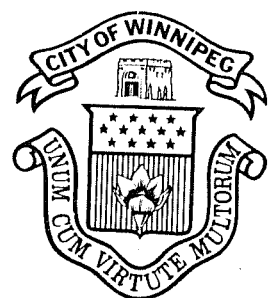


LANDFILL SITING STUDY

Executive Summary

A. Penman, P. Eng.

Director



## LANDFILL SITING STUDY - EXECUTIVE SUMMARY

### BACKGROUND

In 1977 James F. MacLaren Ltd. completed a comprehensive Solid Waste Management Study for the City of Winnipeg. The findings of this study resulted in a 3 site landfill system and closure of the incinerator.

An energy-from-waste study, as recommended in the James F. MacLaren Study, was initiated 2 years ago and is now complete. A presentation of the study findings to Works and Operations Committee took place on March 5, 1985. The consultant's findings are that an energy-from-waste plant is economically viable for Winnipeg. If this project is approved, a detailed 2 year study will be conducted with a three year construction period to follow. The plant could be operational around 1990. Because of the lead time required to implement either a plant or a new landfill, the energy-from-waste and landfill siting studies proceeded concurrently.

This report deals with the findings of the Landfill Siting Study.

In 1982 a task force was assembled to carry out a preliminary engineering study into future landfill siting. The task force consisted of staff with operating expertise from the Operations Department, input from the Civic Properties Department on building requirements and environmental expertise from the Waterworks, Waste and Disposal Department. The Steering Committee for this study consisted of Mr. S. Dolhun, P. Eng. of the Operations Department, Mr. E.H. Klassen, P. Eng. of the Waterworks, Waste and Disposal Department and Mr. R. Houghton, P. Eng. of the Civic Properties Department. The Task Force consisted of Messrs. T. Zielonko, P. Eng. and H. Sandulak of District 4 Operations, Mr. R. Christiuk, P. Eng. of the Civic Properties Department and Messrs. D. Moerman and T.J. Kuluk P. Eng. of the Waterworks, Waste and Disposal Department. In addition, a number of other City Departments were contacted for specific information, including the Environmental Planning, Land Surveys and Real Estate, Streets and Transportation and Parks and Recreation Departments. This study was patterned after the 1977 James F. MacLaren Ltd. report and utilized MacLaren Engineers Inc. for the financial analysis by computer. During the course of finalizing the recommendations, presentations were made to the Operations Department and valuable feedback was received for consideration.

The study included an examination of the effects of resource recovery on landfill requirements and considerations for implementing the recommendations, including the matter of public participation.

INDEX

This summary report is organized under the following headings:

- Recommendation
- Implementation Considerations
- Implications of an Energy-From-Waste Plant
- Introduction
- Past and Current Disposal Practice
- Landfill Siting Study
- Waste Reduction Alternatives
- Implementation Considerations

Figures referred to are appended to this report.

## RECOMMENDATION

Based on the Landfill Siting Study, IT IS RECOMMENDED THAT THE EXISTING DISTRICT 6 SITE BE EXPANDED TO A 40 YEAR SITE, WITH TRANSFER FACILITIES. ✓

## IMPLEMENTATION CONSIDERATIONS

The existing District 2 and District 4 landfills will be completed by 1989. In order to ensure sufficient disposal facilities for 1989, the following steps must be implemented:

- 1.) Develop details for planned closure of the District 2 and District 4 landfills.
- 2.) Initiate land acquisition.
- 3.) Detailed engineering for development and transfer facilities.
- 4.) Establish a Citizen's Advisory Committee to work with the Administration in developing landfilling and end use concepts.

## IMPLICATIONS OF AN ENERGY-FROM-WASTE PLANT

The recommendation is still valid with an energy-from-waste plant, except that the land requirement would be reduced by approximately 65 percent.

## INTRODUCTION

Current residential, commercial and industrial waste generated annually in Winnipeg amounts to 450,000 tonnes (500,000 tons) and in the next 20 years this quantity is expected to increase by 35%. The waste is disposed of at the three active landfill sites in Winnipeg located in the northwest, northeast and southwest sectors of the city. Over the next 20 years, the land disposal requirement is 162 hectares (400 acres).

By 1989, two of these sites, which receive the majority of the waste will be completed. Since it could take up to 5 years to implement a new site, it is urgent that the necessary preplanning be done now. If preplanning of new facilities involves the public, any significant concerns can be taken into consideration, thereby eliminating conflicts in the latter implementation stages.

The purpose of this study was to address the foregoing issues in developing recommendations for a long term landfill and a process whereby the relevant community can participate in the implementation process.

## PAST AND CURRENT DISPOSAL PRACTICE

Prior to planning future facilities it is useful to review past and current disposal practice in Winnipeg.

### Past Practice

As the result of separate disposal operations in the municipalities that now constitute Winnipeg, there are 35 closed landfills and dumps of various types in the Winnipeg area.

In 1974 methane problems were discovered in 7 industrial buildings located on the former St. Boniface Landfill site, which ultimately resulted in closure of these buildings. Another concern with landfills is the potential for pollutants affecting ground water or surface water. A program for monitoring former and active landfills was instituted in 1979 and based on the findings thus far it appears that such vigilance will be required in the long term. Therefore, from the standpoint of the long term care requirements, it is advantageous to minimize the number of new facilities.

In addition to landfilling, incineration was used to reduce waste quantities, with the ash disposed of at dump sites. The largest incinerator, which was built in the 1940's off Henry Avenue, was closed in 1978 due to the cost of upgrading to modern standards. The large ash dump off McPhillips Street in West St. Paul, which received the ash from the Henry Avenue incinerator, is in the process of being landscaped. Ash disposal sites can be used upon completion, as is the case with the former ash dump located off Empress Street which was developed into Westview Park.

### Current Practice

Current waste disposal is by sanitary landfilling at the three active sites located in Operations Districts 2, 4, and 6. Please refer to Figure 1.) of this report for the exact location of these sites.

Sanitary landfilling is defined as "a method of disposing of refuse in land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, and to cover it with a layer of earth at the conclusion of each day's operation or at such more frequent intervals as may be necessary." The key elements to achieving these objectives are, compaction of the waste, daily cover, monitoring for gases and liquid pollutants, and a final cover and appropriate end use.

The largest active landfill is Kilcona Park (see Figure 2). This is a pre-planned, environmentally sound, sanitary landfill, which is being developed concurrent with a regional park. Proper planning and design allows for non-conflicting activities to take place concurrently. At the Kilcona Park site effective separation and screening allows for a variety of recreational activities to take place at the same time as landfilling.

Currently, the District 2 site receives approximately 30% of the total waste generated, the District 4 site receives 50 percent and the District 6 site the remaining 20 percent. By 1989, the District 2 and District 4 sites will be completed, therefore, by 1989 a location must be found for 80 percent of the City's waste. Since it can take up to 5 years to implement a new site, a preliminary engineering study has been carried out to initiate this process.

### LANDFILL SITING STUDY

The study methodology is illustrated on Figure 3, and described as follows:

- A.) Establish the existing and projected distribution of quantities for the City.
- B.) Establish the location of alternative disposal and transfer\* sites in consideration of constraints and environmental and social factors..
- C.) Establish capital and operating costs for disposal sites and transfer facilities.
- D.) Establish costs of hauling waste to alternative sites.
- E.) The operating and capital cost information from activities A.) through D.) is processed in a financial analysis by computer to yield a present worth cost for the various alternatives. This output on the economics of various alternatives is used in the evaluation.
- F.) The evaluation of site alternatives is based on economic factors from Activity E.) and environmental and social factors from Activity B.). Preferred sites are selected in this activity.

\* A transfer site is the location of a facility to transfer the loads from standard collection vehicles into larger vehicles to minimize the number of vehicles hauling to a disposal site.

### Quantities

Figure 4) shows the projected residential, commercial and industrial waste generation over the 20 year study period commencing in 1981. This chart does not include construction and demolition or clean fill wastes, which amount to approximately 200,000 tonnes (220,400 tons) per year. As can be seen in Figure 4), current yearly quantities are approximately 450,000 tonnes (495,900 tons) and this is expected to increase to 570,000 tonnes (628,000 tons) by year 2001. For purposes of establishing costs of hauling to the various disposal alternatives, these quantities were distributed for the City as to locations of origin.

## Site Selection

For site selection, the study area included the City of Winnipeg and the Additional zone. The first step in this process was to eliminate areas with constraints prohibitive to locating new landfills. These constraints included the following:

- waterways and flood plains eg. Red River
- ground water recharge areas eg. Birds Hill area
- developed or committed development areas
- transportation corridors
- historical sites
- archeological sites
- airport control zones (within 5 mile radius of the Winnipeg International and St. Andrews Airports.)

When a composite is produced of all the constraints superimposed on the study area (see Figure 5) it can be seen that there is not much land available for landfilling within the City boundary.

Based on the available soils and groundwater information, accessibility, expansion potential and preliminary economic analyses, alternative sites in each sector were screened to identify sites with the best potential for more detailed analysis.

### Northwest Sector Sites (Refer to Figure 6)

Because of limited areas of sufficient clay depth, only one potential site was identified in the northwest sector.

The advantage of this site is that it would complement the existing District 6 site for a 2 site system. The main disadvantage of this site is, that there is a potential for shallow soil anomalies and high groundwater conditions in this area, which could create operational and environmental problems. Also, the site is outside of the City proper, in the Additional Zone.

### East Sector Sites (Refer to Figure 7)

Of the sites in the East Sector, L12 was the preferred location. Sites further to the south, west and east were excluded based on site specific limitations such as expansion potential, proximity to development and accessibility, or they were too close to the existing District 6 site to the west to justify a second site.

The advantage of this site is that it would complement the existing District 6 site for a 2 site system. The main disadvantage of this site is its proximity to the Deacon reservoir. Problems have been documented with gulls from landfills frequenting nearby reservoirs and affecting water quality. Also, this site is outside of the City proper, in the Additional Zone.

### Southwest Sector Sites (Refer to Figure 8)

Of the sites in the Southwest sector, the existing District 6 site was the preferred location. Sites further to the north and west were excluded based on site specific factors whereby they offered no advantage over the existing District 6 site.

The advantages of the District 6 site are the good soil and ground water conditions and being located within the City boundary. Also, a preliminary use for this site has been established.

### Financial Analysis

A financial analysis by computer was carried out for haul costs and landfill operating costs over the study period, utilizing combinations of the preferred sites in each sector. The alternatives analysed included the following:

- 3 site system
- 2 site system
- 1 site system
- 1 site system with transfer facilities

The differences in the 20 year present value costs for these alternatives were marginal therefore the selection of the preferred alternative was based on the comparative advantages/disadvantages of the options.

### Evaluation of Site Alternatives

The evaluation considered the current trends which could affect future landfills. Trends such as:

- landfill standards becoming more stringent. This includes increased requirements for control and monitoring of gas and leachate.
- possibilities of waste reduction through incineration and/or materials recovery, and
- changes in waste composition and quantities due to new products and containers.

A one site system using the District 6 site with transfer facilities was selected as the preferred solution based on the following considerations:

- good soils and groundwater conditions
- ample room for expansion
- this is an existing use in the area
- within the City boundary
- preliminary end use established



In order to ensure that sufficient long term capacity is provided, a 40 year capacity or approximately 400 hectares (1000 acres) of land should be assembled.

Therefore, IT IS RECOMMENDED THAT THE EXISTING DISTRICT 6 SITE BE EXPANDED TO A 40 YEAR SITE, WITH TRANSFER FACILITIES.

One of the considerations was whether there is a need for long term land-filling with the possibilities of incineration and/or recycling. The following section examines the impact of waste reduction alternatives.

### WASTE REDUCTION ALTERNATIVES

The current composition of our waste is as shown in Figure 9.

#### Extraction and Recycling

One source of waste reduction would be material extraction and recycling. This can be done either through home separation or at a plant.

In home separation, residents separate glass, metal and newspapers for curbside pickup. This requires a strong commitment from the residents and a market for the materials.

Separation can also be done mechanically in a plant, although the cost is very high and a secure market would be required for the materials.

Even under ideal circumstances it is unlikely that a 20% reduction can be achieved in the foreseeable future through recycling, therefore, landfilling would still be the main disposal method.

#### Incineration

Based on the recent Energy-From-Waste Study, for a plant startup in 1990, landfilling would still be required for 34% of the total quantity. The ash product and the material surplus to the plant's needs must still be land-filled.

Therefore, even with recycling and/or incineration, in the foreseeable future, landfills will still be required.

## IMPLEMENTATION CONSIDERATIONS

Further to the recommendation made earlier, the following are some considerations relative to implementing the District 6 Landfill as a long term solution.

### Transfer Facilities

For a one site operation, the level of service, that is, distance of travel for disposal, can be maintained by providing transfer depots and or transfer stations.

A transfer depot refers to a drop off facility for small residential disposal, typically by homeowners. Periodically the refuse would be transferred to the landfill. The depot(s) would be located so as to provide disposal locations in the same general area as the current landfills.

A transfer station refers to a major drop off point for typical refuse trucks in order that the waste collected can be transferred to the landfill by a larger vehicle, thus minimizing the number of vehicles hauling to the landfill. The preliminary financial analysis for the District 6 site indicated that one transfer station would be advantageous within the 20 year planning period.

### End Use

Of importance is an end use plan for a site because of the long term care requirements. The Kilcona Park (District 4) site is typical of the kind of end use to be considered, that is, some form of recreational use.

### Implementation Plan

Figure 10 illustrates the activities for implementing the recommendation.

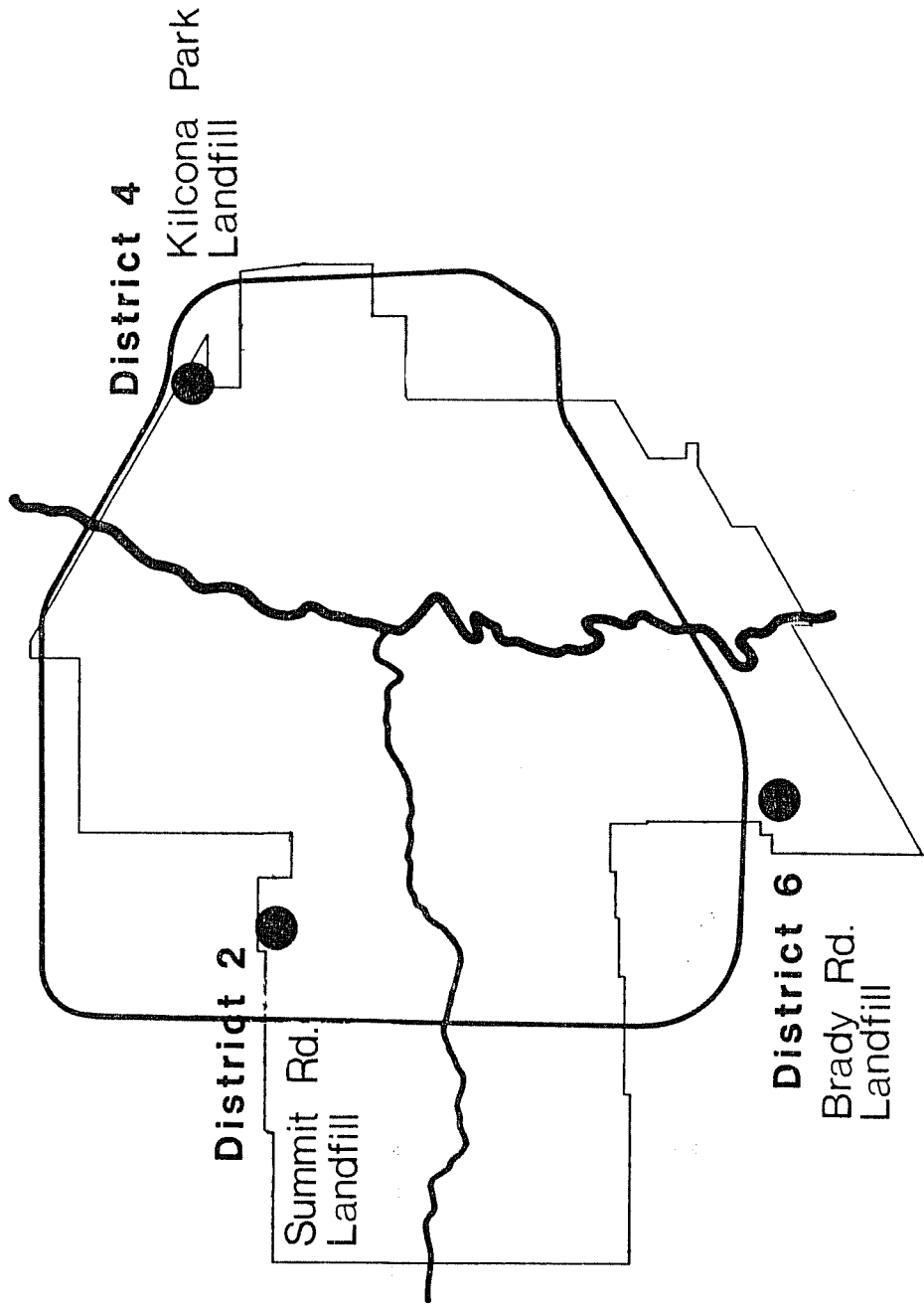
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- 4.) Establish a Citizen's Advisory Committee to work with the Administration in developing landfilling and end use concepts.

The process being recommended for implementation has been successfully used for the Kildona Park Landfill. The Citizen's Committee for the Kilcona Park Landfill provided good solid input throughout the implementation and operating phases, which has resulted in a desirable end product.

As in the Kilcona Park Landfill, consultants would be assigned to carry out detailed soil investigations and to establish specific land, transfer and operational requirements for the one site system.

# Current Disposal Is By Sanitary Landfilling

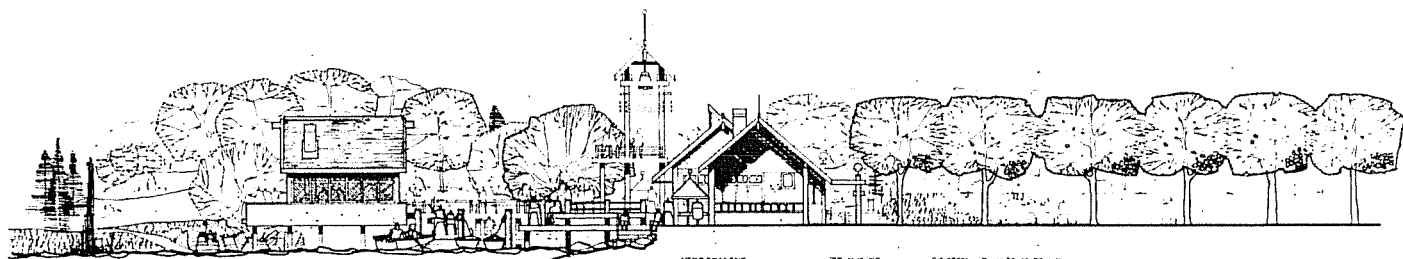
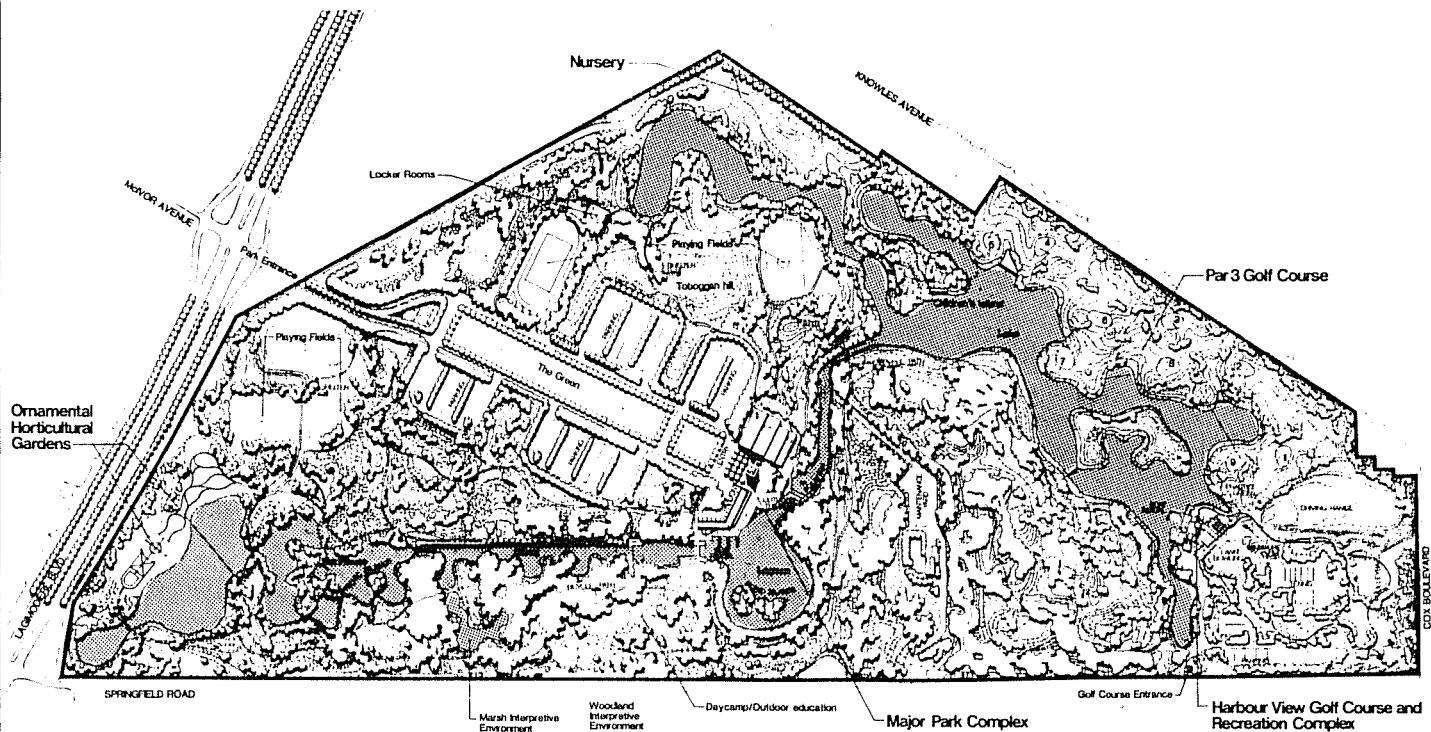


# Kil-Cona Park

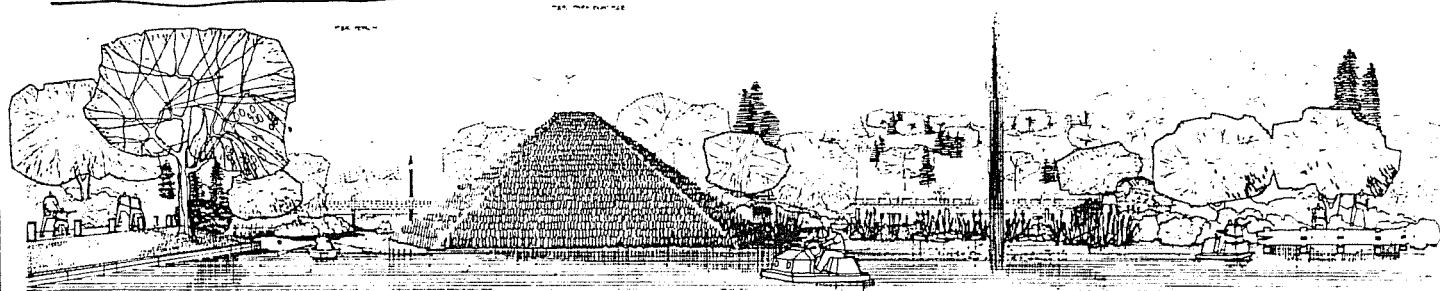
## Winnipeg, Manitoba

Kil-Cona Park, when completed during the 1990's, will be the largest public park in the City of Winnipeg. The 182 hectare park development will in part be constructed on a 72 hectare sanitary landfill site. Unlike the development of the City's previous landfill operations for solid waste disposal, the planning of this site involves a careful integration of park needs with the requirements of solid waste disposal. The resultant terrain, comprised of rolling hills and over 6 miles of treated shoreline, will eventually disguise the former landfill operations; creating a diversified landscape, capable of accommodating a wide variety of year round recreational activities.

As prime consultants, Lombard North Group has been responsible for master planning and detailed design for most components of the park and continues to play a major role in ongoing park planning and development processes.



EAST PARK VILLAGE - CROSS-SECTION



VIEW FROM EAST PARK VILLAGE

# Study Methodology

Establish Existing  
And Projected  
Distribution Of  
Quantities

Establish Disposal  
& Transfer  
- Operating Costs  
- Capital Costs

Establish Haul Costs  
For Alternative Sites

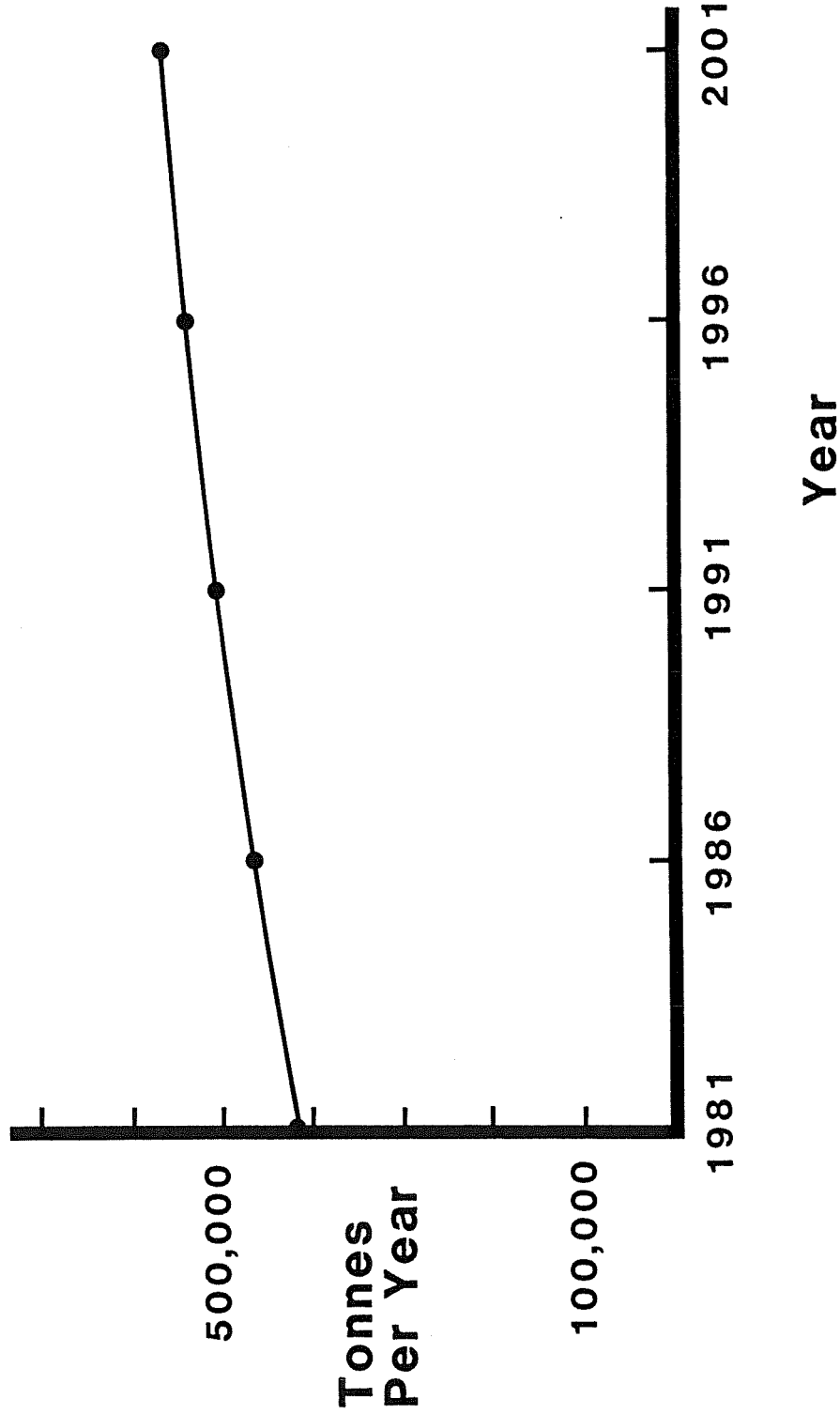
Establish Disposal &  
Transfer Site  
Alternatives  
- Constraint Mapping  
- Environmental  
Considerations  
- Social  
Considerations

Financial  
Analysis

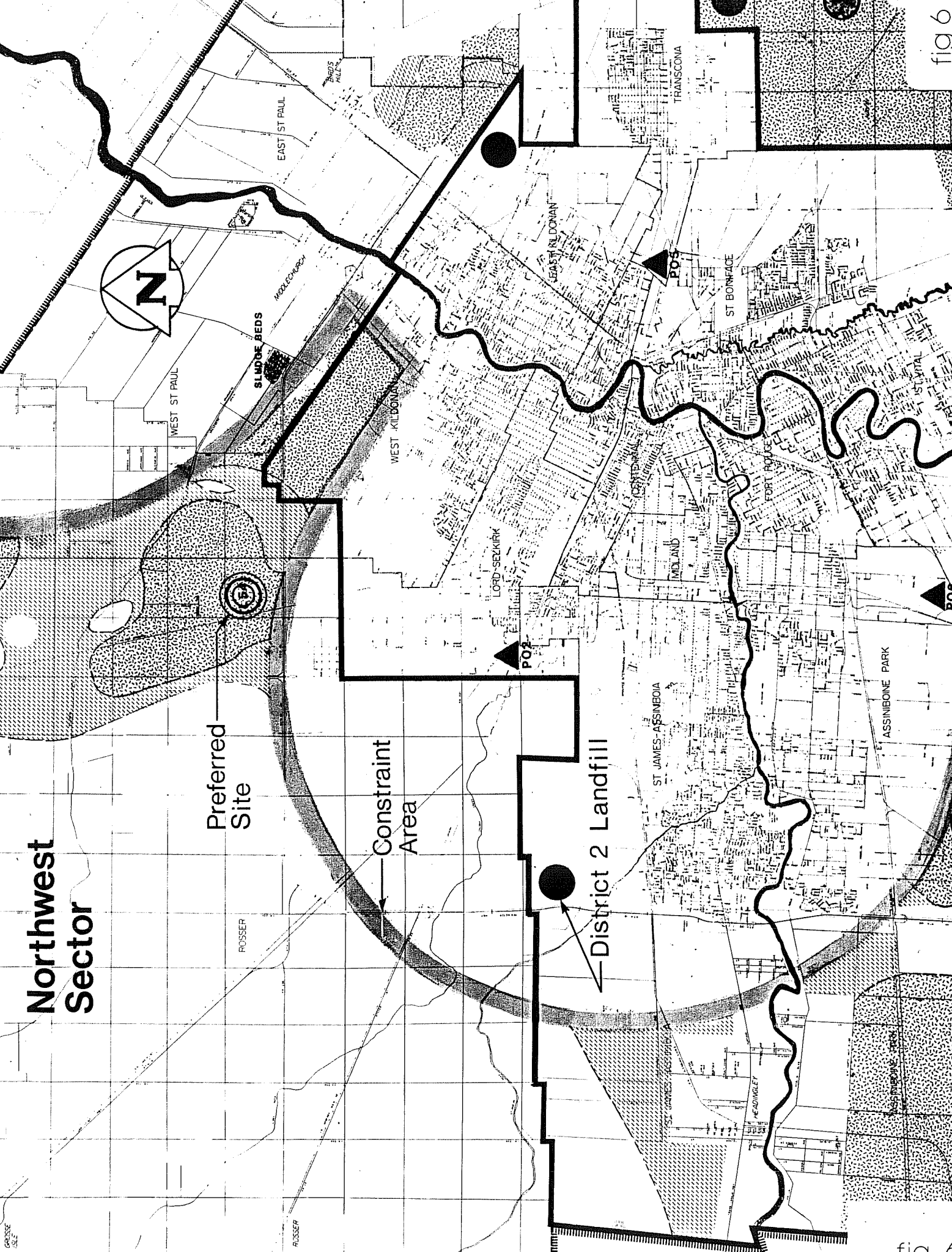
Evaluate Site  
Alternatives &  
Select Preferred  
Sites

Environmental And Social Factors

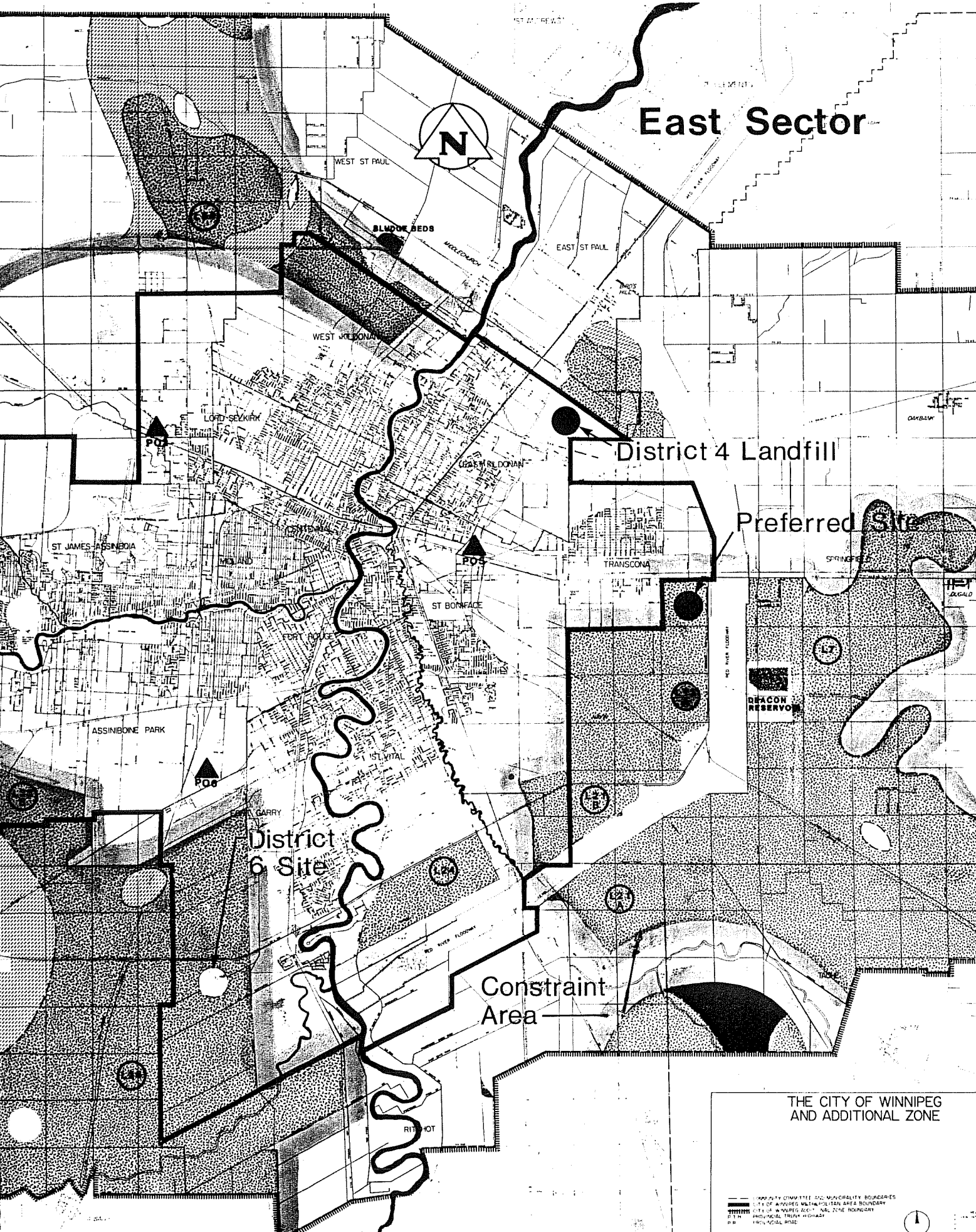
# Current And Projected Solid Waste Quantities ( Not Including Construction, Demolition Wastes & Clean Fill )



# Northwest Sector



# East Sector

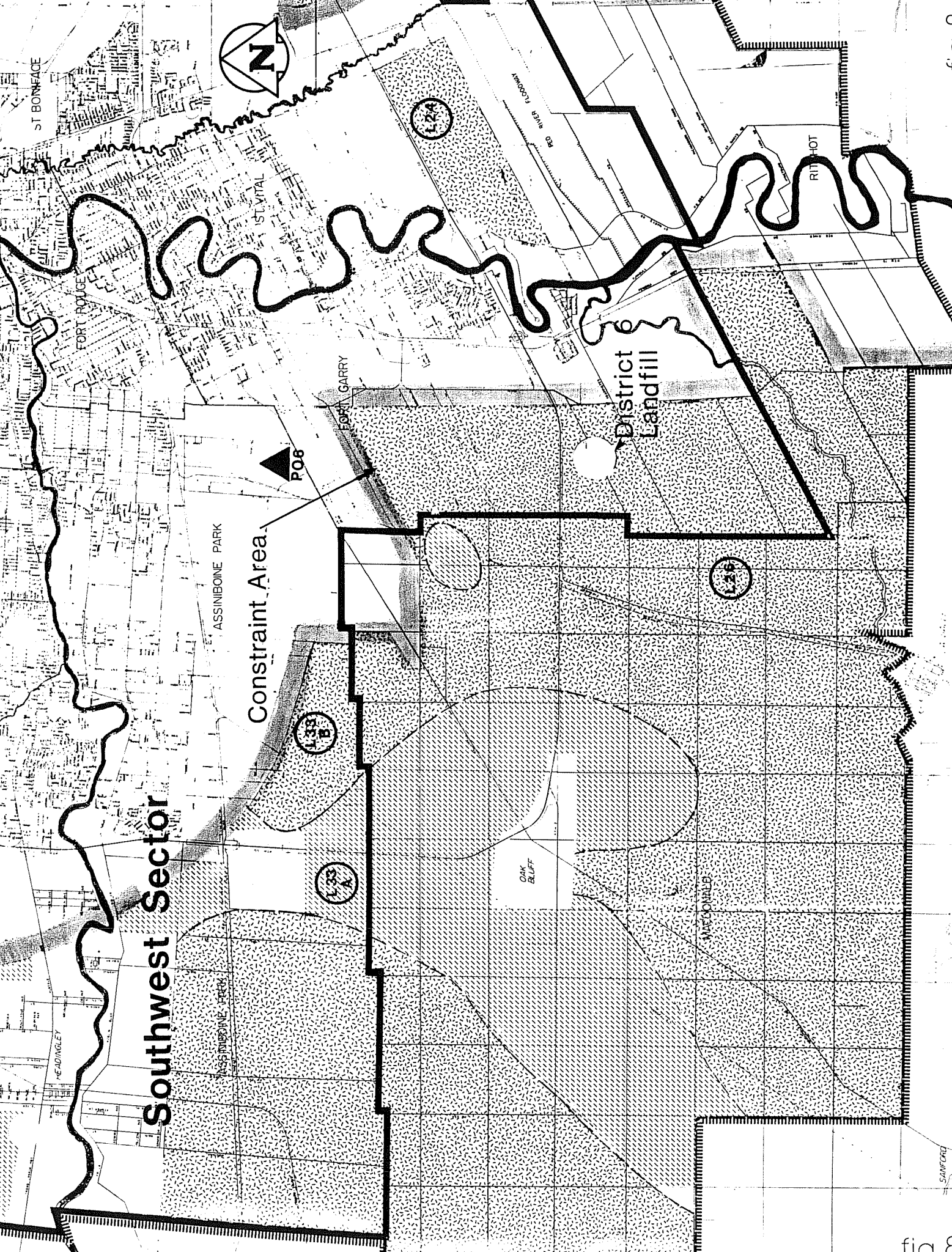


THE CITY OF WINNIPEG  
AND ADDITIONAL ZONE

- COMMUNITY COMMITTEE AND MUNICIPALITY BOUNDARIES
- CITY OF WINNIPEG MULTIPURPOSE AREA BOUNDARY
- CITY OF WINNIPEG ZONE AND ZONE BOUNDARY
- PROVINCIAL TRUNK HIGHWAY
- PROVINCIAL ROAD







Southwest Sector

Constraint Area

District Landfill

ASSINBOINE PARK

ASSINBOINE PARK

OAK BLUFF

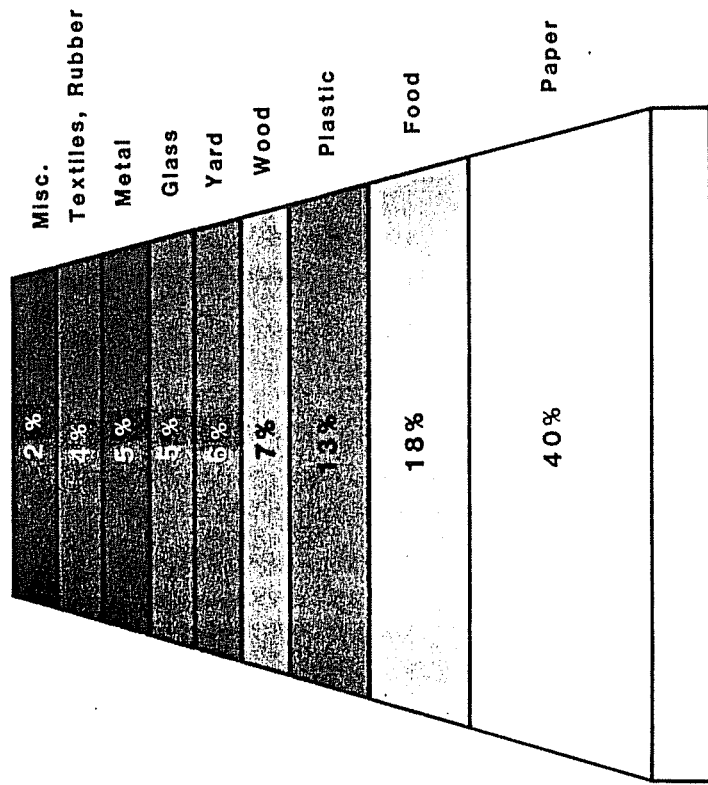
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# Composition Of Solid Waste



# Implementation Plan

