CITY OF NASHUA, NEW HAMPSHIRE

MASTER PLAN UPDATE

PART 1: THE SOUTHWEST QUADRANT

Adopted by the Nashua City Planning Board

June 1996

PLANNING
DEPARTMENT
CITY OF NASHUA
NEW HAMPSHIRE

June 1996

NASHUA CITY PLANNING BOARD

CERTIFICATION STATEMENT

PERSUANT TO ADOPTION OF THE

CITY OF NASHUA MASTER PLAN UPDATE, PART 1: THE SOUTHWEST QUADRANT AND THE NASHUA URBAN TRAILS NETWORK AND THE NASHUA TRAILS PLAN

both parts of the update to the MASTER PLAN, CITY OF NASHUA, NH, December 1985

As required by RSA 675:6 III., a majority of the Nashua City Planning Board (NCPB) hereby certifies their adoption of the City of Nashua Master Plan Update, Part 1, The Southwest Quadrant, and The Nashua Urban Trails Network and The Nashua Trails Plan, both components of an update to the Master Plan, City of Nashua, NH, adopted December 1985. The Nashua Urban Trails Network and The Nashua Trails Plan was adopted by the NCPB on February 17, 1994; The Southwest Quadrant Master Plan Update was adopted by the NCPB on June 6, 1996. Both components were filed with the City Clerk on June 7, 1996. Both components were adopted by resolution of the Nashua Board of Aldermen, R-96-51, on September 11, 1996.

Jody Wilbert, Chair

Bette Lasky, Vice-Chair

Members:

Tony Hack

Lyn Heavy

Richard LaBrecque

R-96-50

CITY OF NASHUA

In the Year of Our Lord One Thousand Nine Hundred and Ninety-six.

RESOLUTION

RELATIVE TO THE APPROVAL OF AMENDMENTS TO THE 1985 MASTER PLAN ADOPTED BY THE NASHUA CITY PLANNING BOARD

WHEREAS, the Nashua City Planning Board adopted a Master Plan for the entire City which was enacted into law by Resolution in December 1985 pursuant to the City Charter; and

WHEREAS, the Nashua City Planning Board and City Administrative Staff have undertaken a complete review of that portion of the 1985 Master Plan pertaining to the goals and objectives and elements relating to the Southwest Quadrant of the City as defined therein; and

WHEREAS, pursuant to the Nashua Revised Ordinances and the statutes and laws of the State of New Hampshire, the Nashua City Planning Board held a public hearing on September 7. 1995, as required by law, notice of which was duly published in the Nashua Telegraph on August 27, 1995, for the Southwest Quadrant Master Plan Update (consisting of a Future Land Use Plan and a Technical Reference); and

WHEREAS, the Nashua City Planning Board, pursuant to Chapter 16 of the Nashua Revised Ordinances and New Hampshire Revised Statutes Annotated (RSA Chapter 674), duly adopted the Southwest Quadrant Master Plan Update; and

WHEREAS, pursuant to the City of Nashua Charter and Related Laws, the adopted Master Plan must be submitted to the Board of Aldermen for enactment into law by resolution;

NOW THEREFORE, be it resolved by the Board of Aldermen that the 1985 Master Plan be and hereby is amended, pursuant to the City Charter and Related Laws, by the adoption of The Southwest Quadrant Master Plan Update, August 1995, including the Technical Reference, and all related file materials; as amended and approved by the Nashua City Planning on June 6, 1996. Said amendments shall supersede the applicable sections of the 1985 Master Plan.

PASSED SEPTEMBER 11, 1996
CLAIRE MCGRATH, PRESIDENT
APPROVED SEPTEMBER 11, 1996
DONALD C. DAVIDSON, MAYOR

A TRUE COPY
ATTEST:

ELEANOR BENSON
CITY CLERK

R-96-51

CITY OF NASHUA

In the Year of Our Lord One Thousand Nine Hundred and Ninety-six.

RESOLUTION

RELATIVE TO THE APPROVAL OF AMENDMENTS TO THE 1985 MASTER PLAN ADOPTED BY THE NASHUA CITY PLANNING BOARD

WHEREAS, the Nashua City Planning Board adopted a Master Plan for the entire City which was enacted into law by Resolution in December 1985 pursuant to the City Charter; and

WHEREAS, the Nashua City Planning Board and City Administrative Staff have undertaken a complete review of that portion of the 1985 Master Plan pertaining to an Urban Trails Network and Nashua Trails Plan; and

WHEREAS, pursuant to the Nashua Revised Ordinances and the statutes and laws of the State of New Hampshire, the Nashua City Planning Board held a public hearing on January 20, 1994, as required by law, notice of which was duly published in the Nashua Telegraph on January 8, 1994, for the Nashua Urban Trails Network and the Nashua Trails Plan; and

WHEREAS, the Nashua City Planning Board, pursuant to Chapter 16 of the Nashua Revised Ordinances and New Hampshire Revised Statutes Annotated (RSA Chapter 674), at its meeting of February 17, 1994, duly adopted the Nashua Urban Trails Network and Nashua Trails Plan; and

WHEREAS, pursuant to the City of Nashua Charter and Related Laws, the adopted Master Plan must be submitted to the Board of Aldermen for enactment into law by resolution;

NOW THEREFORE, be it resolved by the Board of Aldermen that the 1985 Master Plan be and hereby is amended, pursuant to the City Charter and Related Laws, by the adoption of The Nashua Urban Trails Network and The Nashua Trails Plan, October 1993, as amended and approved by the City planning Board on February 17, 1994. Said amendments shall supersede the applicable sections of the 1985 Master Plan.

PASSED SEPTEMBER 11, 1996
CLAIRE MCGRATH, PRESIDENT
APPROVED SEPTEMBER 11, 1996
DONALD C. DAVIDSON, MAYOR

A TRUE COPY
ATTEST:

ELEANOR BENSON
CITY CLERK

ACKNOWLEDGEMENTS

This Southwest Quadrant element of the Nashua Master Plan Update was produced with the input, assistance, feedback and support of the following:

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Sgt. Peter Bouchard, Nashua Police Department
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Greg Lantos, Ray Guarino and Greg Gaines, Transportation Planners, NRPC
Former Mayor, Rob Wagner
Former School Superintendent, Dr. Berard Masse
Former Public Works Directors, Peter Benet and Lorraine Sander

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OUTLINE

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I. INTRODUCTION

A. Purpose of the Southwest Quadrant Component of the Nashua Master Plan Update

The last Master Plan for the City of Nashua was adopted in December of 1985, nearly at the height of a growth explosion that transformed the City in a few short years. The City grew rapidly in the mid-to-late 1980's. However, in the 1990's, this situation has changed considerably. The City is now growing at a much slower pace than in the 1980's. The City's fiscal situation has also changed. A comprehensive property revaluation significantly decreased the City's total assessed valuation, and in turn shifted the relative burden from commercial and industrial to residential land-uses. Today, the City faces additional budgetary constraints due to a spending cap in force since November 1993. However, even if the spending cap were repealed, significant fiscal constraints would remain. Because of these fiscal constraints, and a heightened awareness of the impacts that accompany growth, the City's Master Plan should be revised to reflect the realities and constraints of the 1990's.

This document is one part of the larger Nashua Master Plan Update, which will ultimately revise the findings and recommendations of the 1985 Master Plan for the entire City. Because the southwest quadrant contains the bulk of Nashua's large, undeveloped, subdividable parcels, the potential for change there is greater than in the other quadrants of the City. Therefore, the Planning Board believes that the Master Plan Update should address the southwest quadrant as its first priority.

The manner in which the subdividable parcels of the southwest develop could have wide ranging effects on the character and fiscal stability of the entire City. Clearly there are conflicts between the recommendations of the 1985 Master Plan, which, for example, recommends that parts of the southwest quadrant be rezoned for medium and high density residential uses, and the City's present ability to service the growth that those recommendations would encourage.

The overall goal of the southwest quadrant component of the Nashua Master Plan Update (MPU) is to **manage growth in the quadrant to achieve a balance between residential growth, economic development, public safety, conservation and capital infrastructure concerns in a way that will have the most favorable or least negative possible fiscal impact on the City.**

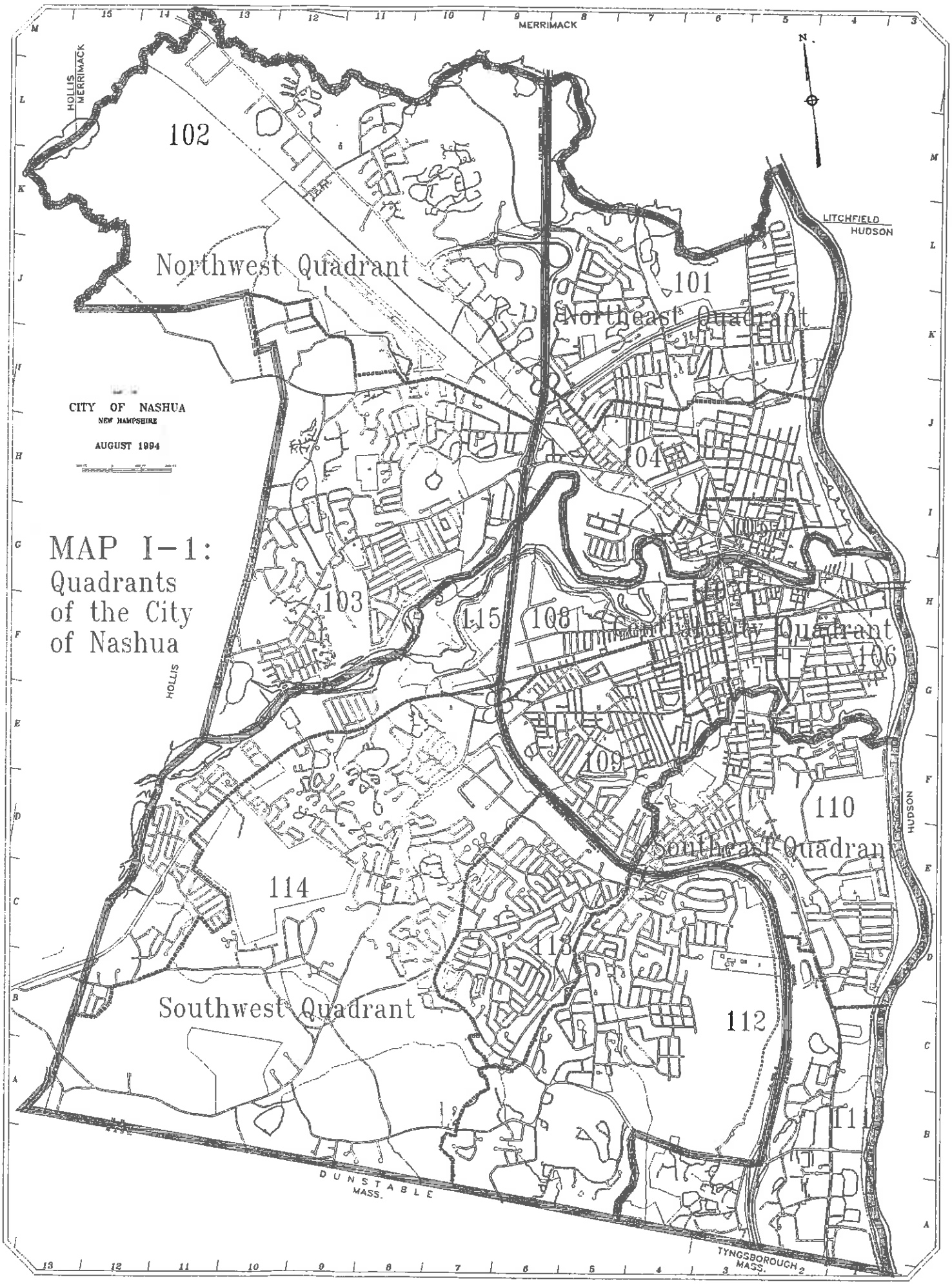
B. Description of the Southwest Quadrant and Definition of the Study Area

The 1985 Nashua Master Plan divided the City into four major quadrants and an inner city area with a central business district subarea. (Map I-1) The four major quadrants are the northwest, northeast, southwest and southeast quadrants. The Nashua River and the F.E.E. Turnpike (the turnpike) form the boundary between most of the quadrants. As thus defined, the southwest quadrant is the land area south of the Nashua River and west of the Turnpike. As such, with an area of 7,899 acres (Nashua's total is 20,534 acres) it is the largest quadrant in the city with 38.5 % of the city's area. Approximately half of that area consists of medium density residential subdivisions, condominium / planned residential developments and mobile home parks. Most of the area's residents reside in these suburban neighborhoods. Most of this suburban housing was developed in the late 1970's and in the 1980's. Before the mid-1970's, most of the southwest was rural and wooded.

There are several distinct parts of the southwest quadrant. The northern and eastern parts of the quadrant are suburban in nature, while the western and southern parts are rural. (Map I-2) The suburban parts are served by municipal sewer and Pennichuck water, while the rural parts must rely on private wells and septic systems. This plan will primarily focus on the most rural part of the southwest quadrant; its southwest corner. This area is bounded by the Town of Hollis on the west, the Town of Dunstable, Massachusetts, on the south, Gilson and Conant Roads to the north and Searles and Middle Dunstable Roads to the east-northeast. Most of this area is in the R-30 or R-40 residential zoning districts. This plan will address areas and issues of the wider southwest quadrant, however, when pertinent.

Organization of this Document:

Following this Introduction, Chapter II details the process and methodology used in arriving at a Future Land Use Plan. Part A of that chapter further defines the study area. Part B describes the existing infrastructure and City services. Part C briefly describes the build-out scenario and impact analyses, which played a major role in developing the Future Land Use Plan. Part D covers the workshop meetings and the public review process. Part E provides some of the details of the Future Land Use Plan, as derived from the existing infrastructure needs and the build-out and impact analyses. This section focuses in particular on the rationale for the numbers and recommendations of the Future Land Use Plan, whereas Chapter III sets them forth as policy recommendations. Chapter III, which is intended to serve as a stand alone document, summarizes the recommendations of the Future Land Use Plan, both as text and in two Future Land Use Plan maps. Chapter IV describes a possible Implementation Strategy for turning the recommendations of the Plan into reality on the landscape. There may appear to be some redundancy between parts of this document. For example, the present school infrastructure situation is discussed in Chapter II, B., analysis of the situation as it pertains to the Future Land Use Plan is discussed in Chapter II, E. 2, and recommendations for future school facilities are discussed in Chapter III, which again is intended to serve as a stand alone document. The sections thus support each other in a logical fashion, leading sequentially to the Future Land Use Plan recommendations.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NEW HAMPSHIRE
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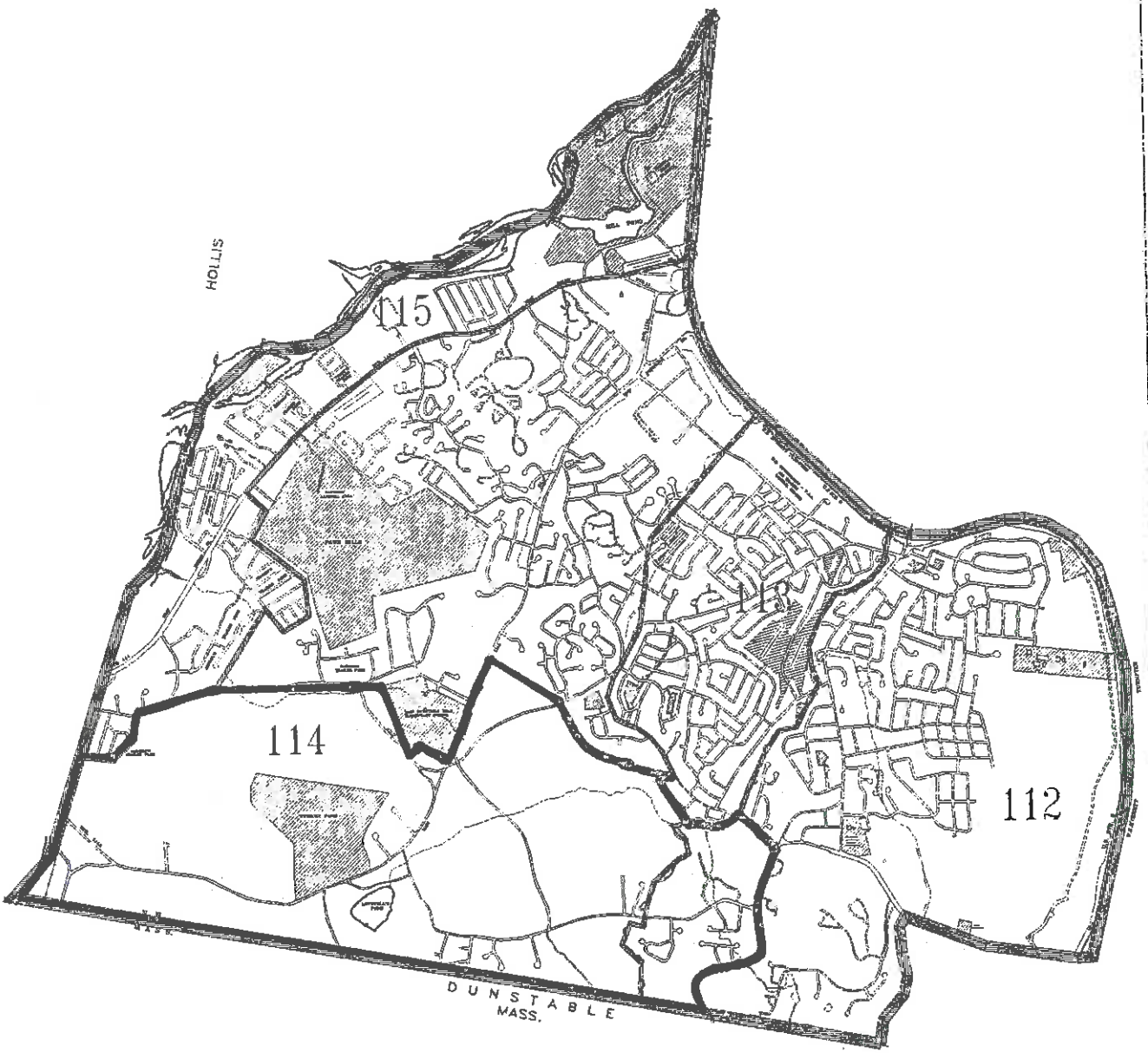
DUNSTABLE
MASS.
TYNGSBOROUGH
MASS.

MAP I - 2
Southwest Quadrant



MAP I-3:
ZONING MAP

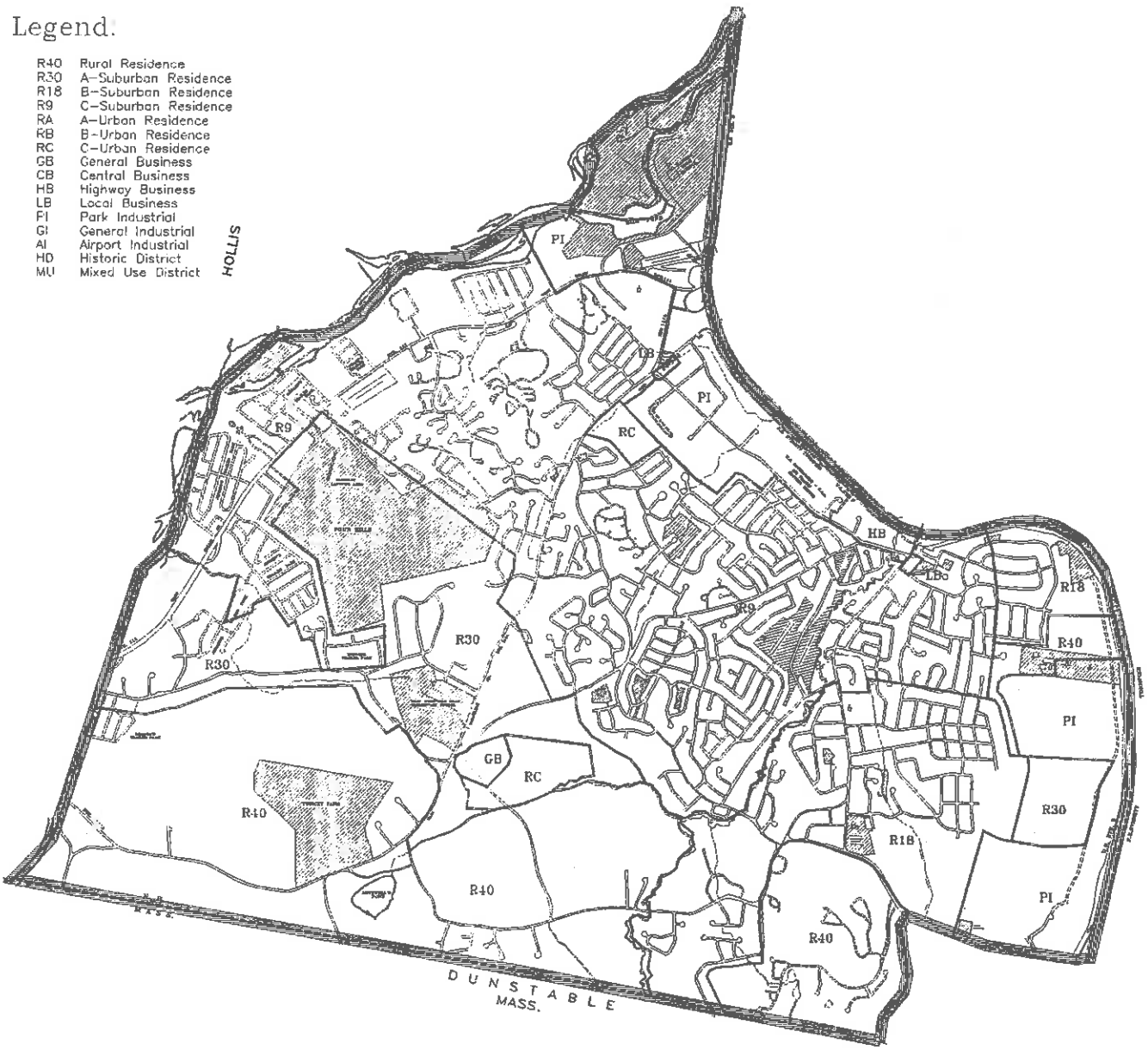


TABLE I - 1

POPULATION OF THE SOUTHWEST QUADRANT: 1970 - 1990					
POPULATION	1970	1980	%Change 70' - 80'	1990	% Change 80' - 90'
THE SOUTHWEST QUADRANT *	9,700	15,611	61 %	23,641	51.4 %
THE CITY OF NASHUA	55,820	67,865	21.6 %	79,662	17. 4 %
% S.W. QUAD OF TOTAL CITY POPULATION	17.7 %	23 %		29.7 %	

NOTES: The Southwest Quadrant * is defined as Census Tracts 112, 113, 114 and 115 for purposes of this table. The area of these census tracts closely approximates the total area of the Southwest Quadrant. The source of all information is the United States Census.

As seen above, during the last two decades the population of the southwest quadrant has grown at a much faster rate than the population of the entire city. The population of the southwest quadrant increased by 61% between 1970 and 1980 and by 51.4 % between 1980 and 1990. During the same periods, the population of the city increased by 21.6 % and 17.4 %, respectively. During this period, the percentage of the city's residents living in the southwest quadrant increased from nearly 18% to nearly 30%.

Map I - 4 on the next page shows the sequence of development in Nashua from 1980 to 1994. Many subdivisions in the southwest quadrant designated as "Residential Subdivisions, 1980 - 1985", were actually started in the 1970's, but were completed in the early 1980's. This delay in dating also applies to the other time periods. Subdivisions were placed in the time period during which they were nearing completion. Many larger subdivisions were constructed in phases, with some phases completed in the late 1970's, with more to follow in the early 1980's. In any event, the southwest quadrant has experienced an enormous amount of residential growth in the last two decades. As this Plan will show, much more change is possible by the time this quadrant becomes built-out, even if the rate of growth is slower than in the past.

C. Goals and Objectives of the City and the Southwest Quadrant Master Plan

As stated, the overall goal of the southwest quadrant component of the Nashua Master Plan Update (MPU) is to **manage growth in the quadrant in order to achieve a balance between residential growth, economic development, public safety, conservation and capital infrastructure concerns in a manner that will have the most favorable or least negative possible fiscal impact on the City.** This primary goal can be broken into several components, each with several objectives and actions to consider.

It is important that the goals and objectives for the southwest quadrant support and be compatible with the wider vision and goals for Nashua's future as articulated by the Mayor and the Board of Aldermen. Consequently, the following discussion of goals and objectives starts with a citywide Vision Statement and Goals as put forth by the Board of Aldermen:

CITY WIDE VISION STATEMENT:

By the year 2000, Nashua will be a municipal leader, a city of quality and opportunity that values its citizenry. Through our commitment to continuous improvement of services, we will be recognized as:

- The leader in education, culture, transportation, safety and recreation
- The city of choice for business
- The most effectively managed city
- The community that has planned for the 21st century
- The community with a quality of life second to none

OVERALL CITY GOAL AND MISSION STATEMENT:

The overall Goal of the City of Nashua is to provide an attractive and safe community for its residents, businesses and visitors, while encouraging balanced economic growth, improved transportation efficiency and environmental integrity.

The mission of the city government is to make Nashua a desirable place to live by

Providing:

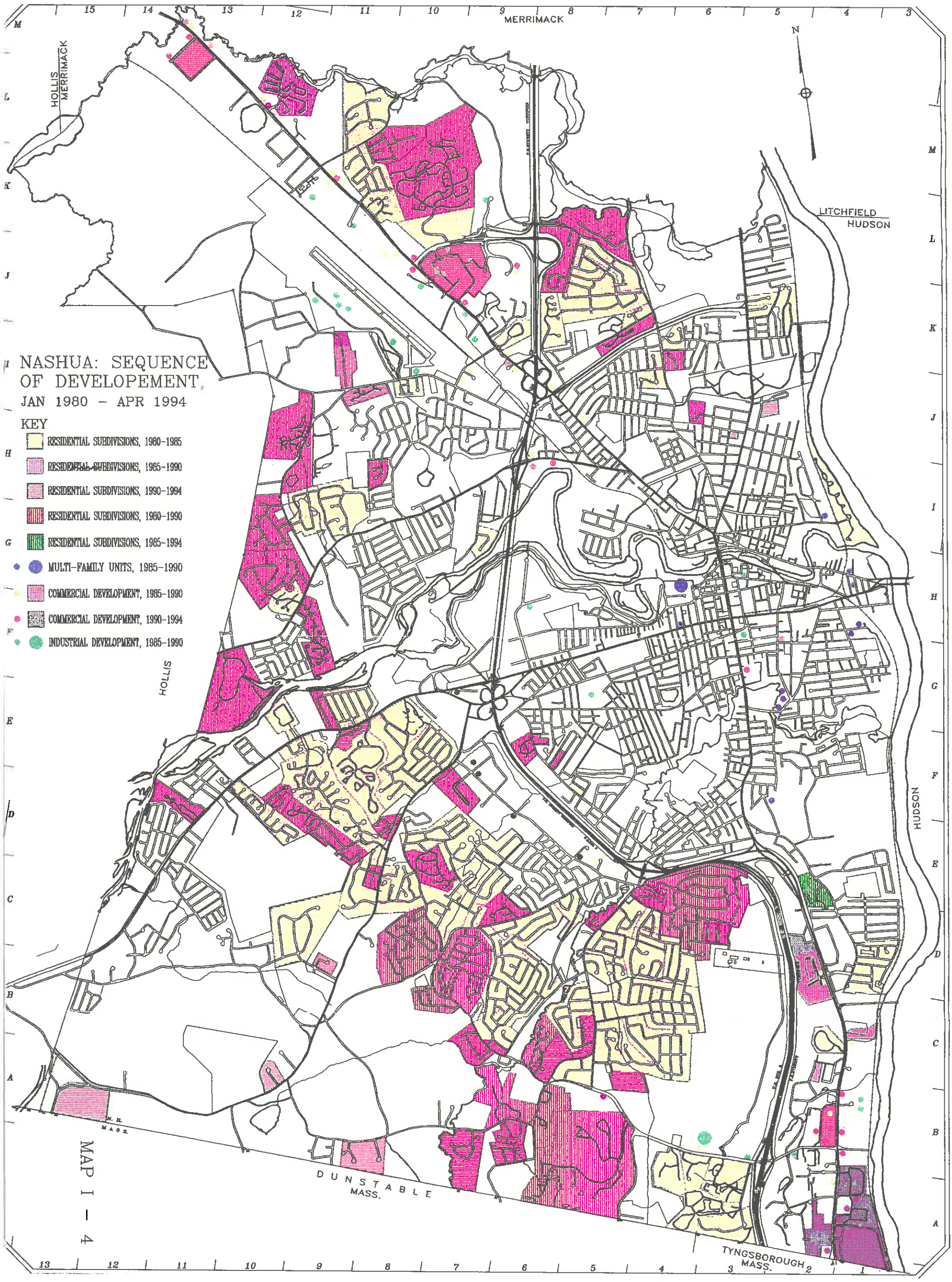
- An open government dedicated to service and fiscal responsibility
- Excellent educational, cultural, and recreational opportunities
- A clean and safe community with effective, functional transportation
- For a diversity of land-uses and densities
- Adequate and efficient public services and facilities

Promoting:

- A strong economic community
- Comprehensive long range planning and regional cooperation
- Management of all our resources for our future
- The public health, safety and welfare
- The lifelong educational requirements and needs of the community

Fostering:

- An informed and active citizenry
- Integrity in city government
- Fair and equitable treatment for all citizens
- An understanding of the interrelationships between land-use, fiscal and economic health and environmental integrity


NASHUA: SEQUENCE OF DEVELOPEMENT
JAN 1980 – APR 1994
KEY
RESIDENTIAL SUBDIVISIONS, 1980-1985
RESIDENTIAL SUBDIVISIONS, 1985-1990
RESIDENTIAL SUBDIVISIONS, 1990-1994
RESIDENTIAL SUBDIVISIONS, 1980-1990
RESIDENTIAL SUBDIVISIONS, 1985-1994
MULTI-FAMILY UNITS, 1985-1990
COMMERCIAL DEVELOPMENT, 1985-1990
COMMERCIAL DEVELOPMENT, 1990-1994
INDUSTRIAL DEVELOPMENT, 1985-1990
MERRIMACK
HOLLIS
MERRIMACK
LITCHFIELD
HUDSON
HOLLIS
HUDSON
DUNSTABLE
MASS.
TYNGSBOROUGH
MASS.
N. H.
MASS.
N

MAP I – 4

SOUTHWEST QUADRANT MASTER PLAN UPDATE GOAL STATEMENT:

The overall goal of the southwest quadrant component of the Master Plan Update is **to manage growth in the quadrant in order to achieve a balance between residential growth, economic development, public safety, environmental integrity, and capital infrastructure concerns in a manner that will have the most favorable or least negative possible fiscal impact on the City.**

GOALS AND OBJECTIVES OF THE SOUTHWEST QUADRANT MASTER PLAN UPDATE

1. LAND-USE

Overall Goal: The Southwest Quadrant is an area of orderly and well-planned growth, which adequately provides for a variety of land-uses that are in balance with each other, the environment and the City as a whole.

a. Residential

Goal: A wide variety of housing types and options are available in the Southwest Quadrant, and the supply of housing available there helps in meeting the housing needs of Nashua's citizens.

Objectives:

- Reserve lands for a broad range of residential densities and lifestyles.
- Designate an area for Townhouse/Garden Apartment and/or Elderly Housing somewhere in the quadrant, perhaps near the "Crossroads".
- Consider (and develop if appropriate) a "Village District" zone that would integrate such housing into a master-planned community with small-scale businesses and open space areas.
- Develop standards governing the density, scale, site requirements, and appearance of multi-family and attached housing units in such a Village District.
- Review, and amend if needed, existing regulations concerning residential development.
- Examine existing Cluster and Planned Residential Developments to decide if they are serving the needs of residents and the City.
- Rewrite the existing Cluster section of the Nashua Zoning Ordinance so as to produce higher quality developments and fully realize the benefits of this development option (more efficient services, shorter road lengths, recreational areas etc. . . .).

b. Commercial

Goal: Provide expanded shopping opportunities and commercial land uses in a well planned manner consistent with the area's rural nature and the needs of area residents.

Objectives:

- Consider, and develop if appropriate, a master planned "Village District" which would provide for the basic shopping needs of residents of the southwest corner.
- Alternately, an area in the southwest corner could be rezoned to allow for a small, neighborhood-scale convenience center, one which would meet the needs of area residents without detracting from the rural nature of the area.
- Revise, if appropriate, the PRD section of the Nashua Zoning Ordinance to allow small areas of commercial use serving the needs of the residents in the development.
- Encourage infill development within, and work to revitalize existing commercial areas.
- Require that any Village/Commercial District be **Master Planned** as a cooperative effort between the landowner(s), applicant(s) and the City of Nashua through its Planning Board and Board of Aldermen.

---

c. Industrial

Goal: The existing industrially zoned areas of the Quadrant (vacant area north of Spit Brook Road, Northeastern Boulevard...) are fully utilized, well planned, and contribute to the economic and fiscal well being of the City.

Objectives:

- Promote the industrial use of the area north of Spit Brook Road, and provide any infrastructure support that may be required for the industrial development of that area.
- Encourage and support the reuse and rehabilitation of existing, underutilized industrial buildings.
- Encourage and support infill industrial development next to existing industrial sites.

---

d. Forestry and Agriculture

Goal: Conserve and encourage the wise use of areas in active forestry or agricultural use.

Objectives:

- Support and encourage landowners to participate in the State's Current Use Program.
- Identify and make landowners aware of land areas with high forestry or agricultural potential.

e. Parks, Recreation and Open Space

Goal: Residents of the quadrant enjoy adequate and accessible recreational space at a variety of levels, from citywide and district parks to neighborhood parks.

Objectives:

- Improve and expand park facilities at the district, community and neighborhood levels in relation to the distribution and composition of the population.
- Continue to improve and maintain existing city-owned parks and recreational areas, such as Yudicky Farm and Roby Park.
- Implement the Nashua Urban Trails Network and Nashua Trails Plan (1993).
- Require developers to set aside adequate amounts of usable recreational land within subdivisions and on large non-residential tracts, where advisable, through the subdivision and site plan review processes.
- Amend the Cluster and PRD sections of the Nashua Zoning Ordinance to require that a higher percentage of dry, usable land, suitable for recreation, be set aside whenever these development options are exercised.
- Link open spaces and recreational areas, wherever feasible, to produce a trail network or greenway throughout the quadrant.
- Update the 1977 Nashua Parks and Recreation Plan.
- Improve access, where advisable and needed, to existing city-owned parks and recreational areas.
- Develop criteria for the acquisition of additional parks and conservation areas, based on need, location, function, price and environmental features.
- Plan and set aside money for the acquisition of additional parks and conservation areas. The acquisition of new recreational areas could perhaps be funded through a land bank charge on development.

f. Institutional

Goal: The City shall adequately provide services for maintaining, and enhancing, the public health, safety, education and general welfare.

Objectives:

1. Schools

- Locate the new elementary / middle school close to the "center of gravity" of residential development at build-out, as described in the Future Land-Use Plan.
- Locate the new elementary / middle school to reduce the number and mileage of school bus trips.

2. Fire Department

- Determine if, when and where a new Fire Station for the quadrant would be needed.
- Include the setting aside of land for a Fire Station in any Master-Planning effort for the Village/Commercial Center.

3. Landfill

- Manage the landfill to be able to accommodate all growth in the quadrant and in the city for the foreseeable future, in a manner that maintains the quality of life of residents near the landfill.
- Develop a conversion/re-use plan for the landfill that considers what use(s) the landfill may best serve once is closed, whether that be recreation, open space, education etc . . .

2. ENVIRONMENTAL PROTECTION AND CONSERVATION

Overall Goal: The ecosystems, wildlife habitats and natural features of the Southwest Quadrant are protected from degradation, and unique or threatened natural areas are conserved.

a. Wildlife Habitat

Goal: Protect the most significant wildlife habitats in the quadrant, and link those areas, whenever possible, to provide wildlife corridors and contiguous areas of habitat.

Objectives:

- Identify and delineate key wildlife habitats throughout the quadrant.
- Encourage the protection of contiguous areas of wildlife habitat.
- Encourage the protection of wildlife habitat through improved land use regulations, land acquisition, conservation restrictions or the setting aside of such land in Cluster subdivisions and PRDs.

---

b. Wetlands

Goal: Protect the quadrant's wetlands and associated buffer zones from any further degradation, and restore, when possible, wetland areas encroached upon.

Objectives:

- Strongly enforce the provisions of the Nashua Wetlands Ordinance for all development in the quadrant.
- Consider whether strengthening the Wetlands Ordinance would afford greater protection to the wetlands and their buffer zones in the quadrant, and if so, work to draft changes to the ordinance.

---

c. Open Space

Goal: Protect and set-aside significant areas of open space for wildlife habitat, recreation and the preservation of rural character. Link these areas, whenever possible, with existing parks and open spaces and with each other.

Objectives:

- Acquire additional open space and conservation areas. Emphasis should be placed on linking already existing parks, conservation areas and common open land into a network of open areas that could be incorporated into a greenway or similar network of open space.
- Amend the site plan and subdivision regulations to address the protection of existing vegetation (especially large trees) in development sites. Clearcutting or near clearcutting of vegetation should be prohibited.

- Encourage the use of the Cluster and PRD styles of development, to be able to set aside greater open space in subdivisions.
- Amend the Cluster and PRD sections of the Nashua Zoning Ordinance to require that a greater minimum area of open space be set aside than is required at present, and decrease the amount of wetlands that can qualify towards the total open space area.

3. TRANSPORTATION

Overall Goal: The City of Nashua provides safe, smooth and efficient traffic flow within and through the City for its residents and visitors.

a. Vehicular Circulation

Goal: Provide smooth, safe and efficient travel for motorized vehicles within the quadrant and the entire City of Nashua.

Objectives:
- Develop a functional road classification system for the City, and classify all roads in the quadrant according to this system.
- Specify physical and safety standards for all classes of road and roads in the quadrant.
- Ensure that new subdivision roads tie onto the existing road network in a way that eases the flow of traffic and optimal distribution of trips throughout the quadrant and the city.
- Consider transportation linkages with the rest of the city and with the region when undertaking any transportation planning in the quadrant.
- Improve the approaches to the F.E. Everett Turnpike interchanges to ease traffic flow into and out of the quadrant.

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b. Roadway Improvements

Goal: A Comprehensive Plan for road improvements in the quadrant is adopted, and repair and maintenance work is done according to the recommendations and schedule of the Plan.
Objectives:
- Maintain all roads and bridges consistent with their functional road classification and traffic volumes.
- Evaluate, and if needed, repair or replace any narrow bridges, such as those found on Ridge and New Searles Roads. Consider the feasibility of covered bridges for both Salmon Brook crossings.
- Require that development contribute its fair share toward needed off site road improvements.
- Identify hazardous road segments or intersections, rank them in priority for improvement, and work to remedy them as quickly as possible within the limits of financial resources.
- Provide safe and contiguous sidewalks along such roads.

c. Alternative Transportation (Pedestrian, Bicycle, CityBus)

Goal: Make the southwest quadrant, and the entire City of Nashua, user friendly for bicyclists and pedestrians. Alternative transportation truly becomes an option for trips throughout the quadrant and in Nashua.

Objectives:

- Develop a Comprehensive Plan for pedestrian and bicycle trails throughout the quadrant, which provides linkage with the rest of the city.
- Require developers to make provisions for, wherever advisable and possible, pedestrian and bicycle routes that follow the Comprehensive Plan, to eventually create a safe and efficient network of bicycle and pedestrian trails throughout the quadrant and the City of Nashua.
- Determine where additional CityBus routes and stops may be logical (such as at the "Village / Commercial Center"), and incorporate such into any planning undertaken in the area.
- Encourage the City to address pedestrian, bicycle and alternative transportation modes on its own properties.

4. PUBLIC SERVICES, FACILITIES AND INFRASTRUCTURE

Overall Goal: The City provides a suitable level of public services, facilities and infrastructure support for both the existing and future residents of the quadrant.

a. City Sewer

Goal: Make the most efficient use of the City's sewer system and wastewater treatment plant by extending service only into those areas that will use the service most efficiently and cost-effectively.

Objectives:

- Decide which parts of the quadrant should be sewered and which should rely on septic systems, to meet the goal of efficiency and logical provision of sewer services.
- Require that any extension of sewer lines be done only when the development that would benefit from such extension pay its fair share toward such extension.
- With assistance from the Health Department, review the City's existing septic and well regulations to see if any revisions are needed to protect landowners and the environment in those areas that are to rely on individual septic systems.

b. Pennichuck Water

Goal: The City of Nashua will work closely with Pennichuck Water Works to ensure the most efficient and logical provision of water services throughout the quadrant.

Objectives:

- Plan all infrastructure improvements comprehensively, taking road improvements, water lines, sewer lines, natural gas lines, electrical service, and cable TV service into account when doing any road work or other infrastructure improvements.
- Provide adequate water pressure throughout the quadrant for fire flow and to allow the use of built-in protection (sprinklers) in outlying areas.

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c. Fire Protection

Goal: Provide adequate fire protection, according to regional and national standards, to all areas of the quadrant.

Objectives:

- Closely monitor the rate and distribution of development as the quadrant proceeds toward build-out, to determine if, when and where an additional Fire Station may be needed.
- In the event of the need for a new Fire Station, locate it to provide the most efficient provision of services, especially to areas currently outside the recommended response times.
- Upgrade the Spit Brook and Conant Road Fire Stations, if growth occurs such that these facilities become inadequate to service their zone of protection within recommended levels of service.
- Provide adequate water pressure throughout the quadrant for fire flow and to allow the use of built-in protection (sprinklers) in outlying areas.

d. Police Protection

Goal: Provide adequate police protection, according to regional and national standards, to all areas of the quadrant.

Objectives:

- Closely monitor growth in the quadrant, and track reported crimes and police reports, to determine if, where, when and how additional police protection could be provided as the area proceeds towards build-out.
- If additional police protection is warranted in the quadrant, determine the level of police department expansion (new officers, cruisers, facilities) that would be required to meet the additional need.
- Modify the platoon and patrol schedules, if needed, to meet the varying needs of the quadrant's changing population and businesses.

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e. Education

Goal: The City meets the educational needs of the quadrant's present and future school aged population in a manner consistent with the wider educational and school facility goals of the City as a whole.

Objectives:

- Upgrade the existing schools in the quadrant to use them to their fullest potential.
- Locate the new elementary / middle school close to the likely center of gravity of the southwest corner's population at build-out to provide the most efficient service, decrease the need for busing and decrease the costs of providing sewer, water and other services.
- Build the new elementary / middle school with sufficient capacity to retire all the existing portable classrooms now in use in the quadrant and to accommodate all of the new elementary students anticipated at build-out.

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f. Library

Goal: The Nashua Public Library will meet the reading and educational needs of all Nashua citizens into and past the period of build-out.

Objectives:

- Determine if a branch library would be needed in a built-out southwest quadrant, and if so, where it should be located to provide service most efficiently. Alternately, the bookmobile could make additional stops at convenient locations.
- In planning for uses in the Village/Commercial Center, it may be advantageous to set aside a small area for a future municipal building, which could house a small branch library, and other community functions.

5. ECONOMIC DEVELOPMENT

Overall Goal: The City promotes and realizes balanced and sustainable economic development that is consistent with the wider goals and objectives of the Southwest Quadrant Master Plan and the City as a whole. This balanced economic growth results in a positive annual cash flow for the City.

a. Industrial Development

Goal: The existing areas zoned for industrial use are fully utilized and strongly contributing to the economic vitality of the City. Some expansion of industrial land may be warranted once the existing areas are fully utilized.

Objectives:

- Encourage and promote infill commercial development on Northeastern Boulevard and in the surrounding area by modifying any local codes that would help facilitate the reuse and full use of the industrial buildings and space in that area.
- Solve the access problems to the industrially-zoned area north of Spit Brook Road, and work with the landowners to develop a master plan for this area.
- Begin to consider what additional lands, if any, would be best suited to industrial use if the existing stock were to fill up.

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b. Commercial Development

Goal: The existing commercial areas are strong and vital, and at least one successful "Village Commercial" area has been developed that serves the needs of area residents, without detracting from the rural ambience of the southwest corner.

Objectives:

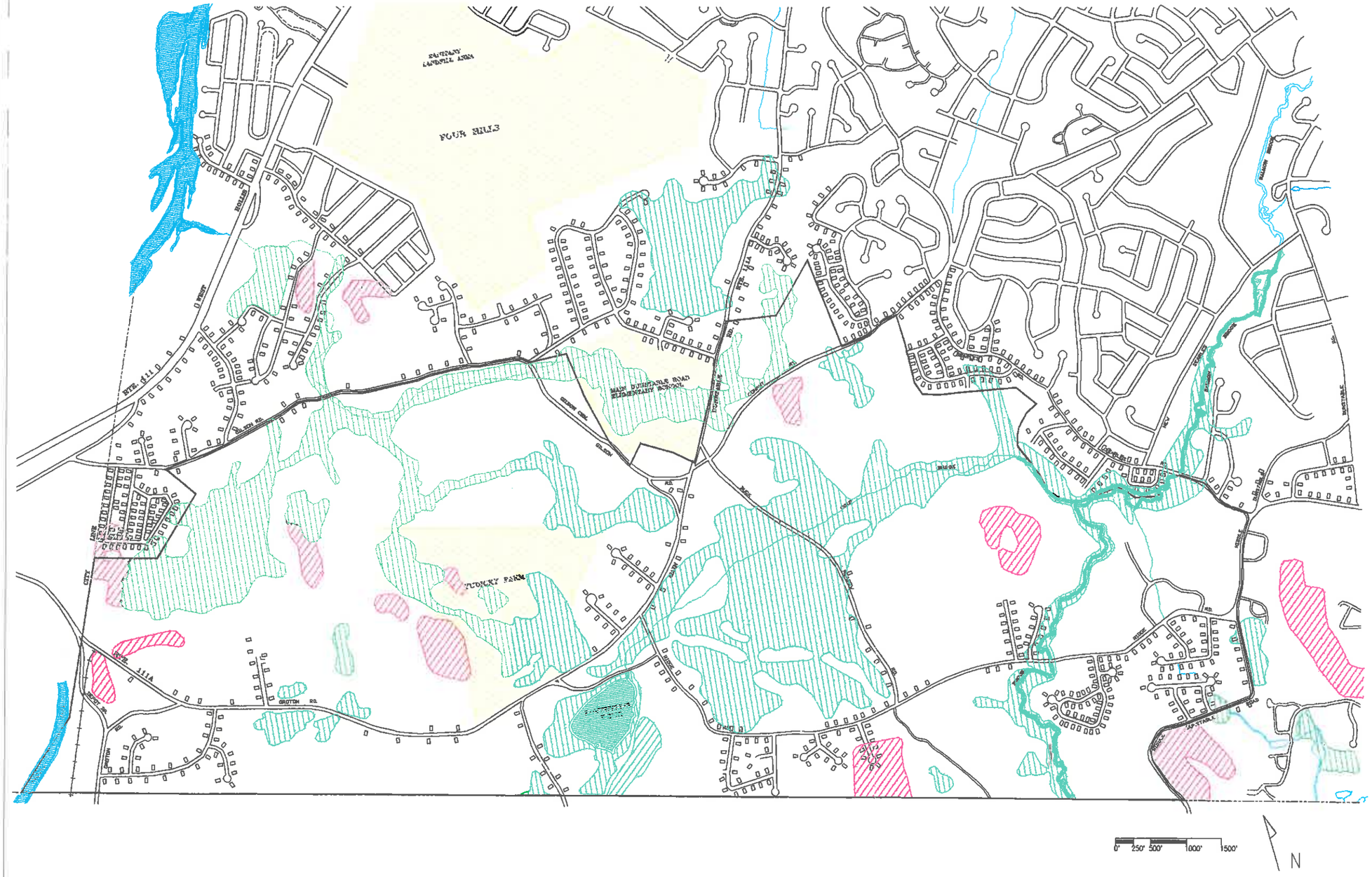
- Promote infill commercial development consistent with the City's long-range economic plans.
- Require that any possible "Village / Commercial District" be master planned as a cooperative effort between the landowner/applicant(s) and the City of Nashua through its Planning Department, Planning Board, School Board and Board of Aldermen. A professional consulting firm approved by the City should be hired to assist in the development of the Master Plan for the Village Commercial District. This Master Plan shall consider such factors as traffic circulation, aesthetics, economic and environmental impacts, buffer zones and open spaces, pedestrian and bicycle circulation, location of a new elementary school, elderly and/or multi-family housing, and any other agreed upon factors that arise in the planning process.
- A key objective will be to balance, as much as possible, the negative fiscal impacts of most residential growth with the positive fiscal impacts of most commercial growth.

II. PROCESS AND METHODOLOGY

A. The Primary Study Area Further Defined

As mentioned in the Introduction, this Plan is primarily concerned with a part of the southwest quadrant known as the southwest corner because it is the area with the most development potential. This area of approximately 1,960 acres, one-quarter of the southwest quadrant's 7,899 acres, is predominantly rural today. The southwest corner for the most part is unsewered and relies on septic systems for domestic wastewater disposal. Most of the remainder of the quadrant has been developed with residential subdivisions and is largely suburban. The boundaries of the southwest corner can be seen on Map II-1, Existing Conditions, on the following page. The Southwest Quadrant Future Land Use Plan Map, which appears in part E of this chapter, contains land-use recommendations for the entire quadrant, with the caveat that these recommendations may be later fine-tuned for a few selected areas in forthcoming sections of the Master Plan Update, as described below. Thus, the majority of recommended changes to the 1985 Master Plan are shown on the Southwest Corner Future Land Use Plan Map, found on page 85. The Future Land Use Map for the entire quadrant is found on page 109.

Several areas of the southwest quadrant may be addressed in greater depth in forthcoming sections of the Nashua Master Plan Update because they concern land-uses, such as industry, which are better addressed on a citywide basis, or because they are areas in flux due to transportation and road improvements such as the F.E. Everett Turnpike widening. Future land use issues, and goals and objectives for these areas are much more interrelated with other areas of the city and its transportation network, or with citywide policy considerations (such as the extent and character of industrial development), than the southwest corner area that is of primary concern in this document. These areas include the Northeastern Boulevard - Harris Road and the Exit 4 and 5 interchange areas, the Park Industrial area next to the Exit 1 and 2 interchanges, and the area north of West Hollis Street (NH Route 111) and south of the Nashua River, near the Police Station and Mine Falls Park.



LEGEND:

- Existing Roads
- Existing Development
- Nashua City Line
- City Owned Property
- Wetland Soils
- Steep Slopes (>20%)
- Southwest Corner

Nashua, New Hampshire

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MAP II – 1
Existing Conditions

B. Existing Infrastructure and City Services

Notes: In the following pages reference will be made to several versions of "build-out scenarios" and their differing impacts and implications for city services. The build-out scenario process and the different scenarios will be described in the next section.

The discussion of both existing road and traffic conditions and recommended road improvements is found in Chapter III, B. 2 , starting on page 111.

1. The Extent of Pennichuck Water and City Sewer Service

a. Pennichuck Water Works, Supply and Distribution in the Southwest Quadrant

Nashua's water supply and distribution system is provided by and under the regulated control of a private company, the Pennichuck Water Works. Pennichuck obtains its water from the Pennichuck Ponds, which are impoundments of Pennichuck Brook which forms the northerly border of Nashua with Merrimack. Additionally, some water is obtained from the Merrimack River for summer use during times of peak demand. All water is treated at Pennichuck's treatment plant located off of Concord St. in northern Nashua. From this plant the water is distributed throughout the city.

Most of the southwest quadrant is within what is known as the "southwest high-pressure system", (SWHPS) meaning that the water is pumped through the area under high pressure. The two main booster pumps serving the SWHPS are located off of Main Dunstable Road near the intersection with Conant Road, and off of Timberline Drive near its intersection with East Dunstable Road. The main transmission lines from these booster pumps are 12 and 16 inches in diameter. From these main lines, smaller 8, 6 and 4 inch lines serve the residential subdivisions within the SWHPS.

Pennichuck water is presently supplied to that portion of the southwest quadrant which is most developed, though expansion of the system is ongoing as new development occurs. Gilson Road, Musket Road, Whitford Road, Conant Road, the subdivisions west of Searles Road, and Ridge Road about 1,500 feet west of Buck Meadow Road form the present limit (Fall, 1994) of the distribution system. Please see Map III-1 for a graphic representation of the present water service area. Recently completed extensions to the service area include the Pine Brook extension, which continued a 16 inch water line across Salmon Brook to Governor's Lane, an extension to Clark Road off of Whitford Road, service to Caitlan Circle and service to Lojko Road.

Extension of a 12 inch water line from the Rodger's Trailer Park, off of Gilson Road, to the Route 111A, Groton Road intersection, will be underway once the developer pays for this extension to the recently approved 36 unit subdivision called "Hadley Woods" which is located in the extreme southwestern corner of the City. Pennichuck Water Works typically requires a land developer to cover the initial total costs of extending the water lines. The company then reimburses the developer as homes and businesses are connected to the system.

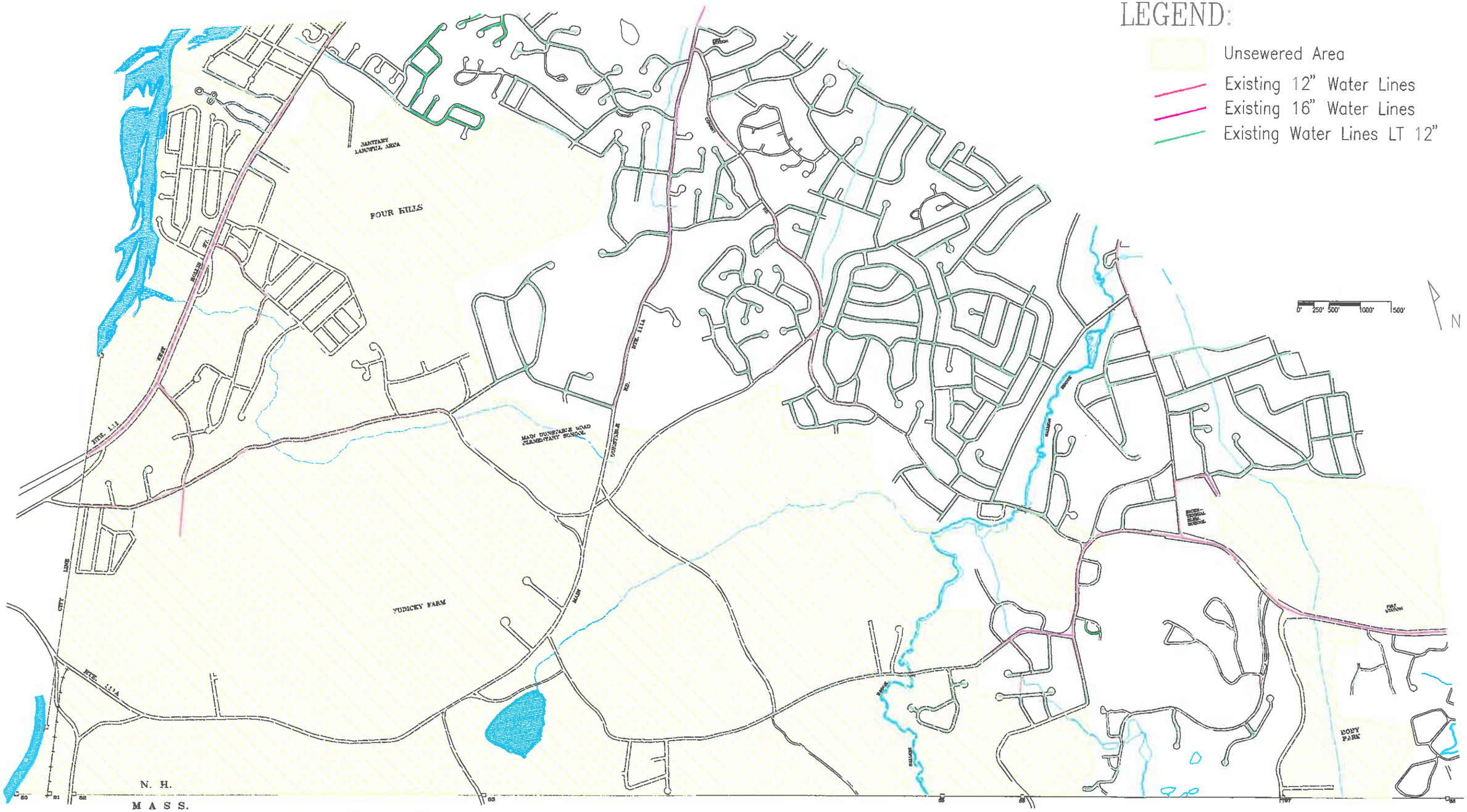
Pennichuck water service will thus soon surround the unserviced part of the quadrant on three of four sides. Pennichuck's long range plan calls for extending 12 and 16 inch water lines in a loop along Groton and Ridge Roads from the end points of the existing 12 and 16 inch mains. From these main lines, smaller lines would be able to service any major subdivision development that would occur in the presently unserviced area. These extensions would be built on an as needed basis, and not in anticipation of development. Pennichuck has indicated that they will respond to demand, but not dictate where development should occur by locating water lines before development enters an area.

It is the policy of the Pennichuck Water Works Company to extend service as needed, and as required through actions of the City's Planning Board, which may require as a condition of subdivision approval that new subdivisions be served by "public" water. Though there are many homes in the southwest corner that presently rely on private wells, as major subdivision development moves into the area, Pennichuck anticipates that it will eventually be providing the entire area with water. This provision of water is contingent on the developers contribution of capital to accomplish the work.

This leads to questions of Pennichuck's capacity to supply water to the entire southwest quadrant. Pennichuck's Chief Engineer has stated that there are no problems with water supply per se. There is sufficient volume in the Pennichuck Ponds and in the Merrimack River to meet demand into the foreseeable future. Pennichuck's existing treatment capacity is 35 million gallons per day (mgpd). Their actual average demand is presently 12-13 mgpd, with an average peak being 24 mgpd in the summer.

Any constraints would be in water storage capacity or in the capacity of the booster pump stations. Pennichuck has recently constructed a new water tank off of Shakespeare Road. This tank has a capacity of 1.7 million gallons. A previously constructed tank has a capacity of 1,000,000 gallons, bringing the total storage capacity to 2.7 million gallons, all of which services the SWHPS. This is sufficient for the near term, but will not be adequate when the area is close to build-out.

Pennichuck's Chief Engineer estimates that the 700 additional residences possible by build-out (under the Future Land Use Plan, to be discussed later on), would require an additional 800,000 gallon storage tank. The City and Pennichuck Water Works should work together to find an appropriate site if and when it appears that the additional storage is needed.



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MAP II - 2
Sewer &
Water Lines

b. Nashua's Wastewater Treatment Plant and The Extent of City Sewer Service in the Southwest Quadrant

The majority of Nashua's residences and businesses are connected to the City's sewer system. The sewer service area covers most of Nashua, except portions of the northwest and southwest quadrants. The developed parts of the southwest quadrant are on City sewer, while the rural southwest corner relies on septic systems for domestic wastewater disposal. All of the City's sewerage is treated at its wastewater treatment facility (WTF), which is located on the banks of the Merrimack River below the confluence with Salmon Brook. This discussion of Nashua's sewer system will begin with the WTF.

Nashua's WTF came on-line in 1969, in response to the Clean Water Act requirements for wastewater treatment. Initially only a primary treatment plant (removal of solids), the WTF was expanded in 1988 for secondary treatment of sewerage, which involves filtration and aeration, besides primary treatment. The primary plant has a greater treatment capacity than the secondary plant, up to 52 million gallons per day (mgpd) for **maximum** flows, as opposed to 38 mgpd for the secondary plant. Maximum flow means the amount of wastewater that can be treated for a 24-48 hour period during peak flow events. Since the older section of Nashua is served by a joint wastewater / stormwater system, these peak flows often occur during and shortly after heavy rainfalls. The WTF cannot treat peak flows for an extended period, however. The optimal peak for sustained treatment, or average daily flows, is 16 mgpd for the secondary plant, which is expandable to 29 mgpd.

Recent yearly averages for daily flows are 9.3 mgpd in 1991, 8.8 mgpd in 1992, 11.2 mgpd in 1993, 12.5 mgpd in 1994 and 11.3 mgpd in 1995. The secondary plant of the WTF is thus at approximately 75% of its maximum capacity for average daily flows. The remaining capacity, assuming an average daily flow of 11.2 mgpd, is 4.7 mgpd (16 - 11.2 mgpd). Combined sewer overflows (CSOs), which are the combined stormwater and wastewater streams generated from the older parts of the sewer system, are being studied by Camp, Dresser and McKee as part of the Phase II CSO study. This study will identify CSO pollutants on the Merrimack and Nashua Rivers and suggest abatement facilities.

It shall be assumed that the present treatment capacity for average daily flows is 4.7 mgpd. A second assumption is that all additional units will be connected to city sewer, though in actual practice that will probably not be the case for all of the southwest quadrant. In this way we can find out where in the sewer system, whether at the WTF or in the collection system, constraints will first be felt.

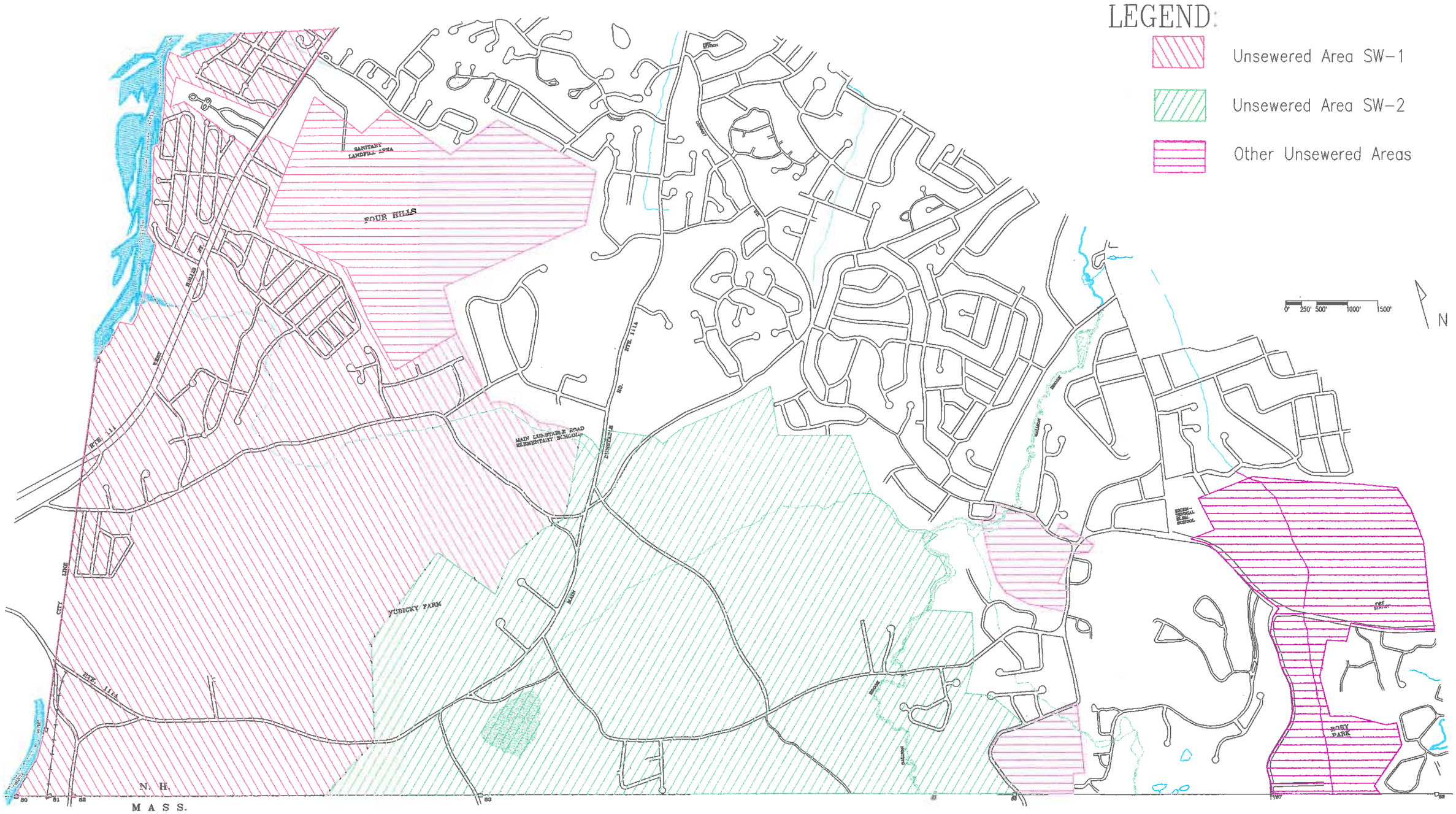
The superintendent of the WTF reports that the average daily household generation of wastewater is 100 gallons per person (gpp). This number is true for most single family detached residences. Attached and multi-family units are likely to generate somewhat less wastewater per person. However, for these calculations we will assume the "worst case" by applying the 100 gpp figures to the total population calculated for each build-out scenario. Table II-1 on page 35 lists the numbers of units, population and volume of wastewater generated for each build-out scenario. The lowest volume of additional wastewater is generated by the 2-Acre Zoning scenario, with 168,400 gpd. The highest volume is from the 1985 Land-Use Plan scenario with an additional 621,800 gpd.

As the remaining capacity for secondary treatment is 4.7 mgpd, it appears that there is more than adequate capacity to handle the wastewater generated from any possible scenario for the southwest quadrant. However, the true capacity of the unsewered portions of the southwest quadrant depends on the amount of growth in the other unsewered areas, especially the northwest quadrant. Future building code requirements could affect wastewater generation rates as well. For instance, if building codes are adopted that require low flow toilets, then the demand on the WTF would be reduced. Future capacity also depends on the amount of wastewater that would be generated by any new elementary or middle school that might be constructed in the southwest quadrant. (Please see the school section.) The accepted wastewater generation rate for students is 15 gallons per student per day. With a possible student population of 750, that would equal an additional 11,250 gpd from the school.

Another variable already mentioned is whether some or all of the present additional capacity will be used to treat combined flows. The WTF's superintendent believes that a safer estimate of capacity, considering CSO's, is an additional 1.6 mgpd, which represents 16,000 new residents served. The highest PRD scenario estimates 12,389 new residents for the southwest quadrant, which is within 4,000 residents of the total estimated capacity. It is a safe assumption that any capacity constraints for the City's sewer system will exist elsewhere than at the WTF.

The sewer collection system consists of a hierarchy of lines, of which the interceptors are the main branches. The interceptors are the main lines that carry wastewater to the WTF. There are three main interceptors in the southwest quadrant; the Salmon Brook interceptor, the West Hollis Street interceptor, and the Hassell Brook interceptor.

The next level in the hierarchy of sewer lines are the lateral lines, which bring the wastewater from the subdivision or home level lines to the interceptors. Lateral lines often run parallel to or underneath major roadways. Waste-water in both the lateral and interceptor lines generally follow the flow of gravity; and, for that reason, possible future sewer service areas are delineated by drainage basins or watersheds. The City Engineer has identified two such major unsewered areas, SW-1 and SW-2. (Map II-3)



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MAP II - 3

Sewer System

TABLE II - 1

QUANTITY OF DOMESTIC WASTE-WATER GENERATED FROM THE ADDITIONAL POPULATION EXPECTED FOR EACH OF THE BUILD-OUT SCENARIOS

SCENARIO:	EXISTING ZON.	2 ACRE ZONING	FUTURE LAND USE PLAN	1985 LAND-USE PLAN
# OF S.F. HOMES:	1,225	488	982	1,477
# OF M.F. UNITS:	87	87	187	698
TOTAL # OF UNITS:	1,312	570	1,169	2,175
TOTAL POPULATION:	3,939	1,684	3,448	6,218
VOL. WW GEN. (GPD)	393,900	168,400	**344,800**	621,800

Note: The number of units given for each scenario is the number of new units resulting from build-out, plus the previously approved, but not built (ANB) units.
The average volume of wastewater used for domestic purposes is 100 gallons per day, per person.

C:\123W\SWQUAD\WWGEN.WK3

If sewer lines were to be extended into these areas, the wastewater from each would flow in different directions to different interceptors. Wastewater in SW-1 flows west or northwest, and eventually enter the West Hollis Street interceptor. Wastewater in SW-2 flows east or northeast, and eventually enters the Hassell Brook and Salmon Brook interceptors.

The consulting firm of Metcalf and Eddy, submitted a report to the City in 1990 called An Evaluation of Sewer System Needs for Southwest Nashua, which was prepared in response to the possible development of approximately 3,200 units in the Hall's Corner project. The total costs involved in extending sewer service to these areas was calculated as part of the report, and the City Engineer has updated these costs in 1995 dollars. Table II-2 , below, gives these cost estimates by the type of sewer line and on a per acre basis. It should be noted that, historically, extensions to the lateral and subdivision level sewer lines have been at the developer's expense when such extensions were needed to service a new subdivision. When development has required upgrades of the interceptor lines, these costs were either covered entirely by the City or by both the developer and the City, according to agreements worked out in the subdivision review process. The actual allocation of costs of any sewer expansion will depend on the type of expansion needed, agreements undertaken as part of the development review process and any possible use of an impact fee system, which is under consideration by the City.

TABLE II-2:
MAJOR UNSEWERED AREAS OF THE SOUTHWEST QUADRANT AND THE COSTS ASSOCIATED WITH SEWER LINE EXTENSIONS WITHIN THEM

AREA DESIGNATION	SW-1	SW-2
COST OF TRUNK SEWERS AND PUMP STATION	$ 6,383,000	$ 2,507,000
COST OF LATERAL SEWERS WITHIN EXISTING PUBLIC STREETS	$ 3,970,000	$ 3,112,000
COST OF RELIEF SEWERS	$ 1,002,000	$ 5,016,000
TOTAL OF THE ABOVE COSTS	$ 11,355,000	$ 10,635,000
TOTAL ACREAGE OF AREA	1,400 ACRES	1,070 ACRES
COST OF SEWER SERVICE PER ACRE	$ 8,110	$ 9,940

NOTE: The above costs are from the 1990 Metcalf and Eddy report as updated to 1995 dollars

2. Energy Infrastructure in the Southwest Quadrant

The energy infrastructure of the southwest quadrant consists of electrical distribution and transmission lines and high pressure natural gas lines. The electrical system is controlled by the Public Services of New Hampshire (PSNH) company, and the gas lines are controlled by the Energy North company.

a. Electrical Distribution and Transmission System

Southern New Hampshire's electric company is Public Service of New Hampshire (PSNH). PSNH supplies electricity to the entire city. PSNH reports that they anticipate being able to supply electricity to a fully built-out southwest quadrant, even if that build-out takes the form of high density PRDs with areas rezoned for higher density housing.

There are two main types of power line: transmission and distribution lines. Transmission lines transmit power from the transmission substations, which receive power from various power plants. These lines vary in voltage (KV = 1,000 volts) depending on the type of transmission substation that feeds them electricity. Eventually, the lower voltage transmission lines end at a distributor substation, from which power is distributed to the residential and business customers in the city. Distribution lines carry much less voltage than transmission lines, usually 12 or 4 KV.

In Nashua, there are two levels of transmission lines. The first are the 115 KV lines that bring the power into Nashua from the regional distribution station in Hudson. These cross the Merrimack River just north of the Nashua River confluence. They then enter a nearby transmission substation located off Armory Street. From the substation, smaller 34.5 KV lines transmit power to the City. These lines form two loops through Nashua that are the backbone of the City's transmission system. The first 34.5 KV line closely parallels the Nashua River and then heads north to a switching station near the intersection of Durham and Broad Streets. One line goes west into Hollis and the other services northern Nashua from the switching station.

The second 34.5 KV loop proceeds south from that switching station, cuts through Mine Falls Park, and then runs south parallel to Northeastern Boulevard, crosses Salmon Brook, cuts through the Timberline Drive area and crosses the F.E. Everett Turnpike before crossing the Merrimack River and entering Hudson.

The 34.5 KV lines feed distribution substations from which distribution lines branch out to all parts of Nashua. The highest level distribution lines are 12 or 13 KV lines. Three of these enter the southwest corner study area. One runs south from Northeastern Boulevard along Main Dunstable Road to a terminus at the Main Dunstable School. The second runs southwest from Harris Road along Conant Road and terminates near Sterling land. The third runs south from Timberline Drive along east Dunstable Road to a terminus at the Bicentennial School.

PSNH has stated that they will be able to supply power to meet the energy needs of a built-out southwest quadrant.

b. High-Pressure Natural Gas Lines

The second form of energy infrastructure is natural gas lines. In Nashua, these are under the ownership and control of the Energy North corporation. As was the case for the electrical transmission system, there is a hierarchy of lines in the high pressure gas line system. 6 inch lines are the major arteries, with 4 inch lines acting as sub-arteries and 2 inch and smaller lines as the distribution lines from which homes and businesses can hook into. In the southwest quadrant, 6 inch lines run along Main Dunstable Road south to the Main Dunstable School, and also along East Dunstable Road, Spit Brook Road , Lamb Road and Ridge Road west to the Pinebrook subdivision. (Map II-4) A spur of the 6 inch line also extends into the Sky Meadow planned residential development south of Spit Brook Road. As can be seen the map, the remainder of the southwest quadrant, especially its western area, is beyond the service area of the high pressure natural gas lines. In order for natural gas lines to be extended, there needs to be a financial reason to do so, which commonly requires higher density development than that presently occurring in the area.

Should development densities and the demand for natural gas justify extension of the high pressure natural gas lines, Energy North has said that they can do so.

Nashua, New Hampshire

S.W. Quadrant Master Plan

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MAP II - 4
High Pressure Gas Lines

3. Police, Fire and Public Works Facilities and Services

In terms of budget and capital plant, the major city services besides education consist of the public safety services of police and fire protection, and a public works program for maintenance of existing infrastructure and city construction projects. This discussion will begin with public safety services, and then examine public works facilities and programs. The discussion will focus on those aspects of each department concerning the southwest quadrant, and will not provide full treatment of the department citywide.

a. The Nashua Police Department

The Nashua Police Department headquarters is located off West Hollis Street in the northern end of the southwest quadrant. This 40,000 sq.ft. facility serves the entire city. As of November 1994, 108 patrolmen were on the force.

The 1985 Master Plan reported that existing police facilities and manpower were adequate to serve a growing population within the 10-15 year planning period of the Master Plan. This judgement was made based on population projections that forecast a greater rate of growth for the 1990s than that experienced so far. Given this, it should be a safe assumption that, for the most part, the Nashua Police Department has adequate capital facilities and staffing to serve the city for the next few years. This is not to say that there are no needs or plans for capital facility upgrading and expansion as part of normal police department planning. However, these are based upon more modest growth assumptions than those used in the 1980s.

Police patrolling operations are done on shifts, termed "platoons". There are three platoons, and within each platoon are designated geographic areas, called "sectors", which are patrolled by teams of police officers. Platoons 1 and 3 divide the southwest quadrant into two sectors; 12 and 6. Sector 12 covers the area south of the Nashua River, west of the F.E. Everett Turnpike, east to a line running along Gregg Road, Groton Road, Conant Road and Harris Road. Sector 6 covers the area to the east of Sector 12 east to the F.E.Everett Turnpike. A small portion of the D.W. Highway commercial area, near the Pheasant Lane Mall, is also included in this sector.

Platoon 2 contains within it three sectors; 13, 12, and 6. These three sectors together cover the same geographic area covered by sectors 12 and 6 of Platoons 1 and 3, but each is somewhat smaller in itself. In addition, sector 6 covers the D.W. Highway south area north to the Sagamore bridge.

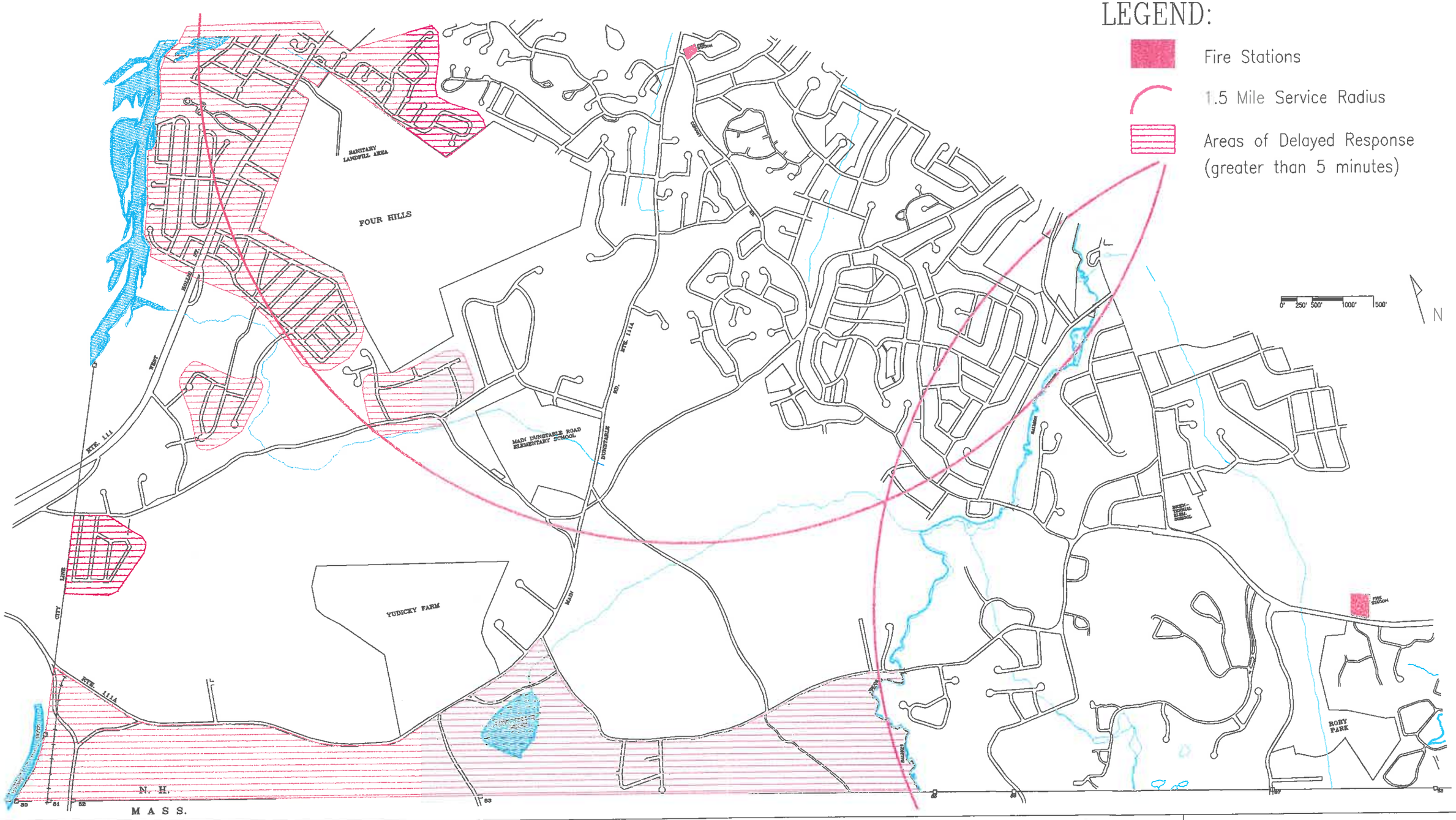
b. The Nashua Fire Department

The Nashua Fire Department is more decentralized than the Police Department, in large part because of the need to be able to respond to all parts of the city within a reasonable period of time. There are two fire stations in the southwest quadrant; the Conant Road station and the Spit Brook Road station. The Conant Road station is located near the intersection of Main Dunstable and Conant Roads, while the Spit Brook Road station is located to the northeast of Roby Park, near the Sky Meadow Planned Residential Development (PRD).

There are several standards given in fire department manuals for response time and staffing levels for municipal fire departments. The first is that for the northeastern United States a staffing level of 23.4 firemen per 10,000 population is recommended. When applied to Nashua, this formula recommends 189 firemen for Nashua (based on an estimated population of 81,000). The actual number of firemen as of November 1994 is 136, over 50 men short of the recommended number.

The second recommended standard is a 4 minute response time for all fires. A study undertaken by Fire-Pro, Inc., called the *FirePro* Study, estimated the area within a 4 minute response time for each fire station in Nashua. When applied to the Conant Road and Spit Brook Road stations, it was found that there were several areas in the southwest quadrant outside this area. These areas are found mostly to the west and south of Main Dunstable and Gilson Roads. Areas with a 5 minute or greater response time are considered areas of delayed response. In the southwest quadrant, these areas are found south of Groton and Ridge Roads, east to Salmon Brook, and in the trailer park areas off Gilson Road and in the vicinity of West Hollis Street. (Map II-5) The Assistant Fire Chief, however, considers a fixed radius from the fire stations to be a better indicator of response, because response time depends on factors that vary over time and throughout the year, such as road conditions, traffic volumes and snow and ice. In his view, a mile and a half radius (1.5 miles) is a better standard for planning purposes. This is supported by fire department standards as well. Areas within a mile and a half radius can be responded to within 4 minutes, under average conditions. Map II-5 shows the area within and outside this radius in the southwest quadrant.

The *FirePro* report found that the relative remoteness of the southwest corner, and the overall poor road conditions found there, aggravate the response time situation. Large-scale development in this area would require increased fire protection, either through a new fire station or through road improvements and other capital projects that would reduce response times. The report noted that a new fire station would provide service to those portions of the southwest quadrant that are now within the area of delayed response.



Nashua, New Hampshire

S.W. Quadrant Master Plan

City of Nashua Planning Department 1995

MAP II - 5

Fire Services

Besides new facilities, there are other actions that can be taken to increase fire safety and decrease response times. The first of these is called "built-in protection", or in laymen's terms, sprinklers. If sprinklers were required for all new homes constructed beyond the mile and a half radius from the existing fire stations, the immediate need for a new fire station would be lessened. Such a requirement could be made by amending the building codes. Improving the roadways of the area would help to reduce response times.

The southwest quadrant is not the only area of Nashua in need of improved fire service. The northwest corner and Route 101A corridor and the South Main Street area are also presently underserved. The greatest fire station need in the City, according to the assistant Fire Chief, is the relocation or improvement of the Lake Street station. Any proposal to construct new fire stations elsewhere in the city will be weighed against the needs of the existing fire stations, especially the Lake Street station.

c. Public Works Facilities and Services

Public Works is a division of City government, with several departments under it; including the Street Department, Solid Waste, Recycling, Engineering, Parks and Recreation and the Waste-Water Treatment Plant. The Wastewater Treatment Plant was discussed previously, this section will focus on the Street Department, Solid Waste and Parks and Recreation.

1. The Street Department

The Street Department is responsible for the maintenance of public roadways in Nashua, and the construction of City -owned roadway improvements. The Department maintains approximately 1,000 lane miles of roadway in the city, with a network of approximately 1,400 streets. Part of its road maintenance duties consists of salting and sanding the public roads in winter.

In the southwest quadrant, they would be responsible for the maintenance of all new subdivision roads accepted by the City as public roads. New roads in Planned Residential Developments (PRDs) would be privately maintained by the developer or homeowners association.

Street Department maintenance responsibilities include street sweeping, hot and cold patching, sidewalk and curb repair, winter damage resurfacing, crack sealing, brush and tree cutting, shoulder work and guard rail and fence repair. In addition, maintenance and repair of the sanitary and storm sewer lines is a Street Department function.

Widespread development in the southwest corner would certainly affect the Street Department's operations, as most of the new subdivision streets that would be constructed would become public ways eventually. Within Cluster and Planned Residential Developments (PRDs), most roads would remain in private maintenance and would not be maintained by the City.

2. Solid Waste and the Landfill

The City of Nashua is fortunate in having its own landfill. Many communities throughout the country have already used up their landfill capacity, and must rely on private or regional waste solutions that usually cost far more in annual operating expenses than a landfill. However, the Nashua landfill is at a decisive point, and while there is room for expansion, its life is definitely finite, and the City must seriously plan for a long-range solid waste solution. The City should encourage and pursue any source reduction strategies that will extend the life of the landfill and lead to more efficient waste collection and processing.

The City's Four Hills Landfill (from hereafter "the landfill") was purchased by the City in 1970. It lies in the southwest quadrant, just south of West Hollis Street and north of Gilson Road. The entire landfill area covers 286 acres, of which 65 acres are presently in use. This represents the last available portion of "Four Hills - 1" (or the first phase of the landfill) which started being used in the early 1970s. This area will soon reach maximum capacity, at which time the City must be ready to use another portion of the landfill. To close a section of landfill, "closure grades" must be met. The purpose of the closure grade is to allow water to shed, and not stagnate on top of the landfill, while simultaneously not being so steep that the banks of the landfill erode. There is thus a minimum closure grade, and a maximum closure grade. Minimum closure grade for the area currently in use will be reached in 18-36 months. Maximum closure grade will be reached in 3 to 5 years. The City is planning to go through with the maximum closure grade, or something close to it, and expects to close that section of the landfill in about three years, or by the end of 1999. The total cost to cap this area is between $8 and $9 million dollars.

Currently, about 40% of the commercial waste and 100% of the residential waste generated in Nashua reaches the landfill. The landfill takes in 70-100,000 tons of waste per year. of which approximately 16% is sludge from the Wastewater Treatment Plant and 15% are recyclable materials. The City plans to reduce the amount of sludge accepted in the near future in order to free up more capacity for residential and commercial solid wastes. The City should consider expanding its recycling program to decrease the amount of recyclable materials that get landfilled.

The planned expansion of the landfill, known as "Four Hills - 2", will cost between $17 and $20 million over its lifespan, which is expected to be between 18 and 20 years. The life span of Four Hills 2 depends on its planned capacity. If 3.5 million cubic yards of capacity are provided, the life would be approximately 20 years, if 4 million cubic yards of capacity are provided, the life would be approximately 22 years. Four Hills 2 will be brought on line in 3 stages. Another variable in both landfill life and costs is federal and state regulations.

The City has obtained the permit to construct the expanded, lined landfill. To maintain compliance with this permit, the City must demonstrate that the facility will last the intended 20 years. In the event that trends demonstrate that the facility will last less than the intended 20 years, corrective measures must be taken.

Excavation and preparation of the Phase 1 site is budgeted for Fiscal Years 1996 and 1997, and is expected to cost $3.7 million dollars. Groundbreaking will hopefully be in the spring/ summer of 1996. This will enable a smooth transition from Four Hills 1 to Four Hills 2.

It is expected that the expanded landfill will serve the needs of all southwest quadrant residents, indeed all City residents, into the near future. Therefore, it will be important to estimate the effects of the various build-out scenarios on the expanded landfill, and to see how they affect its life expectancy.

3. Parks and Recreation

The Parks and Recreation Department is responsible for maintaining the City's network of parks and recreation areas, which total approximately 715 acres. The Department also manages and runs recreation programs, such as team sports for children, that take place on City-owned property. The Department is also responsible for snow and ice removal at 14 of the City's schools. Major recreation areas managed by the Department include Mine Falls Park, Greeley Park and Holman Stadium.

In the southwest quadrant, the major park and recreation areas are Yudicky Farm and Roby Park. The 120-acre Yudicky Farm park was created as a gift to the City of Nashua. The owners stipulated that the land could only be used for recreation, conservation or educational purposes. Yudicky Farm fronts on Groton-Main Dunstable Road. Most of the park land is presently unimproved and is used for passive recreation such as hiking and horseback riding. However, active recreation fields for team sports are being developed in the southern portion of the property across from Old Ridge Road. A Master Plan for the property was prepared in the 1970's. This plan considers several alternative uses for the property into the near future, chief among them being recreation and education.

The second major park area in the southwest quadrant, and one of the newest additions to the park system is Roby Park, which is located at the intersection of East Dunstable and Spit Brook Roads in the eastern part of the quadrant. Roby Park, which covers 57 acres, is used primarily for passive recreation, though there is a section devoted to playing fields and team sports.

Besides public use of Nashua's parks and recreation areas, private groups representing various sports and recreation interests also make use of these facilities. Soccer has become Nashua's most rapidly growing sports program for youths. The Soccer Council of Nashua is an umbrella organization that coordinates the activities of nine local soccer clubs representing both youth and adult players. The Soccer Council has found that the demand for limited practice and playing fields is great and increasing. In the fall of 1994, 131 Nashua based soccer teams had 1,889 players (not including school teams) and the projection for the spring season of 1995 is for 147 teams with 2,368 players, a 25% increase in the number of players in just one year. The number of soccer players has increased by 54% since 1991, according to the Chairman of the Soccer Council of Nashua. However, he points out that the number of playing fields has not increased at all in this period. It remains level at nine (9) soccer fields citywide.

Therefore, the Council is actively seeking new land for additional fields. The favored site is the open fields on the Main Dunstable School property. Presently, there are three playing fields at this site. The Council believes that grouping of fields into a "soccer complex" is not only ideal for tournaments, but it also decreases costs for parking, irrigation, facilities, and maintenance by the City Parks and Recreation Department.

However, as will be discussed later, other City Departments are considering this site for other uses as well. The open land on the Main Dunstable School site is large enough to accommodate a new southwest quadrant elementary school, should that be built in the next few years. It is also possible that a new Fire Station may be needed in this area.

4. Schools

The City of Nashua operates a full public school system, educating children from the kindergarten to high school levels. The school system consists of one senior high school, three junior high schools, and twelve elementary schools. Total enrollment at all of the schools as of the 1995-1996 academic year stands at 12,631 students. The oldest schools are the Elm Street Junior High School, originally built in 1937 as the city's high school, the Amherst Street School originally built in 1892 and the Mt. Pleasant School built in 1925. The remaining schools were all built from the late 1950's to the 1980's, the period in which Nashua' s population exploded. Most of the older schools have had several additions and renovations to increase their capacity and upgrade their facilities to modern standards.

The city is divided into several school districts that demarcate the area served by the elementary and junior high (or middle) schools. (Map II-6) The main high school, with a total capacity of 2,800, serves the entire city . The grade structure of the three main school levels, elementary, junior high and high school is as follows; elementary is grades K - 6, junior high school is grades 7, 8 and 9, and high school is grades 10, 11 and 12. This grade configuration may be modified in the near future to address capacity problems.

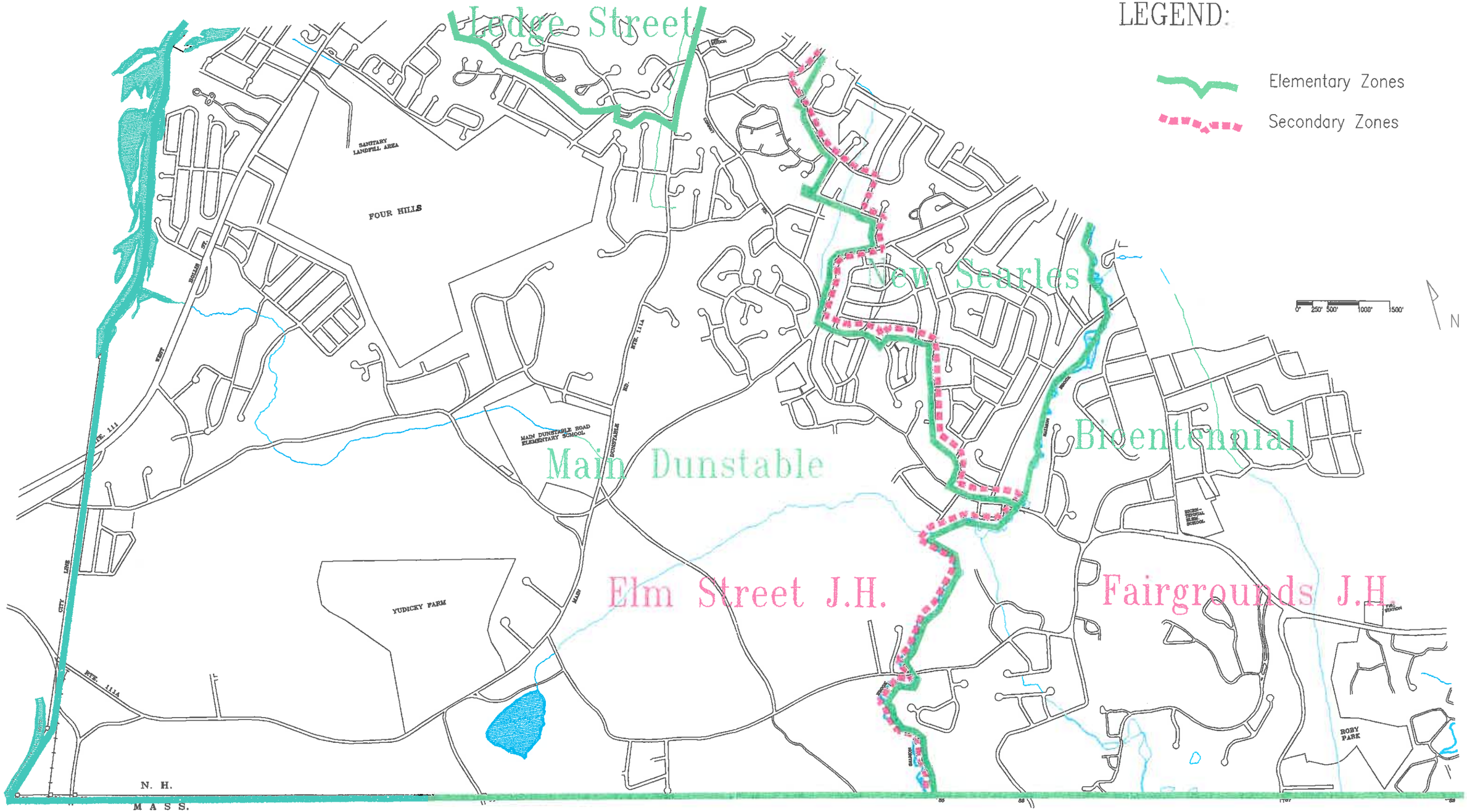
In the present configuration, 62% of the students are found at the elementary level, 20% at the junior high level and 18% at the high school level. The only level currently not experiencing capacity constraints is the high school. Nashua High has a current enrollment of 2,190 with a capacity of 2,800 students. By the year 2000, enrollment there is projected to reach 2,637, closer to capacity but still within a comfortable margin. However, at the elementary school level, the situation is much different. It is at this level that the most serious capacity problems currently exist.

The twelve elementary schools have a capacity of 7,075 students, against a current enrollment of 7,767. The elementary schools in aggregate are thus 692 students over capacity. This overflow has resulted in the need for expansions and portable classrooms at most of the elementary schools. 28 portable classrooms are now in use throughout the city, all at the elementary level.

Capacity problems at the schools are in large part the result of the rapid growth Nashua experienced in the mid-late 1980s. In 1985 elementary enrollment stood at 5,039, compared to a current enrollment of 7,767; an increase of 54% over this ten-year period. Much of the growth affecting the school system took place in the southwest quadrant, where three elementary schools are found.

These three schools are the Main Dunstable School, with a capacity of 685 students, the New Searles School with a capacity of 570 (after ongoing renovations) and the Bicentennial school, with a capacity of 640. The total enrollment at the three schools as of 1995 is 2,163, which is 268 over the aggregate capacity of 1,895. Three portable classrooms have been sited at the Main Dunstable School, and six at the Bicentennial School.

Because of this capacity shortfall, the school department is considering siting either an additional elementary or middle school in the southwest quadrant.



Nashua, New Hampshire

S.W. Quadrant Master Plan

City of Nashua Planning Department 1995

MAP II - 6
Educational Zones

C. The Build-Out Scenarios and Impact Analysis

1. The Build-Out Scenarios

To discover the possible effects of future growth and land use change on the southwest quadrant and the City, it was necessary to model several scenarios of how that development could occur. It was decided that the best way to approach this exercise would be by considering a wide range of possible development scenarios, from extensive low-density rural development, similar to that found in the abutting Town of Hollis, to extensive use of the Planned Residential Development (PRD) option, which would result in the highest densities and numbers of units. Between these two extremes are scenarios based on the existing 1994 zoning ordinance and the recommendations of the Future Land Use Plan of the 1985 Master Plan. The area modeled in each scenario was the same throughout, and consists mostly of land in the southwest corner subarea, where most of the subdividable, developable land is found.

It was first necessary to find the areas that would be considered unbuildable by virtue of wetland soils and degree of slope. Areas with slopes over 20% were identified using the United States Geological Survey (USGS) composite topographic map for Nashua. Wetlands were considered all soils designated as poorly drained or very poorly drained on the Soil Conservation Service (SCS) maps. The City of Nashua wetlands ordinance defines wetlands according to the Federal Manual that uses the three-part definition of hydrology, wetland vegetation and associated wetland soils. However, the City has not yet comprehensively mapped these areas (only prime and critical wetlands as defined in the ordinance have been mapped). Therefore, the next best method was to use hydric or wetland soils as the criteria.

The area of each wetland and steep slope zone was calculated using a planimeter and entered onto a spreadsheet developed for the subdividable parcels and the build-out analysis. These spreadsheets include fields for the sheet and lot number, city account number, zoning district, land use code, land owner, location, land area, wetland area, steep slope area, and the total unbuildable area of all parcels.

A build-out study is an exercise in which a town or city's existing zoning ordinances and subdivision regulations (or modifications thereto) are applied to undeveloped areas to illustrate the pattern that development could take when all the remaining buildable land has been developed. It does not predict *when* final build-out will occur, but shows a possible end result in terms of the number and arrangement of dwelling units, non-residential development and the estimated number of residents and school children. A build-out study can be done for an entire town or city, or a part of it.

There are two major forms of build-out study: numeric and graphic. A numeric build-out is based on taking measurements of unbuildable areas such as wetlands, and then calculating the net buildable area. By applying the zoning and subdivision dimensional standards to the net buildable area, it is possible to find out how many units the area can theoretically support. A graphic build-out consists of drawing hypothetical development on a base map to show how it could be arranged, given the applicable zoning and subdivision standards. The results of a graphic build-out show one possible example of how development could be arranged in the future. However, since there are nearly limitless ways in which new subdivisions can be arranged, the development that eventually occurs may differ substantially from that shown on a build-out map.

The possible number of dwelling units calculated in a numeric build-out is generally higher than that shown through a graphic build-out, because many limitations of development regulations, such as the maximum allowable length of a col-de-sac, are difficult to consider in a mathematical model. In most build-out studies an attempt is made to maximize development. In other words, the aim is to get as many new lots/units on developable parcels as possible, given the constraints of the zoning ordinance and subdivision regulations. One of the most interesting analyses that can be performed with the build-out technique is the modeling of different scenarios. Various scenarios can have their own set of guiding assumptions and dimensional standards, and the results can be used by decision makers in deciding the best density for an area, or in deciding which modifications should be made to the zoning ordinance to cause the desired change.

The build-out exercises for the Southwest Quadrant study consisted of the generation of several different scenarios. The first of these was to model build-out under the existing zoning ordinance and subdivision regulations (as of June 1994). This scenario was modeled both numerically and graphically. The second scenario was to model the effects of widespread cluster and PRD development. A key assumption in this model was that PRDs and Cluster subdivisions would be developed wherever possible by the standards of the zoning ordinance. This scenario was numerically modeled with a low, medium and high range, given the potential for a density bonus as explained in the zoning ordinance. As the analysis went on, it became evident that the PRD-Med and High density versions were unrealistic in terms of the density of units and potential impacts, so a decision was made to limit further consideration of this scenario to the low density version. The graphic version of the PRD build-out shows a maximization of development at the high end of the range, in keeping with early assumptions. The third scenario was to model the effects of rezoning the remaining developable land to 2 acre lot size zoning, similar to that found in the abutting Town of Hollis. The fourth scenario was to model the recommendations of the 1985 Future Land Use Plan of the 1985 Master Plan.

The 1985 Master Plan recommended that a significant portion of the land presently zoned for 30,000 and 40,000 square foot house lots be rezoned to permit smaller lots, in the 9,000 - 18,000 square foot range. This would provide more opportunities for affordable housing in a market where prices were escalating out of control. Since a Master Plan is considered an indication of the desires of the community, it is important to understand what the effects of the 1985 Master plan would be if its blueprint for development were closely followed.

Several assumptions and conditions were made for each build-out scenario. A few were shared by all of the scenarios, while others are unique to each. The assumptions common to all scenarios are:

a. *Build-out Assumptions Common to all Scenarios*:

- Pennichuck water service will be made available to all development.
- An attempt was made to maximize the number of units possible through the zoning ordinance and subdivision regulations in effect, or as modified for each scenario.
- The existing sewer capacity, without the provision of a new trunk line or major upgrade to the existing trunk lines, will be extended. This represents about 1,000 units worth of capacity for the easterly sewer basin, SW-2.
- The placement of roads and units is entirely hypothetical and is not intended as a master plan for development of the area, but rather is intended to show how development might occur in response to the assumptions of the scenario.
- Parcels were "subdivided" according to ownership patterns. In other words, when a parcel does not border another parcel in the same or family ownership, the subdivision of that parcel will take place internally. Adjacent parcels in the same or family ownership were developed together as one parcel, whenever doing so maximized the number of units that would result from subdivision.
- No building will occur on wetland (hydric) soils or on slopes over 20%. However, wetland crossings were used when needed to reach large areas of buildable upland.
- For the numeric build-outs, it was assumed that 10% of the parcel or tract for development would be set aside for roads when subdivision of that tract required a road to maximize the number of units.

One of the reasons for doing the build-out study was to project the effects of each scenario on city services and facilities, especially schools. Following this analysis, it was possible to recommend changes to the regulations that would facilitate development according to the desired scenario or land use ideal. Before that assessment could begin, however, it was necessary to calculate the total population and number of school aged children generated by each scenario.

One of the most important components of this task was determining the multipliers used in calculating the number of public school children and the total population resulting from development. A multiplier is a number that is multiplied by the number of possible housing units in order to give a reasonable estimate of the new, post development, population and/or the number of SAC. One can derive multipliers from locally obtained data or from the available planning literature, such as Listoken and Burchell's Fiscal Impact Handbook. Locally-derived multipliers are generally more accurate, provided they were calculated using sound methodology.

For this study, **population** multipliers were calculated by the consulting firm Applied Economic Research, (AER), which was hired by the City to evaluate the feasibility of an impact fee system. AER used 1990 census data and examined the population of census tracts that were predominantly single family or multi-family. Multipliers were obtained by dividing the number of units by the population in the tract. The population multipliers used in this study are 3.04 persons per dwelling unit (ppdu) for single family homes, 2.475 ppdu for townhouses and 1.91 ppdu for garden-style units.

The calculation of the public **school-aged children (SAC)** multiplier is often more difficult. AER originally calculated these multipliers using the 1990 census data in a manner similar to that used in deriving the population multipliers. The result was a multiplier of .55 public school-aged children per dwelling unit for single family homes, and .18 for multi-family units. After test running these multipliers against the build-out scenarios, and researching the recent experience of nearby communities such as Milford, Planning Department staff felt that these multipliers were low. As a result, staff decided to develop a "second opinion" locally derived multiplier for single family homes. This multiplier was found by identifying neighborhoods where all the school aged children were bused to school by virtue of being outside the walking zones. Once these areas were located, staff obtained a report from the City's Management Information Services (MIS) department, listing the number and type of homes on the street or street segment. Using this approach, it was possible to derive a refined City-wide multiplier of .665, and a southwest quadrant multiplier of .743 public SAC per single-family household. These numbers were acceptable to AER.

TABLE II - 3

ADDITIONAL POPULATION AND NUMBER OF SCHOOL-AGED CHILDREN GENERATED IN THE SW QUADRANT ACCORDING TO THE BUILD-OUT SCENARIOS AND POPULATION AND SCHOOL CHILDREN MULTIPLIERS

ASSUMPTIONS: Standard subdivisions in the R-9, R-18, R-30 and R-40 districts will be comprised of single family homes exclusively, per the requirements of the Nashua Zoning Ordinance. Cluster subdivisions will also be comprised solely of single family homes. The mix of unit types in PRDs has been revised from the 15% single-family, 85% multi-family (attached) applied previously. The new mix is as follows: PRD low density: 50% SF, 30% Townhouse, 20% Garden (attached apts.) units; PRD medium density: 30% SF, 50% Townhouses, 20% Garden (attached apts.); PRD high density: 20% SF, 50% Townhouses, 30% Garden. The school aged children (SAC) multipliers are as follows: SF Homes: .734; Townhouses: .29; Garden Style: .13. The population multipliers are as follows: SF Homes: 3.04; Townhouses: 2.475; Garden Style: 1.91.

SCENARIO:	EXIST. ZON.	2 ACRE ZON	85' FUTURE LAND USE	PRD-CLST / LOW
TOTAL # OF UNITS:	**1,103**	**361**	**1,966**	**4,358**
# of SF Homes:	1,103	361	1,355	2,179
# of Townhouses:	0	0	611	1,307
# of Garden Style Units:	0	0	0	872
Pop. S.F. Homes:	3,353	1,097	4,119	6,624
Pop. Townhouses:	0	0	1,512	3,235
Pop. Garden Style:	0	0	0	1,666
TOTAL POPULATION:	**3,353**	**1,097**	**5,631**	**11,525**
# OF S.A.C. S.F. Homes: (.743 SAC Mult.)	820	268	1,007	1,619
# OF S.A.C. Townhouses: (.29 SAC Mult.)	0	0	177	379
# OF S.A.C. Garden Style: (.13 SAC Mult.)	0	0	0	113
TOTAL S.A.C.:	**820**	**268**	**1,184**	**2,111**

Note: The above numbers are for new, not yet approved, units only. The purpose of the data was to help choose between development scenarios, where the number of new units is the important variable.

C: POPKD2.WK3

As seen in the preceding table, the range of single family homes is much narrower than the range of multi-family units. The only exception to this rule is the 2-Acre zoning scenario that generates 361 single family homes and no multi-family units. The range of single family homes from the existing zoning scenario to the PRD scenarios is 1,103 to 1,375. The range of multi-family units for the scenarios generating such units is 611 to 4,298. The difference in the ranges can be explained by the proportion of units that are single-family and multi-family in each scenario. In reviewing the historical ratios of single family detached units to multi-family units in PRDs developed in Nashua over the last 15 years, staff has found that on average 15% of the homes were single family detached homes and 85% were attached or multi-family units. The attached or multi-family units consist of both townhouses and garden-style units. In developing the scenarios, the approximate percentage of each type of housing had to be assumed. The percentage of each unit type changes in each PRD scenario, based on what was deemed reasonable by staff.

A.E.R.'s analysis breaks the multi-family or attached units into two subcategories: townhouses and garden-style units, each with its own population and school-aged children multipliers. It seemed reasonable to assume that the PRD-Low scenario would have the highest percentage of single family homes (50% of total units), with the PRD-Med at 30% and PRD-High at 20%. The PRD-Med and High scenarios have the highest percentage of townhouse units, at 50%; while the PRD-Low is 30% townhouses. The greatest number of garden-style units is found in the PRD-High scenario, at 30%; with both the PRD-Med and Low having 20% garden-style units.

2. Impact Analysis

It was decided that the major issues facing the southwest quadrant fall into six major categories: fiscal impacts, traffic impacts, environmental impacts, land-use patterns, city sewer system related impacts and school impacts. The various types of impact were then rated in order of importance using a weighted-average prioritization matrix. Fiscal impacts were rated as highest priority, followed in order by school impacts, land-use patterns, environmental impacts, traffic impacts and finally sewer system impacts. For example, in considering the different impacts, fiscal considerations were to be given more weight than traffic impacts. These priority levels were designed to assist in the selection of a"Planner's Preferred Scenario", which was the first attempt at a Future Land Use Plan. Details of this scenario can be found in the Technical Reference.

Most of the issues and impacts can be considered from two perspectives; the situation at the end of the build-out period, and the incremental impacts that accrue year by year. Most of the analysis in this report is given from an "at build-out" perspective, though incremental school and fiscal impacts were also considered. Rather than describe each analysis and its results, a summary of the impacts is found in the table on the next page. For a full description of the analysis and decision making process, please prefer to the Technical Reference of the Southwest Quadrant Master Plan. Details of each scenario's demographics and associated impacts can be found in the Technical Reference. This document will provide details of the final chosen Future Land Use Plan only. Most of the tables in part E compare features of this Plan with those of several other scenarios, usually the Existing Zoning, 2-Acre Zoning and 1985 Master Plan scenarios. Therefore, it will be possible to examine the relative impacts of several scenarios without consulting the Technical Reference. The process of narrowing the choices and deriving the Future Land Use Plan is covered in the next section.

MATRIX OF IMPACTS TO CONSIDER FOR THE BUILD-OUT SCENARIOS: TABLE II - 4

Notes: This table represents a simplified version of both quantitative and qualitative impacts as they were estimated in 1995. The fiscal impacts were updated for the latest calculations as of April, 1996. This table gives end of build-out impacts. The school impacts include those from ANB units.

SCENARIO	FISCAL IMPACTS	TRAFFIC IMPACTS	ENVIRON-MENTAL IMPACTS	LAND-USE PATTERNS	CITY SEWER (Issues / Extension)	SCHOOLS
Existing Zoning (1,103 Units 820 S.A.C. 3,353 pop)	Annual deficit of $1.35 million at total build-out. The total capital impact is $13.5 million by the time of total build-out.	Spit Brook Road both east and west of the turnpike is over capacity. Routes 111 and 111A are at half capacity, compared to 40% at present.	Widely scattered conventional devt. results in forest fragmentation, loss of open space and wetland edges, increased siltation of streams and water bodies.	At total buildout the SW corner is similar in appearance to the northern parts of the quadrant. Large wetland areas and public land may help to break up the sprawl to some extent.	Total number of units nearly equally divided between SW-1 and SW-2. 1,029 units would be sited in these unsewered areas. These could be accommodated without major upgrading to the sewer interceptor system.	920 new students, nearly 550 of which are at the elementary level. 54 new teachers and 37 additional classrooms needed. School capital costs total $5.7 million dollars.
2 AcreZoning (361 Units 268 S.A.C. 1,097 pop)	Annual deficit of approximately $500,000 at the time of final build-out. Total capital impact of $2.9 million.	Similar to existing zoning, though volume/capacity ratios are less.	Env. Impacts are similar in scope but quantitatively less than existing zoning. More apt to keep land between subdivisions open.	Similar to the "suburban" areas of Hollis. The opportunity exists to retain some rural character.	2 acre lot sizes could justify leaving either SW-1 and/or SW-2 unsewered. A widely scattered land-use pattern may make it hard to justify extension of the sewer lines.	370 new students. 22 new teachers and 15 classrooms required. School capital costs total $1.87 million per the multiplier method.
1985 Master Plan (1,966 Units 1,184 S.A.C. 5,631 pop)	Annual deficit of $840,000at the time of final build-out. Total capital impact of $18.7 million.	Very close to the existing zoning traffic impacts. 111A receives the greatest impact, going from 51% to 69% vol/cap ratio.	Very similar to existing zoning but quantitatively greater. Very little contiguous open space is apt to be preserved outside of wetlands.	VERY suburban for the most part, with urban housing densities in areas rezoned to R-9.	Under this scenario, upgrades to the interceptor system would be required to service the 860 units over the 1,000 unit capacity of the present system.	1,285 new students, with 770 in elementary schools. 76 new teachers and 51 classrooms required. Capital costs total $8.28 million.
PRD / CLUSTER Low Density (4,358 Units, 2,111 S.A.C. 11,525 pop)	Annual deficit of $1.7 million at the time of final build-out. Total capital impact of nearly $44.7 million.	The impacts to Spit Brook road are slightly higher than existing zoning, and the vol/cap ratio for 111A increases from 51% to 64%.	Along with extensive conventional devt. would have the greatest env. impact. However, with flexible design the opportunity to save some open areas exists. Greater use of the PRD option could also save open areas.	In combination with extensive conventional devt. would be very suburban. However, coordinated planning of several PRD tracts could retain some rural character and lessen sprawl.	This scenario would require major upgrading of the existing interceptors and placement of new ones. The 4,246 units in the unsewered areas represent a four-fold increase over the capacity of the existing system.	2,111 new students. 124 new teachers and 84 classrooms required. The school capital costs total over $14.6 million dollars, enough for 2 elementary schools or a combination elementary-middle school.

D. Workshop Meetings and Fine-Tuning of the Future Land Use Plan

During the fall of 1994, planning department staff performed detailed build-out and impact analyses for all of the original scenarios: Existing Zoning, 2-Acre Zoning, 1985 Master Plan and the three PRD scenarios, which were eventually reduced to just the PRD-low density option. The most important impacts studied were school system impacts and incremental and long-term fiscal impacts. During the winter of 1994-95, planning department staff set priorities for the different categories of impact and then produced a "Planners' Preferred" scenario, a hybrid scenario that blended features of the Existing Zoning, 2-Acre Zoning and 1985 Master Plan scenarios. This scenario was put forth as a tentative, draft Future Land Use Plan that would be presented in the first complete draft of the Southwest Quadrant Master Plan Update. This first draft was completed in April 1995.

Pursuant to state law, the Nashua City Planning Board assumed responsibility for updating the Master Plan. During the early stages of researching and developing the initial draft, the Aldermanic Planning and Economic Development Committee (APEDC) served as the catalyst, holding regular meetings to discuss all aspects of the Plan. Concurrently, the Planning Board held numerous discussions, and was kept up to date by staff on developments in the analysis.

The first draft of the Plan was distributed for comment to the Planning Board, the Board of Aldermen, the Zoning Board of Adjustment, Conservation Commission, Mayor's Office and the heads of most of the City's departments, in late April 1995. The Planning Department staff, Planning Board, and the APEDC submitted the most comments, resulting in a consensus that a lower density scenario is desired, one approaching the two-acre scenario in terms of density, number of units and overall impact. The "Planners' Preferred", while deemed to be a better choice than any of the original scenarios, was felt by most to have too large of a negative impact to truly be a preferred choice as a Future Land Use Plan. Planning Department staff then set out to develop a revised Future Land Use Plan that would address the comments and concerns of the participants.

An ad hoc committee consisting of the Nashua City Planning Board and representatives of the APEDC, Conservation Commission, Zoning Board of Adjustment and School Board, met in a series of meetings starting in May of 1995 to participate in, review and fine tune the development of a Future Land Use Plan for the Southwest Quadrant Master Plan Update. This Plan, which will be presented in the remainder of this document, represents the majority view of this Committee. This revised Future Land Use Plan was presented at a Public Hearing on September 7, 1995.

The following section details the demographics and associated impacts of the Future Land Use Plan. The actual land use recommendations based on these findings will be presented in the next chapter.

E. Demographics and Impacts of The Future Land-Use Plan at Build-Out

1. General Features

Like the earlier "Planners' Preferred" scenario, the Future Land Use Plan is a hybrid scenario in that it is not strictly one of the scenarios studied in the build-out analysis. However, while the earlier scenario was largely a mix of the Existing Zoning and 1985 Land Use Plan scenarios, this Plan falls between the 2-Acre Zoning and Existing Zoning scenarios in terms of the number of units and their associated impacts. The review committee noted that the 2-Acre Zoning scenario had the most favorable fiscal impact of all of the scenarios, and that the Future Land Use Plan should tend towards its density, at least over a majority of the area, in order that favorable fiscal impacts be realized. At the same time, the committee realized that applying the 2-Acre scenario over the entire southwest corner was neither feasible or practical, and that a balance had to be struck. This Plan attempts to strike that balance between fiscal considerations, likely extensions of the sewer system and the higher densities that would allow, landowner rights, environmental concerns, transportation concerns, economic development and land use pattern concerns. This section will describe the demographics and associated impacts of this Plan, while the actual land use recommendations, and the recommended land use maps, appear in the next chapter.

The method used to calculate the estimated number of dwelling units of various type is based on the graphic build out techniques described in the Technical Reference. The estimated number of units found in the numeric build out tables was compared to what was known about each parcel in terms of access, unbuildable area, presence or absence of utilities etc... . The numbers were further refined by considering what effect a higher or lower density scheme would have on the possible number of units. The rough borders of the various density areas were then set and the final numbers tallied.

There are two density categories for residential areas:

- Low (or rural) Density Residential, with an average density of .5 units per acre
- Medium Density Residential, with an average density of 1.5 units per acre

In addition to the residential areas, the Plan identifies a small (roughly 40 acre) area as a Mixed-Use Village-Commercial District ("Village District") which could include retail uses, a park or playground, attached townhouse, garden and/or elderly housing units and possibly a municipal use, such as a new school or fire station.

The Future Land Use Plan does not set exact boundaries for these areas, nor does it provide specific zoning standards. Rather, it gives options as to how these density goals can be achieved, and suggests the general areas where various land uses and densities should be located. Two Future Land Use Maps appear in the next chapter. The first is a detailed, specific map for the southwest corner, and the other is a map of the entire southwest quadrant.

It is estimated that under the recommended densities of this Plan, approximately 860 new single family homes could be built in this area by the time of final build-out, which is estimated to take from 12 - 15 years from now (1995). In addition to the single family homes, approximately 100 garden, townhouse and/or elderly housing units are envisioned for the "Village District".

It was noted in reviewing the April draft of the Southwest Quadrant Master Plan Update that the build-out, demographic and fiscal impact analyses done previously did not fully account for all of the units approved in the last several years, but not yet built, the "approved but not built" (ANB) units. So that this Plan is as accurate as possible, planning staff determined the number of ANB units found in the southwest corner and added them to the total. Table II-5 on the next page lists the demographic characteristics of the Recommended Future Land Use Plan and compares these to the characteristics of the Existing Zoning, 2 Acre Zoning and the 1985 Land Use Plan scenarios. The numbers in the table are estimates, and reflect the situation at the time of build-out, when most or all of the available, subdividable land has been built on. The main demographic features of the Future Land Use Plan are summarized below:

DEMOGRAPHIC FEATURES OF THE FUTURE LAND USE PLAN AT BUILD-OUT

- 860 single family homes from new development
- 122 ANB single family homes
- 100 Townhouse or multi-family units from new development
- 87 ANB Townhouse or multi-family units
- 3,448 additional people in the southwest corner
- 758 additional school aged children in the southwest corner, 455 at the elementary level and 152 each at the junior high and high school levels

It was then important to estimate the number of units built per year. In keeping with the style of the earlier analysis, a straight line method was used to project growth. Given a fifteen-year build-out horizon, it was assumed that over the period there will be on average 67 single family homes, 9 townhouse units and 3 garden-style units built per year in the southwest corner study area. Table II-6 on page 67 shows the yearly and cumulative number of units toward build-out.

TABLE OF FUTURE LAND-USE PLAN DEMOGRAPHICS

TABLE II - 5

ASSUMPTIONS: Standard subdivisions in the R-9, R-18, R-30 and R-40 districts will be comprised of single family homes exclusively, per the requirements of the Nashua Zoning Ordinance. Cluster subdivisions will also be comprised solely of single family homes.
The mix of unit types in PRDs has been revised from the 15% single-family, 85% multi-family (attached) applied previously.
The new mix is as follows: PRD low density: 50% SF, 30% Townhouse, 20% Garden (attached apts.) units;
PRD medium density: 30% SF, 50% Townhouses, 20% Garden (attached apts.); PRD high density: 20% SF, 50% Townhouses, 30% Garden.
The school aged children (SAC) multipliers are as follows: SF Homes: .734; Townhouses: .29; Garden Style: .13.
The population multipliers are as follows: SF Homes: 3.04; Townhouses: 2.475; Garden Style: 1.91.
The Future Land-Use Plan consists of 860 SF Homes and 100 Townhouses, Garden and/or Elderly units; for a total of 960 new units.
The demographic and school multipliers were then applied to these figures in the same manner as for the other scenarios.

SCENARIO	EXIST. ZONING	2 ACRE ZONING	1985' LAND-USE	REC. FUTURE LAND-USE
TOTAL # OF NEW UNITS:	1,103	361	1,966	960
TOTAL OF ALL UNITS ^	1,312	570	2,175	1,169
Final # of new SF Homes:	1,103	361	1,355	860
# of "ANB" SF Homes * :	122	122	122	122
Final # of Townhouses and Multi's under build-out:	0	0	611	100
# of "ANB" Townhouses and Multi's * :	87	87	87	87
Final Pop. S.F. Homes:	3,724	1,468	4,490	2,985
Final Pop. Townhouses and Multi's:	215	215	1,728	463
FINAL POPULATION:	3,939	1,684	6,218	3,448
Final # OF S.A.C. S.F. Homes: (.743 SAC Mult.)	820	268	1,007	639
Final # OF S.A.C. Townhouses: (.18 SAC Mult.)	0	0	177	18
S.A.C. from "ANB" units * :	101	101	101	101
TOTAL S.A.C.:	921	369	1,285	758

NOTES: * means "approved but not built" (ANB); units approved in the past which will be adding students to the school system but which do not fall under the "Future Land-Use Plan".
The calculation for the ANB SAC's is as follows: 87 x .13 (for Sky Meadow Units) = 11 SAC
122 x .743 = 90 SAC for ANB SF Homes. The total is 101.

^ Includes the "Approved But Not Built" (ANB) units.

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TABLE II - 6

FUTURE LAND-USE PLAN UNITS OVER TIME

NOTE: The assumption is that Southwest Quadrant build-out is reached in 15 years, by the year 2010.

YEARS HENCE	YEAR	S.F. UNITS	CUM.TOTAL	TNHS UNITS	CUM.TOTAL	GRDN UNITS	CUM.TOTAL	TOTAL CUM. UNITS
1	1996	67	67	9	9	3	3	79
2	1997	67	134	9	18	3	6	158
3	1998	67	201	9	27	3	9	237
4	1999	67	268	9	36	3	12	316
5	2000	67	335	9	45	3	15	395
6	2001	67	402	9	54	3	18	474
7	2002	67	469	9	63	3	21	553
8	2003	67	536	9	72	3	24	632
9	2004	67	603	9	81	3	27	711
10	2005	67	670	9	90	3	30	790
11	2006	67	737	9	99	3	33	869
12	2007	67	804	9	108	3	36	948
13	2008	67	871	9	117	3	39	1,027
14	2009	67	938	9	126	3	42	1,106
15	2010	67	**1,005**	9	**135**	3	**45**	**1,185**
16	2011							
17	2012							
18	2013							
19	2014							
20	2015							
	TOTALS:	1,005		135		45		

NOTE: The above numbers include both totally new units and units/lots that have been approved but not built on as of 1995.

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2. School Issues

The question of school capacities and the need for a new school in the southwest quadrant is one of the most important issues that the City will be facing in the near future.

The School Department is planning the construction of a new southwest quadrant elementary school that could become operational by 1997-1998. This school will have a capacity of approximately 750 students. One of the purposes of constructing this new school is to relieve overcrowding at the other schools in the southwest quadrant. The three schools; Main Dunstable, New Searles and Bicentennial, are approximately 268 students over their total recommended capacity. These students must currently be taught in portable or overcrowded standard classrooms. Table II - 7, below, shows how the school capacities were calculated.

TABLE II - 7

ELEMENTARY SCHOOL CAPACITIES IN THE S.W. QUADRANT

SCHOOL	EXISTING REC. CAPACITY	'94 - 95 ENROLLMENT	AMOUNT OVER + OR UNDER - CAP.
Main Dunstable	685	824	+ 139
New Searles	570	508	- 62
Bicentennial	640	831	+ 191
TOTALS:	**1,895**	**2,163**	**+ 268**

NOTE: The existing recommended capacities were taken from the School Department commissioned report of Frank Marinace, 1994. Enrollment figures for 1994-95 are from the school department.

If all of the overcrowded classrooms are reduced and the existing portables retired, 268 students worth of capacity would be immediately available for the new (1997-98) elementary school planned for the southwest quadrant. Subtracting this from the planned capacity of 750 students, the "opening" capacity of the new elementary school would be 482 students. There is, however, a complicating factor in this analysis. There are presently 178 students in the northwestern part of the southwest quadrant (the area between the Four Hills Landfill and the Turnpike) bussed to the Ledge Street School outside the quadrant. These students technically live in the southwest quadrant, so it is possible that they may be brought into the new school.

This "redistricting" happens periodically, and is one tool used by the School Department to balance out the enrollment levels at schools throughout the City. If these 178 students were brought into the new school, the opening capacity would fall to 304 students. This is a factor that must be kept in mind when considering school enrollment trends. For now, however, it will be assumed that the initial capacity of the new school will be 482 students. When would the new school be filled to capacity based on the demographics of this Plan? To determine this time threshold, it was first necessary to derive the likely number of elementary students from the total population of school aged children. Based on historic averages, it was assumed that 60% of the total student population would be elementary students in any given year. Of course, this will vary in actuality, but over time this average should hold true.

60% of the total estimated number of additional SAC (758 students), yields 455 students at the elementary level. Subtracting these 455 students from the 482 student "opening capacity" gives a 27-student margin of safety for operation of a new elementary school at build-out. Therefore, it appears that this Future Land Use Plan allows for the full utilization of a new school, without much threat of requiring a second new school further into the future. This assumes that birth rates will not rise dramatically and that the present ratio of elementary students to total students remains fairly steady.

The situation as described above would change, however, if the 178 students currently attending the Ledge Street School were redistricted to the new southwest quadrant elementary school. The effect of those additional students would be to fill the new school sooner than just described. The School Department and the City should monitor growth and the number of students closely in order to effectively plan for future school facilities in the southwest quadrant.

The question of where this new school should go, and how it should be planned in relation to other land uses, will be taken up in the next chapter. Table II-8 on the next page shows the school aged children distribution for both the Future Land Use Plan and several other scenarios.

TABLE II - 8

DISTRIBUTION OF PUBLIC SCHOOL-AGED CHILDREN IN THE 3 MAJOR GRADE LEVELS OF THE NASHUA SCHOOL SYSTEM: ELEMENTARY, JUNIOR HIGH AND HIGH SCHOOL.

ASSUMPTIONS: The ratio of students at each level was found to be very close to the following: Elementary School, 60% of total students, Junior High School, 20% and High School, 20%. These ratios were applied to the total number of public SAC calculated for each scenario. Elementary School includes Kindergarden and Readiness levels. These numbers represent the number of SAC in each major level at the time of total Build-Out according to each scenario. An analysis of the timing of SAC increases will be conducted seperately. These numbers will be compared with the available capacity of each grade level in the school system.

SCENARIO:	EXIST. ZONING	2 ACRE ZON	85' FUTURE LAND USE	FUTURE LAND-USE PLAN
TOTAL S.A.C.: (Note: Includes SAC from Build-out plus "ANB" units)	921	369	1,285	**758**
# OF SAC IN ELEMENTARY SCHOOL:	553	221	771	**455**
# OF SAC IN JUNIOR HIGH SCHOOL:	184	74	257	**152**
# OF SAC IN HIGH SCHOOL:	184	74	257	**152**
IMPACT OF ADDTL. SAC ON DEMAND FOR NEW TEACHERS AND CLASSROOMS:				
ADDTL. TEACHERS REQUIRED: (at 17 SAC / Teacher, overall)	54	22	76	**45**
ADDTL. CLASSROOMS REQUIRED: (at 25 SAC / Classroom, overall) (Classroom could also read "teaching station")	37	15	51	**30**

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3. Sewer line issues

As discussed previously, the unsewered portions of the southwest quadrant can be divided into two basins based on groundwater divides. In the westerly basin, SW-1, wastewater flows north to meet the West Hollis Street interceptor. In the easterly basin, SW-2, wastewater flows east-northeast to the Salmon Brook interceptor.

One of the major issues raised was how far to extend the sewer lines. Should both basins be sewered? Should only one basin be sewered? Should only part of a basin be sewered? Fully utilizing the capacity of the Salmon Brook interceptor, which is estimated at 1,000 additional units, would reduce the per unit cost of hooking into the system by spreading operating and capital costs over more rate payers. Exceeding the capacity of the interceptor would require the construction of parallel relief interceptors along the existing interceptor lines.

Based on an analysis of costs and the land use implications of sewering different areas, it was agreed that sewer should be extended only into that part of basin SW-2 north of Ridge Road and east of Buck Meadow Road. A full presentation of the sewer cost and land use analysis is found in the Technical Reference. A summary of the reasons for limiting the sewer extension in this manner is given below.

- The proposed sewered area serves as a transition between the present R-9 zoning district and proposed areas of lower density to the west and south.

- By providing sewer in this area, the proposed commercial / village center (to be discussed in the next chapter) and the new school could also be easily served.

- By extending the gravity flow sewer system out to Main Dunstable Road, the existing pump station serving the Main Dunstable School and nearby residential areas could be eliminated.

- The number of potential new units to be provided with sewer in the area described above is about 450. In addition to these new units, roughly 160 units could be developed in the area just east of Salmon Brook, along with 122 approved but not built (ANB) units. The total number of potential units connecting to this interceptor then approaches 732, still under the 1,000 units worth of capacity threshold.

Table II-9 on the next page gives the sewer service status of parcels/units for the Future Land Use Plan and three other growth scenarios. There are approximately 450 units possible in that part of SW-2 that would be sewered. Table II-10 on page 74 details some of the economics of extending the sewer system. As can be seen, the per unit cost of extending the sewer into SW-2 is lower for the Future Land Use Plan than for the Existing Zoning Scenario, but not as low as for the 1985 Land Use scenario. However, the 1985 Land-Use Plan leaves a very small margin of safety, especially when a new school is considered, and the PRD scenario definitely exceeds the capacity of the Salmon Brook interceptor.