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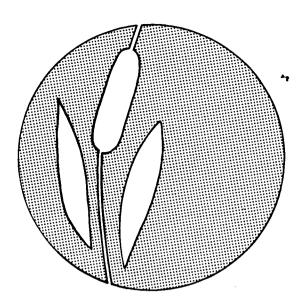
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TIFFT FARM F.L.

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# TIFFT FARM NATURE PRESERVE

## TECHNICAL REPORT

ECOPLANS, INC.



#### ECOPLANS, INC.

January 31, 1975

Hon. Richard L. Miller, Commissioner Department of Community Development City Hall Room 920 Buffalo, New York 14202

Dear Commissioner Miller:

Ecoplans Incorporated is pleased to transmit this final Technical Report for the Tifft Farm Nature Preserve Master Plan.

Now and then, a firm such as Ecoplans receives a commission for a project which turns out to be a richly rewarding labor of love. The Tifft Farm Master Plan has been one of those projects. It is our hope that in the years to come, all of the citizens of Buffalo will be able to share the beauty and delights of this unique area which we have come to know and love over the last two years.

As a native of Buffalo, it has been a particular pleasure for me to have the opportunity to provide some return to the city and school system which helped to shape my own life. The knowledge that the Tifft Farm will be an educational resource as well as an urban sanctuary for wildlife especially close to my former South Buffalo home and neighborhood makes this project one of the high points of my professional career.

We at Ecoplans want to express our deep appreciation for the assistance of your staff, particularly my good friend Deputy Commissioner Danforth, and your Director of Program Charles Rosenow.

Our task was made even more delightful by the inspiring leadership and assistance of the Tifft Farm Technical Advisory Committee chaired by Dr. Ted Hullar. The City of Buffalo and all of Western New York are most fortunate to have their dedicated and active service to the community.

My very best wishes.

Sincerely,

Vincent J. Moore

VJM/bb

MASTER PLAN FOR THE TIFFT FARM NATURE PRESERVE BUFFALO, NEW YORK

**JANUARY 31, 1975** 

PREPARED BY: ECOPLANS, INCORPORATED THE ARCADE SARATOGA SPRINGS, NEW YORK 12866 518 / 587-2550

A MEMBER OF THE SARATOGA ASSOCIATES

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Department of Community Development Richard L. Miller, Commissioner Richard S. Danforth, Deputy Commissioner Charles F. Rosenow, Project Director

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The preparation of this report was made possible by a grant from the New York State Department of Environmental Conservation and the Greater Buffalo Development Foundation.

Service

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#### PREFACE

The Master Plan for the Site Development and Environmental Management of the Tifft Farm Nature Preserve is a product of talent and energies from several sources.

Primary credit goes to Nature, and her refusal to abandon an area abused and rejected by man. The Tifft Farm even today is an eloquent and powerful statement of Nature's ability to reclaim an environment abandoned by man. Because of the steady, restorative processes of nature, the Tifft Farm has advanced to a fairly high stage of ecological complexity and diversity. Already the Tifft Farm is an area of significant value to urban man - provided that urban man steps back and accepts a new partnership with nature.

Second credit belongs to the sensitive people who first recognized what was going on at the Tifft Farm, who refused to accept the idea that the Tifft Farm was just another junkyard for the deposit of the wastes of urban society. Foremost among these people is Tony Pierzchala a citizen in the real sense of the word - who believed in something and fought to get his idea up for consideration. Tony knew what was going on at the Tifft Farm several years It was his "open space" although it wasn't exactly public open space. From his home across the polluted Buffalo River, Tony and his childhood friends from the First Ward traveled across railroad tracks and bridges to play in the Tifft Farm. The "play equipment" in the Tifft Farm was better than most of the sterile "designed" equipment of the urban playground. Tony and his friends climbed trees, played chase among the ruins of the coal and lumber docks, dug holes, built shacks of scrap lumber. But Tony began to notice other things about his "open space". The marsh had muskrats, ducks and There were frogs, snakes, newts, other waterfowl. rabbits, pheasant and other wildlife - including rats attracted by the grain spilled from railroad cars serving the nearby mills. Gradually, Tony became a selfeducated naturalist - learned a lot about ecology and the habitats of the Tifft Farm wildlife. Even after he was married, Tony brought his family over to the area to picnic and learn what he could teach them about nature.

When the Buffalo Sewer Authority announced plans to acquire the site as a landfill area for the transfer of

two million cubic yards of municipal refuse from Squaw Island, Tony swung into action.

A number of other people also knew what was going on at the Tifft Farm and responded to Tony's concerns. These were people who could bring the support of community organization and political power to bear on the demand to preserve the Tifft Farm. They include Dr. Ted Hullar of the Sierra Club, Dr. Robert Andrle of the Buffalo Museum of Science and Harold Dodge of the Buffalo Ornithological Society. These men and the groups they represented had periodically visited the Tifft Farm for nature study purposes. Together, they formed an Ad Hoc Committee to prepare a position statement on the value of the Tifft Farm, and when that was done, they approached the Buffalo City Government Officials with a plan for accomplishing the preservation of the Tifft Farm.

Third credit goes to the officials of the City of Buffalo who recognized the validity of the Ad Hoc Committee's work and who began turning the administrative wheels to incorporate the objectives of preserving the Tifft Farm. Former Mayor Frank Sedita, Richard L. Miller, Commissioner, and Richard S. Danforth, Deputy Commissioner of the Department of Community Development, were particularly responsible for generating the financial and administrative policy support needed. Mayor Stanley Makowski has continued his predecessor's strong support for the project.

Fourth credit goes to the New York State Department of Environmental Conservation and the Greater Buffalo Development Foundation for securing the funds necessary for proper planning.

Last, but not least, major credit belongs to the Buffalo Sewer Authority which has cooperated with the master planning effort by incorporating standards and criteria into the transfer operation in order to ensure that the landfill is accomplished in an environmentally sound manner.

Ecoplans, Inc., is indebted to the members of the Tifft Farm Technical Advisory Committee listed inside the cover for their helpful advice and assistance in the preparation of this Master Plan. We also wish to thank the Erie County Health Department for providing water quality samples, Dr. Robert Dorney for the Vegetative Resource Survey, Dr. Richard Clark and Dr. Robert Denoncourt for the Faunal Resource Survey, Mr. Frank Manuele for the Historic Ecology Survey, and Mr. Charles

Rosenow, Director of Program, Buffalo Department of Community Development, who was in charge of the project.

We also wish to acknowledge the assistance and cooperation of the Lehigh-Valley Railroad Company, Niagara Mohawk Power Corporation, New York State Department of Transportation and the Niagara Frontier Transportation Authority.

Vincent J. Moore, President Ecoplans, Incorporated

#### INTRODUCTION

The story of the Tifft Farm Nature Preserve is a capsule history of man and nature in the Niagara Frontier.

Before the advent of colonial man, the Indians used it as a hunting ground. At that point in history, much of the area of Buffalo south of the Buffalo River was extensive marsh - the largest wetlands on the south shore of Lake Erie - and like all such areas, teeming with wildlife and waterfowl.

As the Buffalo area was settled, the Tifft Farm was avoided. Its lowness and unstable condition made it unsuitable for development - and it was more of a barrier to growth. Eventually, the flourishing port business generated the economic feasibility to develop the area. Much of the marsh was drained, canals dredged and rail access laid into the site during the late 19th century.

Had Buffalo's unique locational advantage as a break-in-bulk shipment center not been eroded by federal anti-trust legislation, the Welland Canal and St. Lawrence Seaway, the Tifft Farm today might be a bustling complex of wharves and docks. Soon, however, even the developed area became obsolete, and the site was gradually abandoned in the late 1930's.

The Tifft Farm then became one of those residual, forgotten areas of the urban fabric - a handy place to stick the trash and waste of the growing urban center. For years anyone entering Buffalo from the south along the lakeshore was treated to the rancid smoke of burning garbage and the shanties of hobos and squatters who lived off the refuse.

By the late 1950's, even dumping on the site was discontinued except for occasional deposition of slag by the Republic Steel Corporation which bought the abandoned site from the City. Now, only about 75 acres of the original marsh remains.

With the lull in human use of the site for industrial purposes, nature quietly took over. In the space of fifteen years the raw piles of slag and other fill sprouted wild grasses and pioneer tree species. With natural vegetation reestablished, the wildlife began returning to the site. Today, it would be difficult for anyone unfamiliar with the site to imagine the many phases of its history of development.

Were it not for the new environmental awareness symbolized by Earth Day 1970 and the growing popular concern with

environmental quality, the Tifft Farm might have stood quietly awaiting an uncertain future. But two environmental concerns intervened to set an ultimate plan for the use of the site.

At first these two concerns seemed to present a confrontation of opposing priorities. On one hand, the plans for a new secondary waste water treatment plant on Squaw Island required the removal of an estimated two million cubic yards of mixed municipal refuse from the site for the plant. The Tifft Farm appeared to be an ideal place to put it. On the other hand, citizens, community groups and environmental organizations following the natural reclamation of the Tifft Farm site saw the need for preserving the area as a wildlife sanctuary and environmental education resource.

As it has turned out, the use of the Tifft Farm site for the transfer operation has turned out to be the key to its preservation and development as a nature preserve. With proceeds from the sale of dumping rights to the Buffalo Sewer Authority for the transfer operation, the City has purchased the entire site from Republic Steel Corporation.

In an all too infrequent display of cooperation between governmental agencies to respond to the sincere, dedicated concerns of people interested in improving the environmental quality of the city, a program has been worked out to meet all objectives of the environmental use and development of the Tifft Farm area.

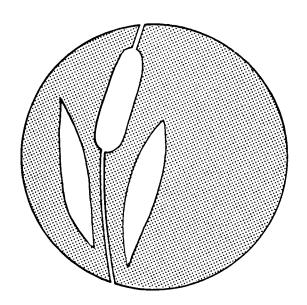
The Buffalo Sewer Authority and the citizen environmental interest groups were brought together by the Buffalo Department of Community Development. Specifications to monitor and control the environmental impact of the transfer operation were incorporated into the contract documents. The Buffalo Sewer Authority developed a plan for grading and planting the earth-covered refuse to create an aesthetically pleasing series of mounds which could be used as vista points.

Next, the New York State Department of Environmental Conservation provided a grant to cover half the costs of preparing a master plan for the ultimate use of the site. These State funds were matched by a private foundation grant to the City.

The Mayor then formally appointed a subcommittee of the Citizens Advisory Committee to oversee and direct the planning program. Professional environmental planners, engineers and landscape architects and various natural scientists were retained to prepare the master plan.

To implement the plan, state and federal funds have been requested by the city to help with the restoration of this municipal wetland, and prepare a detailed environmental education program.

Much remains to be done to secure the future of the Tifft Farm, but it is a project of tremendous significance for the citizens of Buffalo - especially those who will learn from its unique environmental history and resources.



# TIFFT FARM NATURE PRESERVE

PHASE I INVENTORY OF ENVIRONMENTAL RESOURCES

ECOPLANS, INC.



#### INTRODUCTION

This section of the report summarizes the results of recent surveys of the Tifft Farm Nature Preserve environmental resources. These findings draw upon the research conducted directly by Ecoplans, Incorporated, and that of other agencies and individuals with interests in the ultimate use and development of the site as a nature preserve.

The objective of this work was to identify the constraints and potentials of each individual environmental resource prior to synthesizing the findings as a composite Ecoplan for the site. The latter will serve as a basis for the master plan for site development and environmental management.

This report is not intended as a complete compendium of the Tifft Farm's environment. There are two reasons for this. First, the master planning process is directed at defining a general level of development and management policy and simply does not require expensive in-depth research. Areas of major concern were studied more thoroughly than others. Secondly, the environment of the Tifft Farm site is not static, but constantly undergoing change, and there is a general commitment and need for continuing, more refined analysis and monitoring of environmental change.

In defining areas for concentrated research during the master plan program, there were obvious priority concerns for vegetative and faunal resources research. Relatively detailed soil information for the site has been developed by the Buffalo Sewer Authority, but the extensive historic manipulation of the Tifft Farm area - particularly the series of dredging and filling activities - has resulted in a man-made geomorphology in which soil properties - both physical and chemical - may vary significantly within the space of a few yards. In this situation, the terrestrial vegetation affords better clues to the nature and capacity of the soil regime.

Similarly, aquatic vegetation and fauna provide distinct clues as to the chemical and physical quality of the water resources of the site - at least sufficient for master plan studies of the suitability of the water resources as an element of the nature preserve.

The hydrology of the Tifft Farm's major environmental feature - the cattail marsh - required detailed topographic information for the eastern portion of the site. This work is programmed as a first priority element of the plan implementation and is expected to begin shortly under a grant from the New York State Department of Environmental Conservation's Wetlands Restoration Program.

Micro-climate variations on the site have important implications, but climate is perhaps the most variable of all elements of the total ecosystem - requiring especially long-term monitoring before normative conditions and the degree of variance from the norms can be established. For purposes of master planning, general climate data on regional conditions is adequate, and the more important micro-climate features can be deduced from a general evaluation of site topographic and vegetative elements.

Historic ecology studies can provide important insights into the nature of the overall ecology of the site. If the Tifft Farm expresses any clear historical phenomena, it expresses the marvelous adaptability of nature and the capacity for renewal of the land even after substantial disruption and degradation of the original ecosystem.

#### HISTORIC ECOLOGY

The historic ecology of the Tifft Farm site consists of both natural and man-made events. An analysis of the historic ecology of an area can often provide important information useful in the development of plans and policies for the future development and management of an area.

In this section of the report, the human history of the use and development of the Tifft Farm is reviewed, beginning with the recorded impressions of the area by the earliest French explorers of the Western New York Region and culminating with the recent "rediscovery" of the area which this overall study signifies. The natural historic ecology of the site, of course, extends back beyond any human awareness and knowledge, but for all practical purposes begins with the retreat of the last glacial age. The historic ecology of the Tifft Farm is incorporated in the analyses of each of the individual natural environmental resources. Thus, this entire section discusses the history of the Tifft Farm.

Because man's impact on the Tifft Farm in the future is the subject of the entire study, and because man's impact on the Tifft Farm in the past has been a profound and important factor in the current environmental condition of the site, our analysis begins with a survey of the historic ecology of the site as it has been affected by man.

The Tifft Farm is a small portion of the original extensive wetland area between downtown Buffalo and the City of Lackawanna. It extended well inland from the lake shore to the general vicinity of Hopkins Street.

The original natural vegetation and wildlife of this large wetland undoubtedly offered the Indians who occupied the area a diverse and plentiful food supply of meat, fowl, fish and edible plants - but for the Indian and early colonial settlers alike, the area was unsuitable for settlement and was generally shunned except for food gathering. Higher grounds north of the Buffalo River, closer to the Canadian shores were the historic points of settlement before and after the arrival of the white man. Indeed, the fact that a small portion of this original environment remains today is testimony to the problems the area presented for human settlement.

At the time of the first French explorations in the early seventeenth century, the Buffalo area was inhabited by Indians of the so-called Neutral Nation. In 1687 Lasalle's Journal describes the sighting of deer, turkey, and mysterious "wild bulls" (thus giving rise to the theory that buffalo existed in the area and hence were responsible for the name of the city). Shortly thereafter, the Indians of the Iroquois Confederation claimed the lands along the Buffalo River and the shores of Lake Erie. In the process the tribes of the Neutral Nation were assimilated or driven out of the area. Sovereignty was awarded to the powerful Seneca Nation of the Iroquois Confederation.

In 1778 the famous Christian missionary, William Kirkland, forded the Big Buffalo Creek in his southward journey to Ohio. He encountered John Kenjockety or Skendyoughwatti in the vicinity of the Tifft Farm. Kenjockety, although residing with the Senecas was reputed to be the son of a Neutral Nation captive.

In 1789 Kenjockety's name appeared on a letter addressed to George Clinton, the Governor of New York, protesting some unauthorized sales of Indian lands south of the Buffalo River. In the same year Augustus Porter, the noted jurist, was sent by Clinton to survey the disputed boundary line of the "Gore" between the Seneca reservation and Lake Erie. Porter stated that he was accompanied during the survey "by an old Indian named Scaugh-juh-qualty" (Kenjokety) who had been appointed by the great Seneca chief Red Jacket to accompany the surveyors. The old Indian guided the judge around what is now the Tifft Farm.

Porter's account mentions that the area in question was of "comparatively no value" and that it was composed mostly of swamp and "flats". The term "flats" is curious and merits examination. Apparently the site was not entirely marsh land. There may have been dry areas during periods of slack lake turbulence or even permanent or semi-permanent "reefs" deposited through the flushing action of the lake over the centuries.

In 1783, the Holland Land Company had purchased one-and-a-half million acres in Western New York. In 1797, they also purchased several Indian Reservations. In a similar vein Captain William Johnson, an Indian Agent, had received a "gift" of two square miles of land at the mouth of the Buffalo River from the Senecas. Although the title was of questionable legality, the Holland Land Company purchased the land from Johnson. Johnson's land did not include the Tifft Farm site but the "gift"

did manage to supply the infant Village of New Amsterdam with a window on Lake Erie. Apparently, the Tifft Farm was not considered developable by the early planners of the city. This can be seen by the fact that it was not until 1845 that the Indian land which encompassed all of the Tifft Farm was deeded.

By 1850, the sole improvement on the site was a drainage ditch which had been dug from the Buffalo River through the center of the property. As a result of this the marsh lands on the western half of the site receded, but it should be noted that these attempts at improvement were futile since the low terrain south of the Buffalo River was a massive floodplain. Lake waters, driven by seasonal westerly winds, spilled over what is now Fuhrmann Boulevard and inundated the area to as far as the present Hopkins Street.

By 1853, the boundary of the City of Buffalo included the Tifft Farm site. In 1858, George Tifft, a prominent local entrepreneur, purchased 600 acres in the newly incorporated area of the City south of the Buffalo River. This area, which was dubbed the "Tifft Farm", and had been originally known as the "Pratt Farm", was never really a farm, although one historian has noted that it was "a tract of rich bottom land of great productiveness, and admirably located for manufacturing and commercial purposes." In the late 1870's, Tifft sold the entire tract to his heirs for the sum of one dollar. In 1883, the property was again sold, to a Mr. Packer, an entrepreneur from Pennsylvania. same year, Packer leased the property to the Lehigh Valley Railroad Company for a term of 50 years at \$20,000 per In this transaction, it was stipulated that over a million dollars were to be spent on improvements. parently the aim was to establish rail and canal coal distributing facilities on the site.

In the period from 1862 to 1887, the number of tons of coal shipped to Buffalo rocketed from 132,371 to 3,437,818. The Tifft Farm site figured prominently in this commerce. One report indicates that "at one time, it (Tifft Farm) had coal, ore and commercial docks, and two freight houses, nearly a mile long, flanked its main canal." This activity was made possible by the extension of the City Ship Canal, and the creation of a canal complex to service an extensive rail network. The canals served both a commercial and a practical environmental function as massive drainage ditches for wind-driven lake waters. It is hardly plausible that hard-headed 19th century businessmen would have built

structures "nearly a mile long", if the threat of flooding existed. The Lehigh Valley Railroad Company intended to further canalize the tract and transform it into a major break-in-bulk point for rail shipments.

While coal reigned supreme in the Tifft Farm, Lehigh Valley Basin lumber was also an important commodity. Utilizing a total dock frontage of 10,000 linear feet, the Superior Lumber Company, Hurd Brothers, and the Buckley and Douglas Lumber Company, unloaded their cargoes at 29 lumber yards on the site. As one historian has written:

"Here was seen lumber piles by the acre; pine and hemlock from Michigan, Wisconsin and Pennsylvania, lath and shingles from up the lakes, ash, walnut, oak and yellow poplar from the Central States, West Virginia, Kentucky and Tennessee; maple and birch from Canada and the Adirondacks."

One source reveals that the Pillsbury Mills also had a warehouse on the property, and that by 1900, 12 permanent shipping lines consisting of some 83 vessels, operated from the Tifft Farm.

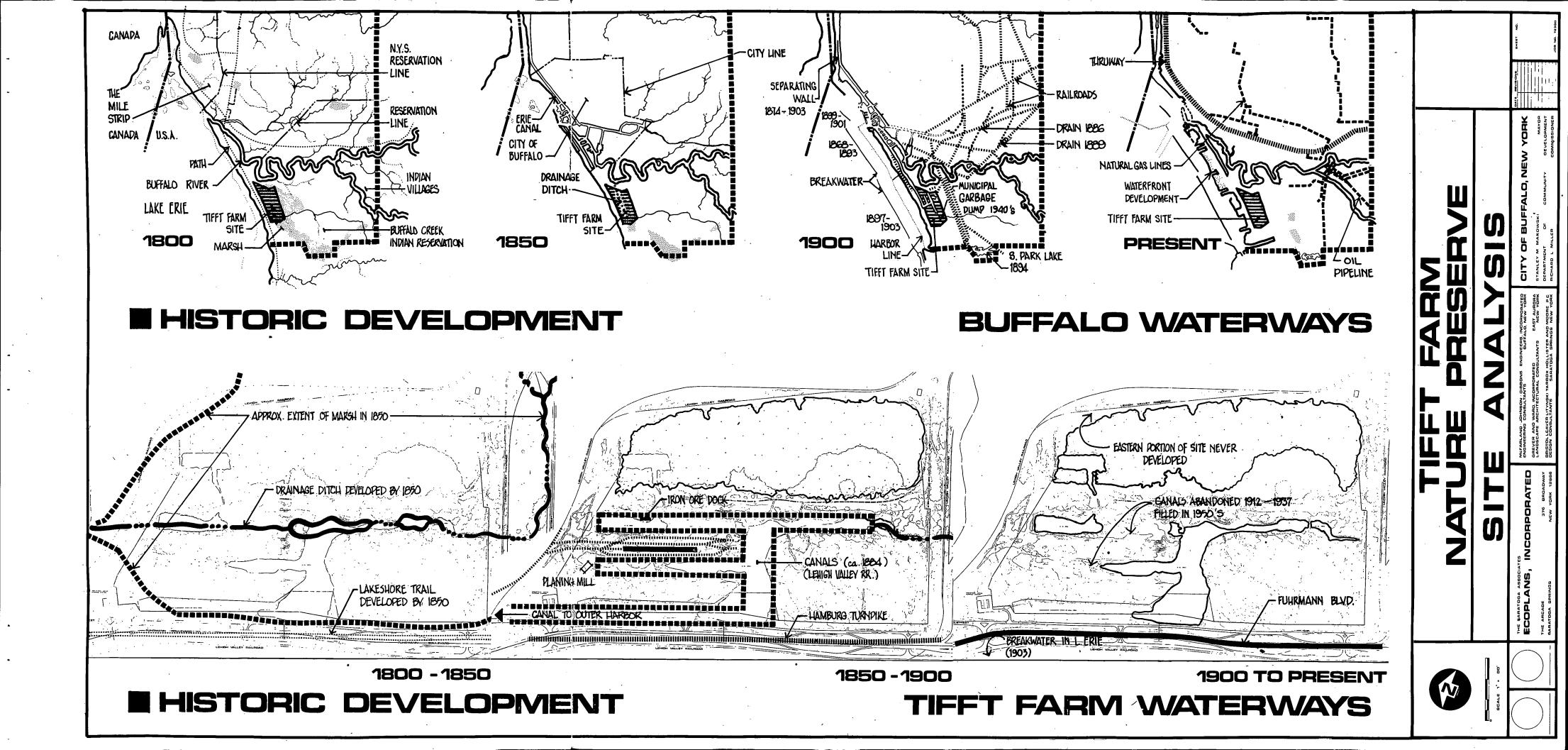
As commerce boomed on the Tifft Farm, the marshy character of the site receded. By 1900, no marshland existed in the western half of the site. The tracks of the Lehigh Valley bounded the property to the east and south, while Buffalo Creek Railroad bounded the north. The disappearance of the swamp in this area was further accelerated by the construction, in 1903, of the south harbor break water. This wall ended the intrusion of lake water into the area. By all indications, at least half of the Tifft Farm, while not high, was certainly dry. But, the lack of commercial activity or physical improvements on the eastern half of the site indicates that the swamp which is so highly prized today for its wildlife capacity, had remained intact A 1902 "Birds-eye View" throughout the nineteenth century. map of Buffalo indicates neither canal nor railroad intrusion into this area. That natural features of the Tifft Farm were still intact is further evidenced by the fact that Fredick Law Olmstead, the famous 19th century landscape architect, considered the site as part of the South Park of his proposed Buffalo Park System. The concentration of rails in the general area, however, soon forced Olmstead to limit his proposal to the current South Park complex.

Commercial activity notwithstanding, the development of the Tifft Farm, was shortlived. In 1912, the Federal Government implemented the Panama Canal Act. an anti-monopoly law, the act sought to curtail unfair combinations of rail and shipping interests, thus, seriously limiting the break-in-bulk activities of the Tifft Consequently, in the period from 1912 to 1937, the Tifft Farm decayed from lack of use. Rails were pulled up; wharves fell into disrepair and crumbled into the canals; the massive freight houses were destroyed by fire. During this period, the site was utilized for the winter storage of lake freighters in the "debris cluttered canals", which the lakers referred to as "Oklahoma." such vessel, the Staten Island, sunk and for several years the hulk was visible along the eastern bank of the extended City Ship Canal. (This Channel was eventually filled in the mid-60's.) As one account related, the Tifft Farm had become a "haven for the idle fleet . . .". It was at this time the property reverted to the City. As a consequence of this, natural vegetation began to evolve, but nature's reclamation process was hampered by a final surge of commercial activity on the site.

By 1937, as the economic paralysis of the Great Depression began to wear off, ore shipments increased and activity once again returned to the Tifft Farm. The increased productivity of the war years sustained this trend, with iron ore and related steel producing materials forming the bulk of the commerce. By the 50's, however, the normalizing effects of a peacetime economy accelerated the process of decay, which had begun in 1912. With the promise of the St. Lawrence Seaway, optimists grasped the only remaining hope for commerce on the Tifft Farm. This potential was never to materialize.

In 1955, the Republic Steel Corporation offered to buy the Tifft Farm property for \$200,000. Their initial intention was to use the site for a slag dumping area, while at a later date, they meant to expand. At the same time, the Seaway Terminal Company bid \$260,000 for the property. In December of 1955, the Common Council of the City of Buffalo accepted Republic's revised offer of \$265,000. One year after the purchase, Republic petitioned the Common Council for a 50 percent reduction in the property's assessment. This was denied by the Council, but in 1959, the City agreed to pay \$4,000 per month for dumping rights on the Tifft Farm, over a three-year period. Apparently the City confined its trash dumping activities to the area adjacent to Fuhrmann Boulevard and the tracks of the Lehigh Valley Railroad

in the southwestern quadrant of the property. Republic Steel dumped slag along the southern spur of the Lehigh Valley. Aerial photographs flown in 1958 indicate infrequent patches of brush and almost no trees except for some established willow stands along old Tifft Street and the extreme northern boudary. From these photographs the marsh area appears to be intact with a large body of open water at its northern end. Aerial photographs flown only ten years later show a remarkable resurgence of vegetative cover with pioneer forest developments. In short, nature had reclaimed what man had left alone. Conversely, the cattail marsh on the eastern half of the boundary endured as a vestige of the natural history of the area.



#### GEOMORPHOLOGY AND SOILS

The geomorphology or "earth-structure" of the Tifft Farm is likewise a product of natural and man-caused environmental phenomena. Geomorphological analysis describes how an environment was formed originally, and how it has been altered over time, and thus requires an understanding of regional bedrock structure and the formation of the soil cover.

In the case of the Tifft Farm, the geomorphology of the site plays a very significant role in the functional mechanics of the ecosystem, affecting not only the types of vegetative communities found on the site (which in turn affect the species of wildlife), but the fundamental hydrology - particularly the ground water - so important in the sustenance of a wetland environment.

The western New York regional bedrock structure consists of a series of rock strata laid down as sediments in the remote geological past when great seas covered much of the area. Over great expanses of time, these rock strata were uplifted toward the north and eroded. The hardest layers of these strata, being more resistant to erosion forces remained close to the surface and today form a series of three east-west trending escarpments.

The northernmost escarpment - the Niagara escarpment - bisects Niagara County and separates the Ontario Plain from the Tonawanda-Chippewa Plain (sometimes called the Huron Plain) and is the most prominent of the three. It consists of a lower face of Rochester Shale capped by Lockport Dolomite.

The southernmost escarpment - the Portage escarpment - bisects Erie County and is the least prominent of the three and separates the Erie Plain from the Allegheny plateau. It consists of a lower face of Hamilton Shale capped by Portage Shale.

The middle escarpment - the Onondaga Escarpment - bisects the northern half of Erie County and the City of Buffalo and consists of Onondaga Limestone, which can be seen in the vicinity of the intersection of the Kensington and Scajaquada Expressways. This escarpment is also responsible for the rapids of the Upper Niagara River in the vicinity of the Peace Bridge. It separates the Tonawanda-Chippewa Plain

from the Erie Plain - the former drained by the Tonawanda Creek System, and the latter by the Buffalo River System and Smokes Creek.

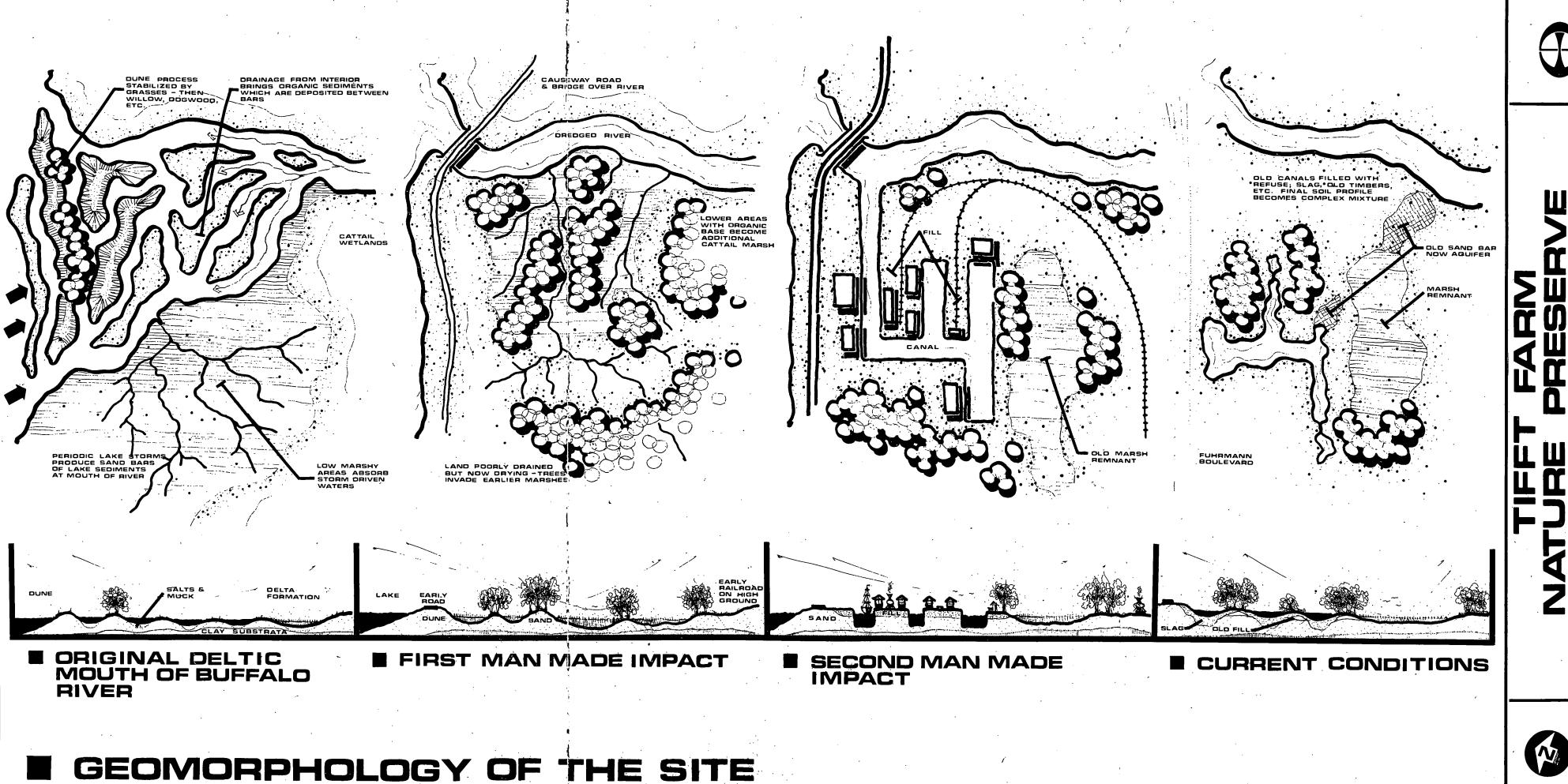
The soil materials covering this basic bedrock topography of terraces consists primarily of alluvial deposits in the three northernmost plains and glacial tills in the Allegheny Plateau.

During the various glacial movements back and forth, the water levels of the Great Lakes rose and receded. When the last glaciers receded, the lake-laid sediments of the Erie Plain were further built-up by soils carried down by the drainage channels of the ancient Buffalo River system. The shoreline of Lake Erie in the vicinity of the Tifft Farm was probably much further inland than it is at present. The sediments carried down by the river gradually formed a delta at the mouth, and extended the shoreline further into the lake.

Lake Erie, due to its relatively shallow depth and southwest-northeast alignment with prevailing summer winds, was always capable of producing high wave action during storms. The wave action periodically drove in sandy sediments from the lake, adding to the land mass, and the littoral drift gradually forced the main river channel to the northern edge of the delta, forming a barrier dune along the lake edge which was higher to the south.

Behind this barrier dune (the present alignment of Fuhrmann Boulevard) the extensive Tifft Farm wetlands formed draining generally toward the north, consisting of eroded remnants of earlier barrier dunes, interlaced with remnant channels of the river delta filled with more organic soil deposits carried down from the upland areas.

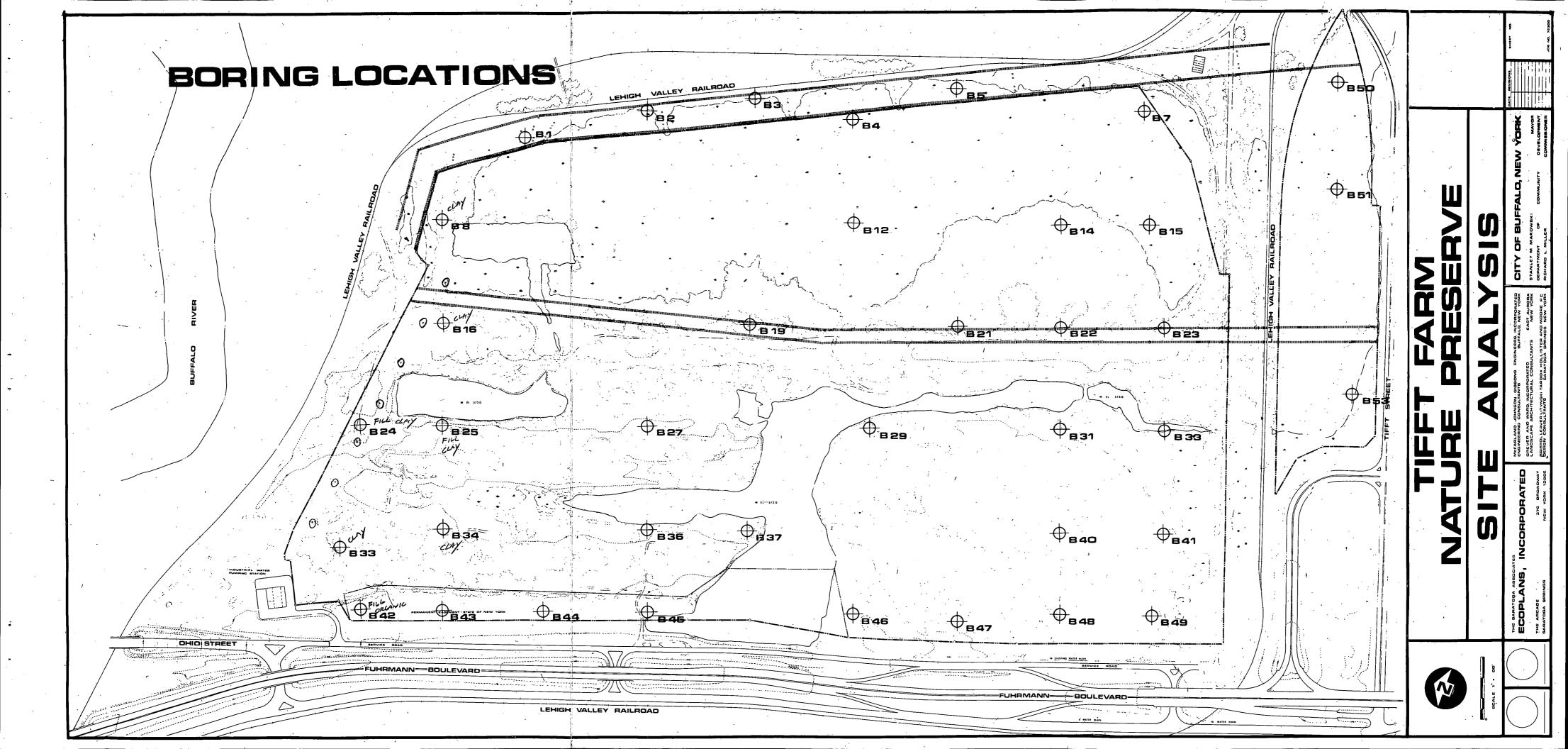
This was the natural geomorphology of the Tifft Farm area when western man arrived on the scene in the early 17th century. Because of its low swampy character, the area was generally avoided by the early settlers of Buffalo. Following the development of the Erie Canal in 1825, and the later development of the railroads in the mid-1800's, the City of Buffalo's potential as a break-in-bulk transhipment port created a demand for additional cargo handling facilities. Since the South Harbor Breakwall did

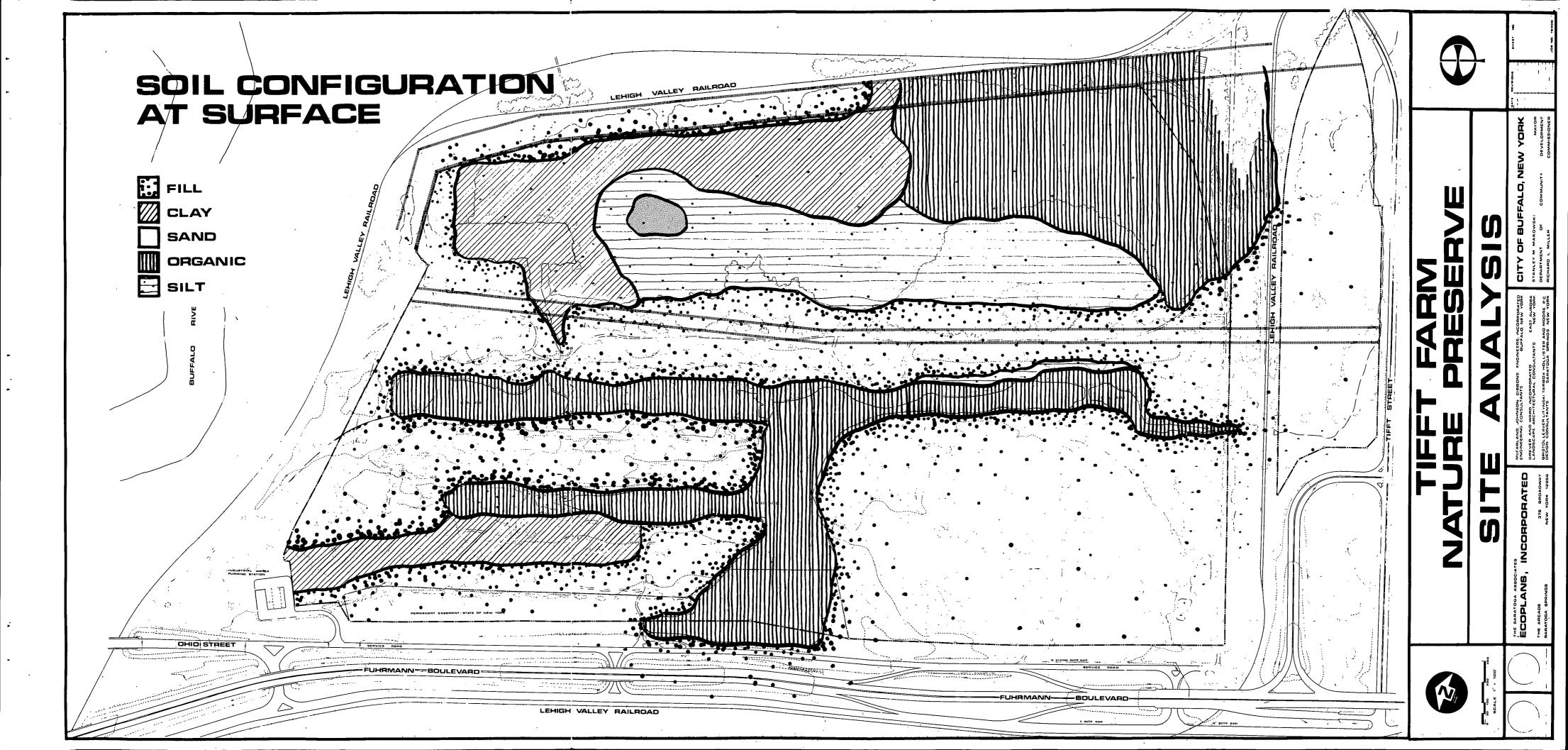


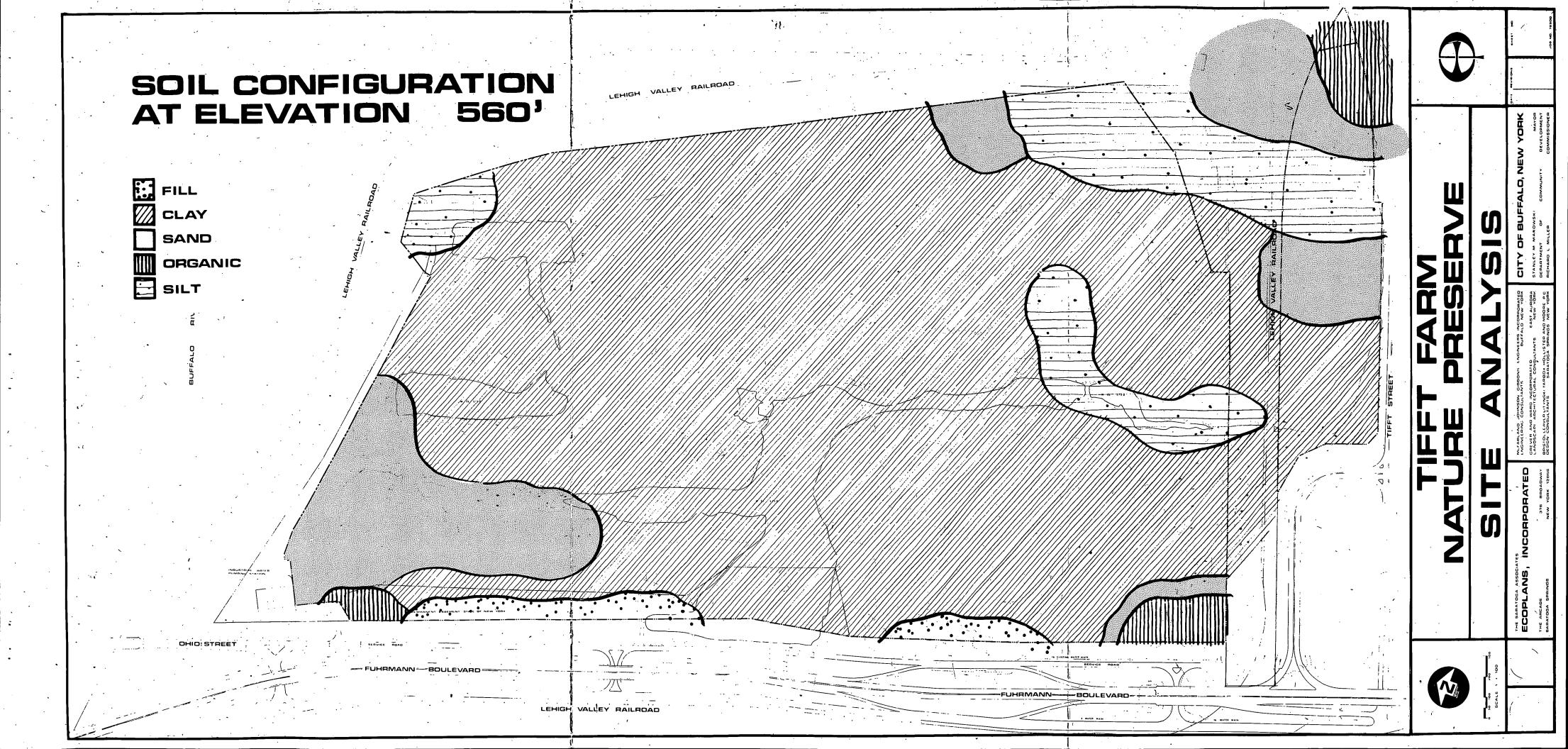
not exist at that time, the lowlands of the Tifft Farm area presented a feasible area for the construction of a sheltered canal system, and in the lowest areas, immediately behind the barrier dune and closest to the main Buffalo River Channel (the western half of the Tifft Farm Site) canals were dredged and the areas between them filled in to form higher areas for wharves and warehouses. There were plans for extending this system further east, into the eastern marsh of the Tifft Farm site, but these plans were never realized. The construction of the South Harbor breakwall, and several other factors combined to reduce the demand for interior port facilities. The extensive coal and lumber docks were gradually abandoned, and portions of the canals filled in with slag and flyash from area steel mills.

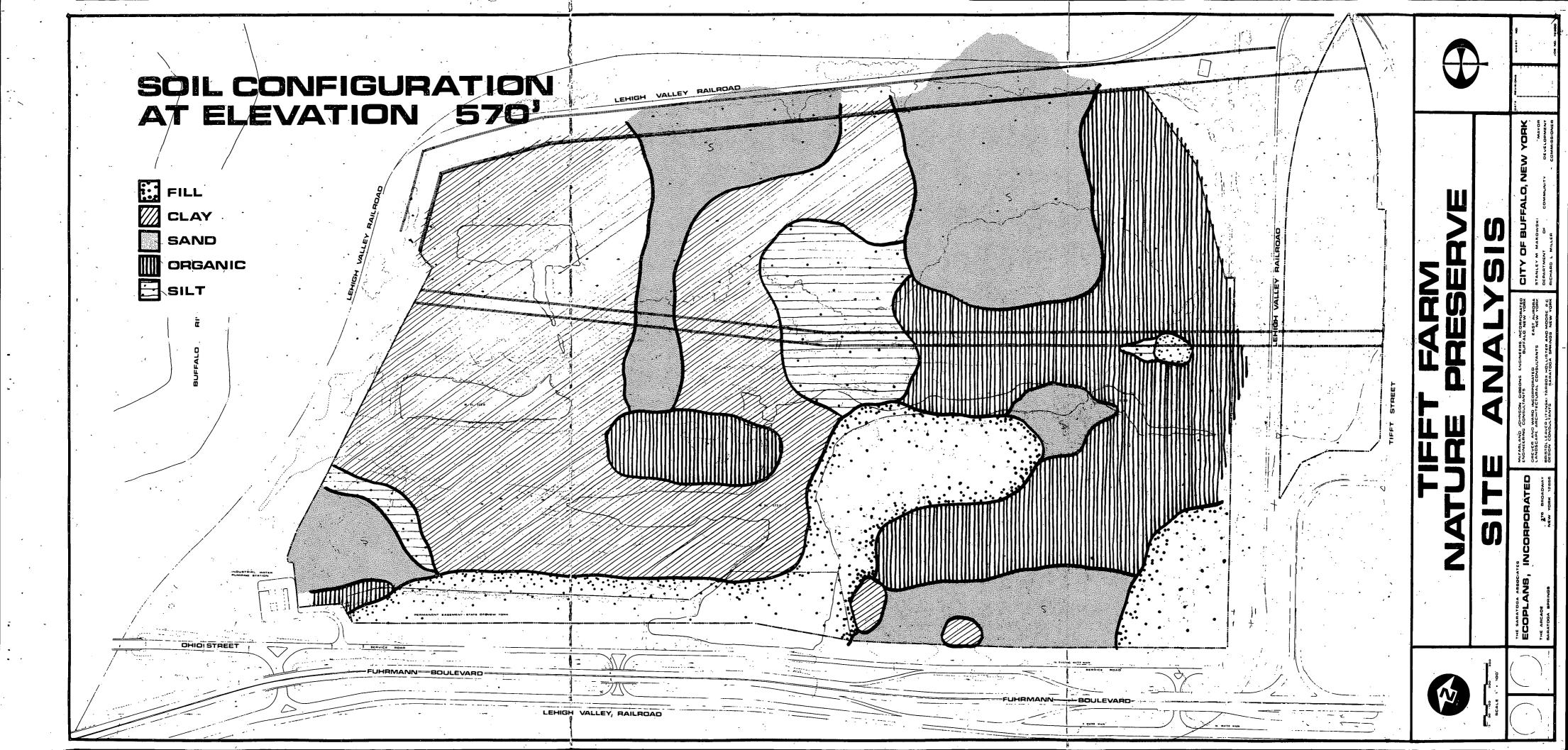
In addition, portions of the site have been utilized for landfill disposal, municipal refuse, the disposal of foundry sand and harbor dredgings, and a variety of other industrial fills.

Thus, the current geomorphology and soil base of the Tifft Farm is a complex mix of natural and man-made elements, with the most extensive disturbances located on the western portion of the site while the eastern half remains largely in its native state.









#### CLIMATE RESOURCES

Climate is a major controlling factor in any ecosystem, and the nature of a specific site's ecosystem is determined by both regional climate conditions (which set the broad parameters for the life forms of the region which potentially can have access to the site) and the site micro-climate conditions which determine the specific plant communities and consequent habitat forms that will exist on the site.

Generally, man can do little to affect the nature of regional climate conditions, although sustained long-term activities by man have changed climate conditions in some regions with basically sensitive ecosystems unable to withstand damage. Historically, as in the case of the American mid-west "Dust Bowl" these changes are often for the worse.

With respect to micro-climates, however, man can generate substantial change by the way he shapes the earth and alters or removes existing vegetation.

Regional climate conditions in the Buffalo area probably have not changed significantly since the end of the last Ice Age. These regional conditions govern the broad range of plant and animal species which may have access to the Tifft Farm site.

Buffalo is located near the mean position of the polar front. Its weather is varied and changeable, characteristic of the latitude. Wide seasonal swings of temperature from hot to cold are tempered appreciably by the proximity of Lakes Erie and Ontario. Lake Erie lies to the southwest, the direction of the prevailing wind. Wind flow throughout the year is somewhat higher due to this exposure. The vigorous interplay of warm and cold airmasses during the winter and early spring months causes one or more windstorms. Precipitation is moderate and fairly evenly divided throughout the twelve months.

The spring season is cloudy and cooler than points not affected by the cold lake. Vegetation is retarded, a fact that protects it from late spring frosts. With heavy winter ice accumulations in the lake, typical spring conditions are delayed until late May or early June.

Summer comes suddenly in mid-June. Lake breezes temper the extreme heat of the summer season. Temperatures of 90 degrees and above are infrequent. There is more summer sunshine here than in any other section of the state. Due to the stabilizing effects of Lake Erie, thunderstorms are relatively infrequent. Most of them are caused by frontal action. To the north and south of the City thunderstorms occur more often.

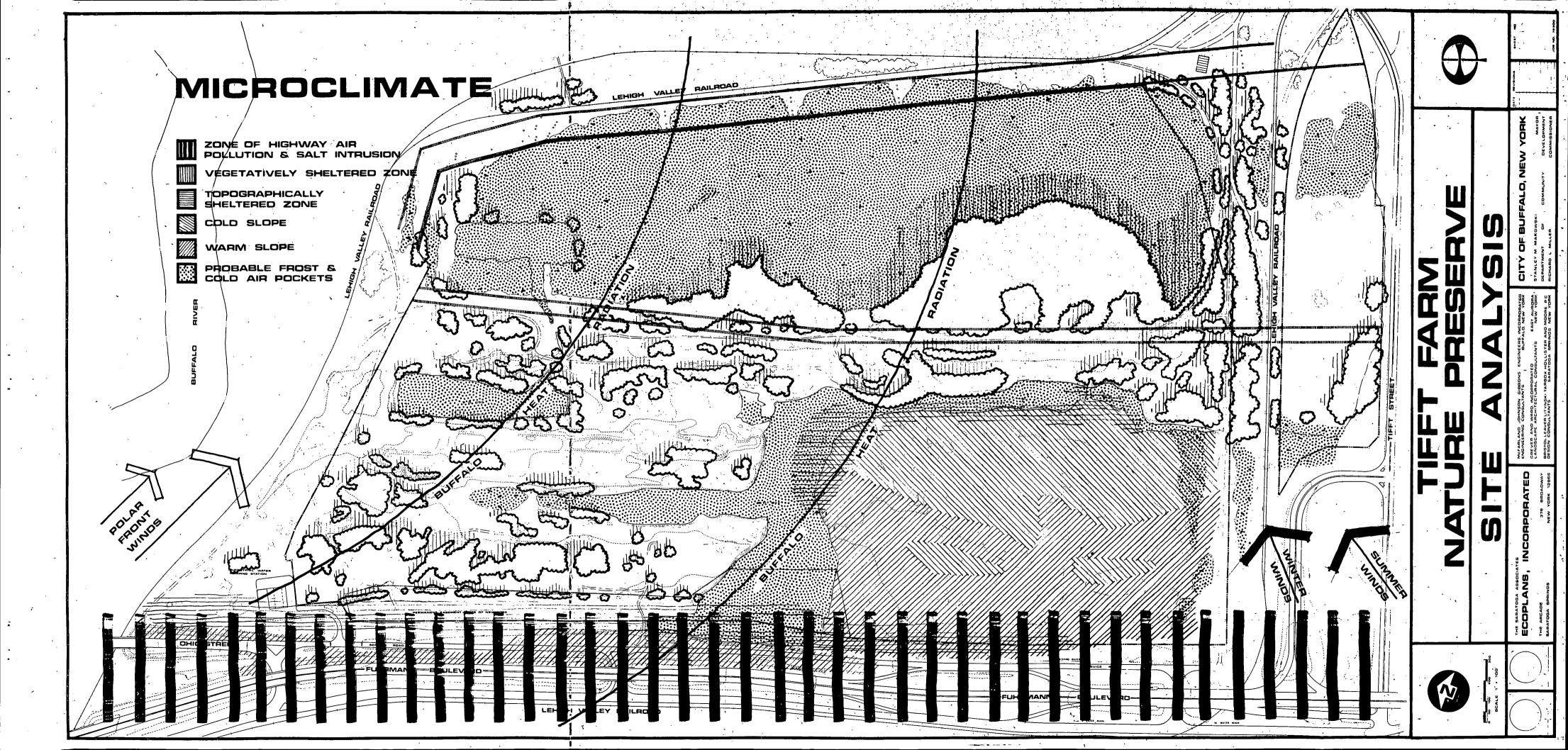
Autumn has long, dry periods and is frost free usually until mid-October. Cloudiness increases in November, continuing mostly cloudy throughout the winter and early spring. Snow flurries off the lake begin in mid-November or early December. Outbreaks of arctic air in December and on through the winter months produce locally heavy snowfalls from the lake. At the same time, temperatures of well below zero over Canada and the mid-west are raised 10 to 30 degrees in crossing the lakes. Only on rare occasions do polar airmasses drop southward from eastern Hudson Bay across Lake Ontario without appreciable warming.

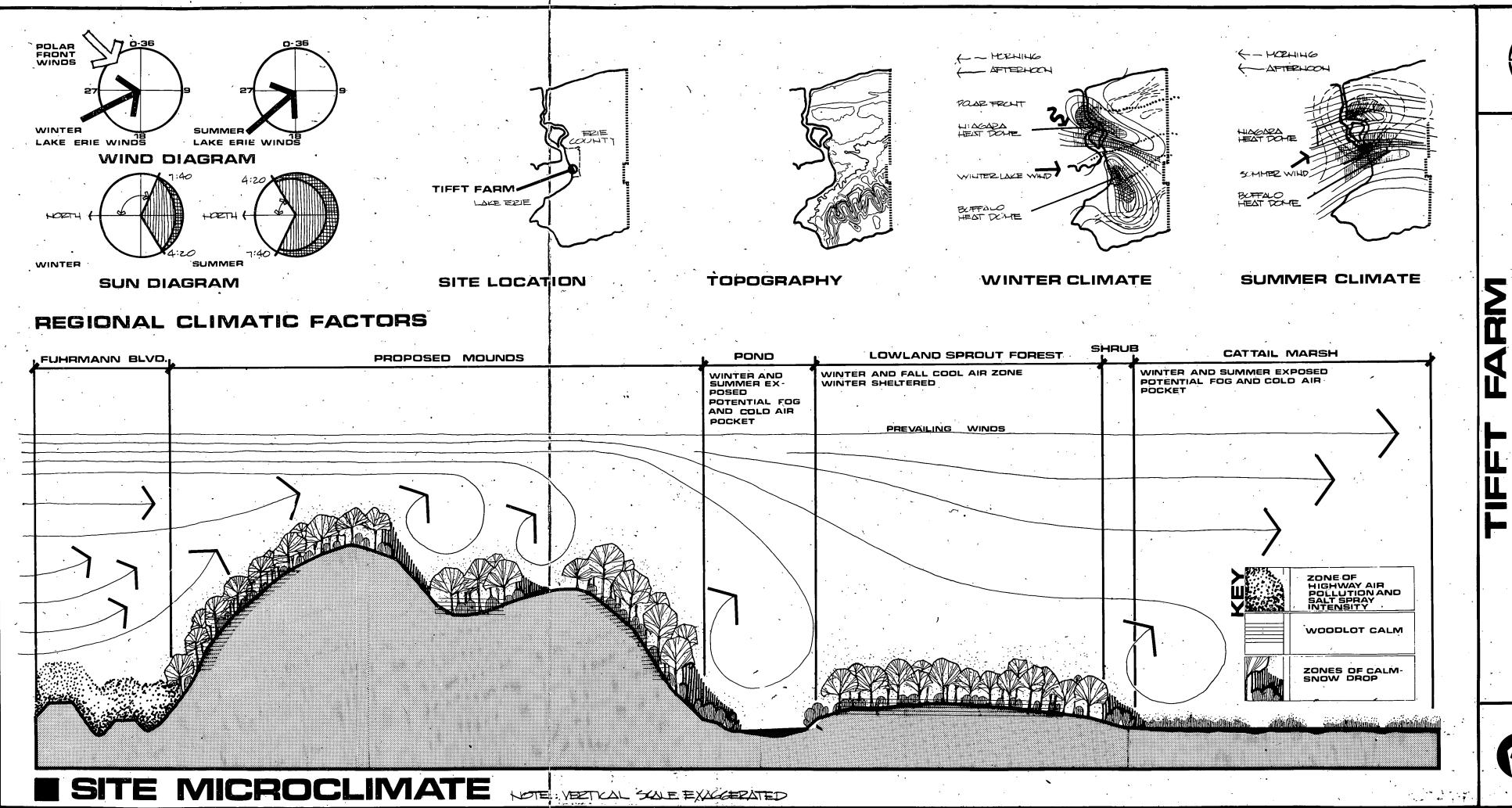
Micro-climate conditions at the Tifft Farm site probably have varied significantly due to man-made impacts on the soil, water and vegetative resources of the site.

Prior to the Industrial Revolution and the commercial exploitation of the Tifft Farm, the general microclimate was probably more moist and humid due to the extensiveness of the marsh and the thick tree and shrub vegetation which combined to maintain a more stable, moist micro-climate. In the summer months, the area was probably a very unpleasant environment for humans, hot and muggy, and teeming with insects. During the spring and fall, dense fogs and frost pockets would have been present and the windbreak effect of the vegetation would have brought deeper snow cover in the winter. The creation of more open water expanse and land, with corollary removal of vegetation undoubtedly brought drier conditions from less inhibited wind flow, and the construction of the South Harbor Breakwall ended the storm inundations of the area.

While industrial air pollutants ring the site on three sides, the prevailing wind conditions keep the site somewhat more protected from these emissions than other inland areas of the city. At times the downtown Buffalo building mass creates a heat dome of radiant energy which generally

intensifies the air movements through the Tifft Farm - such as the so-called evening "land breeze" caused by the gradient in air temperature and pressure between the lake and the upland areas. Summer winds generally enter the site from the southwest carrying moisture from the lake. During the winter, winds and polar fronts move more from the northwest to southeast across the site. In the winter, these winds are cooled further by the lake ice which retards the spring growing season. In the summer, the winds warmed by the more stable lake water temperature conversely extend the growing season. As pioneer tree species have invaded the now abandoned site, climate conditions can be expected to moderate from the more desert-like extremes which occurred when the site was stripped bare.







#### WATER RESOURCES

Water, of course, is one of the most essential components of the ecosystem. All plants and animals need water to survive and generally, this water must be of good quality -- especially if a diversified and healthy environment is In addition to its essential role in sustaining desired. biological life, water serves as habitat for aquatic and amphibian species of animal life. Water in quantity is also essential for the sustenance of submerged and emergent aquatic plant communities, as will be discussed in a later section of this report. Water is used as a medium of transport or distribution of organic life. It helps retain optimum soil textures, assists in the conversion and exchange of chemical elements, moderates climate conditions and, finally, adds to the beauty and aesthetic quality of an area as an element of sight and sound.

The historic development of the Tifft Farm water resources is included in earlier sections of the report. To summarize, there has always been water at the Tifft Farm site. Initially, however, the water resource forms probably did not include large ponds, although many small ponds might have existed throughout the extensive marshland that once occupied the area. These would have been quite shallow, like the pond at the northern end of the current marsh, and being shallow and warm they would have excluded certain fish species that now inhabit the site.

The small stream that once drained much of the southwest area of the city probably meandered through the center of the site in a northwest-southeast direction, flowing into the Buffalo River at the northern end of the site.

The water resources of the Tifft Farm site have undergone substantial change from the original site environment of an extensive marsh and lowland wet forest. The industrial water pollution of the Buffalo River, South Harbor and the stream feeding into the site from the south have unquestionably downgraded the chemical and biological water quality, but there are indications that the conditions do not preclude certain wildlife and fish species at present, and may in fact be improving in quality. The water quality of the cattail marsh in the eastern half of the site appears to be suitable for most forms of marsh life, indicating that the marsh water supply may be derived from a natural underground "lens" of sand which provides an aquifer connection to the Buffalo River extensive enough to filter and purify the water.

There are three major surface water resources at the Tifft Farm site:

Pond #1, about 11 acres in size, is located adjacent to Fuhrmann Boulevard and consists of a central portion approximately 1200 feet by 250-650 feet. A small stream entering the site from the southeast flows into the Water from this pond flows into Lake Erie through a 48" culvert under Fuhrmann Boulevard. Its shore is ringed with deciduous shrubs and trees and cattail growth. Depths to 9 feet are recorded in a main area but range from 2 to 6 feet as a rule. A dense growth of rooted and floating aquatic vegetation is present in all extensions, particularly near the northern shore of the main area. The bottom contains a thick layer of grey-black silt and A variety of debris (trees, wire, branches, etc.) is present. Extensive anaerobic bacterial action is indicated in the pond by the measurement of low oxygen concentrations at the two foot depth. These were accompanied by a corresponding rise in carbon dioxide concentrating at these depths, a lack of vegetation in many places, and a profuse bubbling of gasses that rise whenever the bottom is disturbed.

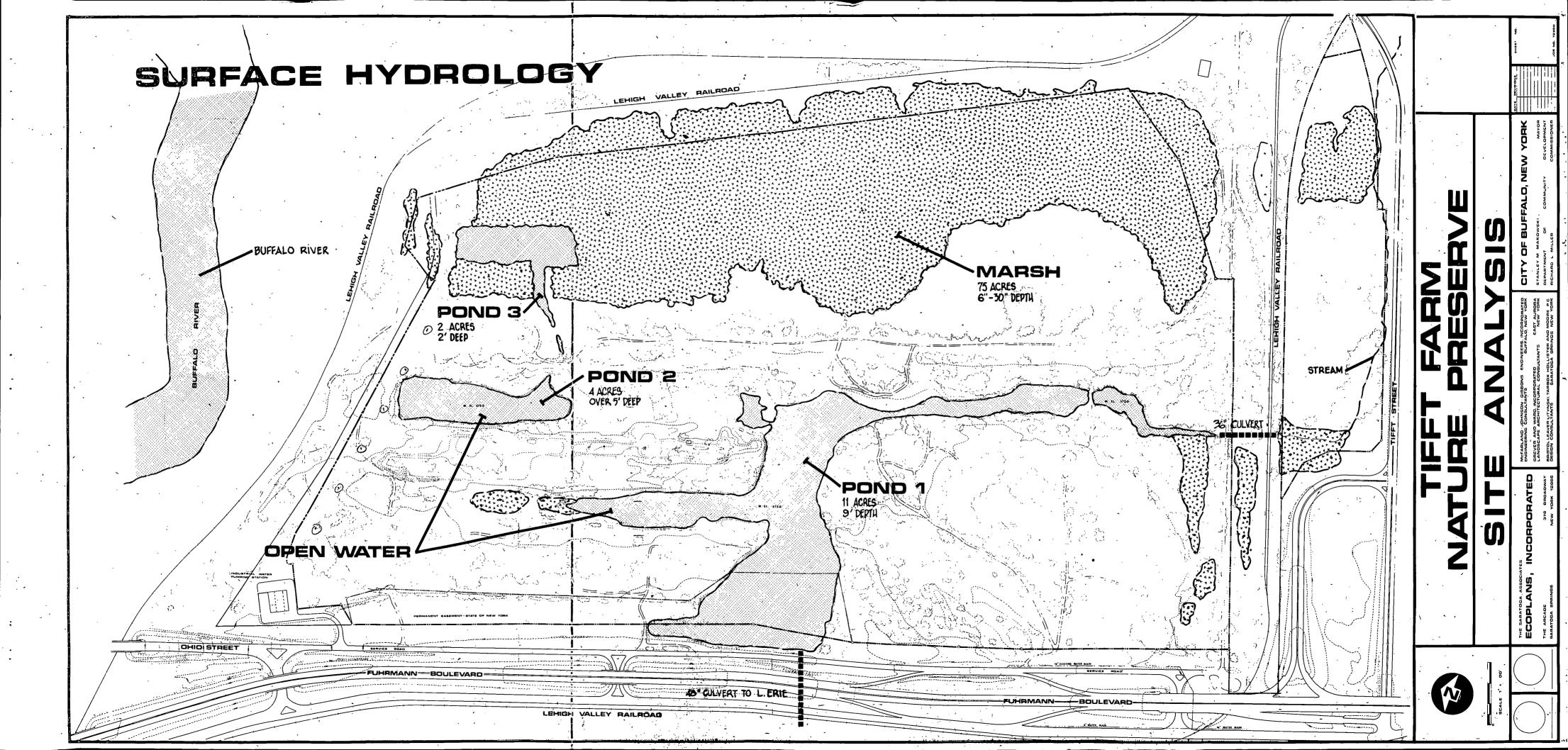
Pond #2, located between ponds #1 and #3, is about 800 feet long and 100-200 feet wide. Depths exceed five feet. Very little aquatic vegetation is present, however, some algae and sponges occur on rocks in the pond. High oxygen concentrations exist at the surface and two foot level. Logs, tree stumps and branches float freely in the pond and refrigerators, bed springs, and other "junk" are present on the pond floor. The pond bottom is covered with silt. This pond will be enlarged as part of the Buffalo Sewer Authority Transfer Operation.

Pond #3 is located in the northeast corner of the preserve and is flanked on two sides by the cattail marsh. It is about 600 feet long by 175 feet wide and has depths up to two feet. The bottom is covered with two feet of muck. The surface of the pond is almost entirely covered with Waterweed to a depth of 6" to 12". No rooted vegetation is present. Cattails and deciduous trees form the edge of the pond. Low oxygen and high carbon dioxide concentrations indicate extensive anaerobic bacterial action in the pond.

In addition to these open waters, the water resources of the Tifft Farm include the major cattail marsh covering 75 acres of the eastern half of the site. The water in this marsh varies in depth from 6" to 30". There are several small marsh areas on the site. Generally, these are not remnants of the original marsh but low areas which remained after fill was placed.

Minimal tests have been made to determine general water quality levels. These data are indicated on the following page. In addition, the sections of this report covering vegetative and faunal resources contain additional information which indicate general water quality parameters.

A test of the stream water entering the site in Pond #1 -- a bioassay of the water using Chlorella (an algae) and Hotropis sp. (a common minnow) -- indicated no abnormal stimulation in growth or any toxic response. Therefore, it appears that the water sustaining this pond is within ecological ranges of tolerance for a wide variety of species typical of the Buffalo area waters.



#### INDICATORS OF WATER QUALITY AT THE TIFFT FARM NATURE PRESERVE March 1973

Parameter	Sampling Locations (See Map)							
,	A	В	C	<u>D</u>				
	0.0			2.5				
pH Alkalinity	8.2	8.4 228	8.4 112	8.5				
B.O.D.	144 ppm 2.5	3.2	2.4	82 5.1				
C.O.D.	24.4	27.2	13.6	24.0				
Color	0	0	0	0				
Turbidity	. 5	5 .	18	14				
Nitrate N	0.45	0.41	0.60	0.50				
Kjeldahl N	1.7	2.2	1.7	2.4				
Ammonia N	< 0.001	0.008	0.028	0.008				
Solids	~~~~	0.000	. 0.020	0.000				
Total	378	660	453	288				
Volatile	158	266	116	98				
Fixed	220	394	337	190				
Suspended Solids			7, 7 '					
Total	10	.25	24	8				
Volatile	2	11	6	3				
Fixed	. 8	14.	18	5				
Dissolved Solids	•	•						
Total	368	635	429	280				
Volatile	156	255	110	95				
Fixed	212	380	319	185				
Conductivity	112	250	230	190				
Hardness	240	.393	204	152				
Total phosphates as P	0.056	0.095	0.100	0.020				
Ortho phosphates as P	0.024	0.005	0.006					
Arsenic	<0.01	< 0.01	< 0.01	<0.01				
Chromium	<0.02	< 0.02	< 0.02	< 0.02				
Copper	<0.02	< 0.02	< 0.02	< 0.02				
Lead	0.02	0.03	0.01	0.02				
Mercury	<0.001	< 0.001	< 0.001	<0.001				
Chloride	25	27.5	25	40				
Phenol	< 0.001	0.010	< 0.001	<0.001				
Zinc	0.1	0.1	0.1	0.1				
Cadmium	<0.001	< 0,001	< 0.001	<0.001				
Nickel	0.5	< 0.5	< 0.5	< 0.5				
Iron	< 0.05	0.25	0.25	0.10				
Magnesium	5.0	9.0	25.0	7.5				
LAS Detergent	< 0.01	< 0.01	< 0.01	< 0.01				
Albuminoid Ammonia	0.35	0.40	0.30	0.16				
Air Temp.	61° F							

Source: Erie County Laboratory, Lab Number 150-153 Collected April 17, 1973 Received April 17, 1973 Examined April 30, 1973

#### VEGETATIVE RESOURCES

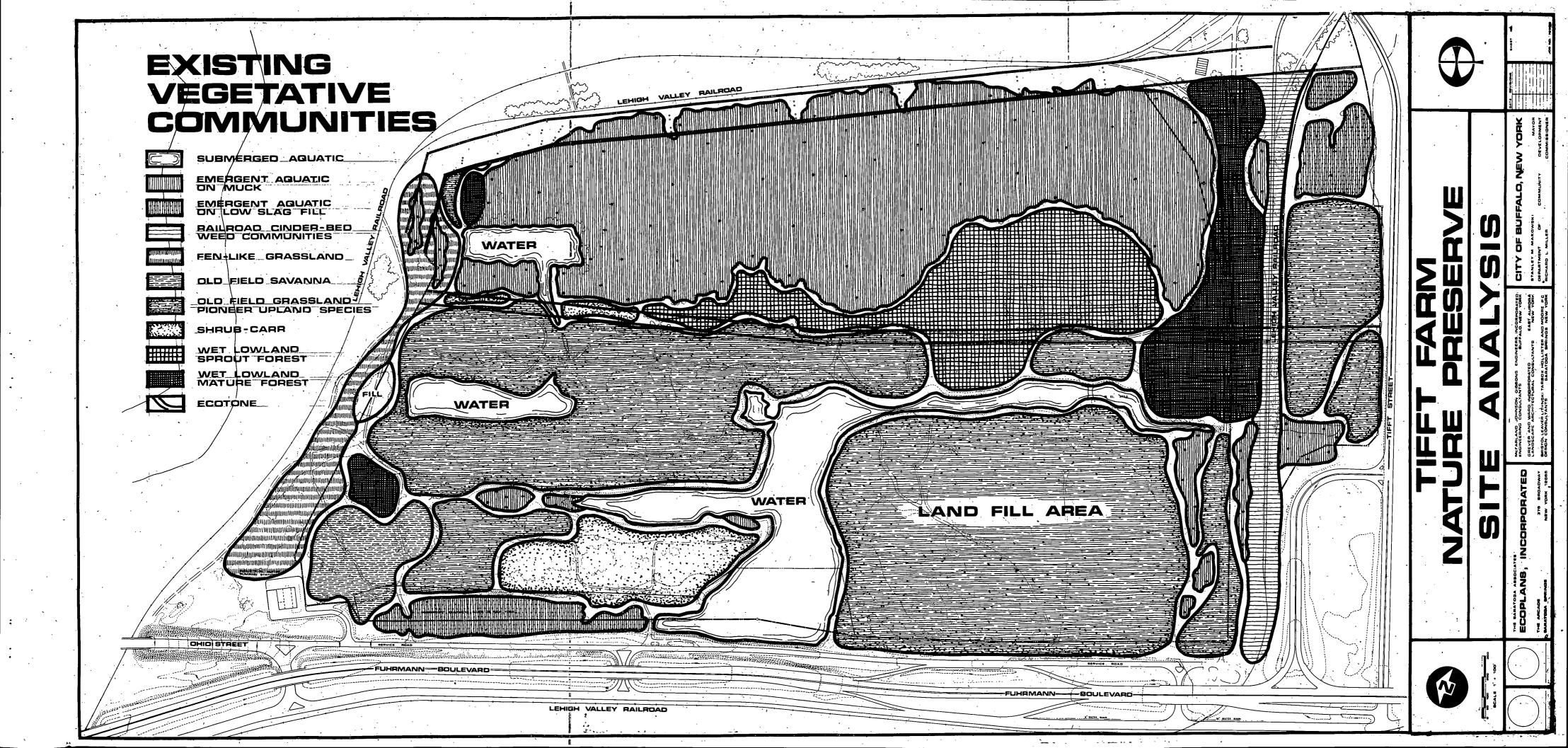
In the ecosystem, vegetation plays an especially significant role. The plant life of the Tifft Farm, as elsewhere, provides food and nesting habitat for wildlife, protects the soil from erosion, helps maintain optimum micro climate conditions - especially in retaining moisture and cleansing the air of dust particles. Plants are a major source of oxygen, using carbon dioxide in the process of chlorophyll manufacture by photosynthesis. Plants help to reduce noise levels and provide the essentially seasonal variety and beauty of the place. Even in death, plants contribute to the buildup of organic soils in the eternal cycle of life.

Vegetation is most usefully described in terms of communities - groupings of plant species which share common requirements and preferences for growth conditions - primarily moisture levels, soil types and varying exposures to sunlight.

Again, history is an important key to understanding the present. The Tifft Farm area, before settlement, was once part of an extensive marsh and wetland area at the deltaic mouth of the Buffalo River. The vegetation of the Tifft Farm area at that time was probably less diversified in terms of community types than now due to generally uniform moisture gradients and soil characteristics. These communities were undoubtedly all in stages of succession from the hydrosere - or water-oriented phase of development.

As the Buffalo area developed and the Tifft Farm converted to commercial and industrial uses related to the port, much of the original vegetation was destroyed - either by removal or by man-made changes to the basic environmental conditions needed for survival by various communities. Since the area was abandoned, however, much of the native vegetation has returned and, because of the manipulation of the landform and soil structure, there are many new species of plant life on the site - mostly species native to the region in general but not to the original site. In addition, there are several introduced species - exotics which were transplanted to the site in seed forms carried by the wind, animals and man.

Today, the vegetation of the Tifft Farm is a highly complex mixture of species. Nature is gradually sorting these into distinct communities. These communities pass through successive phases of development, or "seres" in which the plant



species change as preceding species slowly and subtly alter the initial environmental conditions. Gradually, certain species emerge to dominate the community.

From an analysis of the general land form, climate and hydrology of the Tifft Farm, the following basic communities of vegetation would be expected to exist or emerge at the Tifft Farm site:

Submerged aquatic communities
Emergent aquatic communities
Shrub-carr communities
Fen communities
Wet lowland forest communities
Mesic forest communities
Old field savannah communities
Weed communities on railroad cinderbeds, cry soils and slag fills.

Each of these communities have prevalent species which serve as indicators of the community's existence and stage of development and environmental condition. Field research at the Tifft Farm indicates that many of these species are present at the Tifft Farm site and are generally grouped in communities as indicated on the map, Vegetative Communities.

#### Submerged Aquatic Communities

Submerged aquatic plant communities are found in the open water areas of the Tifft Farm site. The plants may be rooted in the soils of the bottom in the littoral zone, or free floating in the limnetic zone.

A typical species index for a submerged aquatic community is as follows:

Most prevalent species:

Ceratophyllum demersum - Hornwort

Naias flexilis - Slender Naias

Philotria canadensis - Water-weed

Potamogeton natans - Common Floating Pondweed

Potamogeton pusillus - Small Pondweed

Vallisneria spiralis - Tape-grass

Other commonly found species include:

Brasenia Schreberi - Water-shield
Castalia odorata - Sweet-scented White Water Lily
Elatine americana - Water-wort
Eriocaulon septangulare - Seven-angled Pipewort
Isoetes macrospora - Lake Quillwort
Lemna minor - Lesser Duckweed
Lemna trisulca - Ivy-leaved Duckweed

Lemna trisulca - Ivy-leaved Duckweed

Lobelia Dortmanna - Water Lobelia

Persicaria amphibia - Water Persicaria

Sagittaria cuneata - Arum-leaved Arrowhead

Sparganium fluctuans - Floating Bur-reed

(Note: Illustrations of these plants and those of the following communities are found in the Appendix.)

#### Emergent Aquatic Communities

Emergent Aquatic plant communities are found in swamps and marshes and along the edges of ponds and streams. They are rooted in the soil -- generally, but not always, beneath the water. The Tifft Farm contains several emergent aquatic communities -- with the 75 acre cattail marsh as the most prominent feature.

A typical species index for these communities is as follows:

Most prevalent species:

- Eleocharis acicularis Needle Spike-rush
- \* Iris versicolor Large Blue-flag
- \* Phragmites Phragmites Common Reed-grass Pontederia cordata - Pickerel-weed Sagittaria latifolia - Broad-leaved Arrowhead
- \* Scirpus americanus Three-square
- \* Scirpus occidentalis Viscid Great Bulrush
- \* Scirpus validus American Great Bulrush Sparganium americanum - Nutall's Bur-reed
- \* Typha latifolia Broad-leaved Cattail Zizania aquatica - Wild Rice

#### Fen Communities

Fens are low wet grassland communities. The northern edge of the Tifft Farm appears to conform to the general character of a few, except in one or two spots where recent land fills have been made.

A typical species index for a fen community includes the following:

Most prevalent species:

Andropogon furcatus - Forked Beard-grass

Bromus ciliatus - Fringed Brome-grass

Calamagrostis canadensia - Blue-joint Grass

Panicularia nervata - Meadow-grass

Spartina Michauxiana - Tall Marsh-grass

Most prevalent groundlayer species:

\* Aster paniculatis - Tall White or Panicled Aster

\* Iris versicolor - Larger Blue-flag

Lycopus americanus - Cut-leaved Water Hoarhound

Thalictrum dasycarpum - Tall Meadow-Rue

#### Shrub-carr Communities

The shrub-carr community is a normal stage in the primary hydrosere successions around lakes and ponds. It follows the sedge-meadow or fen stage and in turn is followed by the wet lowland forest. A shrub-carr is a dense thicket of tall shrubs, usually 20 to 30 meters wide, and due to this density, generally has a life span of at least fifty years. The Tifft Farm has several acres of shrub-carr, the most prominent being the southern end of the penninsula at the extreme northwestern edge of Pond #1, the large central open water area of the site.

A typical species index for the shrub-carr includes the following:

Most prevalent species (major dominants):

\* Cornus stolonifera - Red-osier Dogwood

Salix alba - White Willow

Salix Bebbiana - Bebb's Willow

Salix discolor - Pussy Willow

Salix petiolaris - Slender Willow

Most prevalent ground layer species:

Asclepias incarnata - Swamp Milkweed

Aster paniculatus - Tall White or Panicled Aster

\* Eupatorium maculatum - Spotted Joe-Pye Weed

Solidago serotina - Late Goldenrod

Thalictrum dasycarpum - Tall Meadow-Rue

Other common species include:

<u>Clematis virginiana</u> - Virginia Virgin's Bower <u>Micrampelis lobata</u> - Wild Balsam Apple <u>Parthenocissus quinquefolia</u> - Virginia Creeper

\* Rhus hirta - Staghorn Sumac Ribes americanum - Wild Black Currant Rubus strigosus - Wild Red Raspberry Sambucus canadensis - American Elder Tiniaria Convolvulus - Black Bindweed

\* Viburnum Lentago - Nanny-berry

#### Lowland Wet Forest Communities

The Lowland Wet Forest Community exists in pioneer and intermediate stages of succession at the Tifft Farm. Currently, the site contains a pioneer sprout forest community (the cottonwood forest at the southwest corner of the cattail marsh) and an intermediate mature forest community (the willow grove along the old Tifft Street right of way).

A typical species index for the lowland wet forest community includes:

Most prevalent species (major dominants):

Acer saccharinum - Silver Maple Betula nigra - River Birch

- \* Populus deltoides Cottonwood
- \* Salix nigra Black Willow
- \* Ulmus americana American Elm

Most prevalent ground layer species:

Homalocenchrus virginicus - White Grass
Parthenocissus vitaceae - Virginia Creeper
Toxicodendron radicans - Poison Ivy
Urticastrum divaricatum - Wood Nettle
Vitis vulpina - Riverside Grape

#### Mesic Forest Communities

The Mesic Forest Community is a normal stage of succession following the Lowland Wet Forest. As a natural succession, the community requires rich, moist (but not wet) soils -- the organic humus of previous

successions. At the Tifft Farm, the lowland forest communities can be expected to evolve naturally to include the following typical species of a mesic forest:

Most prevalent species (major dominants):

Acer saccharum - Sugar Maple Fagus grandifolia - American Beech Quercus borealis - Gray Oak Tilia americana - Bass-wood Ulmus fulva - Slippery Elm

Most prevalent ground layer species:

Allium tricoccum - Wild Leek Geranium maculatum - Wild Crane's-bill Podophyllum peltatum - May Apple Vagnera racemosa - Wild Spikenard Washingtonia Claytoni - Woody Sweet-Cicely

Other commonly occurring species (trees):

Fraxinus americana - White Ash Juglans cinerea - Butternut Hicoria glabra - Pitnut Hickory

\* Malus Malus - Apple Ostrya virginiana - Hophornbeam

- \* Padus virginiana Wild Black Cherry
- \* Populus tremuloides American Aspen \* Ptelea trifoliata Three-leaved Hop-tree Robinia Pseudo-Acacia - Locust-tree

Other commonly occurring species (ground layer):

- \* Cornus femina Gray Dogwood
- \* Cornus stolonifera Red-osier Dogwood
- \* Rhus hirta Staghorn Sumac Sambucus canadensis - American Elder
- \* Vitis Labrusca Northern Fox-grape

These latter tree and ground layer species are especially common on the better drained, drier (Xeric) soils -- when the community evolves from an old field-savannah succession, as described in the following section.

#### Old Field - Savannah Communities

While the natural succession to a Mesic Forest is from the Lowland Wet Forest, the community can also evolve on areas of prior cleared or man-made land which has been abandoned. The community occupying this stage is called an "old field" and may include a "savannah" character of generally open grasslands with a variety of shrub and weed species and occassional large mature trees. Several areas of the Tifft Farm site possess this character, and include species typical of the community. A typical species index for the Old Field - Savannah Community includes:

Most prevalent species (dominants):

Hicoria ovata - Shagbark Hickory

\* Populus grandidentata - Large-toothed Aspen

\* Padus virginiana - Wild Black Cherry Quercus borealis - Gray Oak

Most prevalent ground layer species:

Asclepias syriaca - Common Milkweed

Comandra umbellata - Bastard Toad-flax

Falcata comosa - Hog Pea-nut

Monarda fistulosa - Wild bergamot

Rosa virginiana - Low Rose

Tithymalopis corollata - Flowering Spurge

Other commonly-found species (trees):

Fraxinus americana - White Ash
Malus Malus - Apple
Ptelea trifoliata - Three-leaved Hop-tree

Other commonly-found species (ground layer):

- \* Cornus stolonifera Red-osier Dogwood
- \* Lonicera tatarica Tartarian Bush-Honeysuckle
- \* Rhus hirta Staghorn Sumac
- \* <u>Viburnum Opulus</u> Cranberry-tree <u>Vitis Labrusca</u> - Northern Fox-grape

#### Weed Communities on Railroad Cinderbeds

The Tifft Farm contains one final plant community of interest -- the Weed Communities growing on the cinder fills of the surrounding railway tracks and yards. Although these weeds

generally not considered of interest, except as something to eradicate, they provide significant food sources for wildlife, as do many of the "weed" plant species found in the submerged and emergent aquatic communities. In addition, many of them provide colorful floral displays and interesting fruit forms and foliage textures.

A typical species index for weed communities on dry soils or cinder fills includes:

Achillea Millefolium - Yarrow Agropyron repens - Couchgrass Agrostis perennans - Upland Bent-grass Allionia nyctaginea - Heart-leaved Umbrella-wort Ambrosia elatior - Roman Wormwood Anthemis Cotula - Mayweed Asclepias syriaca - Common Milkweed Bidens frondosa - Beggar-ticks Chamaesyce maculata - Milk Purslane Chaetochloa glauca - Yellow Foxtail Chenopodum album - Lamb's Quarters Chenopodium hybridum - Maple-leaved Goosefoot Cirsium arvense - Canada Thistle Cirsium horridulum - Yellow Thistle Echinochloa Crus-galli - Barnyard-grass Equisetum arvense - Field Horsetail Hordeum jubatum - Squirrel-tail Grass Lactuca virosa - Prickly Lettuce \* Leontodon Taraxacum - Dandelion Linaria Linaria - Butter-and-Eggs Lychnis alba - White Campion Medicago lupulina - Black Medic Melilotus alba - White Melilot Melilotus officinalis - Yellow Melilot Oenothera biennis - Common Evening-Primrose Panicum capillare - Witch-grass Persicaria Persicaria - Lady's Thumb Phleum pratense - Timothy Plantago major - Common Plantain Poa compressa - Wire-grass Poa pratensis - Kentucky Blue-grass Polygonum aviculare - Knot-grass Potentilla monspeliensis - Rough Cinquefoil Rumex crispus - Curled Dock Sericocarpus linifolius - Narrow-leaved White-topped Aster Syntherisma sanguinale - Large Crab-grass Trifolium hybridum - Alsike Trifolium pratense - Red Clover

# VECETATION SECTION

				1.1		LOWLANI			wb
LVD	MOUNDS			sc s	A. WILL	SPROUT F	OREST S	EMERGENT AQ	RR
		-PLANT	SPECIES	SEE TEX	T FOR C	ETAILED I	NDEX -		•
AHT WITH  MIT  PECIE  JACK PINE  MUCHO  PINE  TAMAZACK  JUNIPER  SUMAC  B. LOCUST  HICKORY  CHERRY	ESTABLICH UPLAN STAND  MAPLE  BASSWOOD  BEECH  HOP HORN REAM  ASH  BOTTERHOT	,	FOREST	77 P. 11 2ED WILL CUE BLD	PINDEX EMHAN CITCHAC AUEX OUEZ CW	PLE OW DHWCCU  TTP HITE PED WILLON CURRA CURRA - PCPLA		THE SHELPS CAPE  THIS SHEET  THE INDEX  BULLEUSH  CATTAIL  APEC WHEAD  BURLEDO	TYPINDEX
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#### FAUNAL RESOURCES

In view of the proposed use of the Tifft Farm site, wildlife are perhaps the most significant element of resource analysis. The role of wildlife in the ecosystem is more than aesthetic and educational. They are, of course, important elements in the food chain and in the process, help to control the environmental balance. Certain species are herbaceous (feeding only on plants), others are carnivores or insectivores (feeding only on other species) and others are omnivorous (feeding on both plants and animals). In addition, they help maintain soil texture and aeration, and provide for the transport of plant seeds.

As a wetland area, the Tifft Farm undoubtedly has always provided the Buffalo region with a rich and productive wildlife area. We know from historical records that the Indians in the area used it frequently as a hunting ground, and the early colonial settlers of the area must have used it also as a source of food and furs.

Commercial development of the Tifft Farm and its environs eliminated or otherwise reduced many of the animal species that once occupied the site. Only the more tolerant or transient species of birds, fish, amphibians, reptiles and mammals would have remained during the use of the area as a port facility. Man induced changes in the original soil, water and vegetative environment and these in turn induced changes in the animal populations. Some species, like the Norway Rat, are harmful introductions. Others, such as the Pheasant, are beneficial introductions. Throughout the ages, however, the site has been a permanent residence or migratory home for many species of waterfowl and marsh birds -- and, of course, the industrious Muskrat has persistently claimed ownership of the cattail marsh, unconcerned with the clamor of trains and boats and managing to keep one step ahead of the trappers who have always sought his prized pelt.

The wildlife resources of the Tifft Farm today are best described in reference to their habitat preferences, and these in turn can be related to the major plant communities described in the previous section.

Aquatic Habitats (Open Water, Submerged Aquatic Plant Communities)

Field research has revealed that each of the aquatic habitats of the Tifft Farm has quite different faunal diversities and ecosystems -- as their physical qualities and

variety of submerged aquatic plant materials would suggest. These differences are particularly evident in the fish and aquatic macro-invertebrates which inhabit the three ponds, since unlike the avifauna, reptiles and amphibians, their mobility is more restricted to a particular area.

#### Fishes:

Some 789 specimens of fish representing 9 families and 20 species were taken in six collections in August 1973. Pond #1 contained 18 species of fish, the more abundant were:

Pimephales notatus - Bluntnose Minnow (28%)
Lepomis gibbosus - Pumpkinseed (25%)
Micropterus salmoides - Largemouth Bass (19%)
Perca flavescens - Yellow Perch (9%)

The range in fork lengths and length frequencies suggest that several species may have reproduced in this pond; central mudminnow, goldfish, carp, golden shiner, bluntnose minnow, brown bullhead, rockfish, pumpkinseed and largemouth bass. Many large goldfish and one large carp were observed during the several hours of reconnaisance. It is reasonable to expect all species have access to Lake Erie via the culvert under Ohio Street -- and the young collected in August came from Lake Erie rather than spawning within the pond itself.

An examination of stomach contents shows a complex food web with the largemouth bass and rockfish the top predators. The bluntnose minnow and pumpkinseed are forage fishes for these predators. The Yellow perch will feed upon small fishes and in turn be forage for larger bass.

Observation of, and reports from, anglers indicate that pond #1 is fished regularly. Yellow perch, brown bullheads and largemouth bass are the desired species.

Pond #2 contained 4 species of fish. The more abundant were:

Lepomis gibbosus - Pumpkinseed (64%)
Carassius auratus - Goldfish (18%)
Pomoxis annularis - White Crappie (16%)
Ictalurus nebulosus - Brown Bullhead (2%)

Many of the Sunfish were juveniles spawned that year. The White Crappies had rather small fork lengths of 115 to 129 millimeters. One young fisherman was observed in July with a mixed string of crappies, pumpkinseeds and bullheads, taken in pond #2.

Pond #3 contained a very large population of 3 species out of 5 collected. The three most abundant were:

Pimephales promelas - Fathead Minnow (34%) Culaea inconstans - Brook Stickleback (34%) Umbra limi - Central Mudminnow (29%)

Two goldfish and 6 yellow perch were also taken. One of the former and 5 of the latter were juveniles. Measurements of these species suggest that all five may have reproduced in or near the pond. Perhaps in the spring and with higher water there were connections between ponds.

#### Macro-invertebrates:

Some 42 species representing 35 families were taken. flies, water striders and midges were common to all three ponds.

Planaria, aquatic sowbugs, scuds, Stenonema mayflies, midges, and pond snails were abundant in pond #1. Many of these are tolerant of organically enriched environments. Springtails were also abundant, but are common to most wet areas near vegetation. Whirligig beetles, midges and pond snails were abundant in pond #2. Although the diversity is fairly high, most species were well hidden and thus not easily accessible to fishes. Water boatmen and backswimmers were found in "super" abundance among the vegetation of pond #3.

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Some of the macro-invertebrates available to fishes as food are indicated in Table 4 and include small crustacea, crayfish, leeches, midge fly larvae, pond snails, scuds and adult horse flies.

Most of the macro-invertebrate species taken are typical of pond and slow water environments and can be expected in all ponds. Further collection should significantly increase the list of organisms.

#### Reptiles and Amphibians:

Reptiles and amphibians of the aquatic habitats at the Tifft Farm site would include the following recorded and potential species:

Natrix s. sipedon - Northern Water Snake Chelydra serpentina - Snapping Turtle Chrysemys picta marginata - Midland Painted Turtle Notophthalamus v. viridescens - Red-spotted Newt (adult)

#### Birds:

Many species of avifauna have a distinct preference for aquatic habitats. Typical indicator species found in or over the ponds at the Tifft Farm include the following:

Podilymbus podiceps - Pied-billed Grebe

Larus argentatus smithsonianus - Herring Gull

Larus delawarensis - Ring-billed Gull

Sterna hirundo - Common Tern

Chlidonias niger surinamensis - Black Tern

Anas platyrynchos - Mallard

Anas d. discors - Blue-winged Teal

Stelgidopteryx ruficollis seripennis - Rough-winged Swallow

#### Mammals:

Mammals related to the aquatic habitats at the Tifft Farm site include the following:

Ondatra zibethicas - Muskrat Mustela vison - Mink Castor canadensis - Beaver

The latter are known to have visited the site, and have possibly attempted to establish lodges or burrows. Moore (1974) found beaver-gnawed stumps and logs in two sites -- at the northern end of the old canal slip that extends northward from Pond #1 and along the eastern edge of the old canal slip that extends southerly from the same pond. The latter sign was more recent, probably less than a year old.

#### Marsh Habitats (Emergent Aquatic Plant Communities):

As a wetland area, the most extensive and productive habitat at the Tifft Farm site includes the extensive cattail marsh which occupies most of the eastern half of the site, the many lesser cattail marshes, the edges and littoral zones of the open water ponds, and the stream which traverses the southern boundary of the old Tifft Street right-of-way.

### Fishes, Macro-invertebrates, Reptiles and Amphibians:

Most of these marsh habitats contain small fish and macro-invertebrates as listed previously. The reptiles and

amphibians listed previously, occasionally venture into the marsh habitats as well. Other species include:

Rana p. pipiens - Northern Leopard Frog Rana clamitans melanota - Green Frog

#### Birds:

Birds that frequent this habitat include the following species:

Branta c. canadensis - Canada Goose

Butorides v. virescens - Green Heron

Botaurus lentiginosus - American Bittern

Circus cyaneus hudsonius - Marsh Hawk

Rallus e. elegans - King Rail

Fulica americana - American Coot

Gallinula chloropus cachinnans - Common Gallinule

Actitus macularia - Spotted Sandpiper

Telmatodytes palustris dissaeptus - Long-billed Marsh Wren

Agelaius p. phoeniceus - Red-winged Blackbird

The latter is the most common bird resident of the Tifft Farm marshes.

#### Mammals:

The Muskrat is even more closely aligned with this habitat than the aquatic habitats. Other mammal species associated with the marsh habitat are:

<u>Procyon lotor - Raccoon</u> <u>Urocyon cinereoargenteus - Gray Fox</u>

Open or Brushy Wet Lowland Habitats (Fen, Shrub-Carr, Old Field Savannah):

This habitat type includes the basic "edge" or "ecotone" between the drier upland areas and the marshes and ponds on the Tifft Farm. At the Tifft Farm, these habitats are most closely related to two plant communities -- the Fen (an open wet grassland) and the shrub-carr (a thick brushy lowland community).

#### Terrestrial Macro-invertebrates:

No definitive surveys were made of terrestrial macroinvertebrates at the Tifft site, although the presence of certain families and species can be inferred from the presence of other animal species which feed upon them. These are identified in the Phase II report materials which cross-reference animal species, habitats, food preferences, etc.

#### Reptiles and Amphibians:

Several species of reptiles and amphibians favor open or brushy wet lowland habitats. These include:

Lampropeltis t. triangulum - Eastern Milk Snake

Thamnophis s. sirtalis - Eastern Garter Snake

Storeria d. dekayi - Northern Brown Snake

Hyla c. crucifer - Northern Spring Peeper

Pseudacris t. triseriata - Western Chorus Frog

#### Birds:

Bird species of the open or brushy wet lowland habitats would include the following indicator species:

Pluvialis d. dominica - American Golden Plover
Falco s. sparverius - American Kestrel
Phasianus colchicus - Ring-necked Pheasant
Zenaida macroura carolinensis - Mourning Dove
Lanius excubitor borealis - Northern Shrike
Calcarius 1. lapponicus - Lapland Longspur
Plectrophenax n. nivales - Snow Bunting
Geothlypis trichias brachidactylus - Yellowthroat
Spizella p. passerina - Chipping Sparrow
Philohela minor - American Woodcock

#### Mammals:

Some of the mammals previously mentioned also favor this habitat, such as the Gray Fox and Mink. Other mammal species in this habitat would include:

Mustela ermina - Shorttail Weasel Rattus norvegicus - Norway Rat Sylvilagus floridanus - Eastern Cottontail Wet Lowland Woods and Edge Habitats (Wet Lowland Forest Plant Communities, including Forest/Shrub-Carr/ Emergent Aquatic Ecotone):

This habitat type, like other forest habitats, can be stratified horizontally into ground layer, high canopy, and low canopy edge conditions. This of course increases the diversity of habitat types included, and so the species found in this area will also generally be found in some other habitat form.

#### Reptiles and Amphibians:

Typical reptiles and amphibians found in this habitat include the following species:

Bufo americanus - American Toad

Rana sylvatica - Wood Frog

Diadophis punctatus edwardsi - Northern Ring-neck Snake

Notopthalmus v. viridescens - Red-spotted Newt (Terrestrial stage)

#### Birds:

Typical bird species of this habitat preference include the following indicator species:

Lophodytes cucullatus - Hooded Merganser

Aix sponsa - Wood Duck

Butea 1. lineatus - Red-shouldered Hawk

Spinus t. tristus - American Goldfinch

Melanerpes e. erythrocephalus - Red-headed Woodpecker

Pheucticus ludovicianus - Rose-breasted Grosbeak

Junco h. hyemalis - Slate-colored Junco

Parus a. atricapillus - Black-capped Chickadee

Dendroica petechia - Yellow Warbler

Nyctea scandiaca - Snowy Owl

Buteo jamaicensus borealis - Red-tailed Hawk

#### Mammals:

Mammals which prefer wet lowland woods and edge habitat include the previously mentioned Beaver, Racoon, Short-tailed Weasel and Gray Fox. In addition to these, the following species are typical of this habitat type:

Sorex cinereus - Masked Shrew

Odocoileus virginianus - Whitetailed Deer

Didelphis marsupialis - Opossum

Dry Upland Woods and Edge Habitat (Mesic to Xeric Forest Communities including Old Field-Savannah/Forest Ecotone):

This habitat type is found in scattered locations at the Tifft Farm, and upon completion of the land fill operation, the mounds will naturally succeed to this habitat type.

#### Reptiles and Amphibians:

Several of the reptiles and amphibians previously noted also favor this habitat type. These include the Eastern Milk Snake, Smooth Green Snake, Northern Leopard Frog, Eastern Garter Snake and Northern Brown Snake.

#### Birds:

Typical bird species that one would expect to find in this habitat include:

Accipiter striatus volox - Sharp-shinned Hawk

Accipiter cooperii - Cooper's Hawk

Bombycilla cedrorum - Cedar Waxwing

Seirus aurocapillus - Ovenbird

Piranga divacea - Scarlet Tanager

Passerina cyanea - Indigo Bunting

Sitta canadensis - Red-breasted Nuthatch

Vireo olivaceus - Red-eyed Vireo

Dumetella carolinensis - Gray Catbird

Catharus ustulatus - Swainson's Thrush

Dendroica c. coronata - Myrtle Warbler

Empidonax minimus - Least Flycatcher

#### Mammals:

Most of the mammals previously indicated could also be expected to be found in this habitat on the Tifft Farm site. In addition to several species of moles, shrews, voles and mice, the following might be expected.

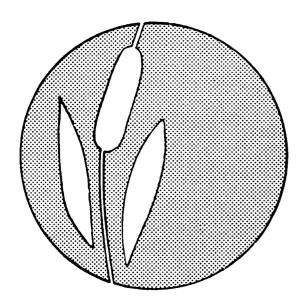
Mephitis mephitis - Striped Skunk

Marmota monax - Woodchuck

Tamias striatus - Eastern Chipmunk

Sciurus carolinensis - Eastern Gray Squirrel

Full species lists and comments of field research methodology findings and conclusions are in the Appendix.



## TIFFT FARM NATURE PRESERVE

PHASE II SITE ECOPLAN & DESIGN VOCABULARY

ECOPLANS, INC.



#### Wet Lowland Forest Communities

#### Community Distribution:

The wet lowland forest communities of the Tifft Farm include both sprout and mature stands. As might be expected, the mature stands are located primarily on the periphery of the site where there was less disturbance in the past. The sprout forest is located along the western edge of the cattail marsh in areas of earlier fill which appears to be made up primarily of harbor dredgings that were pumped into the southwestern corner of the marsh.

## Major Natural Factor Interrelationships. Potentials, Limitations and Major Needs:

- Land Form. As the name of this community/habitat type implies, land form and elevation are important factors. Low depressions which retain a high moisture level are needed for the development of the plant species found in these communities. As in other units, this in turn controls the type of wildlife species.
- Geomorphology. The soil structure of the wet lowland forest community in a natural state tends to have a high content of organic matter that sometimes approaches peat in nature. This is usually built up over lower layers of flood deposited silts and mucks. At Tifft, especially in the mature willow grove along the old Tifft Street right-of-way, this basic soil is intermixed heavily with rubble and debris dumped in the area in the past.
- Hydrology. Wet lowland forests naturally occur on bottomlands and flood plains. The water level will generally vary from actual submergence during flood times to nearly xeric conditions during midsummer low-water stages.
- climate. As might be expected, temperatures will generally be lower within the lowland forest communities, and humidity levels will be higher near the ground than in upland forest areas due to higher moisture levels. The sprout lowland forest along the western edge of the cattail marsh additionally provides a shelterbelt on the lee side from the strong prevailing

grounds for seeds and insects. The fen, as might be expected, contains a higher population of reptiles and amphibians than the other grasslands. The small rodents, snakes, and insects found in the grasslands are also a readily available food source for the birds-of-prey that occassionally hunt the marshes and open fields.

#### Aesthetic Values:

The grassland communities and habitats of the Tifft Farm form a series of spaces which provide a variety of aesthetic values ranging from a sense of extensive openness and exposure to a sense of enclosure and shelter, depending upon the size of the area and topographic features.

#### Educational - Recreational Values:

The grassland habitats at Tifft have a high educational value due to their ability to tolerate human access, and the ease of observation of plant and animal species due to their general open character. As a passive recreational resource, they provide an opportunity for trail walking and hiking, and trailside photography.

#### <u>Development Tolerance</u>:

With the exception of the fen area, the grasslands at Tifft are able to support the development of a nature trail system. Access, however, should be restricted to the trails, since many waterfowl nest in the deeper grasses. It is quite easy for the careless visitor to step on a nest of duck or pheasant eggs or fledgling birds which usually freeze at the approach of footsteps. In the drier months, fire could be a hazard from careless smokers and warning signs should be posted along the trails to remind people of the hazards and the necessity to restrict their travel to the trails.

- Hydrology. The fen area is the wettest of the grassland communities at Tifft and its moisture level is maintained by surface drainage into the depression and ground water infiltration from nearby ponds and marshes. The savannah area immediately west of the fen is only slightly higher in elevation, and moisture is also an important factor in maintaining this community. The old field pioneer brushland is the driest of the existing grassland communities on the site and in areas of exceptionally high slag and rubble content, moisture conditions approximate the xeric due to rapid drainage.
- Climate. The grasslands are the most exposed plant communities at the Tifft Farm. The fen area, because of its lowness is a potential fog and frost pocket, but the higher grasslands are normally swept clear by the prevailing winds, and are thus generally warmer and drier. These micro-climate variations principally affect the basic plant and insect populations and the small rodents.
- Vegetation. While the dominant plants of the grassland communities are, of course, grasses and forbs, these communities at Tifft contain many other vegetative resources. The fen community includes species related both to the emergent aquatic communities and the shrub-carr. The latter community type would replace the fen community in the natural succession. Panicled aster and larger blue-flag are examples of the showy wildflowers often found in the fen at the Tifft Farm. In the higher elevation, but still in moist savannah area, the understory includes species found in both the shrub-carr and the old field pioneer brushland areas - including red-osier dogwood and staghorn sumac. Of the upland weeds and herbs growing in the latter community, the most valuable species from the standpoint of wildlife food are panicgrass, bristlegrass, ragweed, paspalum, crabgrass, doveweed, sedge, pokeweed and lespedenza.
- Wildlife. Two of the most prominent wildlife species of the Tifft Farm grasslands are the ringneck pheasant and eastern cottontail rabbit. Many waterfowl species also inhabit the fen and other grasslands as nesting areas. The grasslands are also the habitats of the smaller rodent species. Many songbirds also use the grasslands as foraging

#### <u>Grassland Communities - Fens, Old Field - Pioneer</u> Brushlands and Savannahs

#### Community Distribution:

The Tifft Farm contains several types of grassland communities which are well distributed on the site. The "fen" along the northern edge of the preserve is a low springy grassland that has an exceptionally interesting variety of wildflowers and other ground layer species. A large area of the middle of the site is characterized as an old field - pioneer brushland, and at the extreme northwest corner of the site is an expanse of grassland with large mature trees giving the impression of a savannah. Each of these grassland communities is a somewhat different habitat type, but they are closely related and will be treated together in this discussion.

## Major Natural Factor Interrelationships. Potentials, Limitations and Major Needs:

- Land Form. The land form of the fen area is a slight topographic depression with poor drainage. The "fen" at the Tifft Farm site may not be a true fen, in the opinion of some authorities, but this area is distinct enough from other grassland communities and has many features of a true fen, containing different grasses and forbs and several species of hedge. Although part of the area has been filled (north of the new pond) and cut by roads, the surrounding higher grounds provide a drainage system similar to that of a "perched bog". The other grasslands the old field and savannah areas are generally on the higher areas of the site, and their plant species are more typically found on mesic to xeric soils.
- Geomorphology. The surficial geomorphology of the fen community is normally an organic peat that is either neutral or alkaline in reaction. The more mesic grasslands at Tifft occur on a soil base of mixed fills of rubble and organic silts and mucks which initially were built up as the filled areas between the old ship canals and later extended as these canals were filled in.

#### Educational-Recreational Value:

As educational-recreational resources, the shrub-carr communities must be ranked low in relation to the other environmental resources at the Tifft Farm. The density of the community makes wildlife observation difficult. Any recreational value comes from the passive recreational experience of seclusion which these thickets provide.

#### Development Tolerance:

Shrub-carr communities are quite tolerant of human disturbance. Pathways through the thickets are readily closed when no longer used, and the communities are easily established and maintained. Their effectiveness in the control of circulation and access is quite high, and the use of this community for additional natural barrier zones should be considered in the master plan.

- o Climate. The shrub-carr communities provide natural windbreaks at the Tifft Farm. The general climate of the Buffalo region is, of course, conducive to the maintenance of required moisture levels. The windbreak effect also causes wind-driven snow to drop on the lee side of these communities, further increasing the available moisture.
- Shrub-carrs are generally highly stable Vegetation. communities, because the density of the dominant species discourages invasion by any but the most shade tolerant species of trees. While dogwood species dominate, other species include shrub willows, alder and nanny berry. Grapes are also frequently found in the shrub-carr communities. The fruit of the dogwood is an important duck food. Pheasant will also eat the fruit and birds but it is not an important part of their diet. Rabbit (cottontail) browse on the bark in winter months of low food supply. The fruit is eaten by many songbirds, including the cardinal, evening grosbeak, robin, wood thrush and cedar waxwing. It is a favorite food of the evening grosbeak.

The density of shrub-carr vegetation makes this community an important buffer, and an excellent shelter for upland game such as pheasant and rabbit.

o Wildlife. Species that frequent the shrub-carr community are mentioned above. The general relationship to water areas, and the high shelter and food value of the shrub-carr makes this community an excellent wildlife habitat. In turn, the establishment of this community is often due directly to the dispersion of seeds by animals.

#### Aesthetic Value:

Anyone visiting the Tifft Farm site in winter will be treated to a sharp contrast of red-osier dogwood against the white background of snow. The graceful texture and high color of this community is therefore an important aesthetic feature of the Tifft Farm. During the spring, the dogwood flowers also contribute to early floral beauty at the site.

#### Shrub-Carr Communities

#### Community Distribution:

The shrub-carr communities of the Tifft Farm consist of wide bands of low shrub species - predominantly red-osier dogwood - which usually form a transition zone, or ecotone, between wet lowland areas and drier upland areas. Thus, they are generally well distributed at the site because of the good dispersion of wet lowland communities. However, the high land area in the northwestern portion of the ship canal and the lake-inlet pond's northern bay contains the most extensive shrub-carr community. There are other areas of the site where more intensive development of this community would be desirable, and this establishment could be accomplished in conjunction with selected thinning of the larger community areas.

## Major Natural Factor Interrelationships. Potentials, Limitations and Major Needs:

- Land Form. As a transitional community, or ecotone, the shrub-carr generally occupies higher land along the edges of the low wetland areas. At Tifft, the shrub-carr community was probably not present on the original site as extensively as it is now. Man-made fills in the areas between the old ship canals generated the necessary land form for this community on the existing site, and the related plant species were probably established from seeds in bird droppings.
- Geomorphology. As transitional communities the shrubcarrs prefer fairly moist soil conditions and are generally found on the higher mucks and silts associated with wet lowland plant communities. Again, at Tifft, these conditions are fairly extensive both as naturally deposited soils and as higher ground made by dredging the mucks and silts to form the ship canals that once occupied the site.
- Hydrology. Periodic, or seasonally-flooded areas are needed for shrub-carr development. As noted previously, moist soil conditions are a requirement. The density of shrub-carr communities is also a factor in maintaining moist soil condiions. The thick growth traps precipitation and the shading of the foliage retards direct evaporation of this moisture.

#### Educational-Recreational Values:

This community/habitat type has extremely high educational and passive recreational value. Access to these areas is therefore very important, but should be carefully planned to avoid direct intrusion upon their sensitive ecological features. The large marsh will be particularly valuable for scientific studies of icterid populations and the muskrat.

At the western end of the play field site, the small cattail marsh should be left undisturbed - as a "mini-marsh" for the viewing enjoyment of families using the picnic areas and children using the playground area.

While a major area of the slag marsh at the eastern end of the play field site will be filled to accommodate the play field area, as much of this area should be preserved as is possible. In addition, a new marsh of this character should be developed in the low filled-in portion of the ship canal along Fuhrmann Boulevard.

#### Development Tolerance:

The large cattail marsh, and smaller marshes of this character are quite fragile and should not be subjected to any development activity, except for the creation of additional open water areas, control of reedgrass, and the construction of a few catwalks and observation blinds for environmental education purposes in the large marsh.

The slag marshes, while more tolerant of circulation impacts should also be restricted except for scientific studies.

The larger littoral zones of the lake-inlet pond, as well as the entire shorelines of the two smaller ponds should also be planned to discourage access. Visitors canoeing on the lake-inlet pond should be provided with a map showing littoral areas restricted to access from the water side.

The muskrat is the most important mammal of this community/habitat type. The estimated population at the Tifft Farm is about 1,000, and they have been trapped for many years - providing some of the best rat pelt found in the area. Cessation of trapping may result in overpopulation unless there is an increase of natural predators such as mink. This could cause a marsh "eat out" and should be carefully monitored. Periodic trapping might be permitted as a means of control.

The teeming insect life of these areas also favors the continuation of amphibians and reptile species.

In the construction of the new pond, consideration should be given to the development of appropriate secluded nesting habitats and potholes for waterfowl within the shallow littoral zone fringing the pond.

#### Aesthetic Values:

The emergent aquatic plant communities and marsh habitats at the Tifft Farm are a substantial aesthetic asset, providing the strongest sense of primitive natural area on the site. The large cattail marsh is exceptionally beautiful and the rippling sea of green cattail on windy summer days is certainly an aesthetic experience few cities in American can boast of. In contrast to this "macro-scale" aesthetic character of the large marsh, the aesthetic experience of the smaller marshes - especially the slag marshes - requires more study of details - and in many ways will produce a higher sense of discovery for the new nature lover.

The marshes have been favorite dumping grounds in the past, and the exposed eastern edge of the large cattail marsh should be protected with a fence barrier to prevent continued dumping of trash.

exposure aids in hatching and development of young birds, animals and insects. The climate conditions of this community/habitat type also produces fog and frost pockets and these have additional shelter value.

- Vegetation. Emergent aquatic plant communities and marsh habitats are primarily populated by moisturetolerant herbaceous species of plants and provide a rich source of plant food for many animals. Tifft the major marsh is dominated by cattail - both the broad-leaf and the narrow-leaf species are pres-There are some areas of invasion by giant reedgrass which has a high aesthetic value but which also has a low value for wildlife. The spread of this plant should be monitored and controlled by hand mowing in the late spring - early summer before the seed head matures. Cattail root stocks are a valuable wildlife food - particularly for geese and muskrats, and the stems and leaves are used for shelter and nesting cover. Arrowhead, found along the fringes of the ponds, is a high value duck food - sometimes called duck potato. Bulrushes, found primarily on the slag marshes at Tifft, are used by sora and many species of duck (seeds) and also by muskrats (stems and underground parts). North of the large cattail marsh there is a smaller marsh area fringed by a large patch of bur-reed which are also used as food by both waterfowl and muskrat.
- Wildlife. The emergent aquatic plant communities and marsh habitats at the Tifft Farm are the most productive wildlife habitats in the entire site. The dominant bird species of the cattail marsh at Tifft is not a waterfowl, but the red-wing blackbird. This icterid species utilizes the marsh as a nesting habitat and there are great flocks present in the spring and summer. The animal food of this species is primarily insects, including weevils, beetles and caterpillars, but weed seeds make up the bulk of the diet at Tifft - with dominant foods being ragweed and bristlegrass. Marsh birds such as gallinules, coots, and herons are also found in the marsh. deer and sandpipers are more commonly found in the slag marshes where they nest, laying their highly camouflaged eggs in shallow depressions where they blend with the stony gravel. The diet of these birds is almost completely of small insects, worms, crustaceans and mollusks.

Other marsh areas at the Tifft Farm are found on low slag and rubble fills. They have a slightly lower moisture content than the cattail marshes, and generally contain more grass and sedge species, and dominant populations of rushes and bur-reeds.

Lens-like layers of sand may connect the main cattail marsh to the Buffalo River providing natural aquifers for the maintenance of marsh water levels.

Hydrology. Maintenance of appropriately high water levels is essential to sustain emergent aquatic communities and marsh habits. At Tifft, in addition to the marsh areas, emergent aquatic plant communities are found rimming the ponds, forming the littoral zone of plant growth, which may extend to three or four feet below the surface of the water - or more, depending upon water clarity. In these areas, water levels are generally quite stable. Marsh areas which are relatively even in depth and completely covered by plant growth, however, present some management The annual die-back and decay of marsh problems. vegetation will eventually raise the soil level above the water level. As this continues, the drier soil is easily invaded by less moisture-tolerant plant species. This condition exists along the southwestern edge of the cattail marsh near the aspen sprout forest which is gradually invading the main This perimeter should be dredged two to four feet below the main marsh water level to stem this encroachment.

Seasonal spring flooding helps to maintain emergent aquatic communities in the areas of low slag or rubble fill in the low wetland forest areas and slag marshes in the western and southern edges of the site.

High moisture content is essential for sustaining the high wildlife population of emergent aquatic plant communities and marsh habitats.

Climate. Climate plays an important role in sustaining this community/habitat type. Precipitation is, of course, the most important climate aspect. The interrelationship of climate and thick vegetative growth maintains a high humidity which is important for wildlife food and reproduction needs. The plants are more succulent species which are more digestible, and the warmth of more direct solar

# Emergent Aquatic Communities and Marsh Habitats

# Community Distribution:

The emergent aquatic communities and marsh habitats of the Tifft Farm site are well diversified in terms of size and species compositon and have an excellent distribution on the site. The entire eastern portion of the Tifft Farm consists of this community-habitat type, but smaller marshes and wetland areas are found in the northwestern edge, south of the landfill area along the old Tifft Street right-of-way and in the area south of that line designated for the playfields. The large cattail marsh is undoubtedly the only remnant of the original ecosystem in the area.

# Major Natural Factor Interrelationships. Potentials, Limitations and Major Needs:

- The land form structure of the emergent Land Form. 0 aquatic community and marsh habitat is a shallow depression a few feet below the surrounding ground or surface water table. Most marshes are naturally formed as the result of the aging of shallow lakes and ponds, and much of the Tifft Farm area and its environs is thought to have been a shallow bay at the western end of Lake Erie which was filled in by sands from lake storms and more organic materials deposited at the mouth of the Buffalo River. however, several of the smaller marshes of the Tifft Farm are the result of man-made changes to the earth's topography. Depending upon the type of fill material, these smaller marsh areas have a marked variation of plant species - and, accordingly, contain different animal species.
- Geomorphology. The surficial geomorphology of the Tifft Farms emergent aquatic communities and marsh habitats is of two principal forms. The cattail marshes are located in areas of natural, or mancreated organic soil fills. Usually, these organic soil layers are the result of historic alluvial deposits of the Buffalo River over a base of lake deposited sands, although the natural processes of vegetation decay have added to the organic soil layers.

# Development Tolerance:

In terms of development tolerance, the lake-inlet pond is undoubtedly capable of withstanding development impacts and human recreational and nature study use. The marsh pond, conversely, is the most sensitive water body and least tolerant of any developmental change. Selected dredging of bottom debris and accumulated sediments are recommended for defined areas of these ponds, but should be carefully planned and carried out lest the disturbance create even worse conditions. In terms of circulation access, the lake-inlet pond should provide many access points along the southern and west-ern shores. Unstable bank conditions on the northern and eastern sides suggest that access points in these areas be limited to a few areas.

The pond in the northwestern quadrant that is to be created by the transfer operation earth fill borrow is expected to have an extremely high aesthetic quality due to modifications in the grading plan which will make the shoreline more irregular and which will leave a major island in the center where a major structural foundation was uncovered. The island, which will not be accessible to the public, will heighten the sense of mystery and remoteness and, if used by nesting waterfowl, will probably become a major observation focus for nature study.

The small pond in the northern end of the cattail marsh, with its background screen of willow groves and cattails and its marshy foreground - including the old ditch connection to the west and the small earthen peninsula adjacent - provides an experience similar to that of the previously mentioned pond. The shallowness of this pond, however, and resultant dense vegetation in the summer sometimes gives a feeling of stagnation - yet even this provides an aesthetic contrast which is part of the total Tifft Farm experience. The rich variety of marsh birds and other waterfowl and amphibians and reptiles in this area provides a real nature experience. This pond usually contains several muskrat lodges as well, adding to the aesthetic experience and intensifying the feeling of curiosity.

# Educational - Recreational Values:

As active recreational resources, the lake-inlet pond should be opened for canoeing and fishing from designated docks and bankside areas. Ice fishing in the winter might also be permitted on this pond.

The other two ponds, however, should not be opened for either of these uses if their high wildlife and aesthetic values are to be sustained. The pond created by the borrow operation and the marsh pond would also have high value for scientific study of submerged aquatic plant communities and aquatic animal species. The lake-inlet pond would have high scientific-educational value from the perspective of pollution abatement impacts on wild-life restoration.

more balanced food web rather than a food chain such as the bass-bluegill-minnow.

It would be advisable to add at least one additional forage species and other predator species. A member of the pike family is recommended, as is yellow perch. The perch will be intermediate in the food web, feeding upon minnows and invertebrates while in turn being forage for the larger species. The screen at the lake inlet would, of course, not prevent repopulation of carp and goldfish by larval and juvenile forms, but if water quality is improved and a desirable food web established, the aquatic community will be more stable and able to compete with the undesirable species.

It has been suggested that beaver be introduced to the site - and in recent years some have migrated into the site. Beaver would be expected to lodge along the narrow canal extending south from the lake inlet pond to the stream - where aspen and poplar growth is predominant, and the land suitable for the construction of dams. However, they may cause serious flooding of areas such as the willow grove along the old Tifft Street right-of-way, and their foraging could leave the lowland sprout forests in a rather unaesthetic condition.

# Aesthetic Values:

The submerged aquatic plant communities and open water habitats at the Tifft Farm provide a variety of aesthetic attributes to the overall visual experience of the area. The lake inlet pond helps to heighten the sense of the site as a composite of distinct zones. While this pond aids in the control of site use it still affords the opportunity of visual access to more remote areas of the site from the areas programmed for more intensive use and in many ways is responsible for the feeling of a remote wild area that is achieved when one is in the north-The large expanse of open water of the lake western area. inlet pond provides a real sense of linkage with nearby Lake Erie, and because of this size factor the water presents many moods depending upon the daily and seasonal climate variations. To a canoeist, the meandering course of this old ship canal with its inlets and bays gives the same sense of intrigue and discovery that would be obtained canoeing in any natural estuarine area.

feeding this pond should be monitored and pollution sources along its course should be eliminated. Anerobic conditions exist in the lake-inlet pond due to to the nature of bottom debris as well as depth and turbidity, but disturbance of this pond by dredging may cause even more serious depletion of oxygen.

- Climate. Climate effects on the submerged aquatic communities and habitats result primarily from seasonal temperature changes, wind-generated wave action which erodes the banks where the land form change is abrupt, and the increase of water temperature from solar exposure. As noted previously, the formation of ice and cooling of the surface water during winter months is beneficial in the maintenance of vertical water circulation. Wave erosion of the northern and eastern banks of the lake-inlet pond, however, contributes to the turbidity of the lakeinlet pond and consideration should be given to the stabilization of such banks. Increase of surface water temperature is not a major problem in the larger ponds - where it contributes to the vertical circulation of the water, but it accelerates the growth of waterweed and algae in the shallow pond in the northern end of the marsh.
- O Vegetation. The submerged aquatic plants of the Tifft Farm open water habitats are typical of those found in the area. These include both floating and rooted, but submerged, species. The pond in the northern end of the cattail marsh contains extensive growths of waterweed, which has a low rating as a duck food. The more valuable existing floating or submerged aquatic plants are wild celery, pond weed, duck weed, tape grass and filamentous algae. More detailed analysis of the submerged and aquatic plant species is needed to determine a basic program for developing a better balance of species useful for wildlife food.
- o Wildlife. Second only to the emergent aquatic plant communities and marsh habitats, the open water areas of the Tifft Farm sustain rich diversity of wildlife. Representative species of each of the major wildlife groups fish, amphibians and reptiles, birds, and mammals along with a variety of macroinvertebrates are found in the Tifft Farm waters as indicated in the previous section. Carp and goldfish are the least desirable species and consideration should be given to screening the lake inlet and poisoning the lake-inlet pond to remove them and restocking to gain a

Depending upon the color and turbidity of the water and the amount of suspended solids, the depth of water at which photosynthesis can occur varies, and thus determines the extent of submerged aquatic vegetation that may be rooted on the pond bottom.

At the Tifft Farm site, the shallow depth of the pond in the northern part of the large cattail marsh is a limiting factor, as is the turbidity of the murky waters of the other two ponds. Periodic dredging of the pond in the cattail marsh should be considered to remove the build-up of decayed vegetation and retard the evolution of this water body into additional marsh-like habitat. The pond in the northwestern quadrant of the site is to be enlarged during the transfer operation, in accordance with contours prepared for the Tifft Farm Nature Preserve Master Plan, which will provide a balanced basin for accommodating both submerged and emergent aquatic communities.

Geomorphology. The surficial geomorphology of the Tifft Farm site is an extremely important factor in the maintenance of the submerged aquatic habitat. The rate of lateral flow of ground water is determined by the porosity of the soil. At Tifft, the upper soil levels include extensive sand deposits which probably provide natural aquifers between the ponds and other wetland areas. There may also be dikes of porous slag fill and other such materials resulting from previous development of the site as a commercial port facility.

Recommended improvements to supplement water levels in the cattail marsh in essence will provide an artificial aquifer system which will help to maintain water levels in the pond in the northern end of the marsh. If water levels of the enlarged pond in the northwestern section prove unstable, this can later be corrected by the construction of a sand and gravel aquifer between this pond and the lake-inlet pond.

Hydrology. The physical and chemical quality of the water is probably the most significant natural factor/habitat relationship affecting the submerged aquatic communities at Tifft. While the situation, which is a major factor in the ecology of the lake-inlet pond, is probably better than in earlier years due to water pollution control improvements affecting the Lake Erie Harbor, the stream from the South Park Lake

# Submerged Aquatic Communities and Open Water Habitats

# Community Distribution:

The submerged aquatic communities and open water habitats of the Tifft Farm consist primarily of the three ponds identified in the first section of the report. The northern and western sections of the site contain the most open water. The southeastern portion of the site - particularly the south of the large cattail marsh - lacks an appropriate balance of this habitat type and additional open water areas should be provided as a master plan improvement.

# Major Natural Factor Interrelationships, Potentials, Limitations and Major Needs:

Land Form. The role of land form in sustaining submerged aquatic communities is obvious. Land form depressions from the basins of ponds and lakes, and the surface hydrology watersheds that sustain a flow of water into them. The depth of water depends upon the contour of the land itself and the ground water level of the surrounding area. At the Tifft Farm, water levels are sustained primarily by direct connection with Lake Erie and by lateral flow of ground water through the earth barriers separating the ponds from the lake inlet and nearby rivers and streams. The topography of the land adjacent to the ponds is relatively flat and provides little direct runoff into the ponds.

The three principal ponds of the Tifft Farm vary significantly in depth - a direct factor of the land form. The depth of the pond basins is important in sustaining submerged aquatic communities. If a pond is too shallow, it will more rapidly evolve into an emergent aquatic community - a marsh - and ultimately become an even drier community. Minimum water depth to allow for a spring-fall turnover is approximately eight feet. This phenomenon occurs when there is sufficient imbalance between the temperature of the water at the surface and bottom layers, and results in a natural circulation in which the cooler, more oxygenated water at the surface is replace by the warmer less oxygenated water from the bottom.

#### ECOLOGICAL ASSESSMENT

The existing natural ecology of the Tifft Farm site appears conducive to the support and sustenance of a variety of distinct plant and animal communities. Because the evolution of the Tifft Farm's ecosystem has been subjected to intensive development impact in the past, however, the current resource base contains a number of weaknesses which must be considered in the preparation of the master plan. Through the use of proper planning, construction and management techniques, those ecological elements or processes which are not consistent with the proposed development and use of the site can be eliminated or their influence minimized. Likewise, it is possible to identify and strengthen or accelerate those natural elements or processes which support the proposed development and use of the site.

The following discussion focuses on the interrelationships between natural factors of climate, geomorphology, hydrology, vegetation and wildlife, and the existing and potential plant communities and wildlife habitats of the site.

#### INTRODUCTION

The previous section of this report presented an analysis and interpretation of each of the existing individual resources of the Tifft Farm Preserve Site.

The following section considers these resources in terms of their interactions and assesses, on an integrated basis, the ecological and visual status of the site to present a composite picture of the total ecosystem and the potentials and limitations for use.

Projected site development impacts, the impacts of peripheral facilities and other external factors are then considered. These include the impact of the transfer operation and the future development and management of the site as a nature preserve.

Based on this analysis, policies are formulated to guide the development and management of the Nature Preserve. Taken together, these components of the report constitute a Basic Ecoplan which serves as the foundation for the preparation of the Tifft Farm Nature Preserve Master Plan as presented in the final section of the report. westerly winds.

- Vegetation. The dominant tree species of the mature wet lowland forest at Tifft are black willow and cottonwood. All grow rapidly and may attain a very great size. They generally produce stump sprouts and tend to have many-branched trunks. The loose soil structure sometimes permits the windthrow of exposed trees, and the soft wood contributes to the high wind breakage of branches. Groundlayer species are often quite showy in the spring. The sprout forest along the marsh edge is quite dense, and its wildlife value could be improved by providing some clearings in the larger section.
- The forest communities of the Tifft Farm Wildlife. provide a series of habitat conditions for wildlife, including the canopy habitat of the treetops, an intermediate habitat and a ground habitat. In addition to the reptiles and amphibians found in and near the pools of water, the Tifft Farm wet lowland forests provide good ground habitat for mink, raccoon and beaver. Muskrats will forage in these areas as well. The small pools hidden by the dense shrub and tree growth also harbor waterfowl such as the wood duck which nests in hollows in the larger trees. ground layer herb habitat will also provide food and shelter for the mallard, blue-winged teal and ovenbird. Many songbirds live in the intermediate shrub understory including such species as the yellow-shafted flicker, rose-breasted grosbeak, eastern pewee, blackcapped chickadee and redstart. Cardinals and house wrens favor the shrub tops. In the canopy layer will be found the red-eyed vireo, great crested flycatcher and downy woodpecker.

# Aesthetic and Recreational Values:

The lowland forests at the Tifft Farm contribute to the aesthetic value of the site in many ways. They provide a sense of shelter and their shade is a welcome relief on hot days. The character of the mature willow grove along the old Tifft Street right-of-way provides considerable delight with its tunnel-like character created by the tree-canopy, hanging grapevines, and glimpses of the woodland pools. At dawn and sunset, the glade is filled with the song of many bird species.

The sprout forest, because of its density and correspondingly lower use by wildlife, provides a different character, quieter, and somewhat more hostile to human presence because of the stillness and difficulty in orientation caused by the pathless, even character of the woods.

# Educational - Recreational Values:

As an environmental education resource, the willow grove along the old Tifft Street right-of-way must be ranked quite high. This is due both to the size and productivity of the area as a wildlife habitat, and the excellent base conditions for providing controlled access through the area along the old roadway. The smaller willow grove at the north end of the marsh, however, lacks both size and the ability to support foot traffic due to the nearby fen and marsh areas. This area should therefore be preserved undisturbed as a sanctuary area for wildlife. In its current condition, the sprout forest along the western edge of the marsh, except where it thins to a narrow band, is not as productive of wildlife. In the larger areas, the provision of clearings, and the construction of a few trails along the perimeter close to the marsh will improve the education value of the area. As passive recreation resources, the willow grove again ranks high, good for walking and providing many interesting photography subjects. The sprout forest area, and the small mature willow grove at the north end of the marsh have low recreational values and potential.

# Development Tolerance:

Normally, the wet lowland forests will not tolerate development pressures due to the wet ground conditions. At Tifft, however, previous use of the site has resulted in conditions which require improvements to be made to both the mature willow grove along the old Tifft Street path, and in the sprout forest along the marsh edge. The latter improvements include the need to bring in excavating machinery and trucks to develop additional open water in the marsh area next to the sprout forest. The disturbance caused by this construction activity will, however, be relatively quickly restored by the rapid growth of wet lowland plant species. Permanent use of these areas should, however, be restricted to trail systems.

# Upland Mesic Forest Communities

# Community Distribution:

Upland mesic forest communities do not presently exist at the Tifft Farm except in early pioneer stages on the higher grasslands. It would be desirable to establish such communities for variety, however. The new mounds resulting from the landfill operation will provide the major opportunity for the establishment of this community, and consideration should also be given to allowing some sections of the old field - pioneer brushland to naturally evolve into upland mesic forest stands.

# Major Natural Factor Interrelationships. Potentials, Limitations and Major Needs:

- o <u>Land Form</u>. Land form is an important natural factor, since these communities require higher, betterdrained topography. The new mounds, rising in elevation more than fifty feet above the average existing ground elevation will create the land form condition for this community.
- Geomorphology. Mesic forests can develop on a variety of soils - the typical position is about mid-catena, with good but not excessive drainage, and with a deep layer of material fine enough to allow root penetration.
- o <u>Hydrology</u>. As indicated above, the availability of water is not as significant a factor in the upland mesic forest community as it is for other communities at Tifft. Because of the deeper water table, the upland mesic forest community will generally have plant species with deeper root systems and less susceptibility to windthrow and breakage. Generally, the drier the condition, the less suitable the community will be for wildlife habitat, since the plants will be species with less moisture content and insects will be fewer.
- o <u>Climate</u>. The upland mesic forest communities are generally winter and summer sheltered and being on warmer upland slopes will have a marked humidity differential as compared to wet lowland forests. These microclimate features will correspondingly affect the types of vegetative and faunal species present.

- O Vegetation. Beech, yellow-birch and hardwood maples, basswood, elm, oak, ash and hickory are prevalent species of the upland mesic forest communities. The dominance of mast-producing species in turn will attract such wildlife as squirrels, chipmunks, and other animals and birds favoring nuts and hard seeds as foods. Because of the heavy tree canopy, groundlayer species of plants will tend to be restricted to the more shade-tolerant species.
- Wildlife. The introduction or development of upland mesic forest communities at the Tifft Farm would certainly contribute to the diversity of wildlife species that could be supported by the area. In addition to squirrels and chipmunks, the vegetative species of this community/habitat type would attract such wildlife as the wood duck, gray fox, white-tailed deer, porcupine, jays, thrushes and ruffed grouse.

## Aesthetic Values:

The upland mesic forest communities at Tifft would not mature for some time and thus the ultimate aesthetic contribution of these communities would not be immediately experienced at Tifft. At some point in the future, however, these communities would have a valuable aesthetic character - especially in the fall due to the attractive foliage of the species characteristic to these communities. areas would also provide the most suitable locations for the introduction of conifer species which would add some variety and winter evergreen contrast. In later mature stands, the upland mesic forest, with its sun-flecked relatively low and open understory, would provide the inviting, aesthetic appeal of an accessible forest in contrast to the more forbidding, swampy, character of the wet lowland forests. Because of the high ground elevation, these communities can also provide attractive vistas and overlooks of the remainder of the preserve.

#### Educational - Recreational Values:

Development of the upland mesic forest communities would add to the educational value of the Preserve by creating additional plant communities and related wildlife species for study. They would be particularly useful for extended scientific analysis of plant successions and the introduction and management of wildlife species not currently present on the site.

As recreational resources, this potential community/habitat type would also rate high for hiking, photography, sketching and other passive recreational activities. A section of the slope of the new mounds should be made available for sledding in the winter time - and the entire trail system would provide an excellent cross-country skiing facility.

# Development Tolerance:

The land form, soils, hydrology, climate and plant and animal characteristics of this community/habitat type are all quite tolerant of human use impacts, for reasons stated earlier. The upland areas at Tifft are therefore the most suitable areas for development and should provide the basic foundation for the trail system and other improvements that are envisioned for the site.

#### Summary

Overall, the Tifft Farm Nature Preserve site presents a unique natural resource rarely found in such an urban setting. The major visual elements of the site and the habitat/natural factor interrelationships discussed previously are summarized on the following charts.

The major strengths and potentials of the Tifft Farm are its rich diversity of plant communities and wildlife habitats, its key location on the lake shore at the center of a major metropolitan area, and its facinating history.

The major weaknesses and limitations of the site are its exposure to urban air, water, noise and trash pollution, and its susceptibility to illegal access and uses - such as hunting.

The strengths and potentials, however, far outweigh the weakness and limitations. The most serious obstacles to human use are its history as a private shooting preserve for for those who knew of its game resources, and its use as a dumping ground. Those who have habitually used the site for these purposes will not alter their habits unless firm control measures are instituted, and these actions must be taken to eliminate the serious hazards they present for general public use and enjoyment of the site.

Control measures that need to be implemented and strongly enforced, especially in early stages, are signing and posting of the boundary, elimination of points of illegal access by fencing and barrier planting, and frequent patrol of the site by law enforcement agencies.

While it will be impossible to eliminate or screen out all of the urban pollutant sources, area-wide pollution abatement programs and changing land use trends are expected to improve the character of the setting of this unique resource in future years.

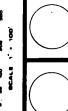
The following section describes in more detail the impacts of current and projected activities on and near the site.

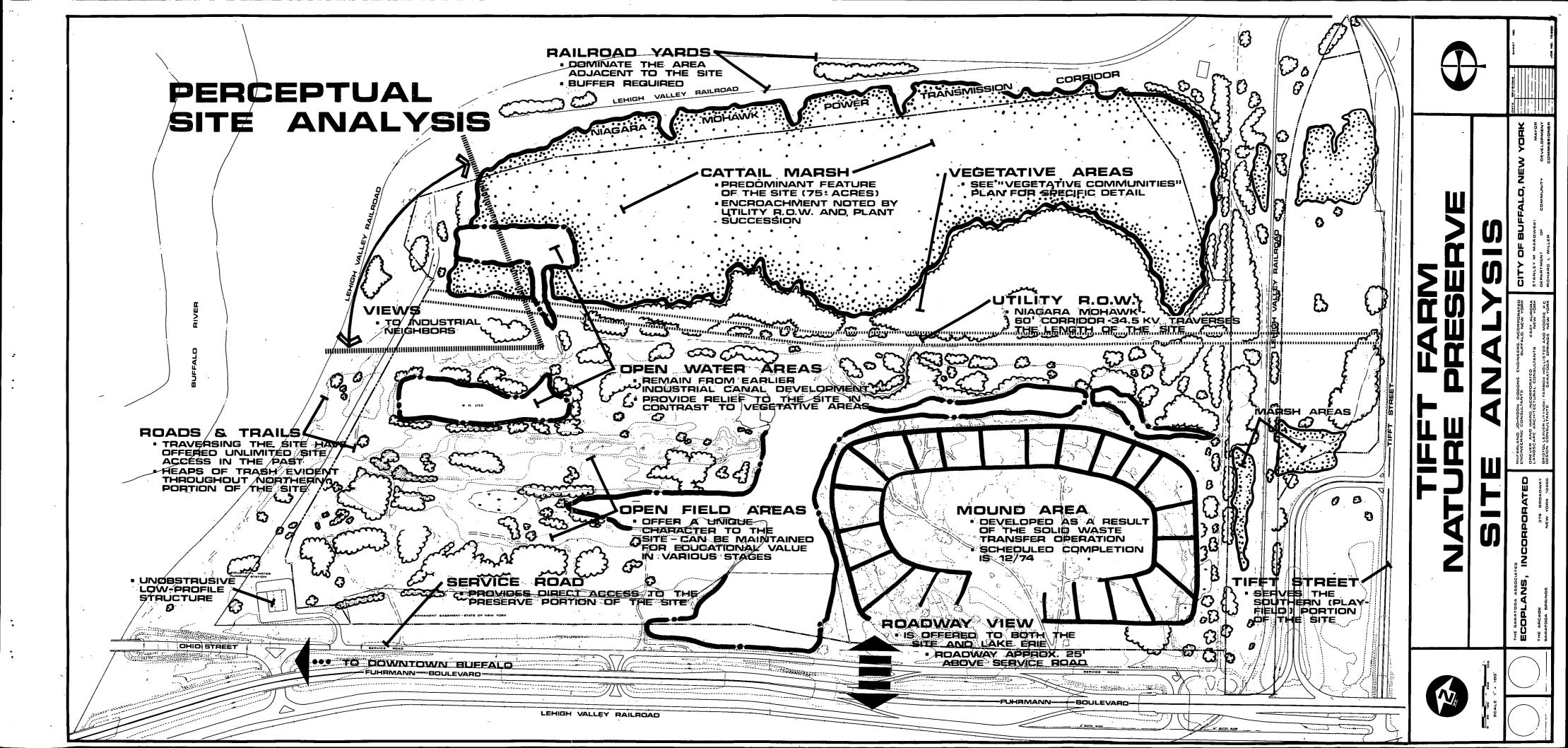
HABITAT NV. ACTORS	OPEN WATER POND SUBMERGED AGUATIC	EMERGENT AQUATIC (CATTAIL MARSH)	SHRUB-CARR	WET LOWLA	ND FORESTS MATURE	OLD FIELD/ SAVANNAH	UPLAND MESIC - XERIC FOREST (SPROUT)	WEED COMMUNITIES OF RAILROAD YARDS	PROPOSED MOUNDS PROJECTED INTERRELATIONSHIP
CLIMATE/MICROCLIMATE DESCRIPTION OF CHARACTERISTICS	- POTELITIAL FOR AND COLD AIR POLLET - WHITER AND SCHMER EXPOSED	- POTENTIAL FOG ALLO COLD ALC POCKET  -WILLTER ALLO SCHMER EXPOSED	POTENTIAL FOG AND COLD AIR PROCEET  -WILTER AND SUMMER EXPOSED  -SHOW DROP ZOLE ON LEEWARD SIDE OF FOREST STANDS	-WINTER AND SUMMER SHELTERED -COOL BOTTOM LANDS SCHMER AND FALL	-WINTER AND SOMER SHELTERED -COOL BOTTOMLANDS SOMMER AND PALL	-WHITE AND SOMMED EXPOSED -WARM UPLANDS SOMMED AND FALL	-WILTER AND SOMMER SHELTERED -WARM GRANDS SOMMER AND FALL	-WILLTER AND SOMMER EXPOSED -WARM UPLANDS SOMMER AND FALL	-WINTER AND SOMMER SHELTERED -WARM CRLANDS SOMMER AND FALL
SEOMORPHOLOGY / SOILS.	MUCK AND SILT	z' MCK	MUCK AND PILLS	SILT AND FILLS	SILT AND FILLS	FILLS	FILLS	CINDRE FILLS	SOLID WASTE FILLS
WETNESS ORDINATION SLOPE LANDFORM	0% POND	POLIDED 0% HARSH-HOOMAIN	0 - 0.5% TLAT LOWLANDS	O-1%	0-190 PLAT LOWLANDS	VARIES 1-10%	VARIES 1-10% EQUINGTORD	0-0.5% MADE LAND	YARLES TO 8%  MADE CRANDS
YDROLOGY/WATER E8OURCES			LESSTHEN I'	/2'-1'	/z'-1'				
WATER TABLE FLOOD POTENTIAL	PERMUNEUTLY FLOORED	PERHALBUTTY FLOODED	SENECT TO YEARLY FLOODING	SEASONAL FLOODING	SEASOHALT TO SEASOHAL FLOODING	SLOW	PREPER THAN 3'	MINIMAL	PERPER THAN 3' VERY SHIGHT
RUNOFF RATE	POHDED	PONDED	VERT SLOW TO POHORD	PONDED	PONDED	SLIGHT	SUGHT	MINOR	RAPID
EGETATIVE RESOURCES . MAJOR DOMINENT SPECIES	HORN WORT SLENDER NAIAS WATER WEED RONDWEED SP DUCKWEED TAPEGRADS	SPIKE RUSH BULRUSH CATTAIL ARROWHEAD BUR-REED	HANHY BEDRY RED OSER DOWOOD WILLOW'S CURRANT ELDERBERRY RED RASPERRY	POPLARS REP OSER DOGWOOD	WILLOWS POPLARS	OAKS HICKORY ASPEN BLACK CHERRY	SCAR MAPLE BASSWOOD BEECH ELM HORHBRAM	RAGNEED MILKWEED SUMAC THISTLE ASTER	PEROMMEND PLANTING WITH CAPLAND MESIC - XERK SECIES
MAJOR GROUND SPECIES		WILD RICE GIANT REEDGRASS RICE WICRASS SLOUGHCRASS	VIRGILL'S BOWER WILD CLICHTER WOOD BILLE BLACK BILDWEED ROISON IVY	WOOD BILLE POISON IVY GRAPE	WOOD BLUE POISON RY GRAPE	FLOWERING SREAM BERGEMOT COMMON MILKWED COMES CRASSES	TROUTLINES SQUIPPEL CORN SPRING BEAUTY TROUTHWORT THESE BUE MEMORE	HAWKWEED	
/ILDLIFE AMPHIBIANS/REPTILES	HORTHERN WATER SHAVE LEOPARD FROG PAINTED TURTLE SHAPPING TURTLE	HOETHERN WATER SHAVE LEXOPARD FROG PAINTED TLRTLE SHAPPING TURTLE MUDPUPPIE	HORTHERN WATER SLAVE LEOPARD FROG PAINTED TORTHE SHAPPING TURTLE MODPURPIE	DAINTED TUETLE SHAPPING TUETLE	AS PER LOWLAND SPROUT	CORTER SHAVE	AMERICAN TOAD GARTER SHAKE		PROBABLE INTRUSION BY UPLAND MESIC XERIC SPECIES
FISH BIRDS	MILHOWS (VARIOUS) SCHEISH LARGEMOUTH BASS YELLOW PERCH BULLHEAD SXXXERS	MILHOWS (VARIOUS)  PIED · BILLED CREBE  CREEN HERON  MALLASO  STACK CROWNED HIGHT	AS PER	PROBILED GREBE GREEN HERON BLACK CROWNED HIGHT HERON BITTERNS (VARIOUS) MALLARD	AS PER LOWLAND SPROUT	HOCTHERH ORICLE VIREOS (VARIOUS) WARBLING GOLDFINCH PHILADELPHIA GOLDFINCH YELLOW WARRLER	SWALLOWS (VARIOUS) WARBLERS (VARIOUS) KILLDER SPOTTED SALLOPIDER SOLITARY SALIOPIDER WREHS (VARIOUS)	CROW	
	COMMON GRACKLE REDWINGED BLAKED	HEROH BLACK DUCK BLOE WINDED TEAL VIRGINIA RAIL COMMON GALLINGE SORA	EHERSELT ACCOUNTS	BLACK DUK BLUE WINGED TEAL VIREINIA RAIL SORA COMMONI GALLINUE COOT GULLS (VARIOUS) RLACK TEAN	,	CATBIRD EASTERN KINGBIRD RING HEKED PHEASANT BLUE WINGED TEAL			
MAMMALS	MILL BEAVER	REDWINGED BLAKEIRD HUSK ZAT ZAGOON	SEAVER SHORT TO IL WEASEL	SHORTTAL WEASEL	AS PER LOWLAND SPROUT	URAY FOX HEADOW VOLE EASTERH COTTONTAIL WHITETAILED DEED	WHITETALED DEER CRAY SQUIRREL CHIPMUNK RACOON	RAT	

HABITAT/NATURAL FACTOR INTERRELATIONSHIPS









### DEVELOPMENT IMPACT ANALYSIS

# The Transfer Operation Impacts

The potential reclamation and restoration of the Tifft Farm site as a Nature Preserve is the result of a prior environmental need in the Buffalo Urban Area -- the abatement of the water pollution of the Niagara River through the construction of the Buffalo Sewer Authority's Secondary Wastewater Treatment Facility on Squaw Island -- a former municipal refuse disposal area.

To construct this needed facility, the Buffalo Sewer Authority has moved an estimated 1.6 million cubic yards of mixed municipal refuse. This material was transferred by barge from Squaw Island to the Tifft Farm site where a landfill solid waste disposal process was used to construct a series of mounds in the southwest sector of the Tifft Farm site.

The development impact of the transfer operation resulted from several specific activities:

- the construction of facilities for the reception of the transfer materials;
- the chemical deodorizing and rodenticide agents used to minimize potential noxious odors and exterminate rodents at the Squaw Island excavation site;
- the containment and removal of liquid leachate at the Tifft Farm transfer site;
- the placement and cover of the transfer materials; and
- the excavation and haul of cover material and restoration of borrow areas.

The impacts of these activities have been temporary and/ or minimal, because of the Buffalo Sewer Authority contract specifications. There may be some minor permanent changes in micro-climate features in areas of the Tifft Farm site, but these may be more beneficial than adverse. Permanent adverse impacts would only occur if the system for controlling the leachate fails to operate properly. While there are some temporary concerns related to the uncompleted connection of the leachate system to an interceptor sewer scheduled to serve the area, the installation of monitoring wells, and the provision of a contingency system (such as tank truck removal of the accumulated leachate) could easily resolve this problem.

The determination to use barges, instead of rail, for the transfer of the materials eliminated the possibility for more extensive disturbance of sensitive areas of the Tifft Farm site, since new rail facilities would have had to be installed on the site.

The containment and removal of the leachate from the refuse placed at the Tifft Farm site was also specified in the Sewer Authority contract. Prior to the placement of any materials, a bentonite slurry wall was constructed around the landfill zone. The material was placed in a trench excavated to a depth where an impervious clay layer was encountered. The bentonite slurry hardens into an impervious wall. A sewer system has also been installed to remove the leachate, with monitor wells for the obtaining of periodic samples of leachate.

Connection of the leachate system to a municipal interceptor must await the completion of the Kelly Island treatment plant and Fuhrmann Boulevard interceptor. This line could be constructed south to the Buffalo River Improvement Corporation pumping station at the northwest corner of the Tifft Farm site within three to four years. No date has been established for connecting the leachate removal system to the interceptor, however, so there is an important question to be resolved regarding interim contingency procedures for removing the leachate.

There are no calculations known to Ecoplans which indicate the rate and volume of leachate from the refuse mounds. However, the transfer material already has a relatively high moisture content, and heavy rains could further affect the amount of leachate produced.

It is recommended that this situation be periodically monitored by the Sewer Authority and Erie County Health Department until the leachate system is connected to the new interceptor.

Cover material for the landfill is being excavated from an area surrounding the small existing pond in the northwest quadrant of the site. In the process, the pond will be enlarged as an addition to the site water

resources. Specifications in the Sewer Authority contract require the final grading of the pond to produce relatively shallow edges where emergent water vegetation will ultimately grow.

The excavated materials are being hauled via a temporary roadway between the borrow area and the mounds located between the cattail marsh and the inlet lake.

Impacts from the borrow operation resulted in temporary disturbance of existing wildlife in the borrow area and haul road area. During the course of the borrow operation, several old concrete foundations were uncovered in the area of the pond and its immediate perimeter. The Sewer Authority requested consideration of a change in the final pond grading in order to avoid the cost of removing these structures. The following suggested revision of the pond configuration was prepared by Ecoplans to assist the Sewer Authority in resolving this problem.

A temporary fence was constructed between the haul road and the cattail marsh to prevent encroachment on that area. The fence and the road area are to be removed and restored following completion of the transfer operation.

Final grading and cover and seeding of the mounds are also specified in the Sewer Authority Transfer Operation contract. At least two feet of soil material capable of growing grass and creating an impervious seal of the landfill is to be provided. Three feet of cover are required in areas of the mound which will form surface drainage ways.

Particular care should be given in the seeding and mulching of the final cover to prevent soil erosion and exposure to the landfill.

Short falls in the estimates of the amount of refuse materials to be removed from Squaw Island will apparently alter the final configuration of the mounds. To retain the objective of natural shaping of the mounds, it is recommended that the Sewer Authority calculate the amount of surplus borrow material to be excavated from the pond area and revise the mound grading plan to distribute this material in a way that will achieve the most natural configuration possible.

Even though less borrow may be required, the Sewer Authority should excavate the pond area as required.

Restoration of the site by the Buffalo Sewer Authority contractors is a critical consideration. The following recommendations are suggested.

Upon completion of the transfer operation, the contractors should be required by the Buffalo Sewer Authority to restore all disturbed areas of the Preserve including the following:

- a. Major windows along all haul roads, excavated areas and access roads (including the Lehigh Valley right-of-way, Old Tifft Street right-of-way from the stream east, and dirt access road along the western perimeter of the cattail marsh) should be leveled to surrounding ground elevations.
- b. All grubbed trees, brush, stumps, trash, rubble and debris uncovered or affected by the transfer operation borrow, haul and access activities should be buried, removed from the site or otherwise suitably disposed of. On-site burning of such materials should not be permitted.
- c. All slag materials used to stabilize haul or access roads, including slag fills placed as base fills for the temporary bridge approaches should be buried or removed from the site.
- d. Topsoil stripped from the borrow area and haul roads and stockpiled should be used to cover all excavated areas except those inundated by the waters of the expanded pond.
- e. Limbs on live trees broken during, and as a result of, the borrow, haul and regrading activities should be trimmed at the trunk and removed.
- f. The temporary culvert across the old canalstream inlet between the landfill and borrow areas should be completely removed and
  the channel, shoreline and surrounding disturbed area restored to blend with surrounding elevations and original lines and depths.
  The culvert pipe should be buried or removed
  from the Preserve site.

- g. All temporary fencing and other temporary structures should be removed from the site upon completion of the transfer operation.
- h. Upon completion of the transfer operation, all areas of exposed soil should be seeded with seed types and mixtures, as specified in the contract documents at the earliest opportunity, consistent with weather conditions and recommended seasonal periods for establishing effective and viable plant growth.
- i. Upon completion of the transfer operation and restoration of the site, the Buffalo Sewer Authority, for a period of two years from release of the contractor, should periodically inspect the site and shall immediately repair and restore any eroded areas or filled areas indicating substantial settlement.

The Tifft Farm Technical Advisory Committee should not approve the location of any structures or facilities within the leachate barrier of the landfill mounds with the exception of trails, observation towers, benches and native plant materials.

The Tifft Farm Technical Advisory Committee should not cause or approve any construction activity within or adjacent to the leachate barrier, drain system or pumping station which will cause damage to or interfere with these systems.

The Tifft Farm Technical Advisory Committee should not approve any plans for construction or earth-moving within the area within fifty feet of the leachate barrier wall without prior analysis by the Buffalo Sewer Authority as to the potential impact of such activities, and certification by the Authority's engineers that the proposed activities will not adversely affect the stability and seal of the landfill.

# Site Development and User Impacts

To sustain the environmental quality of the Tifft Farm site, it is essential to consider the development and human use impacts on the site. These will stem from two somewhat distinct programmed uses of the site -- conservation education and recreation:

# Site Development Impacts

Site development impacts are related to the various types of facilities to be constructed on the Tifft Farm site -- including both facilities for conservation and active recreation -- and the various procedures for constructing these facilities.

The following facilities are contemplated:

- Buildings to serve both the Nature Preserve and Playfields
- Trails
- Fences
- Outdoor lecture facilities
- Playfield areas and playground facilities
- Observation towers
- Marsh catwalks and blinds
- Parking areas and service roadways
- Bridges
- Utility systems for power, water and sewage
- Lighting
- Signs and exhibits
- Wildlife habitat improvements to:
  - Water areas
  - Old field savannas
  - Sprout forests
  - Mature forests
  - Cattail marshes
  - Mounds

All of these facilities will obviously have a permanent impact on the site -- primarily changing it from an unmanaged appearance to a managed one.

The design of the facilities should be in keeping with the Nature Preserve/Playfield character of the site's two primary sectors. The Conservation Education Center could be an unobtrusive, somewhat hidden facility, blending in with the natural forms and colors of the site. On the other hand, if the policy is to attract people into the site, the structure could be designed in such a way as to call attention to it -- and reveal its function as an educational institution -- through a dynamic, exciting mass and form. The building structure for the Playfield can also be designed to advertise its function or hide it. On the whole, the Playfield area probably should provide a conspicuous message that it is the area for active recreation as opposed to the Nature Preserve area, although the small marsh areas in the Playfield site should be retained. This may create a maintenance problem, however, and it is recommended that these marsh areas be protected by barrier zones of natural planting that will discourage "exploratory" incursions into the marshes or litter of these areas.

A unique opportunity exists for the creative design of play structures for small children in the Playfield playground. These designs should generate awareness of natural environmental resources. Timberform play structures should be used instead of the traditional pipe, concrete, and metal structures. Sandboxes, water tables, climbing trees with "crows nests", underground "burrows" and "muskrat lodges" play structures could be used to "teach" a child while he plays.

Trails, bridges, catwalks, observation towers, signs, and exhibits obviously should blend with the natural character of the site. Utility systems should be underground, parking areas should be screened with plant materials. Lighting should be restricted to the area immediately adjacent to the conservation education center and, except for night lighting of the Playfields, light standards should be of the type that hide the light source.

Wildlife habitat improvements should be as natural as possible -- simple clearings, natural nesting islands, and native plant materials that provide food and shelter for desired species.

Water areas should be cleared of underwater trash and debris, and access to the water edge restricted to areas which will not cause accidental drownings. Plant materials can be used to control and direct foot traffic.

Trail paving materials should be natural, and trails graded to prevent erosion and poor drainage.

The trails to the mound observation points should be carefully selected and properly constructed to avoid erosion.

Natural areas should be cleared of foreign debris, but natural debris left undisturbed. The cattail marshes should be protected from encroachment and foot traffic, and catwalks and blinds restricted to areas that will not disturb wildlife.

The construction of each of these facilities will necessitate some disturbances of existing environment. The impacts from construction activities will, for the most part, be temporary. In some cases, however, certain improvements will have permanent impacts. Listed below are the general construction processes which may take place on the site:

- Clearing and grubbing, including the disposal of cleared materials
- Grading and reshaping land forms
- Excavation and trenching
- Removal or replacement of excavated materials
- Dewatering of construction sites
- Filling of certain low areas
- Construction of substructures
- Construction of superstructures
- Paving
- Seeding, planting

In general, these activities can be undertaken without adverse impact on the existing site ecology if care is taken in the development of contract specifications during the detailed design. Because the construction program for the site will be phased over time, extensive disturbance of the site will be minimized.

Clearing and grubbing activity should be restricted to defined contract limit lines. These activities will be necessary to prepare locations for the various facilities on the site, and create improved wildlife habitat and a variety of environmental experiences. For the most part, to be created in the aspen woods where some cut trees and brush may be left to provide natural cover and shelter for wildlife.

Grading and reshaping of landforms should be within specified limits to prevent soil erosion. It is not intended that every landform in the site be manicured. For instance, the eroded banks of the inlet lake generally

should not be graded -- except in selected areas where it may be desirable to create shallow depths conducive to emergent plant growth.

Areas around the principal structures should be graded to provide optimum storm water drainage and a pleasing appearance.

Excavation and trenching will be necessary to install building foundations and utility runs. In addition, it appears desirable to relocate the stream entering the site from the east to form a barrier between the Nature Preserve and Playfield facilities. Side slopes of the new stream channel should be graded to a 5:1 ratio.

To create additional marsh water area, certain areas along the eastern edges of the aspen woods should be excavated. Blasting is sometimes considered to be an effective means to create such areas. The other alternative is to use a dragline shovel. While the shovel is obviously more controllable and avoids the shock impact on wildlife, bringing such equipment in requires clearing along the edge of the marsh, and necessitates haul out and disposal of spoil materials.

The disposal of spoil materials from excavations not needed for backfilling could be transferred to other low areas requiring fill, or spread evenly across nearby ground services in thin layers that will not suppress existing vegetation.

Fill material for areas such as the Playfield should be composed of inert materials and compacted to prevent slumping and graded to prevent areas of standing water.

Dewatering of foundation sites may be a necessary temporary requirement. If necessary, such water should not be discharged directly into existing water bodies but allowed to infiltrate back into the soil away from the excavation site.

Depending on the structural methods selected, construction of building substructures and superstructures will have variable temporary impacts. Following construction, debris should be collected and disposed of away from the site. Paved surfaces should not be constructed of materials which may leach toxic substances to adjacent water bodies.

Reseeding and planting of disturbed surfaces should take place as soon as possible. Grass, shrub and tree species used in the area should be native to the area and not attract undesired faunal species or interupt normal successional patterns.

# User Impacts

Subsequent to development of the Tifft Farm site, there will be a continuous sustained impact as a result of the use of the site. User impacts are a function of the type and density of the users, and their activities on the site.

Users of the Tifft Farm site can be classified into four main groups:

- Supervised groups from area associations, schools, colleges, and environmental organizations.
- Scientists engaged in environmental or ecological research.
- Casual visitors, including individuals, families, or small groups of unrelated individuals.
- Management and maintenance personnel.

The majority of the people using the site will arrive by car, bus or bicycle. Because of the inaccessibility of the site, few people are expected to walk to the area. Most use of the site will be during daylight hours, with early morning and late evening hours favored by guided groups and scientists because of greater wildlife activity during these hours. Proportionately higher densities of casual visitors can be expected during early evening hours and weekends and holidays, especially during the warmer months of the year and in periods of migratory waterfowl flights in the spring and fall.

Supervised groups, on the other hand, would be more predominant during weekday daylight hours.

Management and maintenance personnel on the site could range from permanent caretakers and seasonal guides, to periodic maintenance personnel repairing structures, cleaning litter or constructing new facilities.

Age and educational level of user groups must also be considered. Young children and elderly users of the site should be protected from dangerous situations.

This consideration should also be given to the blind and physically and mentally handicapped persons who may use the site. The educationally-deprived, at any age level, should be automatically instructed on the proper use of the site as soon after arrival as possible.

The density of use of specific areas of the site will vary in relation to the accessibility of areas to the parking facilities, user objectives and the location of trails and lecture facilities.

The control of user density is a very important consideration if the site environmental values are not to be destroyed by intensive and excessive use. Recommended densities for various sectors of the site, including the Playfields, are indicated on the attached chart.

Procedures should be established for scheduling the visits of supervised groups, parking facilities sized to accept only the optimum number of vehicles, and trails and lecture facilities designed to discourage access to areas sensitive to disturbance by human use. Management and maintenance personnel should be trained and supervised to avoid what can sometimes be the most serious impact -- incompetent maintenance.

The activities of these various user groups must also be considered in evaluating user impact. These include the typical Nature Preserve activities -- hiking, observing wildlife, research, education, and playfield active recreation activities -- ball games, free play, sledding, kite flying, cycling, running. In addition, more passive recreation activities include walking, sitting and fishing.

Impacts resulting from these activities can cause soil erosion, destruction of vegetation, injury to wildlife, pollution from litter and garbage, and possible hazards to the users themselves. Unsupervised activity can result in illegal uses -- fires, trapping and hunting of wildlife, or collection of specimen plants and animal life.

User density of the site should not exceed a maximum of 135 persons per hour. This maximum density is unlikely to occur except during peak weekends. For the most part, the Preserve can expect approximately 100,000 annual visitors -- but facilities are programmed to accommodate maximum density during peak use consisting of 75 people (five groups of fifteen people each) on

the trails and sixty people on the mounds and at the center during a single hour. Parking facilities have been sized to accommodate this load.

Overall, this would mean a gross density of approximately two people per acre.

Use of the Tifft Farm Nature Preserve at maximum density is calculated as follows:

- 5 Trail Groups @ 15 each = 75 people per hour Environmental Education
  - Center and Mounds = 60 people per hour
- 45 Parking Spaces/Hour
  @ Three Persons/Car 135 people per hour

Probable peak use should be anticipated as follows:

#### SUMMER PEAK USE (SATURDAY/SUNDAY)

Morning	3				•			
5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	
15	30	45	60	45	45	45	60	Trail Groups
5	10	15	20	15	15	25	30	Center/Mounds
20	$\overline{40}$	60	80	60	<u>60</u>	70	90	
		•					•	
Afterno	oon .							
.1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	•
45	30	30	30	45	60	75	45	1020 Visitors
25	15	15	15	30	60	60	30	x 52 Days
70	45	45	45	75	$\overline{120}$	135	75	53040

#### WINTER PEAK USE (SATURDAY/SUNDAY)

Morning 8:30 15 5 20	9:30 30 10 40	10:30 45 <u>15</u> 60	11:30 30 20 50	12:30 30 25 55	Trail Groups Center/Mounds
Afternoc	n	•			
1:30	2:30	3:30	4:30	5:30	
30	30	45	30	30	470 Visitors
20	15	10	15	20	x 52 Days
<del>50</del>	45	<del>55</del>	45	<u>50</u>	$2\overline{4440}$

# Highway Facility Impacts

The location of the Tifft Farm Nature Preserve in a relatively isolated industrial-port area, with no immediate residential environs implies that the majority of the users will reach the site via motor vehicle. The major highway facility providing north-south access to the Tifft Farm is Fuhrmann Boulevard -- also one of the principal east-west New York State routes (Route 5).

Several years ago Fuhrmann Boulevard was upgraded by the State Department of Transportation, and the highway is now a four-lane elevated expressway facility with parallel service roads along each side at grade. In the vicinity of the Tifft Farm, there are "slip ramps" on and off of the expressway and a modified interchange connecting the expressway to Tifft Street, the principal access route from the east.

The expressway carries a heavy volume of both truck and passenger vehicle traffic.

There are three primary adverse impacts of these highway facilities -- noise, air pollution, and salt dispersion. Secondary impacts include visual blockage from eye level to the west toward the lake, litter and dust and potential safety hazards to vehicles and people attempting to reach the site through a confusing series of U-turn movements necessitated by the highway structure.

In addition, a segment of the Tifft Farm site contains a permanent easement of the State of New York to protect against abnormal loading of the Fuhrmann Boulevard road base from the area of the inlet north to the vicinity of the Buffalo River Improvement Corporation Pumping Station. The State wishes to maintain this easement, but may permit selected uses and improvements within the easement.

Of the primary impacts, highway noise is one of the more distracting elements, and the prevailing winds carry sound well into the site. New federal noise abatement regulations directed at vehicle mufflers may reduce noise somewhat in the future, and appropriate planting schemes for acoustical functions could also help minimize the problem.

While noise is disruptive to people in nature study situations, e.g., interrupting learning various bird species from their song and calls, the noise levels within the Tifft site, seem to have little affect on the wildlife species within the site. Species less tolerant or urban noise levels would be discouraged from residence by the noise levels, however,

Emissions from motor vehicle exhaust systems also affect the Tifft Farm site due to the highway proximity and prevailing winds. Generally, however, the strong lake breezes quickly dissipate these pollutants (with evening land breezes in the summer reversing the airflow toward Lake Erie) and with new federal auto emission standards in effect, this problem could be reduced to very insignificant levels in the future.

Salt dispersion from highway de-icing in the winter is another highway impact that can seriously affect plant materials and nearby water resources. Again, careful selection of resistant plant species and grading, storm sewer service can reduce this impact.

The elevated structure of Fuhrmann Boulevard creates a visual block of the view of Lake Erie from the site. The mounds will provide new vista points, however, and the planned development of a planting program along the Fuhrmann Boulevard berms can do much to improve the visual quality of the site.

Litter from vehicles is generally more apparent in industrial areas, principally because the adjacent areas usually do not receive the same level of street cleaning maintenance. Signing along Fuhrmann Boulevard and its service roads, drawing attention to the Nature Preserve location and including anti-litter slogans could help reduce this problem at the Tifft Farm site.

From the potential Tifft Farm user's point of view, perhaps the most important highway impact to be considered is the need for directional signage locating the access routes to the Nature Preserve entrance and parking areas. These elements have been considered in the schematic plan presented later in this report.

#### Port Development Impacts

Fortunately, the Tifft Farm Nature Preserve is located in an area of the Buffalo Port which is little used except for public recreational purposes. The Buffalo

Municipal Small Boat Harbor is located opposite the northwestern sector of the Tifft Farm site, within the outer breakwall.

The area just south of the small boat harbor is currently used intermittently as a spoil area for harbor dredgings. The ultimate use of this area should be analyzed in cooperation with the Niagara Frontier Transportation Authority.

We recommend that the area not be used for port activities, especially bulk storage. If structures are built in this area, they should be designed so as to not obstruct the vista from the mounds. The Great Lakes Laboratory has been investigating the potential use of this area as a wildlife habitat. If these investigations substantiate that feasibility, we recommend that the area be acquired as part of the Nature Preserve.

Access to the lakefront areas would be most feasible under the Fuhrmann Boulevard viaduct approach to the Union Ship Canal Bridge at the southwest corner of the site. A pedestrian walk light should be installed to provide safe crossing of the heavily travelled section of the west service road at this location.

#### Rail Facility Impacts

Lands immediately north of the Tifft Farm are occupied by the Lehigh Valley Railroad Company. Adjacent to the old Tifft Street right-of-way, the Lehigh Valley Rail-'road also owns about 26 acres of land which separate the Tifft Farm Nature Preserve from the proposed Tifft Street Playfield Area. These lands contain a rail spur which crosses Fuhrmann Boulevard beneath the viaduct approach to the Union Ship Canal Bridge and then parallels Fuhrmann Boulevard to the west, extending north to, and currently serving the Freezer Queen plant.

The lands along the trackage to the north also contain utility power lines adjacent to the current Tifft Farm boundary, and are of secondary importance to the expansion of the Preserve for control purposes.

To ensure integrity of the Preserve (preventing illegal access and dumping), and to link the Preserve proper with the Playfields, it will be necessary to eventually acquire the Lehigh Valley lands where the spur is located.

Since the Freezer Queen plant can be serviced by truck, discontinuation of the spur is possible. Negotiations are currently underway to establish the feasibility of the acquisition of these lands from the Lehigh Valley Railroad.

The main Lehigh Valley trackage east of the Preserve serves several grain milling operations along the Buffalo River. Grain spillage from empty boxcars sometimes stored in this area attracts Norway Rats and these rodents have also invaded the Nature Preserve. They do not pose a major problem, however.

# Utility Line Impacts

Properties owned by, or under easement to the Niagara Mohawk Power Corporation abut the Tifft Farm on the north and east and bisect the site in a north-south direction. The power lines on the periphery of the site are 115 kv lines. A 100' wide strip of land bordering the cattail marsh on the east is owned by the power company, and the poles carrying the lines were constructed on areas created by filling in portions of the marsh.

Negotiations are currently underway with the power company to establish policies relative to future filling of the marsh, and the erection of a fence along the eastern boundary of the marsh to prevent illegal access and dumping of trash.

Two 34.5 kv lines are located on the easement that bisects the site between the eastern and western sectors. This line serves the Portland Cement Company and cannot be relocated without considerable cost to the City. This line also bisects the Playfield areas.

Impacts on the site relate to the visual aspects of these lines and the restrictions on using the easement areas for certain purposes. These are currently under discussion with the power company, and the following policies are recommended:

The Niagara Mohawk Power Corporation should provide the City of Buffalo a permanent easement within the Corporation's 115 kv power transmission line rightof-way along the eastern edge of the cattail marsh for the construction of a barrier fence to protect against dumping in the marsh.

The Niagara Mohawk Power Corporation should provide the City of Buffalo flowage rights over unfilled marsh lands within the 115 kv transmission line right-of-way.

The City of Buffalo should provide a designated 50 foot permanent easement to the Corporation along the route of the now undesignated 34.5 kv transmission line bisecting the site.

The City of Buffalo should consult with the Niagara Mohawk Power Corporation prior to finalizing plans for the construction of the barrier fence and should incorporate such grounding devices, gates and other criteria as are required by Niagara Mohawk.

The Niagara Mohawk Power Corporation should avoid unnecessary filling of the natural marsh areas within the 115 kv right-of-way, and in the event of an emergency requiring either removal of all or portions of the fence, of fill of any portion of natural marsh, should consult with the City of Buffalo's designated representative in the Department of Community Development prior to initiating any such action, provided that such event occurs during working hours of City employees. In any event, the Niagara Mohawk Power Corporation should notify the City of any such action within four days of occurrence.

The City of Buffalo should provide for the clearance and removal of all vegetative growth taller than four feet within the easement to be designated for the 34.5 kv line, and should establish permanent policies and criteria to maintain said easement in a condition facilitating access by the Niagara Mohawk Power Corporation.

The Niagara Mohawk Power Corporation should not utilize any chemical herbicides to prevent or retard vegetative growth on power line rights-of-way or easements within or immediately adjacent to the Tifft Farm Nature Preserve.

Except in the event of a line break or other immediate emergency operation, the Niagara Mohawk Power Corporation should not conduct routine

maintenance operations within the Tifft Farm
Nature Preserve without five days prior written
notice to the City of Buffalo Department of
Community Development.

# Miscellaneous Peripheral Facility Impacts

There are a number of miscellaneous peripheral facility impacts which need to be resolved. These include:

 Use of Lehigh Valley Railroad lands for the disposal of foundry sand.

 The visual appearance of City-owned lands inside the Tifft Street-Fuhrmann Boulevard interchange loop.

• Future use of the lands south of Tifft Street.

Future land use of the area in general.

Currently, certain Lehigh Valley lands both within and adjacent to the site have been leased as dumping areas for used foundry sand. As an interim measure, the parties involved have agreed to restrict the dumping to railroad properties outside of the Nature Preserve area, although field inspection has indicated occasional violations of this understanding. Truck access across the site to the railroad properties east of the site was permitted, and most recent violations have occurred along this route.

The foundry sand contains a binder agent, but the material is inert. In some areas of the site (along the Lehigh Valley railroad spur) the material has been dumped along the sides of marshy areas. This material should be removed during the development of the site.

Once the transfer operation is completed, truck access across the site should be terminated. The trucks could use the roadway along the east side of the cattail marsh.

The condition of the stream connection between the South Park Lake and Tifft Farm Inlet was surveyed in connection with City Department of Public Works' suggestions that the stream be improved under the Wetlands Restoration Program. Due to higher priorities for other projects, the stream improvement project was tabled for later consideration, but this issue will require attention at some point. The stream improvement project

should include the definition of set limits to slag and sand dumping now encroaching on the adjacent small marsh areas, dredging the stream channel along the main line railroad tracks, stabilization of the banks and cleaning of the culverts passing beneath the tracks.

The South Park Lake will eventually be used as a surcharge basin for storm water run-off, and this supplemental flow would increase the periodic discharge into the Tifft Farm inlet lake. South Park Lake is suspected of being polluted by current sanitary sewage leakage. Field inspection of the stream revealed fish, water fowl and muskrats along with intermittent pollution from leachate of the slag piles and foundry sand dumps west of Hopkins Street.

The chemical and biological water quality of both the South Park Lake and the stream should be monitored to establish present quality levels as a standard for determining whether the storm drainage should be diverted directly into Lake Erie via an interceptor line to the Union Ship Canal, as an alternate system.

The City-owned land inside the Tifft Street-Fuhrmann Boulevard loop is not conducive to any human use activity, but the present unattractive appearance of this area could be upgraded by a tree and shrub planting program as recommended in a later section of this report.

The lands south of the Tifft Farm, between Tifft Street and the Union Ship Canal are zoned for industrial use, but have remained vacant for several years. Any eventual development of this area will have some impact on the site -- increased traffic, visual impact, possible noise and air pollution depending on the specific industry occupying the site.

The City Department of Community Development should establish performance standards for the use of the site to prevent the environmental degradation of the Nature Preserve.

Looking toward the long-term future, the emerging energy crisis may ultimately reverse the trend in the abandonment of the railroads, and reshape industrial location trends to place greater emphasis on the need to sustain present land use designations in the portindustrial district surrounding the Tifft Farm. Given the stress on environmental quality, however, there is

no reason why this district should not be pleasing, well-planned and compatible with the Nature Preserve.

However, there may be opportunities for housing development in the area, even if new industrial and port uses are established. The alternatives need careful examination -- an opportunity forthcoming in the Department of Community Development's community master plan program.

#### PLANNING, DEVELOPMENT AND MANAGEMENT POLICIES

The following planning, development and management policies are recommended to guide the formulation and implementation of the Tifft Farm Master Plan. These policies were developed by the Tifft Farm Technical Advisory Committee and reviewed by the Department of Community Development.

#### Preserve Name, Concepts and Purposes

The name "Tifft Farm Nature Preserve" should be adopted and used to identify all lands on the entire Tifft Farm site exclusive of the area bordering Tifft Street on the south end of the tract, such area being planned as an active recreation area. It is further recommended that this latter tract be separately identified as the "Tifft Farm Playfields".

The concepts, purposes, and policies stated below are absolutely basic if the Tifft Farm Nature Preserve is to preserve the natural resources of the area and provide the aesthetic, educational and scientific resources desired by the City.

#### GENERAL USE POLICY

- 1. The Tifft Farm Nature Preserve is a permanent natural area providing habitats for plant and animal species and communities. It is dedicated to being maintained as nearly as possible in its natural condition and to being used in a manner and under limitations consistent with its continued preservation, without impairment, disturbance, or artificial development, for the public purposes of nature study and conservation, education, aesthetic enjoyment, and scientific research on a year-around basis.
- 2. The Tifft Farm Nature Preserve should be considered primarily as a protected natural area aimed foremost at providing educational benefits for the general public. To accomplish a desired balance between the preservation of the site's natural resources and its use by the public, a zoning plan should be prepared to describe appropriate levels of use intensity as a guide to the provision of user facilities.

- 3. The Tifft Farm Nature Preserve should provide for the following uses listed in the order of their priority of desired functions:
  - o Wildlife sanctuary
  - o Conservation education
  - o Informal nature study
  - o Scientific ecological studies (by permit only)
  - o Individual and passive recreation including photography, sketching, painting, and cross-country skiing, hiking (restricted to the trail system), canoeing (restricted to the lake-inlet pond), fishing (restricted to dock facilities and selected points along the shore of the lake-inlet pond).
  - o Scenic enjoyment
  - o Open space preservation
  - o Nature festivals (in restricted locations by permit only) for occasions such as Earth Day and Arbor Day.
  - o Organized and active recreation and picnicing (restricted to the playfield area and mound sledding area)

#### Planning and Construction Policy

- 1. The Master Plan for the Tifft Farm Nature Preserve should be formulated to achieve the above general use policy objectives, with particular emphasis on providing "built-in" control of site use to minimize later management tasks.
- The Master Plan should set forth a realistic program for the development of the site over the next three to five years.
- 3. The Master Plan should reflect the basic ecologic objective of providing a variety of distinct plant and animal communities which would be present in the potential natural evolution of the Tifft Farm site. Exotic plant and animal species should not be intro-

duced to the site.

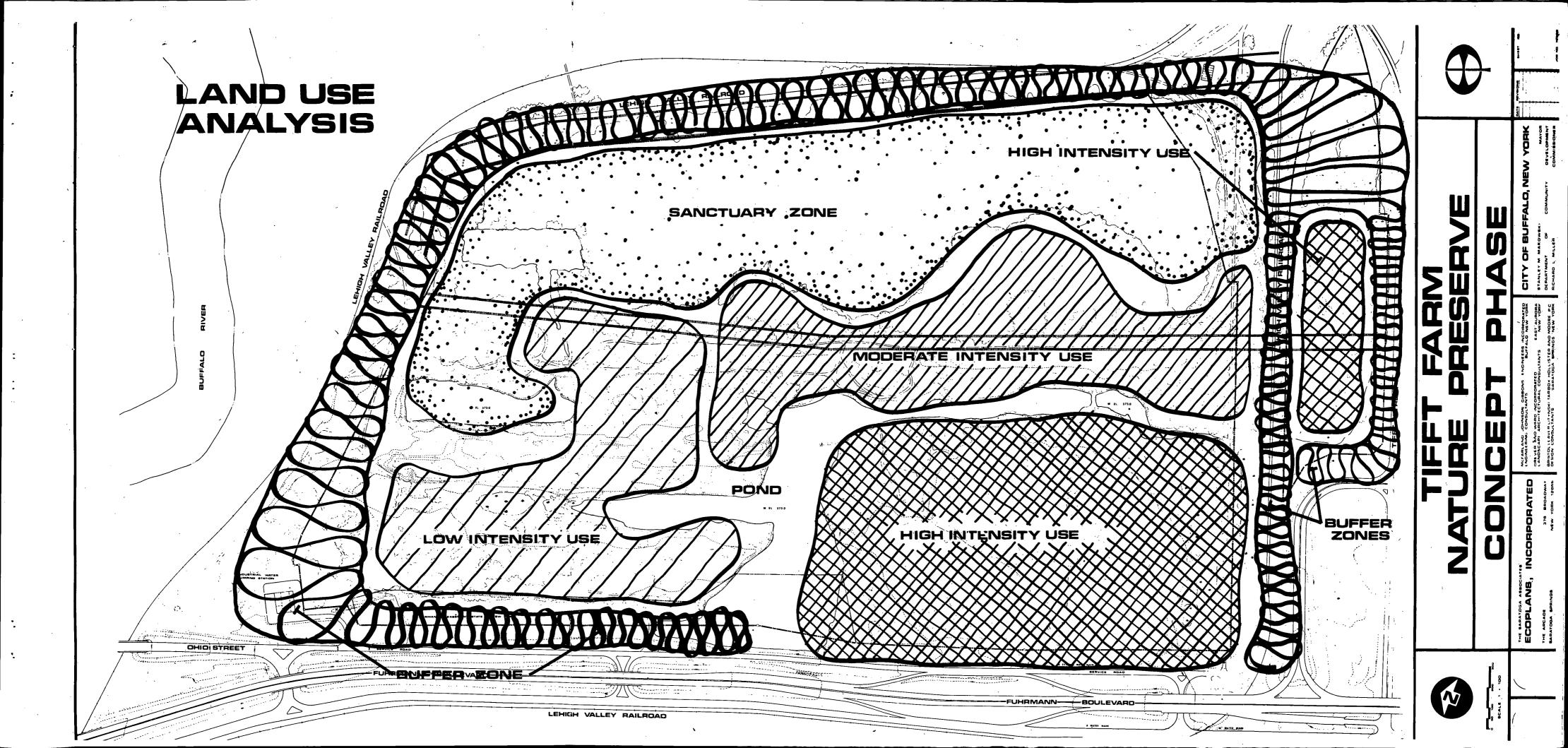
- 4. To the extent feasible, the Master Plan should sustain the historic ecology of the area by preserving those remnants of the original site as they existed prior to human influence and by emphasizing both the natural and man-managed restoration of disturbed portions of the site.
- 5. The Master Plan should provide for special needs of the physically handicapped. This should include the equipment of a section of the trail system with an asphalt surface to accommodate wheel chairs and the provision of a self-guidance system for the blind. with easily activated audio and/or braille devices explaining nearby ecological systems, plants and animal species. This section should also emphasize natural exhibits that could be recognized by touch, odor or sound. Entrances, restrooms and other aspects of the environmental education center should be designed to accommodate wheel chairs.
- 6. The Master Plan should be considered as a flexible document setting forth general long-range objectives and illustrative design details that will permit modification if subsequent studies and analyses indicate desirable changes. The Master Plan should accommodate such changes without violation of the goals for overall organization and use of site.
- 7. The development phasing of the Master Plan should allow for the early use of the site as a Nature Preserve by providing basic use facilities (parking, trails and outdoor lecture centers) in areas which have not been disturbed by the transfer operation. The latter areas should not be programmed for development or use until the flora have had an opportunity to become established, thus being able to resist better the degradative effect of human traffic.
- 8. Construction activities should be planned with the biosystem in mind and restricted at certain times, such as during the nesting seasons. The annual construction schedule should be reviewed and agreed upon by the Advisory Committee and other advisors as appropriate.
- 9. Initial construction efforts should be directed, at least in part, to providing perimeter control and screening of the site, particularly through the use of native plant materials.

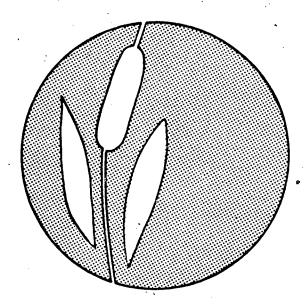
#### Management Policies

- 1. The City of Buffalo should retain title to the Tifft Farm and provide for the physical development of the site as defined in the Master Plan. However, county, state and federal funding sources for both development and management should be fully explored and secured wherever possible. A program should be organized to stimulate the participation and contribution of private enterprise, conservation-oriented groups, and concerned individuals to the development of the Nature Preserve.
- 2. The Nature Preserve should be managed and operated by a private, non-profit agency on a contractual basis with the City. Such an agency should be responsible for the management of the facility and for establishing policy guidelines within the broad policy directives established by the City Administration and its advisory committees.
- 3. A management committee should be established as a subcommittee of the Tifft Farm Technical Advisory Committee to formulate management policies and programs until a permanent management contract is secured.
- 4. Management personnel should be hired as soon as possible to help provide the continuity required to effectively implement the Master Plan. Temporary personnel should be assigned to the project by the Department of Community Development until a permanent staff is hired by the management contract agency. The management contract agency should hire personnel on the basis of education, training and experience qualifications.
- 5. General public use of the site should be continually monitored so that the natural carrying capacity of the Nature Preserve is not exceeded. Use of the site by area school environmental education classes should be formally solicited and programmed and conducted by trained personnel.
- 6. User fees should not be charged, as a rule, but policy should be reviewed as a means of controlling overuse of the site in future years.
- A scientific program of wildlife marking and monitoring should be established. Specific scientific study areas should be marked out and staked to provide con-

stant locations for the acquisition of base-line data on wildlife species and habits. Botanical study programs should also be organized to both monitor vegetative succession in specific areas, and evaluate various management techniques for maintaining, accelerating or retarding natural successional trends.

- 8. Exotic plant and animal species should not be introduced to the site, but desirable species native to the area, but not presently found on the site should be introduced to provide variety.
- 9. The Preserve should be operated on a year-around basis to provide for maximum utilization and allow the study and analysis of seasonal variations of natural factors on a continual program.





# TIFFT FARM NATURE PRESERVE

### PHASE III

- SITE DEVELOPMENT PLAN
- MANAGEMENT PROGRAM

ECOPLANS, INC.



#### INTRODUCTION

The Basic Ecoplan and recommended policies, goals and objectives presented in the previous section are the foundation for the Tifft Farm Nature Preserve Master Plan.

In this section of the report, the proposed master plan is presented in four components. These are:

- o The Site Development Plan and Program which will serve as a guide for the physical development of the Nature Preserve.
- o The Habitat Improvement Plan and Program which will be used to guide activities directed at the strengthening of the plant communities and other actions necessary to make the site a more attractive habitat for wildlife.
- o The Environmental Education Plan and Program designed to set basic guidelines for the use of the Preserve as an environmental education resource.
- o The Management Plan and Program for the maintenance and operation of the Nature Preserve.

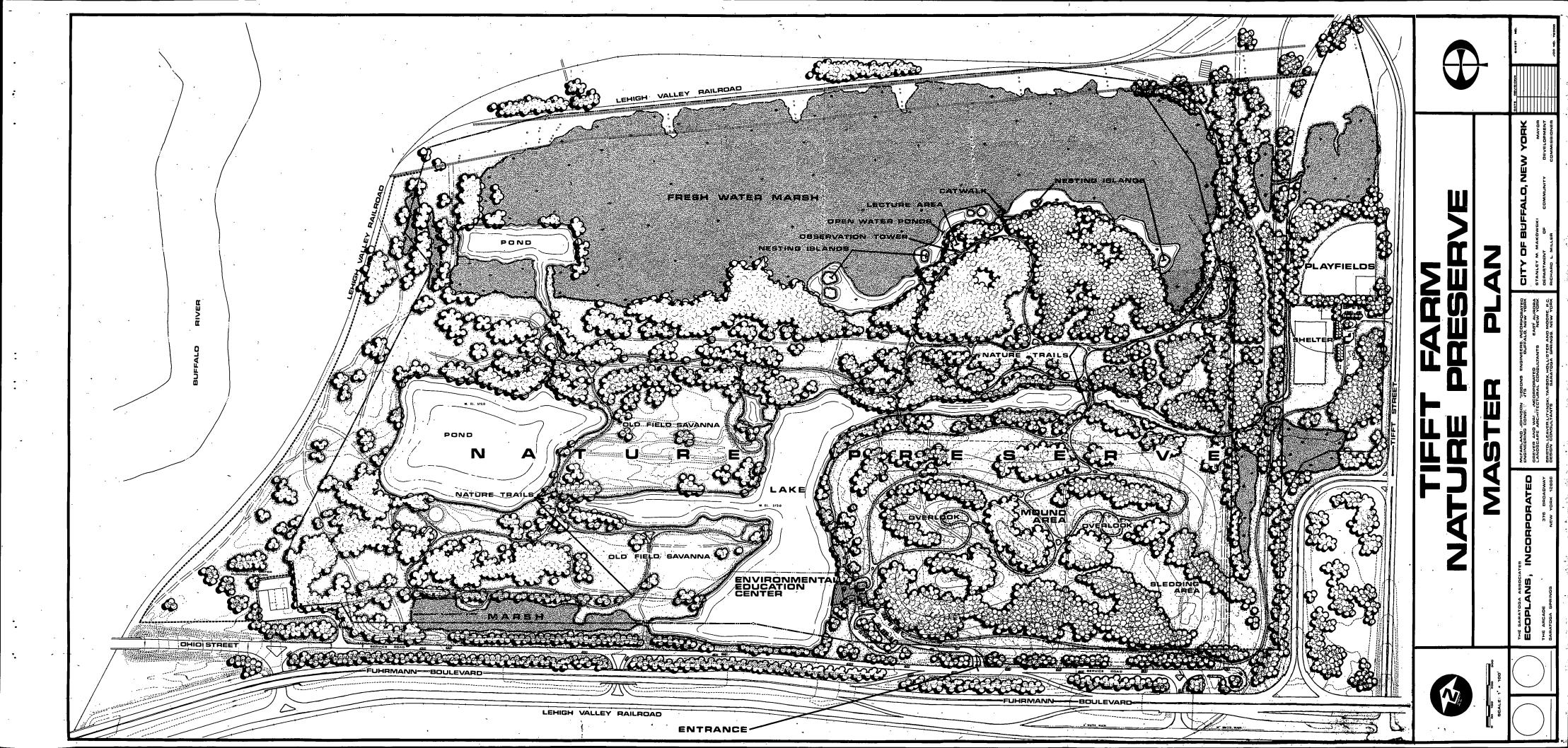
#### SITE DEVELOPMENT PLAN AND PROGRAM

The Site Development Plan and Program is meant to serve as a general guide for the more detailed project planning that will take place as part of the implementation of the master plan. Thus, the site development plan should not be considered as a final, ultimate plan, and such details as the configuration of buildings, trail locations, etc., can be expected to change as more refined project planning begins.

The major elements of the site development plan have been investigated in some detail on an individual basis and are illustrated here in order to highlight their function and importance. These include:

- o Land Use and Structural Facilities Plan
- o Circulation Plan
- o Utilities Plan
- o Graphics Plan
- o General Grading Plan
- o Site Development Phasing and Schedule

The overall site development plan on the following page indicates how each of these components are integrated, and what physical facilities the site will contain when fully developed. Certain modifications of this plan have already been made in response to changes in the grading of the mounds and the more detailed project planning which has occurred on the playfield site.



#### Land Use and Structural Facilities Plan

The basic land use plan for the Tifft Farm is based on the sensitivity of site values. Those assets easily upset by man's intrusion are sheltered or protected. Other areas, less sensitive, are utilized to their maximum potentials to absorb the pressures of human use while still satisfying visitor curiosity. To achieve this objective, the site is organized according to the following use density zones:

High Intensity Use Zone - This area is designed to absorb sustained and intense use. Views or vistas into the site should be provided along with educational displays aimed at interesting the "average" visitor. This concept will allow one to "visit" the preserve and satisfy his or her curiosity, while protecting the more sensitive areas of the site from overuse.

The mounds and western edge of the large pond are best suited for this task. Visitors may enter the site from Fuhrmann Boulevard and immediately park their vehicles, arrive at a visitor's center, and "spread out" into the mounds area. This intense use is then contained to one area, an area designed with facilities (such as paved walks, etc.) to absorb this use.

2. Moderate Intensity Use Zone - This area is designed to accommodate those desiring a more involved site experience while providing a "second stage" defense for protecting the more sensitive assets.

Lands between the high use area and cattail marsh are recommended for this use. This area possesses numerous habitat types, including limited marsh areas. The trail system takes advantage of this variety of assets to allow full appreciation and satisfaction of one's visit to the Preserve.

3. Low Intensity Use Zone - This area is intended to provide a more isolated area which can still be used for environmental education purposes. It is intended that this area would provide land and water areas where wildlife would only occasionally be disturbed by human activity.

The northwestern quadrant of the site is set aside for this purpose since it is relatively remote from the primary access point to the Preserve, and the area contains an excellent mix of habitat types.

4. Sanctuary Zone - This area is intended to protect that part of the site which is least tolerant of human use. No human traffic will be permitted in the sanctuary zone.

The eastern area of the site -- the large cattail marsh including the pond and willow grove at the northern end -- is set aside for this purpose.

- 5. Buffer Zone Generally, the perimeter of the site should be set aside as a buffer area to protect the site from unauthorized access and screen out adjacent unsightly uses. The buffer zone will also exclude human traffic, and thus serves as part of the sanctuary zone as well.
- 6. Organized Play Zone This area is intended as a place where people coming to the Preserve can engage in more organized recreational activity and have picnic lunches.

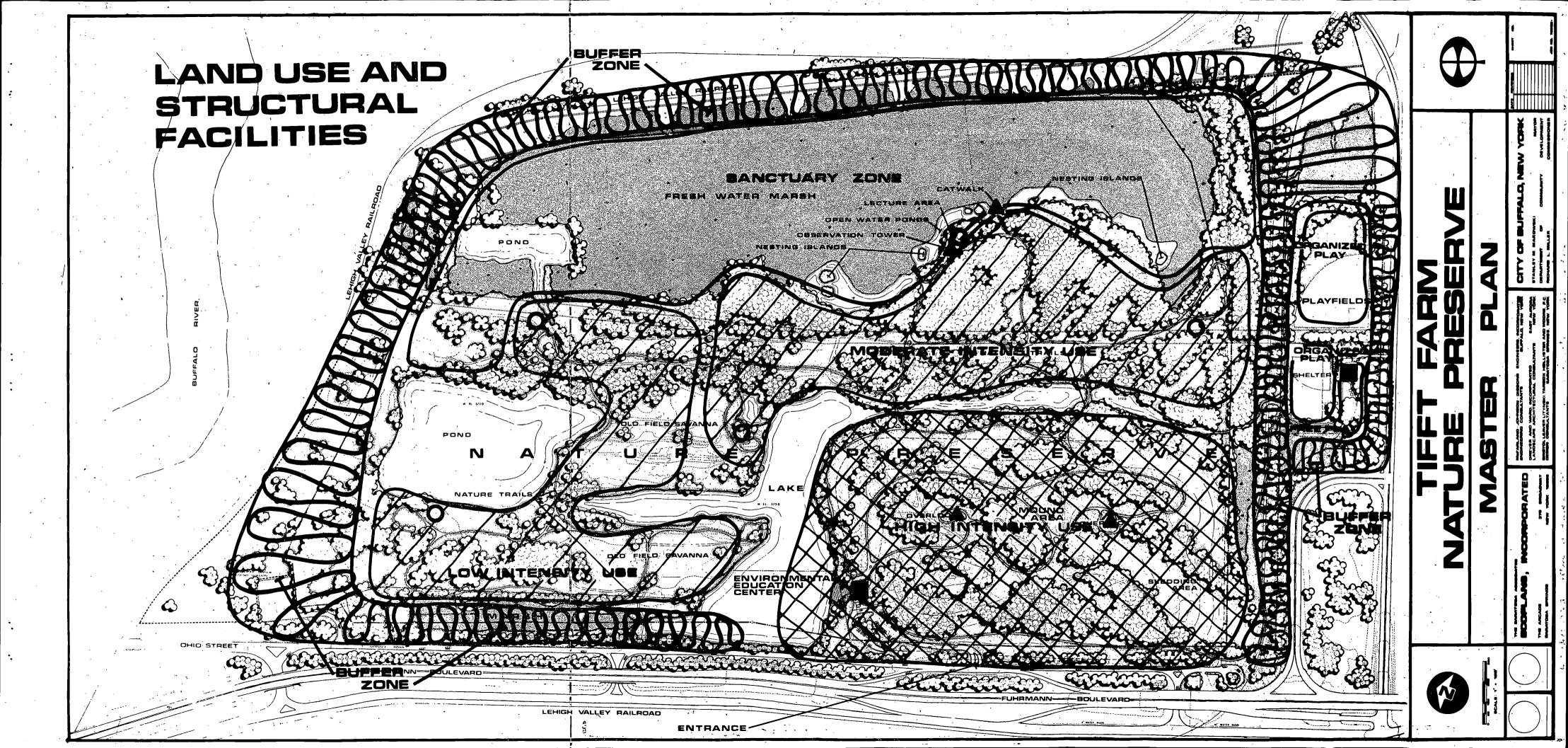
The area south of the Lehigh Valley railroad spur entering the site from the east is set aside for this purpose.

The attached Land Use and Structural Facilities Plan describes the various functional relationships between the site and the facilities contemplated for development. Land Use Areas include:

- o Nature Preserve Area
  - o High Intensity Use Zone
  - o Moderate Intensity Use Zone.
  - o Low Intensity Use Zone
  - o Sanctuary Zone
  - o Buffer Zone
- o Playfield Area
  - o Organized Play Zones
  - o Free Play Zones
  - o Buffer Zones

Facility relationships to these zones are as follows:

- o Nature Preserve Area
  - o High Intensity Use Zone Environmental Education Center, Mound Observation Areas, Mound Sledding Areas, Lake Inlet Fishing Docks.
  - o Moderate Intensity Use Zone Trail System, Lecture Centers, Marsh Catwalk and Observation Tower.
  - o Low Intensity Use Zone Trail System, Lecture Centers.
  - o Sanctuary Zone No structures.
  - Buffer Zone Fencing.
- o Playfield Area
  - o Organized Play Zone Ballfields.
  - o Free Play Zone Playground Facilities, Shelter, Picnic Areas.
  - o Buffer Zone Small marshes at east and west ends of playfield, relocated creek and area along Tifft Street.



#### Circulation Plan

As indicated on the attached plan, vehicular traffic is restricted to the perimeter of the site, where penetration is made for service to the two major facilities on the site.

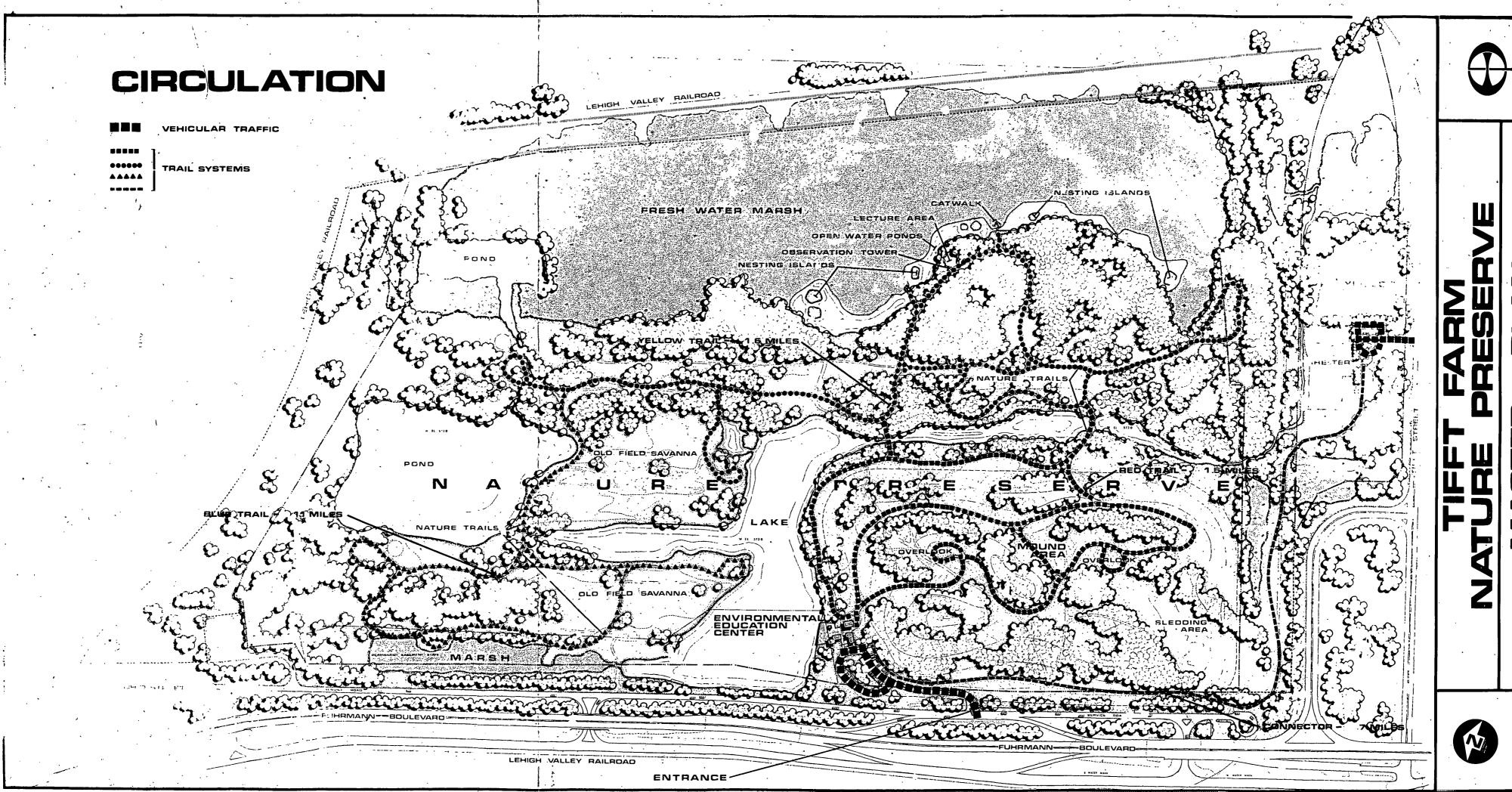
A strong relationship is developed with the site and the lake in particular through its orientation, elevation and development of site elements such as decks, terraces and observation areas.

The entrance road provides service to a drop-off area at the Center. Parking for approximately fifty cars and five buses is provided along the access road in close proximity to the facility.

Three trail systems have been included in the site plan. The red trail, 1.5 miles in length, serves the mound area of the site and is expected to accommodate the greatest number of people. The yellow trail, 1.6 miles in length, provides access to the eastern portion of the site and portions of the marsh. The blue trail, 1.1 miles in length, serves the most remote areas of the site and is expected to be oriented toward study purposes.

A connector trail of .7 miles provides a pedestrian connection from the Environmental Education Center to the Playfield Shelter. The shelter is the second most prominant facility on the site and serves as the focal point of this area. The shelter is planned as an open-sided facility with some capability for storage and future restroom facilities. An entrance road serves the vehicular need and culminates in a drop-off area and parking facility.

The design vocabulary discussion deals with the details of road and trail surfaces, treatment and alignments, as well as massing material and color selection of the structures.







#### Utilities, Lighting and Graphics

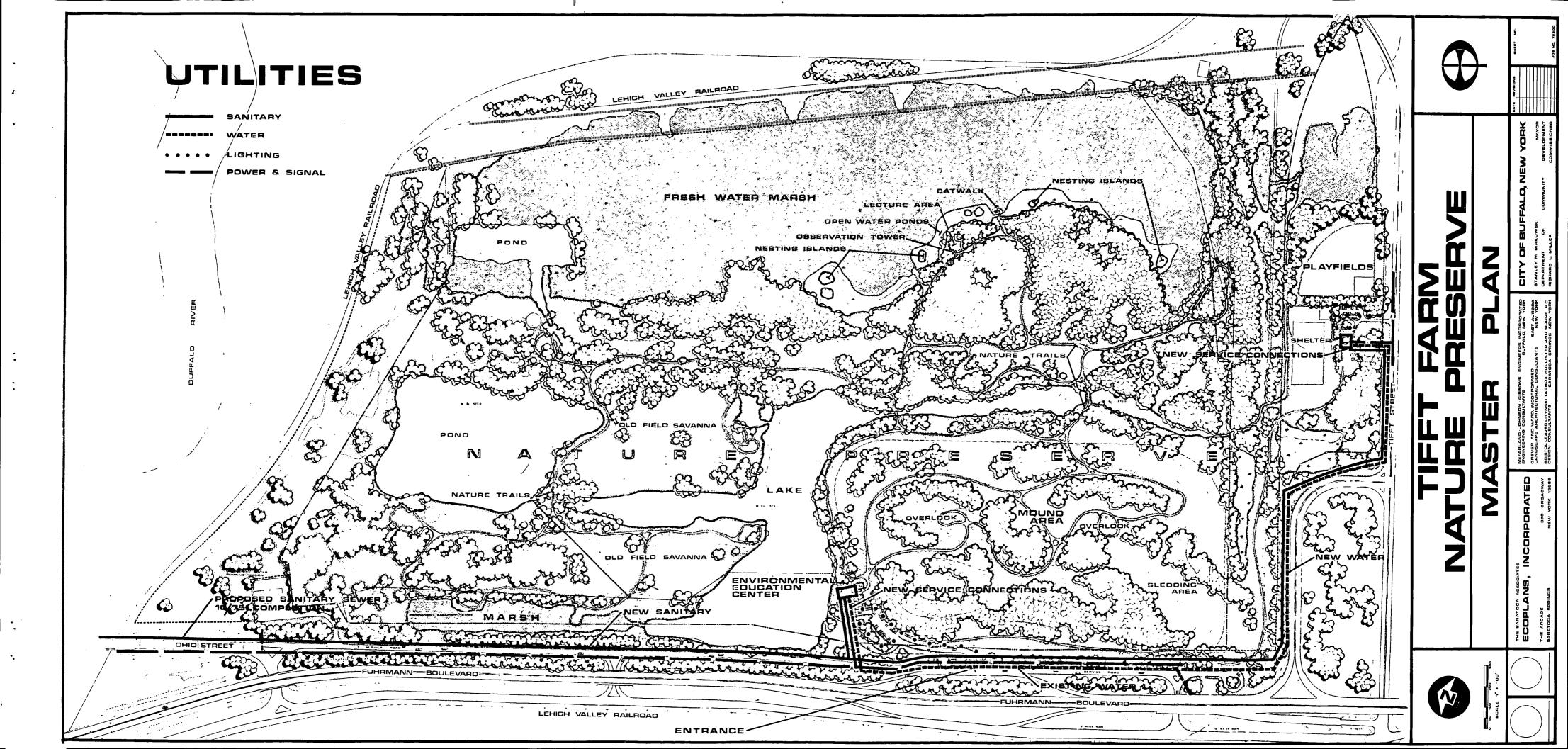
The plan entitled "Utilities and Lighting" illustrates the type and extent of utility services existing in the vicinity of the site and those proposed for servicing of the site.

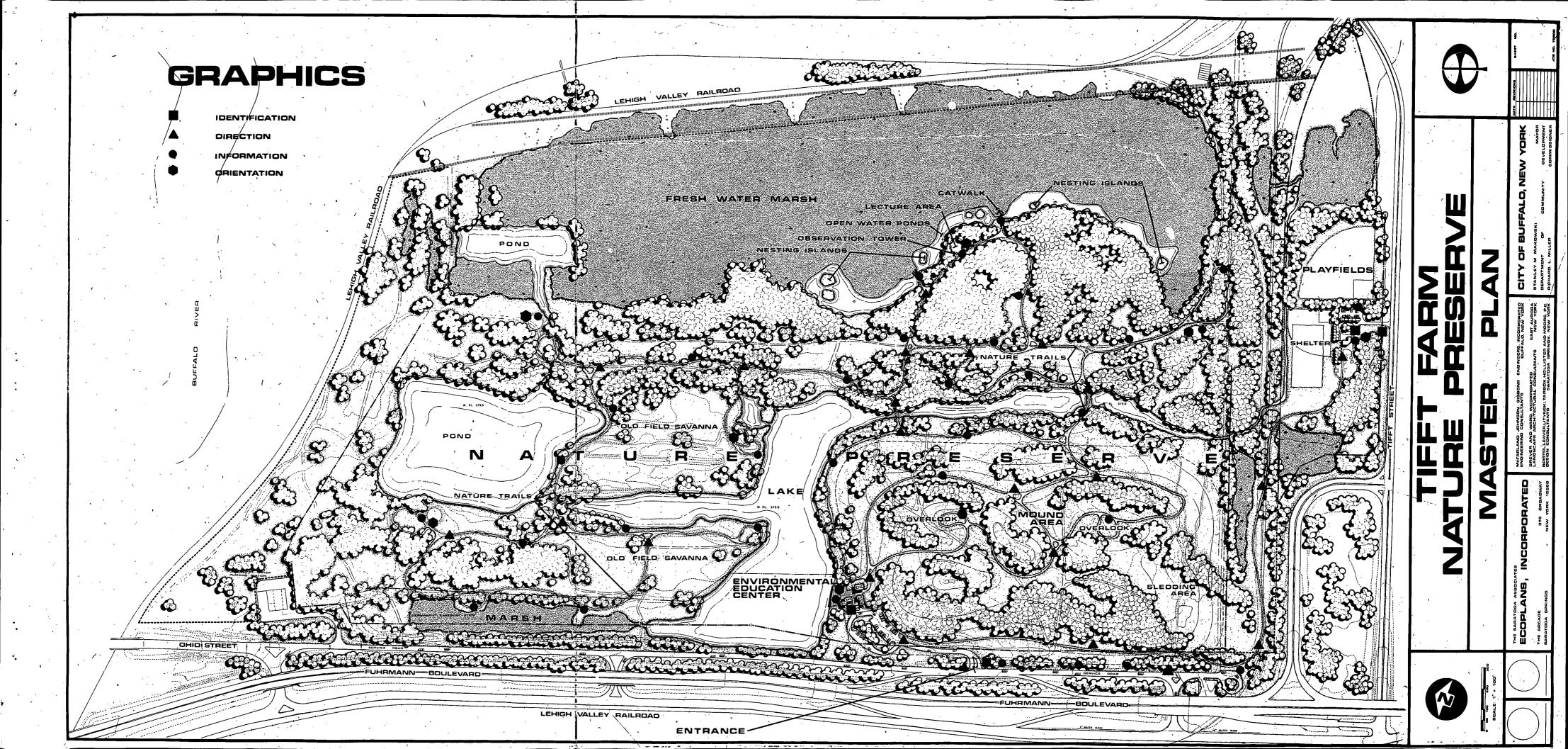
Lighting within the site will be limited to the road and parking areas and those areas directly related to the buildings. Since the areas will generally operate during daylight hours, further lighting is not required except in the playfield for evening recreation.

Power and signal sources exist along the Fuhrmann Boulevard Service Road and Tifft Street, in addition to a 16" water line which also exists along the north side of the Service Road.

Sanitary service will ultimately be provided only as far as the Water Pumping Station. A schedule has not been developed; however, it is estimated that this will not be available until the fall of 1975, at the earliest. A sewer connection from the Environmental Education Center to the proposed sewer will necessarily be a forced main due to the grade differential.

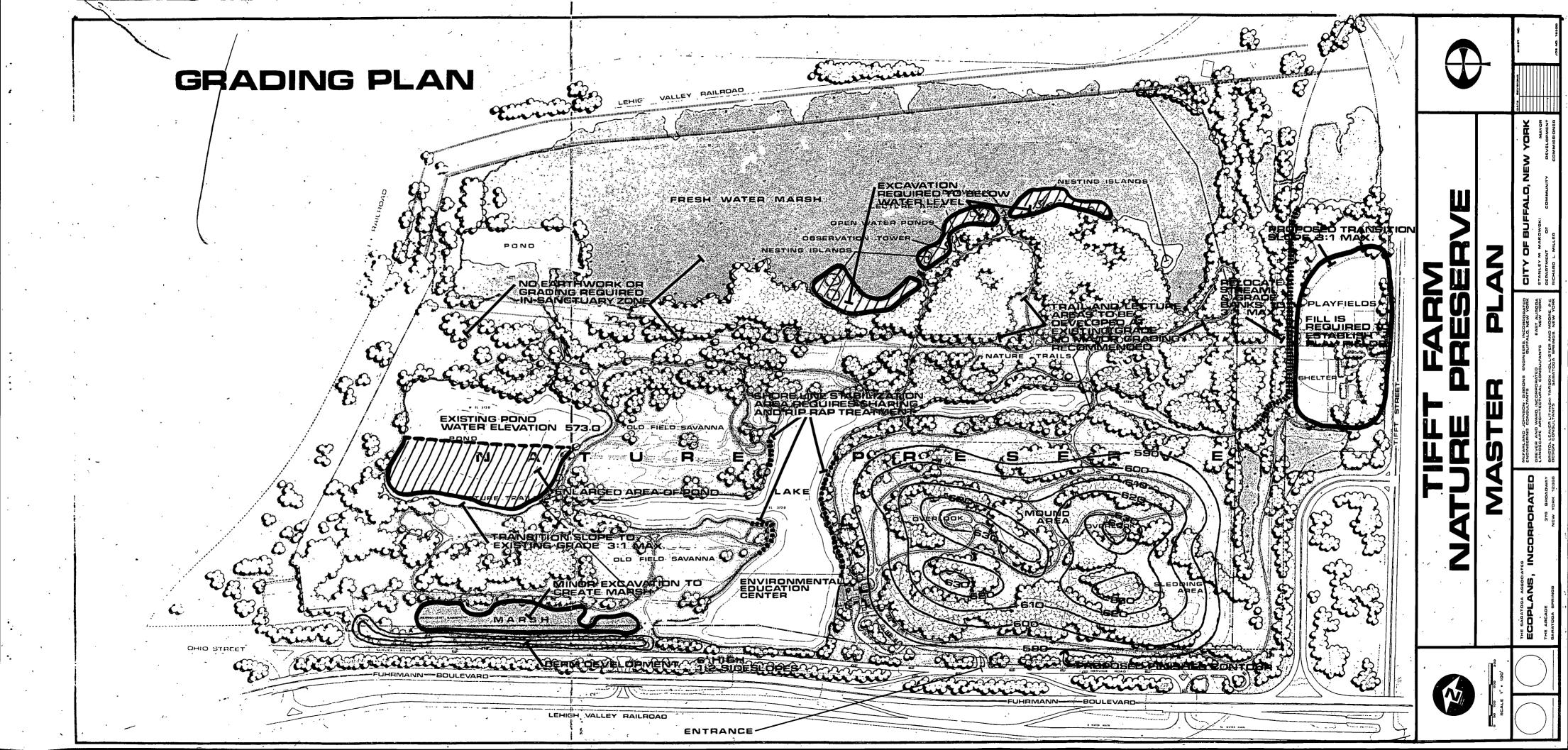
A graphics program is delineated in the plan entitled "Graphics". It indicates the general location and requirements envisioned include: identification, directional, informational and orientation devices. The design vocabulary section discusses the graphic format recommended for the family of signs to be utilized at Tifft Farm.





#### General Grading Plan

Most of the site is maintained in its present character in terms of earthwork. Grading is limited to the western portion of the site where an existing pond will be expanded to provide earth fill for the solid waste mound in the southwest corner of the site. With the exception of some shoreline stabilization along the lake shore, no further earthwork is planned.



#### Facility Design Vocabulary

This section is intended to summarize the character and quality desired in the physical elements to be introduced within the Tifft Farm environment.

Two distinct areas should be developed within the site which will require compatible yet varying treatments. The nature preserve proper should essentially remain in its natural state with management techniques used to "improve" the area; while the visitor center and playground portions should be substantially developed to perform their intended functions. Man-introduced elements should be limited in the former area while these elements should be obvious in the latter. Indigenous plant materials should be utilized throughout the preserve with exotics and other specialized plantings limited to the entrance areas or perimeter of the site. Colors should be subdued, organic tones within the preserve proper while the pallete may be somewhat broader in the other areas of the site. Materials throughout the site should be limited in an effort to blend with the environment. Most structural elements including the buildings at the visitors center and playground are envisioned as wood framed and clad.

The active areas of the site should be reinforced as distinct from the more passive preserve areas through the use of a variety of techniques. In combination or separately they would include: barrier planting (dogwoods, hawthorns, roses), fencing, grading of mounds and maintenance of water courses.

The discussion which follows describes each of the primary site elements to be utilized, their suggested scale, materials, detail and general treatment.

#### Roads

The site is served by Fuhrmann Boulevard to the west and Tifft Street along the south. From these two roads, vehicular penetration on the site should be minimal; with traffic limited to the Visitors Center and Playground area. The entrance roads should be 18' wide with an asphaltic concrete surface.

#### Parking

Provision should be made for parking 50 cars and 5 buses both at the Visitor Center and the Playground area. This area should also be surfaced with asphaltic concrete and curbed to control drainage and direct traffic.

#### Walks & Trails

The area near the active centers should be served by asphaltic concrete walks from 4' to 8' wide depending on their location and function. The remainder of the trails on the site should be composed of a wood chip surface, 4' in width. The slope should vary with the natural contour which should be generally level throughout most of the site. However, in the mound area, slopes should not exceed 8%. As illustrated in the sketches, plant materials can be utilized to advantage in trail development as means to: attract, repel, define, direct and buffer.

#### Bridges

Bridges will occasionally be required to cross streams and afford access to certain portions of the site. Appropriately located bridges can provide a great deal of control to the circulation system; providing access to some areas while limiting access to others. They should be constructed of timber and wood frame treated for protection and allowed to weather to a natural gray color. Bridge design and size should consider the crossing requirements of service and emergency vehicles.

#### Catwalks

As a further extension of the trail system, catwalks should allow penetration of the wetland areas for study and observation purposes. Catwalks should be of simple wood frame construction, treated with preservative and allowed to weather in the same fashion as the bridges. Blinds should be provided in association with the catwalks and for other observation areas on the site.

#### Observation Towers

In areas where it would not be appropriate to develop trails or catwalks, but study or observation is desired, a simple observation tower may be developed. This would permit visual penetration without physically disturbing the area of interest. Depending on the specific location, a tower of 25 to 35 feet in height would be ample to provide a filtered view to the surrounding area. This structure should be wood framed, provided with a railing and roof and simply executed. Natural weathering should be allowed once the wood is treated with preservative.

#### Site Furniture

Benches will be required throughout the site along the trail system. As detailed in sketch form, backless benches can be provided in areas where people are not expected to linger or where it may not be desirable for people to stay from a management point of view. Benches with a back are envisioned for use primarily at the developed "centers". Waste receptacles should be conveniently located throughout the site. They should be made of heavy duty woven wire and painted matte black.

#### Lighting

Lighting should be limited to the entrances and active centers of the site and be unobtrusive in character. A "Cut-off" fixture is recommended which controls light in a positive and desirable fashion and eliminates the "spill" of light. This fixture type can be established for both vehicular and pedestrian uses with appropriately sized and spaced standards.

#### Graphics

It is important to establish a graphic program early in the development of the preserve to aid visitors in the appropriate and fullest use of the site. The graphics are used to identify, direct and inform and can be accomplished within a consistent format. A logo has been chosen (as illustrated in sketch form) which should be

used throughout the signage system. Once established, the logo will be the familiar identification of the Preserve. The message "Tifft Farm Nature Preserve" need only appear on the highway trailblazers and entrance sign. The directional signs will direct people to specific areas, trails, etc. while the informational signs will impart data including uses of the site. Educational information regarding flora of the site and faunal habitats can also be imparted in the format of the informational signs described.

The type face, "Optima", has been chosen for its appropriateness in combination with the logo. The sign material should be metal with the capability of applying strip-on messages. This would allow flexibility in developing messages appropriate to the specific needs of the site.

#### Peripheral Treatment

The road frontage portion of the site should be buffered from the road through the use of planted mounds where possible. The planting chosen should be salt tolerant species which can withstand the winter road salt condition which currently exists. It is felt that a well planted mound will provide a sufficient feeling of exclusion to the general public; will prevent vehicles from entering the site and can be used as a directional device to the proper entrance. The planting will also in time, provide a sufficient screen and promote a feeling of remoteness on the site.

The peripheral area along the cattail marsh is currently being violated by the dumping of refuse. A more positive exclusion device must be developed in this area. It is recommended that a 6' high chain link fence be developed along this edge for the most positive control. The fencing could be installed in combination with berming and planting.

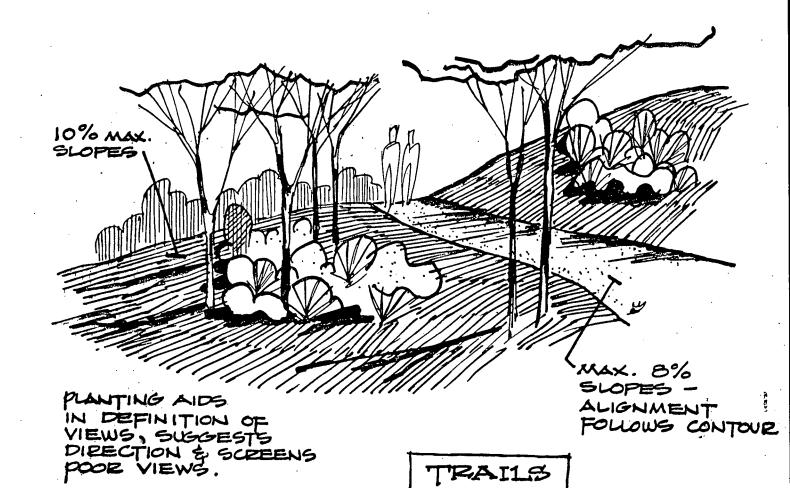
#### Active Centers

The Visitors Center and Playground Area are the two points of entry to the site. It is envisioned that the Playground Area will be developed as a distinct entity from the preserve and that no connection between the two areas will

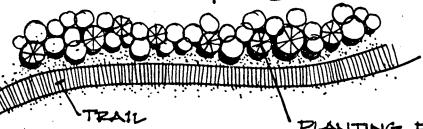
be developed. Both areas should provide for vehicular parking and should be developed in a manner which will support numbers of people.

The shelters or structures envisioned for each site should be wood framed and wood clad in keeping with the character of the site. The structure at the preserve will become the "gateway" to that area and could house informational displays, seminar areas and administrative functions. Its location near the central lake suggests that decks and overlooks could be developed in concert with the structure and the site. The playground structure can be a simple expression of shelter which should in addition, house play equipment and maintenance items.

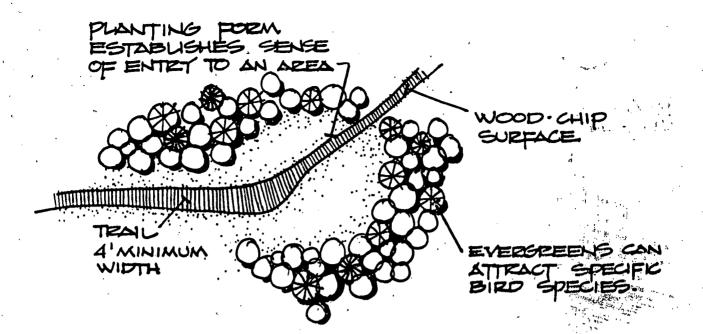
These areas should be expressed as the most highly developed areas at the Tifft Farm site.



QUIET AREAS OF PRESERVE CAN BE MAINTAINED

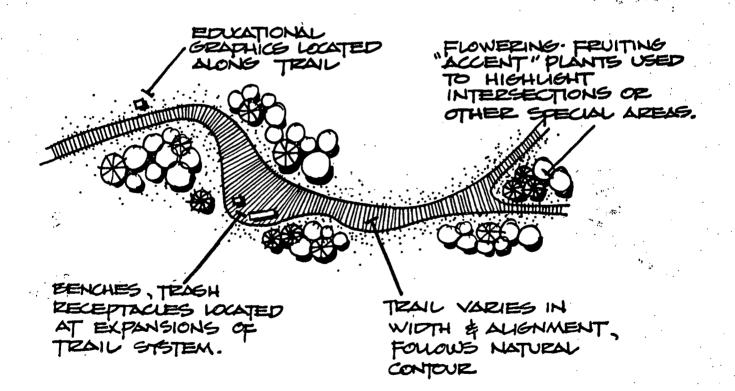


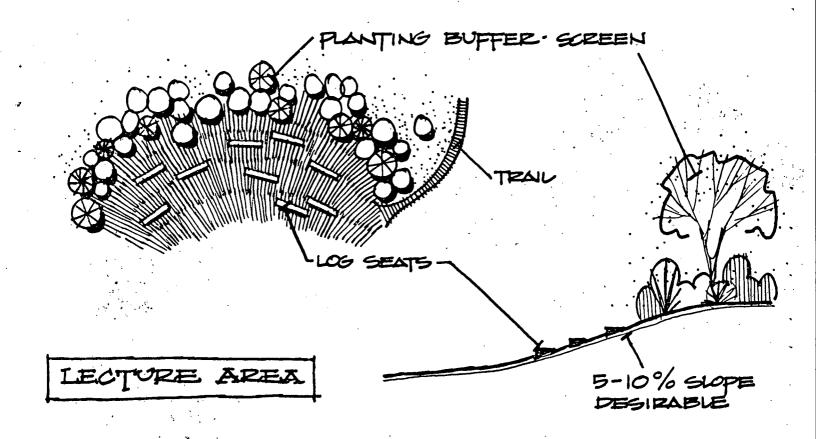
PLANTING FORM SUGGESTS
NO ENTRY - CONCEPT CAN BE
REINFORCED THROUGH THE
USE OF DENSE SPECIES
(DOSWOOD, HAWTHORN)

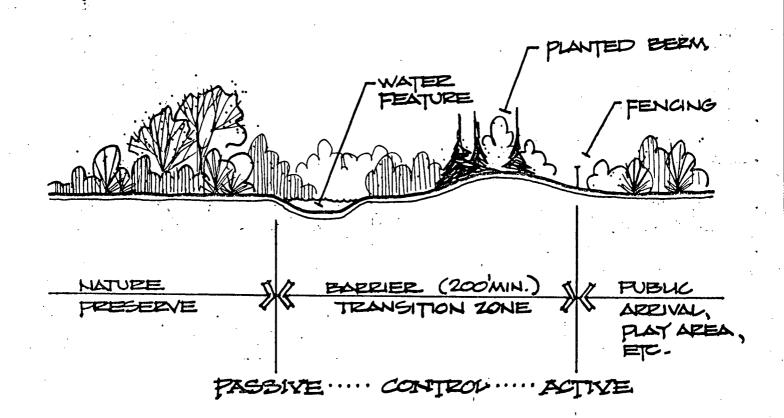


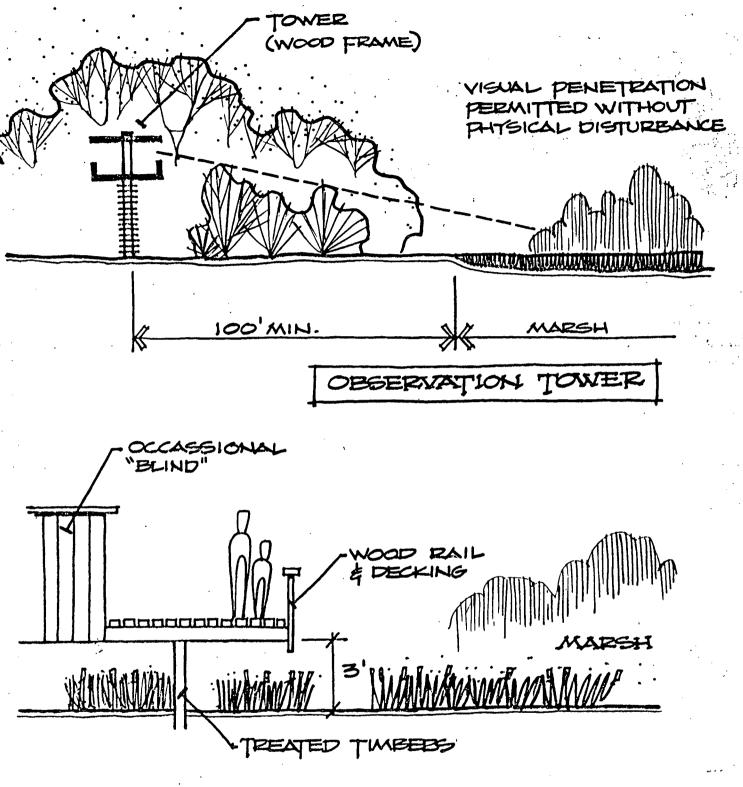
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## TRAILS

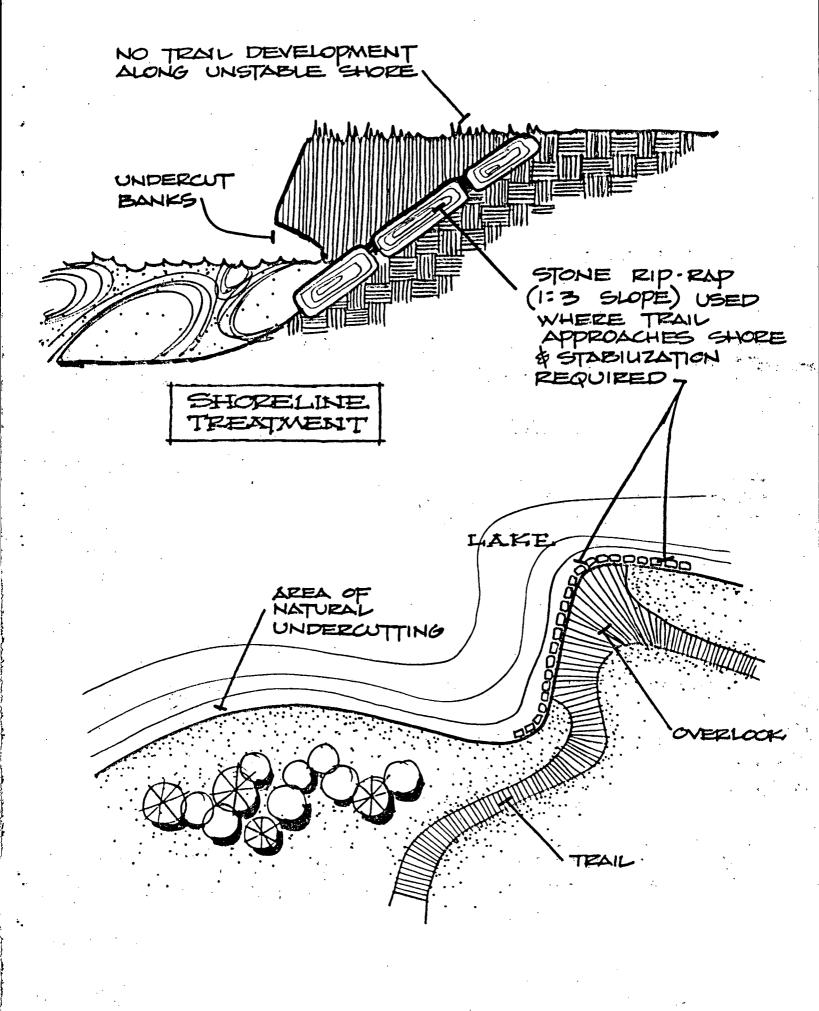


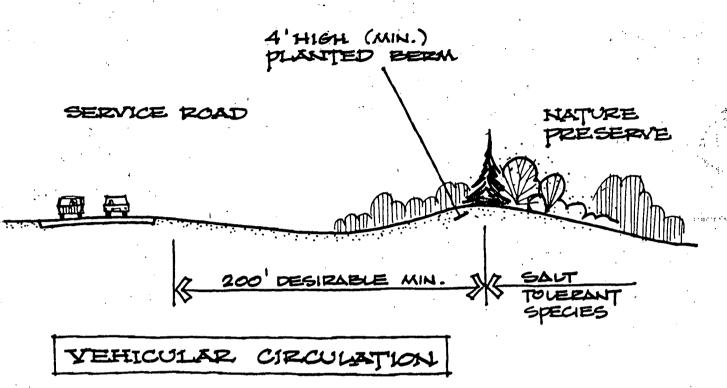


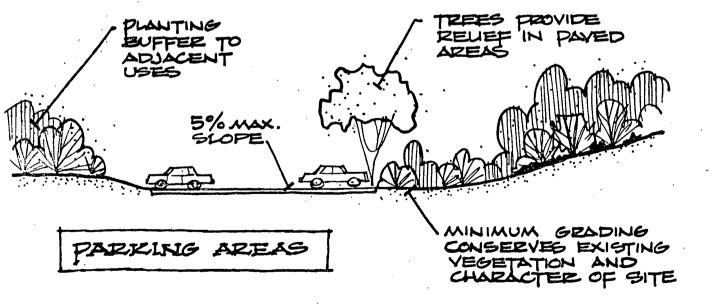




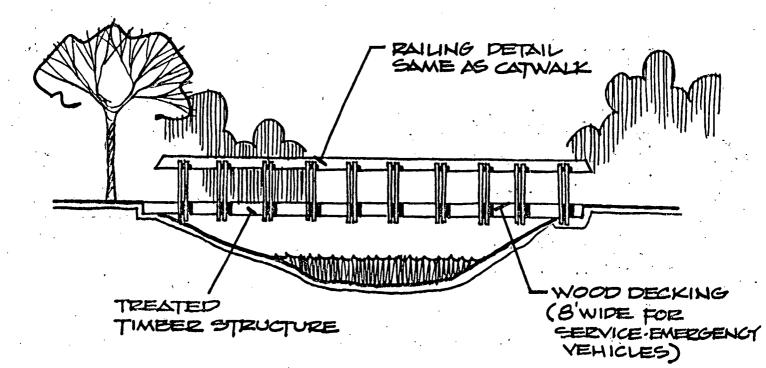
CATWALK

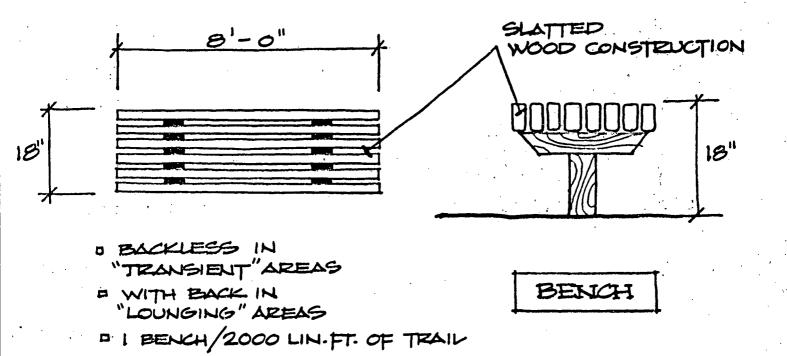


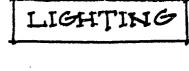


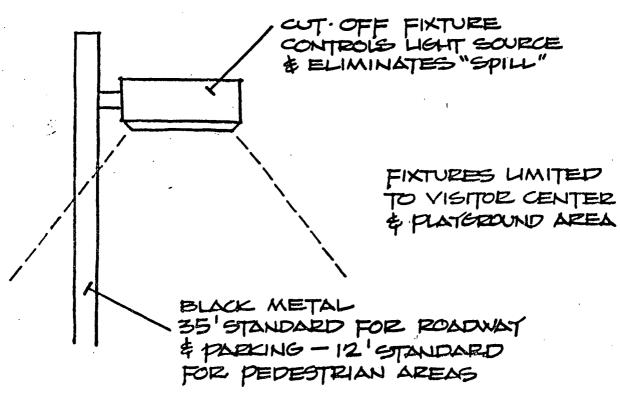


BRIDGE



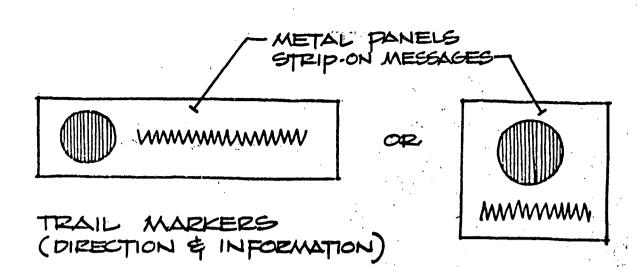


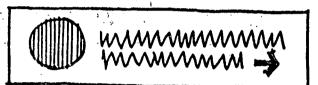




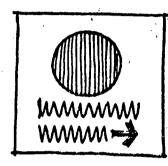
WHITE CATTAIL DARK GREEN BACKGROUND TIFFT FARM LOGO GRAPHICS MESSAGE (DARK GREEN) MMMAMMM IDENTIFICATION (TIFFT FARM NATURE PRESERVE) WWW.WW. PIRECTIONAL (VISITOR PARKING)  $\sqrt{M}$ INFORMATIONAL (HOURS OF CPERATION, USES... TYPE FACE FOR

ALL MESSAGES TO BE "OPTIMA"





OR.



HIGHWAY TRAILBLAZERS

CRAPHICS.

## Site Development Schedule and Costs

The following strategy proposes that a logical and orderly development of the Tifft Farm site over a four-year period be accomplished. The costs are based upon 1974 dollars and delays within a phase would require a verification or adjustment in the scope of work proposed.

Phase 1 (1973-74)	o Wetlands Restoration o Planning-Playfield Area	\$144,000 <u>45,000</u> \$189,000
Phase 2 (1974-75)	o Playfield Construction o Nature Preserve-Part 1 o Land Acquisition	\$350,000 225,000 125,000 \$700,000
Phase 3 (1975-76)	o Playfield Shelter o Nature Preserve-Part 2	\$ 75,000
Phase 4 (1976-77)	o Land Acquisition o Nature Preserve-Part 3	\$175,000 125,000 \$300,000

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TIFFT FARM IMPLEMENTATION SCI	HEDUL	<b>E</b>				
PHASE	1973	1974	1975	1976	1977	1976
MASTER PLANNING				. <u>.</u>		
1 PLATFIELD						
WETLANDS RESTORATIO	N ==					
PLAYFIELD SITEWORK HATURE PRESERVE : PART I S LAND ACQUISITION		***				
3 NATURE PRESERVE - PART 2		<u>-</u>				
4 PLATE ELD STEUCTURE  4 LAND ACQUISITION						
NATURE PRESERVE · PAST 3						· ·
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## Phase 1 (1973-74)

#### Wetlands Restoration

- o Marsh Development
- o Water
- o Clearing Aspen Woods
- o Culvert Control
- o Fencing Barrier

## Phase 2 (1974-75)

## Playfield Construction

- o Roads and Parking
- o Softball Diamond
- o Football and Playfields
- o Planting
- o Playground Equipment
- o Utilities and Site Lighting
- o Site Furniture
- o Graphics

#### Nature Preserve - Part 1

- o Roads and Parking
- o Mound Area Planting
- o Yellow and Red Trails
- o Pedestrian Bridge
- o Lecture Centers
- o Site Furniture
- o Site Lighting
- o Graphics

#### Land Acquisition

o Lehigh Valley Spur Portion

#### Phase 3 (1975-76)

## Playfield Shelter

#### Nature Preserve - Part 2

- o Environmental Education Center
- o Walks, Terraces
- o Decking, Dock Areas
- o Planting, Reforestation
- o Utilities
- o Site Lighting
- o Site Furniture
- o Graphics
- o Catwalks

- Observation Tower Ó
- Shoreline Stabilization 0
- Additional Water Marsh Area Ö
- Blue Trail 0
- Connector Trail

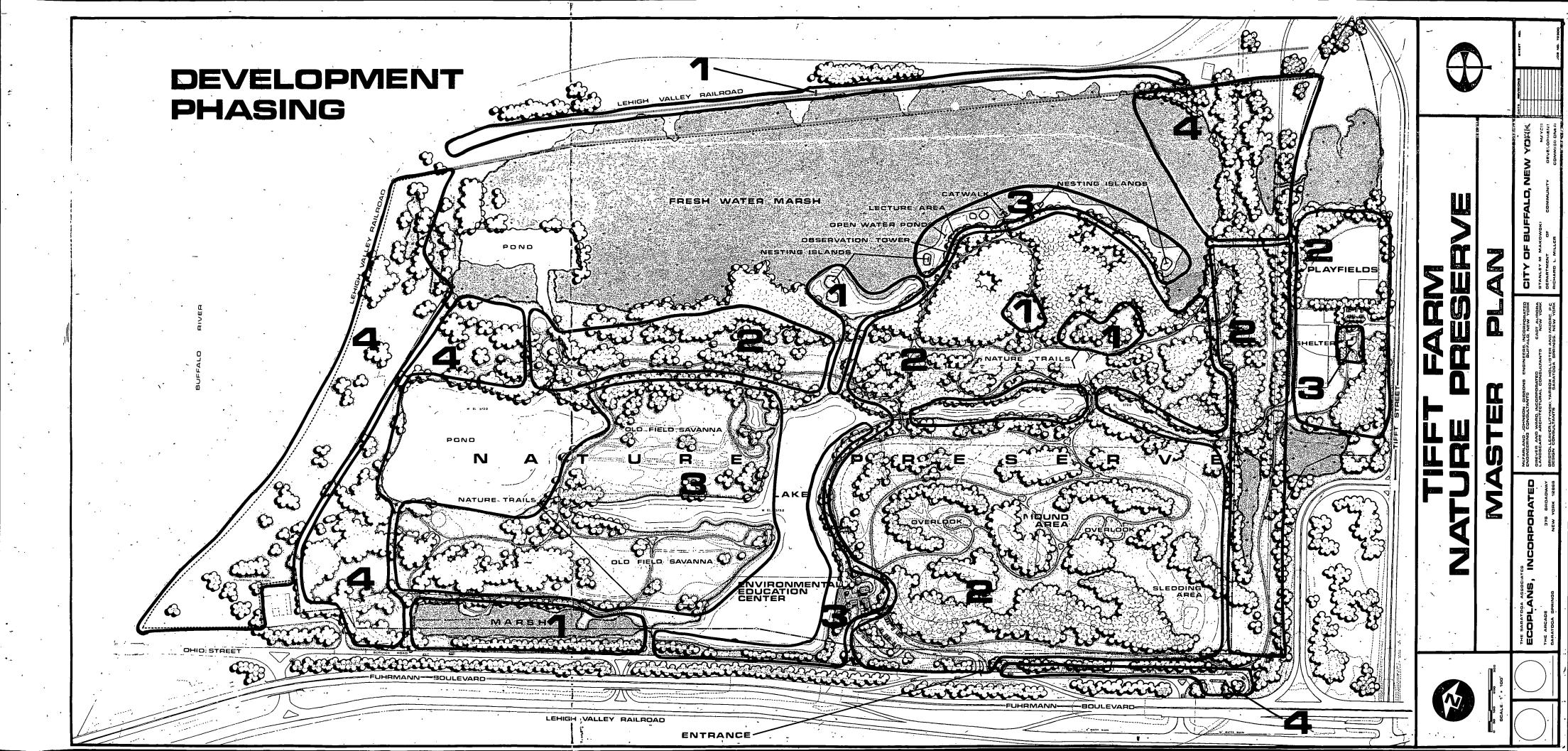
# Phase 4 (1976-77)

## Land Acquisition

- Lehigh Valley Spur S.E. Section Lands North Portion of Site 0

# Nature Preserve - Part 3

- Parking Pull-offs 0
- 0 Planting
- Habitat Improvements 0



## HABITAT IMPROVEMENTS PLAN AND PROGRAM

The improvement of habitat conditions at the Tifft Farm Nature Preserve follows from the Basic Ecoplan identification of the various ecological units within the Tifft Farm and the existing constraints and potentials of each unit. The criteria for effective habitat improvement are:

- o Management of existing site resources to sustain a <u>diversity</u> of habitat environment.
- o Management of existing site resources to produce a higher quality of habitat environment.
- o Introduction of certain native plant and animal species to increase the diversity and quality of the Tifft Farm ecosystem.
- o Control (including removal) of certain plant and animal species which might tend to reduce the diversity and quality of the Tifft Farm ecosystem.

The following habitat improvement program recommendations are based on the various ecological units and the above criteria.

## Submerged Aquatic Habitats

Upon completion of the Nature Preserve Development, the ratio of open water area to upland and wetland areas will approximate the current conditions, but the plan recommends improvements in the distribution and quality of open water areas. These improvements are as follows:

- Reduction of the water area occupied by the old 1. canal-inlet pond in the central, eastern portion of the site and improvements in the volume and circulation of water in this pond. This can be achieved by a number of steps. A portion of the pond adjacent to the northern boundary of the landfill area should be filled in to create a site for the Environmental Education Center. This action will also reduce the development of wave action during high winds -- a phenomena which is responsible for the extensive soil erosion on the western and northern shorelines which has contributed considerable silt to the pond. Areas of bank erosion due to wave action generally should be graded back. The stream from the South Park Lake to the inlet pond and several culverts along its route should be cleared and graded to improve the volume and rate of water entering this pond, and major debris on the pond bottom should be removed to improve circulation. Artificial structure could be added at a future date to improve fish Since this pond is open to pollution influences from both the stream and harbor areas outside the boundary of the Nature Preserve, the water quality of the pond will always be related to influences on the stream and harbor. Particular steps should be taken by the City to supervise dumping along the stream west of Hopkins Street.
- 2. Enlargement of the pond in the northwestern sector of the site. This work will be done in connection with the Buffalo Sewer Authority's transfer operation borrow pit excavation. When completed, this enlarged pond should provide the best fresh water quality available at the site. The lake will be

approximately 11.7 acres in size, and have a maximum depth of approximately 10 feet, sufficient for a natural fall-spring water overturn to maintain good dissolved oxygen distribution yet shallow enough to prevent formation of a permanent thermocline. The shoreline will be graded to a maximum slope of 3 on 1 and a substantial emergent aquatic zone will be created by grading the northern and southeastern bottom to a maximum depth of 2 feet for a distance of approximately 40 feet from the shore. Massive concrete foundations uncovered in the borrow operation should be covered with earth or reduced to elevations below the water level by blasting. The latter may be preferable as it could provide "structure" for fish habitats. Prior to the growth of natural vegetation in this marshy edge, we recommend the construction of several potholes to provide better duck nesting habitat.

- 3. Rehabilitation of the marsh pond. The pond at the northern end of the cattail marsh is quite shallow and contains extensive waterweed and algae bloom in late summer months. This pond should be dredged periodically to remove decayed vegetation and other detritus on the bottom which will otherwise accumulate, reducing the oxygen content of the water until the pond becomes similar to the remainder of the marsh.
- 4. Creation of additional open water area in the main cattail marsh. This improvement is recommended as part of the Phase I improvements to be financed from the Municipal Wetlands Restoration grant from the State of New York. This open water area will be created by dredging areas along the southwest perimeter of the marsh. Water levels should be maintained primarily by natural conditions, but this new pond facility will also be connected to the marsh hydrological control culvert and pump station which will provide a controlled connection between the marsh and the lake inlet.

## Emergent Aquatic Habitats

Emergent aquatic habitats are the most dominant and important features of the Tifft Farm wetlands. These include the cattail marshes, edges of ponds and ponded water areas within the low wetland forest communities. They are very productive wildlife areas since much of the groundlayer and understory plants provide food for a variety of animal species. The master plan recommends the establishment of additional emergent aquatic habitat -- primarily cattail marsh and the maintenance and quality improvement of other forms of emergent aquatic habitat as well. This includes:

- 1. Creation of a new cattail barrier marsh habitat in the northwestern quadrant of the site along Fuhrmann Boulevard. Excavation for this marsh area would require the removal of approximately 2.5 feet of slag and other waste fill. In the process of the excavation, occasional deeper potholes should be left to allow for open water waterfowl.
- 2. Control of giant reedgrass invasions in the major marsh areas. Giant reedgrass is a visually attractive plant. However, it has no value as wildlife food, and can invade marsh areas reducing the more valuable cattail. Hand mowing in late spring or early summer before the plant flowers is probably the most effective means of control.
- Maintenance of marsh water levels. Occasional periods of drought can seriously affect the ecology of the cattail marsh. In order to prevent this occurrence, it is recommended that the City install a pump and conduit connecting the marsh with the lake inlet to maintain appropriate water levels in the marsh.
- 4. Maintenance of marsh vegetation density. Generally, the major cattail marsh will respond to water level control as a principal maintenance mechanism. However, the elimination of muskrat trapping in the marsh could, on occasion, lead to a phenomenon called "eat out" in which uncontrolled population generates excessive consumption of the cattail

stands. Conversely, too low a muskrat population can lead to the development of a dense mat of dead cattail. In the latter case, control is sometimes achieved by burning-off the marsh in late fall.

5. Provision of additional vegetative species. Introductions for native plant species not commonly found in the Tifft Farm marshes should be considered. The most valuable additions would include rice cutgrass, wildrice, wildcelerly, widgeongrass and arrowheads. Each of these provides food for a variety of waterfowl.

#### Shrub-Carr Habitats

The shrub-carr is an ecotone habitat or transition zone between the submerged or emergent aquatic habitats and the upland habitats. On the Tifft Farm, these units are well-established and consist primarily of Red-osier Dogwood. They are particularly prevalent in the northern half of the site bordering the bays of the lake inlet pond and the cattail marsh. To improve this habitat type, the following management actions are recommended:

- 1. Thinning of the shrub-carr in the penninsula area north of the lake inlet pond. The shrub-carr in this area is quite extensive and the interior edges could easily be moved back closer to the water edge. This would provide additional grassland in this area and provide stock for replanting in other areas.
- 2. Diversification of shrub-carr species. The variety of the shrub-carr stands could be increased by planting willow and alder shrubs in thickets. Shrub-carrs should be maintained along the edges of the ponds and the cattail marsh.

#### Grassland Habitats

The existing grassland habitats at the Tifft Farm are relatively indistinct. Generally, grassland habitats rapidly advance to later successional stages if not managed to maintain the existing sere or stage of development. The following habitat improvements are recommended:

1. Establishment of a fen -- a grassland on a wet and springy site -- along the northern edge of the preserve. The low elevation in this area receives seepage from surrounding higher areas including the northern end of the cattail marsh and the pond in the northwestern quadrant. Much of the area lies along the Niagara-Mohawk utility easement and the easement for the Buffalo River Improvement Corporation's transmission main from the pumping station to the elevated storage tank east of the site. This improvement should include some minor grading to eliminate access roads now crossing the area and fill which has been placed just to the north of the pond in the northwest quadrant.

Fens tend to develop into shrub-carrs if protected from external disturbance due to increases in the size of their component dogwood and willow shrubs and by the invasion of other woody plants. In natural states, this invasion is usually controlled primarily by the size of local rabbit populations, but at Tifft, it is recommended that the area be periodically mowed.

Establishment of old field-savanna habitats in the low density use area. Much of the northwestern quadrant of the site should be managed as old fieldsavanna habitat. Removal of excess shrub-carr in the penninsula to the northwest of the lake inlet pond will convert the interior to grassland which should be maintained as an old field pioneer brush-Immediately north of this penninsula, across the existing access road from the Fuhrmann Boulevard service road and adjacent to the pumping station is an open grassland with several large cottonwood trees which approaches a mature savanna condition. This area should be left intact. The area immediately east and south of the new pond, and the area east and adjacent to the old canal east of the mounds, should also be maintained as a mixture of old field pioneer brushland and lowland wet forest.

## Lowland Wet Forest Habitat

The primary lowland wet forest habitats at the Tifft Farm are the poplar sprout forest at the southwest edge of the cattail marsh and the more mature willow

forest along the old Tifft Street right-of-way at the south end of the marsh. Improvements to these habitats are recommended as follows:

- 1. Control of the sprout forest invasion of the cattail marsh. The eastern edge of the sprout forest
  is slowly encroaching upon the cattail marsh.
  Maintenance of this edge will be secured by the
  provision of additional open water areas in the
  marsh adjacent to this forest community.
- 2. Provision of wildlife clearings in the lowland sprout forest habitat. The density of the sprout forest has decreased its capacity to serve as a wildlife habitat. It is recommended that several small clearings (about 1 acre each in size) be provided as shown on the plan. Brush should be left on the ground to provide additional cover.
- 3. Removal of trash and other litter in the pools in the mature willow forest. Considerable trash and litter is strewn about the willow glade south of the old Tifft Street right-of-way. While not directly decreasing the habitat value of this area, the litter is unsightly and the area should be given a major clean-up to remove the larger debris. Piles of rubble of old building materials can be left as these provide dens for fox and mink in the area.

## Upland Mesic Forest Habitat

The mounds resulting from the transfer operation will provide the opportunity to establish an upland mesic forest habitat on the site. Both tree and ground-layer species (see typical species list in Section I of the report) should be planted. The mounds will also provide the opportunity to introduce conifer species which would add to the variety of the species found at the site. Because of the high rabbit population, it may be necessary to protect young saplings from browsing rabbits by encircling the trunks with wire-mesh screen.

#### Buffer Zones

Generally, the perimeter of the Nature Preserve should be strengthened by planting shrub-carr species and multiflora rose shrub barriers. Along Fuhrmann Boulevard on the northwestern edge of the site, an earthen berm should be planted with shrub and tree species that will be resistant to auto exhause pollution and salt spray from winter ice control. are some primary equipment items recommended. These include a pick-up truck with four wheel drive, a small tractor with a power drive and attachments for snow plow, gang mowers and a disc harrow, two canoes and an outboard motor boat and motor. Additional "above normal" equipment includes biological laboratory facilities, veterinary medicine equipment, automatic weather monitoring equipment, automated analytical instruments for physical and chemical water quality analysis, audiovisual units and emergency wireless telephone communication units to link the center with each of the Preserve's lecture areas.

## Annual Budget

The annual operating budget for the Tifft Farm Nature Preserve, when fully operational, should amount to approximately \$270,000, based on current dollars. This does not include debt service payments or capital construction outlays, or any reserve or sinking fund for the replacement of facilities or equipment over time. Initial costs for major equipment and vehicles would be approximately \$35,000 to \$40,000.

The following proposed budget indicates a program of gradual staff development. Salaries indicated can be considered conservative, and do not include salary increases. Phase I staffing is considered a minimum requirement.

A considerable portion of this annual operating budget expense could be recaptured by the following.

#### 1. User Fees

There is a strong possibility that the Preserve would attract close to 100,000 visitors annually if agressively promoted and creatively programmed. Revenues from such use, based on the same fee structure applied at the Buffalo Zoo, would yield approximately \$55,000.

## 2. Contribution and Subscriptions

A variety of environmentally-oriented groups and individuals reside in the Niagara Frontier and the feasibility of establishing a Tifft Farm Nature Preserve Association should be explored as a means of acquiring revenues from subscriptions and contributions. It is difficult to estimate the revenues

# ANNUAL OPERATING PROGRAM BUDGET TIFFT FARM NATURE PRESERVE

	Phase I	Phase II	Phase III
Salaries	15 000		15 000
Exec. Director Adm. Asst.	15,000 _	15,000 -	15,000 9,000
Exec. Secretary	7,500	7,500	7,500
Director of Maint.	8,000	8,000	8,000
Director of			
Env. Education	-	13,500	13,500
Chief of Maint.	-		10,000
Chief of Hab. Imp.	-	_	10,000
Chief R&D		_	11,500
Chief Env. Ed.	12,000	12,000	12,000
Laborer	-		7,500
Laborer	<del>-</del>	7,500	7,500
Botanist	-		8,500
Zoologist	8,000	8,500 8,000	8,500 8,000
Res. Asst.	<b>6,</b> 000	0,000 -	8,000
Devel. Asst. Supv. of Exhibits	_	_	9,000
Tour Supv.	10,000	10,000	10,000
Secretary	-	-	6,000
Secretary	_	. <b>-</b>	6,000
Total Perm. Sal.	60,500	90,000	175,500
Fringes (x .12)	7,260	10,800	21,060
Part-Time Tour Guides	8,400	16,800	33,600
			r (10 @ 3/hr
·	x 560hr)	x 11200h	
Utilities	1,500	1,500	1,500
Supp. Equip. Ins.	5,000	10,000	20,000
Travel	400	800	2,300
Contract Serv.	3,000	7,500	15,000
Veh. Maint.	500	1,000	1,000
TOTAL BUDGET	86,560	138,400	269,960

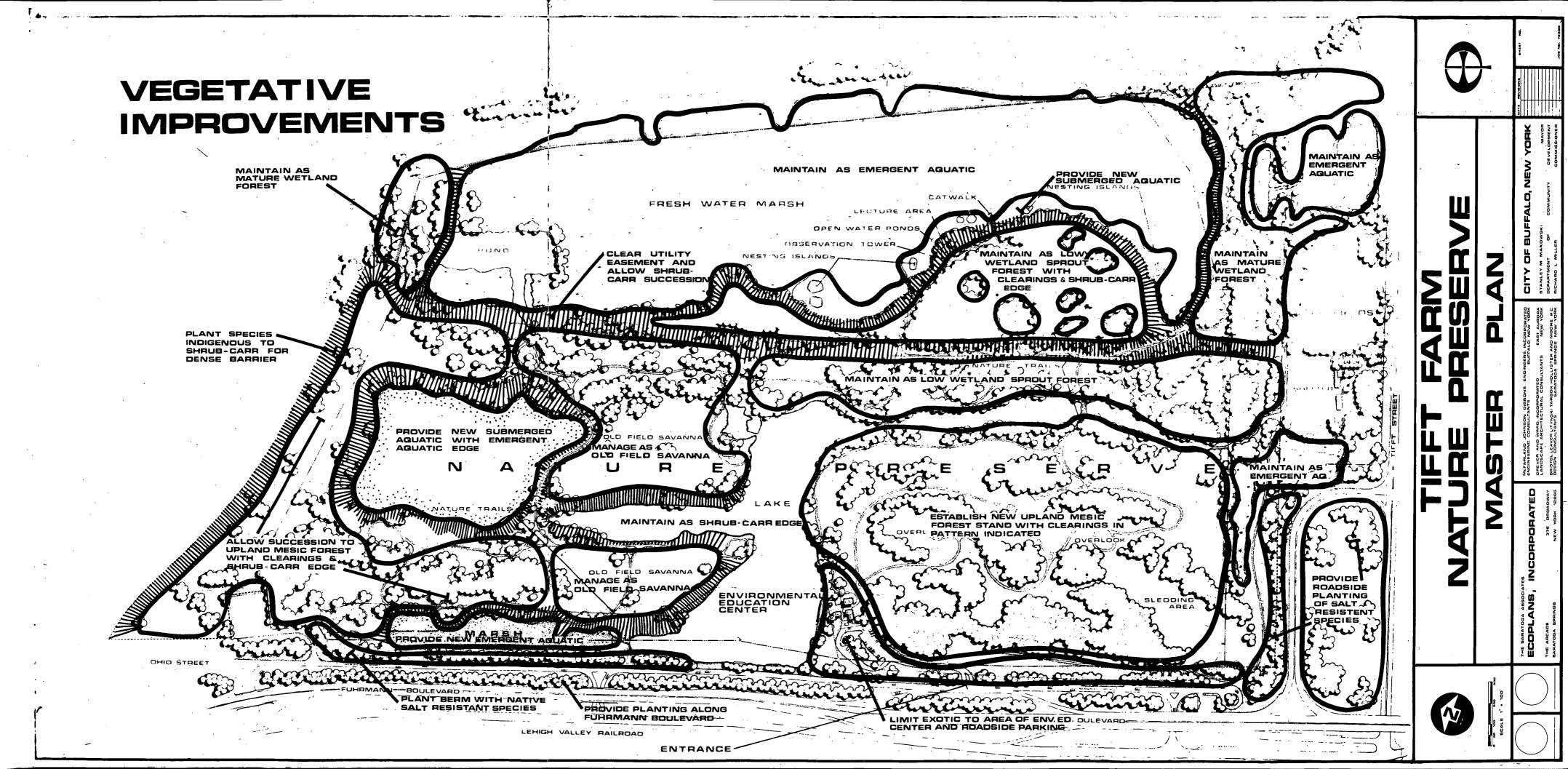
from such a source in as much as subscribers or members are often provided with free admission to the facility and some form of newsletter and special program events are generally needed to maintain interest. A reasonable estimate might suggest a net additional revenue of \$20,000 to \$50,000 could be acquired by this method.

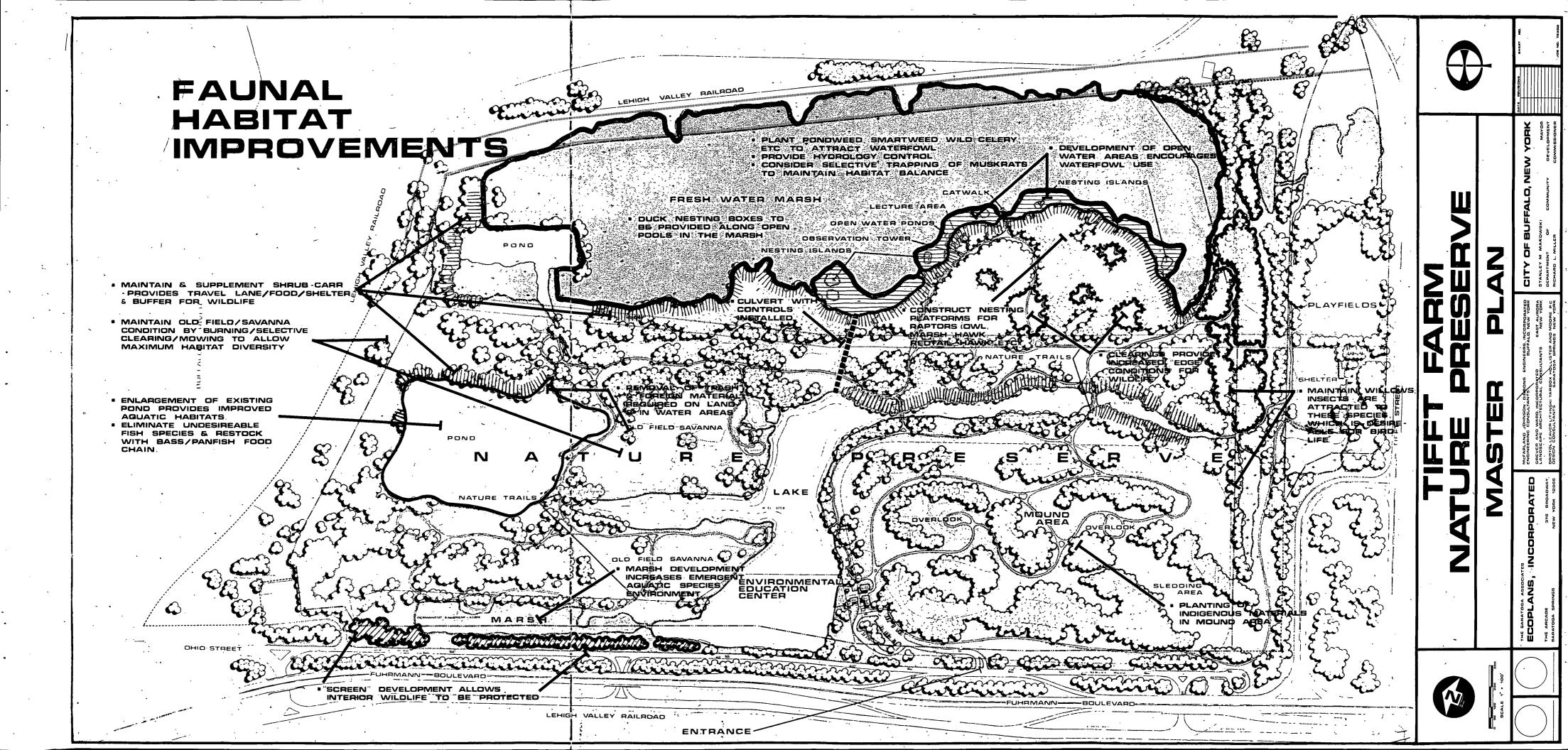
#### 3. Intergovernmental Transfers

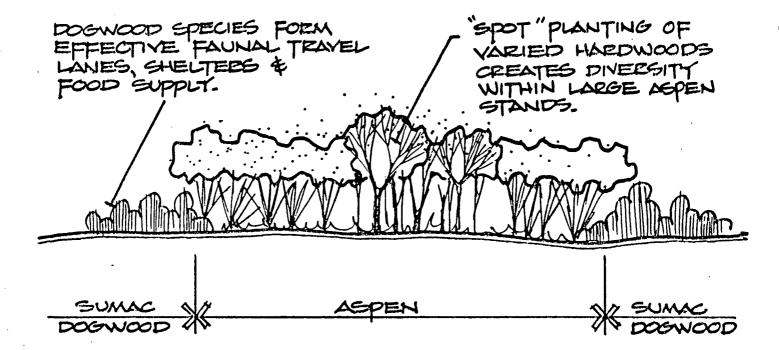
Appropriations in the form of non-categorical program grants or grants for specific programs from the federal, state and county governments also should not be overlooked. The indeterminancy of these programs is a major factor for consideration however, and these should not be relied upon for steady support, but as supplemental funds. If the Preserve is a success as a unique urban resource and research situation, an average of \$10,000 to \$20,000 per year might be a reasonable guess of this "outside" support.

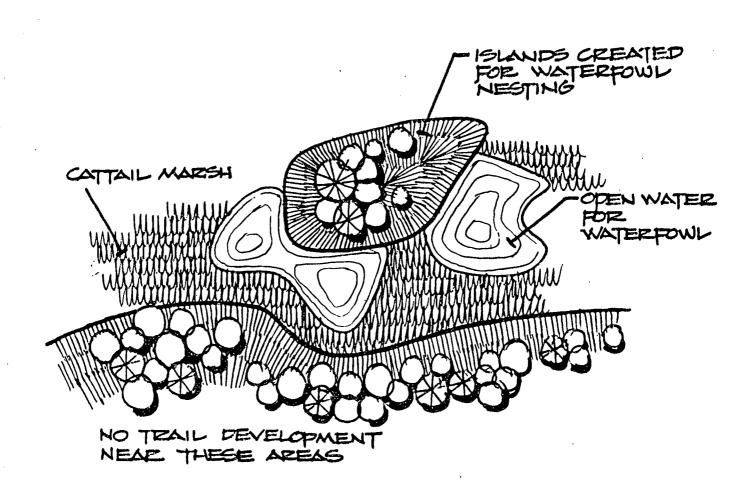
Further reduction of direct costs to the City can be achieved by considering the following:

- 1. If the City contracts with an existing organization for management and operation of the Preserve, certain administrative costs (accounting, bookkeeping and fringe benefits) might be absorbed by utilizing the existing administrative services of such an agency.
- 2. The City could make available vehicle repair and maintenance services, and loan equipment to the Preserve on occasion.
- 3. City, county, or state personnel could also be loaned on occasion, and summer employees under federal and state work programs could be used by the Preserve.
- Voluntary services could be provided or donated by interested conservation organizations and neighborhood groups.









#### ENVIRONMENTAL EDUCATION PROGRAM

## Locational Concepts and Environmental Education Resources

The Tifft Farm Nature Preserve, as an urban facility, has an inherent mission to improve the character of urban man -- and the primary contribution the Tifft Farm can offer is an educational experience. The underlying purpose of the "preserve" is not the mere protection of wildlife, but the protection of wildlife so that man can learn the intricate processes that nature has developed to sustain life -- including human life -- on the planet.

The Tifft Farm transmits a powerful message to urban man, an optimistic message which speaks of the capacity for survival and recovery in the face of intensely degrading influences. If nature, largely unaided, can restore viable purpose and function to such an abused and abandoned area, then perhaps the rest of the deteriorated urban fabric can be restored.

The environmental education program for the Tifft Farm therefore should emphasize the <u>meaning</u> of natural ecology as it affects the life of the urban man. This does not mean that the program should not include aspects of non-urban ecology, or that fundamental ecological principles always must be presented in a way that relates them to human involvement.

More detailed consideration of the locational aspects of the Tifft Farm site also suggest program orientations. These aspects include the site's proximity and connection to Lake Erie, its proximity to major highway and rail facilities, its proximity to heavy industrial centers, and its proximity to the less affluent residential areas of the inner city. In terms of the program, these locational aspects suggest programs dealing with the formation of the Great Lakes and the aquatic ecology of Lake Erie, the relationship of plants to highway noise and dust abatement, the plant ecology of railroad yards, the impact of industrial air and water pollution on natural areas, the ecology of the Norway Rat, the environmental education of central city residents and the human social values of urban open space.

Within the Tifft Farm site proper, there are a number of major and minor ecological units that will provide the basic setting for the environmental education program. These are:

Submerged Aquatic Environments
Emergent Aquatic Environments
Shrub-carrs
Grasslands, including Fens and Old Field Savannahs
Wet Lowland Sprout Forests
Wet Lowland Mature Forests
Upland Mesic Forests
Weed Communities on Old Railroad Cinder Beds

These units cannot be defined by rigid lines but are separated by transition zones or "ecotones" which, in many cases, provide the most interesting areas for environmental study. A variety of programs and facilities will be necessary to provide for the diversity indicated above.

## Client Groups

In terms of the "users" of the environmental education program, there are three basic factors to be considered -- the client objective in using the site, the age and general educational level, and the physical-mental condition.

Generally, there will be three types of users of the program:

- o Organized, supervised environmental education classes or groups from public, private and parochial schools and colleges and conservation-oriented associations.
- o General public, casual visitors to the site who may be attracted to the program, and other associations interested in, but not directly related to conservation activities.
- o Individuals or groups engaged in environmental education and/or scientific research who wish to utilize the site resources for short or long-term projects.

Within the first group, "user" objectives are generally focused on the extension of environmental education levels and the use of the site for field demonstration and/or observation of previous knowledge gained from books or classrooms. Usually, such a group is accompanied by a teacher or competent director who has either advanced knowledge of the site itself, or is familiar with the general experiences the site will offer.

Depending on the age of the group, educational levels will vary -- and the supervisors accompanying such groups will usually be better equipped to organize and direct the groups' activities after a general orientation session. Nature Preserve personnel may be needed for this general orientation, and later as "guides" or for occasional advice, but in these situations, they play a secondary, support role. This assumes, of course, that the visit to the Tifft Farm site is actually part of a larger curriculum of study or involvement in conservation-oriented group activities.

In as much as this general group of users are young people or others used to considerable outdoor activity, physical-mental condition is not a major area of concern.

The objectives of the second group are generally to gain an understanding of the rudimentary principles of ecology and environmental phenomena. There may be a considerable variation in the age and background knowledge of such groups and a major problem is determining an appropriate level of detailed, scientific information which can be easily transmitted to, and assimilated by, this group.

Generally, this group of users would tend to have the greatest range of physical and mental health characteristics. Thus, the environmental education program should be flexible enough to meet the needs of the elderly, physically-handicapped, blind, and mentally-retarded, as well as the needs of families with children of all age levels.

The Nature Preserve Environmental Education Center should be adequately staffed and equipped to provide this group with definitive orientation sessions and guided tours related to their general physical and mental levels of ability.

Since these groups would tend to use the Preserve more during the late spring, summer and early fall months, and more generally on the weekends and during evening hours, the staffing requirements could generally be provided by part-time personnel.

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The objectives of the third major group of client-users are similar to the first, but are generally more detailed and more narrowly focused on the advancement of environmental knowledge and ecological study of specific phenomena. These would include college graduate students or advanced high school students working on specific, programmed research projects, or teams from environmentally-oriented organizations developing and maintaining detailed studies and records of the Nature Preserve's environmental resources.

Generally, this group of client-users would tend to be mature adults or young adults with a sophisiticated understanding of ecology. As a whole, this group would not present any serious physical or mental health conditions, and would not require supervision, except for checking in and notifying the Nature Preserve staff of their activities.

## Environmental Education Program Policies and Objectives

To meet the environmental education objectives of the groups identified previously, we recommend the following program policies and objectives:

- O A Tifft Farm Nature Preserve Environmental Education Committee should be established to administer, monitor and control the use of the site for environmental education purposes.
- o The Master Plan for the Tifft Farm Nature Preserve should include an Environmental Education Center operated as a year-round facility.
- o The Master Plan for the Tifft Farm Nature Preserve should include a system of trail facilities, observation points and lecture areas designed to provide controlled access to each of the major ecological units found within the preserve.
- The Management Program for the Tifft Farm Nature Preserve should include permanent trained personnel for environmental education orientation and instruction. This core staff should be supplemented by part-time personnel for weekend and seasonal peak use periods. Part-time personnel should be drawn from local colleges and universities, or area conservation organizations.

- o Priority use of the Preserve for environmental education should be given to organized and supervised environmental education classes from the Buffalo Public School System. These groups should be scheduled in advance.
- o In-service training and orientation seminars should be held twice a year in order to equip elementary, secondary and higher education teachers for the supervision and guidance of environmental education classes.
- o The Nature Preserve should be open to the general public only during early morning and late evening hours and week-ends, except during the periods when schools are not in session.
- o Individual or group research activities, especially those requiring long-term use of the site, should be permitted only on an application basis which would require the applicant to prepare a research prospectus for prior review and approval of the environmental education committee.
- o The Master Plan for the Tifft Farm Nature Preserve should be designed to accommodate the environmental education needs of all age groups and educational levels.
- o Facilities should be provided for the environmental education of special groups, such as the physically and mentally handicapped and senior citizens. Self-guidance systems for the blind, including Braille descriptions of the site, history, environmental exhibits and wildlife habitats should also be provided. The needs of non-ambulatory visitors should be considered in trail design. Wide-track wheel-chairs should be provided.
- o Special efforts should be made to provide environmental education programs for exceptional children,
  such as the hyper-kinetic, emotionally and educationally deprived, and mentally retarded. Such
  children often respond strongly to natural environmental experiences and such programs could have a
  powerful therapeutic as well as educational impact.

- o Overall user density of the site should be controlled to avoid adverse impacts. This should be achieved by limiting the availability of parking facilities and by the provision of proper supervision and site use schedules. The size of single groups should be limited to approximately 10 people.
- environmental education facilities, outside of the center itself, should be unobtrusive and blend with the natural features of the site. Trails, observation points and lecture facilities should be located away from areas of particularly sensitive ecology.
- o The core Environmental Education Program should consist of the following:

## I. Orientation

Objective: To provide the visitors with an overall historic and current perspective of the Tifft Farm Nature Preserve, prepare them to recognize and understand their field observation experiences and acquaint them with the basic rules and procedures for utilizing the preserve.

Content: The History of Tifft Farm

- o Original natural state as a river delta marsh.
- o Geomorphology of the parent soils and subsequent vegetation and wildlife structure.
- o Early settlement of the area.
- o Buffalo River Improvements and drainage of the delta marshes.
- o Channelization and industrial development.
- o Impact of harbor breakwalls.
- o Port and industrial abandonment.
- o Industrial and municipal land fills.
- o Inactive stage and natural regeneration.
- o Transfer operation.
- o Master Plan development and implementation.
- o Current management and cooperating agencies.

Composite Ecology of the Tifft Farm

- o Climate
- o Hydrology
- o Land Form and Soils
- o Vegetation
- o Fauna
- o Inter-relationships of the above

#### Urban Influences

- o Urban impacts from air, noise, solid waste, visual and water pollution.
- o Potential vegetation and wildlife.

#### Use of the Preserve

- o Facilities available.
- o First aid, emergency procedures.
- o Rules and regulations.

#### Location:

o Environmental Education Center, Auditorium and Display Areas.

#### Media:

 Audio-visual film strips, slides, dioramas, maps, guide booklets, narrative by personnel.

## II. Field Observation

Objective: To provide users of the site with direct environmental education experiences, and develop a more specific understanding of individual environmental resources and phenomena.

Content: The Ecology of Disturbed Areas

- The Mounds Technique of development, materials used, restoration of a natural system, importance of soil cover, grasses, control of soil erosion and leachate, selection of native upland mesic shrub and tree species, the mounds as existing and potential wildlife habitat. Overview of the entire preserve (note the transitional role of the mounds from indoor to outdoor orientation).
- Other disturbed areas Highway embankments, railyard cinder and weed communities, harbor dredging spoil areas. Impacts of trash on pollution and salt dispersion. Norway rat ecology related to illegal trash and grain spillage from railcars. Highway affinity of crow, kestrel. Use of plant materials for noise control, dust control and improvement of visual quality.

The Ecology of Fresh Water Lakes, Streams and Ponds

- o The Lake Inlet Ecology of the Great Lakes and Lake Erie in particular, industrial pollution problems, original commercial fishing value, species, invasion of the lamprey and subsequent control efforts, chemical and biological water quality testing procedures, trends in inlet water quality.
- o The New Pond How it was developed, grading to create and sustain aquatic biologic communities, stocking, amphibians and reptiles, aquatic insects, migratory waterfowl.
- o The Stream Original and current drainage basin, connection with South Park Lake, beaver, mink habitats, minnow species, amphibians and reptiles. Impact of adjacent land fill and slag dumping.

The Ecology of the Cattail Marsh

The marsh as a remnant of the original dominant ecological unit. Hydrology of the marsh, soils, emergent aquatic plant communities, muskrat ecology, marsh birds, waterfowl, amphibians.

The Ecology of the Shrub Carr

o The shrub carr as a transitional zone from emergent aquatic to wet lowland forests. Dominant shrub species, related wildlife -- cottontail rabbit, ruffed grouse, fox, spotted skunk.

The Ecology of the Sprout Forest

O Upland and lowland varieties and related wildlife, historic development of the aspen grove (lowland) on land fill area and upland sprout forest on former cinder communities on old wharf and dock sites.

The Ecology of the Grasslands

o Dominant grasses and trees and related wildlife, voles, pheasant, raccoon, sparrows, finches, grass snake.

## The Ecology of the Wet Lowland Forest

o Willow forest and related wildlife species, impact of moisture gradient of soils in controlling plant species.

#### Location:

o Trails, observation points, outdoor lecture areas related to the above.

#### Media:

 Guided tours, guide books, outdoor exhibits, concealed observation blinds, outdoor lectures.

## Facilities and Personnel

The Tifft Farm Nature Preserve contains a variety of ecological units as described in the Phase II Report. Each of these distinct ecological units should be served by a trail system with outdoor lecture facilities located at key points. The Cattail Marsh, because of its sensitive ecology, should be left undisturbed for the most part except for a limited section of trail catwalk on the north side of the aspen grove where a concealed blind and observation tower could be constructed. Submerged aquatic environments (the pond, inlet lake and stream) could also be served by small piers. The tops of the mounds should be developed as overall observation points, possibly equipped with coin operated view binoculars. Each of the high observation facilities (mounds and towers) should also have weatherproof panoramic display panels to orient the view and identify important features.

The trail system should be organized to avoid overuse of the site, yet provide a variety of routes. It should also control access and egress to the site from the environmental education center. At key points along each of the trails, outdoor exhibits could be constructed in vandal-proof display cases. Lecture areas might also include small outdoor shelters which could also serve as picnic locations and outdoor classrooms. Each lecture area should be equipped with a small storage shed for maintenance equipment.

The Environmental Education Center should include spaces for entry, information, orientation area, display/exhibit area, library and projection equipment room, classroom and laboratory, administrative spaces, toilet facilities, maintenance equipment and vehicle storage, and caretakers residence.

In terms of personnel, the Environmental Education Center should have a full-time staff Director and secretarial assistant. For peak use periods, about five part-time personnel will be required.

#### MANAGEMENT PLAN AND PROGRAM

The Tifft Farm Nature Preserve Master Plan sets forth a plan of action designed to establish the Preserve as a proper setting for the protection of unique wildlife resources and the environmental education of the public. In addition to providing the capital resources for the achievement of these primary goals, the City must also consider the annual management and operational requirements of the Preserve.

The Master Plan is based upon earlier considerations of alternative goals and objectives for the use and maintenance of the Preserve, ranging from a "no use" policy under which the Preserve would have been left as an undisturbed area to evolve as nature dictated, to a broad "multiple-use" policy under which the Preserve would undergo considerable development intervention to create a new park facility including a variety of recreational facilities and services.

The basic policy goal adopted by the Tifft Farm Advisory Committee falls between these two extreme policies. Under the adopted policy, the Preserve's natural ecosystems will be sustained, but managed. In some instances, the natural evolution of parts of the site will be accelerated. In other cases, interventions will retard natural trends. In terms of user orientation, the adopted policy emphasizes the use of the site for environmental education and passive recreational activity but limits the extent of this use in terms of access to various parts of the site and the overall density of users permitted on the site.

## Management Program Policies and Objectives

The objectives of this management program are derived from and supportive of the above policy. They are:

1. The Tifft Farm Nature Preserve Management Program should be conducted on a full year basis, both to insure against the misuse of this highly visible and accessible facility and provide a complete program of environmental education and ecological research during all seasons of the year.

- 2. The Tifft Farm Nature Preserve Management Program should include the physical facilities and equipment required to conduct on-going monitoring of the status of the Preserve's environmental condition in order to guide the maintenance of the Preserve and improve the educational value of the Preserve.
- 3. The Tifft Farm Nature Preserve Management Program should include the physical facilities and equipment required to conduct an environmental education program with a variety of levels of sophistication ranging from scientific field studies to self-guided nature tours.
- 4. The Tifft Farm Nature Preserve Management Program should be administered by a competent professional staff including persons with administrative management, wildlife management and education program management backgrounds and abilities. The staff should be responsible to a Board of Directors composed of public officials and interested private individuals.
- 5. The Tifft Farm Nature Preserve Management Program should include an integrated annual capital improvement programming budget development process.
- 6. The Tifft Farm Nature Preserve Management Program should be financed from user charges to institutions, subscriptions and donations, federal and state grant funds, county appropriations and city appropriations.

#### Program Activities

The Program Activities to be conducted or provided at the Tifft Farm Nature Preserve provide the basis for the definition of management requirements in terms of organizational structure, personnel, facilities and equipment, and financial requirements. These program activities are recommended as follows:

## 1. Overall Policy Development and Evaluation

Overall policy development and evaluation is a key program activity. This function is recommended as a responsibility of a Board of Directors of the Nature Preserve, as specified in the following sections on organizational structure and personnel. The Board should meet on a bi-monthly basis at the minimum to provide for the continuing development of management policy for the Preserve, and evaluate the progress of the staff in implementing policies adopted by the Board.

#### 2. Preserve Administration

Preserve administration is the program activity involving the basic scheduling and implementation of management policies adopted by the Board of Directors. This includes:

- o Recruitment, training and supervision of personnel.
- o Preparation on an annual basis of a six year capital improvements program.
- o Preparation and administration of the annual operating budget.
- o Purchase of supplies and equipment.
- o Provision of secretarial services.
- Liaison and coordination with city, county, state and federal officials.
- o Promotion of the Preserve.
- o Provision of first aid services.

## 3. Maintenance of Facilities and Equipment

Annual maintenance of facilities and equipment in the Preserve includes the following specific tasks:

- o Repair and upkeep of buildings, trails, lecture centers.
- o Repair and upkeep of vehicles.
- o Construction, installation and maintenance of exhibits.
- o Control of supply storage areas.
- o Prevention of illegal access and use of the Preserve.
- o Control of traffic during peak use periods.
- o Maintenance of formal grounds areas and trash removal.
- o Fire control.

4. Improvement and Maintenance of Preserve Environmental Resources

This program activity is directed at the monitoring, development and improvement of the vegetative and faunal resources of the Preserve. It includes:

- o Preparation and conduct of an ongoing overall program of ecological quality maintenance.
- o Installation and operation of environmental monitoring devices.
- o Control of undesirable vegetative and faunal species.
- o Planning and construction of habitat improvements.
- o Provision of immediate veterinary services and emergency wildlife food supplies.
- o Identification of field observation opportunities.
- o Stocking of wildlife resources.
- o Preparation and supervision of planting programs.
- 5. Environmental Education Program Development

This program activity provides the most important area of preserve staff interaction with the general public. It includes:

- o Preparation and conduct of an ongoing overall program of environmental education.
- o Design and supervision of construction of exhibits.
- Organization, scheduling and control of environmental group visits.
- o Provision of guided tours.
- o Preparation of lectures and course materials.
- o Recruitment, training and supervision of part-time environmental education staff.

#### 6. Research and Development

Continuing improvement of the Nature Preserve requires a continuing assessment and evaluation of the Preserve's ecological quality and the development of scientific information as a basis for updating and formulation of management policy. This program activity includes the following:

- o Analysis and evaluation of data from monitoring devices and programs.
- o Development of specific ecological research project priorities.

- o Coordination and liaison with public and private environmental agencies, high schools, colleges and universities wishing to use the site for ecological research.
- o Development of federal and state grant applications for ecological research and development.
- o Provision of advice and assistance to other program personnel.
- o Supervision of field research by others.

## Organization and Personnel

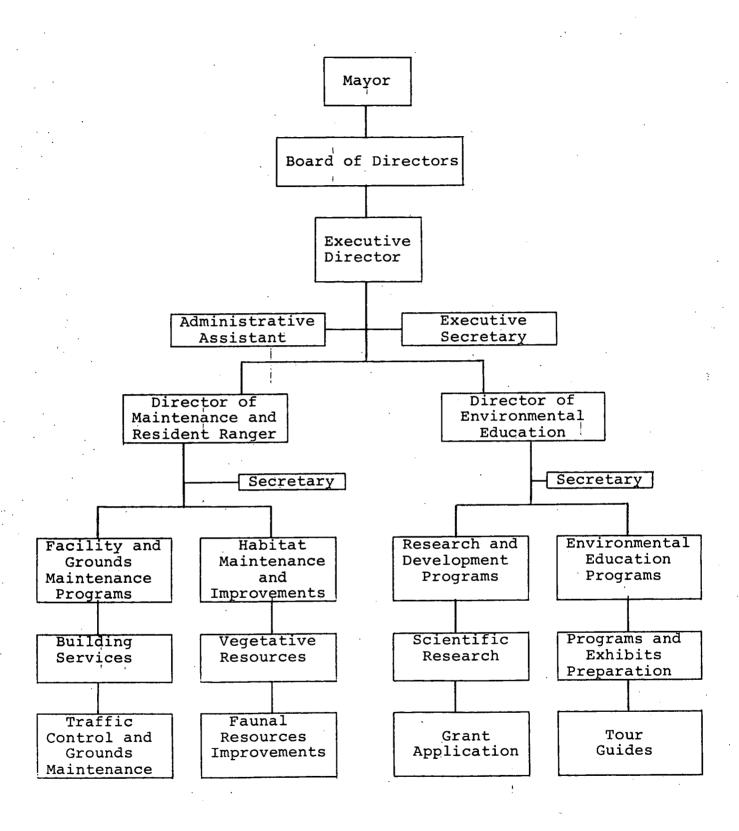
To provide for the creative and efficient implementation of the previously described program activities, the Tifft Farm Nature Preserve will need a skilled professional staff and organization. The Tifft Farm Nature Preserve will be owned by the City of Buffalo. Current city policy with respect to such unique facilities (such as the Buffalo Zoo) is that the City will construct and maintain the actual physical facilities, but management and operation is commonly contracted for with an outside agency or institution that has the specialized skills required for management and operation.

Utilizing such a policy for the Tifft Farm Nature Preserve would require action by the Mayor and Common Council to formulate and execute a management contract. The City's Division of Management Services should be involved in the detailed preparation of such a contract. It is recommended that the management staff for the Preserve be non-civil service employees in order to meet the requirements for special skills and background orientation of Preserve employees. This policy is especially important in the early years, since flexibility in the management plan is desirable until the exact nature of the utilization of the Preserve can be determined.

The chart on the following page indicates a recommended organizational structure and required personnel for the conduct of the Tifft Farm Nature Preserve Management Program. Additional personnel considerations are as follows:

#### Board of Directors

The Tifft Farm Nature Preserve Board of Directors should consist of between 6 to 10 individuals selected from various public and private agencies with environmental interests similar to those who are currently serving on the Tifft Farm Technical Advisory



TIFFT FARM NATURE PRESERVE
MANAGEMENT ORGANIZATION

Committee. The members should be appointed to staggered four-year terms by the Mayor of the City of Buffalo. In the event that the Erie County government participates in the funding of the Preserve's annual budget, or an institution such as the Buffalo Museum of Science becomes the agency responsible for the maintenance and operation of the Preserve on a contractual basis, these agencies should have ex-officio representation on the Board. Residents of the surrounding communities should also be appointed. The Executive Director of the Tifft Farm Nature Preserve should also be an ex-The Board should have officio member of the Board. the authority to select its own chairman and would have the responsibilities previously described under Program Activities. The Board should also be responsible for the selection of the Executive Director.

## 2. Executive Director

The Executive Director of the Preserve should be a person of proven administrative ability in the field of nature preserve management. The Executive Director should be a graduate of a college or university and have a degree in environmental sciences or biology and a minor in business or public administration or vice-versa. Teaching experience would also be a desirable, but not mandated, criteria. The Executive Director would be responsible for the program activities specified in the previous section under Preserve Administration. The Executive Director eventually should have sufficient support staff in terms of secretarial and accounting personnel.

## 3. Director of Maintenance and Resident Ranger

The Director of Maintenance and Resident Ranger would be the chief caretaker of the Preserve. This person would be responsible for the conduct of all maintenance and habitat improvement program activities as specified in the previous section. Graduation from a recognized college or university with a degree in forestry, botony or wildlife management or landscape architecture, is a desired criteria along with several years of managerial experience in nature preserve maintenance. The Director of Maintenance and Resident Ranger would be required to reside at the site and the conduct of his responsibilities would require staff support as indicated below.

## 4. Chief of Buildings and Grounds Maintenance

The Chief of Buildings and Grounds Maintenance would be one of two key persons reporting to the Director of Maintenance and Resident Ranger. This position would require the capacity to identify maintenance requirements, program repairs and upkeep, and to program the actual work conducted by contractors or city force account labor or staff personnel. The position would require high school graduation or an Associate Degree in Construction Technology and Building Maintenance and experience in building and grounds maintenance.

## 5. Chief of Habitat Improvement Programs

The Chief of Habitat Improvement Programs would also report to the Director of Maintenance and Resident Ranger. This position would include the responsibility for the identification of needed improvements in vegetative conditions and wildlife habitats, programming and specifying the work required to complete these activities and supervising the actual improvements. This position would require expertise in wildlife management but not necessarily require a college degree in as much as the Preserve staff would provide considerable assistance in developing habitat improvement programs.

## 6. Director of Environmental Education Programs

The Director of Environmental Education Programs would be the second key staff assistant of the Preserve's Executive Director. This position would require considerable environmental and educational experience and training as well as a personality with the ability to promote the Preserve's use and gain public understanding and acceptance. The Director of Environmental Education Programs would be responsible for definitive scientific research and development programs as well as general environmental education activities.

#### 7. Chief of Research and Development

The Chief of Research and Development would report to the Director of Environmental Education Programs although the activities of this program have an obvious application to all other program areas. The position would require a person with at least a master's degree in the environmental sciences as

well as several years of experience in environmental research management. Many ongoing programs in this general area are funded by the federal and state governments, so the Chief of Research and Development would require a staff assistant (or personally conduct the work) to achieve the necessary liaisons in Albany and Washington to acquire such funds.

## 8. Chief of Environmental Education Programs

The Chief of Environmental Education Programs would also report to the Director of Environmental Education Programs. This person would also need to have expertise and talent in public presentations, as well as the ability to supervise a large part-time staff of tour guides during the peak periods of use. The position requires a college or university degree in education with an emphasis on the natural sciences. Artistic abilities would also be needed to guide the preparation of exhibits and displays. A close working relationship with public school officials would also be desirable.

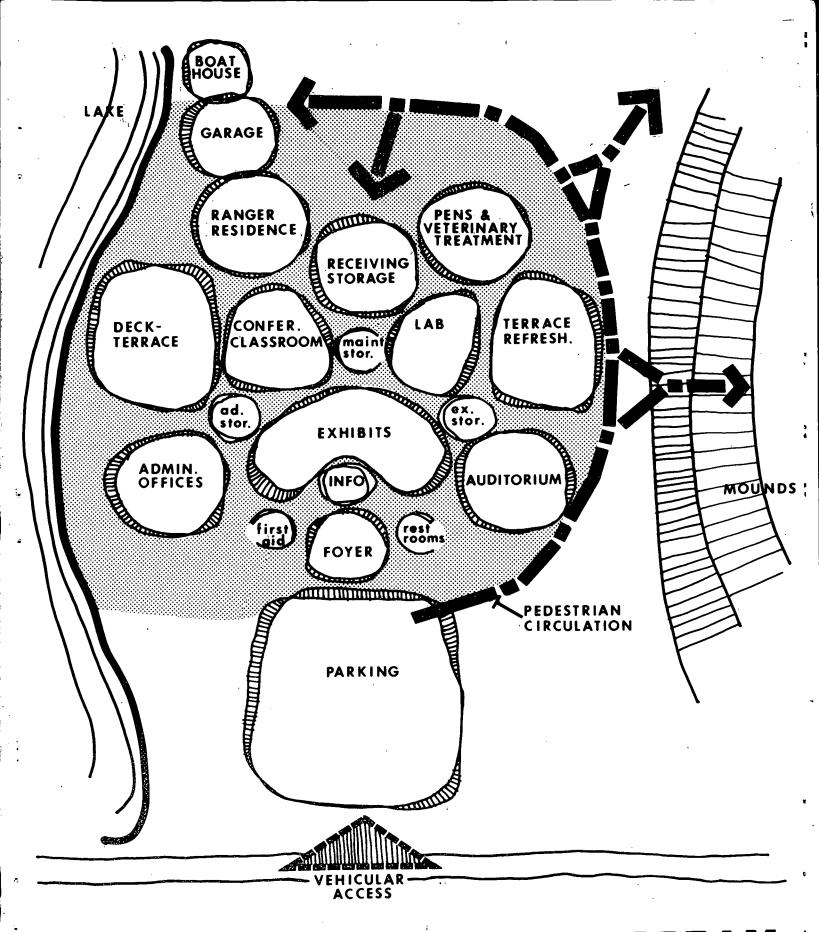
#### 9. Part-Time Staff

During summer periods of peak use of the Preserve, user demand is very likely to extend over a 16-hour period from early morning to late evening. The permanent staff of the Preserve will need to be expanded by part-time staff -- college students majoring in environmental or natural sciences would be good candidates. With a maximum of five tour groups on the trails within any given hour, as many as 10 part-time assistants might be required.

## Facilities and Equipment

The provision of the previously described program activities and personnel obviously generate a need for basic facilities, equipment and supplies. The trail system and lecture center/observation tower programs defined in the master plan anticipate the provision of an orderly user structure. These will be detailed further in later phases of the work.

The principle facility -- the Environmental Education Center -- is indicated as a schematic program on the following page. In addition to this facility, the Ranger's residence, the trails, lecture centers and observation towers, there



SCHEMATIC FACILITY PROGRAM

TIFFT FARM

ENVIRONMENTAL EDUCATION CENTER