A FEASIBILITY STUDY TO DETERMINE THE ADEQUACY OF THE MANHATTAN LANDFILL FOR A PUBLIC GOLF FACILITY

by

DON E. SULLIVAN

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Manhattan, Kansas

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Approved by

Ben D. Mahaffey
Major professor

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TABLE OF CONTENTS

		Page
Abstract		i
Acknowledgments		iii
Table of Contents		iv
List of Maps		vi
Introduction		1
Chapter One.	Desirability of a Municipal Golf Facility in the Manhattan Area	3
	Municipal Golf	3
	Golf in Manhattan	7
	Comparison of Manhattan with National Standards	11
	Potential New Markets	12
	Potential Facility Types	14
Chapter Two.	Physical Suitability of the Manhattan Landfill for Development of a Golf Facility	15
	Introduction	15
	Site Location and Access	15
	Compatability with Contiguous Land Use	16
	General Physical Features	18
	Flooding and Water Supply	21
	Soil Analysis	22
Chapter Three.	Estimated Costs of Project	25
	Introduction	25
	Capital Improvement Expenditures	25
	Maintenance Equipment	26
	Suggested Annual Operating Budget	28
	Possible Revenues	28
	Project Financing	29

Page

Chapter Four. Summary 31

Report Conclusions 31
Recommended Action 31

Notes 33

Bibliography 34

Appendix 36

Change in Manhattan Population 37
Townships and Populations Included in Market Area 38
County Population Growth Predictions--1975-2000 39

LIST OF MAPS

Map		Page
1.	Estimated Market Area for Manhattan Public Golf Facility	8
2.	Location and Access	17
3.	Area Land Use	19
4.	General Physical Features	20
5.	Soil Analysis	23

INTRODUCTION

The present Manhattan sanitary landfill is an 80 acre tract located approximately 3 miles south of Manhattan in the area known as "Hunter's Island."

In approximately *one* year the landfill will be full and phased out of use. It will then be turned over to the Manhattan Park Resources Department for park development.

There is local interest in developing this land into a municipal golf facility. This has been successfully done in several communities around the country. However, the development of any golf facility means a large capital investment and an increase in maintenance activities.

Important questions must be answered before the city of Manhattan can make this type of investment: (a) Can the City of Manhattan support more golf facilities? (b) Can the city afford to develop and operate a golf facility? (c) Is the landfill a suitable site for a golf course? This study will attempt to answer these questions and to make recommendations concerning the feasibility of this type of project.

The objectives of this study were:

(1) To determine whether the Manhattan area can support additional golf facilities.

(2) To determine whether the landfill area is a desirable site for a golf course development and what type of facility is best suited for the area.

(3) To determine the approximate cost of this type of project.

CHAPTER ONE

DESIRABILITY OF A MUNICIPAL GOLF FACILITY IN THE MANHATTAN AREA

Municipal Golf[1]

A popular conception of the game of golf is that it is an elitist's game, played only by doctors and rich housewives at the local country club. It is true that many doctors and housewives enjoy the game. It is also true that many play at the local country club. However, the game of golf appeals to a broad segment of the public. Most golfers do not play at a country club but on municipal or daily-fee golf courses.

Golf has always been a game of common people. The famous St. Andrews golf course was originally founded as a public course in 1754 and remains that way today. This nation's first municipal course was opened in New York City in 1895, just eight years after golf was first introduced in this country. This proved so popular that a second course was opened two years later.

By 1910, municipal golf had spread to the Midwest, and by 1920 there were 100 municipal courses scattered throughout the country. This figure has continued to grow until today there are some 1400 municipal facilities.

A municipal golf course is one operated by a tax-supported agency. Such an agency can be directly under the jurisdiction of state,

county, or city government or within the jurisdiction of some other public body such as a regional recreation commission or special park district. One important difference between the municipal golf course and other types of ownership is the reason for operating. The primary motive of municipal courses is to bring quality golf facilities to the largest number of citizens at the most reasonable cost.

Today municipal courses comprise less than 15% of the nation's total golf facilities, yet they handle nearly 45% of the nation's golf play. The total number of golfers has grown along with the population, and the proportion of golfers to the total population has increased. In 1936, it was estimated that there were 16 golfers for every 1,000 population. In 1970, there were about 60 golfers per 1,000. These figures dramatically indicate that golf is a growing sport and will probably continue to grow as leisure continues to increase.

There are now some 240 golf courses in the state of Kansas. Of these 240 courses there are 37 courses operated by municipalities. This means that there is a golf course for approximately every 15,000 Kansans. There is a municipal course for every 60,000 Kansans. Golf courses have grown by some 34% in Kansas in the past ten years, and the number of municipal courses has increased by nearly 50%. Golf in Kansas, as in the nation as a whole, is growing, especially municipal golf.

There are many advantages for a community that operates a municipal golf course. One basic advantage of a municipal facility

is that it can provide a well-maintained golf facility at a reasonable direct cost to the consumer. Since the course is tax supported and income is not a primary motive, the greens fees can be less than private or semiprivate courses. This allows the course to be available to a broader segment of the population and thus increase the total amount of revenue. As development costs are paid and the operation of the course becomes more profitable, excess revenues can be made available to other areas of the community's total recreation program.

Another advantage to the municipal course is an opportunity for public recreation programming. Free lessons, city-wide tournaments, workshops presented to youth, senior citizens, or women's groups can be attractions of a municipal course.

There can also be community cooperation with the area schools in developing golf programs using the municipal course. This and recreation programming is a good way to stimulate interest in golf and create more individual play.

A golf course can be an effective way to reclaim and beautify land. In Manhattan's case, a golf course is a good way to reclaim a sanitary landfill area.

The open, green space of a golf course increases the prestige and the value of the surrounding area. In addition, it would be expected that the people already in the area would begin to feel a new sense of neighborhood pride brought on by the transformation of a sanitary landfill to a beautiful golf course.

Golf courses can provide a compatible land use for flood plains. Although flooding may cause damage to a golf facility, the damage is much less than with most other types of development, and the course may even be benefitted by a topdressing of river silt.

Golf courses can serve as a resource for other recreational activities. Local schools often use a golf course for cross country track practice and competition. They can also become outdoor laboratories, presenting opportunities for local school children to study nature in a close, effective setting. A golf course built on a sanitary landfill becomes a lesson in ecology and the reclamation of used land.

The principal disadvantage to a municipal golf course is cost. A golf course requires a large capital investment for maintenance and operation. A golf facility requires one of the largest capital investments of any recreational facility. Development costs average $25,000 per hole. Operating costs average close to $75,000 per year for a nine-hole course. A community should realize that a first-rate facility will probably operate with a deficit for several years.

Before such an investment is made, it must be determined by the community leaders that their recreation dollar may be best spent by investing in a golf facility. Alternative recreation or public investments for the landfill area are beyond the scope of this paper. However, consideration of the feasibility of a golf course is necessary to select the best alternative for the sanitary landfill.

Another major disadvantage of a municipal golf facility is the risk of entering into competition with local private enterprise. Businessmen often feel that golf courses should be considered private enterprise. They may feel that local government is giving unfair competition. A community, however, should provide services that are not being adequately provided by the private sector. Communities can successfully provide golf facilities without unfairly competing with private enterprise.

Golf in Manhattan

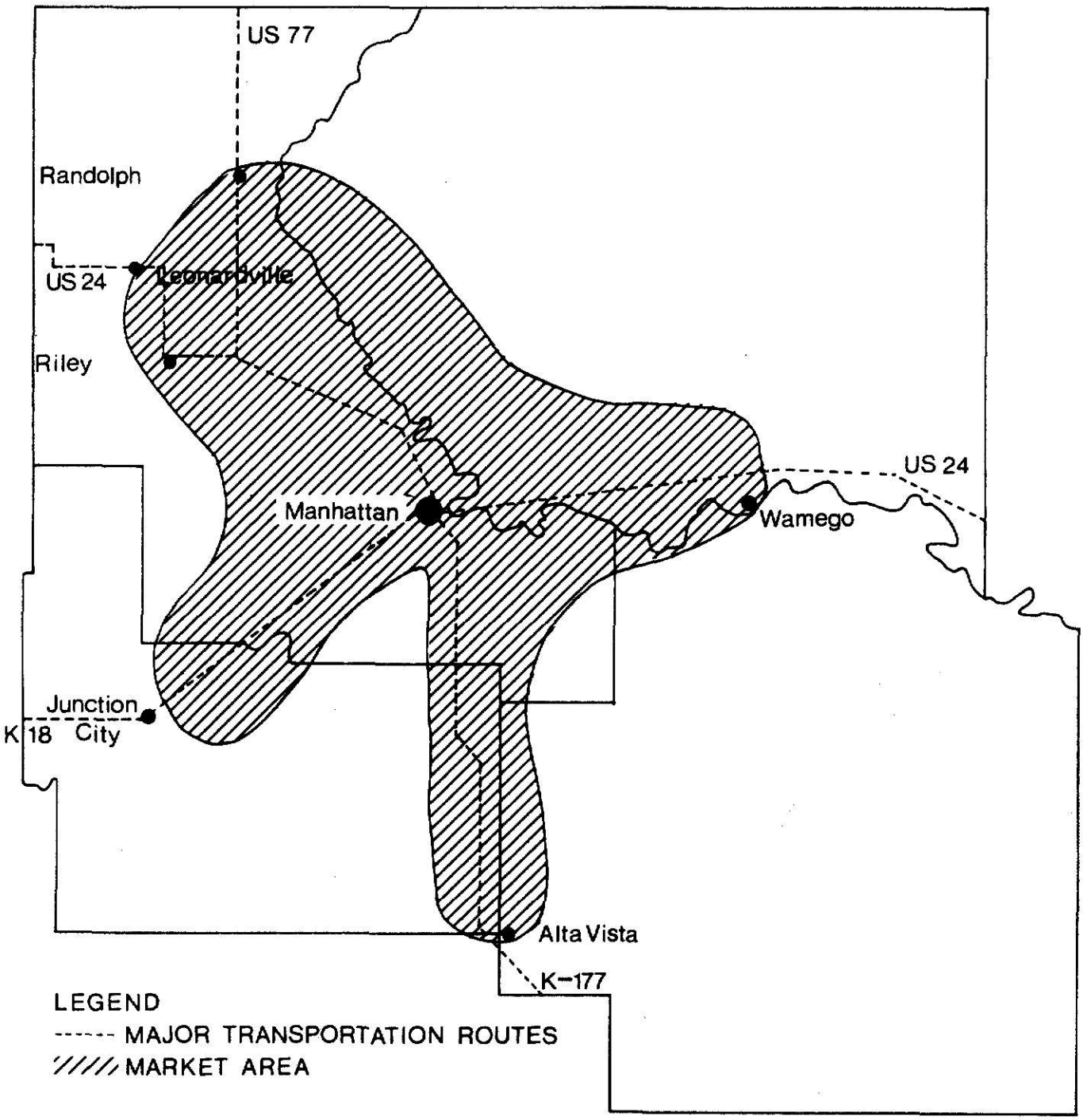
In determining whether additional golf facilities are needed in the Manhattan area, several considerations are necessary. The first is to identify the market for a new facility.

To establish this, the author has identified a market area for golf facilities in Manhattan. (See Map 1) This market area is based on a time-distance criterion, determined by the distance a person will travel to play golf. This presumes that an adequate local facility will be used, rather than a person traveling away from the area, and that people without intervening opportunities will be attracted from a distance.

The market area delineated extends from Manhattan along the major highway routes throughout a four-county area including Riley, Pottawatomie, Geary, and Wabaunsee Counties. The market area has been limited by outlying towns or cities since it is believed that persons beyond this area will find it generally more desirable to travel in other directions for golf activities.

ESTIMATED MARKET AREA FOR MANHATTAN PUBLIC GOLF FACILITY

MAP 1



The knowledge of total population within the market area and growth prediction for the area are necessary in deriving the size of the available markets. The total population of the estimated market area was determined by the population of the townships that fall within the designated area. This total population was 66,000, based on the 1970 census. (See appendix for a listing of townships and the census figures.) This population figure may be low because of growth and migration since 1970.

In predicting the need for additional facilities, future populations must be considered. Estimating the exact rate of population growth for the defined area is difficult. However, population growth rates are available for the entire four-county region, and these are indicators of expectations within the market area. (See appendix for detailed population predictions.)

The population of the four-county region is predicted to increase by nearly 50% by the year 2000. This figure, however, is slightly misleading. While the population of Geary, Pottawatomie, and Wabaunsee Counties is actually predicted to decrease, the population of Riley County is expected to increase by 91%. This is especially important for consideration since almost 85% of the total market area population lies within Riley County. It seems probable, considering the past growth patterns of Riley County, that a sizable percentage of the population growth will occur in and around Manhattan.

There are six golf facilities available within the market area. Of these six, only one facility is fully developed, i.e., has grass greens, a complete maintenance program, and a daily-fee basis. The six facilities are:

Fort Riley Officers Club	9 holes*
Fort Riley E. M. Club	18 holes*
Manhattan Country Club	18 holes
Wamego Country Club	9 holes
Leonardville Golf Club	9 holes
Stagg Hill Golf Course	18 holes
Total	81 holes

The Stagg Hill Golf Course is the only public, fully developed facility within the market area. This is the only club where a person can play on a daily-fee, independent basis.

This fact is extremely important when considering the cost of golf play. A golfer who enjoys playing only a few times a year cannot afford to pay several hundred dollars to join a country club. This fact also applies to lower-income groups, middle-income groups, youth, and senior citizens on a fixed income. For this reason a daily-fee basis is extremely important for a municipal golf course. A much larger population desiring recreation can be served by this type of course. Thus, the Stagg Hill Golf Course is the only course within the market area that would compete for part of the same market as a municipal facility.

In addition to the total number of holes, the total amount of play is also an important determinant of needed facilities. Interviews

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*available only to military personnel, retired personnel, and their guests.

with local golf pros and others involved indicated between 100,000 and 125,000 rounds of golf played per year on all six courses.

Comparison of Manhattan with National Standards

National standards, when applied to a particular area, should not be the sole justification for facility development. However, they can be considered along with other factors unique to a particular area. National standards are guidelines based on statistics from many areas. Figures indicate average population rates at which recreational facility development has been successful. Organizations vary in estimating figures for the number of golf courses needed to serve a particular population. The U. S. Soil Conservation Service recommends one 18-hole course for every 20-25,000 people.[2] The National Recreation and Park Association recommends one golf course for every 50,000 population.[3] The National Golf Foundation recommends one 18-hole, daily-fee course for every 20-25,000 persons.[4]

The Manhattan market area, with 81 holes and a total population of 66,000 is well above the national standards. However, two considerations need to be emphasized.

Although there are 81 holes of golf available, only 18 are available on a daily-fee basis. According to the National Golf Foundation criteria cited above, this is far below what can be considered as an adequate number of golf facilities.

The other consideration is population growth. The Manhattan area is expected to grow by some 50% in the next 20 years. Advanced

planning is necessary for development of future recreational facilities.

Another important factor in considering the need for additional facilities is the amount of play on the Manhattan area courses as compared with the national average. According to the National Golf Foundation there are 60 golfers for every 1,000 population. Considering the population in the Manhattan area of 66,000, there would be approximately 3,960 golfers. The National Golf Foundation indicates a golfer is considered to be someone who plays at least 15 rounds of golf per year.[5] Using this figure, Manhattan should have a total golf play per year of around 59,000 rounds of golf.

Since the Manhattan area estimate for total number of rounds played is above 100,000, the Manhattan area is well above the national average for the total amount of golf played and the number of golfers. Considering this and the new markets available (see below), it is highly possible that the Manhattan area could support total golf facilities well above the national standard.

Potential New Markets

To determine the desirability of additional golf facilities in the Manhattan area more must be considered than the present amount of play. An important benefit of a municipal golf facility is that it offers golf to the total community. Although programs, such as lessons and workshops, do not themselves generate additional revenues or play, they lead to an increasing area-wide interest in golf and an increase in the quality of life.

There are certain factors that must be present to fully exploit these new markets. One factor is that of reasonable fees. The greens fees for the course must be kept as low as possible to allow all ages and income groups the opportunity to play. The other is promotion. The course itself must be used to its full potential. Recreational golf programs must be offered to all groups. These programs must be conducted frequently, and they must be top-quality programs. The course should have full-time instructors and a pro to plan and carry out these programs.

New markets may also open up from other areas. As golf facilities in larger areas, such as Topeka, become more and more crowded and waiting lines become longer, golfers from these areas will be looking for new places to play. A top-quality facility can attract these people from the larger areas to Manhattan.

Other possible markets might be nonrelated uses mentioned earlier, such as nature study or even picnicing along the fringes of the course. With the development of a large clubhouse, meetings and activities can become an important source of revenue through rent and service charges.

It should be realized that the services needed to fully exploit all of these new markets, i.e., a large clubhouse or a full-time course pro means additional capital outlay and increased yearly operating costs.

Potential Facility Types

The final consideration should be the alternative types of facilities that might be developed. The most common type of facility would be the regulation 18-hole golf course. This would include a maintenance shop and a clubhouse that would include a pro shop, concession facilities, restroom and locker-room facilities. Along with this there could be a driving range and practice greens. There is no required form for these features. They could be as elaborate as St. Andrews or as simple as a metal barn and a level pasture. The amount of development depends on the resources available: land, capital, operating budget, and market.

CHAPTER TWO

PHYSICAL SUITABILITY OF THE MANHATTAN LANDFILL FOR DEVELOPMENT OF A GOLF FACILITY

Introduction

For any recreational facility to be top quality it must be developed on a site that provides certain necessary features. The site must be physically suitable for the proposed use. Soil conditions should be correct for the particular use, the site should be relatively free of flooding, and the topography should not seriously hinder the development.

The site itself should be properly located within the community. The proposed use for the site should be compatible with surrounding land uses. Adequate utilities should be available, and the site should have reasonably good access.

In determining the suitability of a landfill site for development, there are additional considerations made necessary by the character of the landfill itself. The solid waste present in a landfill decomposes both chemically and biologically to produce certain liquid and gaseous by-products. These by-products may hinder development of the landfill for years after it is closed.

Site Location and Access

The National Golf Foundation recommends that a municipal golf facility be located, if possible, on a main highway into the community

and should not be off main traffic arteries.[6] A primary highway location provides good advertising to attract the transient player and also provides good access to the course.

While the Manhattan landfill site is not located on a major highway, access to the area is good. The site can be reached easily from two separate hard-surface county roads that converge just before the site entrance is reached. (See map 2.) The site is well served by these two roads. However, truck traffic is heavy throughout the day. This truck traffic will cease when the landfill is no longer used for dumping. These roads can also be traveled by bicycle, which will add to the attraction of the site.

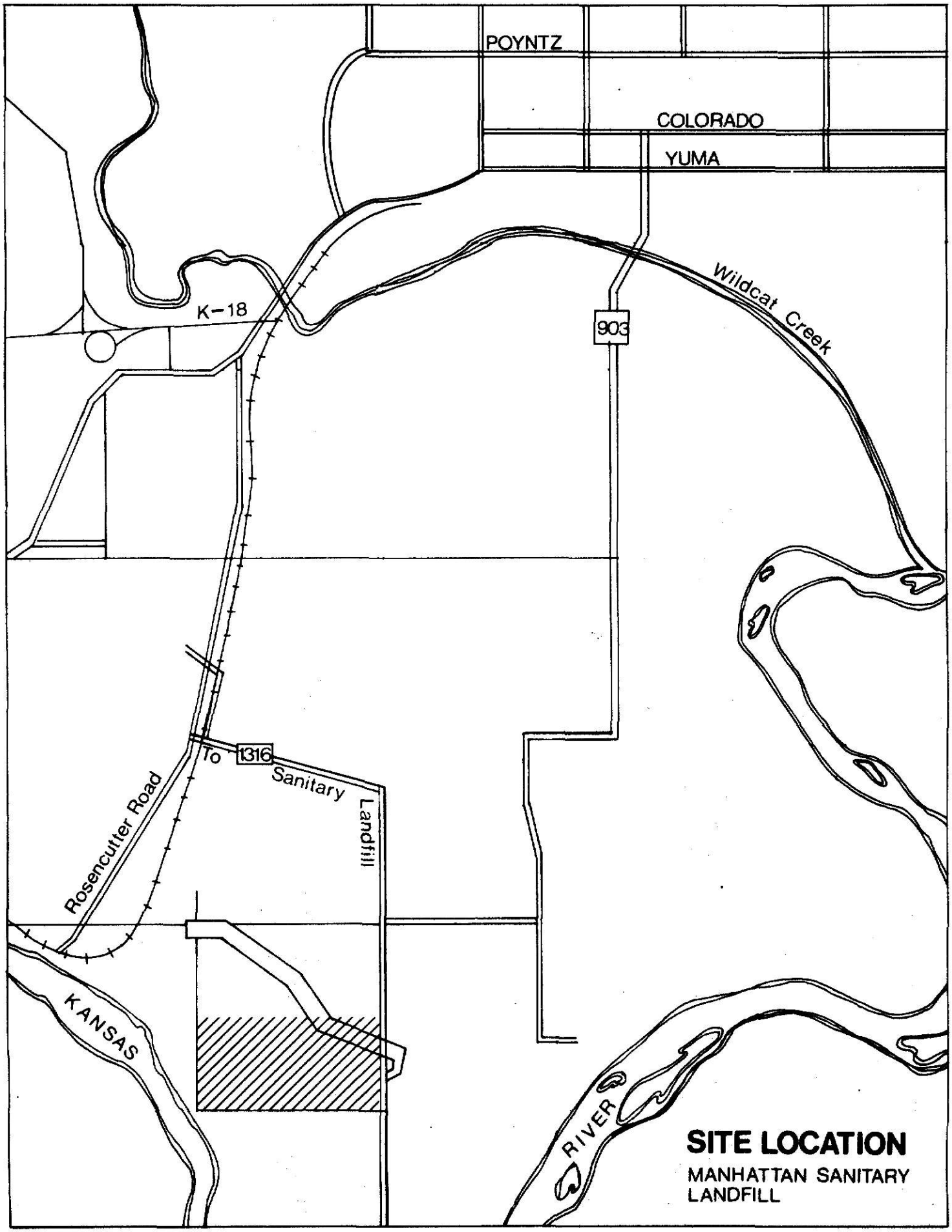
Since a Manhattan municipal golf facility can apparently be supported from a particular local market, the necessity of drawing large numbers of transient players is not great. For this reason the easy local access of this site overshadows the slightly out-of-the-way location for transient players.

Compatability with Contiguous Land Use

A good golf course should be located in an area where surrounding activities do not interfere with it. A golf course should not be located in an area where the diseconomies of surrounding activities, i.e., air or noise pollution, will make playing golf an unpleasant activity. A golf course should not be developed where it will interfere or hamper other existing land uses.

A golf course developed on the Manhattan landfill site should present little problem with compatability to surrounding land uses.

MAP 2


POYNTZ
COLORADO
YUMA
K-18
903
Wildcat Creek
To 1316
Sanitary Landfill
Rosencutter Road
KANSAS
RIVER
SITE LOCATION
MANHATTAN SANITARY LANDFILL

(See map 3.) The uses of the areas immediately adjacent to the landfill site are primarily agricultural. The entire area is dedicated to agricultural and residential uses. Most of the residential areas are mobile homes. An open, green area such as a golf course could fit well into the present total area land use scheme.

Future land uses within the area will probably remain similar to what they are now. The landfill site is located within an unprotected flood plain. For this reason large-scale residential or industrial development is unlikely.

General Physical Features

There are few major physical features on the landfill site. (See map 4.) The area is approximately 80% open and level with a rough grass cover. There is one area along the northern edge of the property that has a tree cover. There is some relief in this area. Most of this relief consists of sand dunes covered with grass. There is also a very small tree covered area on the south edge of the site. The existing areas with relief should enhance development.

The National Golf Foundation has determined that for a safe, top-quality course there should be at least an 80-acre area for every nine holes.[7] Since the landfill site is an 80-acre site, a quality nine-hole facility could be developed without additional land purchases.

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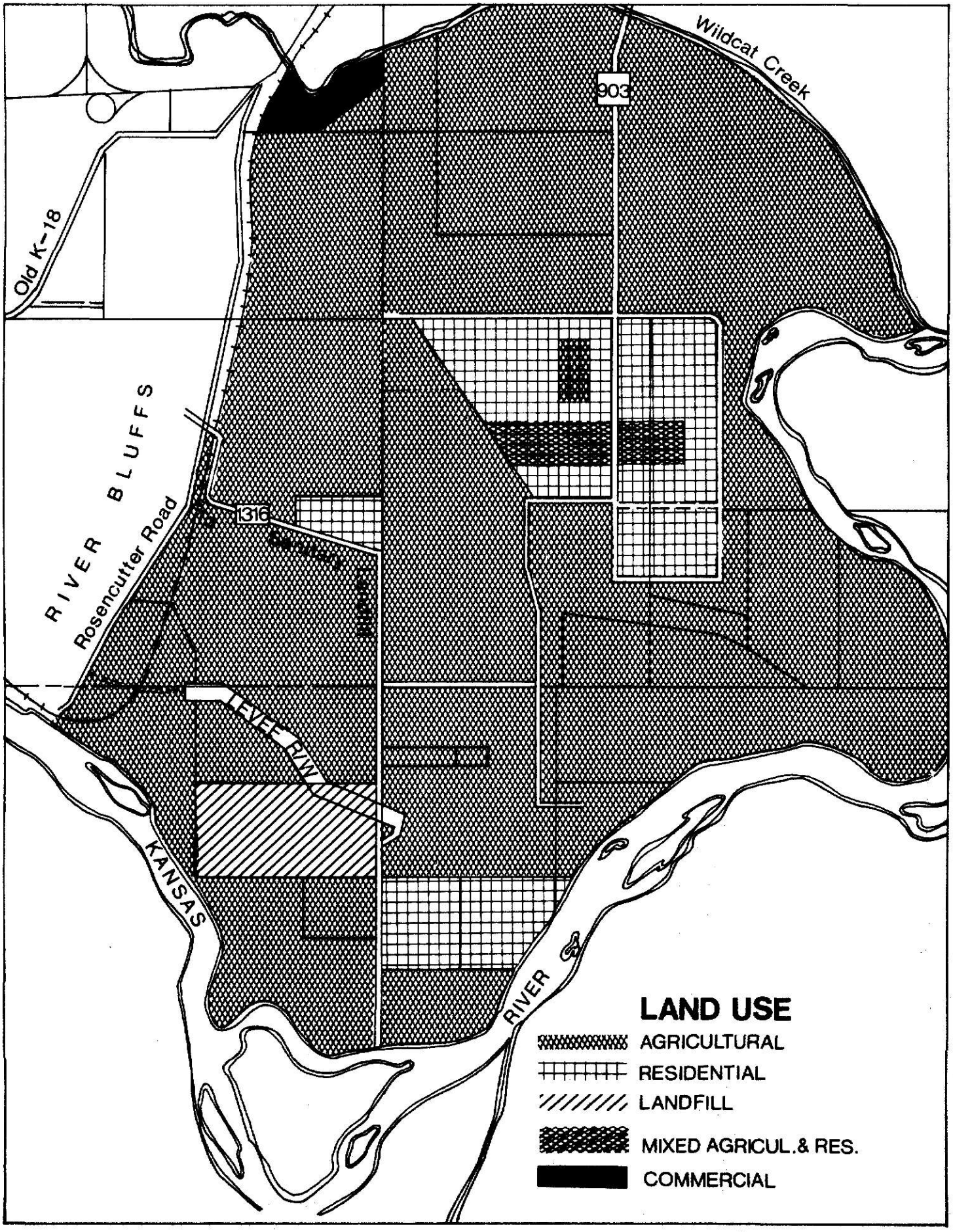
MAP 3


Wildcat Creek
903
Old K-18
RIVER BLUFFS
Rosencutter Road
1316
LEVEE RD.
KANSAS
RIVER
LAND USE
AGRICULTURAL
RESIDENTIAL
LANDFILL
MIXED AGRICUL.& RES.
COMMERCIAL

THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.

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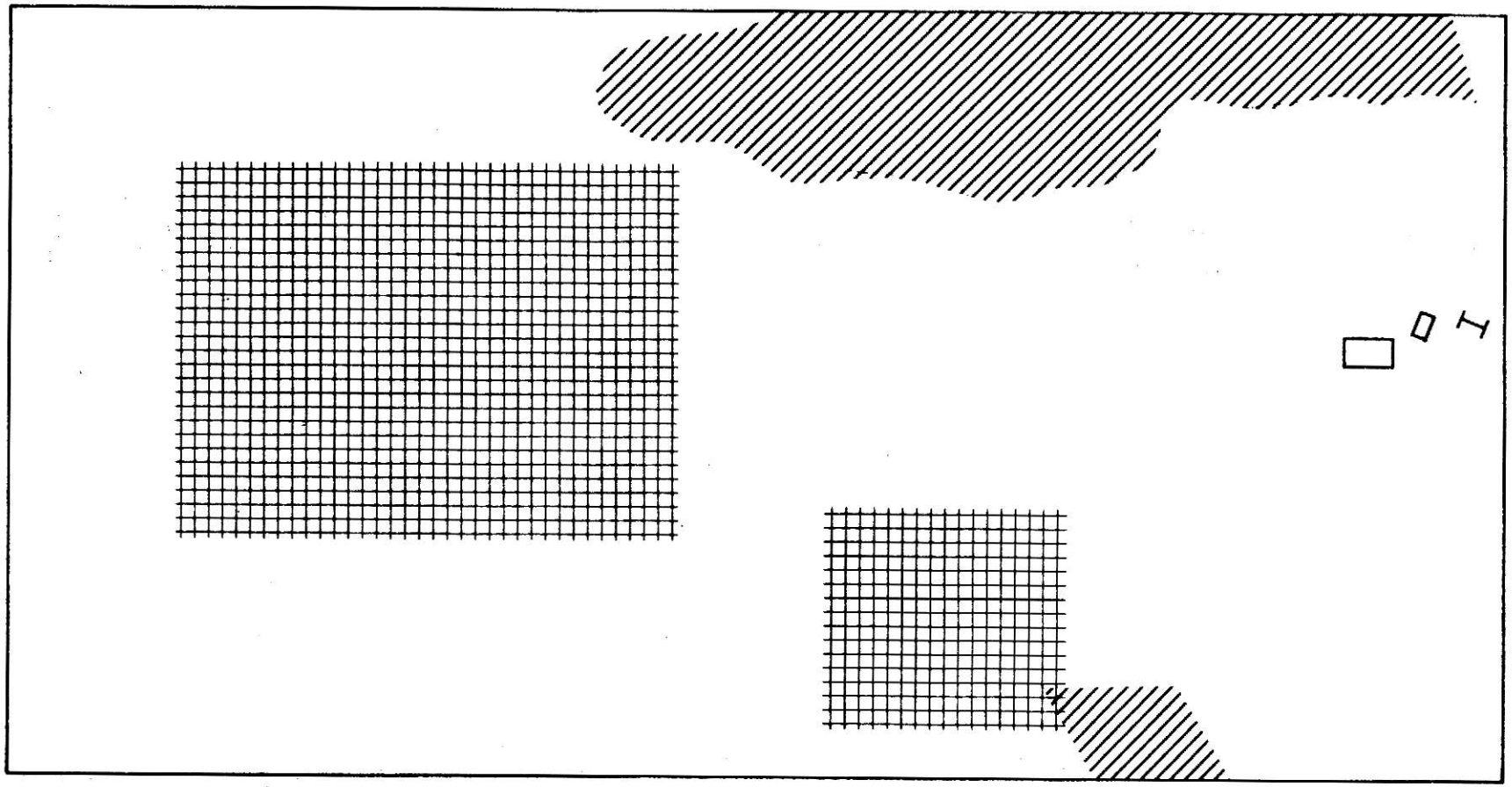
PRESENT SITE ANALYSIS
MANHATTAN SANITARY LAND FILL

MAP 4



LEGEND

- TREE COVER
- PRESENT DUMPING AREAS
- OPEN, UNUSED AREAS
- ENTRANCE
- BUILDINGS

N

SCALE 1″=300′

Flooding and Water Supply

The landfill site is subject to some flooding. However, the problem is lessened by the type of development planned. With a golf course there would be no extensive development of structures that could be damaged by flooding. The damage that would occur would be to the turf areas of the course. With flooding of several days duration, turf areas would not be destroyed. The cost to the course in capital outlay and lost revenues would depend on the extensiveness of the damage and the time of year the damage occurred.

Another hydrologic consideration is the availability of groundwater for irrigation and drinking. No water hookups are available from the city water system so water must be obtained from wells.

Potential chemical by-products that are produced by the decomposition of the solid waste present in the landfill may be a problem. The ground water table on the site is about 25-30 feet below the surface. In many places the fill areas are deeper than the water table. These chemical by-products can easily enter this groundwater and cause severe pollution.

According to the U. S. Public Health Service, safe, potable water can be obtained by the polluted water percolating through approximately four to five feet of fine sandy loam soils, the type present in this area.[8] With the permeability of the soils in this area (see soil analysis) a well that was drilled deep, 45 to 50 feet, and sealed in impermeable casing could produce enough potable water for all uses. As time passes and the solid wastes decompose,

this problem would disappear, but constant water tests would be necessary for the first few years.

Soil Analysis

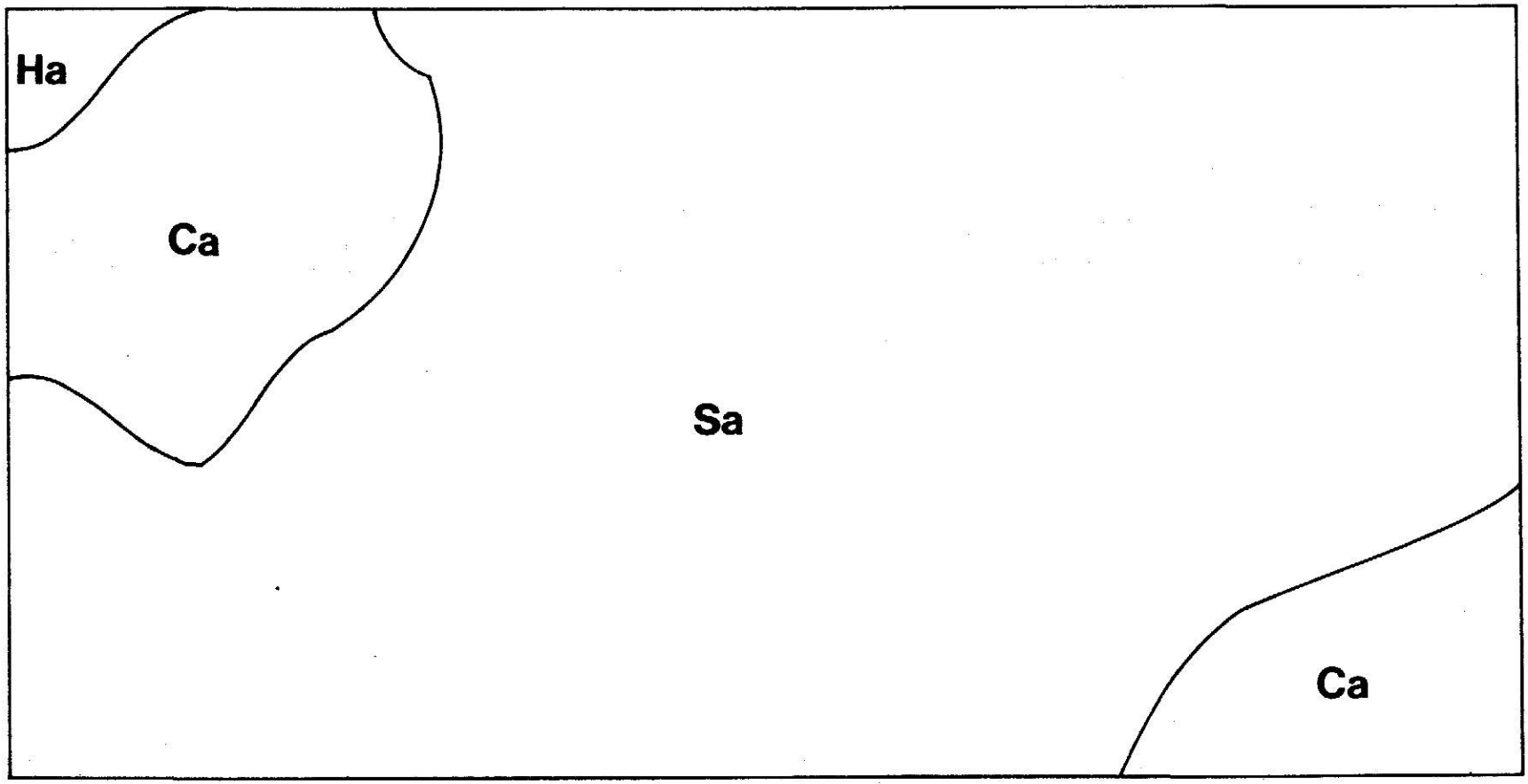
There are three major types of soils present on the landfill site.[9] (See map 5.) These are the Carr-Sarpy complex, which consists of Carr fine sandy loam and Sarpy loamy fine sand, Sarpy soils alone, and Haynie fine sandy loam. These soils are well drained to moderately well drained and are subject to surface flooding only in periods of excessive rain.

According to Beard,[10] loamy sands, coarse sandy loams, and loams are preferred soil textures for turf grass culture. This is an important consideration since good turf areas are the most important part of quality golf play. While Beard feels coarse sandy loams are best, the sandy loams located on the landfill site are fine. These fine sands are more subject to compaction and more water retention, but through selection of suitable grasses, proper maintenance, and introduction of organic matter and soil modification, quality turf areas can be cultivated on this area.

These soil types are also suitable for supporting the type of buildings that would be necessary for a golf facility. Basically the buildings would be low, one-story buildings built on concrete slabs. Since there is no sanitary sewer service available in the area, a septic tank and drainage field would be necessary. These soils are also well suited for this type of construction.

SOIL MAP
MANHATTAN SANITARY LAND FILL

MAP 5



LEGEND
Ca- CARR-SARPY COMPLEX
Ha- HAYNIE VERY FINE SANDY LOAM
Sa- SARPY LOAMY FINE SAND

N

SCALE 1″=300′

Another consideration to be made, while not related directly to soil types, does involve soil structure. This is the release of the gaseous by-products of the decomposing solid waste. While carbon dioxide is the normal by-product, this is only produced if oxygen is present in the soil during the decomposition process. Many times in some soils all oxygen is used up and methane gas is produced by decomposition. Methane gas can be harmful to plant growth and can retard growth of turf and trees. However, in soils that have good gas exchange at the surface this problem has much less chance of developing. The soils present on the landfill site seem to handle this problem well. This is evidenced by the relatively lush stand of grass now present on the used areas of the landfill. This problem, like the water pollution problem, is reduced as the solid waste is broken down and even at this time does not appear to be a hindrance to development of this site.

CHAPTER THREE

ESTIMATED COSTS OF PROJECT

Introduction

To determine the exact costs of a golf facility, decisions must be made as to exactly what kind of golf facility is to be constructed. An exact design must be formulated by a golf course or landscape architect and all the features that will be included in the course must be detailed. Only then can detailed cost estimates be formulated. The features that could be included in the course design are nearly limitless, and some of the alternatives have been discussed in Chapter One.

The National Golf Foundation suggests that a nine-hole course can cost anywhere from $90,000 to $250,000. This chapter will attempt to detail the features that will be necessary for the construction and operation of a golf course and give an estimated cost. The estimate will be general, but it will give the City a better idea of what kind of investment would be necessary. The cost estimates and equipment needs are computed for a nine-hole course.

Capital Improvement Expenditures[11]

Land Acquisition	Land is already owned by city
Engineering and Architectural Costs: includes aerial photos, maps, architectural designs, working drawings, bidding, etc.	$ 30,000

Rough Grading: includes "cut and fill," land clearing, etc.	$ 10,000
Finish Grading and Planting: includes shaping of tees, greens, bunkers, and fairways; subdrainage; preparation of area for seeding; seeding, etc.	100,000
Water System: includes well, pumps, irrigation system, etc.	100,000
Contingency Fund: 10% of total construction budget to cover contingencies of construction	30,000
Maturation Costs: covers period of from two months to one year to get course into final desired condition; includes regular mowing, fertilization, smoothing greens, etc.	15,000
Maintenance Building: includes storage area, workshop, office, employees' lockers and restrooms; floor space of approximately 4,000 sq. ft.	40,000
Power Supply: includes running electric and gas lines to buildings and pumps	2,000
Landscaping: includes finishing landscaping around course and buildings	10,000
Clubhouse: includes only rest area and concession area; floor space of approximately 1,000 sq. ft.	15,000
Total Construction Costs	$352,000

Maintenance Equipment

Tractors and Trucks:	
1 utility tractor	$5,000
1 golf course tractor	6,000
1 pick-up truck	4,000
2 utility turf trucks	8,000
1 trailer	2,000

Mowing Equipment:	
2 power greens mowers	8,000
2 power tee and apron mowers	8,000
1 3-unit riding reel mower	4,000
1 30" rotary mower	300
1 20" rotary mower	200
1 vertical mower	500
1 5-gang fairway mower	3,500
1 5-gang rough mower	2,800
1 72" tractor mounted rotary mower	1,500
1 power grass edger	200
General Maintenance Equipment:	
1 150-300 gallon sprayer	3,000
1 sod cutter	900
1 power blower	500
1 greens aerifier	2,500
1 power spiker	750
1 topdresser	2,000
1 36" fertilizer spreader	650
1 tractor mounted aerifier	1,000
1 leaf sweeper	3,500
1 steel drag mat	250
2 cyclone spreaders	100
Golf Course Equipment and Tools:	
2 hole cutters	100
18 hole cups	100
1 cup extractor	25
1 cup setter	50
18 poles and flags	300
18 practice green cups	100
18 practice green markers	150
3 sets tee markers	300
5 golf ball washers	300
6 doz. tee towels	100
5 waste receptacles	250
9 tee benches	2,000
1 divot repairer	50
1 4" plugger	50
1 8" turf repairer	50
hand tool, including shovels, rakes, brooms, clippers, shears, etc.	2,500
Total Maintenance Equipment	75,575
Total Estimated Capital Investment	$467,575

Suggested Annual Operating Budget

A. Personnel		
1 full-time golf pro	$10,000	
1 course superintendent	10,000	
2 full-time maintenance	14,000	
3 part-time summer maintenance	9,000	
2 part-time office	6,000	
Fringe benefits	4,000	
		$53,000
B. Supplies and Material		
Office supplies	600	
Heat and utilities	1,500	
Motor fuel and supplies	2,000	
Tools and mechanical supplies	1,000	
Agricultural supplies	10,000	
		15,000
C. Maintenance		
Building and grounds	1,000	
Machinery and tools	1,000	
Automotive equipment	5,000	
		7,000
Total Operating Budget		$75,100

Possible Revenues

Revenues from the course can be obtained from greens fees, concessions, and rental fees. Greens fees should be set so that they cover the total cost of annual operation and produce a small percent "profit." This additional revenue could then be used for contingencies in course operations, capital improvements, or to pay back loans or bonds issued for original capital expenditures.

Green fees charged on a course with an annual budget of $75,100 and an annual play of 40,000 rounds should be approximately $2.50 per

round. This would include a small markup and would provide an annual income of $100,000.

Additional revenues can be obtained from concessions, i.e., a snack bar or pro shop, or from the rental of such items as golf clubs or golf carts. These concessions and rentals could be run directly by the city or contracted as are concessions in other city recreational areas. Revenues from the concessions and rentals could run as high as $5,000 to $10,000 per year.

For some rentals, however, such as golf clubs or carts, the city would need to make additional capital expenditures. Aside from the initial costs of items such as carts, additional storage space and increased annual maintenance expenditures would be required.

Project Financing

Although detailed analysis of project financing are beyond the scope of this study, some alternative financing methods will be mentioned. For this type of project two possible types of capital improvement financing would seem best. Capital improvement costs could be covered by federal assistance grants or through issuance of municipal bonds.

Federal agencies do provide assistance grants for recreational facilities. The grants are generally provided through the Bureau of Outdoor Recreation or through the Community Development Program. In some cases, however, these grants will only pay part of the total cost of a project. The additional cost must be paid by the city.

Municipal bonds could be issued to cover the cost of capital improvements. These bonds would probably be either general obligation bonds or revenue bonds. For a golf course project with a possible annual surplus revenue of approximately $25,000, revenue bonds might be the best means of financing. The bonds could be retired from the revenue produced by the golf course itself. With this program the users of the course would pay the cost of development. However, since it is probable that the course would operate with a deficit for the first few years, other means of refinancing the bonds would need to be found until the course revenues could handle the burden.

The operating costs for the course should come from the revenue produced by the course. Again, other sources might need to be found until the course could establish itself. This additional money could probably come from the City's general fund. It would be necessary to insure that the course is fully financed during these first years of operation. Good programs and full service to golfers will be necessary during this time to build the reputation of the course and to continually increase the amount of play so that the course can become financially sound.

CHAPTER FOUR

SUMMARY

Report Conclusions

1. The Manhattan area can support additional golf facilities as long as the facility provided is of good quality and available to the entire public.

2. The Manhattan Sanitary Landfill site is not only suitable for reclamation and development but is an excellent location for a municipal golf facility. Due to space limitations and cost, it is recommended that a nine-hole, par-36 golf course be developed with supporting facilities consisting of a maintenance building and a small clubhouse providing only office space and a concession area.

3. While the exact cost of this project is not possible to determine until final architectural drawings have been completed, the estimated cost of the nine-hole course would range between $400,000 and $500,000. An annual operating budget of from $75,000 to $100,000 would also be required. With a greens fee of approximately $2.50, which would make the course available to most community groups, and a total annual play of 40,000 rounds, approximately $100,000 in revenues could be obtained each year. This would probably not be possible during the first few years of operation and the course would probably operate with a deficit.

Recommended Action

With the completion of this report, the Manhattan City Commission must weigh the facts presented and determine whether or not they wish to proceed with the golf course project. The Commission must determine its overall recreational priorities and decide whether the capital investment necessary for this type of project is justified.

If it is decided to continue this project, the next step would be the securing of the services of a reputable golf course or landscape architect to provide detailed designs and construction cost estimates.

In the meantime, it is suggested that an active soil improvement program be begun on the landfill site. This would simply include the addition of organic matter to the surface soil layer. This could be done through the addition of a mulch or the cultivation of a dense turf. Whether or not the golf course project is pursued, this soil program can only improve the value of the site.

It is also suggested that the future utilization of the site be determined before operations at the landfill cease. If this is done, the final rough land form of the site might better conform to the future use and development costs would be reduced.

NOTES

1. Unless otherwise noted, statistics used in this section were obtained from Organizing and Operating Municipal Golf Courses, National Golf Foundation, 1973; this publication has no page numbers and will be cited only by name.

2. Outdoor Recreation Space Standards, U. S. Department of Interior, Bureau of Outdoor Recreation, Washington, D. C., 1970, p. 22.

3. Ibid., p. 23.

4. Op. cit., National Golf Foundation.

5. Op. cit., National Golf Foundation.

6. Planning and Building the Golf Course, National Golf Foundation, Chicago, Illinois, 1971, p. 4.

7. Ibid., p. 3.

8. Weiss, Samuel. Sanitary Landfill Technology, Noyes Data Corporation, Parkridge, New Jersey, 1974, p. 11.

9. These soil classifications were developed by the Soil Conservation Service of the U. S. Department of Agriculture in Soil Survey of Riley County and Part of Geary County, Kansas, USDA, Washington, D. C., 1975.

10. Beard, James B. Turfgrass: Science and Culture, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1973, p. 328.

11. Figures are taken from Hoyden's Hill Golf Course Cost and Feasibility Study, Hoyden's Hill Golf Course Committee, Fairfield, Connecticut, 1973, and are adjusted to meet local conditions.

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APPENDIX

POPULATION INFORMATION

Change in Manhattan Population

Year	Population	Number Increase	% Increase
1900	3,438		
1910	5,722	2,284	66.4
1920	7,989	2,267	39.6
1930	10,136	2,147	26.9
1940	11,659	1,523	15.0
1950	19,056	7,397	63.4
1960	22,993	3,937	20.7
1970	27,575	4,582	19.9
1975	28,092	517	1.8

Townships and Populations Included in Market Area

Riley County:

Ashland	136
Zeandale	348
Ogden	17,168
Manhattan	8,715
Manhattan (city)	26,897
Wildcat	397
Grant	338
Sherman	234
Madison	1,574
Total	55,817

Waubaunsee County:

Washington	145
Garfield	1,008
Total	1,153

Pottawatomie County:

Blue	263
Green	120
St. George	1,242
Wamego	5,337
Total	6,962

Geary County:

Jackson	84
Wingfield	144
Jefferson	1,847
Liberty	252
Total	2,075

Total Market Area Population: 66,007

County Population Growth Predictions--1975-2000*

Riley County:

1975	65,150
1980	76,184
1990	91,844
2000	124,209

Pottawatomie County:

1975	11,529
1980	11,272
1990	10,952
2000	10,307

Geary County:

1975	28,177
1980	29,232
1990	27,480
2000	27,226

Wabaunsee County:

1975	6,140
1980	5,864
1990	5,524
2000	5,187

*These figures were obtained from the Population Research Laboratory, Department of Sociology and Anthropology, Kansas State University.

A FEASIBILITY STUDY TO DETERMINE THE ADEQUACY OF THE MANHATTAN LANDFILL FOR A PUBLIC GOLF FACILITY

by

DON E. SULLIVAN

B. A., University of Kansas, 1974

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Horticulture and Forestry

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1976

ABSTRACT

A FEASIBILITY STUDY TO DETERMINE THE
ADEQUACY OF THE MANHATTAN LANDFILL
FOR A PUBLIC GOLF FACILITY

DON E. SULLIVAN

B. A., University of Kansas, 1974

There has been an increasing interest in the reclamation of land used to dispose of solid wastes by municipalities. One of the prime uses of the reclaimed land is the development of recreational facilities. With the closing out of the Manhattan, Kansas, sanitary landfill and the local interest in golf, it was decided to make a feasibility study to determine whether the City of Manhattan could develop a golf course on the landfill site.

The study attempted to answer three questions basic to the feasibility of such a project. Those questions were:

(a) Can the Manhattan area support additional golf facilities?

(b) Is the sanitary landfill a suitable site for golf course development?

(c) What is the approximate cost of such a project?

The results of this study indicated that the Manhattan area could support additional public golf facilities.

The landfill site was determined to be excellent for development of a proposed golf facility, although space will limit the course to nine holes.

The study suggested a general cost estimate for the project of approximately $450,000 capital investment with an operating budget of approximately $75,000 per year.

The study concluded that the project was feasible if the city government would finance the investment needed. If so, landscape architectural services should be secured to offer detailed design and cost alternatives.