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DRAFT ENVIRONMENTAL IMPACT STATEMENT

WOODLAKE SANITARY LANDFILL PROPOSED EXPANSION AT MEDINA, MINNESOTA

AUGUST 1980

PREPARED BY

Minnesota Pollution Control Agency

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1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Minnesota Pollution Control Agency (MPCA) has received a permit application for the construction and operation of a 40 acre expansion to an existing landfill in Hennepin County. The proposed project would involve construction and operation of a landfill disposing of municipal wastes over a ten year time period. The facility would continue to be owned and operated by Woodlake Sanitary Service, Inc., a subsidiary of Browning-Ferris, Inc. (BFI).

An Environmental Assessment Worksheet (EAW) prepared in early 1979 found that the proposed expansion was a major action with the potential for significant environmental effects. Consequently, the MPCA board ordered that an Environmental Impact Statement (EIS) be prepared. In November 1979, a Consultant Task Force was retained by MPCA to provide assistance in the preparation of the EIS and related background documents. Utilizing the best available information, MPCA and its consultants prepared this EIS.

1.2 PROPOSED ACTION

The proposed action involves the construction (primarily excavation) and operation (primarily waste placement, compaction and application of daily soil cover) of a proposed forty acre landfill expansion in Medina Township in Hennepin County. The site would process approximately 270 to 440 tons per day of municipal and commercial wastes. Hazardous wastes other than household quantities are not accepted at the site. Construction and operation would begin immediately upon approval of the permit application. Expected project life is approximately ten years.

1.3 ENVIRONMENTAL IMPACT

To date, public concern over the proposed action has focussed on the following issues: ground and surface water contamination, public health, terrestrial ecology, and local socio-economic conditions. The following sections provide additional detail on these and other environmental considerations.

Ground And Surface Water Quality

The effects of normal operations of the proposed project on both ground and surface quality should be minimal given the selection of appropriate design and operation procedures. While the potential for surface water contamination is high due to the immediate proximity of the site to two wetland areas and an unnamed creek, the actual potential for surface water contamination is dictated by design and operating conditions. Ground and surface water impacts should be minimal, given the highly impermeable subsurface soils found on site.

Public Health

Numerous pathogens and toxics found in municipal waste streams are capable of causing disease in humans. However, pathogen survival in landfills is relatively brief and subsurface soil conditions preventing leachate migration should similarly reduce the potential for public health impacts.

Additional public health impacts relate to on-site accidents to workers and site visitors. While landfill sites do offer opportunities for this particular type of impact, landfill sites are not generally regarded as hazardous work areas, and only a minimum of effort is required to reduce accident rates to acceptable levels.

Ecology

Potential impacts due to construction and operation of the proposed expansion relate primarily to direct removal of terrestrial vegetation during construction operations. This includes approximately nine acres of mature basswood-maple overstory. However, given the extent of similar resources located throughout the area, actual impacts are expected to be insignificant.

Socio-economics

Landfill sites can result in reduction of land use values for adjacent properties since public reaction to the siting or operation of a sanitary landfill is generally negative. At the Woodlake site, it is possible that continued landfill operation would depress property values for adjacent land parcels. However, existing limited land use value data for properties adjacent to the existing site do not demonstrate this trend and, more importantly, adjacent properties are already sited next to an existing landfill. Thus, decreases in land value, if any, should already have been experienced.

Air Quality

The effects of normal operations of the proposed facilities on any federal or state ambient air quality standards would be negligible. Potential fugitive emissions, methane gas emissions, and odor emissions are expected to be minimal and the existing site has not demonstrated any substantive problems in these areas.

Energy

The impacts of the proposed action on areawide energy resources are negligible due to the small size of the proposed expansion in terms of total energy requirements.

Geology And Hydrology

The impact of the proposed action on areawide geology and hydrology resources is insignificant, due to the localized area of construction and operation. Actual impacts will be limited to soil movement (excavation, filling, final contouring) on a forty acre site.

1.4 ALTERNATIVES

The Proposed Action

The proposed action has been described in Section 3.0 and potential impacts in Sections 5.0, 7.0, 8.0, and 9.0.

The Proposed Action With Design/Operating Modifications

Based upon the description of potential impacts contained in Section 5.0, Section 6.0 defined a variety of mitigative measures which are available to ameliorate those impacts as required. Major modifications which can be considered include: utilization of a liner and/or leachate collection and treatment system, installation of vertical impermeable barriers along the wetland boundary, increasing the thirty to fifty foot separation distance from the landfill operation to the wetland, utilization of litter fences and increasing litter clean-up frequency, improving site security by installation of fences along property boundaries, submission of more detailed runoff control and monitoring plans, installation of a berm and/or a settling pond(s) at the base of the landfill slope adjacent to the wetland, increasing compaction ratios, utilization of composting for leaves or grass clippings, providing a row of trees for aesthetic purposes along Tomahawk Trail, or installation of a limited methane recovery system for on-site energy use.

Proposed Action At A Different Site

Section 11.0 also considered the possibility of a BFI operation at an alternative site. In summary, capacity is probably not available at the alternative BFI site and the siting of a new landfill facility in Hennepin County would be a difficult process, due to the level of citizen concern. In any case, a new site would transfer some of the same environmental impacts to a site currently unaltered by landfill operations and would likely result in higher disposal costs due to increased waste collection costs.

Different Action At The Woodlake Site

A variety of waste processing, materials recovery and energy recovery options were discussed in Section 11.0 for applicability to the Woodlake site. In general, due to the small quantity of incoming wastes, the site would not be economically attractive with respect to most of the above options. Since the site is a private venture, those particular types of decisions are primarily based upon economic analyses and as such final decisions are made by the site owners. In this case, the only option BFI has indicated any interest in pursuing is the provision of additional compaction equipment (i.e., a landfill compactor).

Regional Actions Which Would Not Be Implemented By BFI Or MPCA

Section 11.0 also discussed the impacts of the Woodlake site on regional plans for resource recovery and the impacts of regional resource recovery implementation on the Woodlake site.

In the first area, due to the size of the site and the required time frame for implementation at the regional level, no specific impacts could be expected in the short term, i.e., 0 to 5 years. At the same time, the TCMA, and particularly Hennepin County, has a demonstrated need for additional landfill capacity.

Similarly, in the second area, impacts on a Woodlake site due to construction of a regional resource recovery facility would be expected to be minimal in the short-time frame. However, in the long term, should a large regional facility be constructed, the issue of waste ownership and control will require resolution.

No Action

The no-action alternative would involve continued utilization of the current site primarily as open space use. This alternative would eliminate all adverse impacts of the proposed operation, while reducing available landfill capacity. Waste from the Woodlake wasteshed would have to be accepted at other sites reducing the life of those landfills and likely increasing energy use for transportation. No-action could also result in displacement of landfill site operating employees and several or all of BFI's forty-five employees operating trucks as part of BFI's waste collection service.

2.0 INTRODUCTION

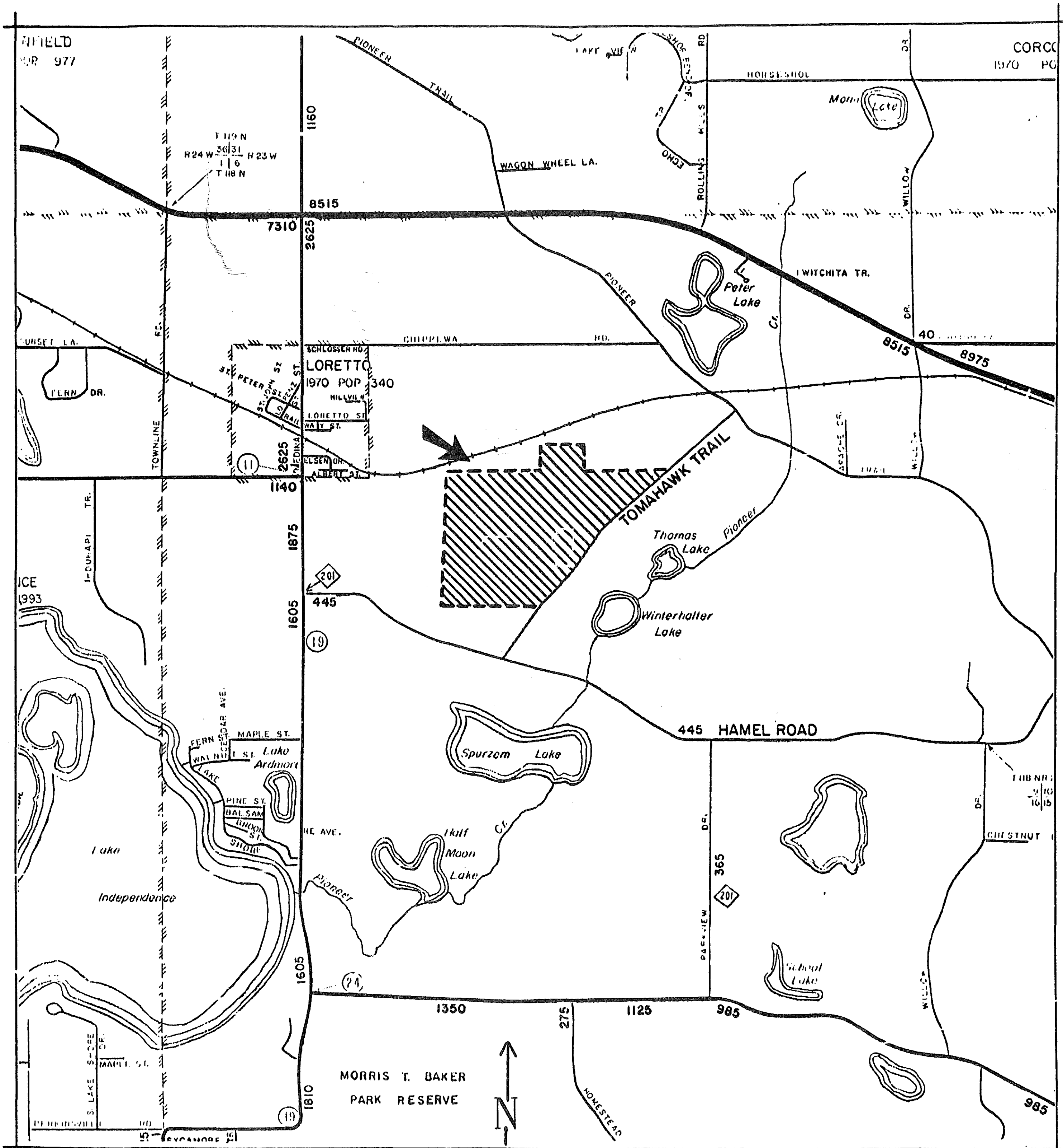
2.1 BACKGROUND

Woodlake Sanitary Service Inc., a subsidiary of Browning-Ferris Industries, Inc., has proposed a 40-acre expansion to its Medina, Minnesota landfill. The location had previously encompassed a 15-acre open dump, owned and operated by the Boyer Landfill Company. In 1971, the Boyer Sanitary Landfill Company was granted Permit No. SW-61 by the Minnesota Pollution Control Agency (MPCA) to construct and operate a 28-acre sanitary landfill on the site. Hennepin County and the City of Medina also licensed the Boyer facility at that time. The site was then purchased by Woodlake Sanitary Service, Inc., and a temporary operational plan was submitted to MPCA in August, 1973.

An amended operation plan involving a 40-acre expansion and a revised permit application were first considered in January, 1975 (see Figure 2-1). Corrective measures to the problems inherited from the Boyer operation were incorporated in the plan. The Minnesota Environmental Quality Council (now the Minnesota Environmental Quality Board--MEQB) ordered an environmental assessment (with the City of Medina as the responsible agency) and upon review, recommended that no EIS be required. However, this decision was reconsidered and an EIS (with MPCA as the responsible agency) was required in June, 1975. Browning-Ferris ultimately withdrew its expansion proposal in 1975 before beginning any EIS preparation and entered into a stipulation agreement with MPCA to implement mitigative measures to correct problems associated with the Boyer facility. The agreement included the submission of a hydrogeologic study to MPCA.

Browning-Ferris resubmitted their current expansion plan proposal to MPCA in 1979 and an Environmental Assessment Worksheet (EAW) was prepared. The EAW found that the expansion was a major action with the potential for significant environmental effects.

FIGURE 2-1 WOODLAKE SANITARY LANDFILL SITE -- MEDINA, MINNESOTA



SOURCE: Minnesota DOT, St.Paul-Minneapolis Street Series, 1977.

SCALE: 1" ≅ 2667'

2.2 THE WOODLAKE ENVIRONMENTAL IMPACT STATEMENT PROCESS

Under the provisions of the 1973 Minnesota Environmental Policy Act, (Minn. Stat. Chapter 116D) an environmental impact statement must be prepared when a proposed action is found to be a major action and has the potential for significant environmental effects.

The purpose and scope of an EIS is governed by the 1973 Minnesota Environmental Policy Act (Minn. Stat Chapter 116D) and MEQB rules (MEQC 1977):

> The purpose of an Environmental Impact Statement is to provide information for agencies and private persons to evaluate proposed actions which have the potential for significant environmental effects, to consider alternatives to the proposed actions, and to institute methods for reducing adverse environmental effects. An Environmental Impact Statement is not a document to justify an action, nor shall indications of adverse environmental effects necessarily require that an action be disapproved. It is to be utilized as a guide on issuing, amending, and denying permits and carrying out the other responsibilities of public agencies to avoid or minimize adverse environmental effects and to restore or enhance environmental quality consistent with the Act (MEQC 1977).

As prescribed by the rules of the MEQB, Draft EIS contains the following information:

1. Summary. A summary sheet that describes the action, major environmental impacts (adverse and beneficial), reasonable alternatives, and the federal, state, and local permits outstanding. Also, federal, state, or local agencies, other organizations and private individuals consulted in the preparation of the EIS shall be identified.

2. Description. A regional and site- specific map should be included to assist in identification of the project.

3. Environmental impact of the proposed action. All phases of an action shall be considered when evaluating an action: planning, acquisition, operation, and conclusion of operation. Special consideration shall be given to pollution, impairment, or destruction of the air, water, land, or other natural resources located within

the State resulting from the proposed action. This discussion shall also include a description of all resources in the area and how they will be affected by the action, with emphasis placed on resources that are rare or unique to the region or that possess important historical, cultural, natural, ecological, or aesthetic values.

4. Any direct or indirect environmental, economic, energy, and employment effects that cannot be avoided if the proposed action is implemented. This discussion shall describe the adverse and beneficial environmental, economic, energy, and employment effects that will result directly from the action, as well as the effects that may be reasonably expected to result from the action. Mitigation measures that have been or may be incorporated into the action to reduce or minimize significant adverse environmental, economic, energy and employment effects shall be discussed.

5. Any irreversible and irretrievable commitments of resources that would be involved in the proposed action if it is implemented. This discussion shall include the proposed use of non-renewable resources, long-term or irreversible commitments of resources to a particular use and any irreversible and irretrievable damages that may result from the action.

6. The relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity, including the environmental impact of predictable increased further development of an area if the action is implemented. This discussion shall include the extent that the proposed action involves trade-offs between short-term environmental gains or losses versus long term gains or losses, including potential risks to health and safety, and the extent that the proposed action forecloses future options. The impact of predictable increased future development in the area that may be stimulated, directly or indirectly, by the proposed action shall be discussed.

7. Alternatives of the proposed action. An objective evaluation of all reasonable alternatives to the action and the environmental impact of each and the reasons for their rejection in favor of the recommended choice shall be made. Reasonable modifications of the proposed action that may avoid or reduce adverse environmental effects shall be discussed, including the expected benefits, costs, and effects of the objective of the proposed action.

8. The impact on state government of any federal controls associated with the proposed action. Federal actions pending which may affect the final outcome of the project should be discussed, including those actions which may result in the expenditure of additional state funds.

9. The multi-state responsibilities associated with the proposed action. Impacts of the proposed action upon multi-state responsibilities shall be discussed, including the environmental effects of the action upon adjacent states (MEQC 1977).

The EIS process is shown in simplified form in Figure 2-2. Between 30 and 45 days after the Draft EIS is filed, a public meeting is scheduled. A transcript of the meeting is made and the public record remains open for 20 days after the public meeting to allow the submission of additional information. The Responsible Agency has 30 days from the close of the public record to prepare and file the Final EIS.* The Final EIS consists of the Draft EIS, comments or summaries of comments received during public hearings and reviews, and MPCA responses to the comments. MEQB may review the Final EIS to ensure that EIS rules have been complied with. If MEQB determines that the Final EIS is inadequate, the Responsible Agency has 30 days to undertake required revisions, with an additional 15-day review period. Once the MEQB has determined that the EIS is adequate, the EIS process is concluded.

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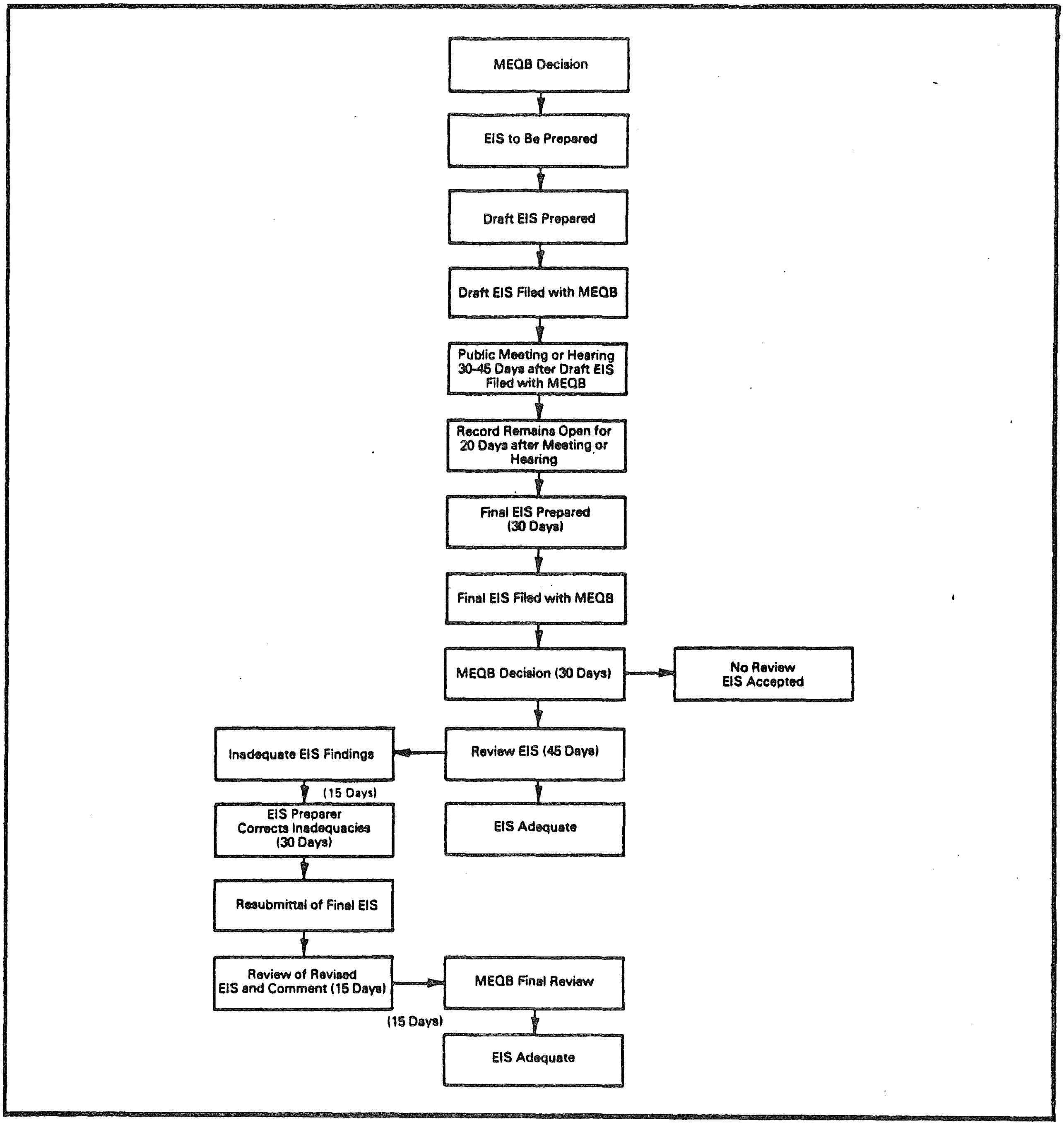
* MEQB may extend the time limitation upon written request showing good cause.

FIGURE 2-2 ENVIRONMENTAL IMPACT STATEMENT PROCESS



SOURCE: Minnesota Pollution Control Agency, 1980.

2.3 PERMITTING PROCESS

One major purpose of the EIS process is the generation of information that can assist governmental agencies in making decisions on permit applications. During the permitting process, the various agencies review the impacts and effects of the proposed facility on the environment to determine whether the facility will meet applicable environmental and safety standards. Public comment on these decisions is always solicited by the agencies and public hearings are sometimes held.

If the agencies determine from the available information that the proposed facility will comply with applicable standards, permits authorizing construction can be issued. If one or more of the permitting agencies determines that applicable standards will not be met, permits may be denied. The Applicant could also redesign the facility or abandon that proposal. No agency may make a final decision to approve the action until the Minnesota Environmental Quality Board (MEQB) has found the final EIS adequate.

The major approvals that Woodlake Sanitary Service Inc. (herein referred to as BFI) must obtain for its proposed expansion of the Woodlake Sanitary Landfill are listed below with the relevant agencies and the status of each approval:

Unit of Government (federal, state, regional, local)	Name or Type of Permit/ Approval or Federal Funding	Status
MPCA	Solid Waste Disposal Permit	Not applied for
Hennepin County	Landfill Permit	Have
Village of Medina	Landfill Permit	Not applied for
	Land Alteration Permit	Not applied for
	Rezoning	Not applied for
	Surface Water Permit (for culverts and berms)	Not applied for
Metropolitan Council	Approval	

3.0 DESCRIPTION OF THE EXISTING LANDFILL AND PROPOSED ACTION

3.1 INTRODUCTION

The objective of this section is to provide an overview of existing and future areawide solid waste service conditions as well as to describe the specifics of the existing and proposed landfill sites and operations at the Woodlake Sanitary Landfill. The information which is presented is based to some extent on studies and reports previously prepared on the Woodlake landfill. Areawide information was obtained through studies prepared by the Metropolitan Council (1975; 1979; and 1980), MPCA (Sept. 1979), Metropolitan Waste Control Commission (1977), and various private consultants (Pope-Reid Assoc., Inc., 1980; Ellerbe Assoc., Inc. and Camp, Dresser and McKee, Inc., 1979). The description of the proposed action has been supplemented by plans and discussions submitted by BFI to MPCA, and by a number of verbal discussions with BFI personnel. (Browning-Ferris Industries Inc., 1973; 1979; Minnesota Pollution Control Agency, March 1979; and National Biocentric, Inc., 1975; July 1975; and 1977; McKie and Assoc., Inc., 1974; and Minnesota Engineering Co., 1971.)

3.2 AREAWIDE SOLID WASTE SERVICE CONDITIONS

3.2.1 Solid Waste Sources, Quantities and Composition

Existing

Areawide. The Seven County Solid Waste Plan indicates that the Twin Cities Metropolitan Area (TCMA) generates approximately 1.95 million tons of refuse a year. Of this total quantity, 0.56 million tons is industrial and 1.40 million tons is residential and commercial waste. Projected generation increases have been estimated at 20,000 tons per year. Table 3-1 indicates waste generation trends for the seven counties. Table 3-2 projects future waste generation rates for the TCMA in pounds per capita per day.

Table 3-3 indicates percentages of different waste components for the TCMA. These estimates closely compare to those prepared for other metropolitan areas by the National Center for Resource Recovery.

TABLE 3-1

TRENDS OF WASTE GENERATION IN THE TMCA (TONS PER YEAR)

Waste Source	1970	1975	1980
Residential	917,200	977,850(e)	996,400
Commercial	310,300	357,136	388,800
Industrial	464,000	523,276	559,200
TOTAL	1,691,500	1,858,262	1,944,400

SOURCE: Pope-Reid Assoc., Inc., 1980.

TABLE 3-2

FUTURE WASTE GENERATION RATES IN THE TCMA
(POUNDS PER CAPITA PER DAY)

Waste Source	1980	1985	1990	1995	2000
Residential	2.69	2.69	2.69	2.69	2.71
Commercial	1.05	1.06	1.07	1.09	1.12
Industrial	1.51	1.52	1.53	1.54	1.54
TOTAL	5.24	5.27	5.29	5.32	5.38

SOURCE: Pope-Reid Assoc., Inc., 1980.

TABLE 3-3

SOLID WASTE COMPOSITION FOR THE TCMA (PERCENT)

Waste Component	%
Paper	44.5
Plastic	4.1
Wood	6.7
Textile	1.9
Yard Wastes	9.0
Food Waste	10.9
Glass	7.8
Metal	7.2
Other	7.9
TOTAL	100

SOURCE: Henningson, et. al., 1975.

Browning-Ferris Industries. BFI owns and operates two landfills in Hennepin County (Flying Cloud and Woodlake), and a transfer station in Ramsey County. Both counties are part of the TCMA's solid waste service area. BFI is the largest waste collection and disposal contractor in the Twin Cities area. Since BFI owns both Woodlake and Flying Cloud, the bulk of the quantities disposed at these locations are of Hennepin County origin and are collected by BFI. This refuse is of approximately the same composition as that collected in the Metropolitan Area in general.

Future

Areawide. The bases for estimating future waste generation rates are population growth and per capita waste generation increases over past years. Table 3-4 projects annual waste generation by waste type for the TCMA. If these generation rates are realized, the regional Solid and Hazardous Waste Management Plan (Metropolitan Council, 1979) estimates that approximately 65,000 acre-feet of space would be required to landfill the area's waste by the year 2000. This total is approximately five times the actual remaining space at the 11 landfills now in use (see Table 3-5). Actual total quantities and compositions of waste streams requiring disposal, however, will depend in large part on the extent of source separation and resource recovery programs.

Browning Ferris Industries. BFI, as a private enterprise, will continue to operate a solid waste collection and disposal service in the TCMA. Due to competitive market forces future anticipated growth by BFI cannot be quantified. However, for planning purposes, it would appear reasonable to assume that BFI's total market share would remain reasonably consistent with existing private enterprise collection service patterns.

TABLE 3-4

ANNUAL WASTE GENERATION BY WASTE TYPE IN THE TCMA THROUGH YEAR 2000 (TONS)

Waste Source	1980	1985	1990	1995	2000
Residential	996,400	1,052,800	1,109,600	1,161,100	1,223,300
Commercial	388,800	415,100	441,400	472,800	504,000
Industrial	559,200	595,100	630,900	663,100	696,500
TOTAL	1,944,400	2,063,000	2,181,900	2,297,000	2,423,800

SOURCE: Pope-Reid Assoc., Inc., 1980.

TABLE 3-5

TCMA SOLID WASTE DISPOSAL SYSTEM CAPACITY, 1972-1977

Site Location	Permitted Capacity (acre-ft.)	Receiving Rate (tons/day)[a]						Average Receiving Rate	Present Use Rate (acre-ft/yr)	Remaining Capacity, Dec. 1977 (acre-ft.)	Yrs. Remaining at Present Use Rate (Dec. 1977)
		1972	1973	1974	1975	1976	1977				
Anoka County											
Anoka Municipal	2,259	313	268	312	454	638	570	426	264.5	1,182	4.5
Oak Grove	975	481	320	321	325	213	Temporarily closed	277	99.0[b]	157	1.6
East Bethel	993	58	117	52	18	10	8	44	6.2	808	130.3
Waste Disposal Engineering	1,135	221	171	207	208	195	149	192	69.2	170	2.5
County Total	5,362	1,072	876	891	1,005	1,055	727	938	339.9	2,317	6.8
Dakota County											
Burnsville	5,703	577	579	503	300	353	345	443	160.0	4,592	28.7
Freeway	1,962	833	409	425	429	305	380	464	176.3	818	4.6
Dakhue	482	26	28	19	32	38	37	30	17.1	375	21.9
Pine Bend	7,173	481	758	1,071	1,253	1,272	1,240	1,013	575.6	4,450	7.7
American Systems	Closed	172	272	78	Closed	Closed	Closed	87			
County Total	15,320	2,090	2,046	2,096	2,014	1,969	2,001	2,036	929.0	10,235	11.0
Hennepin County											
Woodlake	800	208	159	229	258	249	260	227	120.9	176	1.5
Hopkins (closing 1979)	740	103	138	99	91	89	99	103	45.8	104	2.3
Flying Cloud	3,109	438	291	338	685	980	854	598	396.6	1,555	3.9
County Total	4,649	749	587	666	1,034	1,318	1,213	928	563.3	1,835	3.3
Scott County											
Louisville	1,800	84	58	75	70	81	108	79	50.2	1,588	31.6
Washington County											
Oakdale	Closed	601 est.	607	568	674	Closed	Closed	408			
Metropolitan Area Total/day	**27,131**	**4,596**	**4,175**	**4,296**	**4,796**	**4,423**	**4,049**	**4,389**	**1,882.4**	**15,975**	**8.5**
Metropolitan Area Total/yr		**1,434,000**	**1,303,000**	**1,340,000**	**1,496,000**	**1,380,000**	**1,263,000**	**1,369,000**			
lbs/capita/day - landfilled		**4.11**	**3.70**	**3.77**	**4.19**	**3.85**	**3.50**	**3.85**			

[a] 312 days/yr.; 4 cubic yds/ton

[b] 1976 data

SOURCE: Metropolitan Council, 1979.

3.2.2 Solid Waste Collection and Disposal Systems

Existing

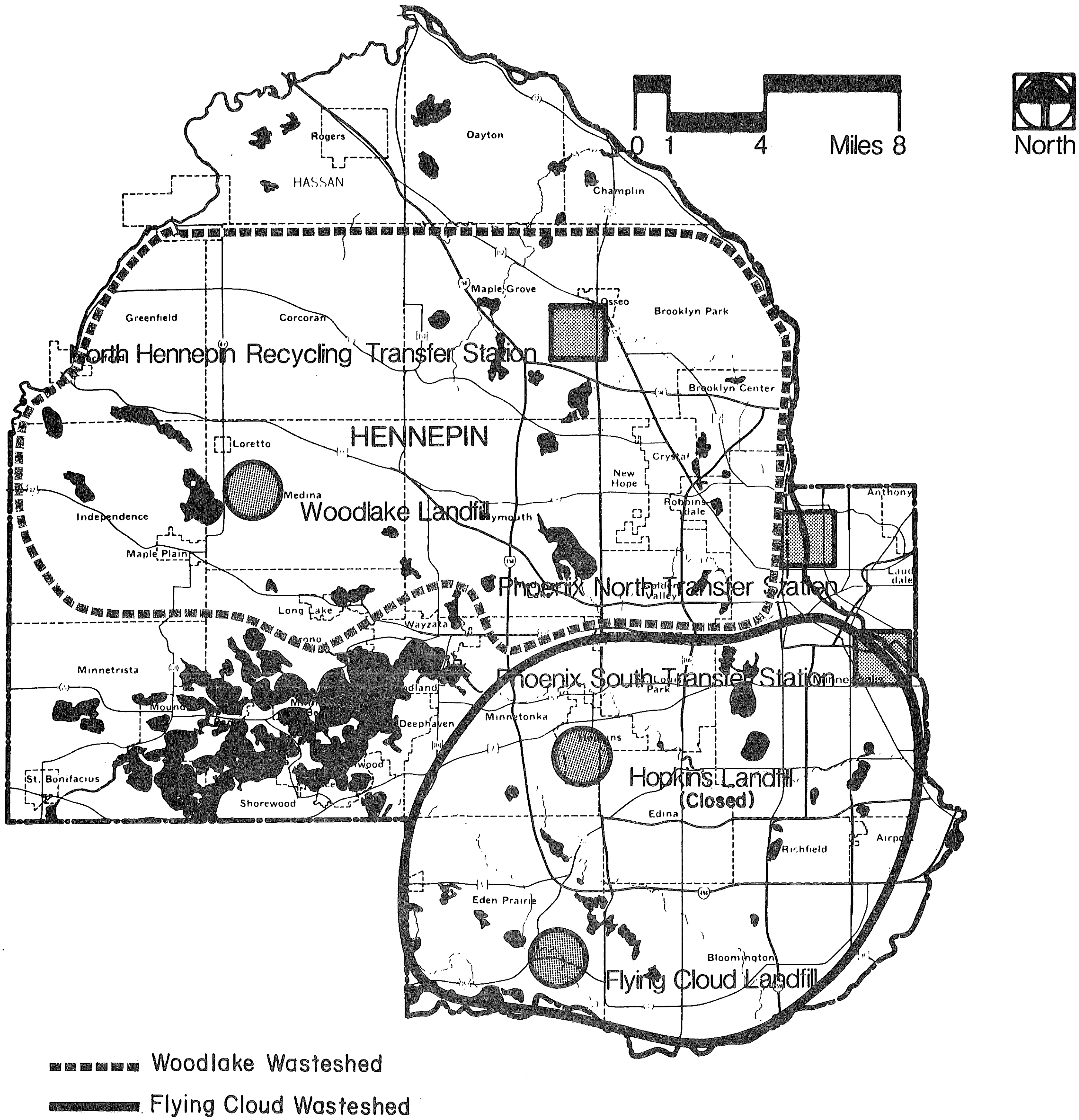
Areawide. Approximately 70 percent or 1.3 million tons of TCMA's solid waste is landfilled at the TCMA's 11 primary landfill disposal sites (see Table 3-5). The remaining quantity is either recovered, land applied in cases involving agricultural waste, or deposited outside the region. Ten of the 11 sanitary landfills are privately owned, and the one site owned by the City of Anoka is operated under contract with a private firm. The bulk of TCMA collection is by private haulers. Collection of refuse from commercial and industrial establishments is usually contracted on an individual basis with these private haulers. According to the Solid Waste Energy and Resource Recovery Study for Hennepin County, for example, the City of Minneapolis is currently contracted with approximately 47 private haulers, each having designated collection routes. The city also has municipal crews with designated routes; however, the level of operation is limited. Some cities in the County also have their own trucks and collect part of their waste in these municipal trucks. These cities include St. Louis Park, Deephaven, Robbinsdale, Tonka Bay, Excelsior, Medicine Lake, Osseo, Wayzata, Minnetonka and Minneapolis. Hopkins is the only municipality that collects all of its own waste in municipally owned trucks.

Figure 3-1 provides a map of Hennepin County identifying landfill locations, transfer station locations, and approximate landfill wasteshed boundaries. Figure 3-2 is a similar map identifying waste disposal facilities in the TCMA region. Table 3-6 provides annual use rate data for TCMA disposal facilities utilized by Hennepin County residents. Table 3-7 identifies the counties served by each of the landfills in the TCMA.

Browning-Ferris Industries. Of the three sanitary landfills indicated in Table 3-7 in Hennepin County, two are owned and operated by BFI. Hopkins Landfill closed its operation as projected on Table 3-5. As a result, BFI is the sole operator of landfills in Hennepin County. Given current waste projections, it is expected that the currently permitted Woodlake site will reach full capacity during 1980 and Flying Cloud could reach full capacity by 1981.

FIGURE 3-1

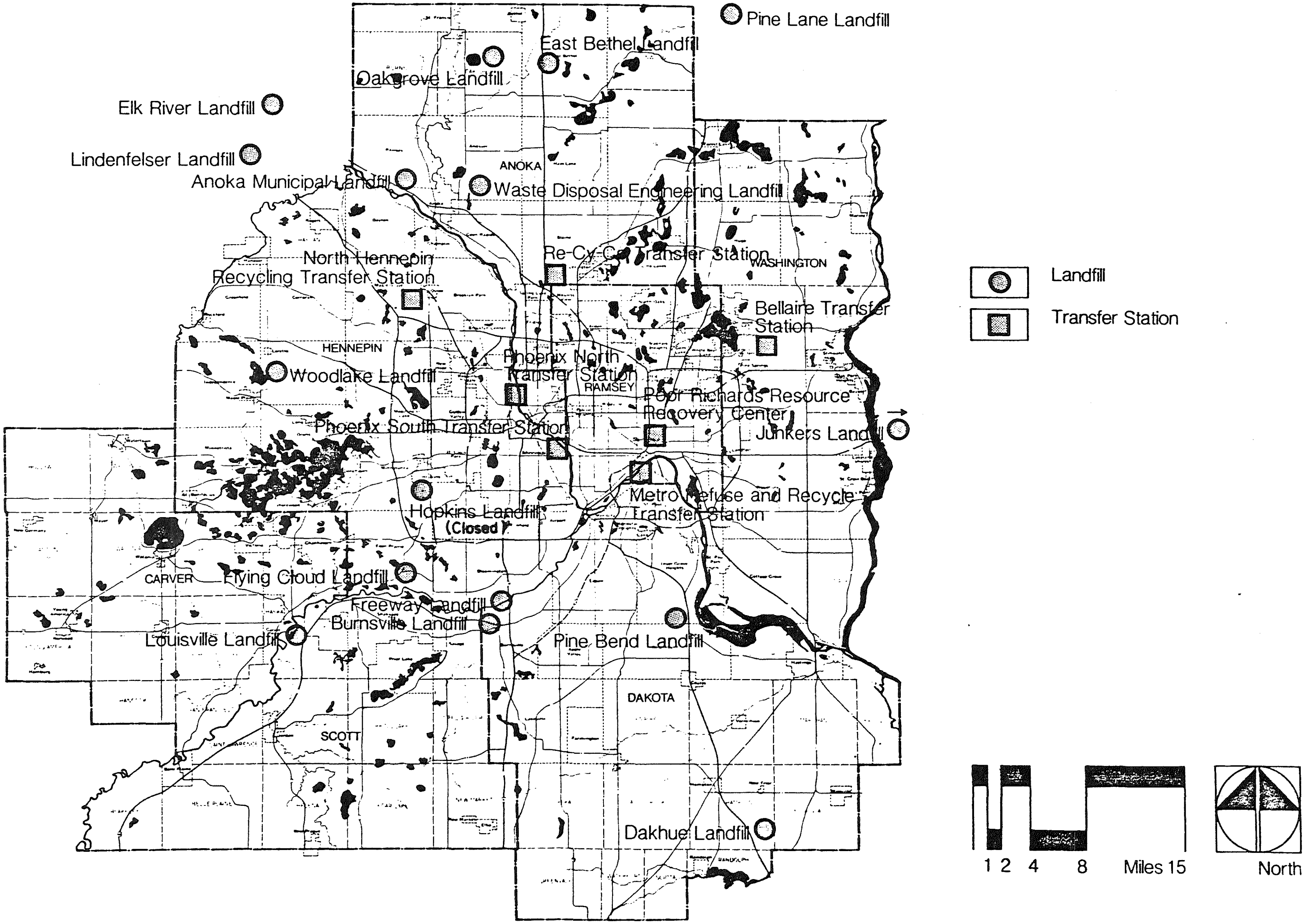
TRANSFER STATIONS, LANDFILLS AND LANDFILL WASTESHED BOUNDARIES IN HENNEPIN COUNTY



Source: Pope-Reid Associates, Inc., 1980.

FIGURE 3-2

LAND DISPOSAL FACILITIES IN THE TCMA



SOURCE: Pope-Reid Assoc. Inc., 1980.

TABLE 3-6

ANNUAL USE RATES OF TCMA LANDFILLS CURRENTLY UTILIZED BY HENNEPIN COUNTY

Landfill Location	1978 Use Rate (Acre-Feet/Year)[(a)]	Remaining Life of Landfill (Years)
Anoka County:		
Anoka Municipal	252.3	4.1
Dakota County:		
Burnsville	234.5	1.0
Freeway	119.4	5.9
Pine Bend	641.6	5.9
Hennepin County:		
Woodlake	121.0	0.45
Hopkins	43.3	1.4
Flying Cloud	442.0	2.5
Scott County:		
Louisville	61.3	25.0
Sherburne County:		
Elk River	20.7[(b)]	427.0
Wright County:		
Lindenfelser	41.9[(b)]	0.52

(a) Conversion from acre-feet/year to tons/year:

$$\text{multiply } \frac{\text{ac-ft}}{\text{yr}} \times 672$$

(b) 1977 use rate used.

(c) Closed

SOURCE: Poep-Reid Associates, Inc., 1980.

TABLE 3-7

TCMA COUNTIES CURRENTLY SERVED BY EACH TCMA LANDFILL

	Landfill Wasteshed Includes						
County and Landfill	Anoka	Carvel	Dakota	Hennepin	Ramsey	Scott	Washington
Anoka County:							
Anoka Municipal	X			X			
Oak Grove	X						
East Bethel	X						
Waste Disposal Engineering	X						
Dakota County:							
Burnsville	X		X	X	X		X
Freeway			X	X	X	X	X
Oakhue			X			X	
Pine Bend	X		X	X	X		X
Hennepin County:							
Woodlake				X			
Hopkins				X			
Flying Cloud				X			
Scott County:							
Louisville		X		X		X	
Extra Regional Landfills:							
Pine Lane					X		X
Junkers							X
Elk River				X			
Lindenfelser				X			

SOURCE: Pope-Reid Assoc., Inc., 1980.

Future

Areawide. Table 3-8 indicates projections for available disposal capacity in the TCMA. As noted, the bulk of the regional land disposal capacity will be exhausted by the year 1984 (Metropolitan Council, 1979). In Hennepin County, landfill disposal capacity, as currently permitted, will be exhausted by 1981. By the year 2000, Hennepin County, of the seven metropolitan counties, will require the most landfill space by far, or approximately 32,049 acre-feet (Metropolitan Council, 1979).

Given the lack of available disposal capacity and the regional concerns with environmental problems associated with improper disposal practices, the regional plan stresses disposal alternatives, including conservation and waste reduction. These measures are followed in order of preference by source separation, processing to recover materials and/or energy, and land disposal. The Solid and Hazardous Waste Management Plan further states that landfilling should be considered only after all other options have been eliminated or determined unfeasible. However, the plan does not rule out land disposal, but rather considers it a vital part of the region's solid waste management plan. As such, Hennepin County is currently evaluating potential landfill disposal sites throughout the county. In an effort to select an adequate site for future land disposal, Hennepin County has prepared a series of three reports addressing landfill site selection. As a result of this effort, nine finalist sites had been selected (see Figure 3-3).

The reports also present disposal alternatives to the nine landfill sites recommended at the public hearing on May 16, 1979. These alternatives include resource and/or energy recovery, recycling, land leasing, landfilling out of the County, and landfill of a "megasite." The mega-site landfill would be a single large landfill site intended to serve the County's long-term disposal needs. The total land required for such a site would be 1000-2000 acres. However, because of Hennepin County's growth patterns, such tracts of land are rare. At this time, the County is continuing to refine the original list of sites.

TABLE 3-8

REMAINING SANITARY LANDFILL CAPACITY SERVING THE TCMA

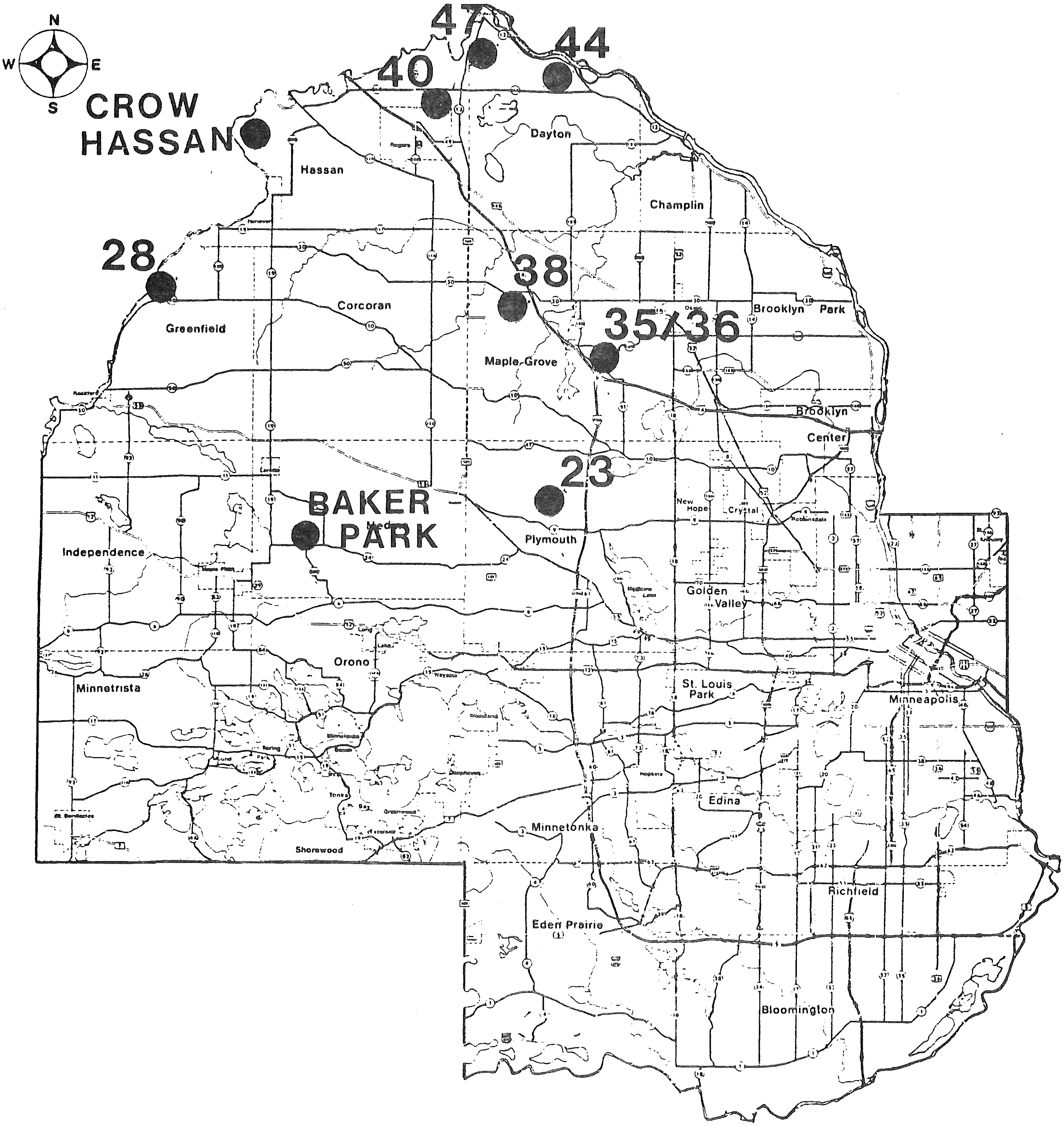
County and Landfill	Permitted Capa- Acre-Ft.	1978 Current Use Rate Acre-Ft./Yr.	December 1978 Remaining Capa- city: Acre-Ft.	Remaining Life at Current Use Rate (Years)
Hennepin				
Woodlake	800	121	55	0.45
Hopkins	740	43	61	-
Flying Cloud	3,109	442	1,113	2.5
Total	4,649	606	1,229	2.0
Anoka				
Anoka Municipal	2,246	252	1,038	4.1
Oak Grove (N.W.)	2,821	174	385	2.2
East Bethel	989	9	816	91
Waste Disposal Engineering	973	40	285	7.1
Total	6,929	475	2,524	5.3
Dakota				
Burnsville	5,703	235	254	1.0
Freeway	1,962	119	699	5.9
Oakhue	480	21	354	16.6
Pine Bend	7,173	642	3,808	5.9
Total	15,318	1,017	5,115	29.4
Scott				
Louisville	1,820	61	1,538	25.0
Chicago[a]				
Pine Lane	403	69	415	6.0
Sherburne[a]				
Elk River	8,927	21	8,839	427
Wright[a]				
Lindenfelser	267	42	22	0.52
St. Croix, WI[a]				
Junkers	620	56	423	7.5

(a) Using 1977 use rates.

SOURCE: Pope-Reid Assoc., Inc., 1980.

FIGURE 3-3

SANITARY LANDFILL SITE SELECTION FINALISTS IN HENNEPIN COUNTY



SOURCE: Hennepin County Department of Environment and Energy, August 1979.

Browning-Ferris Industries. Browning-Ferris Industries, Inc. as represented by Woodlake Sanitary Service, Inc. is a privately owned operation in the waste collection and disposal business in the TCMA. As such, it is expected that BFI will seek to continue its level of operations in Hennepin County, and in the seven-county region in general. At this time, however, it is not known whether BFI intends to develop another landfill site, or whether BFI intends to seek additional permits to extend operations at Flying Cloud beyond 1981 or at the Woodlake site beyond 1990.

3.3 DESCRIPTION OF EXISTING LANDFILL SITE

3.3.1 Existing Permits

The site is operating under Permit No. SW-61 granted on November 18, 1971 by the Minnesota Pollution Control Agency. The operation is classified as a Type I sanitary landfill, as defined in Subsection 2, Section II of Ordinance No. 1, Solid Waste Disposal Ordinance for Hennepin County.

3.3.2 Existing Site Location

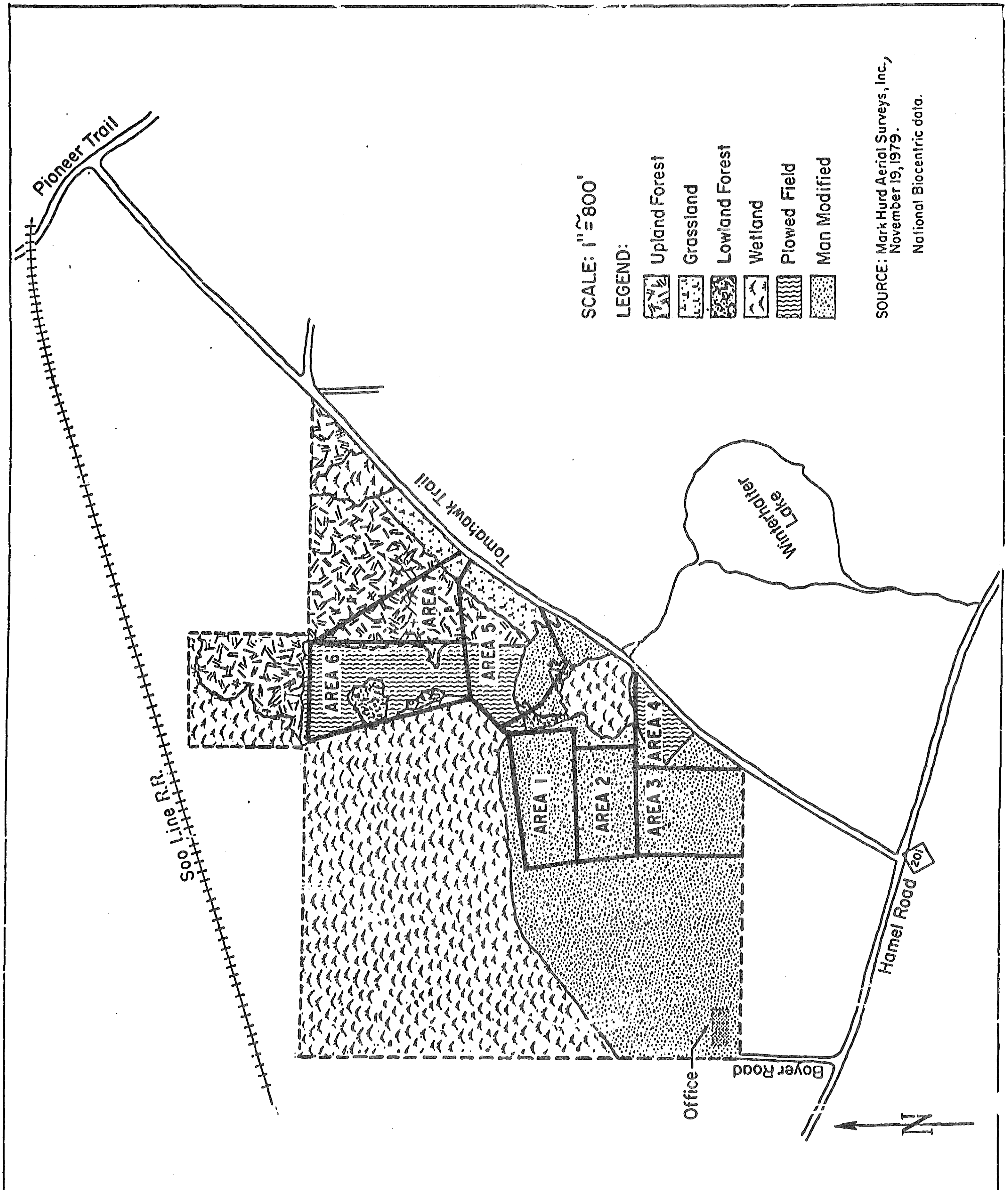
Woodlake Sanitary Landfill is located in the City of Medina, in the northern half of Section 8, Township 118, Range 23 West, Hennepin County, and is approximately 20 miles west of the Minneapolis-St. Paul metropolitan area and approximately one mile southeast of the Village of Loretto. Access to the site entrance itself, via Boyer Road, Hamel Road, Tomahawk Trail and Pioneer Trail, is from County Road 19, County Road 24 and State Highway 55.

Figure 3-4 indicates the existing and proposed landfill in Areas 1 and 2, and, upon completion, utilization of cover material from Area 3. To date, cover apparently has been obtained from both Areas 3 and 4.

To the south, the existing operation is bounded by the southerly property line and Area 3, and to the north, by the larger wetland area. The operation is bounded to the west by the entrance drive, parking area and main office. To the east, the existing operation is bounded by a small wetland area and Area 3.

FIGURE 3-4

DEVELOPMENT PLAN FOR WOODLAKE SANITARY LANDFILL



3.3.3 Existing Site Operation

Waste Sources, Quantities, and Composition

Refuse quantities received at Woodlake average approximately 27,500 cubic yards per month. This average load is expected to continue in the future, with 5 percent annual increases. Table 3-9 indicates recorded monthly waste quantities received at Woodlake from 1973 to 1979. These quantities verify the 27,500 cubic yards used for estimating future capacities.

The site was originally designed to achieve an ultimate capacity of 500 acre-feet. After almost 10 years of operation, Woodlake's capacity is nearly exhausted and as a result, restrictions have been placed on non-BFI incoming waste streams in the last several months.

The Woodlake site currently encompasses a service area with a 20-mile haul radius. Table 3-10 lists the communities normally served by Woodlake, along with their populations, haul distances and haul routes.

Woodlake's policy is to accept primary municipal and commercial wastes. Street cleanings, construction wastes, brush, trees, tires, and animal carcasses are also acceptable refuse. Previous studies have indicated that the site does not accept explosives, sewage sludge, septic tank cleanings or manures.

At one time, a designated area of the Woodlake Sanitary Landfill was set aside for the disposal of toxic and hazardous waste materials. This was a requirement for permitting by the MPCA. No toxic or hazardous waste materials were deposited in this designated area, nor are these materials currently accepted at the landfill except in expected household quantities. With the exception of obviously dangerous or hazardous wastes such as gasoline or paint cans, no specific waste pre-screening procedure is currently utilized.

TABLE 3-9

MONTHLY WASTE QUANTITIES RECORDED AT WOODLAKE, 1973 TO 1979 (CUBIC YARDS)

Month	Year						
	1979	1978	1977	1976	1975	1974	1973
January	21,337	21,788	22,659	21,698	22,739	15,542	16,285
February	18,587	20,102	20,799	18,594	20,831	17,820	14,922
March	22,619	23,709	24,600	22,050	21,187	19,648	16,311
April	31,312	28,008	35,548	32,463	27,545	24,810	18,329
May	34,931	34,040	29,630	27,297	35,804	29,275	21,300
June	32,187	31,743	-	28,297	29,528	26,016	19,406
July	31,999	32,402	27,541	28,139	31,267	27,638	-
August	31,383	31,509	28,549	27,755	30,586	27,610	15,880
September	25,169	25,141	26,408	29,951	27,109	21,713	14,254
October	*	26,398	29,193	25,928	30,214	26,248	14,804
November	*	26,751	26,822	25,063	22,436	25,620	-
December	*	22,397	23,880	23,193	22,769	23,854	13,361
Average	27,724	26,999	26,875	25,869	26,834	23,816	16,485

* Records do not indicate quantities for these months, although BFI has indicated that non-BFI waste is generally not accepted at the site due to limited remaining available capacity.

SOURCE: Minnesota Pollution Control Agency, 1979.

TABLE 3-10

COMMUNITIES SERVED BY WOODLAKE SANITARY LANDFILL, THEIR POPULATIONS, HAUL DISTANCES, AND HAUL ROUTES

Generation Area and 1970 Population	Haul Miles	Major Route To Site
Brooklyn Center (35,173)	20	F.A.P.* 100- F.A.S. 9 - F.A.P. 55 - Co. 19.
Brooklyn Park (33,306)	18	Co. 18 -F.A.S.* 9 F.A.P. 55 - Co. 19
Champlin (7070)	25	F.A.P. 52 - F.A.S. 9 F.A.P. 55 - Co. 19
Crystal (30,925)	19	F.A.P. 52 - F.A.S. 9- F.A.P. 55 - Co. 19
Golden Valley (24,246)	16	Co. 18 - F.A.P. 55 - Co. 19
Hamel (Medina) (2396)	8	F.A.P. 55 - Co. 19
Independence (2383)	8	F.A.P. 12 - Co. 19
Long Lake (1506)	8	F.A.P. 12 - Co. 19
Maple Crove (8377)	18	RT. 94 - F.A.S. 9 F.A.P. 55 - Co. 19
Maple Plain (1169)	5	Co. 19
Medina (2660)	4	F.A.P. 12 - Co. 19
Minnetonka (35,776)	15	F.A.P. 12 - Co. 19
Mound (8817)	10	Co. 110 - Co. 19

TABLE 3-10

(continued)

COMMUNITIES SERVED BY WOODLAKE SANITARY LANDFILL, THEIR POPULATIONS, HAUL DISTANCES, AND HAUL ROUTES

Generation Area and 1970 Population	Haul Miles	Major Route To Site
New Hope (23,180)	14	F.A.S. 9 - F.A.P. 55 - Co. 19
Orono (7264)	8	F.A.P. 12 - Co. 19
Osseo (2908)	20	Co. 18 - F.A.S. 9 - F.A.P. 55 - Co. 19
Plymouth (17,593)	11	F.A.P. 55 - Co. 19
Robbinsdale (16,845)	17	F.A.P. 55 - Co. 19
Spring Park (1549)	12	F.A.P. 15 - Co. 110 Co. 19
Wayzata (3700)	11	F.A.P. 12 - Co. 19

*F.A.P. - Federal Aid Primary Road.
F.A.S. - Federal Aid Secondary Road.
Co. - County Road.

SOURCE: McKie and Assoc., Inc., 1974.

General Method of Landfilling

Operating procedures are regulated by a site attendant present during operating hours. Upon acceptance of the refuse, the waste is unloaded at the assigned working face, spread, compacted and covered. The existing site was landfilled in general accordance with the operational plan developed by the Minnesota Engineering Co. in a report called "Report on Boyer Sanitary Landfill for Boyer Sanitary Landfill Company, Hamel, Minnesota," in May, 1971.

Previous studies indicate that the operation is a combination of the ramp and area fill methods. Unloading of the refuse takes place at either the top or bottom of the slope of the working face and is confined to the minimum practical area. The refuse is then pushed up or down the slope, spread and compacted in layers to a maximum depth of two feet. The slope does not exceed 30 degrees and the maximum height of any one lift is eight feet. Prior to daily shut-down, the refuse is scheduled to be covered with six inches of compacted soil. However, during winter, freezing conditions, cover availability and equipment maintenance problems could result in occurrences of less than six inches of daily cover.

At various stages of cell construction, earth is piled on already filled areas for use as future cover. These stockpiles assist in the further compaction of the landfill area.

Inclement Weather Operations

Inclement weather does not hinder access to the site. Boyer Road is classified as an all-weather road, and offers ready access to the office and the landfill. The company gravels and grades the road periodically, and the town plows the snow in winter.

Inclement weather operations also include utilization of stockpiled cover material.

Personnel and Equipment

The labor category breakdown associated with the operation of the Woodlake landfill is as follows:

Labor Category	Number
Line Manager	1
Equipment Operator	2
Clerk	3
Truck Drivers	41
Mechanics	2
Office Manager	1

Of the above, the only personnel utilized for on-site landfill operations are the two equipment operators, with assistance from the two mechanics and three clerks (for maintenance and check-in procedures).

The following equipment on the site is used for spreading refuse in two-foot layers, compacting the waste and placing, spreading and compacting the cover material:

Number	Model
1	D-8H-46a Caterpillar (Bulldozer)
1	627 Caterpillar (Earthmover)
1	International Loader
1	Back-up Dozer

Access Control and Security

Roadway access to the site is from Boyer Road through a gate located adjacent to the office building. The gate is open during operating hours between 8:00 A.M. and 5:00 P.M., Monday through Friday, and between 8:00 A.M. and 2:00 P.M. on Saturday. An attendant is on duty at all times during operating hours. Upon closing, the gates are locked and access to the landfill is restricted. The landfill area is not fenced.

Recordkeeping and Reporting

The landfill office keeps a daily record of all waste delivered to the site. These records indicate the date, type and quantity of each delivery. The office provides a quarterly report of these records to the Minnesota Pollution Control Agency. Part of the reporting process is an annual report to Hennepin County, which in turn prepares an annual report to the Metropolitan Council. The reports indicate current rates for disposal as well as remaining capacities and general conditions at the landfill.

Surface Runoff Control

Site runoff follows natural contours generally in a northerly direction down-gradient to the marsh area bordering the sites northerly boundary of the site. Depending on the season and the levels of surface water in the swamp, the water is retained in the marshland for various lengths of time prior to discharge through a small stream crossing Tomahawk Trail.

Landfill operating methods tend to minimize infiltration into the landfill and include cover applications, surface grading, and proper sloping.

Leachate Control

There is no engineered landfill liner, leachate collection or leachate treatment system at the existing 28-acre landfill. The "Hydrogeologic and Chemical Report" for Woodlake Sanitary Landfill concluded that leachate is moving into the low-lying marsh section adjacent to the site. This is primarily due to the filling of a portion of the adjacent wetlands by the previous owners of the Woodlake site.

Gas Controls

No formal gas control system exists in the existing landfill. However no methane gas migration problems have been identified during the ten-year site operation period.

Fire, Vector and Litter Control

A water supply system is available at the site to control any fires that might occur on the landfill and, if required, the Loretto Fire Department is available on call. Cover material can also be used to extinguish any landfill fires. As indicated, fire extinguishers are also available on all equipment used on the site. To date, the operation has not experienced fire problems.

To minimize scavenging by rodents and other animals, daily cover is applied at the end of the day's operation. While there were complaints about rodents at the December 13, 1979 public meeting, according to the Hennepin County Department of Energy and Environment, vectors apparently have not been a problem at the site. Also, should rodent problems develop, a variety of effective rodenticides are available.

While several site visits did not reveal substantial quantities of litter off-site, enough uncontrolled litter exists on-site to present potential localized problems. Litter control is maintained by minimizing the working face area, cessation of operation on unusually windy days, and by employing (temporary) litter crews after excessive wind. Daily cover also reduces the potential for blowing refuse.

Buildings

The landfill office structure is approximately 3200 square feet inside and is located immediately adjacent to the entrance gate. The office structure has sanitary and lunch-room facilities. The area around the gate and office provide ample space for visitor parking as well as uninterrupted, through trucking. The road is of sufficient width to permit trucks to pass in opposite directions.

There is also an existing garage of approximately 2500 square feet which is used primarily for equipment storage and repairs. The maximum height of both structures is 20 feet.

Utilities

On-site utilities include a water supply system for potable and non-potable use, as well as a sanitary septic system. The water supply source is from on-site wells. Electricity and telephone service is also available in the office and the garage.

Monitoring

As required by MPCA, BFI set up a quarterly sampling program which continued for 3 years and provided quarterly reports to the MPCA. The program was initiated with five monitoring wells at the site. In 1977, additional borings and piezometers were installed by National Biosentric Inc. to provide more substantial data. TWP 4, Water Quality, contains more detailed monitoring data and a map of the well locations.

Closure

Two feet of final earth cover has been spread and compacted over all finished areas with the exception of Areas 1 and 2. The original plan called for final compaction and grading to minimize potential soil erosion and revegetation with grass the next step in the closure plan. Formal closure, monitored by MPCA, has not yet taken place.

Post-closure

The original plan calls for Woodlake Sanitary Landfill to be finished, graded and revegetated in accordance with MPCA regulations. The suggested ultimate land use plans were for tree and argicultural farming. While the closed site could provide useful open or recreational space, there is some question about the viability of utilizing landfill area for agricultural purposes, due to potential heavy metal contaminants, or for tree farming, due to the shallow depth of soil cover.

3.4 DESCRIPTION OF THE PROPOSED PROPOSED LANDFILL

3.4.1 Proposed Project Background

Expansion of the Woodlake Sanitary Landfill is under consideration to provide approximately 10 years of continued operation.

3.4.2 Proposed Site Location

The proposed expansion area is located immediately to the east of the existing operation and consists of Areas 3, 4, 5, 6 and 7.

As such, access will continue via Boyer Road, which runs north to the site from Hamel Road. The road is used in all weather conditions by trucks delivering refuse.

Figure 3-4 indicates the proposed expansion areas, specifically Areas 3, 4, 5, 6, and 7. The five areas encompass a total of 40 acres. The site is characterized by a small stream and a small peat bog separating Areas 3 and 4 from Areas 5, 6 and 7. The areas are bounded to the north by a larger peat bog and by an area of upland forest, to the east by Tomahawk Trail, to the west by the larger bog and the existing landfill and to the south by the small bog and the southerly property boundary.

3.4.3 Proposed Site Operation

Waste Sources, Quantities, and Composition

No major change in refuse characteristics is expected or proposed for the expansion area. The types of refuse will include primarily municipal and a limited quantity of commercial waste. Toxic and hazardous wastes will not be accepted at the landfill. The current rate of refuse acceptance estimated at 27,500 cubic yards per month, was utilized to estimate capacity requirements estimated at escalations at 5 percent per year. Actual waste generation rates will vary depending on total service population, changes in per capita generation rates, and changes in the private service collection market. The availability of additional disposal pathways such as development of a regional landfill or resource recovery facility could also impact quantities of waste received at the site.

General Method of Landfilling

The proposed expansion will encompass those tracts designated as Areas 3, 4, 5, 6, and 7. The plan calls for placing fill in Area 3 utilizing cover from Area 4, until it is within two feet of final elevation. Then the filling operation would move to Area 4 and final cover would be placed in Area 3. This procedure would continue as such using cover from subsequent areas.

In Areas 5, 6, and 7, the proposed operational plan consists of excavation to elevation 970 feet above mean sea level, compaction of in-place soils and filling to within two feet of the planned final contours. Figure 3-5 provides a final plan for the projected site. As indicated, cover material would be procured from the subsequent fill area. Earthwork balance calculations provided by BFI indicate an excess of approximately 500,000 cubic yards of soil for Area 5 and 6. BFI also concludes that Area 7 will also yield excess cover material. Plans call for any topsoil to be stockpiled for future use as final cover material prior to revegetation.

The proposed action calls for continuation of existing operation methods. The site attendent will accept the refuse, record it and direct the truck to unload at the working face where the refuse will be spread, compacted and covered.

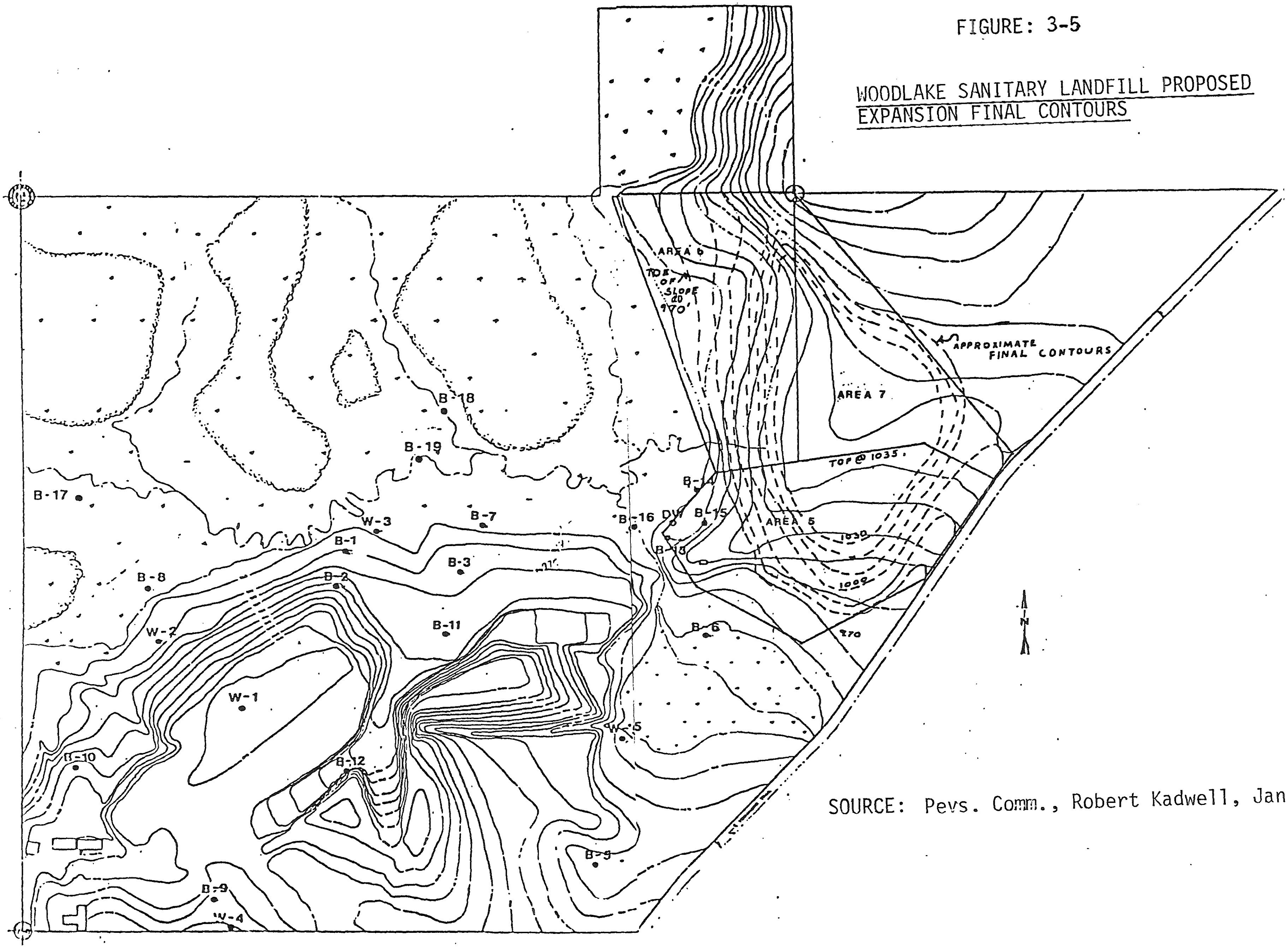
Inclement Weather Operations

Boyer Road is classified as an all-weather access road thus permitting continued waste delivery during severe weather conditions.

Winter operations will also include the utilization of a ripper attached to the Caterpillar to break frozen ground for cover. Stockpiling of cover material also will aid in providing cover during the winter months.

FIGURE: 3-5

WOODLAKE SANITARY LANDFILL PROPOSED EXPANSION FINAL CONTOURS



SOURCE: Pevs. Comm., Robert Kadwell, Jan 10,1980

Personnel and Equipment

No employee increases are anticipated for the expansion.

Existing equipment used on the site ranges from five to fifteen years in age. As part of its operation, BFI plans to replace equipment as necessary with comparable equipment and is currently investigating utilizing a landfill compactor, as well.

Access Control and Security

Access control and security provisions will remain unchanged from those used on the existing operation. However, under the proposed plan, Areas 4 and 5 are more conveniently located with respect to unauthorized access from Tomahawk Trail.

Recordkeeping and Reporting

Recordkeeping and reporting procedures will remain unchanged for the proposed expansion.

Surface Runoff Controls

Surface runoff control will be accomplished using several methods. The plan calls for proper grading to minimize flow rates and control flow direction. An adequate slope on the working face will be maintained to minimize infiltration but also minimize erosion due to surface run-off. Site drainage will follow the existing and proposed contours. The proposal also calls for the installation of concrete culverts with sealed joints between Areas 1 and 5. This culvert will allow uninterrupted drainage of the lowland areas northwest of the site.

Leachate Controls

A leachate control system has not been proposed by BFI. The proposed landfill will rely on the in-place natural soils, with permeabilities of 1×10^{-7} cm/sec, to prevent the migration of leachate.

Gas Controls

No specific gas controls systems have been proposed due to the absence of gas migration problems at the existing site. Should specific problems develop, BFI has indicated that a variety of mitigation measures could be employed. These, for instance, could include impermeable barriers, permeable trenches or other venting systems.

Fire, Vector and Litter Control

No change in existing fire, vector and litter control practices has been proposed.

Safety Practices, Contingency Plans and Emergency Procedures

No change in existing safety practices, contingency plans or emergency procedures has been indicated for the proposed expansion.

Buildings

In addition to the two existing units, a new maintenance shop has been proposed. The structure will provide an additional 2000 square feet of floor space. The location of the structure has not been indicated by BFI; however, it will be in close proximity to the existing structures and will not be located over previously filled areas.

Utilities

Existing utilities such as water and electricity will be extended to the new structure. No other utility extensions or modifications are proposed.

Monitoring

While a detailed plan has not yet been developed, BFI will provide a monitoring well system along the site perimeter to identify potential movement of landfill leachate. Sampling and reporting requirements are expected to be similar to exisitng monitoring requirements.

Closure

The expansion area will follow the same MPCA-approved closure procedures to be used on the existing landfill. Prior to seeding and revegetation, clay material will be spread and compacted in two-foot layers. Final contours for the expansion area are shown on Figure 3-5.

Post Closure

No specific post-closure activities have been proposed to date.

3.4.4 Proposed Construction

Construction Methods

Construction of the landfill will occur sequentially for Areas 3, 4, 5, 6 and 7. As any given area is being filled (e.g., Area 3), cover material will be secured from the next area (e.g., Area 4). Cover material would be excavated to the proposed baseline elevations, and, as necessary, additional soil not required for immediate cover purposes will be stockpiled for future use. Essentially, then, construction and operational phases will be occurring on site simultaneously over the life of the landfill.

Construction Costs

BFI indicates that construction costs will be approximately $200,000. No cost breakdown has been provided by BFI.

Construction Scheduling

While no specific schedule has been provided, given projected fill rates, a construction schedule can be readily projected. Assuming that the proposed expansion receives all appropriate permits, construction would commence immediately in Area 3, given the limited remaining fill capacity on-site. Construction activities in subsequent expansion areas would commence approximately every two years over the life of the landfill. The following construction schedule can be projected:

Fill Area	Construction Initiation	Final Cover
3	1980	1982
4	1982	1984
5	1984	1986
6	1986	1988
7	1988	1990

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 METEOROLOGY/CLIMATOLOGY, AIR QUALITY AND NOISE

4.1.1 Introduction

The objective of this section is to describe the existing environment of the proposed Woodlake Sanitary Landfill expansion with regard to meteorology/climatology, air quality and noise.

4.1.2 Meteorology/Climatology

General

The climate of the Minneapolis-St. Paul area (based on U.S. Dept. of Commerce, 1973; 1978) is classified as a humid continental type. Due to its location close to the geographical center-line of North America, there exists a tendency to extremes in all climate features. For example, there are wide variations in temperature, plentiful summer rainfull and relatively little winter precipitation.

The temperature variation from season to season is quite large. Summers are warm though comfortable due to low daytime relative humidity, while winters are very cold. Approximately 65 percent of the annual rainfall occurs during the growing season (May through September). Occasionally, crop damage will occur from excessive rains, high winds, lightning and hail caused by severe thunderstorms. During the winter months, humidities are high and sunshine is at a minimum. Fog is infrequent and occurs generally during late fall, winter, and early spring.

The following sections will provide further details on the meteorological parameters that are of importance in sanitary landfill design and operation. The National Weather Service does not monitor meteorological conditions in Medina. Therefore, data from the Minneapolis-St. Paul Airport will generally be utilized in the climatic analyses. Where possible, data from Maple Plain, the station in closet proximity to the site, will be presented.

Temperature

During January and February, maximum daytime readings average in the low to mid 20's, while minimum nighttime readings average 3 to 7^{O}F. Temperatures of zero or below occur on the average 35 days per year. The maximum temperatures exceed 32^{O}F (freezing) on only 26 percent of the days in December through February, with the average daily maximum at 25^{O}F for these three months. In March, the mean daily maximum is only 4.9^{O}F above freezing, although maximums above 32^{O}F can be expected to occur on the average of 21 days. No maximums below 32^{O}F normally occur during April through October. Maximum daytime temperatures during July and August average in the low 80's while nighttime temperatures average around 60^{O}F. Maximum temperatures above 90^{O}F occur on the average 15 times per year.

Precipitation

Precipitation amounts in the Minneapolis-St. Paul vicinity are small during winter and relatively high during the summer. Annual precipitation at Maple Plain averages 29.9 inches per year. The vast majority of precipitation during winter falls as snow. Winter snowfall can be heavy and averages more than 40 inches a season.

During the growing season (May through September), the normal rainfall averages 19.7 inches, approximately 66 percent of total annual precipitation. Thunderstorms are the primary source of rainfall during the growing season. Consequently, rainfall can be heavy, but is usually brief in duration. Severe thunderstorms occur ocassionallly and may produce excessive rains, high winds, lightning and hail.

Wind Factors

Wind data at the Minneapolis-St. Paul Airport indicate that wind velocities are moderate with the annual wind speed averaging 10.5 m.p.h. Prevailing winds are from the northwest during the winter, early spring and late fall. During the remainder of the year south or southeasterly winds predominate. Average wind speeds are highest during the cold portion of the year (12.3 m.p.h. in April), while the lowest values occur during the summer (9.1 m.p.h. in August).

Dispersion Characteristics

The overall dispersive ability of the atmosphere in this area of the country is quite good. The frequent passage of weather systems minimizes periods of air stagnation. Consequently, atmospheric conditions are usually favorable for the dispersion of pollutants and the area seldom encounters "extended periods of fog or high pollutant levels." The frequency of light winds (0-3 m.p.h.) at Minneapolis, which is indicative of the frequency of stagnation periods, is low, ranging from 11 to 14 percent of the time (MPCA, 1979). Pollutants are distributed through the atmosphere by the action of horizontal wind and vertical air currents. The frequent weather changes common to this section of the country inhibit prolonged inversion conditions so that adequate dispersion conditions generally prevail.

4.1.3 Air Quality*

Areawide

Major Emission Sources. Actual data on TCMA air pollution sources is available only for particulates and hydrocarbons. Most of the TCMA's major emission sources are situated in the immediate Minneapolis-St. Paul vicinity. No major sources of particulates or hydrocarbons are located in the vicinity of the proposed landfill expansion area.

*Based on MPCA, 1977; 1978; 1979; and 1980.

Ambient Air Quality. The State of Minneasota is divided into seven Air Quality Control Regions (AQCR) based on regional differences in meteorology, population density, pollutant emission density, and ambient air characteristiecs. The proposed expansion site is located in the Minneapolis-St. Paul AQCR whih includes the following counties: Ramsey, Washington, Hennepin, Anoka, Carver, Scott, and Dakota. In order to determine compliance with National Ambient Air Quality Standards (NAAQS), the Minnesota Pollution Control Agency has established an ambient air monitoring network for the pollutants of concern including particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide and ozone. The majority of the air quality monitors for the Minneapolis-St. Paul AQCR are situated in urban downtown Minneapolis-St. Paul. Hence, air quality data from this network is of limited value in directly assessing the air quality of the proposed expansion site because of the rural character of the project site. This monitoring data can, however, be used to make a general assessment of air quality in the TCMA.

Tables 6 through 9 of TWP 3 (Meteorology/Climatology, Air Quality and Noise) present ambient air quality data on particulates, sulfur dioxide, nitrogen dioxide and carbon monoxide for the monitoring stations in the TCMA. The data contained in these tables was compiled by the Minnesota Pollution Control Agency and is valuable in determining compliance or noncompliance with the applicable ambient air quality standards, as discussed below.

Regulatory Compliance. There are 28 stations throughout the TCMA which measure total suspended particulate concentrations. Monitoring data for 1978 indicated that 9 of these sites violated the annual primary state standard of 75 micrograms per meter, while 13 stations exceeded the secondary state standard of 60 micrograms per cubic meter. The 1978 annual average of all stations was 63 micrograms per cubic meter. Furthermore, 5 sites violated the 24-hour primary state standard, while 15 sites exceeded the 24-hour secondary state standard. In general, highest particulate concentrations were recorded in downtown sections of Minneapolis-St. Paul. It is possible that baseline particulate concentrations at the landfill are considerably below the levels reported in Minneapolis-St. Paul due to the rural site area character and the lack of major sources. However, particulate concentrations in rural areas can be higher than those in urban areas due to wind erosion and dust entrainment resulting from routine agricultural activities. Particulate emissions from such activities are unavoidable and consequently, the "native soil" component of total suspended particulates is exempted in the determination of whether a particular locality exceeds ambient air quality standards. Consequently, most rural areas of the United States are classified as attainment areas (meeting the standards) for total suspended particulates. It should be noted that the U.S. Environmental Protection Agency (EPA) has designated the entire Twin Cities AQCR (which includes Hennepin County) as a nonattainment area for total suspended particulates.

TCMA has 23 sites which monitor sulfur dioxide concentrations. During 1978, five of these sites exceeded the annual primary state standard of 0.03 parts per million (ppm). Six sites exceeded the 24-hour primary state standard of 0.10 ppm, while 4 sites violated the 3-hour primary state standard of 0.25 ppm. Most of the sites which violated the sulfur dioxide standards are located in the St. Paul Park area.

Nitrogen dioxide concentrations are measured at 13 locations throughout the TCMA. During 1977, no violations of the annual state primary standard of 0.05 ppm were recorded. In fact, no areas in Minnesota currently violate nitrogen oxide standards.

In general, it is probable that the site-specific baseline ambient concentrations of sulfur dioxide and nitrogen dioxide in the study area are considerably below the levels reported in Minneapolis-St. Paul due to the lack of man-made sources of these pollutants. However, the U.S. EPA has designated the entire Twin Cities AQCR as a nonattainment area for sulfur dioxide.

The MPCA operates five carbon monoxide monitors in the TCMA. During 1978, no violations of the 1-hour primary state standard of 30 ppm was reported. However, 4 of the 5 monitoring sites recorded violations of the 8-hour primary state standard of 9 ppm. Carbon monoxide levels reported in downtown Minneapolis-St. Paul are clearly unrepresentative of the study area due to the much lower traffic volumes experienced at the proposed expansion site compared to downtown levels (Metropolitan Council, 1974; 1978). Carbon monoxide levels in the study area should approximate rural background concentrations (that is, only several parts per million even under worst-case meteorological conditions). It should be noted that the U.S. EPA has designated the entire TCMA as nonattainment (violation of standards) for carbon monoxide.

The Minnesota Air Quality Reports for 1977 and 1978 contained no data for oxidant concentrations. However, the U.S. EPA has designated the entire Twin Cities AQCR a nonattainment area for oxidants.

In summary, although Hennepin County has been desingated as a nonattainment area for particulates, sulfur dioxide, carbon monoxide and oxidants, it may be that the proposed site is actually an "attainment sub-area" (within a non-attainment area) for these pollutants. It is important to note that nonattainment designations were made on an areawide basis using available monitoring data and air quality modeling. A nonattainment classification does not necessarily mean that the entire area which is designated nonattainment is actually in violation of the air quality standards. Most of the monitoring stations in the Minneapolis-St. Paul AQCR are situated in urban and industrial areas and thus the data obtained from these stations are not representative of air quality at the proposed site. The proposed site is primarily an agricultural/residential area with a minimum of manmade pollution sources. Furthermore, the prevailing winds in this section of the county limit the transport of pollutants from the Minneapolis-St. Paul urban area to the proposed site.

On the basis of these facts, it is probable that air quality in the vicinity of the proposed site is in compliance with ambient air quality standards. A more precise assessment cannot be made without the availability of on-site monitoring data.

Existing Landfill Site

Emission Sources. Landfill activities such as landclearing, transporting heavy trucks and equipment over unpaved roads, excavation, grading, stockpiling, and the transport of cover material generate fugitive dust by wind action or by entrainment caused by mechanical means.

Dust is produced at the existing sanitary landfill by all of the above processes. However, fugitive dust impacts have not been a significant problem with the existing operation. Potential fugitve dust impacts have been minimized due to the type of soil cover, the type of landfill operation, and the limited number of sensitive receptors in the vicinity of the landfill. In addition, dust generation is usually at a minimum during the winter since the ground is frozen and snow-covered.

The primary carriers of traffic to the Woodlake Sanitary Landfill are Interstate Highway 94, State Highways 12, 52, 55, and 100, County Highways 9, 18, 19, and 24, and the Hamel Road (McKie and Assoc., Inc., 1974).

The access road to the site is Boyer Road, which runs north to the site from Hamel Road and is accessible from County Road 19.

At present, Woodlake Sanitary Landfill services 12 primary population centers. The villages and cities serviced by the landfill are listed in Table 10 of TWP 3, along with the major routes used to reach the site and the haul miles from the center of each community. Approximately 300 vehicular trips per day are generated by operation of the exisitng landfill. Transportation related emissions are primarily hydrocarbons and particulates from diesel engines (National Biocentric, Inc., 1975).

A major product of landfill organic waste decomposition is a gaseous mixture consisting of methane (averaging 55%), carbon dioxide (averaging 45%), with trace amounts of nitrogen, hydrogen, and oxygen and varying trace constituents such as carbon monoxide, ethylene, ammonia and water vapor.

The extent and rate of gas production depends primarily on landill age; percent and type of waste organic materials; cover material type, permeability and thickness; and landfill temperature, waste density, and waste moisture content. Once generated, methane gas, being lighter than atmospheric air, migrates radially by diffusion and convection flow processes. A general rule-of-thumb utilized to predict the potential extent of methane migration is to assume that ten feet of horizontal migration may occur for each foot of landfill depth. The resulting value, however, is only a first-cut estimate since site-specific conditions such as impermeable cover or porous strata can result in methane migration over larger distances.

None of the problems such as explosive build-up or vegetation damage sometimes associated with methane gas have been reported at the existing sanitary landfill.

Odorous emissions may result from the operation of sanitary landfills. In general, there are a number of primary sources of odor at sanitary landfills:

1. the incoming refuse;

2. degradation of previously buried refuse resulting in the production of hydrogen sulfide, amonia, and trace mercaptons, and

3. leachate which reaches the surface by seeps or from collection system operation.

In general, however, properly operated sanitary landfills do not have substantive odor problems. Prompt waste processing, application of daily cover, leachate and gas control measures, and exclusion of special wastes, as necessary, generally result in a relatively odor free operation.

The Woodlake Sanitary Landfill, as operated by BFI has not resulted in odor impacts to date. Odor generation and impacts have been minimized by operation of the site as a sanitary landfill.

Equipment used for the development and maintenance of the Woodlake Sanitary Landfill also gnerates low level air emissions. However, as these activities are conduted over an extended period and because a limited amount of activity is conducted at any one time, no significant air quality impact results from these operations at the existing sanitary landfill.

Sensitive Local Receptors. Sensitive receptors in the vicinity of the proposed expansion areas consist of widely separated residential homes and farm houses. Fewer than 10 residences are located within a half-mile radius of the proposed site. Figure 4-1 shows the distribution and distance of structures with respect to the proposed site. The final contour site plan (January 10, 1980) indicates that the two nearest receptors (residential homes) will be approximately 625 and 1200 feet away, respectively.

Regulatory Compliance. Based on available information, the existing sanitary landfill appears to be in compliance with regulations concerning potential air emissions from the landfill. There is no record of significant adverse odor impacts from the landfill. Furthermore, no significant adverse impacts from fugitive dust emissions and methane gas emissions have been reported.

4.1.4 Noise

Sources and Levels

In brief, the ambient noise in any area is the background noise made up of all the natural and man-made noise generally considered to be contained within the acoustical environment of that general area. During operation of the facility, the primary generators of noise are equipment for landclearing and earth moving (bulldozers, etc.); and vehicular traffic entering and leaving the facility, as well as delivery trucks idling and discharging on the site. Natural phenomena such as weather (wind and rain) and wildlife (insects and birds) are additional sources of noise.

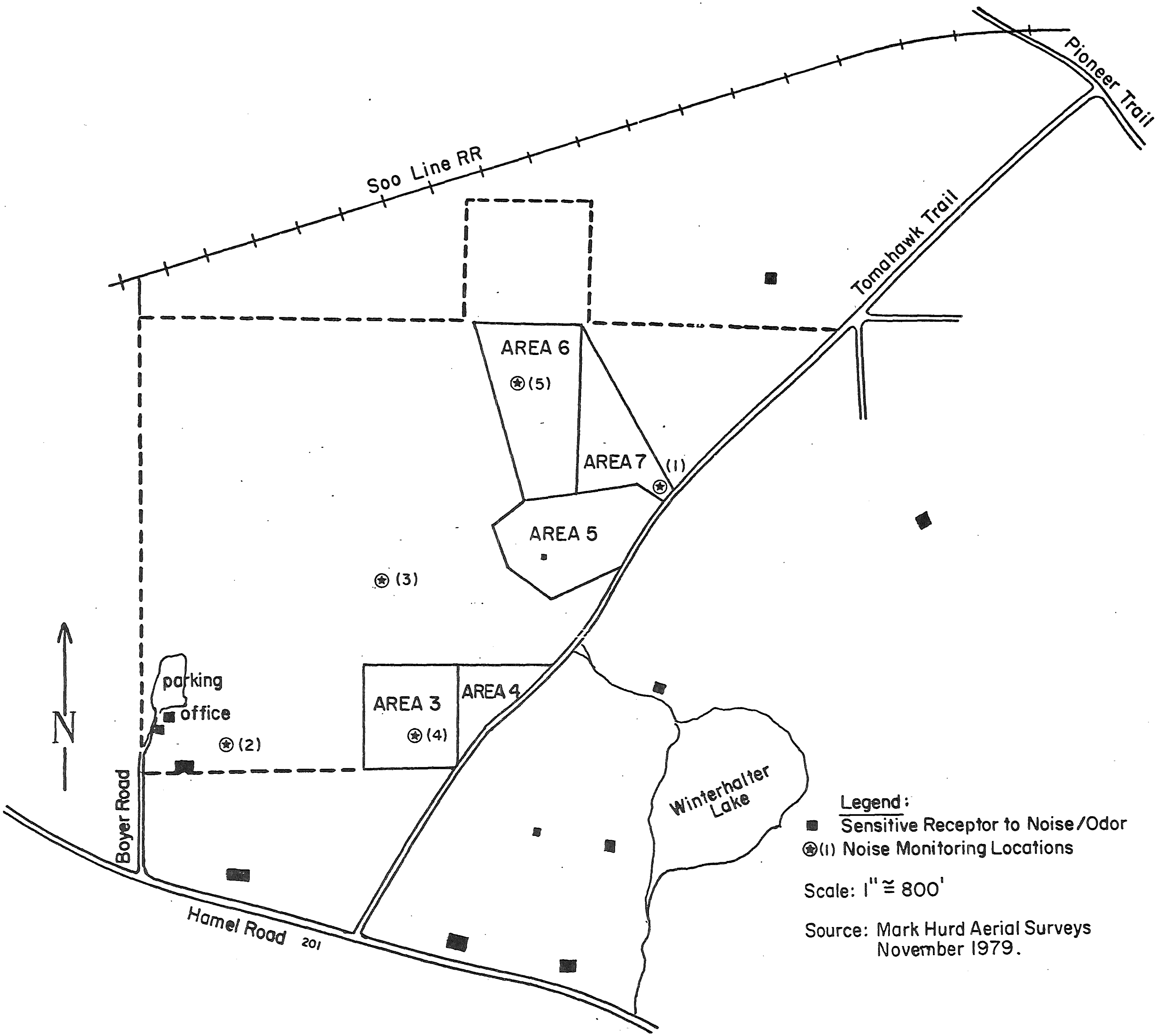


FIGURE 4-1

NOISE MONITORING AND NOISE/ODOR SENSITIVE RECEPTOR LOCATIONS

Noise monitoring was conducted in the vicinity of the Woodlake Sanitary Landfill to assess the baseline noise levels. Measurements were made using a National Institute for Ocupational Safety and Health (NIOSH) certified sound level meter set in accordance with 42 CFR 82. The noise monitoring was conducted on December 12, 1979 at selected locations in and around the landfill. To obtain a representaive sample of operational on-site levels, readings were taken during the midday period. Additionally, measurements were made at the proposed expansion area to determine baseline noise levels.

Monitoring was conducted at the points indicated on Figure 4-1. For the on-site monitoring locations, L_{50} and L_{10} noise level statistics were computed from the collected data. Readings were made using the "A" weighting scale since it most closely resembles the frequency response for the human ear. The results of the noise monitoring are presented in Table 4-1.

Sound levels in and around the Woodlake Sanitary Landfill are generally quite low. The higher levels recorded within the landfill itself were due to bulldozers operating in the distance. Sound levels recorded along Tomahawk Trail and in the parking area were quite low, rising slightly with the occasional passing of a vehicle. Noise level measurements along the perimeter of the landfill were also relatively low, indicating that present operations of the landfill have no significant adverse noise impacts on the surrounding community.

Nighttime noise levels were estimated by using the ERT comparative land use approach (ERT, 1979). Estimated nighttime L_{50} and L_{10} statistics are 25 and 33 dBA, respectively. Depending on local noise conditions (traffic volumes, atmospheric conditions), it is estimated that there is a range of approximately plus or minus five decibels for the values listed above. Since the landfill is not operational during the night, areawide nighttime noise levels would not be expected to vary significantly.

Sensitive Local Receptors

Sensitive receptors in the vicinity of the proposed expansion areas consist of widely separated residential homes and farm houses. Fewer than

TABLE 4-1

ESTIMATED NOISE-LEVEL STATISTICS IN THE VICINITY OF THE WOODLAKE SANITARY LANDFILL

	Noise Level Statistics (dBA)	
Location	L_{50}	L_{10}
1	36	42
2	33	38
3	40	46
4	32	38
5	31	40

Source: Fred C. Hart Associates, Inc., December 12, 1979 field measurements.

10 residences are located within a half-mile radius of the proposed site. Figure 4-1 shows the distribution and distance of structures with respect to the proposed site. The final contour site plan (January 10, 1980) indicates that the two nearest receptors (residential homes) will be approximately 625 and 1200 feet away.

Regulatory Compliance

The results of the noise monitoring program suggest that noise impacts from the existing landfill do not exceed the MPCA noise regulations. Noise levels in and around the site are generally quite low, except in the immediate vicinity of bulldozer operations.

In addition, noise levels generated at the existing landfill are well in compliance with the OSHA standards governing employee noise exposure levels.

4.2 WATER QUALITY

4.2.1 Background

Surface Water

Surface water in the vicinity of the Woodlake Sanitary Landfill consists of the upper portion of the Pioneer Creek watershed. The bodies of water potentially affected by the landfill operation are those downstream of the landfill site, which include Pioneer Creek (alternatively known as Spurzem Creek), Winterhalter Lake, Spurzem Lake, Half Moon Lake, and, ultimately, Lake Independence. The landfill site drains into this chain of lakes via an unnamed creek, which flows through the wetland areas Northwest of the site eventually draining into Winterhalter Lake (see Figure 2-1). The general direction of surface flow in the wetlands is to the southeast towards Spurzem Creek.

Groundwater

The major deep aquifers underlying the Pioneer Creek watershed are the Franconia Aquifer, and a portion of the Prairie du Chien Aquifer. Deep groundwater gradient is generally southwest towards Lake Independence (Metropolitan Council, 1978).

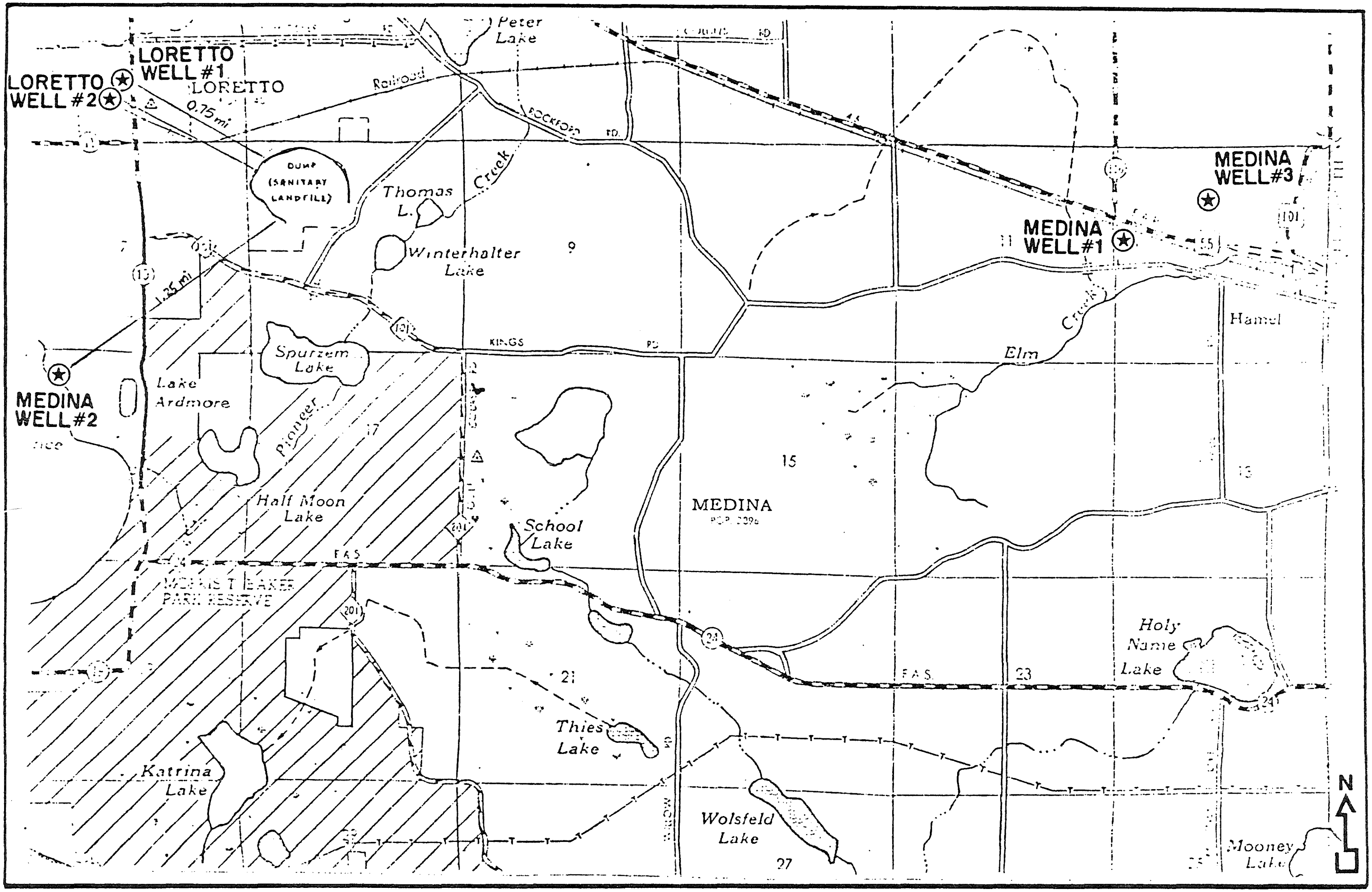
The shallow groundwater table beneath the proposed landfill is estimated to exist at 959 feet at its highest elevation based upon on-site borings. This groundwater table most likely consists of a perched waster table resulting from water-bearing sand lenses lying within a relatively impermeable clay substrate.

Local Water Supply

The communities of Loretto and Medina are the closest towns in the vicinity of the Woodlake Sanitary Landfill. Both municipalities draw their water supplies from wells located within their respective boundaries. The well locations are shown in Figure 4-2. The two Loretto municipal wells and

FIGURE 4-2

LOCATION OF LOCAL WATER SUPPLY WELLS



Source: Department of Health, Hennepin County.

Scale 0 0.25 0.50 1.00 Mile

the No. 2 Medina well draw from the Franconia Aquifer, while the No. 1 and No. 3 Medina wells draw from the Prairie du Chien Aquifer. In addition to those wells, there are a number of private wells from which samples have been taken and data is available.

Major Pollution Sources

In order to determine the potential water quality impacts of the Woodlake Sanitary Landfill, this study has assessed water pollution contributions from all existing sources to the Pioneer Creek watershed.

Estimation of the contribution of non-point sources, such as urban storm-water and agricultural runoff and the extent of contributions from the sewage treatment plant and the existing landfill must be assessed before additional impacts from facility expansion can be predicted. Subsequent sections of this EIS will attempt to define the potential magnitude of each of those inputs, as well as define the potential impacts resulting from the proposed expansion.

4.2.2 Description of the Existing Environment

Surface Water Quality

Existing surface water quality is impacted by a variety of point and non-point sources. In the TCMA area, agricultural inputs accompanying runoff and sedimentation processes can result in the transport of both soil particles and a variety of pollutants, primarily phosphorous and nitrogen. Additional problems can result from the application of a variety of insecticides and fungicides for pest control purposes.

The wetland adjacent to the proposed expansion is also impacted by the Loretto Sewage Treatment Plant. The treatment facility was designed to treat an average flow of up to 120,000 gallons per day of domestic wastewater having a 5 day biochemical oxygen demand (BOD_5) loading of 250 pounds per day and a suspended solids loading of 250 pounds per day. Average flow measured for 1978-79 was 0.064 mgd (MPCA Monitoring Data). The 260-acre wetland located southeast of the facility functions as a tertiary receiving basin for the discharge of the Loretto plant. Discharge to the wetland in the past has occurred via overflooding of the ponds, seepage through the pond bottom and sides and via direct pumped dishcharges. The secondary pond was originally designed to discharge solely through seepage. Inadequate seepage rates eventually led to the modification of permit to permit direct discharge to the wetland.

The facility, as originally designed, was not capable of meeting the original permit's no discharge and phosphorous limitations. The seepage pond has been reported to be meeting other constituent levels associated with secondary treatment, such as BOD, suspended solids, and fecal coliforms (MPCA Memo, McGuire to Breimhurst 1978). Actual data on the treatment facility effluent and wetland surface water quality is limited. Samples were taken from surface water points located at the facility and in close proximity to it during five separate investigations: Sept. 4, 1975; November 14, 1975; March 9, 1976; April 5, 1977 and November 13, 1978 (TWP 4).

Without adequate resources for facility improvements to meet all of the water quality standards, the City of Loretto requested permanent variances from both the phosphorous effluent limitation and the no discharge requirement. These conditions led to the completion of a phosphorous study, in which the impacts on the downstream water courses due to the Loretto seepage pond, were assessed (McCombs & Knutson Associates, Inc.). This study concluded that the phosphorous loading to the seepage pond, estimated to be 328 pounds per year, did not exceed the phosphorous limitation that would be achieved at design capacity (365 lbs./yr). Furthermore, the study stated that, "the slough is effectively filtering the nutrients," and that, "the overflow from the seepage pond is not adversely affecting the downstream watercourses." The conclusions drawn in this phosphorous study were qualified by data collected during March, 1976 by the MPCA. Although data for sampling points located at the seepage pond outfall, the middle of the larger wetland, and at the inlet of the small wetland indicated ongoing assimilative processes in the wetland, the agency reported "little likelihood of nutrient reduction during spring snowmelt periods and other high runoff events."

Upon reissuance of the facility's NPDES permit (11/22/78), revised effluent limitations were incorporated. Special requirements were also imposed permitting discharge during periods of low flow in the wetland and when the secondary cell is ice-free and in an aerobic state. The revised effluent limitations for the treatment facility discharge were based on a flow rate of 0.217 mgd and require a pH range of 6.5 to 8.5 . The limitations are as follows:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS	
		Continuous Discharge
	Seven Consecutive Day Average	Thirty Consecutive Day Average
5-day Biochemical Oxygen Demand (BOD)	45 mg/l (81.4 lbs/day)	25 mg/l (45.2 lbs/day)
Total Suspended Solids	45 mg/l (81.4 lbs/day)	30 mg/l (54.3 lbs/day)
Fecal Coliform Bacteria	400 MPN/100 ml	200 MPN/100 ml
Turbidity	NA	25 JTU

The existing landfill site also continues to contaminate to some degree the adjacent wetland in the form of leachate percolating through the landfill and peat layer, and moving laterally into the wetland. The principal contaminants of concern in landfill leachates are heavy metals, BOD, COD, alkalinity, total dissolved solids, chlorides, microorganisms, hardness and organic compounds, such as oil and phenols (Metropolitan Council, March, 1978). Table 4-2 contains mean leachate composition values for a series of constituents which are characteristic of landfills containing municipal wastes. The data is based upon measured leachate characteristics from fifty-four landfill sites (Metropolitan Council, March, 1978).

TABLE 4-2

MEAN LEACHATE COMPOSITION
(milligrams/liter unless other units are given)

Parameter	Mean Leachate
Alk ($CaCO_3$)	2,062
NH_3-N	158
As	1.09
Ba	3.05
BOD	2,281
B	9.0
Cd	0.10
Ca	635
COD	7,996
Cl	773
Cr^{+6}	0.004
Cr (total)	0.58
Cu	25.2
CN	0.030
F	0.5
Hdns ($CaCO_3$)	2,332
Fe	697
Pb	0.43
Mg	260
Mn	27.5
Hg (ppb)	1.2
Ni	0.3
No3	0.46
Oil	24
pH (units)	6.8
Phenol	1.94
PO_4	5.16
K	270
Se	(undetected)
SiO_2	30
Ag	0.03
Na	276
SC(mmhos/cm)	20,540
SO_4	1,204
TDS	20,240
TSS	915
Zn	12.1

Source: Metropolitan Council, March, 1978.

In determining the pollution potential for the existing 28 acres of the landfill, ranges of annual leachate production of 1.20×10^6 and 2.65×10^6 gal/year for the Woodlake site were estimated utilizing water balance methodologies (TWP 7, and the Metropolitan Council, March 1978, respectively). A separate estimate of 5.02 acre-ft./year, or 1.64 million gallons per year, was also completed for the projected volume of leachate migration through the peat materials into the adjacent swamp from the existing fill (National Biocentric, Inc., 1977).

The above estimates indicate the potential range of leachate production for the existing site. Differences between the first two estimates largely relate to the lower degree of slope (as opposed to actual field conditions) assumed in the Metropolitan Council analysis. The third estimate, which falls mid-range between the water balance estimates are based on an alternative approach utilizing Darcy's Law, which relates rate of flow to soil permeability, hydraulic gradient and cross-sectional area.

Pollution problems due to the existing landfill have been investigated and analyzed both by a consultant of the landfill owners as well as the MPCA. Under a stipulation agreement between Woodlake Sanitary Landfill, Inc., and the MPCA, a detailed hydrogeologic study of the Woodlake site was undertaken to determine if water quality standards (WPC 22 or 14) were being violated. In conducting the study, 17 monitoring wells were installed in addition to the 5 wells already existing (National Biocentric, Inc., 1977). Based on the report and more recent on-site borings and permeability tests (April , 1980), the following conclusions were made with respect to surface water:

- "Contaminants from leachate formation are diminished to acceptable levels as they migrate from the fill area as a result of soil attenuation, dispersion, dilution, oxidation/reduction processes and bacteria action."

- Leachate movement is northwesterly towards the wetland area.

- Once groundwater moves away from the landfill into the marsh, it becomes surface water and moves via surface drainage into Spurzem Creek.

Localized siltation impacts created by the existing landfill operation were also observed during the course of field investigations conducted in March 1976 by MPCA.

In assessing the possible water quality violations at the sanitary landfill, the MPCA Division of Water Quality identified a number of surface water violations based upon the data provided in the hydrogeologic study.

For several of the data points, chlorides, pH, specific conductance, ammonia, copper and chromium concentrations exceeded WPC 14 water quality standards (TWP 4).

This investigation has also included gathering available water qualtiy data in down stream water courses including Spurzem Creek, Winterhalter Lake, Spurzem Lake, Half Moon Lake and Lake Independence. With the exception of Lake Independence, only very limited water quality data are available (TWP 4). Again, with the exception of Lake Independence, each of the aforementioned water bodies apparently supports limited warm water fisheries. With the exception of the wetland adjacent to the sewage treatment plant, substantive water quality problems have not been reported in the drainage area.

Lake Independence was recently surveyed in 1974. The lake's area is approximately 992 acres and has a maximum depth of 58 feet. The Lake is a major area recreational resource and supports an extensive warm water fishery. Water quality data, however, is limited and a determination of compliance with respect to WPC 14 standards cannot be completed. The Metropolitan Council working with Hennepin County, in conjunction with the MPCA, has scheduled a series of water quality analyses for this summer (1980).

Groundwater Quality

Existing groundwater quality is potentially impacted by a number of sources including agricultural inputs, the Loretto Sewage Treatment Plant and the existing Woodlake landfill.

However, given the nature of the highly impermeable surface soils, it is highly unlikely that substantive impacts on groundwater due to agricultural runoff is possible.

The contribution of the Loretto Sewage Treatment Plant to groundwater pollution has not been defined in detail. However, given the failure of the plant's secondary pond to function as a seepage pond, and given available information relating to subsurface soil conditions, it is likely that water quality impacts from the Loretto plant are largely surface water oriented. Groundwater sampling data, downgradient from the plant and upgradient from the exisitng landfill, is not available.

Groundwater contamination from the Woodlake Sanitary Landfill recognized to be a problem during its operation as Boyer Sanitary Landfill. In response to a problem, a hydrogeologic study of the site was requested of BFI by MPCA. The study suggested that the landfill was a contamination source for the adjacent wetland primarily via groundwater movement laterally rather than vertically, from the fill to the surface water of the marsh. Furthermore, the interpretation of bedrock geology asserted that the shallow groundwater system of the site was not hydrologically connected to the deep groundwater system in the bedrock. Additional on-site borings taken during the course of the preparation of this EIS tend to substantiate that conclusion.

During the course of the hydrological study, 17 monitoring wells were constructed in addition to five existing wells. Water quality data obtained during the course of the study is contained in TWP 4.

Conditions and Compliance

Based upon the Biocentric data and WPC water quality standards for Class 1A, the MPCA Division of Water Quality noted that a number of data points for manganese, iron and sulfates indicated concentration levels higher than applicable groundwater standards. It should be noted, however, that a number of data points represented samples of leachate rather than groundwater samples and test concentrations above water quality standards for iron and manganese may occur naturally in this area.

Local Water Supply Quality

Conditions and Compliance

Grondwater provides the drinking water source for the communities of Loretta and Medina. The municipal wells in the two towns are periodically sampled by the Minnesota Department of Health, Division of Environmental Health. The wells in each of the communities have been sampled directly from pump discharges at the wells as well as sink taps and hose bibs along the distribution lines. In Loretto, the two municipal wells pump into the same distribution system and samples taken along distribution lines reflect the water quality of the combined system. Medina's wells, on the other hand, have completely separate distribution systems, and sink tap and hose bibb samples are specific to individual wells. In assessing the Minnesota Department of Health data against the Class 1A potable water standards, excessive levels of iron and phenols were found among seven samples.

4.3 TERRESTRIAL AND AQUATIC ECOLOGY

4.3.1 Introduction

Terrestrial and aquatic ecology issues pertinent to the Proposed Action are discussed in this Chapter. A baseline description of the existing site environment is provided with regard to the following parameters: vegetation, wildlife, aquatic ecology, wetlands, and rare and endangered species. The primary information sources were existing data gathered from written publications, personal communications with various agencies, and a brief site survey conducted in November 1979.

4.3.2 Regional Setting

The proposed Woodlake Sanitary Landfill expansion site is located in a rural/residential setting in western Hennepin County, southeastern Minnesota. The surrounding landscape is referred to as the Loretto Highlands, an area of broad, deep marshes or swamps; steep, smooth-sided hills alongside marshes or lakes; and flat to undulating hill summits (Kennedy and Lueth 1976). This area was once predominated by dairy farming agriculture, but has shifted since the 1960's to accomodate estate homes, single family residences, and recreational land use activities.

In the immediate vicinity of the site is the 2500-acre, Morris T. Baker Park Reserve, an area of particular relevance to the proposed development site due to its proximity and wealth of natural resources. It is located just south of the landfill, bounded by Hamel Road to the north. The park supports a wide range of recreational activities and diverse natural areas including several lakes. Three of the lakes are in the drainage area of the site, Spurzem, Half Moon, and Independence.

4.3.3 Vegetation

The Woodlake site is located in a region of the U.S. referred to as the "Big Woods", which was once characterized by a dense hardwood forest dominated by the Maple-Basswood-Oak association on steeply rolling upland areas. While agricultural land use has brought about significant changes in local vegetative patterns, the climax mesic forest species specific to the area still include sugar maple (Acer saccharum), basswood (Tillia americana), American elm (Ulmus americana), red oak (Quercus rubra), and ironwood (eastern hophornbeam, Ostrya virginiana) (Weaver and Dyhr 1976).

A vegetation survey of the landfill project area was conducted on November 29 and 30, 1979. Attention was focused on the dominant species in the proposed development areas 3,4,5,6 and 7. A list of species identified on the site is presented in Appendix I of TWP5, Terrestrial Ecology and Aquatic Ecology. A schematic representation of the vegetative cover types occuring on the site is illustrated by Figure 3-4. These cover types correspond to those described in the Hennepin County Parks and were characterized from both field data and aerial photo interpretation (Weaver and Dyhr 1976; Mark Hurd Aerial Survey 1979).

The upland forest areas contain climax and intermediate species. A dense canopy is formed, composed of a number of important tree species including sugar maple (Acer saccharum), basswood (Tillia americana), American elm (Ulmus americana), red oak (Quercus rubra), bur oak (Quercus macro carpa), trembling aspen (Populus tremuloides), bitternut hickory (Carya cordiformis), and ironwood (Ostraya virginiana). Along the edges of the upland areas, there are also clumps of coniferous species, shrubs, and herbaceous growth.

The grassland area at the eastern edge of the site along Tomahawk Trail is dominated by a variety of grasses and a number of common herbaceous species such as goldenrod (Solidago spp.) and aster (Aster sp.) and bordered by a stand of predominantly red pine (Pinus resinosa). These areas appear to be abandoned pastures and would eventually be invaded by pioneer shrubs and tree saplings.

Some of the moist lowland pockets on the site are characterized by tree growth and limited woody undergrowth. Species found in these areas include willow (Salix sp.), American elm (Ulmus americana), and green ash (Fraxinus pennsylvania).

The large peat-based wetland adjacent to the site and the small wetland area in the southeastern portion of the site are characterized by typical regional wetland species. Schrub-carr, wet meadow, and emergent aquatic vegetation are found in these areas. These include such species as redosier dogwood (Cornus stolonifera), willow (Salix spp.), cattail (Typha latifolia), reed grass (Phragmites sp.), and sedge (Carex sp.).

4.3.4 Wildlife

Wildlife species potentially occurring in the range of the project region would include those species commonly associated with the regional plant communities found in Hennepin County. However, due to the limited size of the landfill expansion property, nearly all of the wildlife that would be found on the site at any one time would most likely be transient.

Species lists adapted from surveys of Hennepin County are presented in Appendix II of TWP 5 (Weaver and Dyhr 1976). These lists catalogue the range of species that could occupy the various trophic levels in each of the vegetative associations found on the project site. Note that additional animal species may occupy these habitat types in the spring and fall seasons and that, while they are not specifically identified, a number of insect species play a substantial role in the overall functioning of these ecosystems.

Wildlife observations made on the site visits in November and December, 1979 included gulls, crow, and pheasants. It has also been noted that brown rats and white-footed deer mice are common rodents associated with landfill sites in Minnesota (pers. comm., J. Kemp, December 19, 1979).

4.3.5 Aquatic Ecology

The drainage area of the proposed landfill expansion sites includes Winterhalter Lake, Spurzem Lake, Half Moon Lake, and Lake Independence. Connecting these water bodies is a narrow creek referred to as Spurzem Creek (or Pioneer Creek). Limited data from lake surveys is available, however no ecologic stream information has been recorded (pers. comm., T. Kucera, December 13, 1979).

Winterhalter Lake is southeast of the site and drains the narrow stream that emerges from the wetland at that location. Spurzem Creek drains into and out of the lake. The area of the lake is 16 acres and median depth is 10 feet (pers. comm., V. Reiner, MPCA, December 28, 1979). To date, no aquatic ecology data has been made available for Winterhalter Lake.

Spurzem Lake has one inlet and one outlet consisting of Spurzem Creek. The lake area is approximately 65 acres with a median depth of 12 feet. Lake biological characteristics recorded in 1960 are presented in Appendix III of TWP 5. The available information indicates that the lake bottom consists mainly of detritus mixed with muck, that cover is primarily cattails and, that there is only limited public access.

Spurzem Creek flows through Half Moon Lake and consequently functions as the lake's inlet and outlet. The lake's approximate size is 29 acres and median depth is 11 feet. The bottom of the lake is mostly muck. Shoreline cover has been designated as 60% pasture, 10% swampy lowland, 5% cropland, and 25% wooded with homesites. There is no designated public access. Lake survey biological data from 1961 is presented in Appendix III of TWP 5.

Lake Independence has one inlet and one outlet into Spurzem Creek which flows into the Crow River and ultimately to the Mississippi River. The area of the lake is approximately 828 acres and median depth is 15 feet (pers. Comm., V. Reiner, MPCA, December 28, 1979). Lake biological characteristics recorded in 1974 are noted in Appendix III of TWP 5. Shoreline bottom classifications are 5% rubble, 15% gravel, 70% sand, and 10% muck. Shoreline cover consists of 30% open parkland, 30% residential lawns, and 30%

cattail and bulrush fringe. County and village-owned public access is available on the east side of the lake.

4.3.6 Wetlands

Minnesota has a wealth of water-related natural resources, currently protected under the State's "Public Waters" regulations (Minnesota Statutes Chapter 105). A permit program is administered by the Minnesota Department of Natural Resources (MDNR), requiring the granting of a permit for certain activities affecting waters classified as "public waters" or "wetlands." The boundary of the regulated areas is defined as the "ordinary high water level" (MS 105.37 Subd. 14). Those wetlands which are under the jurisdiction of the Public Waters permit program are "limited to all type 3, 4 and 5 wetlands, as defined in U.S. Fish and Wildlife Service Circular No. 39 (Shaw and Fredine, 1971) not included within the definition of public waters, which are ten or more acres in size in unincorporated areas or 2½ or more acres in incorporated areas "(MS 105.37 Subd. 15.).

The Woodlake Sanitary Landfill site incorporates a wetland property within its boundary. The wetland in the northwest area of the site (approximately 126 acres) linked to a smaller wetland in the southeast (approximately 5.2 acres) along Tomahawk Trail, is currently listed and mapped by the DNR (pers. comm., T. Lempke December 13, 1979). Species identified on the wetlands are: cattail (*Typha* spp.), reed canary (*Phalaris arundinacea*), willow (*Salix* spp.) elm (*Ulmus americana*), and alder (*Alnus* spp., shrub).

The wetlands are also listed and identified (as one unit: 8-1) by the Hennepin County wetland survey as illustrated by Figure 4 and Table 5 of TWP 5 (Hennepin Soil and Water Conservation District 1976). Both are identified as Type 3 wetlands, a designation of the U.S. Fish and Wildlife Service that refers to an inland shallow fresh marsh.

4.3.7 Rare and Endangered Species

Minnesota has enacted a state law for the protection of threatened and endangered species (M.S.A. 97.488), and state listings of regulated species are presently being compiled. There is also a recently established natural heritage program within the state. According to present records, there are no listed species in the project area (pers. comm., C. Henderson, December 21, 1979).

There are several unusual species noted by the heritage program that occur in the area: Foster's tern, trumpeter swan, and ginseng. Trumpeter swan is currently considered a rare species and recent conservation efforts within the Baker Park Reserve and other portions of the Hennepin County Park Reserve District have restored this bird to its non-endangered status within the State (King and King, 1968; Moyle, 1975).

4.4 SOCIO-ECONOMICS

4.4.1 Present Land Use

Regional - Twin Cities Area

Land Use. In 1960, 14.1 percent (267,000 acres) of the Minneapolis-St. Paul metropolitan area's 3,000 square miles (1.9 million acres) could be categorized as urban land use. The breakdown by category was as follows:

Residential	5.0%		
Streets and Alleys	5.0%		
Public and Recreational	2.3%	Industrial	1.5%
Commercial	0.3%		
TOTAL	14.1%		

The remaining 85.9 percent of the metropolitan area's land consisted of vacant space, agricultural land or water bodies. In 1970, the percent of land in urban uses increased by 4.6 percent to 18.7 percent (355,000 acres). By 1975, this figure had grown to 21.6 percent. The breakdown by land use category for that year was as follows:

Residential	7.2%		
Streets and Alleys	6.0%		
Public and Recreational	5.8%	Industrial	2.0%
Commercial	0.6%		
TOTAL	21.6%		

The rest of the region was vacant, agricultural (73.5 percent), or water (4.9 percent). (Metropolitan Council, Oct. 1978)

Zoning. Of the seven counties in the Metropolitan area, Washington, Scott and Carver Counties have county-wide zoning with shoreland management provisions. Anoka and Dakota counties have no county-wide zoning but have shoreland management ordinances. Hennepin and Ramsey counties have no county-wide zoning but have shoreland management ordinances. Hennepin and Ramsey counties have no county-wide zoning or shore-land management ordinances. (Metropolitan Council, Oct. 1978)

Land Use Plans. The principal planning agency in the Metropolitan Area is the Metropolitan Council. Its task is two-fold. Firstly, the council is responsible for developing programs and making recommendations for legislative action to meet regional problems and long-range goals. Secondly, the Council provides a check on the programs and expenditures of regional and local agencies in the Metropolitan Area.

In 1976, the Metropolitan Land Planning Act was passed in order to strengthen local planning and achieve orderly local development within four metropolitan systems: airports, recreation and open space, land transportation and waste management. Under the Act, each community is required to prepare a comprehensive plan. This plan will basically contain three parts dealing with land use, public facilities and implementation. The comprehensive plan must be consistent with the plans of other communities, counties, school districts and the Metropolitan Council. (Metropolitan Council, Oct. 1978; Jan. 1979)

Hennepin County

Land Use. Between 1970 and 1975, nearly 12,000 acres of vacant or agricultural land were converted to urban uses. The two land-use categories of greatest growth were Residential and Public/Recreational, accounting for more than two-thirds of the nearly 12,000 acres converted from vacant or agricultural uses to urban uses. (Metropolitan Council, Oct. 1978)

Zoning. Hennepin County does not have any county-wide zoning ordinances. Zoning within the county is under the jurisdiction of individual municipalities. The western portion of Hennepin County -- Plymouth, Medina, Maple Grove, and Corcoran -- is principally zoned for vacant or agricultural land. Approximately one quarter of the city of Medina is zoned for parks and recreational areas; the rest is primarily zoned as agricultural or vacant land with some single-family housing. (Metropolitan Council, Oct. 1978)

Land Use Plans. Hennepin County presently has no definite land use or comprehensive plans.

The County does not have any legal authority for zoning or subdivision review. These are left to local municipalities. Both Medina and Loretto must prepare a comprehensive land use plan which must meet Metropolitan Council standards. (Metropolitan Council, Oct. 1978)

Medina and Loretto

Land use. The cities of Medina and Loretto are located in the rural outlying sector of the Twin Cities Metropolitan area. Nearly three-fourths of Medina consists of vacant and agricultural land. Approximately 15 percent of the land in the city is made up of parks and recreation areas. The remaining land is devoted to single-family housing, commercial retail and service, industrial (mainly manufacturing, wholesale, construction, gravel pits) and water.

Between 1970 and 1975, Loretto and Medina exhibited, by comparison to other county areas, high rates of industrial land consumption. During those years, these communities converted almost 200 acres of vacant or agricultural land to industrial uses. Most of the industrial land consumption in Medina and Loretto was dominated by extractive industries such as gravel operations. (Metropolitan Council, Oct. 1978)

Zoning. Along State Road 55 (see Figure 3), which cuts diagonally across the northeast corner of Medina, land on both sides of the road is zoned for: limited and general industrial and manufacturing uses, and general commercial or shopping center uses. The area south of Hamel Road, north of Route 24, east of Route 19, and west of Parkview Drive is zoned for public, open development, conservation, or reclamation uses. This area and the land south of Route 24, west of Route 201 and north of Routes 28 and 6 comprise Baker Park Reserve. Additional open space zoning exists for properties surrounding Wolsfeld Lake, Holy Name Lake and Kegan Lake. The area in the southwest corner of Medina, along both sides of Route 12, is zoned for limited industrial and manufacturing uses. Properties at the northwest corner of Medina, at the intersection of Routes 19 and 55, are zoned for general commercial or shopping center uses. The landfill site is presently zoned for rural-agricultural uses. The existing site is a non-conforming but "grandfathered" use, since the facility was in operation prior to enactment of the present zoning regulations. The proposed site, Areas 3, 4, 5, 6 and 7, would also be non-conforming under existing zoning regulations. (Pers. Comm., W. Mills)

Land Use Plans. The City of Medina is currently developing a comprehensive land use plan, but details of its contents have not yet been made public. (Pers. comm., D. Ruhl)

4.4.2 Public Facilities and Services

Twin Cities Area

Water Supply and Sewerage. Water supplies throughout the region consist of regionalized water distribution systems, localized water distribution systems and private wells. In the seven county Metropolitan Area water is supplied by: 17 lakes; 40 rivers, streams, brooks, or creeks; 14 artificial or natural pits, ponds, swamps, or ditches; and 734 wells. (Metropolitan Council, Feb. 1977)

Emergency Services. Fire services throughout the area are provided by a combination of paid and volunteer fire services. Large municipalities and densely populated suburban areas generally have paid manned fire companies. Other suburbs and rural areas utilize volunteer services.

With respect to police protection, the region typifies police protection systems throughout the country. State police and local police networks provide services throughout the region. In 1978 the Metropolitan Council authorized distribution of more than $1.7 million in federal Law Enforcement Assistance Administration grants to local police agencies.

The area's Emergency Medical Services (EMS) program completed its first year of activity in 1978. This system calls for plans for a regional EMS communications system for the radio dispatch of medical help to the scene of an emergency. (Metropolitan Council, Feb. 1977)

Health Care. With respect to medical facilities, the Metropolitan Area has 37 general acute care hospitals and medical centers, 3 speciality centers and 165 long-term care facilities. (Metropolitan Council, Feb. 1977)

Education. There are over 600 elementary and secondary schools in 50 public school districts in the Metropolitan Area. In addition, the University of Minnesota is at Minneapolis, Hamline University is at St. Paul, and St. Olaf College is at Northfield. (Minnesota State Planning Agency, Oct. 1979)

Recreation. There are 36 developed regional parks in the Twin Cities area. They average more than 1500 acres in size and total more than 53,000 acres. During the winter of 1980, between 1,000,000 and 1,500,000 visits to the parks are expected. (Metropolitan Council, Aug. 1979)

Hennepin County

Water Supply. The water supply in Hennepin County is from: 4 lakes; 12 rivers, streams, brooks, and creeks; 5 natural and artificial pits, ponds, swamps, sloughs, and ditches; and 246 wells. (Metropolitan Council, Feb. 1977)

Emergency Services. Emergency services (police, fire and ambulance) in Hennepin County are provided by various municipal police and fire departments, the Hennepin County Sheriff's office and the Hennepin County Medical Center. (Metropolitan Council, Feb. 1977)

Health Care. The County has 17 general acute-care hospitals and medical centers and 88 long-term facilities. (Metropolitan Council, Feb. 1977)

Education. About 110 public elementary and secondary schools are located in 16 school districts in Hennepin County. In addition, the University of Minneapolis is located in the County. (Metropolitan Council, 1979)

Recreation. Over 22,000 acres of parks and open space have been set aside by the Hennepin County Park Reserve District. The major components in this system are park reserves -- natural areas of 1000 to 5000 acres. Up to 20 percent of a park reserve is developed for active recreation, nature centers, picnic grounds, swimming beaches, camp grounds, hiking trails, bicycle paths, ski touring, horseback riding and snowmobile trails. The remaining 80 percent of a park reserve is kept in or has been restored to its natural state. (Hennepin County Park Reserve District)

Solid Waste Management. With respect to solid waste disposal services, there are approximately fifteen landfills potentially available for disposal of waste generated in the County. Table 4-3 presents cost data for each individual landfill. As the table illustrates, the predominant rate for loose refuse is approximately $1.00 per cubic yeard. Blanks under the categories (e.g., bulky items) indicates that this type of refuse is not usually handled at the landfill. (Pope-Reid Assoc., Inc., Jan. 1980)

Medina and Loretto

Water Supply and Sewerage. Most of the drinking water supply for Medina and Loretto comes from private wells. The more densely settled portions of both Medina and Loretto, however, are served by municipal water systems. Similarly, sewage disposal is primarily by on-site septic tanks. However, again in downtown more populated areas, sewage collection and treatment systems have been installed. (Pers. comm., D. Ruhl)

Emergency Services. Four volunteer fire companies serve the Medina area. They are:

TABLE 4-3

COMPARATIVE COSTS FOR LANDFILLS IN THE TCMA (DOLLARS PER CUBIC YARDS)

	Loose Refuse	Compacted Refuse	Unclassified Refuse	Bulky Items
Hennepin County				
Woodlake	1.60	2.00		5.00
Flying Cloud			1.25	5.00
Anoka County				
Oak Grove	1.00			5.00 minimum
East Bethel	7.50/load up to 30 cu. yds.			1.50 to 2.00
Waste Disposal Engineering	1.00	1.00		1.00
Anoka Municipal	1.05	1.05		
Dakota County				
Burnsville			1.00	2.00
Freeway	1.00	1.10	1.03	2.00
Pine Bend				2.50
Oakhue	1.00	1.10		1.00 to 3.00
Scott County				
Louisville		1.00		10.00 minimum
Chicago County				
Pine Lane	1.00	1.50		
St. Croix County				
Junkers			1.30	
Wright County				
Lindenfelser			3.00-4.00/load	
Sherburne County				
Elk River	1.10	1.60		1.00 to 2.50

SOURCE: Pope-Reid Associates, Inc., January 1980.

- Maple Plain Fire Company;
- Long Lake Fire Company;
- Loretto Fire Company; and
- Hamel Fire Company.

Police protection is provided by the Medina police force, which consists of four police officers and three vehicles. One additional vehicle is currently on order. Additional protection is provided by the County Sherriff's office.

Ambulance service is provided by the North Memorial Medical Center and the Hennepin County Medical Center. (Pers. comm., D. Ruhl)

Health Care. Neither Medina nor Loretto have hospitals, but both areas have ready access to North Memorial Medical Center, Hennepin County Medical Center and a hospital in Buffalo Minnesota. (Metropolitan Council, Feb. 1977)

Education. Residents of Medina belong to school district 278 and 284. District 278 is comprised of Orono Senior High School, Orono Middle School, Maple Plain Elementary School and Schuman Elementary School. Total enrollment in 1978 was 2576. District 284 is comprised of Wayzata Senior High School, Ridgemont Junior High School, Wayzata Junior High School, Beacon Heights Elementary School, Birchview Elementary School, Greenwood Elementary School, Oakwood Elementary School, Sunset Hills Elementary School, and Widsten Elementary School. Total enrollment for 1978 was 6,880. (Metropolitan Council, 1979)

Recreation. The Baker Park Reserve is accessible to residents of the cities Medina and Loretto. The Reserve, which is 2500 acres, contains picnic areas, beaches, a boat launch and campgrounds. (Hennepin County Park Reserve District)

Solid Waste Management. The most convenient waste disposal location available to Medina and Loretto residents is the Woodlake site. The site operated by Woodlake Sanitary Service, Inc. charges approximately 50 percent higher than the average County disposal rates for loose and compacted refuse. These higher rates are, in part, a reflection of the private operation's attempts to conserve landfill capacity, since the bulk of the landfill's available capacity has been planned for final disposal of waste collected by BFI's regional collection operation. (Pope-Reid Assoc., Inc., Jan. 1980)

4.4.3 Transportation

Regional Roadway Network

Interstate Routes 94 and 35 are the principal highways serving the metropolitan area. Interstate 94 crosses the state diagonally from the southeast (Wisconsin) eventually leading into the northwest (South Dakota). Interstate 35, on the other hand, takes an almost direct north-south route connecting the Twin Cities with Iowa and the city of Duluth. Interstate 494 forms a ring around Minneapolis-St. Paul connecting interstate, state and county roads. In addition, U.S. Routes 52, 169, 10 and 12 provide access into the Twin Cities area. (Metropolitan Council)

Local Roadways

Hennepin County is served by Interstate Routes 494, 35, and 94. In addition, the County is served by State Routes 52 and 169, both of which extend radially to the northwest of Minneapolis, and Route 12, which crosses the County in an east-west direction. State Highway 55 -- Olson Memorial Highway -- connects downtown Minneapolis with northwestern Hennepin County, including the cities of Plymouth, Medina, Corcoran and Greenfield. (Metropolitan Council)

Primary Traffic Routes to and from Site

The principal routes through the city of Medina are State Road 55 and County Roads 24, 201, 19, 11, and 29. The landfill site, located just to the southeast of Loretto, is served by Tomahawk Trail, a county-operated road. (Metropolitan Council)

4.4.4 Areawide Aesthetics

Views from On-Site

The City of Loretto is visible from the upper elevations of the landfill. From the site, the most prominently visible structures are the Catholic Church steeple and village water tower. Between the landfill and the town are the three lagoons of a sewage treatment plant. To the south, a large densely wooded area can be seen. The rest of the view, particularly across Tomahawk Trail, encompasses gently rolling cultivated land. In addition, to the north, an inland shallow marsh is visible, with reed canary grass, cattails, willows, and other wetland vegetation. There are also houses on the hill overlooking the landfill. (Based on an on-site survey conducted by FCHA during February, 1980).

Views from Off-Site

From off-site, the top of the landfill (areas 1 and 2 see Figure 3-4) is clearly visible from Tomahawk Trail. Areas 5, 6, and 7 are at higher elevations than the rest of the landfill and are partially wooded with pine trees and other shrubs. Between Areas 4 and 5 is a small marshy area. A tributary of Spurzem (Pioneer) Creek runs through this marshy area and is visible only during flood conditions due to densely overhanging vegetation.

An abandoned farmhouse/barn on Areas 5 and 6 is also visible from Tomahawk Trail. This area was apparently once used as a corn field. (Based on an on-site survey conducted by FCHA during February, 1980).

4.4.5 Demographics

Regional -- Twin Cities Area

Population Characteristics. Table 4-4 presents current population estimates and projections for the Twin Cities Metropolitan Area by county. Approximately 40 percent of the State's population is expected to be living

TABLE 4-4

TCMA POPULATION PROJECTIONS BY COUNTY

County	(Census) 1970	(Estimate) 1975	Projections 1980	1985	1990	1995	2000
Anoka	11,400	12,400	13,600	14,100	14,600	15,100	15,400
Carver	28,300	33,500	37,300	40,700	43,600	45,900	47,800
Dakota	139,800	145,100	202,200	255,800	249,300	272,400	293,300
Hennepin	960,100	921,000	899,400	891,200	886,000	882,500	880,000
Ramsey	476,300	460,300	450,100	446,500	444,500	443,000	442,000
Scott	32,400	39,600	44,600	48,600	51,700	55,500	58,700
Washington	83,000	103,400	119,300	131,000	141,900	153,900	58,700
METROPOLITAN AREA	1,731,300	1,715,300	1,766,500	1,797,900	1,831,600	1,868,300	1,900,700
STATE	3,806,100	3,921,000	4,070,600	4,203,600	4,329,700	4,440,400	4,529,600

SOURCE: Minnesota State Planning Agency, May 1979.

in the Metropolitan Area by 1980. In that same year, the most populated county will be Hennepin, with nearly 900,000 people, followed by Ramsey and Dakota, with about 450,000 and 200,000 persons respectively. By the year 2000, the Metropolitan Area is expected to have a population of close to 2 million. In comparison, the State of Minnesota is projected to have a population of more than 4.5 million people by the year 2000. (Minnesota State Planning Agency, May 1979)

Household Characteristics. In 1975 there were approximately 640,000 families in the region. This represents a 12 percent increase since 1970. Female-headed households increased the most, by 27 percent, during those years. The average persons per household between 1970 and 1975 decreased by 14 percent to 2.83. (Minnesota State Planning Agency, November, 1978)

Income Characteristics. In 1976 the median income of husband-wife families in the State of Minnesota was approximately $15,000. This represents an increase of 8 percent over the previous year's income. Residents of Washington and Dakota counties enjoyed the highest median income (about $19,300) in the seven county metropolitan area. The median income for residents of Scott County increased the most (approximately 12 percent). (Minnesota State Planning Agency, Nov. 1978)

Employment Characteristics. In 1978, there were more than 45,700 establishments in the Twin Cities area employing nearly one million workers, with total wages of more than $12 billion. The greatest number of establishments was for wholesale and retail trade (15,603) followed by the service industry (13,610). The manufacturing industries generated the largest amount of wages -- nearly $4 billion. Federal, State and local governments employed about 140,000 persons and contributed $2 billion in wages during 1978. (Minnesota Department of Economic Security, Aug. 1979)

Education Characteristics. The level of educational attainment in Minnesota is rising as a larger proportion of each generation graduates from high school and college. In 1977, 70 percent of all persons 25 years and over were high school graduates, as compared to 58 percent in 1970 and 44 percent in 1960. In addition, the proportion of persons with college degrees has more than doubled since 1960, from 8 percent to 17 percent in 1977. (Minnesota State Planning Agency, Oct. 1978)

Housing Characteristics. The State of Minnesota experienced a growth rate in year-round housing units of 15 percent during the years between 1970 and 1977. Housing in the region grew at a similar pace of about 14 percent. (Minnesota State Planning Agency, June, 1978)

Hennepin County

Population Characteristics. Hennepin County was one of the only two counties (Ramsey being the other) in the Metropolitan Area projected to decrease in population by the year 2000. Hennepin County is expected to have 80,000 fewer people in the year 2000 than in 1970, a decrease of 8.3 percent. However, both Hennepin and Ramsey Counties will continue to be the two most populous counties in the State through 2000. The estimated population decline between 1970 and 1980 was more than 6 percent. Between 1980 and 1990 the population in the County is expected to decline at a slower rate of 1.5 percent. In the last decade of the century, this decline is espected to be reduced by about half to 0.7 percent. (Minnesota State Planning Agency, May 1979)

Household Characteristics. The average size of the Metropolitan Area's households has been decreasing between 1970 and 1975. In 1970, the number of persons per occupied housing unit in Hennepin County ranged from below 3.0, in the City of Minneapolis, to about 4.4 for Medina and Corcoran. In 1976, the City of Minneapolis and a few surrounding municipalities (e.g., St. Louis Park, Edwin, Richfield) had less than 3.0 persons per occupied housing unit. (Minnesota State Planning Agency, May 1979)

Income Characteristics. The median income of husband-wife families in 1976 for Hennepin County was $18,646. This represents an increase of 7.5 percent over the 1973 median income value of $15,196. The County as a whole, ranked third in median income among all counties in Minnesota. This was nearly 18 percent above the state median of $15,814. More than 72 percent of the County's residents had income contributed from both spouses. (Minnesota State Planning Agency, Nov. 1978)

Employment Characteristics. As of December 1978, wholesale and retail trade had the greatest number of establishments (8,026), along with the largest number of employees. The manufacturing sector paid the most in total wages, about $480 million. In total for Hennepin County, there were nearly 24,000 establishments employing more than 574,000 persons at a total annual salary of almost $2 billion. (Minnesota Dept. of Economic Security, 1978)

Educational Characteristics. Over 160,000 students were enrolled in 16 school districts in Hennepin County. The Minneapolis school district has the largest number of students (46,638) and Brooklyn Center the least (1,737). By the 1982-83 school year, most of the districts expect a decline in enrollment. Only Eden Prairie and Osseo expect enrollment increases (37 percent and 10 percent, respectively). (Minnesota State Planning Agency, Oct. 1978)

Housing Characteristics. In 1976 there were 65,023 housing units in northwest Minneapolis, which includes Hennepin County. By 1980, this figure is projected to be 68,000, a five percent increase. By the year 2000, in northwest Minneapolis the number of housing units is expected to increase by 60 percent to 104,000 units. Equivalent data for Medina and Hennepin County is not currently available. (Minnesota State Planning Agency, June 1978)

Medina and Loretta

Population Characteristics. In 1977, the total population of west Hennepin County, which includes Medina and Loretto, was 8693. The average age of the population was 27 years. The population was split equally between males and females. Over one-quarter of the residents were between 5 and 14 years of age. Approximately one-quarter was between the ages of 25 and 44. The ethnic composition of west Hennepin County was overwhelmingly white (99.6 percent). (Metropolitan Council, Feb. 1977)

Household Characteristics. Virtually all households in the Medina-Loretto area in 1977 consisted of both parents plus children. The median household size was 3.13 persons. Slightly more than 2 percent of the population lived in one-person house-holds, while an even smaller percentage (0.73 percent) of the residents were involved in group living arrangements. (Metropolitan Council, Feb. 1977)

Income Characteristics. The median income of families in the Medina-Loretto area in 1977 was $10,844. About one-third of all families (32 percent) earned between $10,000 and $14,999 that year. About 6 percent of the families earned more than $25,000. About 8 percent of the families (or 546 persons) in west Hennepin County were below the federally established poverty level. (Metropolitan Council, Feb. 1977)

Employment Characteristics. The breakdown by occupational category is shown in Table 4-5. As shown, most persons in the labor force (41.1 percent) worked as craftsmen, operators or laborers. Sales/clerical and professional/managerial categories comprised the next greatest employment categories. (Metropolitan Council, Feb. 1977)

In 1977, approximately 40 percent of the female residents in the western Hennepin County area were employed. Nearly 84 percent of all male residents were gainfully employed, about 14 percent were not in the labor force and slightly more than 2 percent were unemployed.

Educational Characteristics. About 38 percent of the 25 year-old and older residents of the Medina-Loretto area have had at least 12 years of education. Almost 30 percent have had 0 to 8 years of education. Slightly more than 3 percent of 14 to 17 year-olds are not in school. Almost 80 percent of the persons between the ages of 18 and 24 have completed at least high school. The medial years of education for persons 25 years old or older is 12.2. (Metropolitan Council, Feb. 1977)

TABLE 4-5

OCCUPATION OF WESTERN HENNEPIN COUNTY RESIDENTS, 1977

Occupation	Persons Employed	Percentage
Professional/Managerial	573	17.0
Sales/Clerical	592	18.3
Craftsmen, Operators, Laborers	1,330	41.1
Farmers	253	7.8
Service Workers	393	12.1
Not Reported	95	3.0
TOTAL	3,236	100.0

SOURCE: Metropolitan Council, Feb. 1977.

Housing Characteristics. Most families (82 percent) own the housing they live in; 18 percent rent housing. The median home value in 1977 for the western Hennepin County area was $21,334; the median contract rent was $106 per month. About 90 percent were single family housing units; 5 percent were two-family units; and over 3 percent were multi-family units. Less than two percent were mobile homes. It is difficult to determine the changing housing characteristics (e.g., agricultural to residential) of the Medina-Loretto area since a local land use plan has not yet been released. (Metropolitan Council, Feb. 1977)

4.4.6 Fiscal Setting

Twin Cities Area

Total expenditures of local and regional governments were more than $2.26 billion in 1975. Operating expenditures (e.g., salaries, maintenance) accounted for the biggest share, about $1.5 billion. About one-half billion dollars was spent for capital outlay (e.g., buildings, major equipment), with the remaining one-quarter billion dollars allocated to debt service (payments on borrowing). Total governmental expenditures, expressed in constant 1975 dollars, rose each year in the first 12 years of the period 1960-1975, and then declined after 1972 by an average of about two percent per year. School districts accounted for the biggest share of governmental expenditures, 37 percent in 1975. Cities and townships had 31 percent; counties 21.5 percent; metropolitan agencies, 5.5 percent; and, special district, 5 percent.

The combined outstanding debts of jurisdictions within the Metropolitan Area increased from $0.5 billion in 1960 (1960 dollars) to $2.39 billion in 1975 (1975 dollars). Cities and townships accounted for the largest share of outstanding debts in 1975 - 41 percent; school districts, 31 percent; metropolitan agencies, 12 percent; special districts, 12 percent; and counties, 4 percent.

Revenues of all governments in the Metropolitan Area more than doubled in the 1960-75 period, from about $0.9 billion in 1960 to $1.99 billion in 1975 (dollars adjusted for inflation). Real estate taxes contributed one-third of all governmental revenue in the Metropolitan Area in 1975, down from 54 percent in 1960. Federal aid provided 11 percent of all governmental revenues in 1975, up from two percent in 1960. State aids to governments in the Metropolitan Area accounted for about 35 percent of all governmental revenue in the region in 1975; in 1960, it was about 25 percent. (Metropolitan Council, June 1979)

Hennepin County

On aggregate, counties in the metropolitan area increased disbursements by 71.6 percent from 1960 ($433 per household) to 1975 ($743 per household). Of the $310 increase in per household disbursements between 1960 and 1975, almost 80 percent (about $244) represents an increase in current expenditures, i.e., increased services in welfare, parks, financial administration and courts over the 16 year period. During this same period, counties were fairly active in terms of public works construction and equipment acquisition. From 1961 to 1974, counties doubled their share of per household capital outlay expenditures, and increased their share of per household debt service by 12 times.

With regard to revenues, about 50 percent of county revenues was raised regionally, mostly through real estate taxes, and other fees and service charges. The majority of the remainder came from intergovernmental transfers. (Metropolitan Council, June 1979)

Medina and Loretto

Residents of the City of Medina pay a mill tax rate of 20.665 per $1000.00 of assessed valuation. Residents of Loretto pay 20.168 per $1000.00 of assessed valuation. In addition to these municipal taxes, residents must pay county school and special fee taxes. Depending on what municipality residents live in (Medina or Loretto), what school district they reside in (879, 284, or 278) and what Watershed District they belong to (1, 2, 3, 4 or 5), they will pay approximately 102 mills per $1000,00 of assessed property value.

The area-wide mill rate which is applied to commercial, industrial and utilities property is $114.365 per $1000.000 of assessed valuation.

The total budget for the Village of Medina is $519,533. The largest expenditures are streets, roads and police. Total receipts for Medina for 1980 are expected to be $575,827. (Pers. comm., Hennepin County Assessor's Office, Feb. 1980)

4.4.7 HISTORICAL AND ARCHAEOLOGICAL FEATURES OF SITE AREA*

Prehistorical Features

The Woodlake Landfill expansion site, like the present fill area, is located on high ground flanking a lower swampy area. The higher ground is underlain by glacial till of the Gransburg Sublobe of the Des Moines Lobe of the Laurentide ice sheet. The lower former lake bottom area is composed of peat and other lacustrine sediments. The actual age of the lake is unknown but it post-dates the retreat of the ice in the region which is thought to have occurred ca. 12,000 B.P. (Sims and Morey, 1972)

Such lakes and their surroundings were a much utilized resource by prehistoric peoples, such as Native Americans, in Minnesota for a variety of purposes ranging from subsistence activities to burials (Johnson, 1978 and Winehell, 1911). In the absence of a known time period for the existence of the lake, it is safe only to assume it was present during at least part of the prehistoric period and may, thus, contain remains of archaeological significance.

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*The cultural resources survey was conducted by Dr. John S. Kopper. His report appears as an Appendix to TWP6.

Figure locates by number, in bold numerals, known prehistoric sites in the vicinity of Loretto. Most of these sites were originally listed by Winchell and were subsequently inventoried and assessed in the early 1970's. Those sites closest to the landfill facility, No's. 70,72,73,93,71,81,82,83, and 84, are all burial mounds or mound groups. No contract archaeological surveying has been done nearby. Thus, all of our knowledge of aborigines here comes from these well-known and probably much looted sites.

In view of the foregoing, the Woodlake Sanitary Landfill extension site appears to be a good candidate for occupation by man at any time during the prehistoric period. Evidence of such occupation is likely to be well preserved as well for much of the site appears to have been undisturbed even by farming.

Historical Features

There is no indication, however, that special ecological or topographic features occur in the study area which make it especially desirable to man from adjacent lands. Its attractions are commonplace in the region.

It is probable that the Loretto area was settled in the early 1850's by groups of Americans from New York, New England or Pennsylvania. To these settlements were added immigrants from northern Europe in the next decade. Never densely populated, the area was certainly farmed from the time of the origninal settlement. The Historic Site Survey (1976, 1977), the Minnesota Outdoor Recreation Resources Commission (1963) and the Heritage Conservation and Recreation Service (1980) list no historic sites, structures or markers in the immediate vicinity. The nearest structure listed in the National Register of Historic Places (ibid) is the Burwell House in Minnetonka.

The fieldwork for this project was done during the week of February 3rd, 1980, when there was about 1 foot of snow cover on the ground and the temperatures were below freezing at the site. These conditions precluded any but limited surface surveying and confined investigations to existing subsurface exposures. Despite these limitations much was learned and one probable artifact was recovered. By examining sockets left by fallen trees, railroad cuts, road and highway cuts, drainage system erosional faces, edges of cultivated fields and other natural and man-made exposures of the subsurface, stratigraphy could be recorded and cultural horizons searched for. Most productive were those cuts facing south, southeast or southwest where the winter sun had melted off the snow cover. But, in all cases these were selected to represent the subsurface in similar settings -- on high ground overlooking lakes, creeks or swampy areas.

It is estimated that over 500 feet of subsurface was investigated in this way at depths from 1 feet to 10 or more feet. The actual positions of these tests is shown with the corresponding stratigraphy in Appendix I of TWP 6. Soil horizons in all sections were poorly developed or not present as befits an homogenous glacial till. No cultural indications of the prehistoric period were present with the exception of the blade core earlier noted; i.e. no charcoal, bone, shell or other artifactual material was observed in the exposures.

4.5 GEOLOGY AND HYDROLOGY

4.5.1 Introduction

The Woodlake Sanitary Landfill is linked to natural ecosystems that extend beyond the site boundaries. Therefore, in order to provide a framework for evaluating potentially significant adverse impacts and possible measures to mitigate those impacts, the section defines both regional and site-specific aspects of the associated geology and hydrology.

The primary sources of information for this section were the Minnesota Geological Survey, Minnesota Pollution Control Agency, the Metropolitan Council, Hennepin County and Browning - Ferris Industries, Inc. The bulk of this information was in the form of data culled from existing written publications, open-file records, maps and aerial photos, and personal communications with the appropriate entities.

With regard to the description and discussion of subsurface conditions, extensive use was made of information contained in numerous well drilling and test boring logs from the files of Minnesota Geological Survey various reports by National Biocentric, Inc. (1977a, 1977b), and from recent test borings and analytical tests conducted by Soil Testing Services of Minnesota Inc. (1980).

In addition, available climatic data was utilized in calculating a site water budget to further clarity the associated hydrologic conditions.

4.5.2 Regional Setting

Structural Setting

In most areas of the State, PreCambrian basement rock is unconformably overlain by a series of strata of mainly Paleozoic and Mesozoic age. In addition, igneous activity resulted in an immense series of basalt flows that form the basic Keweenawan rocks. During the Paleozoic time, the southern areas of the state were alternately submerged and re-emerged, with the resulting formation of sandstones, limestones, and shales. Long periods of emergence during the late Paleozoic and the Mesozoic produced weathering, erosion, and sedimentary deposition. The final recession of the sea during the late Cretaceous was followed by extensive glaciation during the Pleistocene epoch. Minnesota's present landscape is inherited mainly from the Pleistocene continental glaciation.

A number of important geologic features were formed during this past history. The southeastern section of the state is generally underlain by a large Paleozoic depositional lowland known as the Hollandale embayment. Associated smaller structures, as well as the larger embayment, did not become clearly defined until the Early Ordovician time. One of these smaller structures is now known as the Twin Cities Basin. Faulting during the PreCambrian resulted in the formation of a rough basin due to the greater relative downward movement of the fault blocks located towards the center of the basin. Later movement along these PreCambrian faults during the Middle Ordovician subsequently warped the Paleozoic rocks and further defined the basin (Sims. and Morey, 1972).

Regional Seismicity

Minnesota is considered one of the least seismically active states in the United States. During the last 120 years, ten (10) earthquakes have been recorded as having epicenters located within the state, ranging in magnitude from mb=2.6 to 4.8 on the Richter Scale. However, no severe structural or earth damage was recorded as resulting from these events in the affected areas (Mooney, 1979).

While the proposed project site lies relatively close (from 50 to 225 miles) to the epicenters of several of these events, it is not known to overlie any major active faults.

The Uniform Building code assigns every location in the United States to a four-grade Seismic Risk Zone (0=least risk, 3=greatest risk). In general, the absence of major quakes and infrequency of seismic activity implies a low level of seismic risk for Minnesota overall. The International Conference of Building Officials rates Minnesota and most of north-central U.S. in Seismic Risk Zone 1, while the State Building Code has amended the Minnesota designation to Seismic Risk Zone 0.

Regional Glacial Geology

During the glacial period, Minnesota was covered by ice sheets several times. However, the surficial deposits and present landforms are mainly the result of the most recent period known as the Wisconsin glaciation.

Four major Wisconsin ice lobes, the Superior, Rainy, Wadena and Des Moines, have been recognized in Minnesota. One major phase of concurrent movement by more than one ice lobe occurred in the area under discussion. A lobe of ice from Lake Superior deposited a thin, discontinuous blanket of red clayey till over the southwestern end of Lake Superior Basin. The Grantsburg sublobe of the Des Moines subsequently overrode the Superior red till and created an intricately interlaminated red and buff mixture (Wright, 1972).

In post glacial time, since the final retreat of the ice sheets, erosion and fluvial deposition are the main factors effecting minimal, subtle changes in the Minnesota landscape.

Stratigraphy

The stratigraphic sequence of geologic units in the Minneapolis-St. Paul area consists of nine cycles of sedimentary deposition. Within this framework, the Paleozoic rocks in southeastern Minnesota show a gradual shift in sedimentary character from predominantly sandstone with some carbonates in the earlier cycles to predominantly carbonates with some sandstone in the latter cycles (Sims and Morey, 1972).

The Mt. Simon and Galesville Members of the Dresbach Formation, the Woodhill and Reno Members of the Franconia Formation, as well as the Jordan Sandstone can be generally characterized as medium to coarse-grained sandstones and represent regionally important aquifers. The Prairie du Chien Formation and the St. Peter sandstone also represent important aquifers in southeastern Minnesota (Kanivetsky, 1978).

Drainage Basin and Floodplains

The site under discussion is situated within the Pioneer Creek drainage basin. A 1979 Flood Hazard Study conducted by the Soil Conservation Service in conjunction with local Minnesota groups has defined the extent of the Pioneer Creek watershed 100-year floodplain. At its closest point the 100-year floodplain comes within approximately 300 feet of the site boundary. According to a survey of the area's flood history conducted for the Flood Hazard Study, past floods in the Pioneer Creek Basin have not caused significant damage in the area.

4.5.3 Site Hyrdrogeology

Topography

The existing and proposed project sites are situated on two steeply rising hills topped by fairly level summits. Site elevations range from approximately 960 feet to 1030 feet above mean sea level. The hills are flanked by two wetland areas to the northwest and southeast that are connected by a short drainage swale. The slopes at the site range from less than 1% near the wetlands to 20% on the steepest hillsides.

Bedrock Geology

Review of the bedrock geology of the region indicates that the site area is successively underlain by the St. Lawrence Formation and the Franconia Formation with the Praire du Chien Formation underlying the area bordering the site to the east. This generalized picture has been confirmed by drilling logs from the area supplied by the Minnesota Geological Survey and in particular, by the log of the deep well drilled on site by National Biocentric, Inc. (1977). The first bedrock formation penetrated at this location was the St. Lawrence at an elevation of approximately 810 feet above mean sea level, followed by the Franconia Formation. The rocks were characterized as mainly dolomitic and glauconitic sandstones. The lower portion of the St. Lawrence Formation is fractured at this location (Personal communication, Robert Kadwell, Soil Testing Services of Minnesota, Inc.)

Glacial Geology

Additional borings in the area of the proposed expansion site were completed during the month of March, 1980. Information from these and previous borings (National Biocentric, Inc., 1977) indicates that the site is underlain by glacial deposits of the Grantsburg sublobe glaciation. The deposits are predominantly composed of clay till interspersed with apparently isolated layers of sand and sandy silt. The test borings reached a minimum elevation of 867 feet, indicating an overburden soil thickness of at least 100 feet.

Permeability tests were performed on samples taken on-site from depths ranging from near surface to 112 feet below ground surface. Three types of permeability determinations were made. The results indicate that permeabilities for fine-grained materials in undisturbed and remolded samples range from 1×10^{-7} to 9×10^{-9} cm/sec, which is generally considered impervious. Permeabilities estimated for sand samples, from grain size analyses, range from 1×10^{-2} to 4.5×10^{-5} cm/sec, which is generally considered low to moderately permeable.

The borings and permeability tests, in conjunction with the aquifer pumping test appear to indicate that there is, at most, a very limited hydraulic connection between the surface and deep aquifers from which most local water supplies are drawn.

Soils

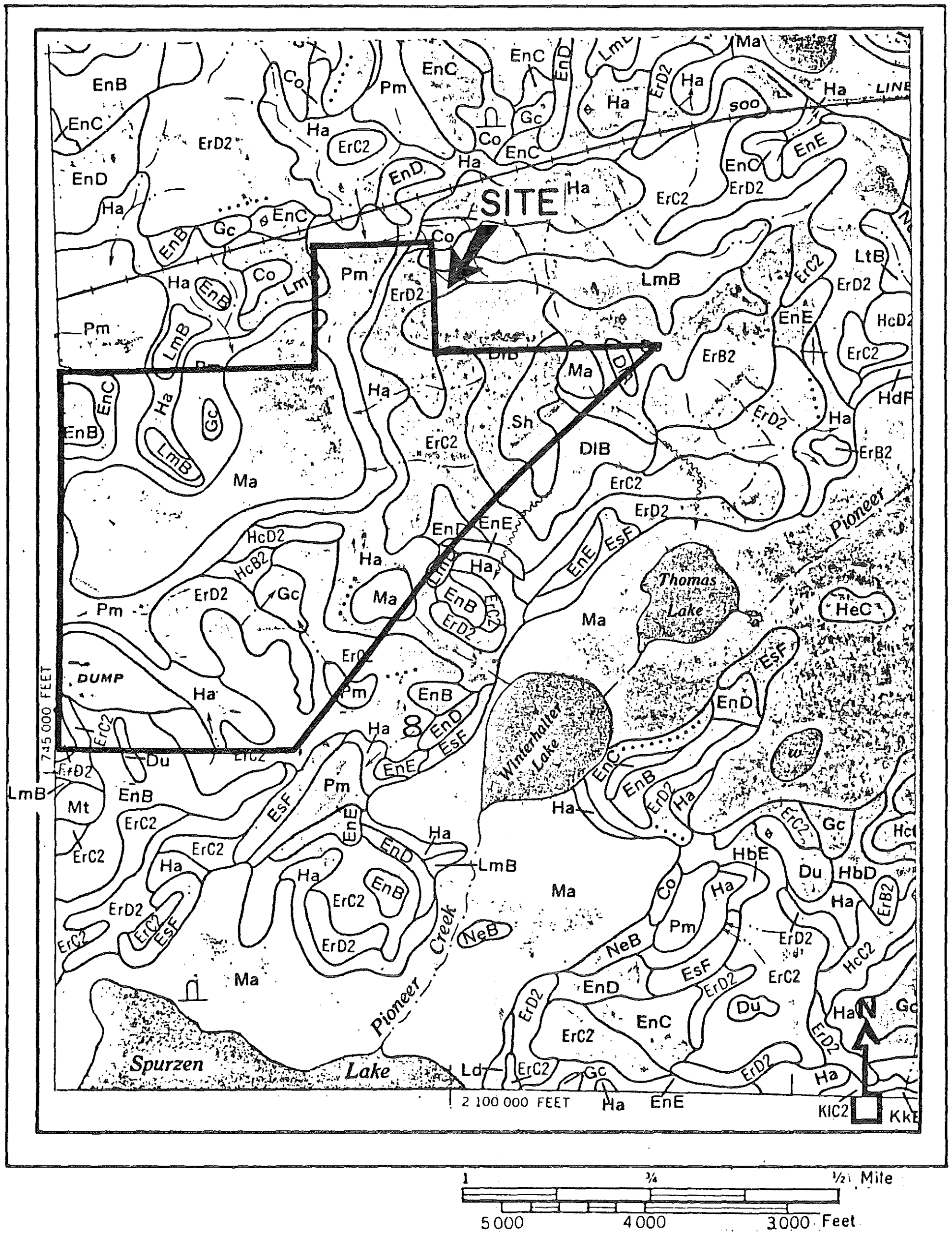
Figure 4-3 and Table 4-6 present the location, classifications and characteristics respectively, of the dominant soil types at the Woodlake Sanitary Landfill site.

Site-Specific Water Budget

Previously, a site-specific water budget for the Woodlake Sanitary Landfill had been calculated by the Metropolitan Council (March, 1978) for inclusion in their study of <u>Leachate Generation Potential from Landfills</u>

FIGURE 4-3

SITE SOILS MAP



SOURCE: USDA Soil Conservation Service, 1974.

TABLE 4-6

SITE SOIL CLASSIFICATIONS

Soil Series and Map Symbols	Slope Represented (%)	Classification	Characteristics
Erin = ErC2	6-12	clay loam	moderately fine texture; deep, well-drained
ErD2	12-18	clay loam	formed in calcareous shaly till; high available moisture
EnD	12-18	loam	moderately slow permeability
Glencoe=Gc		silty clay loam	deep, poorly-drained; moderately slow permeability
Hamel=Ha	nearly level	loam	deep, poorly-drained; moderately slow permeability
Hayden=HcB2	2-6	clay loam	deep, well-drained; moderate permeability
HcD2	12-18	clay loam	formed in loamy glacial till; high available moisture
Lerdal=LmB	1-4	loam	deep, poorly-drained; moderately slow permeability
Marsh=Ma			shallow lakes & ponds
Peaty Muck=Pm		peaty muck over loam	wet soils, decomposed loams and organics

SOURCE: USDA Soil Conservation Service, 1974.

in the Twin Cities Metropolitan Area. For the purposes of comparison, a second water budget for the site was generated for this EIS using more site-specific information relating to area, slopes, cover materials, etc. (EPA, 1975).

Results of this comparison indicate that for the area of the proposed expansion, assuming a 40-acre area, the projected annual volume of leachate ranges from 1.65×10^6 gallons to 3.67×10^6 gallons, while the estimated time of maximum leachate generation ranges from 18 to 40 years.

Surface Water and Groundwater Hydrology

The proposed landfill site drains into the Pioneer Creek watershed via an unnamed creek which flows through the wetland areas northwest of the site and eventually drains into Winterhalter Lake. Bodies of water downstream of the Woodlake site include Pioneer Creek (Spurzem Creek), Winterhalter Lake, Spurzem Lake, Half Moon Lake and Lake Independence. Flow monitoring generally has not occured in any of the watershed area.

The groundwater hydrology of the site consists of both shallow and deep groundwater systems. Under the present fill area a perched ground water mound exists overlying the clayey glacial till. Groundwater elevations ranging from 962 to 982 feet above mean sea level have been documented on the existing site. For the proposed site groundwater was incurred at elevations ranging from 933 to 959 feet above mean sea level. Given the existing site conditions, this also represents a perched water condition due to the impermeable structure of the clayey soil. This is in comparison to a wetland surface water elevation of 960 feet above mean sea level. Shallow groundwater movement under the site is radial in all directions away from the mounded area with most movement towards the wetland itself, while general deep groundwater movement is southwest towards Lake Independence.

4.6 ENERGY

4.6.1 Introduction

This section deals with the impact of the proposed action on site-specific energy requirements and areawide energy resources. This study will analyze present and future energy use at the site, and determine where and how alternatives have been or can be initiated.

4.6.2 Areawide

Energy Supply

The Minnesota Energy Agency (MEA) projects that based on current consumption and growth rates energy demand will overtake fossil fuel energy supplies after 1988. By 1995, fossil fuel energy supply will fall 13 percent short of projected demand (Minnesota Energy Agency, 1978).

Major Energy Consumers

The Minnesota Energy Agency separates the primary energy consumer sectors into four categories. The following shows these four categories and their consumption.

	Trillion Btu	Percent
Transportation	317.8	28.0
Industrial	332.0	29.2
Residential	297.8	26.0
Commercial	190.9	16.8
Total	1,138.5	100.0

The Metropolitan Waste Control Commission (1977) in its 201 Facility Study estimates that of the seven TCMA counties, Hennepin, containing Minneapolis, is the largest consumer of all forms of energy followed in size by Ramsey County, containing St. Paul.

Energy Management Plan

Existing energy policies for the TCMA are the responsibility of the Metropolitan Council which has prepared a comprehensive long range plan entitiled the "Metropolitan Development Guide". While the guide does not outline a specific energy policy as such, it does address the energy issue implicity. By providing policies in reference to transportation, housing, solid and hazardous waste management, and water quality, the Guide impacts energy use within the region. The Guide's chapter on solid and hazardous waste management, stresses waste reduction as its priority policy, followed by source separation for recovery of materials and energy, and land disposal as a last resort. By reducing and recycling as much waste as possible, most energy requirements for manufacturing would decrease substantially. The Guide indicates that energy recovery systems on a regional basis prove more economical than on an individual basis, and part of the plan for achieving the region's solid waste management goals. To date, the Metropolitan Council and the Commission have investigated a pyrolysis facility proposal to convert a mixture of a local sewage treatment plant sludge and refuse into combustible fuel. The City of St. Paul is also currently participating in a resource recovery feasibility study under the President's Urban Policy Program.

4.6.3 Existing Landfill Site

Electricity Use

Woodlake Sanitary Landfill uses an annual rate of 134,238 kw of electricity. The supplier of this power is Wright Hennepin Electric Co. under a firm contract. Due to the proposed maintenance building, electricity demand will increase. This increased demand can be estimated from the present usage and existing floor space. The present use of 134,238 kw serves 5700 square feet of space. Proportionately, and additional floor space of 2000 feet will incur an additional electric demand of 47,000 kw. This represents a 35 percent increase in electric demand. No problems are anticipated with Wright Hennepin Electric's capactiy to provide this additional demand.

Fuel Use

Woodlake uses three forms of petroleum-based fuel. There are diesel fuel at an estimated 203,000 gallons per year, fuel oil at 43,000 gallons per year and liquified natural gas (LNG) at 7,570 gallons per year. The three fuels are supplied to Woodlake by local contractors, under firm contracts. Storage facilities are available on-site for these fuels. There is an exisiting 500-gallon diesel fuel tank above ground, and a 5500-gallon diesel fuel tank below ground. There is also a 10,000-gallon gasoline storage tank below ground. The peak demand for LNG and fuel oil is during the winter months, primarily for heating, while gasoline usage is consistent throughout the year. LNG is currently consumed at a rate of 7570 gallons per yearto heat the existing 5700-square foot structure, and will increase proportionately to a rate of 10,226 gallons per year to heat the proposed additonal structure. This represents a 35% increase in heating fuel demand. No problems are anticipated with local available supplies. The diesel fuel stored on-site is used to operate the landfill equipment as well as to provide gas for landfill trucks. While the Woodlake operation will eventually require replacement of existing landfill equipment, total expected fuel use requirements are not expected to change substantially.

4.7 HUMAN HEALTH

4.7.1 Areawide Epidemiology

This section examines the existing health status of the population in the vicinity of the proposed expansion. The analysis is limited to Hennepin County as compared to Minnesota as a whole. Such a comparison, though not site-specific, will give some indication of the general health of area residents.

Based on data collected on a state and county level, two sets of health indicators have been chosen for analysis (Minn. Dept. of Health, 1977):

1. Comparisons of the rates by the leading causes of death. Rates of heart disease, cancer (malignant neoplasms) and cerebrovascular disease were examined for the years 1977 and 1978. Rates of heart and cerebrovascular disease are consistently lower in Hennepin County, while cancer rates are somewhat higher. The higher cancer rates can probably be attributed to the fact that approximately 40% of the county's residents are urbanized, i.e., live in Minneapolis. It has been known that densely populated and industrialized areas have higher cancer mortality rates.

2. Rates of diseases associated with rodent and insect vectors. The list is limited to diseases which are reportable to the Center for Disease Control. It is impossible to estimate the percentage of cases in which transmission by vectors plays a role.

Hennepin County rates for such diseases are lower than, or differ insignificantly from, rates for Minnesota as a whole. Overall, the epidemiological picture for Hennepin County is consistent with known demographic factors such as age composition and urban-rural distribution. The county age distribution, with approximately 30 percent of the population over 45, is compatible with the observed rates of the three leading causes of death, as all three causes are chronic conditions associated with advancing age.

Since rates of vector-associated diseases, with the exception of tuberculosis, are so low, it is difficult to draw any conclusions regarding these figures. Based on the evidence, however, there is no reason to hypothesize either an effect attributable to the presence of the existing landfill or one resulting from the proposed expansion.

4.7.2 Localized Health Factors

Air Quality-Related Health Factors

Two potential sources of air-related health effects are inherent in the daily operation of a sanitary landfill:

1. Vehicle and Equipment Emissions. Operation of construction equipment, collection vehicles, and earth-moving machinery will generate low level emissions of carbon monoxide, nitrogen oxides, sulfur oxides, and hydrocarbons. At this time there is considerable controversy surrounding the role of these substance in human health problems. From a community health viewpoint, emissions at the present landfill are not cause for concern.

2. Gas Generation. The gases formed in a landfill represent some of the metabolic end products of solid waste decomposition. Methane and carbon dioxide are the chief constituents of landfill gas. Less significant quantities of nitrogen and hydrogen sulfide are also produced. Production of methane is the end product of continuous anaerobic refuse decomposition. Due to its combustibility, it is the most important gas from a health effects standpoint. Although methane is explosive where present in air at concentrations between 5 and 15 percent, there is no oxygen present in the landfill when this critical level is reached and thus, no danger of the fill

exploding. The major concern is the possibility of escaped methane gas accumulating in structures or other enclosed spaces and building up to explosive levels.

Build-up of methane gas is not anticipated at the Woodlake site due to the following:

1. The isolated location of the site provides few opportunities for gas migration and accumulation in nearby structures.

2. Since post-closure plans indicate a return to open land uses, there is no danger of accumulation in buildings which might otherwise be constructed atop the landfill site.

Water Quality-Related Health Factors

Water-related health concerns are primarily related to the production and migration of leachate. The two the major concerns stemming from leachate generation and migration, contamination of drinking and recreational surface waters, are discussed more fully in the following sections.

Drinking Water. Loretto and Medina draw water from municipal wells located within town boundaries. There are also a number of private wells. The present Woodlake Sanitary Landfill has, in the past, posed a groundwater contamination problem. A study has indicated that groundwater movement from the fill resulted in contamination of the adjacent wetland (National Biocentric Inc., 1977). However, the 1976 Municipal well sampling data compiled by the Minnesota Department of Health indicates compliance with most Environmental Protection Agency drinking water standards with the exception of those for iron and phenol. Elevated levels of iron and manganese often occur in the area. More recent well data is not available.

Recreational Surface Waters. The Landfill site drains into Pioneer (Spurzem) Creek, Winterhalter Lake, Spurzem Lake, HalfMoon and eventually into Lake Independence, via a small creek which traverses the wetland areas northwest of the site.

The major health concern is the extent to which adverse impacts extend to the Lake Independence watershed. The 992-acre lake is a major recreational facility for western Hennepin County and is used primarily for swimming and boating. There is little available data indicating the present level of compliance for water quality standards. The only existing information regarding the lake is a 1974 fisheries lake survey conducted by the Minnesota Department of Natural Resources. Nothing in the survey indicates a contamination problem arising from the present landfill (Minn. Dept. of Natural Resources, 1974).

Table 4-2details the leachate constituents and concentations of a typical sanitary landfill. The table gives annual average concentrations which would be expected in Lake Independence considering dilution alone. These are, in turn, compared with the applicable standards set for recreational surface waters. As is shown, these parameters do not exceed state criteria. A number of other natural phenomena including plant uptake, soil filtration and absorption, and chemical precipitation would result in additional reduction of these constituents in the Lake Independence ecosystem.

Disease Transmission via Vectors and Pathogens

Rodent and Insect Vectors. In the past, open dumps often provided an environment for rats, mice, flies, and mosquitoes which posed health and nuisance problems for the surrounding communities. In a properly maintained sanitary landfill, however, vector problems are kept to a minimum. The predominant rodent species in Minnesota landfill areas are the Norway rat (*Rattus norvegicus*) and the white-footed deer mouse (*Peromyscus leucopus*). (J. Kett, personal communication, January 2, 1980). *R. norvegicus* burrows extensively, subsists on any food type, and can tolerate excessive cold and high population density. Both species have been implicated in the spread of various vector-related diseases.

The magnitude of the rodent problem in properly maintained landfill areas may be considerably less than commonly believed, a fact borne out by a 1978 study conducted at a Texas landfill, similar in some respects to Woodlake. The investigators tentatively concluded that (Schroeder, 1979):

1. Properly maintained sanitary landfills are not conducive to the harboring and breeding of _Rattus_ populations.

2. Rats associated with nearby residential areas were not attracted to the landfill as a food source.

Reports from the existing Woodlake sanitary landfill are consistent with the above. When Browning-Ferris assumed control of the poorly-maintained Boyer landfill, they initiated rodent control practices, (i.e. primarily, daily cover operations). Since that time, no official rodent complaints have been filed regarding the faciltiy (E. Monteleone, personal communication, September 7, 1979).

Flies and mosquitoes also transmit a variety of diseases. There are four factors essential to the control of fly infestations: soil which can be compacted, suitable soil compaction equipment, an adequate range of soil moisture, and adequate thickness of cover. Fly infestations at the site have not been a problem, due to utilization of daily cover.

Mosquitoes, also associated with open dumping, carry a wide range of diseases and breed within open containers and pooled liquids. These types of conditions generally do not occur on the Woodlake site and consequently mosquito problems associated with the landfill operation have not been reported.

Pathogens. In the past, considerable concern has been expressed regarding the role of the sanitary landfill as a breeding ground for pathogens, i.e., microbes and viruses which may cause adverse human health effects.

A recent study tested the two-year survival rate in decaying waste of three "indicator" bacteria organisms: fecal streptococcus, fecal coliform, and total coliform (Swartzbaugh et al.) In this analysis, a representative sample of municipal refuse was collected, shredded, and analyzed for microbiological activity. After two years of degradation, a second sample was extracted and analyzed. While the populations declined by approximately four orders of magnitude, significant numbers of indicator species still survived in the shredded waste after a period of two years. However, these organisms showed considerable decline as the simulated landfill environment changed from aerobic to anaerobic. Fecal Streptococcus, assumed to be more resistant to changes accompanying the transition, demonstrated a greater degree of survival within a leachate medium.

The investigators also performed virological assays to determine the survival of polio virus in paper, garden wastes, and diaper categories of municipal refuse. Serologically viable polio virus was detected in all these waste types for a period of 59-60 days. The viruses were found to have finite survival times ranging from several months at low temperature conditions (up to 19°C) to less than ten days at warmer temperatures (up to 28°C).

Overall, most bacteria and viruses eventually declined in number. The health significance of these findings relates to the possibility of migration of bacteria and viruses from the fill, primarily via leachate.

Occupational Safety and Health

With the exception of the logging industry, the sanitation industry has the highest overall injury rate of any studied occupation in the U.S. However, most definitive studies have been conducted on groups of individuals directly engaged in the collection of refuse, making it difficult to relate such studies to an assessment of impacts directly associated with landfilling. Overall, however, risks can be classified into the following, somewhat overlapping, categories:

1. Traffic-related Injuries. These may result from the rough dirt access roads which traverse landfill areas and contribute to vehicle overturning, as well as the presence of collection vehicles and earthmoving equipment on-site.

2. Air Quality-related Conditions. These include both fugitive dust and vehicle emissions. The latter have long been suspect in elevated rates of respiratory problems in certain occupational groups (i.e., truck drivers, auto mechanics). Thus far, however, definitive evidence to support such conclusions is lacking (Fraumeni, 1975).

3. Increased Risk of Infection. Landfills attract rodents, sea gulls, and pigeons, which are potential reservoirs of bacteria and fungi, as wells as a variety of other pathogens. Workers on these sites, run an increased risk of infection. Avenues of transmission vary, but include hand-to-mouth contamination, food poisoning and infection through cuts or sores.

4. Accidental Injury. A study of New York City sanitation workers delineates a number of categorical areas wherein most accidents are likely to occur. These include equipment operation, physical loading and un-loading, maintenance activities. (Cimino, 1975).

Reports from the existing Woodlake Sanitary Landfill do not indicate a current problem with job-related injuries. Occupational Safety and Health Administration figures for the years 1975-1979 break down as follows:

Year	Number of Accidents	Nature	Time Lost
1975	0		0
1976	0		
1977	1	Back strain	0
1978	0		
1979	2	Concussion Bruised Tendon	2 Days

5.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

5.1 METEOROLOGY/CLIMATOLOGY, AIR QUALITY AND NOISE

5.1.1 Meteorology/Climatology

The construction, operation, and closure/post-closure activities on the new landfill areas will have no effect on large scale (macro-climate) meterological processess, i.e., prevailing winds, air masses, and semi-permanent pressure centers, which basically determine the climate of the Minneapolis-St. Paul vicinity. In addition to large scale influences, local factors can affect the climate on a small scale (micro-climate). The construction of the facility could have a small impact on the microclimate due to changes in topography, the removal of vegetation, etc. However, this impact would be negligible, and the climate of the study area will remain essentially unaltered.

5.1.2 Air Quality

Construction

Construction, operation, and closure/post-closure related activities, such as landclearing, excavation, grading, stockpiling, moving heavy equipment over unpaved areas and the transport of fill material, will generate fugitive dust. However, dust impacts are expected to be minimal. Construction activities will be performed in stages and thus will represent only intermittent sources of particulates. The nature and level of dust generating activities at the new landfill will be similar to those of the existing operation. Furthermore, there are few sensitive receptors in the vicinity of the site.

The operation of landfill equipment will cause low levels of carbon monoxide, nitrogen oxides, sulfur oxides, and hydrocarbons to be emitted to the ambient air. However, total atmospheric input is expected to be very small since on the average, only one to two pieces of equipment will be operating at any one time.

Operation

Operation of the proposed expanded landfill area has the potential for adverse odor and/or methane gas impacts. However, proper design and operation of a sanitary landfill usually minimizes odor and methane impacts to satisfactory levels (see Odor Control and Methane Control under Section 6.0, Mitigative Measures). The existing landfill has not demonstrated either odor or methane gas problems.

Implementation of the proposed landfill expansion will not cause short-term transportation-related emissions to vary significantly compared to existing levels, since no immediate increase in vehicular traffic utilizing the site will occur. At the present time, 300 vehicular trips per day (approximately 38 trips per hour based on an eight-hour work day) are generated by operation of the landfill.

Browning-Ferris Industries, in the calculation of future landfill capacity, assumed that the average load of refuse received at Woodlake will increase by 5 percent annually. The 5 percent increase in waste disposal may result in a corresponding 5 percent increase in vehicular truck traffic to the site. Based on that assumption, an average increase of 18 vehicular trips per day (approximately 2 vehicular trips per hour) can be expected each year over the life of the landfill (10-year life expectancy). By the tenth year of landfill operation, vehicular trips to the site will increase from the current level of 300 trips per day to 488 trips per day. While there is a potential for increased on-site vehicular emissions due to increased traffic to the site, significant adverse impacts to local air quality are not expected to occur since vehicle turnover, or the replacement of older trucks with newer, less polluting trucks will decrease the potential for adverse air quality impacts in future years (U.S. Environmental Protection Agency, 1978). Additionally, potential receptors are remote from the site.

On a regional basis, significant adverse air quality impacts will not occur, since the proposed expansion will result in only a very small increase in vehicular traffic on routes used to reach the landfill. The potential for increased vehicular emissions due to landfill-generated traffic will be insignificant in comparison to overall regional emissions.

5.1.3 Noise

A certain amount of noise is always produced during the construction and operation stage of most types of projects. Landfill noise is basically generated by the operation of earth moving equipment during construction and operation activities. Although noise emissions from these sources are transient in nature, levels can be relatively high. The exact level depends upon numerous factors, particularly the age and operating condition of the equipment and the proximity of the nearest receptors.

The primary generators of noise during routine landfill operations are vehicular traffic frequenting the site and landfill equipment (usually bulldozers). Implementation of the proposed landfill will not result in significant short-term transportation-related noise impacts over existing levels since an immediate increase in vehicular traffic utilizing the landfill will not occur (see discussion of Air Quality Impacts-Operation).

The impact of the noise level caused by the proposed action would be determined by the degree of increase and the number of people affected. On a yearly basis, the increase in noise emissions would barely be perceptible since only 2 additional vehicular trips per hour per year will be generated by the proposed expansion. Furthermore, noise emissions from vehicular traffic will be sporadic in nature, and thus will have little impact on hourly noise levels (Minnesota has established hourly noise standards). Potential noise impacts are further minimized since (1) the project vicinity has a low population density, and (2) most of the potential receptors are remote to the road and immediate access roads.

Landfill operations will also not affect nighttime noise levels since they will be confined to the daytime.

5.2 WATER QUALITY

5.21 Surface Water

Background

Prior to a discussion of the potential impacts of the proposed expansion it is necessary to define to the greatest extent possible, the existing pollution inputs to existing surface water supplies. As previously discussed, the major pollution inputs to the surface water systems include agricultural runoff, Loretto Sewage Treatment Plant effluent and the existing Woodlake landfill. Each of these inputs must be examined to determine the potential magnitude of their impact on existing surface water quality.

According to data from the Metropolitan Council, the cities of Medina and Loretto comprise 17,325 acres of which 12,443 acres are vacant or devoted to agriculture. Therefore, a maximum of 72% of the runoff from the area could potentially be contaminated by agricultural contributions, particularly phosphorus and nitrogen. Given the large percentage of land use in the area devoted to agriculture, it is evident that a large portion of surface runoff input into the local surface water systems could be contaminated by agricultural sources. Using averages of different estimates for nutrient loading made by the Metropolitan Council (1975), nitrogen inputs to surface waters from agricultural sources could be assumed to total approximately 9.1 tons per acre per year and phosphorus inputs 1.4 tons per acre per year.

The existing sewage treatment plant was designed to treat an average flow of 120,000 gallons per day. In a worst-case situation in whicn none of the flow would be discharged via seepage, 120,000 gallons per day would be discharged directly into the wetland. Therefore, maximum input of 0.120 mgd could be expected from the sewage treatment facility, although average flow measured for 1978-1979 was 0.064 mgd or 3.12 million cubic feet per year.

In comparison, surface runoff into the wetland from the existing landfill was estimated in a Metropolitan Council study to be 4.12 inches/year (0.34 ft/yr.) (Metropolitan Council, March, 1978). An additional estimate of 0.49 ft/yr. has also been prepared (Fred C. Hart Associates, Inc., TWP 7). Given an existing landfill area of 28 acres, total surfac runoff volume could range between 415,000 and 598,000 cu. ft/yr.

The McCombs-Knutsen phosphorous study also indicated that approximately 85 pounds per year of phosphorous enter the marsh from the Loretto Sewage Treatment Facility seepage pond. The study also indicated that the wetland area was effectively assimilating the added nutrients from the seepage pond overflow so downstream water courses were not adversely impacted. It is evident that the phosphorous loading to the Lake Independence watershed from the Loretto plant is rather small in comparison to the potential level of agricultural loading.

With respect to surface water inputs from leachate produced at the existing Woodlake landfill, the NBI study estimated the dilution effect of existing wetland flows on lateral movement of leachate from the fill areas to be an average ratio of 35.7 based on 4 inches of soil moisture storage (assuming clay and glacial till soils) and 24.7 based on 7 inches of soil moisture storage (assuming peat and clay loam soils). Since the watershed is comprised of surface mixture of both these types of soils, the actual quantity of water which is annually retained in the soil as soil moisture storage and which is unavailable as runoff, actually lies mdiway between the 4-inch and 7-inch valves. Thus the actual diluted ratio lies somewhere between the estimated 35.7 and 24.7 values. With the possible exception of copper, iron, manganese, phenol, and TDS, and based upon the ratios indicated above, simple dilution mechanisms would on the average result in water quality achieving both recreational and drinking water standards within the wetland area. The existing landfill is, however, causing some degradation of surface water quality in the adjacent wetland. This leachate contribution appears to be resulting from both the original placement of refuse in the wetland area prior to the acquisition of the property by Woodlake Sanitary Service, Inc., and by the on-going surface runoff and leachate migration pathways.

No visual evidence exists to show that pollutant contributions in the wetland area have resulted in impacts to the wetland ecosystem (TWP 5). However, while there is no substantial evidence of damage to the wetland ecosystem, some localized vegetative stress along the landfill boundary has been documented by the Agency (Breimhurst, 3/1/78). In addition, water quality testing of the saturated zone of the existing fill has indicated a decrease in pollutant concentrations with migration away from the fill area (National Biocentric Inc., 1977).

The above analyses have thus so far assessed pollution inputs from agriculture, the Loretto sewage treatment plant discharge, and leachate from the existing fill area to the surface water system of the adjacent wetland. This potentially contaminated surface water eventually moves via surface drainage into the Lake Independence watershed where there is potential for impacting a water resource utilized directly by humans. Lake Independence, in particular, is utilized as a recreational body of water receiving substantive human use (i.e. fishing, swimming, boating, etc.).

Previously estimated concentrations in the wetland are based upon dilution ratios available at that point in the drainage basin due to surface runoff contributions. Actual dilution ratios would be much higher in lower portions of the drainage basin due to additional quantities of surface runoff to the creek and other surface water bodies. Table 5-1 specifies average annual dilution ratios available for the existing landfill leachate contributions at various points in the watershed. The ratios were calculated by assuming that runoff rates throughout the watershed are similar to those utilized in developing dilution ratios at the wetland. Thus a doubling of drainage area would result in twice as much dilution of any given volume of leachate and would consequently result in a doubling of the available dilution factor. For example, assuming 4 inches of soil storage, at Lake Independence the leachate from the existing landfill would be diluted 269.5 times or approximately 10.9 times as much as the dilution effects in the wetland assuming 7 inches of soil storage since the drainage area and accompanying runoff volume is approximately 10.9 times as large. Since actual volumes of annual soil storage throughout the basin vary due to differing soil types, the actual dilution available at Lake Independence lies between 269.5 and 389.5.

TABLE 5-1

AVAILABLE AVERAGE WATERSHED DILUTION RATIOS

Watershed Area	Watershed Acreage	Dilution Ratios Assuming 4" Soil Storage	Dilution Ratios Assuming 7" Soil Storage
Swamp Adjacent to Seepage Pond	880	34.7	24.7
Swamp Upstream of Winterhalter	360	14.6	10.1
Winterhalter Lake	1700	69.0	47.7
Spurzem	2370	96.1	66.5
Halfmoon Lake	2690	109.1	75.5
Lake Independence	9600	389.5	269.5

SOURCE: Fred C. Hart Associates, Inc., 1980.

Table 5-2 presents average leachate concentrations from the existing fill as diluted by watershed contributions upgradient from Lake Independence. As can be noted, with the exceptions of BOD and copper diluted concentrations are below applicable quality standards. In fact, dilution processes would be accompanied by a variety of attenuation processes which could potentially result in a further decrease in pollutant concentrations of up to several orders of magnitude.

The proposed landfill design differs significantly from the existing landfill primarily from a hydrogeologic perspective. The existing landfill, while located over a relatively impervious strata, and constructed utilizing a clayey daily and final cover, is directly hydrogeologically connected to the adjacent wetland since filling operations extended into the marsh area. As a result, leachate generated inside the fill area is hydrogeologically free to migrate directly into the wetland area. The proposed landfill however, will not only have a relatively impermeable base and utilize clayey soil for cover operations, but also has been proposed to be hydrogeologically separated from the wetland surface water system. This will be accomplished by the maintenance of clay barrier between the fill and the marsh areas. Very low soil permeability rates, which are on the order of 1×10^{-7} cm/sec or less, would result in leachate movement on the order of approximately one foot per year. Consequently, leachate generated within the fill area should be largely contained within the fill mass. In addition, dilution and attenuation mechanisms would still be available within the watershed system to minimize any impacts should leachate eventually migrate out of the fill area. With this perspective in mind the following sections outline expected primary and secondary environmental impacts.

Impacts

Construction. The construction phase of the landfill consists of, for each new successive work area (i.e., Areas 3, 4, 5, etc.), clearing and grubbing, surface contouring, and concurrent cover excavation and stockpiling from the next succeeding work area. As a result, limited sedimentation may occur in adjacent water courses, particularly in the wetland area, during contruction of Areas 4, 5, and 6. This poses the potential for minimal effects on surface water turbidity, color, and quantity of suspended and dissolved solids. However, the existing landfill construction has not evidenced apparent significant impacts on associated water bodies and as such, construction activities at the proposed landfill areas are not expected to have substantive impacts.

Operation. The operating phase of the landfill will consist of, for each successive work area, actual waste placement, cover placement and all other operations which occur after the construction phase and prior to placement of final cover (i.e., monitoring, dust control, litter control,

TABLE 5-2

DILUTED LAKE INDEPENDENCE LEACHATE CONCENTRATIONS*

Constituents	Characteristic Leachate Composition (mg/1)	Diluted Concentrations in Lake Independence: Diluted Concentrations at 4" Soil Moisture Storage	Diluted Concentrations at 7" Soil Moisture Storage	Most Stringent Water Quality Standard
Alk ($CaCO_3$)	2,062	5.29	7.65	-
Ammonia	158	0.4	0.58	1.0
Arsenic	1.09	0.003	0.004	0.05
Barium	3.05	0.008	0.011	1.0
BOD	2,281	5.87	8.48	5.0
Boron	9.0	0.023	0.033	0.5
Cadmium	0.10	0.0002	0.0003	0.01
Calcium	635	1.63	2.36	-
COD	7,996	20.53	29.67	-
Chloride	773	1.98	2.86	10.0
$Chromium^{+6}$	0.004	0.000001	0.0000014	0.05
Chromium	0.58	0.0015	0.0021	-
Copper	25.2	0.064	0.092	0.01
Cyanide	0.03	0.00007	0.0001	0.02
Fluoride	0.5	0.0013	0.0018	1.5
Hardness	2.332	5.99	8.65	2.50
Iron	697	1.79	2.59	-
Lead	0.43	0.0011	0.0016	0.05
Magnesium	260	0.67	0.97	-
Manganese	27.5	0.07	0.10	0.05
Mercury	1.2	0.003	0.004	-
Nickel	0.3	0.0007	0.010	-
Nitrate	0.46	0.0012	0.0017	1.0
Oil	24	0.061	0.088	0.5
pH (units)	6.8	----	----	6.5-9.0
Phenol	1.94	0.005	0.007	0.01
Phosphate	5.16	0.013	0.019	-
Potassium	270	0.693	1.00	-
Selenium	(undetected)	----	----	0.01
SiO_2	30	0.077	0.111	-
Silver	0.03	0.00007	0.0001	0.05
Sodium	276	0.708	1.023	60% total catorgies me/1
SC(mmhos/cm)	20,540	52.7	76.16	10.00
Sulfate	1,204	3.09	4.47	-
TDS	20,240	51.96	75.10	7.00
TSS	915	2.35	3.4	-
Zinc	12.1	0.031	0.045	-

* mg/1 unless otherwise noted

etc.). Day-to-day operations will impinge primarily upon two site areas simultaneously, i.e., one area for cover procurement and one area for cell construction.

Operation of the proposed facility will have the potential for impacts on surface water quality primarily due to surface runoff and leachate contamination of the creek and wetland adjacent to the site and subsequently, on the downstream drainage system.

Since daily cover and surface runoff controls will be utilized on-site, impacts due to surface runoff contamination should be negligible although some minor sedimentation might occur.

Contamination of surface water due to leachate migration will depend on the extent of shallow groundwater contamination beneath the landfill area. Groundwater moves away from the landfill into the marsh and becomes surface water in the marsh. However, leachate produced in the fill will primarily be contained within the fill by an existing natural liner created by the surficial geology of the site. Essentially, the liner is comprised of 70 feet of bottom clay below the emplaced waste. In addition, there will be a clay barrier consisting of a minimum of 30 feet of in-place clay at the perimeter of the fill area adjacent to the wetland. In addition, all operations will be conducted with a setback of 300 feet to the on-site stream, in accordance with state regulations.

Closure and Post-Closure. The closure phase of the landfill will consist of, for each successive work area, final cover placement and revegetation activities. Post-closure activities consist of all site maintenance work including erosion control, revegetation efforts, monitoring, gas control, maintenance of final grades, etc. The closure period for each landfill area is relatively brief, and activities during the post-closure period are required only infrequently. Therefore, closure and post-closure activities will create only minimal impacts on surface water quality.

Leachate migration during this period would cause contamination of surface water quality in the same manner that leachate contamination could occur during the operation phase. However, due to the existence of the natural clay liner on the fill bottom and sides, minimal seepage of leachate is expected, and no substantial impacts on water quality are foreseen.

5.2.2 Ground Water

Background

Before any discussion can be made of potential impacts to ground water quality from the proposed action, the existing pollution inputs to ground water supplies must be defined. As designated previously, the three major pollution sources to this hydrologic system are agricultural runoff, the Loretto Sewage Treatment Facility, and the Woodlake Sanitary Landfill.

Argicultural lands are potential sources of contamination to surface waters via surface runoff or subsurface leaching. Groundwater is rarely substantially affected by this source of pollution, particularly in areas which are not recharge zones or which have subsurface soil conditions exhibiting large quantities of clayey materials.

The Loretto Sewage Treatment Facility discharges directly into the surface water system via the seepage pond outfall and possibly indirectly into the groundwater system via the seepage pond itself. However, due to the relative impermeability of the subsurface soil conditions in the area, and the higher elevation of the seepage pond bottom relative to the surface of the wetland, contamination of the ground water is not expected to be a substantive problem.

The impermeability of the substrata which forms a natural clay liner at the existing landfill site would also generally preclude any major contamination of the groundwater system by providing on-site containment of leachate from the proposed Woodlake expansion. Furthermore, there is evidence provided by monitoring wells that leachate is being attenuated vertically by the underlying glacial till at the existing site. This attenuation process would also be expected to occur beneath the proposed landfill operation.

Impacts

Construction. Since all excavation and clearing during construction of the expanded area will occur in till soils located above maximum groundwater elevations, no impacts on groundwater quality are expected. Furthermore, the natural clay barrier lining the fill will provide further protection for the groundwater system.

Operation. During the landfill's operation, the groundwater system beneath the site will be protected by the natural clay liner described previously. Leachate will be contained primarily in the fill due to the low permeability of the surrounding soils.

Closure and Post-Closure. Leachate production and migration that might occur after the cessation of site operation would have minimal impact on the site's groundwater system due to the existence of the site's natural clay liner.

5.2.3 Local Water Supply

Impacts

No impacts on local water supplies are expected since both Loretto public water supply wells and two of the three Medina wells are hydrogeologically upgradient from the site. The third Medina well, while located downgradient from the site near Lake Independence, is approximately 1.25 miles from the fill and draws from the hydrogeologically distinct Franconia Aquifer.

5.3 TERRESTRIAL ECOLOGY AND AQUATIC ECOLOGY

5.3.1 Vegetation and Wildlife

Construction

During construction, all existing vegetation will be removed from each of the landfill work areas in succession throughout the projected life of the expansion area. This will eventually include the removal of approximately one acre of planted red pines and eight acres of mature upland hardwood forest in Area 7. Associated wildlife populations, generally consisting of quite limited populations (rodents, ground-nesting birds, etc.) will be forced to relocate. The movements of deer and other mammals presently using the area will also be restricted primarily during daylight hours.

Both the indigenous vegetation and associated wildlife species located on the proposed landfill expansion area are not unique to the project area. In addition, the total individual members of the affected populations are most likely very small in comparison to the total available areawide resources.

Operation

During landfill operation, the potential exists for more substantive impacts on terrestrial populations, and particularly terrestrial flora, due to biological processes inherent at a landfill site. Specifically, decomposition of landfilled organic materials results in or contributes to leachate generation and methane gas production. Both occurrences can have impacts on plant growth and survival. Methane gas production, particularly, has resulted in numerous cases in the creation of anoxic root zone conditions resulting in slow growth or die-off of many plant species near landfills. Potential impacts are generally unpredictable in practice, but are normally localized in extent. Given the elevated site topography, the relatively impermeable cover soil, the site history of no methane problems, and no identifiable impacts either on-site or off-site, no substantive impacts are expected for the proposed expansion.

Closure and Post-Closure. Since the closure period for each landfill area is relatively brief and since post-closure activities are required infrequently, actual closure and post-closure activities will have very minimal negative impacts on terrestrial vegetation and wildlife. In practice, actual closure activities should result in re-establishment of vegetative cover and an associated wildlife community.

5.3.2 Aquatic Ecology

Construction

Limited sedimentation may occur in adjacent water-courses and wetland areas during construction of Areas 4, 5, and 6. This poses the potential for minimal adverse effects on associated aquatic flora and fauna. However, the existing landfill construction has not evidenced significant impacts on associated water bodies and as such, construction activities at the proposed landfill areas are not expected to have a substantive impact.

Operation

Operation of the proposed facility will potentially impact associated aquatic populations through surface runoff contamination of the creek running through the site and the downstream drainage system. However, since daily cover and surface runoff controls will be utilized on-site, potential impacts should be minimal.

Closure and Post-Closure

Activities related to closure and post-closure activities as described previously would not be expected to result in substantial impacts on aquatic resources.

5.3.3 Wetlands

Construction

The proposed action will adhere to all state regulations governing activities in wetlands and watercourses. All operations will be conducted upon the upland with setbacks of a minimum of 30 feet to the wetland and 300 feet to the on-site stream. As such, all excavation will occur in till soils with no direct encroachment on the wetland area. There is the potential for soil erosion during the process, with sediment potentially entering the wetland. However, with appropriate controls, the anticipated impact should be minimal.

Operation

Leachate and landfill gas production will occur during the landfill operation. Gas migration generally does not occur through saturated soil and, as such, there would be no expected impact on the wetlands via horizontal or vertical gas migration. In addition, the existing wetland west of Area 1 has had refuse placed directly in the peat wetland area, and no substantive evidence of vegetative stress has been noted.

The introduction of large quantities of landfill leachate into the wetland ecosystem could result in substantive vegetative stress. However, given that the proposed design includes surface runoff controls and maintenance of impermeable barriers (i.e., the clayey soil in the indicated setbacks), large volume leachate contamination of the wetlands area is not expected.

Closure and Post-closure

Primary impacts for the closure and post-closure period are essentially the same as those identified in the previous section. In addition, leachate generation, though it may persist for a number of years, should be reduced substantially by placement of the final cover.

5.3.4. Rare and Endangered Species

Construction

No on-site impacts on rare or endangered fauna will occur as there are none of these species associated with the site. In addition, the colony of Forster's terns nesting in the wetland which MDNR has identified as requiring protection are not expected to be affected by the expansion activity (Pers. Comm., Carol Henderson, MDNR, December 21, 1979).

Ginseng, another "unusual" species has been identified on the site. While this plant was not evident in a late fall site survey, it is possible that a survey in the spring or summer might reveal a limited amount of this species growing in the upland area. Construction activities would result in removal of this flora.

5.4 SOCIO-ECONOMICS

5.4.1 Land Use, Zoning, and Land Use Plans

Construction and Operation

The predominant land use in the Medina-Loretto area is agricultural and rural. On the site, Areas 3, 4, 5, 6 and 7 are primarily open or wooded land. Areas 3 and 4 have been previously modified to some extent by landfill cover operations. Much of Area 5 and 6 was formerly a corn field.

The construction and generation phases of the operation basically will alter the physical character of the land. This will be in line with the present land use of the existing landfill. It should also be emphasized that the expansion will not cuase a reduction in the amount of active farmland. Areas 4 through 7 have been vacant -- i.e., have not been used as cultivated farmland -- for a number of years. Therefore, no significant land use impacts are expected.

The land in the general vicinity of the Woodlake Sanitary Landfill is presently zoned for rural-agricultural uses. The existing landfill is non-conforming and has been "grandfathered in." This essentially means the landfill is exempt from present zoning regulations because of the number of years the area has been used as a landfill. The proposed area would also be non-conforming under existing and proposed zoning regulations.

There is presently no comprehensive land use plan for the Medina-Loretto area. A land use plan is currently being developed by the City of Medina and should be completed for the Metropolitan Council's review by this summer. Thus, at this time, impacts on land use plans cannot be determined.

Closure and Post-closure

The designated ultimate land use for the site as proposed in the project EAW is for three farming and agriculture. While there is some question relating to the feasibility of these operations, other open space alternatives would be compatible with prevalent land uses in the areas and therefore, no significant overall land use impacts are expected. However, restrictions on future use of the site will occur. These relate to construction of buildings on the previously landfilled area. Limited available bearing stress and potential build-up of methane gas generally would require specialized construction methods to allow building placement on-site.

5.4.2 Public Facilities and Services

No significant impacts on police protection, health care, education, fire protection and ambulance service, solid waste, and recreation services are expected on the regional, county or local level since the expanded facility essentially replaces the existing fill.

In addition, residents will benefit from the landfill expansion due to the increased solid waste disposal capacity at the local level.

5.4.3 Land Use Values

Construction and Operation

One of the major socioeconomic issues associated with the expansion of the Woodlake Sanitary Landfill is the effect it might have on surrounding property values. Before proceeding with this discussion, three caveats are in order. First, it should be emphasized that a landfill has already existed adjacent to the proposed site for a number of years. Most significant property devaluations, if any, would probably already have occurred. Secondly, a true, unbiased, and quantitative analysis of property valuation in the area is, in all probability, difficult if not impossible to obtain. Lastly, property assessment is a very subjective measure, albeit the only measure available.

Most of the properties near the site are active farms and single family homes. The majority of the farms consist of several structures -- the actual residence, a barn, and other storage buildings. A few single family homes are in the general vicinity of the landfill, with a greater concentration existing in the Loretto area.

In 1973, the real estate market in Hennepin County began increasing rapidly in property value. In order to relieve the property owner of the increased tax burden associated with this increase in real estate value, the County began using limited market value as a method of determining the property tax level. Table 5-3 presents historical property value information for properties immediately adjacent to the site. The data is organized by property identification number, and plat and parcel for the years 1973 through 1979. The figures in the table are for limited market value of the land plus any buildings on the property.

From 1973 through 1975, the estimated market value of properties was 5 percent greater than the limited market value. In 1976, this was increased to 10 percent, or to 25 percent of the difference between the limited and estimated market values. As such, a property owner's tax was determined at the lower limited value instead of the estimated market value. Presently, in 1980, this method of determining the property tax burden has been discontinued and another reorganization of the property assessment methodology is being developed.

As was stated above, the limited market value of properties is not the actual market value of the property, but is merely a reflection of that value. It would be safe to assume that an increasing trend in the estimated market value would bring a corresponding increased trend in the limited market value. It should also be noted again that these assessments are subjective in nature.

As Table 5-3 shows, all the limited market values of the properties have more or less steadily increased. The one exception was during 1977. During that year, the value decreased from the year before in 8 out of 11 properties. After that one-year decline, the limited market value of all

TABLE 5-3

PROPERTY VALUE INFORMATION FOR PROPERTIES ADJACENT TO THE SITE ($)

Property ID No.	PLAT	Parcel	1973	1974	1975	1976	1977	1978	1979
0511823330001	60005	4000	6354	6354	7002	12225	7878	8664	11700
0511823340001	60005	4500	2952	2952	3255	5634	3771	4143	6700
0511823340001	60005	5620	22032	28068	24969	39734	32826	36105	46100
0711823140001	60007	1000	28200	29610	31080	44268	35521	38772	50800
0711823320001	60007	2000	24750	25986	27285	34878	14322	19000	20000
0711823110002	60007	2520	5364	5364	5907	7941	6636	7299	9900
0811823110001	60008	0600	23385	24552	25779	32946	28771	31644	43400
0811823130001	60008	1025	17730	18615	19545	25533	23646	24783	34800
0711823410001	60070	3000	890	890	890	1030	1100	1300	2500
0711823410002	60070	6000	22890	24035	25235	27980	30930	33900	44400
0711823410003	60070	9000	1410	2800	2800	3200	3600	4200	4200

SOURCE: Hennepin County Assessor's Office, 1980.

properties continued to increase. A number of reasons could have caused the decline in limited market value, among the most probable being sub-divisions or property damage (e.g., fire). No satisfactory explanation for this decline in property value is presently available.

Traditionally, residential properties near landfills have often suffered in the market due to public concerns over landfill safety, aesthetics, etc. (see TWP 6). Impacts on non-residential properties are generally less evident. The data in Table 5-3 neither supports nor refutes this theory. What the data does show is that properties in the area have, on the whole, experienced a consistent increase in valuation.

In theory, the landfill expansion would cause some decline in market value for properties adjacent to or within view of the site since actual operations would occur for an additional ten years. However, it would be difficult to project substantive declines since the adjacent properties are already located on the boundary of an existing fill area.

Closure and Post-closure

Once closed, the landfill site will be revegetated and, to most casual observers, will appear to be open space. As such, the social stigma effect associated with landfill operation should be mitigated to some degree and rebounds in market values, should decreases actually occur, for adjacent properties could eventually be expected. This assumes that proper closure and post-closure procedures are implemented, and that the site does not become a future liability due to environmental concerns.

5.4.3 Transportation

Construction

Trucks and heavy equipment traffic will increase on local roads during the successive construction periods. However, these periods will be relatively brief in duration and spread out over the projected 10-year life of the landfill.

Operation

The gradual increase of vehicular traffic overtime as a result of the expansion will not have a significant impact on transportation in the area (See Air Quality Impacts).

Closure and Post-closure

No significant impacts are expected on transportation systems due to closure and post-closure activities.

5.4.5 Area-Wide Aesthetics

Construction

The construction phase will consist of clearing and grubbing the site of all trees, grasses and shrubs. A portion of the site is presently covered with a fairly mature Pine-Maple-Basswood-Oak overstory. Preparation of the site for landfilling will remove this view for a number of years (until after the site is closed and assuming revegetation succession occurred). While the site is visible from a number of locations in Loretto, it should be noted that, in general, the surrounding area is sparsely populated rural/agricultural land and that a landfill operation has existed at the site for a number of years.

Operation

Aesthetic impacts during the operation phase of the landfill will be basically the same as those for the construction phase.

Closure and Post-closure

The ultimate land use for the site will probably consist of open space uses. This essentially constitutes a return to the original aesthetics of the site and no significant negative aesthetic impacts are therefore expected.

5.4.6 Demographics

Construction and Operation

No additional employees will be hired for the proposed landfill operation. Therefore, other than the secondary effects of providing a continuing solid waste disposal service, the proposed expansion is not expected to have an impact on area population growth.

5.4.7 Historical and Archaeological Features of the Site Area

Construction

According to a literature search and the nature and proximity of nearby archaeological finds, the proposed Woodlake expansion site appears to be a good candidate for occupation by man at any time during the prehistoric period. Evidence of such occupation is likely to be well preserved, since much of the site seems to have been undisturbed even by farming. However, no cultural indications of the prehistoric period were discovered during the field survey with the exception of the "blade core" noted earlier in Section 4.4.

Due to the fertility and ease of tilling of the TCMA's glacial soils, the area was a prime attraction to European settlers during the historic period. Although there is a consequent high potential for the occurrence of cultural resources on the Woodlake expansion site, there is no indication that special ecological or topographic features occur in the study area which make it especially desirable to man compared to adjacent lands. Morevoer, the Historic Site Survey (1976, 1977) the Minnesota Outdoor Recreation Resources Commission (1963) and the Heritage Conservation and Recreation Service (1980) list no historic sites, structures, or markers in the immediate vicinity (see Appendix I of TWP 6).

The landfill expansion will involve excavation of between 5 feet and 65 feet of overburden over most of the site. As discussed previously, most prehistoric and historic materials in upland areas will be located at the surface or close to it. (Lowland areas are not threatened by landfill encroachment at Woodlake). Therefore the landfill expansion could cause the destruction of artifacts and/or formations - if they exist - of historical or archeaological significance.

5.5 GEOLOGY AND HYDROLOGY

5.5.1 Topography

Construction of the proposed landfill will necessitate the sequential excavation of proposed expansion Areas 5, 6 and 7 from an original top elevation of 1040 feet to a base elevation of 970 feet above mean sea level. According to data available from the applicant, this excavation will remove approximately 426,000 cubic yards of native soil and subsoil materials from Area 5; 237,000 cubic yards from Area 6; and 269,000 cubic yards from Area 7. Approximately 40% of the excavated material will be utilized for daily and final cover, with the remaining material to be available for final contouring or use as fill material. This excavation, therefore, will significantly alter the original natural topography of each proposed expansion area by increasing maximum existing elevations from fifteen to thirty-five feet. In addition, the operation will result in an increase in the average degree of slope throughout the expansion areas.

5.5.2 Soils and Surficial Geology

As indicated in the previous section of topographic impacts, construction of the proposed landfill will result in the sequential excavation of substantive quantities of native soil and subsoil materials from expansion Areas 5, 6 and 7. This material will be stockpiled and gradually used as daily and final cover material as each expansion area is filled, in turn, with solid waste. Before solid waste filling occurs, however, the soil materials remaining at the planned base elevation of 970 feet above mean sea level will be compacted in place to improve their stability to contain percolating solid waste leachate.

The excavation during landfill construction, by removing or physically altering the surficial soil and subsoil materials, will result in an alteration of their physical properties relating to bearing capacity, agricultural suitability and drainage characteristics.

5.5.3 Bedrock Geology

Since excavation of the expansion areas during landfill construction will not reach below elevation 970 feet above mean sea levels, no short or long-term impacts on the local or regional bedrock geology are anticipated during any phase of the landfill's development.

5.5.4 Surface Water Hydrology

As indicated in the previous sections on topographic and soils impacts, all phases of the proposed landfill's development will result in some alterations from the existing topography and soils of the expansion areas. The primary hydrological impacts of these changes will be on the volume, rate, and direction of surface runoff flow. Actual quantitative impacts will vary depending on the specific landfill phase, however the total impact on the hydrology of the neighboring wetland drainage system will be negligible due to the very small portion of the drainage area affected by the facility.

The proposed landfill will also not impinge on any 100-year floodplain or regulatory floodway as designated under the National Flood Insurance Program. The nearest 100-year floodplain, that for Spurzem (or Pioneer) Creek, is approximately 300 feet southeast of the eastern boundary of the proposed landfill expansion.

5.5.5 Groundwater Hydrology

Construction and operation of the proposed landfill will not significantly affect the volume, rate or direction of groundwater flow in the deep aquifers below the proposed site. Some "mounding" of the shallow water table may occur below the landfill due to greater percolcation in the vicinity of the landfill; however this effect is not anticipated to be significant in the proposed case due to the relatively thick layer of impermeable clay soil. Excavation during landfill construction may also intercept or destroy some small and very localized perched groundwater within a lens of more permeable sandy material.

No sole source aquifer or its recharge area has been designated by the U.S. EPA under the Safe Drinking Water Act in the vicinity of the proposed site.

5.6 ENERGY

Construction

Construction activities will increase the current level of energy consumption, primarily by utilizing additional diesel fuel to operate landfill construction equipment. However, since the proposed landfill construction approach (clearing, grubbing, site grading, etc. of successive expansion areas) is identical to that used at the existing landfill, total energy requirements will not increase and areawide energy supplies will not be impacted.

Operation

The proposed action will require additional electrical and heating energy demands due to the scheduled construction and operation of a new maintenance building. However, since the total landfill operation is expected to operate at essentially the same level as the existing facility, no significant in-site additional energy impacts are expected.

Operation of the site, however, will result in loss of the potential for use of the combustibles in the waste stream as fuel. On average, approximately 4600 BTU/lb are available from municipal waste streams.

Continued operation of the Woodlake site as planned will also indirectly result in increased energy consumption. Replacement of many of the materials contained in the waste stream, such as aluminum and steel containers, is generally acknowledged as more energy consumptive than recycling and reuse of those same containers.

5.7 HUMAN HEALTH EFFECTS

5.7.1 Air Quality-Related Health Effects

Some temporary impacts upon air quality may be expected during the construction and operation phases. Such impacts will derive from three main sources:

1. Fugitive dust will result from: the movement of construction equipment and vehicles over unpaved areas, and the excavation of cover materials for the purpose of installing a leachate collection system. No public health impacts would be expected.

2. Low level emissions of carbon monoxide, nitrogen oxide, sulfur oxides and hydrocarbons will result from the operation of construction equipment. However, the short duration and localized impact of these emissions will make them insignificant in a community health context.

3. Generation of landfill gas may occur, depending upon the various factors discussed in greater detail in TWP No. 9. Since there are few buildings or other enclosed spaces in which methane may accumulate, such gas production is not expected to constitute a safety or health problem.

5.7.2 Water Quality-Related Health Effects

Existing pollution sources for both ground and surface water contamination include agricultural lands, the Loretto Sewage Treatment Facility, and the Woodlake Sanitary Landfill. The potential contributions of each are discussed in more detail in TWP 4. In general, the effects of the present landfill and the proposed expansion are ameliorated by the following considerations:

- The possibility of groundwater pollution and subsequent contamination of local drinking water supplies is lessened by the natural clay layer which underlies the Woodlake Site. This clay is relatively impermeable, thus preventing the contamination of the bedrock aquifer from which local water supplies are drawn.

- Dilution and attenuation effects of the Lake Independence watershed act to reduce contaminate concentrations finding their way into Lake Independence to levels which should not adversely affect human health.

5.7.3 Disease Transmission Via Vectors and Pathogens

Construction

During construction, disturbance of the habitats of rodents occupying the planned site area may result in dispersion of this vector type into the surrounding environment. Due to the site's isolated location, and the small range areas of most rodents, it is unlikely that such dispersion will result in significant increased exposure risks to humans.

Operation

If procedures for sanitary landfill cover are not scrupulously followed, the proposed expansion may result in increased numbers of rodents, flies, and mosquitos on site and in the vicinity. It should be noted that the existing operation has not resulted in any documented public health problems.

Closure and Post-Closure

If the landfill is properly secured with adequate final cover, the rodent and insect vector problems should be minimized. Closure will also involve cessation of refuse delivery which will eliminate newly-delivered temporarily uncovered garbage as a source of food and harborage.

There exists the potential for continued leaching of pathogens from the site after closure. However the clay subsurface geology should result in containment of leachate on-site and, as a result, pathogens present in the buried waste should not escape into the surrounding environs.

5.7.4 Occupational Safety and Health

Construction

Major potential health impacts are connected with vehicle and machinery accidents, noise, air emissions and the risk of infection from vectors or pathogens. Existing data does not indicate any substantive public health problems for on-site waters and current data also indicates a low accident rate for existing landfill personnel.

6.0 MITIGATION MEASURES

6.1 INTRODUCTION

"Mitigation measures" are optional elements of landfill design, construction, operation, closure and post-closure activities which, if implemented, would ameliorate the adverse envrionmental impacts of the proposed action. Each of these measures is intended to reduce a specific impact or set of impacts. For instance, each leachate control measure directly impacts ground and surface water quality. The alternatives to the proposed action as discussed in Section 11.0 also have the potential to reduce many or all of the adverse impacts of the proposed action. Waste processing techniques, for example, by reducing the volumes of waste landfilled, may reduce a large variety of adverse environmental impacts. Moreover, "mitigation measures" can be initiated by either BFI or MPCA within the conext of the present proposal. However, many of the "alternatives", whether initiated by BFI or MPCA, could be instituted only in the context of a substantially modified or new expansion proposal.

The intent of this section, then, is to identify those mitigative alternatives which are available to BFI or to the regulatory agency within the present permitting process. The following subsections describe several categories of mitigation measures.

6.2 LEACHATE CONTROLS

The magnitude and nature of landfill leachate generation and migration depend on a large number of factors. The control of leachate generation and migration, in turn, can be achieved by utilizing a variety of technological approaches. The most effective of these include use of liners, leachate collection systems, leachate treatment and/or recycling systems. These types of leachate controls, for the purposes of this EIS, are of such significance in terms of design changes and potential for environmental protection that they are treated as "alternatives" as well as mitigative measures. Thus, the reader is referred to the "alternatives"section for a fuller discussion of these three measures. A number of additional leachate control measures are described as follows:

1. A variety of surface runoff and erosion control measures are discussed in the next section which all contribute to reduction in leachate generation by reducing infiltration of moisture into the waste mass.

2. Increasing the proposed 30 to 50-foot separation distance from the landfill to the wetland area, and the proposed 300-foot setback from the landfill to the on-site stream.

3. Modifying the daily and final cover approach for control of leachate generation. Thicker, less permeable, or more frequent cover applications would result in decreased leachate generation. Less permeable cover can be achieved in a number of ways, including using additional compaction, increasing surface slope, mixing cover soil, blending in other soils, using chemical additives, or using a layered cover system.

4. Utilizing a thicker or less permeable final cover consisting of two feet of clay overlain by six inches of sandy loam topsoil to promote vegetative growth. Additional efforts relating to maintaining appropriate vegetative growth conditions include liming, fertilization, watering, insect control, and selection of a variety of plant species noted for potential adaptability to landfill conditions.

5. Increasing the emphasis on site maintenance primarily oriented towards maintaining cover integrity, including periodic regrading and reseeding of slopes, etc.

6. Maximizing the in-place natural clay's is containment efficiency via compaction of chemical (bentonite) methods.

7. Installing a membrane or other constructed liner to prevent downward migration of leachate, and thus lessen the possibility of leachate contamination of groundwater. Liners may be constructed from a variety of materials, including:

   - admixed and asphaltic materials such as modified bentonite and soil, asphalt concrete, soil asphalt, soil cement, sprayed asphalt membranes, and bituminous seals (the properties of these liners depend on the materials used);

   - polymeric membranes, including a great number of commercially marketed synthetic materials; and

   - natural clay materials or specified clays, such as montmorillonite, illite and kaolinite.

8. Impermeable vertical barriers could potentially reduce migration of leachate and could be used in conjunction with liner systems. A variety of materials, including specialized clays, polymers, membranes, volclay panels, and sheet piling have been used to construct impermeable barriers.

9. Leachate collection and treatment systems may be employed to collect and treat leachate to remove potential contaminants. Collection systems include pipe grids, well points, permeable and impermeable trenches and pump systems. Treatment methodologies include various physical, biological, and chemical methodologies, and potentially, recirculation.

10. Developing a periodic surface water and ground water sampling program to indicate potential leachate contamination.

11. Increasing MPCA's inspection and enforcement activities.

6.3 SURFACE RUNOFF AND EROSION CONTROLS

Surface runoff controls are employed to minimize infiltration of precipitation into the landfill (while also maintaining cover integrity), and thus reduce consequent generation of leachate. Surface runoff and erosion control measures also are utilized to reduce overall soil loss and sedimentation of surface waters. Available approaches include:

1. Providing a system of surface runoff diversion structures including surfaced channels, natural drainage ditches, dikes, berms, collector pipe systems, pump installations, sedimentation ponds, etc.

2. Grading of surface slopes to encourage runoff and prevent pooling and infiltration of water into the fill.

3. Providing prompt initiation of seeding/revegetation procedures.

4. Providing prompt surface compaction of all disturbed soil surfaces.

5. Developing a more detailed excavation and soil use plan designed to minimize soil surface disturbance, and thus reduce erosional impacts.

6.4 METHANE AND ODOR CONTROLS

A variety of controls relating to both the prevention and control of methane and odor generation and migrataion are available. These include:

1. Surface runoff controls (discussed above) help reduce methane and odor generation by reducing moisture infiltration into the waste mass.

2. Utilization of vertical impermeable barriers to impede methane gas movement (as described for leachate controls).

3. Utilization of permeable trenches to vent gas to the atmosphere. These can be used in combination with impermeable barriers.

4. Utilization of a gas collection system involving either individual well points or a combined well point grid system, and utilizing either an induced exhaust or recharge system.

5. Development of a methane monitoring program at regularly spaced intervals around the landfill perimeter and at any buildings or other enclosed structures on or immediately adjacent to the landfill site. Such sampling should be done on at least a quarterly basis, with more frequent monitoring performed when indicated, e.g. during periods of frozen cover.

6. Prompt processing of all incoming waste streams coupled with daily cover also generally reduces the potential for odor formation.

6.5 AIR POLLUTION CONTROLS

6.5.1 Dust Control

A variety of approaches are available to control fugitive dust emissions. These include:

1. Surface paving or road surface wetting with water or a deliquiescent chemical such as calcium chloride.

2. Utilizing dust pallatives on soil stockpiles to reduce wind erosion.

3. Prompt initiation of revegetation procedures, including selection of plant species adaptable to landfill conditions.

6.5.2 Vehicle Emissions Control

1. Periodic maintenance of all vehicles and machinery reduce emissions from fuel burning.

2. Replacement of phased-out equipment with units appropriately suited to expected tasks, and providing higher degrees of pollutant removal efficiencies.

3. Development of an operating plan designed to remove vehicle travel and idling time.

6.6 PUBLIC HEALTH MEASURES

6.6.1 On-site Safety and Health

A variety of both operational and design alternatives to reduce potential risks to employee and public safety and health include:

1. Vehicle accidents can be minimized by providing correct and clear traffic directions, spotters where necessary, and adequate access roads. In addition, all landfill equipment should be fitted with roll-over protective cabs, which are completely enclosed to protect the employee from accidents, weather, and flying debris. Windows on such equipment should be of safety glass or unbreakable scratch-resistant plastic.

2. To reduce injuries, extra care should be taken during periods of adverse weather. A large percent of injuries are incurred by individuals who perform functions to which they are not specifically assigned. Caution indicates that a well-stocked first-aid kit be kept on-site and that employees be trained in emergency procedures. Safety and common sense dictate that at least two persons be on-site at all times. Employees should exercise normal precautions in the vicinity of heavy equipment.

3. Risk of infection. Danger of contracting disease from contact with pathogens or vectors can be reduced by minimizing direct contact with wastes as much as possible. Additional safety is provided by adequate cover which will reduce the landfill's attraction for rodent, bird, and insect vectors. In keeping with Minnesota Solid Waste Diposal Regulations, scavenging in landfill refuse cannot be permitted.

4. Additional leachate and runoff controls can also reduce potential health impacts due to contamination of adjacent ground and surface water supplies.

6.6.2 Vector Control

While existing practices have not demonstrated potential problems relating to vector population development and dispersal, a number of general mitigative measures are available:

1. Assuring prompt processing of incoming waste streams combined with daily application of six inches of suitable compacted cover soil.

2. Maintenance of a runoff control program which minimizes surface ponds and thus prevents propagation of mosquitoes and other insects.

3. Development of a periodic extermination program involving controlled application of rodenticides or insecticides.

6.6.3 Noise Control

A number of design and operating alternatives are available to reduce noise impacts on local receptors. These potentially include:

1. Restriction of equipment working hours in areas adjacent to the nearest receptors.

2. Utilization of noise barriers such as tree or shrub planting.

3. Utilization of more stringent equipment noise muffling devices.

6.7 AESTHETIC MEASURES

A variety of proposal modifications are available to reduce aethetic impacts relating to the usual protection of amenities and the reduction of potential litter problems. These include the following:

6.7.1 Litter Control

1. In order to reduce the incidence of littering and dumping which may have been contributed to in part by Woodlake's pricing schedules, Woodlake could reduce its prices (once it receives approval for the expansion) to the level prevailing in the area, or to levels charged prior to the time restrictions were placed on non-BFI incoming waste flows.

2. Litter clean-up efforts could be instituted more frequently.

3. Portable litter fences could be emplaced at the active face.

6.7.2 Protection of Visual Amenities

1. In order to reduce any negative aesthetic impacts associated with the construction phase of the proposal, a

row of trees could be planted along Tomahawk Trail. This will block the expansion landfill operations to the east from view.

2. Improved revegetation and maintenance activities could improve existing views of the site from the west.

6.7.3 Protection of Archaeological and Historical Features

A number of options are available.

1. In order to mitigate any adverse impacts on archaeological or historical artifacts and formations, additional surveying could be completed. This could be in the form of bore or shovel hole tests spaced 30 to 50 meters apart. The survey could be restricted to the ground above 970 feet above MSL and could concentrate on the rising ground bordering the swamp on the west side of Areas 5 and 6 and the north side of Area 4. Area 7, the eastern third of Area 6, the eastern half of Area 5, all of Area 3, and the sourthern half of Area 4, are less important and could be appraised by surface survey (pedestrian search) with a boring or shovel test hole every 50 meters.

2. A more or less comprehensive survey could also be completed.

3. On-site inspection by a qualified archaeologist could be required during all excavation operations.

6.8 ENERGY CONSERVATION MEASURES

A number of options are available which could reduce energy expenditures at the proposed site. These include:

1. Selection of appropriate landfill equipment; i.e., utilization of larger landfill equipment could result in increased compaction, a decreased number of required passes over the deposited waste and decreased energy requirements per unit of disposed volume.

2. Frequent periodic maintenance operations relating to landfill equipment would reduce their energy consumption.

3. Conservation efforts in the office and maintenance buildings, particularly with regard to lighting and ambient temperature, could result in decreased fossil fuel and electrical energy consumption.

4. Maintenance of operation during wet weather by providing a wet weather disposal area and/or continued maintenance of on-site access routes would reduce equipment energy requirements during severe climatic operating conditions.

5. Proper sequencing of construction, operation and closure operations, particularly with regard to cover movement, could reduce energy requirements.

6. Use of special procedures to assure winter cover availability (i.e., stock piling, stockpile covering, use of ripper mechanisms, etc.) could reduce energy requirements associated with cover procurement during frozen conditions.

7. Minimizing the working face depth and width would reduce energy requirements associated with daily cover application.

8. Utilization of a methane gas recovery system would result in decreased site dependency on outside energy supplies.

9. Institution of resource recovery programs to reduce energy and resources required to manufacture products.

6.9 ECOLOGICAL PROTECTION MEASURES

A limited number of measures are also available to reduce impacts on site flora and fauna:

1. Avoiding equipment encroachment on non-landfill areas.

2. Modifying the proposed landfill area cell boundaries to avoid taking large individual woody plant specimens (i.e., over 6" in caliper).

6.10 MEASURES DESIGNED TO REDUCE CUMULATIVE, LONG TERM OR IRREVERSIBLE IMPACTS

A number of options previously not mentioned are available to reduce these types of impacts. These could potentially include:

1. Reconstruction of the berm along the existing landfill/wetland boundary.

2. Removal and redisposal of wastes previously filled in the peat wetland.

7.0 UNAVOIDABLE ADVERSE IMPACTS

The analysis of potential environmental impacts presented in Section 5.0 indicates that certain adverse effects would be associated with construction and operation of the proposed landfill expansion. Some of these impacts can be ameliorated to some degree by implementation of reasonable mitigating measures as discussed in Section 6.0. This section identifies the significant (only) adverse impacts that cannot be avoided if the proposed action is implemented.

- The excavation entailed by the proposed construction will unavoidably result in changes in the sites elevations, relief and slopes.

- Due to clearing, grubbing, excavation, etc., construction and operation of the proposed landfill expansion will unavoidably cause some additional surface runoff, soil erosion and consequent sedimentation of surface waters. This, in turn, will result in some soil loss, and minor adverse impacts on surface water quality and aquatic species.

- Construction and operation of the proposed landfill expansion will unavoidably result in the complete removal of terrestrial vegetation and associated wildlife habitats from the expansion site. This, in turn, will cause the dislocation of resident wildlife species, particularly rodents and ground-nesting birds. These conditions will persist at least until revegetative succession occurs after closure of the expansed landfill.

- During the operation, closure and post-closure periods of the proposed landfill expansion, organic waste decomposition will unavoidably lead to the generation and migration of leachate and methane gas. Both the generation and migration of leachate and gas are largely controllable due to on-site subsurface conditions.

- Construction and operation of the proposed landfill expansion unavoidably will result in further degradation of the area's visual quality and will increase the total land area which does not conform to the predominant rural/agricultural land use pattern. These impacts, while unavoidable, are tempered to some degree by the fact that a landfill is and has been on the site for over ten years.

- Construction and operation of the proposed landfill expansion will potentially result in a number of very minimal effects on public health and safety via: (1) transmission of disease through surface runoff, leachate migration and various vectors; (2) contamination of local air quality through fugitive dust, vehicle emissions and escaping methane; (3) onsite accidents or disease transmission via direct contact with wastes, rodents, etc.

8.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The analysis of potential environmental impacts presented in Section 5.0 indicates that certain irreversible and irretrievable commitments of resources will occur as a result of implementation of this proposed project. These include:

- Groundwater supplies within the landfill and locally directly beneath the site will not be useable as a potable supply.
- Energy consumption in the form of electricity, gas and oil utilized during the construction, operation and closure/post-closure periods is an irreversible resource commitment.
- The energy resources represented by landfilling of carbonaceous waste materials may be considered irretrievable given the existing state-of-the-art of recovering such resources.
- During construction, a nine acre portion of the native basswood-maple overstory will be removed. Since this overstory represents the climax vegetation for the site, it cannot be replaced within a relatively short time frame.
- All work related injuries or illnesses can be considered an irreversible resource commitment.
- All labor, raw materials, capital and operating expenditures associated with implementation of the proposed project can be considered an irreversible resource commitment.

9.0 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITIY

The analysis of potential environmental impacts presented in Section 5.0 discusses potential short and long term uses of the environment. These impacts related to a variety of areas and included air quality (dust, odors, methane, fugitive emissions), surface water quality (on and off-site), noise, aesthetics, public health, ecological resources (terrestrial and aquatic flora and fauna), energy, land use (patterns and property values), historical and archaelogical features, etc. In general, these impacts are short-term in nature and the magnitude of such impacts will either immediately cease upon site closure or will steadily decrease as the site is returned to a natural state. These impacts, too, are largely offset by the fact that the site has the potential for the secure disposal of approximately 2,500,000 cubic yards of municipal wastes and would eliminate potential environmental problems associated with alternate disposal options. In addition, the TCMA is restricted in its available solid waste disposal capacity, including both landfill disposal and alternative approaches such as materials and/or energy recovery.

There will be, however, several changes in long-term productivity of the proposed landfill area. These include:

- The production of largely site-contained quantities of leachate which will render shallow groundwater supplies on site unfit for potable use.
- The decrease in site-bearing capacity thus largely restricting the site to open space uses.

10.0 CUMULATIVE IMPACTS

A number of cumulative environmental impacts may be experienced with respect to the proposed landfill expansion. This generally relates to the fact that a number of impacts from the existing landfill will continue to persist after the proposed landfill expansion is operating. These specifically relate to impacts not associated with day-to-day operational routines. That is, these impacts relate primarily to those caused by the continued presence of the existing landfill mass. The major areas of impact include leachate migration and consequent ground and surface water contamination, methane generation and consequent potential air pollution and public health impacts and socio-economic impacts relating potentially to depreciated values of adjacent properties which are already sited in close proximity to a landfill operation.

From a more traditional perspective, cumulative impacts could be considered those which would be generated by the proposed expansion and which would overlap those types of impacts currently imposed by the existing operation. These impacts could be both general in nature or related to specific day-to-day operations. The significant (only) cumulative impacts of each phase of development of the proposed landfill are described in the paragraphs below.

Construction of the proposed landfill will necessitate the complete removal of the existing natural vegetation and wildlife habitat which, in turn, will cause a temporary disruption of the site's terrestrial ecosystem. This may be considered a cumulative impact until post-closure revegetation of the existing landfill has progressed to a stage of maturity equivalent to that of the original vegetation.

As discussed previously, construction and operation of the proposed landfill may deleteriously impact aesthetics and nearby property values. The proposed landfill will also be out of character with existing land use patterns in the surrounding area, and similarly, will not conform to present zoning for the site. Until the ultimate post-closure land use plan is fully and successfully implemented, all of these impacts will also be cumulative.

Additional operational impacts which could be considered cumulative include the continued use of the local transportation network for truck transport, the continued generation of noise over a longer time period, the continued site energy demand, and the continual potential for the displacement of on-site historical/archaelogical features.

Operation of the proposed landfill will result in some generation of odors and methane gas. These adverse air quality and human health impacts will persist for some time into the post-closure period. Similarly, until organic waste decomposition is complete in the existing landfill, odor and methane generation will be occurring at both the existing and proposed landfills simultaneously and hence cumulative impacts may be evident to some degree.

Similarly, leachate generation and migration during the post-closure period at the existing landfill will be exacerbated by leachate generation and migration during the operation and post-closure periods at the proposed landfill. Leachate migration, therefore, may cause cumulative impacts on shallow groundwater and surface water quality and, in turn, on aquatic and wetland ecology and human health.

In general, however, it should be noted that due both to the proposed design of the site, and due to the fact that the proposed project is an expansion of an already existing landfill, the above cumulative impacts are not expected to be quantitatively significant. A number of impacts, however, will continue to be experienced for the additional ten years of site operations.

11.0 ALTERNATIVES

11.1 INTRODUCTION

11.1.1 General

This section identifies, describes and evaluates reasonable alternatives to the proposed action of expanding Woodlake Sanitary Landfill so that a comprehensive framework can be established for evaluating the project. The alternatives identified, therefore, include actions within and outside the control or authority of BFI, the MPCA or other governmental entities. Special emphasis, however, was placed on alternatives in which an imaginative and practical approach with less environmental impacts could be implemented while still meeting BFI's objectives.

The alternatives were identified, described and evaluated based on the general criteria cited above and the views of the public as they were stated at the Medina public meeting of December 13, 1979.

The overall process by which alternatives are identified, described and evaluated here consists of five sequential steps:

(1) Outline for each major party-at-interest areas of concern and authority (objectives) relating to the proposed project.

(2) Based on these relevant areas of concern and authority, list and describe the options logically available to each party-at-interest relating to the future of the proposed project.

(3) From the separate lists of decision-making options available to each party-at-interest, list the major reasonable alternatives to the proposed project.

(4) List and briefly describe the criteria by which each alternative is to be evaluated.

(5) Apply the criteria developed above in evaluating each alternative to the proposed project in terms of its negative and positive impacts.

11.1.2 Areas of Concern and Authority for Each Major Party-At-Interest

BFI is proposing this project because there is a demand for landfill space in the TCMA. The goal for BFI is to meet this demand in an economical manner, ensuring the expected corporate return on investment. Consistent with this objective would be expansion at another existing landfill or development of a new landfill elsewhere. To be in the "best interests" of BFI, however this project or investment in some alternative means of solid waste disposal must also be consistent, environmentally and socially, with the best interests of the public.

MPCA's goal is to promote the public interest while adequately protecting our environmental resources. This requires that the project as proposed for Woodlake must meet acceptable criteria for environmental protection. Hennepin County and other governmental agencies are also responsible for providing economically and technically sound solid waste disposal within their respective political boundaries. In relationship to the Woodlake site, Hennepin County has been particularly active in the analysis of the feasibility of alternative landfill sites and alternative disposal technologies. The county's area of concern, other than for the proposed project's environmental adequacy, would relate to compatability of the project with other regional plans and facilities to be developed by the County at a later date.

The citizens in the vicinity of Woodlake also expressed views relating to the adequacy of the Woodlake site at the December 13, 1979 public meeting.

11.1.3 Decision-Making Options Available To Each Party-at-Interest

The following actions constitute the general options available to each major party-at-interest within the context of evaluating the Woodlake expansion proposal:

Browning-Ferris Industries (BFI)

1. Expand Woodlake Sanitary Landfill as currently proposed to MPCA.

2. Expand Woodlake, but modify the landfill design and/or operation proposal to address specific concerns raised by MPCA and/or the public.

3. Abandon this project at Woodlake, and repropose to MPCA some similar landfill project elsewhere in the TCMA capable of serving Hennepin County's solid waste disposal needs.

4. Abandon this type of project at Woodlake, and repropose to MPCA some other type of solid waste utilization or disposal project at Woodlake, such as recycling, composting or other resource recovery or disposal approaches.

5. Completely abandon this or any other solid waste disposal project at the Woodlake site or elsewhere in the TCMA.

Minnesota Pollution Control Agency (MPCA)

1. Approve the State Solid Waste Permit for the pro-

posed project as currently requested by BFI.

2. Approve only a State Solid Waste Permit modified voluntarily by BFI to include more stringent measures for environmental protection.

3. Approve only a State Solid Waste Permit with conditions included by MPCA which, by addressing the project's construction and operating aspects, would reduce its adverse environmental impacts.

4. Deny the State Solid Waste Permit to BFI due to unavoidable and significant adverse environmental impacts.

<u>Hennepin County and Other Governmental Entities Including the Metropolitan Council and Medina</u>

1. Accept the project at Woodlake as currently proposed.

2. Accept the project at Woodlake only with modifications relating to more stringent measures for environmental projection.

3. Where permitting authorities are involved, reject the project at Woodlake due to unavoidable and significant adverse environmental impacts or due to basic technical or economic incompatability with regional solid waste management plans.

11.1.4 Major Reasonable Alternatives To The Proposed Action

Based on the above lists of decision-making options available to each major party-at-interest, one concise list of reasonable alternatives to the proposed action can be formulated:

1. Proposed Action (evaluated in this DEIS)

2. Proposed Action with Design/Operating Modifications

   a. Smaller landfill expansion

   b. Natural clay liner, leachate collection system, and/or leachate treatment system

   c. Other mitigative measures (described and evaluated in Section 6.0)

3. Proposed Action at a Different Site in the TCMA

   a. Expand another existing BFI-owned landfill in the TCMA

   b. Develop a new BFI landfill in the TCMA

4. Different Action at the Woodlake Site

   a. Waste processing
      i. baling

      ii. shredding

      iii. additional compacting

   b. Materials recovery

      i. ferrous metals

ii. non-ferrous metals

iii. aluminium

iv. glass

v. paper

c. Energy recovery

i. waterwall combustion

ii. pyrolysis

iii. refuse - derived fuel (RDF)

iv. composting

v. methane recovery

5. Regional Actions Which Could be Implemented by Parties Other Than MPCA or BFI

a. Waste reduction

b. Alternative landfill Site(s)

c. Energy or Materials Resource Recovery

6. No Action (permit denial by MPCA or complete abandonment by BFI)

These alternatives to the proposed action are more fully described and evaluated in the subsections to follow. The next section, though, first sets out the criteria by which each alternative is evaluated.

11.1.5 Criteria For Alternatives Evaluation

The criteria followed in selecting a specific alternative for consideration included:

- Federal, State or local statutes, regulations and standards. These included, but were not limited to, the Federal regulations such as the Clean Water Act, the Clean Air Act, the Toxic Substances Control Act, the Resource Conservation and Recovery Act, the Safe Drinking Water Act, and standards promulgated to implement the objectives of these acts.

- Major adverse environmental impacts. A reasonable body of knowledge exists concerning the expected impacts of the proposed project. Using this knowledge, alternatives that would eliminate or minimize these potential impacts were considered.

- Technological and engineering effectiveness. Alternatives may exist that better utilize the available technologies with respect to landfilling. Conversely, there may be serious reservations concerning the proposed application of selected technologies, related to their use in this project.

- Economic feasibility. Proposed and potential alternatives will represent varying economic costs, both to the public and BFI. Alternatives should be proposed in view of the economic costs, but should not be eliminated on that basis only.

11.2 PROPOSED ACTION WITH DESIGN/OPERATING MODIFICATIONS

This alternative involves BFI modifiying its proposed landfill design and/or operation to address specific concerns raised by the MPCA and/or the public. Such modifications could be required by MPCA as permit conditions or could be proposed voluntarily by BFI. Major modifications relating to site design and operation might include:

1. Reducing the capacity of the landfill expansion;

2. Adding leachate controls such as a natural clay liner, leachate collection system, and/or leachate treatment system; and

3. Other mitigative measures (described and evaluated in Section 6.0).

11.2.1 Smaller Capacity Landfill

As concluded in TWP 2, Alternatives, BFI is applying for the maximum expansion acreage on the site. The smaller capacity landfill option can result in a decreased expansion area, anywhere from 1 to 39 acres. BFI's decision to apply for maximum expansion is based on anticipated available waste volumes, as well as potential cost savings associated with permit requirments, and to some degree unlimited capital costs.

Positive Impacts

1. A decrease in expansion size would result in a decreased landfill life projection. For example, a decreased expansion area of 20 acres would yield 5 years of landfill capacity as opposed to 10 years. Within this 5 year time period, regional solid waste management plans indicate that some alternate system of solid waste

disposal may have been implemented. As a result, solid waste intended for Woodlake could possibly be processed at a regional landfill or resource recovery plant.

2. Expansion size reduction would obviously result in decresed leachate generation, decreased land commitment, and decreased extent of other environmental impacts associated with solid waste landfilling.

Negative Impacts

1. Expansion size reduction would not provide complete utilization of the site area. Given increased generation rates in future years, BFI may desire to reapply for expansion to create additional disposal capacity. As such reapplication may require another EIS at some future date as well as renewed agency participation and site re-evaluation.

2. Hennepin County is very concerned about available space for landfilling. Although the County generates the most waste in the TCMA, their landfill capacity is nearly exhausted. Alternative solutions are being investigated by the County (i.e., mega-site, other sites, resource recovery) . However, anything less than maximum expansion at Woodland would further increase the burden on finding near-term solutions to the solid waste problems within the County.

3. Decreased expansion would invariably place some economic constraints on BFI's operation in future years. As a result any incurred increased costs would be passed on to service area customers.

4. Decreased expansion size would require earlier closing of Woodlake, and as a result place economic and social constraints on personnel presently employed at Woodlake.

5. In any case the existing site would continue to impact the local environment regardless of the eventual outcome of the Woodlake expansion proposal.

11.2.2 Leachate Control

Section 6.0 will discuss in more detail the advantages and disadvantages of a variety of design and operating alternatives, or "mitigative measures," which could be implemented in the proposed Woodlake project.

The proposed design and operation approach relating to leachate control consists of:

(1) compaction of the base elevation subsoils, primarily by operation of landfill equipment during the final grading process;

(2) maintenance of 30 to 50 feet of clay barrier between the wetland and the active landfill area;

(3) maintenance of a 300-foot separation between the on-site creek and actual waste placement;

(4) utilization of compacted daily cover;

(5) two feet of final cover application;

(6) implementation of surface runoff controls conducive to rapid runoff off-site and reduction of infiltration into the landfill mass.

Given the demonstrated low permeabilities of the subsurface soil and given that those same soils will be utilized for cover materals, the proposed site should result in the production of only limited quantities of leachate. More importantly, the site should also function hydrogeologically to contain the leachate within the landfill mass, thus reducing substantially the potential for degradation of surface or groundwater supplies.

However, a number of alternatives are available which could increase the proposed level of protection. These include:

(1) development of a more detailed runoff control plan providing an analysis of potential runoff considerations over time (since the site topography is gradually modified by the excavation and filling, processes). Additional options include berms along the wetland or stream designed to channel direct runoff away from these areas and/or one or more sedimentation ponds to reduce soil loss;

(2) utilizing additional impermeable barriers along the wetland boundary to preclude horizontal leachate movement. Potential options include sheeting, grout curtains, slurry trenches, synthetic liners, etc.;

(3) increasing the proposed 30 to 50 foot separation distance from the landfill to the wetland area;

(4) maximizing natural clay base liner efficiency by providing additional compaction (requiring additional engineering and laboratory analysis to determine potential improvements in site soil permeability) or by chemical modification (i.e., bentonite addition);

(5) installation of leachate collection and treatment facilities to remove generated leachate from the landfill mass;

(6) development of a more detailed surface and/or

groundwater monitoring program designed to indicate potential leachate movement; and

(7) utilization of a more stringent closure plan consisting of thicker or more impermeable final cover, continued operation of leachate collection/treatment facilities, continued surface and groundwater monitoring, and development of a more definitive post-closure plan.

Essentially each of these potential alternative leachate control approaches would reduce either the quantity of leachate generated or the potential for the escape of leachate and subsequent degradation of ground or surface waters. The disadvantages associated with implementing any of these options relates to substantial economic costs which could be involved, and to the diminishing benefit of more leachate control measures due primarily to the general suitability of existing site sub-soil conditions.

11.3 PROPOSED ACTION AT DIFFERENT SITE IN THE TCMA

Section 11.6, No Action, discusses the implications of not expanding Woodlake as proposed, on the area's existing landfills. Hennepin County's waste stream would most likely be redistributed in the short-term to the Flying Cloud landfill in Eden Prairie and the Waste Disposal Engineering landfill in Anoka County. No Action, therefore, evaluates the impacts on these other sites in terms of using their existing capacity at a greater rate, with no expansion of existing landfill capacity.

Section 11.5, Regional Actions Outside the Direct Control or Authority of MPCA or BFI, discusses the feasibility and impacts of selecting and developing new TCMA landfill sites capable of serving Hennepin County's waste disposal needs. That discussion evaluates both ongoing and anticipated TCMA and Hennepin County site-selection processes.

The discussion contained within this section would involve BFI abandoning the proposed project at Woodlake, either voluntarily or as a result of MPCA permit denials, and reproposing some similar landfill project elsewhere in the TCMA. This alternative landfill site, depending on its location, would be capable of serving as great a portion of Hennepin County's solid waste disposal needs as the proposed Woodlake expansion. The alternative landfill project could entail either the expansion of another existing BFI-owned landfill, or the acquisition and development of a new landfill in the TCMA (or the acquisition and expansion of another existing TCMA landfill not owned by BFI).

At the present time, BFI has shown no interest in the above options. First, BFI owns only one other landfill in the TCMA, namely the Flying Could landfill in the Eden Prairie area of Hennepin County. This site has less than two years of capacity remaining at its existing incoming waste volumes. Even if significant expansion were possible, it is important to point out that such expansion would result in: (1) higher average waste collection costs for previous Woodlake users, due to greater average waste haul distances; and (2) transfer many of the environmental impacts associated with Woodlake to the Flying Cloud site.

The options of BFI acquiring and developing a new site or the acquisition and expansion of another existing TCMA landfill not owned by BFI would be equally difficult due to economic and political obstacles. As Section 3.0 points out, past and present new landfill site selection processes in the TCMA, and in Hennepin County in particular, have met with public resistance. Even if it were possible for BFI to develop a new landfill site capable of serving Hennepin County's solid waste disposal needs, it could result in: (1) substantially higher average waste disposal costs, due to the high capital investment required to acquire and construct a new site, and due to higher collection costs; and (2) transfer of several of the environmental impacts associated with the proposed Woodlake expansion to the new site.

11.4 DIFFERENT ACTION AT THE WOODLAKE SITE

This option would involve BFI abandoning, voluntarily or on the recommendation of MPCA, the landfill option (only) at Woodlake, and reproposing to MPCA some other scheme for solid waste disposal at the Woodlake site which would be capable of serving Hennepin County's disposal needs. A variety of possible actions, other than landfilling by itself, could be implemented which would conceivably result in fewer adverse environmental impacts, or which would result in a transfer of the environmental media to which impacts would be diverted (i.e., an incinerator would result in air impacts vs. groundwater impacts for a landfill operation). A number of variations of these options include waste processing, materials recovery, and energy recovery. However, all of these options would still require landfilling to some degree for disposal of final processing residues.

These same options may be implemented in Hennepin County and the TCMA by entities other than BFI. This possibility is discussed more fully in TWP 2, Alternatives, and in Section 11.5.

11.4.1 Waste Processing

Shredding

Shredding is a viable technical option at the Woodlake site. However, the decision to implement a shredder system would be an investment decision on BFI's part which would weigh the advantages associated primarily with decreased waste disposal volume requirements against the disadvantages of increased landfill capital and operating costs. The potential positive impacts of incorporating a shredding facility at the Woodlake site includes the following:

1. Shredded solid waste reduces disposal volumes and minimizes land requirements.

2. Vector and other health related problems are minimized as are the risks of landfill fires and safety hazards.

3. Shredded waste presents fewer odor and litter problems.

4. Shredded fill promotes rapid landfill stabilization by accelerating waste decomposition because of an increased waste surface area to volume water.

5. The more densely filled landfill has a higher capacity for structural support.

To date, BFI has not proposed a shredder system as part of the Woodlake expansion.

Baling

Baling exhibits similar advantages and disadvantages as shredding. As with shredding, implementing baling would be a private investment decision by BFI. To date, baling has not been proposed by BFI as part of the Woodlake expansion.

Additional Compaction

Additional compaction offers the same advantages and disadvantages as indicated above for the two other compaction technologies. BFI is currently considering the acquisition of another piece of landfill equipment by which additional landfill compaction would be achieved.

11.4.2 Materials Recovery

Ferrous Metals

Ferrous metals recovery is a process that requires an extensive capital investment base. For this reason, such processes have been limited to large scale landfills or resource recovery plants which experience a large waste generation rate on the range of 100 tons per day or greater. Woodlake receives approximately 270 tons per day or less which would make such a large capital investment unjustifiable. From the point of view of potential environmental impacts, installation of a ferrous recovery system would not significantly reduce project impacts on the environment. In addition, BFI has not indicated any interest in developing an on-site ferrous recovery system.

Non-Ferrous Metals

Non-ferrous metals recovery is labeled as an "experimental technology" because it is currently being tested in pilot plants and laboratories, and data with regard to technical and economic feasibility is insufficient (Congress of the United States, Office of Technology Assessment, 1979). As such, this alternative does not apply to the Woodlake site.

Aluminum

Aluminum is a difficult material to recover because of its unique physical characteristics, making it hard to isolate or extract from a municipal waste stream (Congress of the United States, Office of Technology, 1979). However, technologies have been developed to recover aluminum because of its competitive resale value, but capital and operating costs are high. Also, aluminum, in a typical waste stream, is approximately 1% or less by weight (U.S. EPA, 1976). As a result, small waste streams such as that experienced at Woodlake cannot justify large capital investments. Essentially, the decision relating to incorporation of an aluminum recovery process at Woodlake is a private investment decision and BFI has not indicated such an interest. Similarly, total environmental impacts would not be reduced by implementation of an aluminum recovery system.

Glass

Glass, as a waste material, has a relatively low resale value but because it represents a high percentage (9%) in municipal waste, recovery is often more economically attractive (U.S. EPA, 1976). A number of processes for glass recovery are available but are considered "developmental technologies" because of the lack of commercial utilization. Because the systems are highly technical, capital costs are high. As with most recovery technologies, the alternative cannot be economically justified at Woodlake. Additionally, project environmental impacts would not be significantly reduced.

Paper

Paper recovery is possible using either a wet or dry process. Paper fiber recovery by wet separation is an alternative with a proven commercial history and is used extensively at various locations. Recovery utilizing dry processes are at an experimental stage with no proven commercial performance success (Office of Technology, 1979). Either process requires extensive mechanical equipment installation, and, as a result, high capital investments. The marketability of recovered paper is also questionable because the product is usually of poor quality, and, as such, has a limited market.

BFI has not expressed interest in providing any type of material recovery at the Woodlake site.

11.4.3 Energy Recovery

Incineration

Incineration is a energy recovery process which is applicable to a wide range of incoming waste quantities. Commercially available incinerators with energy recovery options are available for quantities in the order of as little as 10 tons per day. As such, incineration as a disposal approach is a technically acceptable alternative at the Woodlake site. However, the economic viability of incineration as a disposal approach is usually keyed to cost recovery achieved through marketing of the available waste energy content, i.e., most commonly by the sale of steam to adjacent users. The local marketability of recovered energy within the adjacent Woodlake area is very limited. Unless a a potential energy market could be developed this alternative is unfeasible due to its high cost in comparison to landfilling costs. In addition, incinerator residue and air pollution control residues would still require landfill disposal.

Pyrolysis

Pyrolysis is a high technology system which produces recoverable energy supplies. While marketing the recovered gaseous or liquid fuels would be less difficult than marketing steam from an incinerator, in all likehood the costs relating to pyrolysis of incoming waste streams would be substantially higher than landfilling costs. A number of impacts relating to discharge to both the air and water media would also be experienced and landfilling of process residues would also be required.

Refuse-Derived Fuel

Refuse-derived fuel processes are also expensive and require high technology systems. An economic justification of such a process at Woodlake is very unlikely. Also a local market for such fuel in the Woodlake area is currently non-existent. In addition, economical RDF production requires a large waste stream somewhere on the order of a minimum of 1000 tons per day.

Composting

Composting (with the exception of land availability) is not as sensitive to incoming waste quantities as many of the other recovery technologies. Approximately one-half dozen existing leaf composting projects are currently operating in Minnesota. Specific markets include mines, nurseries, golf courses, sod farms, forestry and recreational areas, state parks, flower growers, county fairs, highway departments, general contractors and private residences. Operations generally include separate leaf collection programs, and design and operation of a compost area for each 5000 to 7000 cubic yards of leaves collected (Weisberg, 1979). Continual environmental impacts would also affect both the air and water media.

Methane Gas Recovery

Methane gas recovery at sanitary landfills has received wide attention and shows good promise for development as an energy recovery alternative. A number of design requirements associated with the economic feasibility of a methane gas system include the presence of rather large waste quantities to produce sufficient quantities of gas. The Woodlake site in this respect does not warrant a full-scale system because incoming waste quantities are very low. However, a limited system installed on site could be used economically to supplement space heating requirements for buildings located on site. BFI has not indicated any interest to date in providing such a system.

11.5 REGIONAL ACTIONS WHICH WOULD NOT BE IMPLEMENTED BY MPCA OR BFI

Twp 2, Alternatives, discussed in detail the potential impacts of the proposed expansion on regional plans, and the potential impacts of large-scale alternative disposal technology on the viability of the proposed Woodlake site. The following sections are intended to summarize those "regional" actions and their potential impacts.

11.5.1 Waste Reduction

Waste reduction is defined as a method of controlling and minimizing quantities of generated refuse by altering product design, consumer awareness, and/or by initiation of cost incentives in industrial, commercial or residential sectors. Waste reduction in any form can often result in reduced production costs, reduced solid waste management costs, reduced natural resource consumption, and reduced environmental impacts. Although approaches to achieve waste reduction are numerous, this subsection will consider three primary options which can be initiated on a regional basis to assist in reducing future waste generation in the TCMA. These particular approaches would include bottling bills, packaging reduction bills and source separation. As a result of implementing any of these approaches by federal, state or local entities, waste quantities landfilled at Woodlake, as well as at other landfills in the region, could be reduced.

In general, however, only minimal impacts on Woodlake operations would be experienced. Both packaging reduction and bottle bill legislation would result only in small reductions in waste quantity generation. Source separation programs, while having the potential for much larger reductions in disposal waste volume, require high levels of program coordination and voluntary cooperation, and also require reliable material markets. As such source separation activities would not be expected to substantially impact incoming waste quantities at the Woodlake site in the short-term. In any case, reduction of incoming waste quantities to the Woodlake facility would generally serve to increase the potential site operation period, but would not serve to substantially reduce overall environmental impacts.

11.5.2 Alternate Landfill Site(s)

Hennepin County, as well as other counties in the TCMA, is currently investigating alternative landfill sites. Investigation, to date, has resulted in the preliminary selection of a number of smaller landfill sites as well as a large regional mega-site for further study. When considering the impacts of the proposed expansion or the potential development of a regional landfill(s), or vice versa, the most important consideration relates to available waste quantities. In other words, continued operation of the Woodlake site circumvent a large enough portion of the regional waste volume to make an alternative regional site economically unacceptable? Or alternatively, would operation of a regional facility, or facilities, reduce the incoming waste streams to the Woodlake site resulting in the private venture becoming unprofitable?

In general, the impacts of the development of a regional landfill on the Woodlake operation are expected to be minimal. Due to the high level of public opposition to the siting of new facilities, it is unlikely that a regional landfill facility will be available in the TCMA/Woodlake service region within the short-term. Because of this time lag, it is safe to assume that Woodlake will have utilized a large portion of its available capacity prior to the potential start-up of a regional landfill(s). In any case, should incoming waste stream quantities fall below those levels required to maintain an economically profitable landfill operation, Woodlake Sanitary Service, Inc., would likely proceed with closure operations on already opened site areas. In addition, it is clear given the exisiting lack of disposal capacity in the region and in Hennepin County, that regional planning should actively include consideration of the Woodlake site as a viable alternate to the separate development of regional capacity.

11.5.3 Energy and Materials Resource Recovery

A number of regional studies have also examined the feasibility of implementing materials and/or energy recovery facilities. Similarly the major concerns related to available waste quantities. However, as with a regional landfill facility, a regional materials and/or facility, will also be subject to a substantial time lag, and, as such, would only potentially impact the Woodlake in its later years of operation. Woodlake's waste steam accounts for approximately 5 percent of the total metropolitan waste generated (Metropolitan Council, 1978), and, as a result, any large-scale resource recovery facility would not be greatly affected by Woodlake maintaining its landfill operation at current incoming wastes rates.

While resource recovery economics generally dictate large scale designs (due to economy-of-scale effects), there has also been some consideration of smaller modular waste-to-energy systems for the TCMA region. However, in all likelihood, these systems would not be significantly impacted due to their decentralized location with respect to Woodlake's service area.

With the implementation of a regional facility, the TCMA as a whole will also have to address the questions of waste ownership and the role of public authority in requiring all waste to be delivered to such a regional facility. Presently no waste ownership legislation exists in the TCMA region.

11.6 NO ACTION

"No Action" would involve either: (1) a complete abandonment for the present time by BFI of this or any alternative solid waste disposal project at the Woodlake site of elsewhere in the TCMA; or (2) a denial by MPCA of the State Solid Waste Permit, or disapproval and/or denial of local permits by the Metropolitan Council, Hennepin County, or Medina.

In this situation, BFI would be required to complete closure and implement approved ultimate land use plans at the existing Woodlake site.

"No Action" would produce the following implications and impacts:

1. The TCMA Regional Solid and Hazardous Waste Management Plan states in its major new policy that waste reduction is the preferred method of solid waste management followed, "in order of preference, by source separation, processing to recover materials and/or energy, and land disposal." Therefore, no action in the long run would help stimulate earlier waste reduction and resource recovery in the TCMA. TWP 2, Alternatives, discusses the pros and cons of these alternatives more fully.

2. Existing water quality at the Woodlake site would not be further aggravated by the initiation of the proposed action (see TWP 4, Water Quality). Further, air, noise, ecologic, hydrogeologic, energy use, and human health impacts would also be prevented.

3. Earlier site closure would reduce the time frame of potential economic impacts relating to the value of adjacent properties.

Negative Impacts

1. Although regional policy considers landfilling the last alternative in solid waste management, no specific regional materials or energy recovery systems are planned for the immediate future as a specific replacement for the Woodlake site.

2. The entire metropolitan solid waste disposal system can provide only 8.5 more years of total landfill capacity based on present waste generation rates. Sanitary landfill capacity within Hennepin County is more critical than in the TCMA region in general. The Hopkins Landfill reached maximum capacity and closed in 1979, leaving in Hennepin County only Flying Cloud with less than two years of operating life and Woodlake with less than one year. The No Action alternative would accelerate the exhaustion of capacity of the remaining landfills serving Hennepin County (namely, Flying Cloud and Waste Disposal Engineering in Anoka County). The total tonnage requiring alternate disposal capacity is approximately 270 tons/day based on 1979 receiving rates at Woodlake. This, in turn, may place additional pressures on the other existing landfills (and MPCA) to expand capacity where possible, or on Hennepin County to complete its on-going site selection process. TWP 2, Alternatives, presents a fuller discussion of the implications of redistributing Woodlake's waste load to Flying Cloud, Waste Disposal Engineering, a combination of the two, or to Hennepin County's prospective "megasite".

3. Denial of the proposed action would place economic constraints on collection service companies in Hennepin County, including BFI, because of increased haul distances and consequently increased energy costs. Alternate landfills within Hennepin County are limited to Flying Cloud since Hopkins has already closed. Surrounding landfills would have to increase their respective waste-shed areas to handle the load inteneded for landfilling at Woodlake. Collection and disposal costs will invariably rise as haul distances and user rates at alternate sites increase. These costs would be passed on to the public through increased service charges.

4. Air, water, and groundwater pollution impacts could conceivably be transferred to other replacement sites.

5. Another impact associated with the "No Action" alternative is the displacement of up to 45 BFI employees because of redefined landfill wastesheds. Displacement would result in substantial personal and economic burdens on these employees.

6. Denial of the proposed expansion creates the potential for future illegal open dumping at the existing or other sites once the landfill is closed by BFI. This could possibly be aggravated by potential increases in disposal costs at other landfill sites.

12.0 COORDINATION OF EIS EFFORT WITH OTHER GOVERNMENT AGENCIES AND INTERESTED GROUPS

12.1 IMPACT ON STATE GOVERNMENT OF ANY FEDERAL CONTROLS ASSOCIATED WITH PROPOSED ACTION

The Federal Resource Conservation and Recovery Act (RCRA) Sections 1008 and 4004 address the problems of defining environmentally acceptable solid waste disposal. Section 4004 required EPA to establish criteria for determining which solid waste disposal facilities shall be classified as having no reasonable probability of adverse effects on health or the environment.

The criteria for classification of solid waste disposal facilities and practices include whether or not:

1. facilities or practices in floodplains restrict the flow of the base flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste;

2. contribute to the taking of any endangered or threatened species, or resulted in the destruction or adverse modification of their critical habitats;

3. cause a discharge of pollutants or dredged materials into U.S. waters in violation of Clean Water Act Sections 402 and 404, respectively, or cause non-point discharge to U.S. waters which would violate water quality management plans under Section 208 of the Act;

4. contaminate an underground drinking water source beyond the solid waste (or some alternative) boundary;

5. minimize the on-site population of disease vectors through periodic application of cover materials or use of other techniques to protect the public health;

6. engage in open burning of solid waste, or violate any provisions of a State Implementation Plan for air quality under Section 110 of the Clean Air Act; and

7. abide by a number of safety provisions relating to explosive gases, fires, bird hazards to aircraft, and access control.

Each of the States must complete an open dump inventory and either upgrade or close identified open dumps within five years. In this respect, state government may be impacted by a Federal control within the context of the proposed action.

As directed by Section 1008(a) of RCRA, EPA has also published "Proposed Guidelines for the Landfill Disposal of Solid Waste." In keeping with the stated goals and objectives of the Act, the scope of those guidelines encompasses several areas as listed below:

Section	Topic
241.200	Site Selection
241.201	Design
241.202	Leachate Control
241.203	Gas Control
241.204	Runoff Control
241.205	Operation
241.206	Monitoring

The Guidelines identify a variety of approaches and technologies which may be implemented, on a site-specific basis, to provide or maintain the required levels of environmental protection.

Although the Guidelines recommend a number of methods to satisfy the "Criteria for Classification of Solid Waste Disposal Facilities," they are not intended to be "exclusive or discourage or preclude the development or use of equally effective and economical technologies." In effect, the Guidelines provide a set of technologies which may be available for incorporation into landfill operations for a variety of waste types and environmental settings. Since the primary objective is adequate protection of the environment, which is generally achievable by providing the necessary air, groundwater, and surface water controls, the actual technologies required at any one location are highly site-specific.

12.2 MULTISTATE RESPONSIBILITIES ASSOCIATED WITH PROPOSED ACTION

Since the proposed landfill expansion site is located well within Minnesota's borders, there are no formal multi-state responsibilities associated with the proposed action. There are also no general multi-state implications of the proposed action, since the proposal's environmental, economic and social consequences will not reach beyond Minnesota's borders to any significant degree.

12.3 COORDINATION EFFORT

The following groups and individuals were consulted on the development of the Draft EIS:

12.3.1 State Agencies

Minnesota Department of Natural Resources:

Kent Lokkesmoe - Regional Hydrologist
Terry Lempke - Metro Region Waters
Tom Kucera - Division of Fish & Wildlife

Ken Wald, Charlotte Cohn, Tom Bolcom - Environmental Review

Carrol Henderson - Nongame Supervisor, Section of Wildlife

Dale Trippler - State Planning Agency

Steve Greenwood - Department of Health

Linda Reddin - Publications, Minnesota Nuclear Regulatory Commission

Peter McSwiggen - Assistant Scientist, Minnesota Geological Survey

Minnesota Natural Heritage Program

Dorothy Hozza - Project Manager, Minnesota Energy Council

12.3.2 County and Local Agencies

David K. Weaver - Director, Hennepin County Park Reserve District

Timothy M. Dyhr - Natural Resources Specialist, Hennepin County Park Reserve District

James Kemp - County Extension Director, Agricultural Extension Service

Luther Nelson - Director, Hennepin County Department of Environment and Energy

Tom May - Hennepin County Assessor

Rolf Ericson - Medina Assessor

Donnal Rohel - Town Clerk, Medina

Dave Jacobs - City Clerk, Loretto

12.3.3 Federal Agencies

Robert Landreth - Project Officer, Environmental Protection Agency

12.3.4 Miscellaneous Agencies

12.3.5 Interested Groups

12.3.6 Interested Persons

Robert Kadwell, P.E. - Principal Engineer, Soil Testing Services of Minnesota, Inc.

Rodney B. Kager - Operations Manager, BFI

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Mary Manto
Joseph McLaughlin
Barbara Wong

Minnesota Pollution Control Agency Personnel

Dale McMichael - Past Director, Environmental Planning and Review Unit
Janet Cain - Acting Director, Environmental Planning and Review Unit
Tom Clark - Chief of Enforcement, Solid Waste
Sandra Forrest
Don Kyser
Ed Pryzina
Virginia Reiner

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