020		$5,150	$25,755

Table B-7 Continued

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	Salvage Value
Sludge Handling Building					
Concrete/Site/Modifications	40	$373,680			$233,550
Railings/Valves/Gratings	20	$37,370		$1,870	$9,342
Equipment	20	$340,000	$10,200	$20,400	$85,000
Installation	20	$85,000			$21,250
Plumbing/HVAC	20	$142,740		$7,140	$35,685
Piping	20	$185,560		$9,280	$46,390
Electrical	20	$149,870		$7,490	$37,468
Sludge Storage Tank					
Concrete/Site/Modifications	40	$242,360			$151,475
Railings/Valves/Gratings	20	$9,260		$460	$2,315
Equipment	20	$120,000	$2,400	$4,800	$30,000
Installation	20	$24,000			$6,000
Plumbing/HVAC	20	$0			$0
Piping	20	$102,860		$5,140	$25,715
Electrical	20	$83,080		$4,150	$20,770
Main Building & Laboratory					
Concrete/Site/Modifications	40	$600,760			$375,475
Railings/Valves/Gratings	20	$60,080		$3,000	$15,020
Equipment	20	$95,000	$950	$4,750	$23,750
Installation		$0			
Plumbing/HVAC	20	$139,150		$6,960	$34,788
Piping	20	$0			
Electrical	20	$146,110		$7,310	$36,528
Disinfection					
Concrete/Site/Modifications	40	$55,960			$34,975
Railings/Valves/Gratings	20	$42,250		$2,110	$10,562
Equipment	20	$65,700	$1,970	$4,600	$16,425
Installation	20	$13,140			$3,285
Plumbing/HVAC	20	$0			
Piping	20	$0			
Electrical	20	$37,180		$1,860	$9,295
General Site Work		$150,000			$37,500
Demolition of Abandoned Structures		$50,000			$12,500
Site Conditions (Dewatering/Soils)		$10,000			$2,500
Outfall Pipe		$39,000			$9,750
Power Service		$25,000			$6,250
Land		$75,000			$18,750
Maintenance Vehicle		$0			
CONSTRUCTION SUBTOTAL		$7,006,430	$38,690	$214,430	$2,634,024
Contingency, Engr, Legal, Admin, 35% of Subtotal)		$2,452,250			
TOTAL COST Phase II (year 6-20) INCLUDING BONDING)		**$9,458,680**			**$2,634,024**

PRESENT WORTH OF CAPITAL COSTS (FOR YEAR 6-20)	**PWF**	
CAPITAL COST		$9,458,680
5-YEAR COST	0.7130	$27,586
10-YEAR COST	0.5083	$108,995
SALVAGE VALUE	0.3624	($954,570)
TOTAL PRESENT WORTH OF CAPITAL COSTS Phase II (year 6-20)		**$8,640,690**

Table B-7 Continued

OPERATION AND MAINTENANCE COST	ANNUAL COSTS	PWF=	PW ANNUAL 9.108	
Labor	$82,270		$749,315	
Power	$76,810		$699,585	
Chemical-Sludge	$4,200		$38,254	
Chemical-Phos	$5,150		$46,906	
Laboratory	$5,000		$45,540	
Maintenance	$13,410		$122,138	
Sludge Hauling	$45,500		$414,414	
TOTAL AT YEAR 6	**$232,040**		**$2,116,152**	
TOTAL PRESENT WORTH PHASE II COSTS AT YEAR 6				**$10,756,843**

Discounting to PW @ PWF = 0.7130

PHASE II PRESENT WORTH = $7,669,629

TOTAL PRESENT WORTH PHASE I & II = $7,669,629 + $231,738 = $7,901,400

Table B-8
Village of Cambridge
Alternative 3—Replaced Existing Plant by Oxidation Ditch Mechanical Plant in 10 Years
Economic Analysis

OPERATION AND MAINTENANCE COST FOR INTERIM 10 YEARS	ANNUAL COST	PWF=	PRESENT WORTH 7.024	
Labor	$32,760		$230,106	
Power	$19,050		$133,807	
Chemical-Sludge	$0		$0	
Chemical-Phos	$0		$0	
Laboratory	$3,000		$21,072	
Maintenance	$1,710		$12,011	
Sludge Hauling				
TOTAL	**$56,520**		**$396,996**	
TOTAL PRESENT WORTH COSTS—PHASE I (year 1-10)				**$397,000**

Table B-8 Continued
Village of Cambridge
Alternative 3—Phase II (year 11-20)
Present Worth Cost Analysis-Cambridge Plant
Oxidation Ditch with Biological Phosphorus Removal and Thickening
Located On Site Near Existing Cambridge WWTF)

Item Description	Life	Capital Cost	5-Year Cost	Salvage Value
Bonding and General Conditions	20	$210,170		$105,085
Screening				
Concrete/Site/Modifications	40	$54,165		$40,082
Railings/Valves/Gratings	20	$7,330		$3,665
Equipment	20	$70,000	$2,100	$35,000
Installation	20	$14,000		$7,000
Plumbing/HVAC	20	$24,830		$12,415
Piping	20	$32,280		$16,140
Electrical	20	$26,070		$13,035
Grit Removal				
Concrete/Site/Modifications	40	$22,270		$16,702
Railings/Valves/Gratings	20	$24,100		$12,050
Equipment	20	$87,000	$2,610	$43,500
Installation	20	$17,400		$8,700
Plumbing/HVAC	20	$26,670		$13,335
Piping	20	$34,680		$17,340
Electrical	20	$28,010		$14,005
Aeration Basin				
Concrete/Site/Modifications	40	$651,800		$488,850
Railings/Valves/Gratings	20	$46,100		$23,050
Equipment (including dome)	20	$150,000	$4,500	$75,000
Installation	20	$30,000		$15,000
Plumbing/HVAC		$0		$0
Piping	20	$189,900		$94,950
Electrical	20	$153,380		$76,690
Selector Basins (Includes Gates/Weirs)				
Concrete/Site/Modifications	40	$142,935		$107,201
Railings/Valves/Gratings	20	$80,510		$40,255
Equipment	20	$67,500	$3,380	$33,750
Installation	20	$13,500		$6,750
Plumbing/HVAC		$0		$0
Piping	20	$54,710		$27,355
Electrical	20	$44,190		$22,095
Digester				
Concrete/Site/Modifications	40	$180,970		$135,728
Railings/Valves/Gratings	20	$20,260		$10,130
Equipment	20	$117,000	$4,680	$58,500
Installation	20	$23,400		$11,700
Plumbing/HVAC		$0		$0
Piping	20	$77,470		$38,735
Electrical	20	$62,570		$31,285
Clarifier				
Concrete/Modifications	40	$168,320		$126,240
Railings/Valves/Gratings	20	$86,400		$43,200
Equipment	20	$196,550	$5,900	$98,275
Installation	20	$39,310		$19,655
Plumbing/HVAC	20	$0		$0
Piping	20	$127,500		$63,750
Electrical	20	$103,020		$51,510

Table B-8 Continued

Item Description	Life	Capital Cost	5-Year Cost	Salvage Value
Sludge Handling Building				
Concrete/Site/Modifications	40	$373,680		$280,260
Railings/Valves/Gratings	20	$37,370		$18,685
Equipment	20	$340,000	$10,200	$170,000
Installation	20	$85,000		$42,500
Plumbing/HVAC	20	$142,740		$71,370
Piping	20	$185,560		$92,780
Electrical	20	$149,870		$74,935
Sludge Storage Tank				
Concrete/Site/Modifications	40	$242,360		$181,770
Railings/Valves/Gratings	20	$9,260		$4,630
Equipment	20	$120,000	$2,400	$60,000
Installation	20	$24,000		$12,000
Plumbing/HVAC	20	$0		$0
Piping	20	$102,860		$51,430
Electrical	20	$83,080		$41,540
Main Building & Laboratory				
Concrete/Site/Modifications	40	$600,760		$450,570
Railings/Valves/Gratings	20	$60,080		$30,040
Equipment	20	$95,000	$950	$47,500
Installation		$0		
Plumbing/HVAC	20	$139,150		$69,575
Piping	20	$0		
Electrical	20	$146,110		$73,055
Disinfection				
Concrete/Site/Modifications	40	$55,960		$41,970
Railings/Valves/Gratings	20	$42,250		$21,125
Equipment	20	$65,700	$1,970	$32,850
Installation	20	$13,140		$6,570
Plumbing/HVAC	20	$0		
Piping	20	$0		
Electrical	20	$37,180		$18,590
General Site Work	20	$150,000		$75,000
Demolition of Abandoned Structures	20	$50,000		$25,000
Site Conditions (Dewatering/Soils)	20	$10,000		$5,000
Outfall Pipe	20	$39,000		$19,500
Power Service	20	$25,000		$12,500
Land	20	$75,000		$37,500
Maintenance Vehicle	20	$0		
CONSTRUCTION SUBTOTAL		$7,006,430	$38,690	$4,125,953
Contingency, Engr, Legal, Admin, 35% of Subtotal)		$2,452,250		
TOTAL COST Phase II (year 11-20) INCLUDING BONDING)		**$9,458,680**		**$4,125,953**

PRESENT WORTH OF CAPITAL COSTS (FOR YEAR 11-20)	**PWF**	
CAPITAL COST		$9,458,680
5-YEAR COST	0.7130	$27,586
SALVAGE VALUE	0.5083	($2,097,222)
TOTAL PRESENT WORTH OF CAPITAL COSTS AT YEAR 11 Phase II (year 11-20)		**$7,389,000**

Table B-8 Continued

OPERATION AND MAINTENANCE COST	ANNUAL COSTS	PWF=	PRESENT WORTH 7.024	
Labor	$82,270		$577,864	
Power	$76,810		$539,513	
Chemical-Sludge	$4,200		$29,501	
Chemical-Phos	$5,150		$36,174	
Laboratory	$5,000		$35,120	
Maintenance	$13,410		$94,192	
Sludge Hauling	$45,500		$319,592	
TOTAL AT YEAR 11	**$232,040**		**$1,631,956**	
TOTAL PRESENT WORTH PHASE II COSTS AT YEAR 11				**$9,020,956**

Discounting to PW @ PWF = 0.5083

PHASE II PRESENT WORTH = $4,585,352

TOTAL PRESENT WORTH PHASE I & II = $4,585,352 + $397,000 = $4,982,400

Table B-9
Regional Treatment Plant
Present Worth Cost Analysis
(Oxidation Ditch With Biological Phosphorus Removal and Thickening
Located on Site Near Existing Cambridge WWTF)

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	15-Year Cost	Salvage Value
Bonding and General Conditions		$262,710				
Screening						
Concrete/Site/Modifications	40	$83,750				$41,880
Railings/Valves/Gratings	20	$9,650		$480		
Equipment	20	$74,000	$2,220	$5,180	$2,220	
Installation		$14,800				
Plumbing/HVAC	20	$31,550		$1,580		
Piping	20	$41,020		$2,050		
Electrical	20	$33,130		$1,660		
Lift Station Upgrade (Cambridge)						
Concrete/Site/Modifications	40	$36,370				$18,190
Railings/Valves/Gratings	20	$1,400		$70		
Equipment	20	$50,000	$1,500	$3,500	$1,500	
Installation		$10,000				
Plumbing/HVAC	20	$0		$0		
Piping	20	$22,460		$1,120		
Electrical	20	$18,140		$910		
Grit Removal						
Concrete/Site/Modifications	40	$26,370				$13,190
Railings/Valves/Gratings	20	$27,470		$1,370		
Equipment (including dome)	20	$87,000	$2,610	$6,090	$2,610	
Installation		$17,400				
Plumbing/HVAC	20	$28,170		$1,410		
Piping	20	$36,620		$1830		
Electrical	20	$29,580		$1,480		
Aeration Basin						
Concrete/Site/Modifications	40	$1,014,150				$507,080
Railings/Valves/Gratings	20	$57,130		$2,860		
Equipment	20	$197,000	$5,910	$13,790	$5,910	
Installation		$39,400				
Plumbing/HVAC	20	$0				
Piping	20	$284,080		$14,200		
Electrical	20	$229,450		$11,470		
Selector Basin (Includes Gates/Weirs)						
Concrete/Site/Modifications	40	$162,920				$81,460
Railings/Valves/Gratings	20	$82,440		$4,120		
Equipment	20	$75,000	$3,750	$18,750	$3,750	
Installation		$15,000				
Plumbing/HVAC	20	$0		$0		
Piping	20	$61,860		$3,090		
Electrical	20	$49,960		$2,500		
Digester						
Concrete/Site/Modifications	40	$254,750				$127,380
Railings/Valves/Gratings	20	$21,910		$1,100		
Equipment	20	$132,000	$5,280	$11,880	$5,280	
Installation		$26,400				
Plumbing/HVAC	20	$0		$0		
Piping	20	$100,560		$5,030		
Electrical	20	$81,220		$4,060		

Table B-9 Continued

Item Description	Life	Capital Cost	5-Year Cost	10-Year Cost	15-Year Cost	Salvage Value
Clarifier						
Concrete/Site/Modifications	40	$215,610				$107,810
Railings/Valves/Gratings	20	$96,800		$4,840		
Equipment	20	$241,020	$7,230	$14,460	$7,230	
Installation		$48,200				
Plumbing/HVAC	20			$7,140		
Piping	20	$118,720		$5,940		
Electrical	20	$95,890		$4,790		
Sludge Handling Building						
Concrete/Site/Modifications	40	$373,680				$186,840
Railings/Valves/Gratings	20	$37,370		$1,870		
Equipment	20	$340,000	$10,200	$20,400	$10,200	
Installation		$85,000				
Plumbing/HVAC	20	$142,740		$7,140		
Piping	20	$185,560		$9,280		
Electrical	20	$149,870		$7,490		
Sludge Storage Tank						
Concrete/Site/Modifications	40	$368,830				$184,420
Railings/Valves/Gratings	20	$9,260		$460		
Equipment	20	$120,000	$2,400	$4,800	$2,400	
Installation		$24,000				
Plumbing/HVAC	20	$0		$0		
Piping	20	$135,740		$6,790		
Electrical	20	$109,640		$5,480		
Main Building & Laboratory						
Concrete/Site/Modifications	40	$600,760				$300,380
Railings/Valves/Gratings	20	$60,080		$3,000		
Equipment	20	$95,000	$950	$4,750	$950	
Installation		$0				
Plumbing/HVAC	20	$139,150		$6,960		
Piping	20	$0				
Electrical	20	$146,110		$7,310		
Disinfection						
Concrete/Site/Modifications	40	$60,290				$30,150
Railings/Valves/Gratings	20	$42,250		$2,110		
Equipment	20	$95,000	$2,850	$6,650	$2,850	
Installation		$19,000				
Plumbing/HVAC	20	$0				
Piping	20	$0				
Electrical	20	$45,470		$2,270		
General Site Work		$200,000				
Demolition of Abandoned Structures		$150,000				
Site Conditions (Dewatering/soils)		$30,000				
Outfall Pipe		$39,000				
Power Service		$30,000				
Land		$100,000				
CONSTRUCTION SUBTOTAL		$8,576,860	$44,900	$255,510	$44,900	$1,598,780
Contingency, Engr, Legal, Admin, 35% of Subtotal		$3,001,901				
TOTAL COST (INCLUDING BONDING)		**$11,578,761**				

Table B-9 Continued

PRESENT WORTH OF CAPITAL COSTS (BASED 7% INTEREST RATE)		
CAPITAL COST	**PWF**	$11,578,761
5-YEAR COST	0.7130	$32,014
10-YEAR COST	0.5083	$129,876
15-YEAR COST	0.3624	$16,272
SALVAGE VALUE	0.2584	($413,125)
TOTAL PRESENT WORTH OF CAPITAL COSTS	**$11,343,798**	

OPERATION AND MAINTENANCE COST	ANNUAL COSTS	PWF=	PW ANNUAL 10.594
Labor	$133,230		$1,411,439
Power	$96,560		$1,022,957
Chemical-Sludge	$6,700		$70,980
Chemical-Phos	$9,000		$95,346
Laboratory	$8,000		$84,752
Maintenance	$15,200		$161,029
Sludge Hauling	$73,000		$773,362
TOTAL	**$341,700**		**$3,619,865**

Note: Present Worth estimated using discount rate of 7%

PW of Village of Rockdale Abandonment, Lift Station, Forcemain, O & M, Etc. = $710,648 (See Table B-10)

PW of Village of Deerfield Forcemain and Lift Station (O & M and abandonment already included above) = $1,836,937 (See Table B-11)

Total PW of Regional Alternative = **$17,511,200**

Table B-10
Village of Rockdale
Regional Treatment with Village of Cambridge
Economic Analysis

Capital Costs

Item	Unit Price	Qty	Units	Capital Costs	Design Life	Replace. Cost	Salvage Value
Lagoon/WWTF Abandonment	$20,000	1	ls	$20,000	20		
New Lift Station							
Structural	$25,000	1	ls	$25,000	30		$8,333
Pumps and Controls	$40,000	1	ls	$40,000	15	$40,000	$26,667
Flowmeter	$4,000	1	unit	$4,000	20	$4,000	$2,667
Standby Generator	$18,000	1	unit	$18,000	20	$0	$0
Sampling Manhole							
Structural	$1,000	1	ls	$1,000	30		$333
Auto Sampler	$6,000	1	ls	$6,000	15	$6,000	$4,000
6" Forcemain	$20	17,000	if	$340,000	40		$170,000
River Crossing	$100	120	If	$12,000	40		
Air/Vac Valves	$4,000	1	unit	$4,000	20		
Electrical	$12,000	1	ls	$12,000			
Mob./Demob., Bonding/Ins. (7.5%)	$30,000	1	ls	$30,000			
Subtotal				$512,000		$50,000	$212,000
Engr., Admin., Contingencies, and Legal (35%)				$179,200			
Total Estimated Capital Cost				$691,200			

Operation and Maintenance Costs

	Annual Cost
Labor (16 hrs/wk @ $20/hr)	$2,100
Electricity @ $0.05/k W-hr	$1,000
Miscellaneous Maintenance	$1,000
Sampling and Analysis	$1,200
Annual O & M Cost	$5,300

20 Year Present Worth	Actual Cost	Present Worth
Initial Capital Cost	$691,200	$691,200
Annual O & M Cost	$5,300	$56,148
Replacement Cost	$50,000	$18,100
Salvage Value	$212,000	($54,800)

TOTAL ESTIMATE OF PRESENT WORTH	**$710,648**

Note: Present Worth estimated using discount rate = 7%

Table B-11
Deerfield Forcemain
Regional Treatment with Village of Cambridge
Economic Analysis

Capital Costs

Item	Unit Price	Qty	Unit	Capital Cost	Design Life	Replace. Cost	Salvage Value
Mobilization	$20,000	1	ls	$20,000			$0
Pumping & Accessories	$20,000	1	ls	$20,000	15	$20,000	$13,333
Piping & Valves	$15,000	1	ls	$15,000	10	$15,000	$0
Generator	$25,000	1	ls	$25,000	20	$20,000	$0
Building & Valve Pit	$65,000	1	ls	$65,000	30		$21,667
Electrical Service Upgrade	$20,000	1	ls	$20,000			$0
Elec./Instr./Telemetry	$20,000	1	ls	$20,000	20		$0
Flowmeter/Sampler	$20,000	1	ls	$20,000	15	$20,000	$13,333
Forcemain							
12" Forcemain	$35	27000	ls	$945,000	40		$472,500
Air Relief Manholes	$8,500		ls	$59,500			
Street Restorations	$20	200	lf	$4,000			
Creek Crossings	$150	150	lf	$22,500			
Road Crossings	$20	200	lf	$4,000			
Dewatering	$15	7000	lf	$105,000			
Restoration	$2	27000	ls	$54,000			
Utility Conflicts	$20,000	1	ls	$20,000			
Fence/Tree Removal	$15,000	1	ls	$15,000			
Traffic Control	$10,000	1	ls	$10,000			
Construction Subtotal				$1,444,000			$520,833
Engr., Admin., Contingencies, and Legal (35%)				$505,400			
Total Estimated Capital Cost				$1,949,400			

Replacement Costs

		PWF		
10-year =	$15,000	0.5084	PW =	$7,626
15 year =	$40,000	0.3624	PW =	$14,496
Salvage =	$520,833	0.2584	PW =	($134,583)
Total PW =	**$1,836,937**			

O & M already included in Cambridge regional plant table.

Appendix C

Correspondence

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary

Box 7921
101 South Webster Street
Madison, Wisconsin 53707-7921
TELEPHONE 608-266-2621
FAX 608-267-3579
TDD 608-267-6897

April 13, 1999

IN REPLY REFER TO: 3420

MR. ALAN GROOMS
TOWN & COUNTRY ENGINEERING INC.
5225 VERONA ROAD BLDG. NO. 4
MADISON, WI 53744-4451

SUBJECT: Preliminary Effluent Limitations Evaluation, Village of Cambridge, Wisconsin

Dear Mr. Grooms:

Preliminary effluent limits have been calculated for the Village of Cambridge based on the fourth alternative design flow of 200,000 gallons per day. The preliminary effluent limits are summarized in the attached report. These limits are for discharging effluent at the existing discharge location and are being conveyed to you at this time for facility planning purposes only. Please be advised that since these limits are preliminary in nature, they may be subject to changes during the Department's final effluent limits evaluation process.

The limit calculations are for conventional pollutants only. It is possible that additional effluent limits or monitoring requirements including toxics and biomonitoring requirements, may be included in any WPDES permit ultimately issued to the Village of Cambridge.

If you have any questions on preliminary effluent limits or impact on the Village of Cambridge facility plan, please contact me at 608-267-7627.

Sincerely,

Mulazim H. Nasir, P.E.
Bureau of Watershed Management

mhn:
cc: Bob Masnado - WT/2
Roger Schlesser - SCR
Larry Benson - SCR
Nasrin Mohajerani - SCR
Village of Cambridge
Tom Gilbert - WT/2
Kamran Mesbah - DCRPC

RECEIVED
APR 14 1999

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: **DRAFT** April 13, 1999

FILE REF: 3200

TO: Mulazim Nasir – WT/2

FROM: Nasrin Mohajerani - SCR

SUBJECT: Preliminary Calculation for the Village of Cambridge # 4

This is in response to your request an evaluation of water quality-based effluent limitations for the fourth alternative design flow of 200,000 gallon per day for BOD5 and ammonia nitrogen at the Village of Cambridge in Jefferson County.

AMMONIA LIMIT CALCULATIONS

Input Parameters:

EFFLUENT FLOW (mgd) =	**0.200**	0.3
MAX. EFFL. pH =	9.00	
RIVER 7Q10 (cfs) =	9.20	
BACKGROUND NH3-N:		
Summer	0.07	
Winter	0.17	
BACKGROUND pH:		
Summer	8.21	
Winter	7.97	
RIVER TEMPERATURE (C):		
Summer	25.00	
Winter	3.00	
UN-IONIZED NH3-N CRITERION (mg/L) =	0.04	

Cambridge # 4	3.096E-10	3.096E-10
	5.673E-08	9.858E-08
	5.998E-09	1.04E-08

Output Parameters:

	SUMMER	WINTER
BACKGRD. pH =	8.21	7.97
PKa =	9.24	9.97
MIX NH3-N =	0.47	4.08
NH3-N LIMIT:		
Mg/L	**12.46**	120.19
lb/d	20.79	200.47

Recommendation: A weekly average limitation of 12 mg/L (rounded from 12.46) with a mass limit of 21 lb/d (rounded from 20.79) lbs/d are recommended for summer and winter limitations is not needed at this time.

BOD LIMIT CALCULATIONS (26 LB RULE) Cambridge Koshkonong Creek

RECIVING WATER:

	#1	#2	#3	#4
PROPOSED DESIGN FLOW (MGD)	0.4985	0.603	0.958	0.2
RIVER FLOW 7Q10 (cfs)	9.2	9.2	9.2	9.2
RIVER TEMPERATURE	25	25	25	25
EFFLUENT DO (mg/L)	7	7	7	7
BACKGROUND DO (mg/L)	7	7	7	7
MIX DO (mg/L)	7	7	7	7
DO CRITERION (mg/L)	5	5	5	5
BOD5 Concentration Limits (mg/L)	59.9	50.3	33.4	**142.4**
Mass (lbs/d)	249.00815	253.05344	266.79583	237.45293

Mass = (Design flow)(BOD5)(8.34)
BOD5 (mg/L) = 2.4(DObg-DOcr)[a](0.967^(T-24) =
where: a = (Q7,10(0.645) + Qd)f/Qdf
Mass = (Design flow MGD)*(BOD5 mg/L)*(8.34)
Mass limits based on proposed design flow

Recommendation: Because the above calculated limitations for alternative # 4 are greater than categorical limitations contained in ch. NR 210 of Wisconsin Adm. Code, secondary limitations of 45 mg/L as a weekly average and 30 mg/L as a monthly average are applicable.

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary

Box 7921
101 South Webster Street
Madison, Wisconsin 53707-7921
TELEPHONE 608-266-2621
FAX 608-267-3579
TDD 608-267-6897

March 5, 1999

IN REPLY REFER TO: 3420

MR. ALAN GROOMS
TOWN & COUNTRY ENGINEERING INC.
5225 VERONA ROAD BLDG. NO. 4
MADISON, WI 53744-4451

SUBJECT: Preliminary Effluent Limitations Evaluation, Village of Cambridge, Wisconsin

Dear Mr. Grooms:

Preliminary effluent limits have been calculated for the Village of Cambridge.The preliminary effluent limits are summarized in the attached report. These limits are for discharging effluent at the existing discharge location and are being conveyed to you at this time for facility planning purposes only. Please be advised that since these limits are preliminary in nature, they may be subject to changes during the Department's final effluent limits evaluation process.

The limit calculations are for conventional pollutants only. It is possible that additional effluent limits or monitoring requirements including toxics and biomonitoring requirements, may be included in any WPDES permit ultimately issued to the Village of Cambridge.

If you have any questions on preliminary effluent limits or impact on the Village of Cambridge facility plan, please contact me at 608-267-7627.

Sincerely,

Mulazim H. Nasir, P.E.
Bureau of Watershed Management

mhn:
cc: Bob Masnado - WT/2
Roger Schlesser - SCR
Larry Benson - SCR
Nasrin Mohajerani - SCR
Village of Cambridge
Tom Gilbert - WT/2
Kamran Mesbah - DCRPC

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: Draft

FILE REF: 3200

TO: Mulazim Nasir – WT/2

FROM: Nasrin Mohajerani - SCR

SUBJECT: Preliminary Calculation for the Village of Cambridge

Preliminary Calculations for the Village of Cambridge using three different designs flow.

BOD LIMIT CALCULATIONS (26 LB RULE) **Cambridge Koshkonong Creek**

RECEIVING WATER: Koshkonong Creek	# 1	# 2	# 3
PROPOSED DESIGN FLOW (MGD)	**0.4985**	**0.603**	**0.958**
RIVER FLOW 7Q10 (cfs)	9.2	9.2	9.2
RIVER TEMPERATURE	25	25	25
EFFLUENT DO (mg/L)	7	7	7
BACKGROUND DO (mg/L)	7	7	7
MIX DO (mg/L)	7	7	7
DO CRITERION (mg/L)	5	5	5
BOD5 Concentration Limits (mg/L)	**59.9**	**50.3**	**33.4**
Recommended concentration limits			
Monthly average (mg/l)	**30**	**30**	**30**
Weekly average (mg/l)	**45**	**45**	**33**

Mass
(lbs/d)

Mass = (Design flow)(BOD5)(8.34)
BOD5 (mg/L) = 2.4(DObg-DOcr)[a](0.967^(T-24) =
where: a = (Q7,10(0.645) + Qd)f/Qdf
Mass = (Design flow MGD)*(BOD5 mg/L)*(8.34)
Mass limits based on proposed design flow

AMMONIA LIMIT CALCULATIONS **Cambridge** **# 1**

Input Parameters:			Output Parameters:		
EFFLUENT FLOW (mgd) =	**0.499**	0.8		SUMMER	WINTER
MAX. EFFL. pH =	9.00				
			BACKGRD. pH =	8.21	7.97
RIVER 7Q10 (cfs) =	9.20				
BACKGROUND NH3-N:			pKa =	9.24	9.97
summer	0.07				
winter	0.17		MIX NH3-N =	0.47	4.08
BACKGROUND pH:					
summer	8.21		NH3-N LIMIT:		
winter	7.97				
RIVER TEMPERATURE (C):			**mg/L**	**5.28**	**50.66**
summer	25.00		**Lbs/d**	**21.96**	
UN-IONIZED					
NH3-N CRITERION (mg/L) =	0.04				

Recommended NH3-N limits	**mg/L**	**5.28**	**No Limit**
Weekly average (mg/l)	**lbs/d**	**21.66**	

AMMONIA LIMIT CALCULATIONS Cambridge # 2

Input Parameters:			Output Parameters:		
EFFLUENT FLOW (mgd) =	0.603	0.9		SUMMER	WINTER
MAX. EFFL. pH =	9.00				
			BACKGRD. pH =	8.21	7.97
RIVER 7Q10 (cfs) =	9.20				
BACKGROUND NH3-N:			pKa =	9.24	9.97
Summer	0.07				
Winter	0.17		MIX NH3-N =	0.47	4.08
BACKGROUND pH:					
Summer	8.21		NH3-N LIMIT:		
Winter	7.97				
RIVER TEMPERATURE (C):			mg/L	4.45	42.59
Summer	25.00				
UN-IONIZED					
NH3-N CRITERION (mg/l)	0.04				

Recommended NH3-N Limits Weekly Average	**Mg/L**	**4.45**	**No limit**
	lbs/d	**22.38**	

AMMONIA LIMIT CALCULATIONS — Combridge — # 3

Input Parameters:			Output Parameters:	SUMMER	WINTER
EFFLUENT FLOW (mgd) =	0.958	1.5			
MAX. EFFL. pH =	9.00		BACKGRD. pH =	8.21	7.97
RIVER 7Q10 (cfs) =	9.20				
BACKGROUND NH3-N:			pKa =	9.24	9.97
summer	0.07				
winter	0.17		MIX NH3-N =	0.47	4.08
BACKGROUND pH:					
summer	8.21		NH3-N LIMIT:		
winter	7.97				
RIVER TEMPERATURE (C):			mg/L	2.98	28.32
summer	25.00				
winter	3.00		lb/d	23.78	226.25
UN-IONIZED					
NH3-N CRITERION (mg/L) =	0.04				
Recommended Ammonia Limits			**mg/L**	**2.98**	**28.32**
Weekly average					
			lbs/d	**23.78**	**226.25**

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary
Ruthe E. Badger, Regional Director

South Central Region Headquarters
3911 Fish Hatchery Road
Fitchburg, Wisconsin 53711-5397
Telephone 608-275-3266
FAX 608-275-3338
TDD 608-275-3231

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Post-it™ brand fax transmittal memo 7671 | 9/24/99 | # of pages ▸ 3

To Kamran Meshkat	From M. Nasir
Co. Dane County RPC	Co. DNR
Dept.	Phone # 608-267-7627
Fax # 608-266-9117	Fax #

Barbara Winters, Clerk/Treasurer
Village of Cambridge
200 Spring Street
P.O. Box 89
Cambridge, WI 53523

Subject: Notification of Potential Effluent Limitations for NH_3-N
WPDES Permit Number WI-0026948-6

Dear Ms. Winters:

The Department has calculated potential chronic water quality based NH_3-N effluent limitations for the Cambridge Water and Sewer Utility based on DNR's Final Report of the Ammonia Workgroup dated July 1994 and is hereby notifying the Utility via this letter of those values and associated requirements, also referred to in the reissued WPDES permit, WI-0026948-6. Mix pH's, ammonia-N limitations based on variable pH's or pH adjustment is no longer allowed. Based on current calculation procedures (0.355 MGD) by the Department the potential NH_3-N weekly average limitations are as follows:

May through October – 7.23 mg/L (21.4 lbs/d) (Potential Limitation)

The potential chronic NH_3-N effluent limitations are not enforceable effluent limitations at this time and may differ somewhat from future regulatory limitations which will be based on criteria and procedures currently being developed by the Department which may also include not only criteria for chronic limitations but also criteria for acute limitations. They are presented here for informational purposes only to indicate the approximate effluent levels that are needed to protect water quality and provide the permittee with advance planning information. Failure to meet threshold values may signal future compliance problems with final limitations. After the Department has completed the process of codifying ammonia requirements, appropriate regulatory limitations will be imposed. In the interim, the Department is requiring the Cambridge Water and Sewer Utility to comply with the following compliance schedule as found on page 5 of the reissued WPDES permit (WI-0026948-6).

(a) By April 30, 2000, reach a conclusion regarding the plant's ability to meet potential limits and inform the Department in writing of that conclusion. If the conclusion is that potential limits are currently being met, parts (b) and (c) below will not be required. If potential limits are not being met, the permittee shall implement plant process control changes to optimize the ammonia treatment capabilities.

(b) By October 31, 2000, if further actions are required to meet potential limits, submit a plan of investigations to indicate how various alternatives will be evaluated, including dates, which may

allow the permittee to meet potential limits or insure attainment of water quality standards for ammonia.

(c) By March 31, 2003, submit a report detailing results of efforts made or which are ongoing to meet potential limits and/or water quality standards.

Sincerely,

for RB

Ruthe Badger
Regional Director

Dated: 3/31/99

RAS:ras
PERMIT\CAMBRIDGE.DOC

cc: WW Files - South Central Region
Nasrin Mohajerani - SCR
Larry Benson - SCR
WT/2 - WW Permits
Mr. Kenneth Raymond, Operator, Village of Cambridge WWTF, 200 Spring St., P.O. Box 89
Cambridge, WI 53523 (w/enc.)

Nasrin

AMMONIA LIMIT CALCULATIONS

~~Bellows Falls~~ Cambridge

Input Parameters:

EFFLUENT FLOW (mgd) =	0.355
MAX. EFFL. pH =	9.00
RIVER 7Q10 (cfs) =	9.20
BACKGROUND NH3-N:	
summer	0.07
winter	0.17
BACKGROUND pH:	
summer	8.21
winter	7.97
RIVER TEMPERATURE (C):	
summer	25.00
winter	3.00
UN-IONIZED NH3-N CRITERION (mg/L)	0.04

Output Parameters:

	SUMMER	WINTER
Background pH	8.21	7.97
pKa =	9.24	9.97
MIX NH3-N =	0.47	4.08
NH3-N LIMIT:		
mg/L	7.23	69.49
lb/d	21.40	205.74

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TDD 608-267-6897

March 24, 2000

Kamran Mesbah
Dane County Regional Planning Commission
217 S. Hamilton Street, Suite 403
Madison, WI 53703-3228

MAR 28

Subject: Feasibility Study for Regional Wastewater Treatment

Dear Mr. Mesbah:

We appreciated the opportunity last Friday to discuss your Feasibility Study for Regional Wastewater Treatment for Cambridge, Deerfield and Rockdale with you and Bill Lane. I believe our discussions were quite productive. This letter is to confirm the few remaining questions that we are requesting be further addressed in the feasibility report.

1. The study's current assumptions for upgrading the Cambridge plant include costs for an "interim upgrade" scenario. We do not believe this interim upgrade scenario is realistic because if Cambridge adds an additional lagoon, and expands their design capacity, they will receive more restrictive limits for ammonia, and a lagoon system probably could not meet these limits. Cambridge has also recently withdrawn their request for Department review and approval of their facility plan report. They apparently believe the existing facility will suffice for the near term future. With consideration of potential future compliance with limits, upgrading schedules, and other uncertainties, we have concluded that reasonable assumptions for the regional analysis are to assume use of the existing facility for a period of 5 years, and a period of 10 years, and then construction of a new oxidation ditch facility (i.e. delete the previous additional cost for an interim upgrade). We are asking for both the 5 and 10-year scenarios to get a better idea of how sensitive the cost differences are to the uncertain assumptions for service life from the existing plant. We request the analysis be revised accordingly.

2. We also questioned whether a regional plant could be constructed at Deerfield, and whether that could provide cost savings due to use of existing structures. It appears possible the site may be too small but we couldn't verify that. We request that the feasibility report provide additional information on this question. If the site suitability cannot be completely resolved, it would then be beneficial to attempt to approximate what saving might result, assuming the site is usable.

3. We request the study provide more specific analysis and recommendations pertaining to Rockdale. Even if Deerfield proceeds with their own upgrade, the question remains if it would be cost-effective for Cambridge and Rockdale to connect to a regional plant at Cambridge. Of course, whether Rockdale needs to upgrade now, or can defer new construction, is an important consideration to be addressed.

4. For the Rockdale, 10 year interim alternative, Table B-1 contains an error in the cost estimates. The capital cost is discounted twice. This table and resultant cost estimates should be corrected accordingly.

Once the regional analysis is revised we will proceed promptly to complete our assessment and make a determination on this question. If you have any questions, please contact me at (608) 267-7628.

Sincerely,

Thomas A. Gilbert, P.E.
Wastewater Facility Planning Coordinator
Bureau of Watershed Management

cc: Larry Benson – SCR (Madison)
Bernie Robertson – SCR (Janesville)
Mulazim Nasir – WT/2

Appendix D

Stream Water Quality Monitoring Data

Table D-1
Stream Baseflow Water Quality Monitoring Results

Period of Record	Station		Flow cfs	Temperature C	Dissolved Oxygen	pH	NO_3+NO_2 Nitrogen mg/l	Ammonia Nitrogen mg/l	Organic Nitrogen mg/l	Total Nitrogen mg/l	Dissolved Phosphorus mg/l	Total Phosphorus mg/l	Specific Conductivity us/cm	Chloride mg/l	Alkalinity mg/l as CaCO3	Turbidity NTU	Chemical Oxygen Demand mg/l	Suspended Sediment mg/l	Fecal Coliform col/100ml
KOSHKONONG CREEK BASIN																			
1996	Koshkonong Creek																		
May-Dec.	@ Bailey Rd.	mean	8.7	14.3	7.7	7.4	7.93	0.31	0.79	9.03	1.64	1.75	1355	198	315	2.4	31	10	1008
	near Sun Prairie	min	4.7	7.5	5.7	7.1	4	0.16	0.67	5.20	0.81	0.89	1060	120	276	1.1	24	4	200
		max	15.0	20.0	10.7	7.7	13	0.53	0.86	14.10	2.60	2.90	1510	240	330	3.8	44	18	2100
	-USGS	# Samples	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
1996	Koshkonong Creek																		
May-Dec.	@ Hoopen Rd.	mean	65.0	13.7	9.7	8.0	3.57	0.15	0.64	4.35	0.14	0.29	837	51	316	12.7	31	66	373
	near Rockdale	min	37.0	0.5	7.0	7.9	2.8	0.07	0.43	3.30	0.09	0.17	775	42	309	1.6	16	17	97
		max	86.0	22.0	14.5	8.2	4.3	0.23	0.90	5.10	0.19	0.51	892	63	327	33.0	46	206	770
	-USGS	# Samples	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Table - D-2
Stream Baseflow Metal and Secondary Parameter Monitoring Results*

Sampling Period	Station		Arsenic ug/l	Boron ug/l	Cadmium ug/l	Chromium ug/l	Cobalt ug/l	Copper ug/l	Iron ug/l	Lead ug/l	Manganese ug/l	Mercury ug/l	Nickel ug/l	Silica mg/l	Sulfate mg/l	Zinc ug/l	Fecal Streptococcus col/100 ml
	Acute Toxicity Criteria for Aquatic Life[1]		339.8	–	9.65	3381	–	30.45	–	208.9	–	0.83	2434	–	–	220.7	–
	Chronic Toxicity Criteria for Aquatic Life [1]		148	–	–	152.1	–	21.57	–	54.71	–	0.44	270.8	–	–	220.7	–
	KOSHKONONG CREEK BASIN																
1996 (Oct.)	Koshkonong Creek @ Bailey Rd. near Sun Prairie	USGS	<1	150	<1	<1	<1	6	230	<1	70	<.10	2	15	30	30	350
1996 (Oct.)	Koshkonong Creek @ Hoopen Rd. near Rockdale	USGS	2	40	<1	<1	<1	1	350	<1	60	<.10	1	9.2	40	<10	260

*Metal results are from a single sample collection unless otherwise noted. Concentrations of metals are reported as total recoverable and in micrograms/liter.

[1]As listed in State Administrative Code Ch. NR 105.`

Appendix E

Analysis of the Adequacy of The Existing Deerfield Wastewater Treatment Plant Site to Accommodate A Regional Treatment Facility

TOWN & COUNTRY
ENGINEERING, INC.

5225 VERONA RD BLDG 4
PO BOX 44451
MADISON, WI 53744-4451
(608) 273-3350 (fax) 273-3391
(e-mail) townctny@midplains.net

May 8, 2000

Mr. Kamran Mesbah
Dane County Regional Planning Commission
217 S. Hamilton St., Suite 403
Madison, WI 53703

MAY - 9 2000

Subject: Deerfield/Cambridge Regional Analysis
Regional Treatment Facility at Existing Deerfield Facility

Dear Kamran:

Please find enclosed a proposed layout of a new regional WWTF located at the site of the existing Deerfield WWTF. This is in response to DNR's request for evaluation of this alternate. The layout contains the following components:

- Deerfield lift station (existing at present plant)
- Headworks/screening/grit removal (30' x 55')
- Oxidation ditch (136' x 156')
- Final clarifiers (2-50'0)
- UV system/post aeration (15' x 32')
- New sludge thickening/handling building (60' x 90')
- Sludge storage tank & blowers (Existing)
- Additional sludge storage and blowers (convert existing aeration basins and clarifiers)

Key components either missing or assessed as inadequate for regional WWTF are as follows:

- No digesters, existing sludge storage is not adequate
- No new admin/lab building
- No selector basins for bio-phosphorus removal
- No room for tertiary filters (expected discharge limits will be more stringent)

Note that conversion of the existing Deerfield clarifier/aeration basins to sludge storage adds 360,000 gallons to the existing capacity of 460,000 gallons sludge storage facility. The resulting capacity of 820,000 gallons is about 80% of the estimated 1,028,000 gallons of sludge storage estimated to be needed at a regional WWTF to meet the 180 day storage requirement. This storage volume is based on thickening the sludge to 5% and on sludge generation by a biological phosphorus removal process. Since no selector basins are present, if chemical phosphorus removal is needed to meet effluent objectives, the sludge generation and storage requirements will increase.

In short, the available space (less than 2 acres) does not appear adequate to allow location of a regional treatment facility there. Moreover, there is absolutely no space remaining for future improvements or expansion. Future expansion by itself makes this alternative unacceptable. This does not even broach the topics of the Village's willingness to allow location of a regional WWTF within their industrial park, nor the negotiation required to agree on use of the Village's existing WWTF as part of the regional facility.

When these factors are considered along with the fact that to put a regional WWTF at Deerfield would mean pumping 2/3 of the total influent uphill to a location which will have more stringent effluent limits (all these items will only increase the operation cost), it becomes very clear that a regional WWTF located in Deerfield is not desirable or feasible. We would be more than happy to discuss this with you if you have any questions.

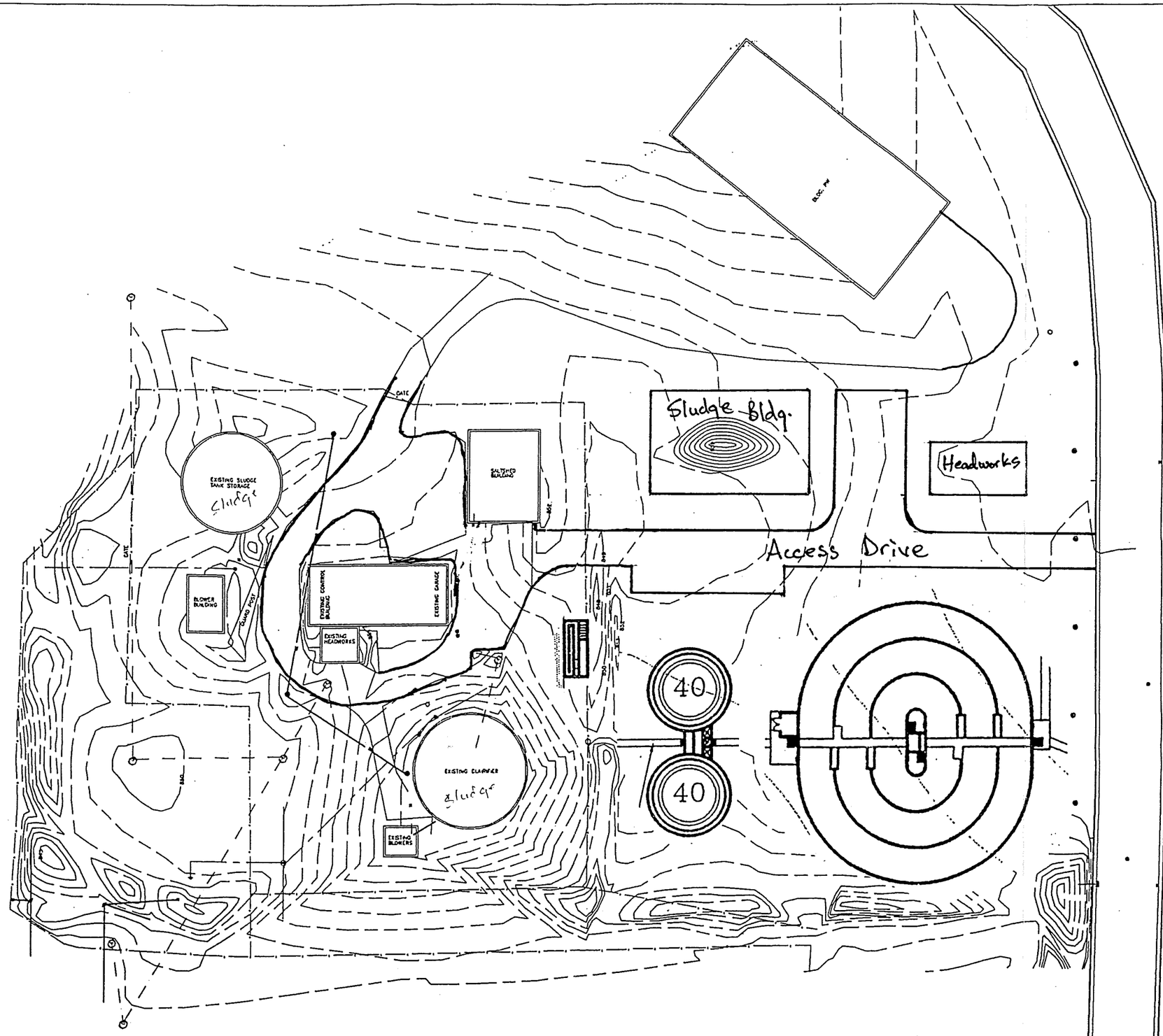
Very truly yours,
TOWN & COUNTRY ENGINEERING, INC.

Eugene A. Laschinger

Eugene A. Laschinger, P.E.
Vice-President

ALG:smd
J:\JOB#S\Deerfield\DE-00-00\regionalwwtf.ltr.doc

cc: Mr. Mulazim Nasir, P.E., Wisconsin Department of Natural Resources *(Municipal Wastewater Section WW/2, 101 S. Webster, P.O. Box 7921, Madison, WI 53707)*



DRAWN BY: GJD	REVISIONS:	PROJECT: **2000 Wastewater Treatment Plant Modifications** **Village of Deerfield, Wisconsin**	Town & Country Engineering, Inc. 5225 VERONA ROAD, BUILDING NO. 4 P.O. BOX 44451 MADISON, WI 53744 (608) 273-3350	SHEET DESCRIPTION: **EXISTING SITE SITE PLAN**	GRAPHIC SCALE: 0' 15' 30' 45' 60'	SHEET NO:
CHECKED BY: EAL	DATE: 5/00					
PROJ. NO: DE 34	SCALE: 1" = 30'-0"					