

## Dawn Bartel

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**From:** Brian Helminger <brian.helminger@hvmsd.org>  
**Sent:** Thursday, November 30, 2017 9:16 AM  
**To:** bruce siebers; Dave Casper; John Sundelius; kcoffey238@gmail.com; Pat Hennessey  
**Cc:** Kevin Skogman; Dustin Jerabek; Dawn Bartel  
**Subject:** Interceptor Action Plan (2)  
**Attachments:** 1975 Facilities Plan - Interceptor section.pdf

Commissioners:

The first e mail in this string serves to bring you up to speed on the discussion to date. Yesterday afternoon Dawn was able to retrieve some of the original planning documents from 1975 prepared by Donohue. The attached PDF discusses the pros and cons of the options looked at for routing the Interceptor prior to its original construction. This information was what was felt to be relevant in 1975 and provided insight into why the Interceptor is located in the river. I believe that its still relevant today and with years of development and growth in the member communities and along the river may be even more relevant today.

My hope is that with your feedback we can narrow in on a scope for SMS for what should be included in the second phase of the Interceptor study and that at its completion it leads us to an obvious road map that satisfies lingering questions on what the best path forward will be. With the Holidays nearing and year end I'd like to give Scott a unified direction from the District that sufficiently addresses outside the box thinking along with the alternative options to satisfy both Commissioner and member community concerns prior to commencing on design work. This project is a game changer and so your discussion and input is critical.

Ideally, it would be nice to be able to communicate our needs and questions to Scott so he can prepare a final scope and estimate the level of effort that will be required to meet our needs. If at all possible, we can agendadize the professional services agreement and act upon it at the December meeting so as not to loose a month of potential productive work time.

With all that said, please review the information and provide comment as necessary in agreement with items currently detailed and to add additional items of concern or questions that you feel need to be addressed in the next phase. If we are unable to move quickly enough for the December meeting then so be it as this is not to be rushed along until we are satisfied with the next study phase.

## Brian Helminger

District Director

Heart of the Valley  
Metropolitan Sewerage District  
801 Thilmany Road  
Kaukauna, WI 54130  
Phone: 920-766-5731  
[www.hvmsd.org](http://www.hvmsd.org)

## CHAPTER IX

### EVALUATIONS, ECONOMIC & ENVIRONMENTAL

#### INTRODUCTION

In the previous chapters of this report, various methods of treatment of wastewaters and interceptor sewer routings were evaluated. From these preliminary evaluations, it has been determined that an interceptor sewer along or in the lower Fox River to convey wastewater flows to a regional treatment facility utilizing a type of biological treatment of wastewaters is the most feasible scheme for the collection and treatment of wastewater in the Heart of the Valley Planning Area. The purpose of this chapter is to further evaluate interceptor sewer routes, various treatment plant sites and unit treatment processes and alternates to insure that the most economically and environmentally sound interceptor route, plant site and treatment processes are selected. Consideration is also given to future expansion beyond 1995, to the addition of nitrification facilities and effluent aeration, and to increased size of the facilities should the Phase 2 Sewer System Evaluation Survey in Kimberly and Combined Locks remove a lesser quantity of infiltration/inflow than presently anticipated. All present worth cost estimates shown in this chapter are based upon a service life of 20 years and an interest rate of 7 percent.

The first half of this chapter addresses three interceptor alternates along with the associated environmental considerations. The three alternates are:

Alternate A: This alternate is a new regional interceptor along and in the lower Fox River commencing at the existing Kimberly wastewater treatment facility then downstream along the bank of the river and across to the Little Chute treatment plant area. From this area, the interceptor would be routed in the navigation canal to Sanitarium Road where an interceptor from Combined Locks will connect into the main sewer. The interceptor would then be routed into the river and would parallel the north bank to Kaukauna. Near the Island Street Bridge in Kaukauna the sewer would be routed onto Thilmany Company property and would then continue to the existing City of Kaukauna wastewater treatment facility area. This alternate is also referred to as the north water route.

Alternate B: This routing is similar to Alternate A except that the sewer is routed on land along the north bank of the Fox River from the Sanitarium Road area into the City of Kaukauna. This alternate is referred to as the north land route.

Alternate C: This routing is also similar to Alternate A except that the south bank along the river is followed from the Sanitarium Road area. This alternate is referred to as the south water route.

These alternates have been evaluated from an environmental standpoint. With the completion of the environmental evaluation, the next step was an economic cost comparison. The interceptor sewer route that was determined to be most environmentally advantageous and economically cost effective was then selected.

The second portion of this chapter addresses various unit processes at the proposed wastewater treatment facility. These unit processes are air aeration, pure oxygen aeration, chlorination, ozonation, heat treatment of sludge and anaerobic digestion. Applicable unit processes proven not cost effective have been eliminated from further consideration. Two potential plant sites were identified. Using this information, four treatment plant alternates were evaluated. These alternatives are:

Alternative 1: A biological treatment process using air aeration, chlorination and sludge heat treatment located at the site of the existing City of Kaukauna wastewater treatment facility.

Alternate 2: A biological treatment process utilizing pure oxygen aeration, ozonation and sludge heat treatment at the existing Kaukauna plant site.

Alternate 3: A biological treatment process utilizing air aeration, chlorination and sludge heat treatment located at a site downstream of the City of Kaukauna.

Alternate 4: A biological treatment process using pure oxygen aeration, ozonation and sludge heat treatment located at the downstream plant site.

These four alternates have been evaluated and compared on an environmental basis. With the economics and environmental comparisons complete, a plan for wastewater treatment was then selected.

## REGIONAL INTERCEPTOR SEWER

### Introduction

In Chapter VIII of this report various alternate interceptor sewer routings were described and evaluated in a preliminary manner. This evaluation revealed that any proposed new interceptor should be located along or in the Fox River from Kimberly to the proposed Regional Plant. In this chapter, detailed evaluations of various alternate routes along the Fox River have been completed.

### Interceptor Sewer Design

The purpose of the proposed regional interceptor is to collect wastewater from the existing and potential sewer areas of the existing and proposed planning area of the Heart of the Valley Metropolitan Sewerage District and transport this sewage to a treatment facility.

The Wisconsin Department of Natural Resources' Regulations, NR-110, approved by the DNR on July 22, 1974, and the "Recommended Standards For Sewage Works" by the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers both state:

"The sewer systems shall be designed for the estimated ultimate tributary population, except for those points in the system that can be readily increased in capacity."

After evaluation of the methods and types of construction required to install an interceptor sewer along the Fox River, it was determined that the interceptor should be sized to serve the ultimate tributary area of the Commission. This tributary area consists of that area which drains naturally towards the Fox River between Kaukauna and Kimberly and which is not serviced by other treatment facilities. This area is shown on Plate IX-A as the Heart of the Valley Planning Area and encompasses the existing municipalities along with portions of the Towns of Vandebroek, Harrison, Buchanan and Kaukauna.

The Fox Valley Council of Governments prepared a Land Use Plan for their entire planning area to the year 2000. In the Heart of the Valley Planning Area various land uses were categorized and detailed. Based upon these land uses, various contribution factors were applied and sewage flows were calculated. The proposed regional interceptor sewers were then sized based on the projected sewage flows and their input locations into the proposed interceptor.

The design life of the interceptor was set at 50 years. Based upon the above criteria, the area served and various contribution factors as shown in Appendix D, the sewer design was then determined.

The Fox River, between Kimberly and Kaukauna, flows near or directly above the limestone bedrock of the area. A series of soil borings were taken at various locations along and in the river to determine the exact relation between bedrock, ground and river bottom elevations.

#### DEFINITION OF ALTERNATES

Based upon the above information, three alternate interceptor sewer routes were identified and are shown on Plate IX-B. These alternates are described as follows:

##### Alternate A

Under Alternate A, the upstream segment of the interceptor sewer system would commence near the existing wastewater treatment plant at Kimberly, traversing southeasterly between the Chicago and Northwestern Transportation Company tracks and the south bank of the Fox River to the point of the proposed river crossing just below the Little Chute Dam. The method of river crossing is a combination gravity sewer and siphon based upon river bottom soundings and soil borings.

After crossing the Fox River, and upon intercepting the flows tributary to the existing wastewater treatment plant at Little Chute, the interceptor would be located generally within the confines of the U.S. Government Canal between the Upper Combined Locks and the Lower Combined Locks.

Installation of intercepting sewer facilities within the U.S. Government Canal will be permitted by the U.S. Army Corps of Engineers provided that the following criteria are met.

1. The sewer must be installed with a 3 foot minimum cover below the existing canal bottom.
2. If, for some reason, a 3 foot minimum cover cannot be maintained within the navigation channel portion of the canal, the sewer must be capped in concrete.
3. Manholes will not be permitted within the navigation channel portion of the canal.
4. Permanent bulkheading around manholes for protection will not be permitted.
5. Manholes located within the canal must be marked in some manner to provide for boaters' safety.
6. Construction within the canal will be permitted year round. The canal, however, is closed to navigation and dewatered from approximately November 1 to May 1, each year.

Construction of the intercepting sewer facility within the U.S. Government Canal may be accomplished in the "wet" or in the "dry" depending upon the time of year, and the contractor's option of preferred method of construction.

At Lower Combined Locks, the interceptor would be routed around the lock, and thence continue easterly to Riverview Sanitarium along the north bank of the Fox River. In the vicinity of Riverview Sanitarium, a second proposed river crossing from the south will join the interceptor. This river crossing will convey flows from South Kimberly, Combined Locks and the northern portions of the Town of Buchanan and Harrison (Darboy Service Area) to the proposed interceptor.

At a point just east of Riverview Sanitarium, the interceptor would be routed into the Fox River, traversing approximately parallel to the north bank of the river to the Kaukauna Guard Lock. Installation of this segment of interceptor sewer would be accomplished by means of marine construction. Overburden material on the river bottom would be dredged aside (not brought to the river surface) and rock, where encountered, would be blasted. The interceptor would be installed with a minimum cover of 3 feet, and the trench backfilled with previously dredged overburden material. Manholes would be located approximately 1,000 to 1,200 feet apart, and marked for their protection and for boaters' safety. The interceptor sewer would be located at least 25 feet from the intersection of the river bank slope with the river bottom to prevent the possibility of slope failure.

In the vicinity of the Kaukauna Guard lock, the interceptor would be placed alongside an existing siphon located downstream from the U.S. Dam. From this point, the proposed interceptor would be located within, and follow along, the main and north branch of the Fox River to the Island Street Bridge. The possibility exists that this particular segment of sewer may be constructed completely in the "dry" during the summer months when river flows are low. The flow over the U.S. Dam could possibly be diverted through the power canal of the Kaukauna Electric and Water Department hydro-electric plant and be discharged via the south branch of the Fox River.

The last segment of interceptor, located between the Island Street Bridge and the existing Kaukauna wastewater treatment plant, would extend in easement, across the Thilmany Pulp & Paper Company property. This routing would entail several rail crossings and one canal crossing.

#### Alternate B

The interceptor sewer routing under Alternate B, including river crossings, is identical to that described under Alternate A with the exception of a segment located approximately between Riverview Sanitarium and the Kaukauna Lock and Dam. Under Alternate B, the interceptor would be routed on land along the north bank of the Fox River between Riverview Sanitarium and the Guard Lock at Kaukauna.

Construction of intercepting sewer facilities along the north bank of both the Fox River and the U.S. Government Canal, between the limits described above, would entail obtaining numerous easements since the majority of this land is privately owned.

Due to the extreme gradient of the banks along the north shore of the Fox River in this vicinity, unusual construction techniques would have to be employed. A haul road of substantial width would have to be cut into the river bank to function not only as a haul road for materials, but also to serve as a working platform from which to install the interceptor sewer. Without the cutting of a working platform, it is doubtful that the interceptor could be constructed on such a steep side slope with depths to flow line varying from 9 to 31 feet. By excavating a working platform, numerous large trees, ornamental shrubs, and several lawned areas would have to be removed. In this regard, the removal of the "toe" at the river bank, blasting operations, and the removal of vast areas of vegetal cover for the construction of a working platform would influence the design.

Upon completion of the interceptor installation, the river bank slopes would be restored. It is doubtful if the slopes could be restored in such a manner as to achieve the same supporting strength for the undisturbed overburden as existed before construction.

#### Alternate C

The routing of an interceptor sewer under Alternate C is also identical to the routing proposed under Alternate A with the exception of a segment located approximately between Riverview Sanitarium and the Guard Lock at Kaukauna.

Alternate C differs from Alternate A, between the limits described above, in that the interceptor would be routed directly eastward from Riverview Sanitarium across the Fox River to near the south bank of the river. At this point, the proposed interceptor would be routed northeasterly approximately parallel to the south shore of the river at an offset distance of about 40 feet from the shore line. At the point of beginning of the power canal to the Kaukauna Electric & Water Department hydro- electric plant, the interceptor would be routed back across the Fox River to the north bank in the vicinity of the Kaukauna Guard Lock. Alternate C routing downstream of the Guard Lock is identical to that of Alternate A.

An advantage in crossing and thence paralleling the south bank of the Fox River between Riverview Sanitarium and the Kaukauna Guard Lock is the fact that this particular routing is approximately 200 feet shorter than Alternate A and approximately 300 feet shorter than following the north bank, as in Alternate B.



A major disadvantage of this routing lies in the fact that the flow line of the segment of sewer located approximately between Riverview Sanitarium and the S.T.H. "55" bridge would require at least a 4 foot greater installation depth than proposed under Alternate A or B in order to accomplish the gravity crossing of the Fox River directly east of Riverview Sanitarium. Another major disadvantage is the fact that the Chicago and Northwestern Transportation Company has experienced, and thereby has expressed some concern over faulting of the south river bank on which their tracks are located.

#### Sewer Sizing

Tabulated below for reference are the proposed interceptor sewer sizings described in segments applicable to all of the alternates as described above.

	<u>Segment</u>	<u>Sewer Size</u>
1.	Kimberly Wastewater Treatment Plant to point of river crossing just below U.S. Dam.	18 & 21 inch
2.	River crossing to Little Chute Wastewater Treatment Plant	6 & 14 inch siphon and 30 inch gravity
3.	Little Chute Wastewater Treatment Plant to Sanitarium Road	36 inch
4.	Sanitarium Road to juncture with second river crossing	42 inch
5.	River Crossing between Combined Locks and Riverview Sanitarium	6, 18 & 24 inch siphon
6.	Riverview Sanitarium to Kaukauna Guard Lock	54 inch
7.	Kaukauna Guard Lock to Regional Wastewater Treatment Plant	54 & 48 inch

### Sewer Materials

Those portions of the interceptor sewer located on land would be constructed of reinforced concrete pipe with a conventional compression-type gasket joint or a material of equal quality. Those portions of sewer located within the U.S. Government Canal and within the Fox River would consist of reinforced concrete pipe with a locked, pressure-type joint. Sewer pipe would be designed to withstand not only existing loading conditions, but also to withstand the superimposed hydrostatic loading of the 100-year flood. Manholes would be designed to withstand pressures exerted by the 100-year flood, ice loadings and be provided with watertight, lock-down covers.

### Route to New Site

Should the evaluations of various treatment plant sites and interceptor sewers show that the most cost-effective and environmentally sound alternative is a new wastewater treatment facility downstream of the City of Kaukauna, it will be necessary to construct a new lift station and force main to convey the wastewater to the proposed site. The present Kaukauna treatment site would be the location of the new lift station and a force main would be constructed along the northwest bank of the river to the proposed plant site. Further evaluations indicating the location of a possible downstream plant site are provided in a subsequent section of this chapter.

### Metering Stations

To accurately measure and record the quality and quantity of wastewater received from each of the existing four communities within the Heart of the Valley Metropolitan Sewerage District, six metering stations would be located at the input point of sewage from various communities. These stations would be equipped with continuous flow monitoring equipment with this information being transmitted to the proposed treatment plant site. Permanent sampling equipment would also be provided such that the necessary samples can be collected for laboratory analysis. It is anticipated that the information provided from this flow measuring and sampling would be utilized for accounting purposes as well as plant operational purposes.

## ENVIRONMENTAL CONSIDERATIONS OF ALTERNATE INTERCEPTOR ROUTES

### Introduction

Each of the alternates described previously have significantly varied impacts on environmental conditions. These differences are described in detail in the following sections.

### Soil Conditions

Certain areas on the north bank of the Fox River between the Riverview Sanitarium in Little Chute and the Guard Lock at Kaukauna, near the S.T.H. 55 Bridge across the Fox River, have been subject to unstable soil conditions. The Corps of Engineers records indicate that profiles of the bank of the Fox River were taken as early as 1892 and repeated at various times throughout the years to determine the characteristics of the soil movement. In general, the Corps of Engineers Reports conclude that the soil movement was the result of the inability of the clay soils, characteristic of this area, to physically maintain the steep embankment.

Throughout the many years of development of the City of Kaukauna, especially along the south side of Wisconsin Street, fill materials have been placed at the top of the bank of the Fox River such that structures could be constructed. This development has created an increased load on the soils along the river bank. Field investigations in the area indicate that recent movements and slippage adjacent to the north edge of the waterway could, in a number of cases, be directly related to the recent addition of fill along the top of the embankment. To determine the exact cause of the soil movement of portions of the north bank of the Fox River in this area, several soil borings were drilled and a test hole was dug. At the location of the test pit, the limestone bedrock of the area was overlain with approximately 8 feet of fill overburden and 18 feet of clay. The lower ten feet of the 18 feet of clay consisted of well compacted horizontal layers of clay varying from a fraction of an inch to several inches in thickness separated by thin silty sand seams. The varved or stratified clay material could easily fracture along the silty sand seam to form thin flat plates.

Based upon the above field investigations, it was concluded that the bank slippage which has occurred could be caused by two specific items. The upper 8 feet of the 18 feet of clay material can be saturated due to area rainfall, thus causing unstable soil conditions and bank slippage. The second form of movement occurs in a lateral direction along the silty sand seams in the lower layers of clay as a result of the seams which form a wear area in the soil and are therefore a natural slippage plain. Any ground water movement along the seams would also reduce the shear strength of the soil in the areas of the already weakened plains.

As stated previously, any proposed sewer along the north bank would have to be constructed on some type of level working platform. This platform would act as a place for equipment to move during construction, but also as the trench location. To construct this working platform would entail the excavation of a portion of the river bank, effectively increasing the slope of the bank. Certain precautions would have to be taken to hold the bank in place during construction. This could be done by the construction of a bin wall or some other type of bank supporting structure.

The interceptor sewer itself would not be placed in the seamed clay soil; it would be located in the bedrock below. However, manholes would be in the path of the soil movement and might be subjected to shifting, thus causing possible maintenance and infiltration problems.

No matter what method of construction is undertaken along the riverbank between Sanitarium Road and the Kaukauna Guard Lock, it is possible that bank movement along certain sections could be accelerated, causing settlement of the structures at the top and causing soils to be shifted towards and possibly into the Fox River. The end result could possibly be increased siltation of the river and damage to the buildings above. The probability of this occurring can be greatly minimized by proper construction techniques, structures and slope stabilization. However the potential problems must be considered when evaluating the interceptor route alternatives.

#### Marine or Dry Land Construction

It may be possible under certain conditions and during specific seasons to construct certain portions of a new interceptor in the dry bed of the river or one of its associated canals. Construction in the canal between the Upper Combined Locks and Lower Combined Locks in Little Chute, if completed during the winter season, could be accomplished under a relatively dry condition. This could possibly be the case downstream of the Kaukauna

Guard Lock, with the entire flow of the Fox River routed through the southern canal. It is felt that construction in the river bottom under dry conditions could be much more easily controlled considering the excavation and blasting required along with subsequent river sedimentation and siltation problems. Since the flow of the Fox River is regulated by the level of Lake Winnebago and dams at the Lake outlet into the Fox, coordination of construction activities to river flow is necessary.

It is therefore recommended that, no matter which alternate is shown to be most cost effective, consideration be given to limit the necessary marine construction to the greatest extent possible and that the marine construction absolutely required be done during periods of low river flow.

#### Use of Explosives

In all of the alternates, it is necessary to remove a portion of the limestone bedrock which lies near or at the ground surface along the downstream portions of the proposed interceptor routes. Use of explosives for the construction of the interceptor is regulated by Chapter 5 of the Industrial, Labor and Human Relations Section of the Wisconsin Administrative Code. These regulations must be followed during construction to assure an absolute minimal potential for damages caused by the use of explosives. When explosives are utilized in the bottom of the Fox River, below river level, the charge should be set as an absolute minimum which would open the necessary trench and create the least shock or concussion on any aquatic life in the river. It is not anticipated, if completed in the proper manner, that blasting in the Fox River would have any long term effects upon the fish. Siltation and sedimentation due to the effects of explosions may have a short term adverse effect due to an increase in sediment in that specific section of the river.

#### Noise

The equipment associated with sewer construction is somewhat noisy and, at certain locations near the equipment, may far exceed normal background noise levels. It is anticipated that the construction workers would either be isolated from the areas of excessive noise, be far enough from the source such that there is no danger of exposure, or would be adequately protected. When blasting is utilized, the noise emanating from this source should be muffled by the use of mats over the exploded area and workers should be away from the vicinity of the explosion.

Due to the isolated location of the proposed interceptor sewer for all of the alternates from the area of the general public, no noise levels in any substantial excess of normal background noises are anticipated.

#### Inconvenience to Public

Since the proposed routes of the interceptor sewer are isolated and somewhat remote from the areas which are used by the general public, no major inconvenience is anticipated. The only exception may be an inconvenience to launching boats if the proposed Alternate B is proven most cost effective. In Riverside Park in Kaukauna, there is a location along the river to launch pleasure boats or crafts. It is anticipated that construction through this area would be completed in a timely manner, thus limiting the inconvenience to the users of the launch.

#### Existing Utilities

There are three natural gas lines, one sewer line, and two existing water mains crossing the Fox River between Kimberly and the existing Kaukauna wastewater plant site. Caution should certainly be taken such that no blasting of bedrock in the close proximity of these existing utilities is done. The owners of these utility lines must be contacted during construction in the specific areas.

#### Excessive Infiltration or Exfiltration

Under certain conditions it is possible for leaks to develop in portions of a sewer. A number of precautions should be taken in the sewer design and construction to prevent possible leaks and to locate and repair any significant sources of infiltration and exfiltration that may occur. These precautions are:

1. All gravity siphons should be constructed with a pipe material which is designed for said use with water tight joints and a designed corrosion allowance.
2. All gravity sewers installed within the confines of the Fox River or canals should also be of a pipe material designed for such use. An example of this type of pipe would be a prestressed, concrete lined interior and exterior, steel pipe. The joints should be a combination rubber gasket and steel designed for subaqueous conditions.

3. The manholes along the interceptor route should be constructed such that basically all are set at a rim elevation higher than the projected regional (100 year) flood. This would allow adequate ventilation of any gases which may be created in the interceptor. The manholes located in the river itself and in the canal should be designed and constructed to withstand the expected hydraulic impact of the river, ice flows and various floating objects.

Metering stations are proposed to be located at various strategic locations along the proposed interceptor route. The primary purpose of these stations is to measure and sample the input wastewater stream from the communities. A secondary purpose would be to determine if any excessive infiltration or exfiltration is occurring along certain sections of the proposed interceptor. Thus, should a line break or similar conditions in any manholes occur, the problem could be identified and corrected.

#### Recreational Uses

Recreational boating, as described in a previous chapter of this report, has become an ever increasing use along and upon the Fox River. For the portion of the interceptor which may be located within the confines of the river, this recreational activity may be affected somewhat unless adequate precautions are taken, both during construction and afterwards. It is anticipated that if a marine route for the interceptor is proven most cost effective, some inconvenience to boating activity within the area of construction may be noticed. It is felt that this inconvenience would be relatively minor. After the interceptor sewer has been constructed, a limited number of manholes would be exposed above the water's surface. These obstructions would be adequately marked and located such that they would be highly visible to any pleasure craft or other vessel.

#### Fish and Other Aquatic Life

The proposed regional interceptor would have a slight effect upon the aquatic life in the Fox River during construction. However, it is anticipated that this effect upon the aquatic habitat would be temporary in nature and have no long term implications. The temporary effects would be in the form of a disturbance of a small portion of the habitat in the specific area of construction.

## Vegetation

Should Alternate B, the north land route, prove to be the most cost effective, it must be noted that this alternate would have the most significant impacts upon trees, shrubs and other vegetative cover. Between the Riverview Sanitarium and the Kaukauna Guard Lock, the property abutting the Fox River is mostly privately owned or a City park. This area is heavily occupied with a relatively mature stand of hardwood trees. In the process of constructing the sewer through this area, it would be necessary to remove a significant number of these trees, shrubs and other vegetation. The shrubs and vegetation could be easily replaced, but new trees would take many years to mature.

The section of the proposed interceptor along the canal near the downstream end of the Thilmany Pulp and Paper Company will also involve the removal of some scrub shrubbery. It is not anticipated that this removal would have any major effect upon the area.

## River Water Quality

During construction it is anticipated that some possible effects upon the Fox River could be noticed. The change would most likely be a small increase in suspended solids which would have been disturbed by excavation in the river or along the bank. Locating the excess spoil above the projected 100 year flood should minimize the quantity of sediment which may enter the river when excavating along the river bank. The relocation of sediment from excavation in the river can be minimized to some extent by proper use of equipment; however it cannot be totally avoided. This negative impact must be compared to the other interceptor route alternatives as well as the positive impact of adequate wastewater collection and treatment.

In a previous chapter of this report the existing bypasses located within the communities of the Heart of the Valley Region were identified. Through the construction of the interceptor, five of these bypasses can be removed, thereby eliminating raw, untreated sewage from being introduced directly into the Fox River. The bypasses, described in the Heart of the Valley Infiltration/Inflow Analysis (8) are:

1. Bypass just upstream of the existing treatment plant in Kaukauna.
2. Bypasses No. 1 & 4 in Little Chute
3. Bypasses at Pumping Stations No. 1 & 2 in Combined Locks.



The bypassing of raw sewage poses a hazard for the aquatic and animal life present in or near the Fox River. Removal of this hazard represents significant progress in the upgrading of the quality of the Fox River.

### INTERCEPTOR SEWER COSTS

The present worth costs associated with the previously described alternate sewer routes along with a proposed lift station at the Kaukauna Plant and force main and metering stations are shown in Table 6.

TABLE 6  
PRESENT WORTH COSTS  
INTERCEPTOR SEWER ALTERNATES  
HEART OF THE VALLEY  
METROPOLITAN SEWERAGE COMMISSION

<u>Item</u>	<u>Present Worth Cost</u>
Alternate A (North Water Route)	\$3,878,000
Alternate B (North Land Route)	5,551,000
Alternate C (South Water Route)	4,482,000
Lift Station at Kaukauna Plant	
Force Main from Lift Station to Downstream Plant Site	789,000

A detailed breakdown of these cost estimates is provided in Appendix E.

To adequately determine the quantity and composition of the wastewater collected from the various communities of the Heart of the Valley Region, it is necessary to construct a series of metering and sampling stations at various points of wastewater input into the regional interceptor sewer. This would be accomplished by the construction of these stations as located on Plate IX-B. The estimated present worth cost for the metering stations is \$247,000. A detailed breakdown of this estimate is also provided in Appendix E.

### INTERCEPTOR SEWER PLAN SELECTION

In the previous sections of this chapter, numerous interceptor alternatives were presented, discussed and evaluated. The advantages and disadvantages based upon both environmental and economic factors have also been discussed. In this section, the various alternatives have been rated and a recommended plan has been selected.

### Rating System for Interceptor Alternates

The three alternative interceptor routes were previously described as Alternate A, North Water Route; Alternate B, North Land Route; and Alternate C, South Water Route. The total present worth costs for these alternates is shown below.

<u>Alternate</u>	<u>Present Worth Cost</u>
A	\$3,878,000
B	5,551,000
C	4,482,000

In the following Table, an attempt has been undertaken to show the various environmental factors which have been considered in the total evaluation of the various interceptor alternates. Table 7 has not been prepared for the purpose of ranking the various alternates, but only to show consideration to both short and long term environmental factors.

From the evaluations completed, it appears that the most cost effective interceptor route is Alternate A, North Water Route. This route has thus been selected as the preferred alternate.

**TABLE 7**  
**ENVIRONMENTAL CONSIDERATIONS**  
**INTERCEPTOR ALTERNATES**  
**HEART OF THE VALLEY METROPOLITAN SEWERAGE DISTRICT**

DONOHUE & ASSOCIATES, INC.  
CONSULTING ENGINEERS  
SHEBOYGAN, WISCONSIN

PROPOSED ALTERNATES WHICH MAY CAUSE ENVIRONMENTAL IMPACT

**LEGEND**

- (+) POSITIVE OR FAVORABLE IMPACT
- (-) NEGATIVE OR UNFAVORABLE IMPACT
- (0) INSIGNIFICANT EFFECT

**EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT**

EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT	CULTURAL FACTORS		BIOLOGICAL CONDITION		PHYSICAL AND CHEMICAL CHARACTERISTICS		ALTERNATE A NORTH WATER ROUTE	SHORT TERM ENVIRONMENTAL CONSEQUENCES	LONG TERM ENVIRONMENTAL CONSEQUENCES	ALTERNATE B NORTH LAND ROUTE	SHORT TERM ENVIRONMENTAL CONSEQUENCES	LONG TERM ENVIRONMENTAL CONSEQUENCES	ALTERNATE C SOUTH WATER ROUTE	SHORT TERM ENVIRONMENTAL CONSEQUENCES	LONG TERM ENVIRONMENTAL CONSEQUENCES																
	CULTURAL	FACTORS	RECREATION	LAND USE	FAUNA	FLORA										PROCESSES	WATER	EARTH	ATMOS												
ECOLOGICAL RELATIONSHIPS SUCH AS MAN MADE ACTIVITIES	CULTURAL STATUS	AESTHETIC AND HUMAN INTEREST	RECREATION	LAND USE	FAUNA	FLORA	PROCESSES	WATER	EARTH	ATMOS	ALTERNATE A	SHORT TERM ENVIRONMENTAL	ALTERNATE B	SHORT TERM ENVIRONMENTAL	LONG TERM ENVIRONMENTAL																
																TRANSPORTATION NETWORK (MOVEMENT, ACCESS)	0	0	0	0	0	0	0	0	0	0	0	0	0		
																EUTROPHICATION	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0
																DISEASE-INSECT VECTORS	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0
																FOOD CHAINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																HEALTH AND SAFETY	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																EMPLOYMENT (POTENTIAL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																POPULATION DENSITY (POTENTIAL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																RARE AND UNIQUE SPECIES OR ECOSYSTEMS	-	+	0	0	0	0	0	0	0	0	0	0	0	0	0
																SCENIC VIEWS AND VISTAS	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																ARCHAEOLOGICAL FEATURES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																UNIQUE HISTORICAL &	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																HUNTING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																FISHING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																BOATING	-	+	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMPING AND HIKING (POTENTIAL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
INDUSTRIAL (POTENTIAL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
OPEN SPACES (TERRESTRIAL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
OPEN SPACES (AQUATIC)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
MICROFAUNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
INSECTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
BENTHIC ORGANISMS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
FISH AND SHELLFISH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
LAND ANIMALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
BIRDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
AQUATIC PLANTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
GRASS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
TREES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
STABILITY (SLIDES, SLUMPS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
SORPTION (ION EXCHANGE, COMPLEXING)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
DEPOSITION (SEDIMENTATION, PRECIPITATION)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
EROSION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
FLOODS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
QUALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
CURRENTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
UNIQUE PHYSICAL FEATURES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
LAND FORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
SOILS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
MICROCLIMATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																