WEST NEWTON NORTH

NEIGHBOURHOOD CONCEPT PLAN

CITY OF SURREY

PLANNING & DEVELOPMENT DEPARTMENT

SURREY
CITY OF PARKS

WEST NEWTON NORTH

NEIGHBOURHOOD CONCEPT PLAN

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SURREY
CITY OF PARKS

Corporate Report

NO: C316

COUNCIL DATE: JUL 2 3 1996

COUNCIL-IN-COMMITTEE

TO:	Mayor & Council	DATE:	July 17, 1996
FROM:	General Manager, Planning & Development	FILE:	2350-006
SUBJECT:	West Newton Neighbourhood Concept Plan (NCP) North Neighbourhood (North of 64 Avenue) Stage I Report		

RECOMMENDATION

The Planning & Development Department recommends that Council:

1. Approve in principle the attached land use plan component (Stage I) of the Neighbourhood Concept Plan (NCP) for the North Neighbourhood of West Newton (Appendix I);

2. Authorize the NCP proponents to complete Stage II of the NCP on the basis of the type, size, densities and location of the specific land uses, road alignments, subdivision concept, and general servicing concepts contained in the Stage I Report (Appendix I);

3. Require the NCP proponents to submit, as part of Stage II report, a comprehensive financial plan demonstrating adequate funding provisions for infrastructure and other amenities.

INTENT

The intent of this report is:

1. To provide an overview of the Stage I NCP for the north neighbourhood of West Newton, including a summary of the planning process and the components of the plan.

2. To recommend approval in principle of the physical plan component of the NCP, in order to permit the NCP proponents with more detailed engineering and financial analyses (Stage II) and to allow the processing of rezoning applications to commence.

3. To provide the background and rationale associated with staff's recommendations.

BACKGROUND

In June 1993, Council approved the West Newton Local Area Plan. The approved plan identifies general land uses and development policies for this new urban community.

In June 1993, Council approved the Neighbourhood Concept Plan (NCP) approach for the implementation of Local Area Plans. There are two NCP areas in West Newton, one is located south of 64 Avenue, bordered by 60 Avenue and 128 Street and the B.C. Hydro right-of-way (South Neighbourhood). The South Neighbourhood NCP received final approval from Council on June 11, 1996. The other is located north of 64 Avenue, bordered by 68 Avenue, 128 Street and the B.C. Hydro right-of-way (North Neighbourhood), and is the subject of this report. (Appendix II).

This Stage I report addresses the land use issues of the North Neighbourhood NCP. Engineering servicing issues and a comprehensive financial plan will be addressed in a future Stage II report.

DISCUSSION

Plan Preparation Process

The West Newton (North Neighborhood) NCP was initiated by property owners representing approximately 75 percent of the land area. In accordance with the process requirements, a steering committee was formed and a planning/engineering consultant (IBI Group) was hired to prepare the NCP. Subsequently, the Terms of Reference was submitted by the consultant.

The preparation of the plan started in September, 1994. The Stage I Plan was submitted in May, 1996 and dealt with land use issues. Subject to a number of minor revisions, a revised final plan was re-submitted in July, 1996 which is satisfactory to the Planning & Development Department.

The formulation of the Land Use Plan included extensive consultation with affected land owners and the general public in accordance with the General Terms of Reference. Two public open houses were held in the West Newton community in October 1994 and March 1995. All property owners and residents within the NCP area as well as those within about 100 metres of the NCP boundary were notified. In addition, local newspapers published notices for the two Public Open Houses.

The public response to both Open Houses was generally positive. Suggestions made at these meetings and in the questionnaire have been incorporated into this Stage I NCP report.

The proponent will hold a third Public Open House to present the final NCP including proposed financial and servicing arrangements prior to the approval of the Stage II report.

Compliance with the West Newton Local Area Plan

The land use and density proposed in the NCP is in general conformity with the West Newton Local Area Plan with the following exceptions which are described in further detail below (Appendix III):

- The NCP proposes less townhouse units than what is indicated in the West Newton Local Area Plan.
- The NCP proposes the elimination of a 4 to 5 acre diamond-shaped park in the northern part of the NCP area.
- The number of cluster housing and compact lot housing units is increased while the number of single family units is proposed to be decreased.

The West Newton (South Neighbourhood) NCP involves approximately 107 acres (43.3 ha) of land. The projected unit yield of 889 dwelling units and population of 2,256 is not significantly different from the West Newton LAP. A comparison of land use statistics is given in Appendix IV.

Following comments from the Parks & Recreation Department, it is proposed that the 4 to 5 acre, diamond shaped park originally proposed in the West Newton Local Area Plan be removed in favour of an expanded park facility on the southwestern section of the NCP. The NCP proposes that the area originally designated for compact lots and cluster housing in the West Newton NCP be expanded and the area designated for single family has been reduced in order to compensate the loss of density through the expansion of park in areas formerly designated for townhouses along 64 Avenue. With the proposed adjustments, the projected population in the NCP has been maintained close to that envisioned in the West Newton Local Area Plan.

Components of the NCP

The NCP is generally divided into two blocks: compact single family and single family lots in the northern block and multiple residential areas of densities from 10 units per acre (u.p.a.) to 45 u.p.a. and a combined 30 acre school (Tamanawis Secondary School) and park site in the Southern Block. (Appendix V).

1. *Northern Block*

The Northern Block proposes approximately 4.6 acres (1.86 ha) of single family housing at 6 u.p.a, 17 acres (6.9 ha) of cluster housing at 10 u.p.a. and 28 acres (11.3 ha) of compact lot housing at approximately 6.5 u.p.a.. The compact lot housing component is proposed to proceed under Comprehensive Development (CD) zoning in order to facilitate the reduced lot sizes. The use of CD Zoning is necessary to implement the intent of the West Newton Local Area Plan in term of increased density and preventing oversized houses. Within this area, the owners will contribute 5% cash-in-lieu towards the parkland acquisition and will set aside at least 10% of the land by restrictive covenant to protect existing trees or replanted trees within the lots. The "target" lot size proposal in the compact lot area is between 4,500 to 5,500 square feet with range of lot frontages from 12.5 metres to 14 metres and minimum lot depths of 34 metres.

2. *Southern Block*

The Southern Block proposed approximately 30 acres (12.1 ha) for a combined school/park site, 5 acres (2 ha) of walk-up apartments at a maximum density of 45 u.p.a., 8.5 acres (3.4 ha) of garden apartments at a maximum density of 30 u.p.a. and 9 acres (3.6 ha) of townhouses at a maximum density of 15 u.p.a. The anticipated densities within the Southern Block are slightly lower than the maximum permitted in the respective zones and this is reflected in the Stage I report.

3. *Single Family Residential Area Design Principles*

In areas designated for single family and compact lot single family, the West Newton Local Area Plan has a policy to discourage the proliferation of unauthorized secondary suites. The intent of the compact lots (RF-G Zone) designated in the Local Area Plan in the north section of the NCP area was to control development of oversized houses, to limit the potential for secondary suites and to achieve some open space and tree preservation.

For single and compact single family residential areas in the northern block of the NCP, it is proposed that an appropriate building scheme be developed in conjunction with the rezoning and subdivision process. Given that this is a new urban area and not an in-fill situation, it is proposed that the future Design Guidelines establish a new residential character. Moreover, concerns expressed by area residents over the proliferation of unauthorized secondary suites and the aesthetic quality of residential design are to be specifically addressed in the Building Design Guidelines to be established in the northern block of this NCP.

The NCP proposes a set of "Design Principles" to guide the development of a Building Scheme which will be used in the compact lot housing areas in the northern block (Appendix VI). Some of the key guiding principles include:

- decreased front yard setback (6.0 metres) with a complimentary increased rear yard setbacks (10 m) to protect existing trees,
- the preparation of an overall landscape concept;
- garages to be placed such that the house becomes the most dominant feature of the property;
- maximum driveway widths of 4.5 metres;
- prohibition of 'basement entry' style homes; and
- prohibition of clay tile roofing materials.

The proposed design principles are intended to establish an aesthetically pleasing, residential form which responds to site characteristics such as existing trees and the narrower frontages proposed in the compact lot area. The small pocket of proposed single family (RF zoned) residential uses is also expected to follow the design principles established in the compact lot area which is the dominant land use in the Northern Block of the NCP.

Regulation of design for Cluster Housing and other forms of multiple residential will be regulated through the Development Permit process. Issues such as the integration of existing trees into proposed site plans will be addressed by applicants through the development permit process.

4. *Road Layout*

The NCP area is well served by arterial and collector roadways. The existing road system is comprised of: 64, 66 and 68 Avenues, and 128 Street. Existing traffic signals are located at the 128 Street/66 Avenue intersection. Other intersections are controlled by stop signs.

A local road system consisting of limited and through locals is proposed for the Northern Block. This proposed road system is designed to provide an efficient and equitable layout connecting 128 Street, 60 and 68 Avenues. The general road pattern is indicated in Appendix V, however, the final road layout will be present in the Stage II NCP report to Council

5. *Parks and Open Space*

The NCP proposes approximately 30.6 acres [12.4 ha] for a combined school and park area. The existing school (Tamanawis Secondary) is 16 acres and the remaining 14.6 acres has been acquired by the City. This combined 30.6 acre site is required to provide sufficient passive and active recreation opportunities for local residents. Main access to the future park facilities will be from 64 Avenue. The Parks & Recreation Department in consultation with the Surrey School District and the community, will

develop a detailed concept plan for the park to meet the recreation needs of the NCP area residents and the community at large.

School Board Comments

Surrey School District No. 36 has commented that elementary students in the area can be accommodated by the Beaver Creek Elementary School. However, the Surrey School District has expressed a preference that the number of single family dwelling not exceed the number established by the West Newton LAP. Due to the elimination of the diamond-shaped park in the Northern Block of the NCP, there has been a resultant increase in the number of single family units. This increase of approximately 8 percent (373 units proposed versus 343 units in the Local Area Plan) is not considered significant.

School District's comments and a catchment boundary/school location map are provided in Appendix VII.

Amenity Provision

The NCP Steering Committee will present complete financial plan to address the provision of identified amenities in a Stage II report. It is anticipated that the amenity contribution package will be similar to the one accepted in the West Newton (South Neighbourhood) NCP.

In-Stream Applications

There are 6 applications currently in-stream in this NCP (Appendix VIII). All "in-stream" development applications proceeding to Council for preliminary approval will be reviewed with respect to their conformity to the approved NCP. Consequently, modifications to existing applications may be necessary to reflect the land uses proposed in this NCP.

Servicing Concepts

The Engineering Department clearly states that significant cash flow shortfalls are projected if the NCPs, currently underway are allowed to proceed to development. It is, therefore, recommended that in addition to the physical plan component, a financial component for each NCP be required to be developed within Council policy of "Development Pay", as soon as possible since Stage I approval creates significant expectation for imminent application processing.

The Engineering Department advises that the general servicing concepts proposed in the Stage I NCP will support the land uses proposed in this NCP. Details of the servicing strategy, solutions for all drainage, utilities and transportation facilities and funding of services will be addressed in Stage II of the NCP. Engineering Department comments on the Stage I NCP are contained in Appendix IX.

Stage 2 NCP

Based upon the framework established in Stage 1 of the NCP, the Stage 2 NCP will include servicing details, phasing, amenity requirements and cost sharing arrangements for services, social amenities and neighbourhood facilities. Stage 2 will also demonstrate how neighbourhood facilities, utilities and services will be provided without undue financial burden on the community at large.

CONCLUSION

The physical plan component of this NCP (Stage I) generally conforms to the West Newton Local Area Plan, and the associated planning process meets the original objectives of the NCP program. The NCP (Stage II) has been prepared and endorsed by a majority of the property owners in the neighbourhood. The NCP's technical components have been developed to a stage which adequately supports the land use configuration proposed.

This NCP represents a majority consensus among the property owners with respect to the subdivision pattern, densities, road alignments, and park and walkway locations. The proponents are in a position to progress to Stage III of the NCP which involves a more detailed analysis of the servicing, design and funding requirements for the neighbourhood.

Lehman O. Walker
General Manager
Planning & Development Department

JP/kms

Appendix I West Newton (North Neighbourhood) NCP - Stage 1 Report
Appendix II West Newton Neighbourhood and Subject NCP Area
Appendix III West Newton Local Area Plan
Appendix IV Land Use Statistic NCP vs. LAP
Appendix V Proposed NCP Land Uses
Appendix VI Subdivision and Design Principles
Appendix VII School Board Comments
Appendix VIII In-stream Applications
Appendix IX Engineering Comments

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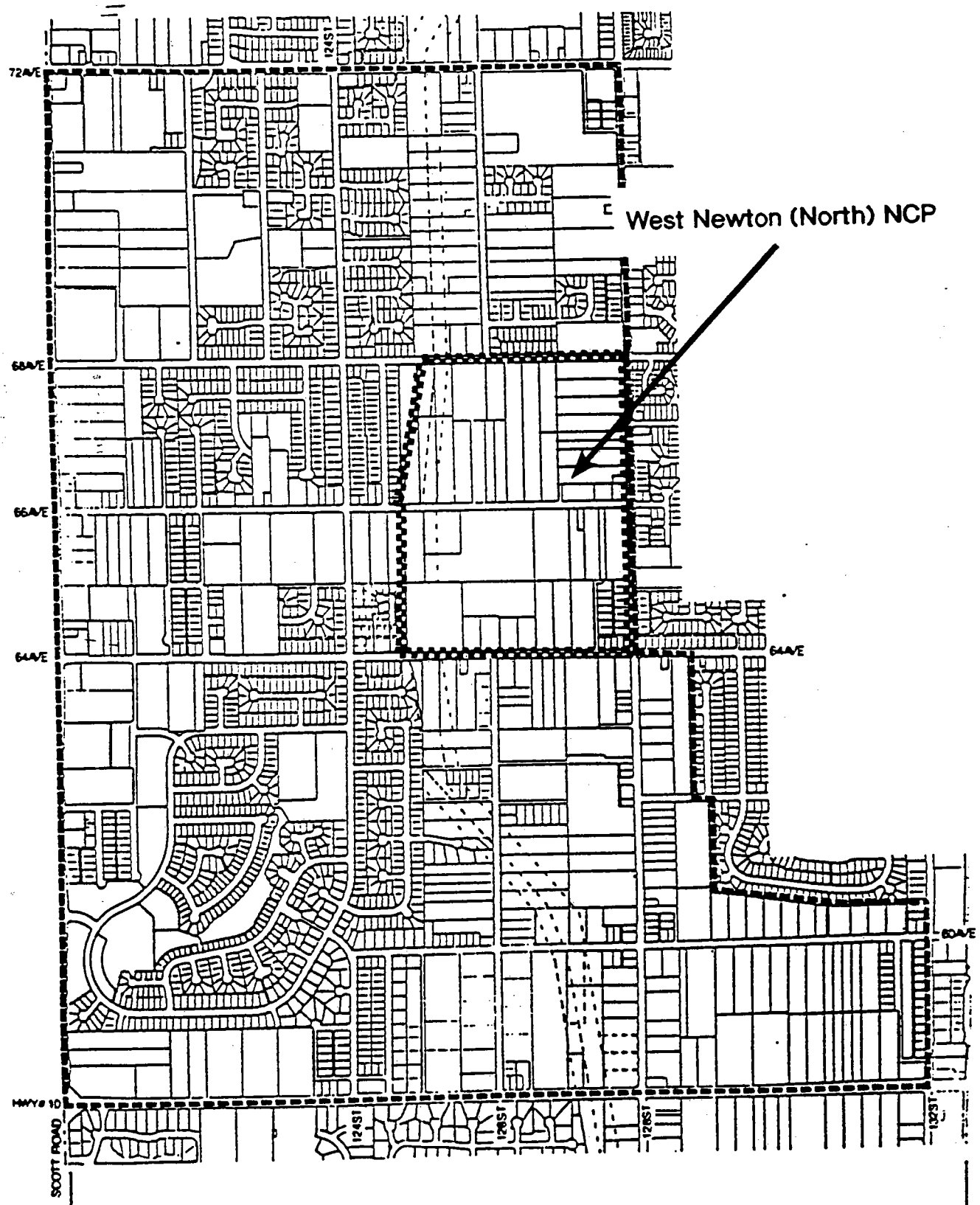
WEST NEWTON

APPENDIX II



MAP No. 1

WEST NEWTON PLAN
BOUNDARIES

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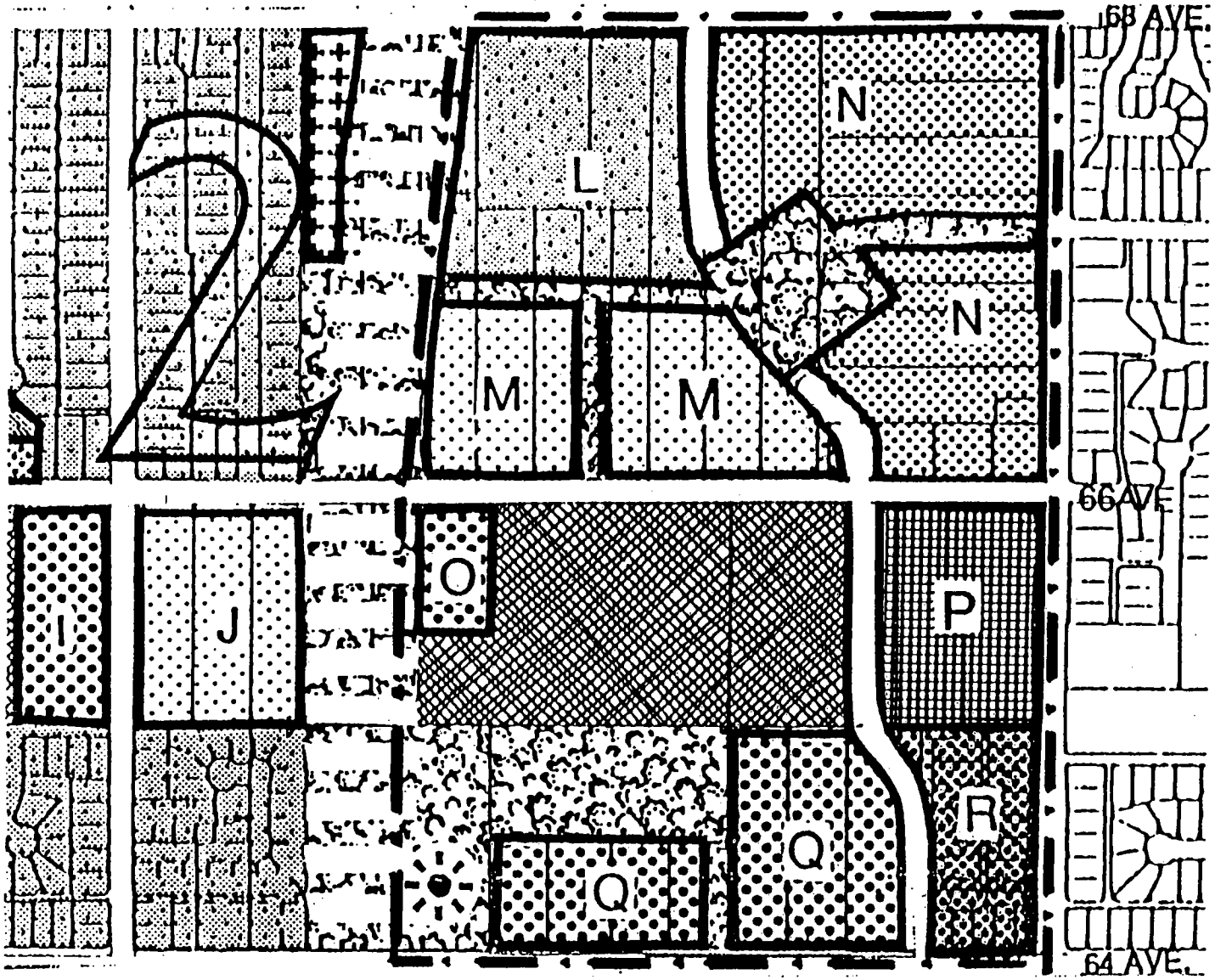


LEGEND

- SINGLE FAMILY HOUSING
- COMPACT HOUSING
- CLUSTER HOUSING
- TOWNHOUSES
- GARDEN APARTMENTS
- WALK-UP APARTMENTS
- SCHOOL
- OPEN SPACE & PARK

IBI GROUP

West Newton Sector 2, NCP

Local Area Plan

Exhibit 4

DATE: APRIL, 1995

COMPARISON OF L.A.P. & N.C.P. PROPOSAL
WEST NEWTON - SECTOR 2

SECTOR 2 - WEST	LAND AREA (acres)			NUMBER OF UNITS *1			PROJECTED POPULATION *2		
Land Use	LAP	NCP Proposal (May 1995)	Final NCP (April 1996)	LAP	NCP Proposal (May 1995)	Final NCP (April 1996)	LAP	NCP Proposal (May 1995)	Final NCP (April 1996)
Single Family	11.8	4.6	4% 4.6	59	23	23.0	207	81	81
Compact Single Family	20.8	27.9	28% 29.7	156	171	178	437	479	498
Cluster Housing	12.8	19.0	16% 17.2	128	190	172	384	570	516
Townhouses	14.6	14.9	8% 8.9	175	179	107	490	501	300
Garden Apartments	8.5	8.5	8% 8.5	213	213	213	469	469	469
Walk-up Apartments	4.9	4.9	5% 4.9	196	196	196	392	392	392
School/Park Site(s)	31.0	24.6	29% 30.6						
Road (66 Avenue)	2.8	2.8	2.8						
TOTAL	107.2	107.2	107.2	927	972	889	2379	2492	2256

***1 based on the following densities:**

Single-Family (S.F.) 5 u/a

Compact Single Family 6 u/a (NCP); 7.5 u/a (LAP)

Cluster Housing 10 u/a

Townhouses 12 u/a

Garden Apartments 25 u/a

Walk-up Apartments 40 u/a

***2 based on the LAP # persons per unit:**

Single-Family (S.F.) 3.5

Compact Single Family 2.8

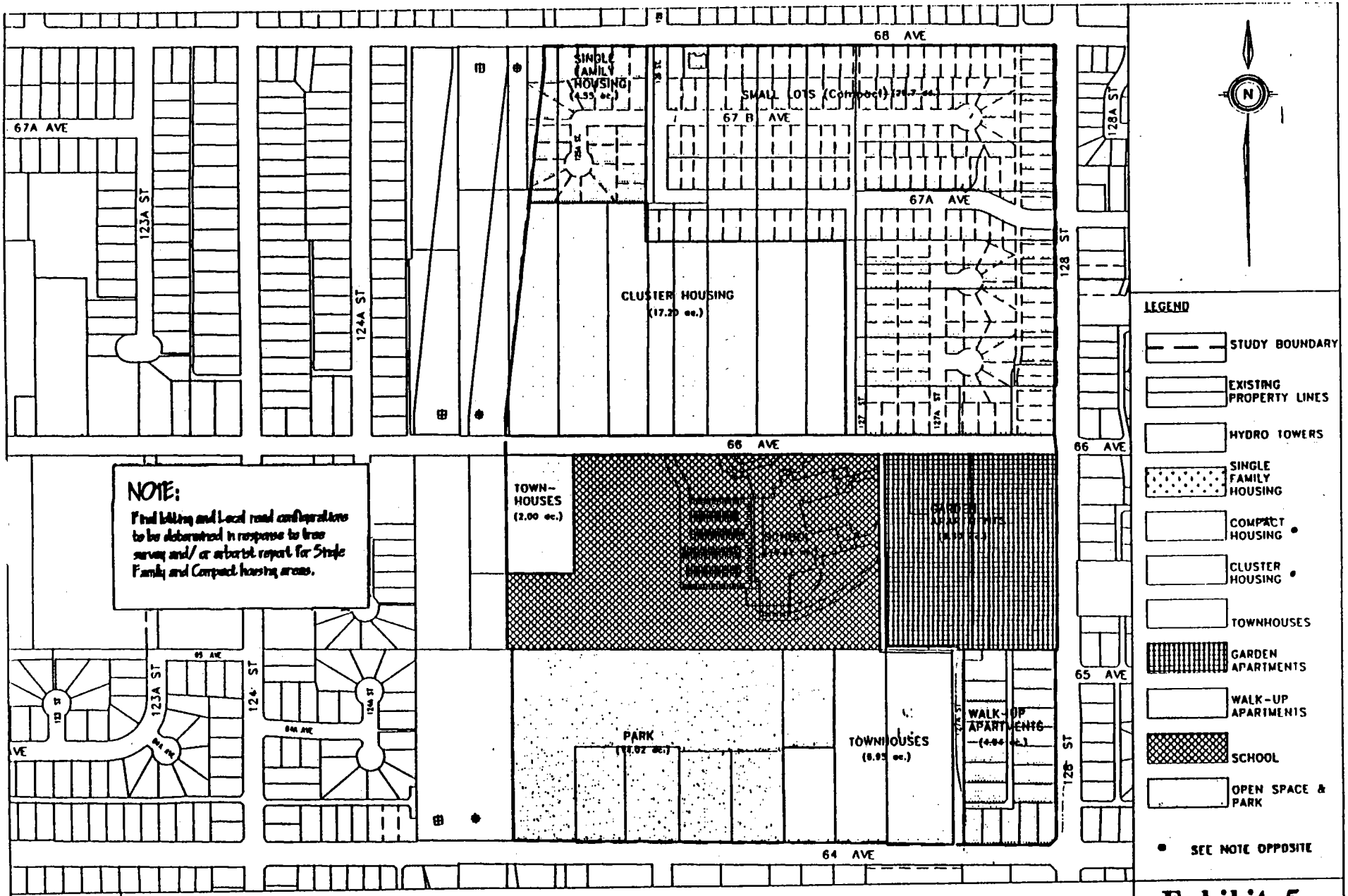
Cluster Housing 3.0

Townhouses 2.8

Garden Apartments 2.2

Walk-up Apartments 2.0

APPENDIX IV



West Newton Sector 2, NCP

Land Use

IBI GROUP

Exhibit 5

SCALE: NTS

DATE: MAY, 1996

PROPOSED LAND USE

APPENDIX V

WEST NEWTON SECTOR 2
NEIGHBOURHOOD CONCEPT PLAN
DESIGN PRINCIPLES

Introduction

The intent of these principles is to create cohesively planned precincts which are sensitive to tree retention/replanting and to discourage secondary suites. The principles in this report are supplementary to the applicable CD Zoning by-law and do not supersede it.

NCP Area

These principles apply to the area located in the West Newton area of Surrey, bounded by 68 Avenue (north), 128 Street (east), 64 Avenue (south), and the BC Hydro right-of-way (west). The area consists of several pieces of property, as noted in the West Newton Sector 2 Neighbourhood Concept Plan (IBI Group, July 1996).

Overall Principles

The overall principles of these guidelines are:

- create aesthetically pleasing housing forms
- prohibit secondary suites
- encourage a design of somewhat larger and narrower lots, particularly in the compact housing area in order to preserve and/or replant trees
- consider decreased front yard setbacks and increased rear yard setbacks in order to create narrower, deeper lots in an effort to protect/replant trees in the rear yard.
- prepare an overall landscape concept for the front yards to form part of the subdivision guidelines
- discourage basement entry homes

Surrounding Neighbourhood Character Analysis

Several single family neighbourhoods surround the NCP area. Most of these houses are large, two-storey homes which have the maximum lot coverage as prescribed by current zoning. The design, scale and siting of these houses facilitates the addition of illegal secondary suites.

The resulting streetscape is characterized by large, dominant garages, extensive parking areas, and very small front yards. Double front doors, portico entrances, large scale front windows, pastel stucco exteriors and imitation clay roof tiles suggest a Californian-inspired character.

The surrounding developed areas do not represent a residential character suited to this NCP area. The following guidelines define a new neighbourhood character with a creative approach to design and planning.

Lot Size and Proportion

The proposed lots are narrower and deeper than the surrounding neighbourhoods. This type of lot allows for an efficient use of land without compromising individual needs for privacy and usable outdoor space, and encourages the preservation/ replanting of trees in the rear yard.

The target lot size in the Compact area is 370 to 510 sq.m. (4,000 to 5,500 sq.ft.), with a maximum lot size of 557 sq.m. (6,000 sq.ft.). A minimum lot width of 12.0 m and minimum lot depth of 34 m will be incorporated into the specific CD zoning for this neighbourhood.

Site Design and Lot Coverage

Houses will be sited to allow for usable back yards, and an increased side yard on the driveway side of the lot. Setbacks have been designed to reflect the smaller scale of development:

Front Yard Setback:	6.1 m (20 feet)
Rear Yard Setback:	10.0 m (33 feet)
Driveway Side Yard Setback:	3.75 m (12.3 feet)
Remaining Side Yard Setback:	1.2 m (4 feet)

Lot coverage will be reduced by increasing the size of the upper level relative to the main level (see 'House Design'), resulting in a relatively compact house form. A maximum floor area ratio which is reflective of the smaller lot sizes proposed will be established in the CD zoning, using the densities permitted under the RF-G and RF zones as guidelines. A maximum house size of 3,120 sq.ft will be incorporated into the specific CD zoning for this area.

Driveways and Garages

A single lane driveway shall be located at the side to provide off-street parking for 2 or more cars. Garages will be placed such that the house becomes the most dominant feature of the property. The maximum driveway width in the Compact area will be 4.5 m with front yard landscaping for non-asphalt areas.

House Design

Houses will be 2-storeys with a basement, with the main living areas located on the ground floor. Basement entry designs will not be permitted. The maximum building height will the 9 m, and upper floors will not exceed 42% of the homes total floor area.

Materials and Exterior Details

Issues such as materials and colours will be determined with the first rezoning/subdivision application. Front porches will be encouraged provided that they supply useable outdoor space and are incorporated into the house design. Front entrances will be limited to a single door (although up to 3 feet in width is permitted),

with or without sidelights. Stained or coloured glass in doors and windows will not be permitted. Clay tile and tar/gravel roof materials are prohibited.

Outdoor Open Space

Efficient site design will maximize the yard area available for landscaping and recreational activities. There will be a minimum standard for landscaping the front yard and a minimum 3.5 m landscaped buffer in the rear yard, which will facilitate the preservation/replanting of existing vegetation.

SCHOOL DISTRICT 36 SURREY

BOARD OF SCHOOL TRUSTEES
14225 - 56th Avenue, Surrey, B.C. V3X 3A3 • Telephone (604) 596-7733 • Facsimile (604) 597-0191

June 28, 1995

Ms. Tamsin Guppy
Planning & Development Department
City of Surrey
14245 - 56 Avenue
Surrey, B.C.
V3X 3A2

Dear Ms. Guppy,

Re: West Newton Neighbourhood Concept Plan- North Neighbourhood (Sector 2)

Thank you for the opportunity to comment on the final draft of the Neighbourhood Concept Plan (NCP) for West Newton (North Neighbourhood). We would like to offer the following comments:

Comparison of LAP and NCP Proposal (Appendix B)

The number of proposed Single Family units (including Compact and Cluster) in the proposed NCP has increased to 384 from 343 in the West Newton Local Area Plan (LAP).

Therefore it is the strong preference of the Surrey School District Planning Research & Evaluation Department that no secondary suites be considered in this area, to avoid a situation where Beaver Creek Elementary School exceeds the Board's Policy on maximum elementary school size (500).

This NCP proposal designates the majority of residential lands within the plan for multi-family or small-lot single family uses. This will likely reduce the potential for the development of suites. However, we would not favour the development of **any** suites in this area and would therefore support the plan's recommendations on the use of Restrictive Covenants and the application of the City's "Model Building Design Guidelines" in this NCP.

5.5.1 Roads (Page 9)

It is our understanding that a 6.0 metre right of way is to be developed, on the easterly boundary of the Tamanawis Secondary School site, as a combined utility corridor/walkway linking 64 Avenue and 66 Avenue. We would like to know who will be responsible for the design, development and maintenance of this public walkway.

.../2

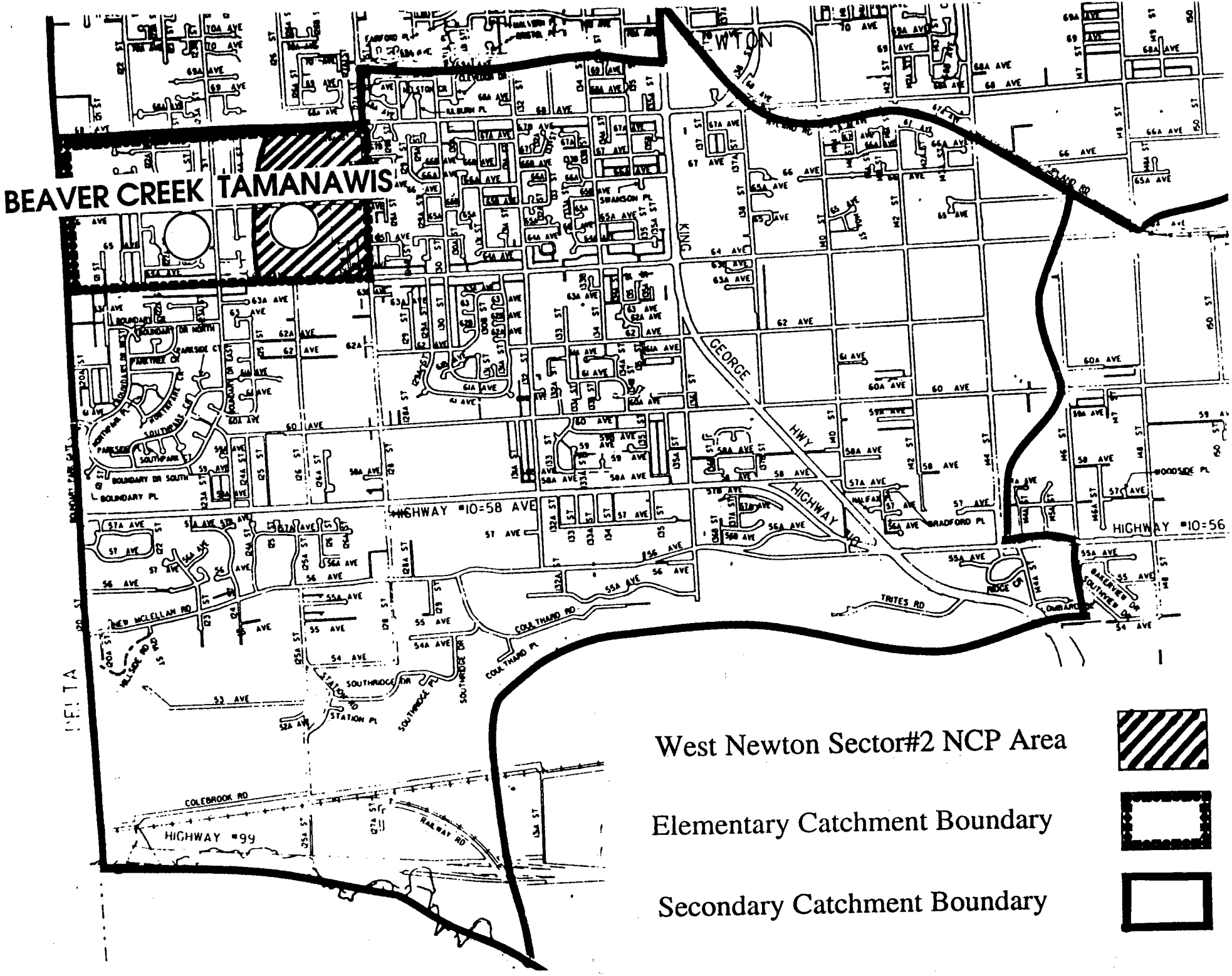
We would like the opportunity to see any further revisions to the plan. Furthermore, we would appreciate additional information about the proposed walkway.

Yours truly,

Michelle Larkan
Planning Associate (Facilities)

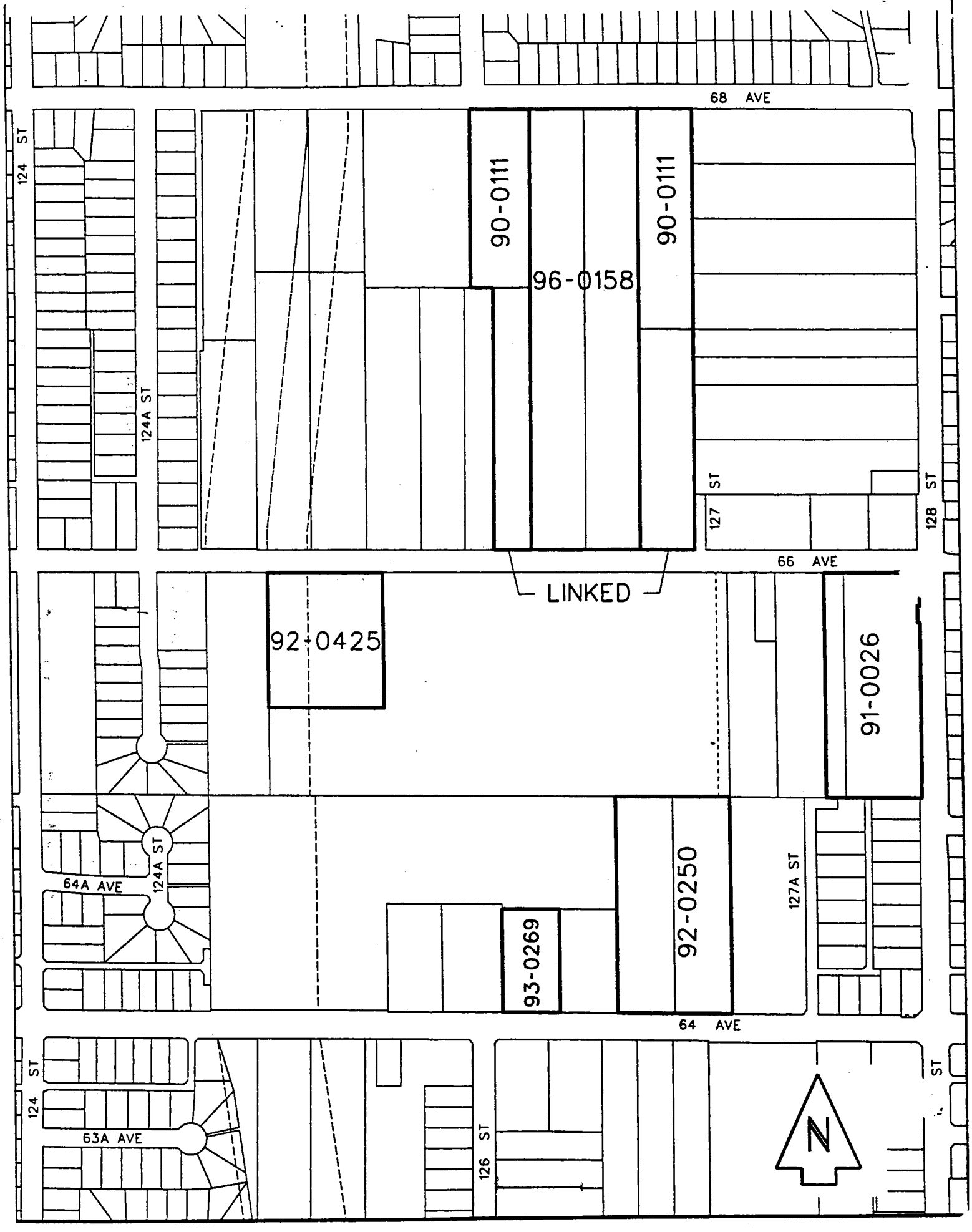
MLml

cc: T. McBurney
B. Holmes
H. Skinner
M. Dodd
G. Royer


BEAVER CREEK
TAMANAWIS
HIGHWAY #10-58 AVE
HIGHWAY #10-56
HIGHWAY #99
KING GEORGE HWY
HIGHWAY #10
TRITES RD
COLEBROOK RD
RAILWAY RD
SOUTHRIDGE DR
COULTHARD RD
NEW MCLELLAN RD
STATION PL
West Newton Sector#2 NCP Area
Elementary Catchment Boundary
Secondary Catchment Boundary

IN-STREAM APPLICATIONS

APPENDIX VIII



APPENDIX I)

SURREY
CITY OF PARKS

INTER-OFFICE MEMO

TO: **How Yin Leung, Manager, Area Planning and Development**

FROM: **Jorgen Johansen, NCP Project Manager**

DATE: **July 17, 1996** FILE: **2350-006**

RE: **West Newton North Neighbourhood Concept Plan**
Engineering Comments on Stage 1 NCP Report

Although this Neighbourhood Concept Plan was to be processed as a single stage report, we understand that it is now proposed to be processed in two stages. Stage 1 will deal with the land use issues and Stage 2 will be the Engineering and related financing issues The Engineering Department does not have a Stage 2 Engineering Report at this time. We do have a draft Stage 2 Report. Based upon this draft Report prepared by the IBI Group, dealing with the general servicing concepts, the Engineering Department is satisfied that the servicing concepts as proposed for transportation, drainage, sanitary sewer and water can support the proposed land use plan.

The detailed work required to confirm the servicing strategies as proposed is currently being undertaken as part of the Stage 2 Report. The Stage 2 Report will provide the necessary detail to allow the infrastructure needs to be clearly identified and their detailed costs estimated. It will also be able to identify the need for land requirements for detention facilities and other engineering infrastructure. The report will indicate in what year, the cost and the funding mechanism for each item of work that will be required as the NCP develops. Council policy is that development pays its way.

Upon completion of this engineering analysis, the Consultant will be in a position to provide construction estimates for the major items of infrastructure that will be required to service this NCP. As part of the Stage 2 Report, the Consultant will provide the City with a financial plan showing how these works will be funded by the NCP. The financial plan will identify the costs to be incurred in each year and the anticipated revenue for that year. It will include a cashflow analysis to ensure that the City's ability to contribute its share of rebates or cost sharing can be funded in a manner acceptable to the City.

Jorgen Johansen, P.Eng.
NCP Project Manager

cc: Manager, Engineering Planning
Wendy Whelen, Planning and Development
James Pernu, Planning & Development

SURREY
CITY OF PARKS

Corporate Report

NO: C 327

COUNCIL DATE: NOV 0 5 1996

COUNCIL-IN-COMMITTEE

TO: **Mayor & Council** DATE: **October 30, 1996**

FROM: **General Manager, Planning & Development** FILE: **2350-006/1**

SUBJECT: **West Newton Sector 2 (North Neighbourhood) Neighbourhood Concept Plan (NCP) - Stage II Final Report**

RECOMMENDATION

The Planning & Development Department recommends that Council:

1. Approve the final and complete Neighbourhood Concept Plan (NCP) for the north neighbourhood of West Newton, as amended (Appendices I - NCP, and IV - Density Clarification).

2. Approve the arrangements, terms and conditions specified in the West Newton Sector 2 (North Neighbourhood) NCP (Appendix I) as a means of managing the development and general provision of services, amenities and facilities for this new neighbourhood.

3. Amend the West Newton Local Area Plan to reflect the recommendations contained in the West Newton Sector 2 (North Neighbourhood) Neighbourhood Concept Plan.

4. Authorize staff to draft the following by-laws to implement the provisions of the Neighbourhood Concept Plan:

   (a) a by-law to adopt the West Newton Sector 2 (North Neighbourhood) Neighbourhood Concept Plan (NCP) as an Official Community Plan;
   (b) an amendment to Zoning By-law, 1993, No. 12000, as amended, to enact the approved bonus density provision for the West Newton (Sector 2) Neighbourhood Concept Plan; and
   (c) an amendment to the City of Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631, as amended, to authorize the payment of additional application fees to recover the costs of

preparing the West Newton Sector 2 (North Neighbourhood) Neighbourhood Concept Plan.

INTENT

The intent of the report is:

1. To provide an overview of the complete and final Neighbourhood Concept Plan (NCP) for West Newton Sector 2 (North Neighbourhood), including a summary of the planning process and methods of implementing the Neighbourhood Concept Plan;

2. To provide City staff's analysis and recommendations on the engineering, amenity and financial proposals (Stage II) of the NCP; and

3. To outline the associated by-laws needed to implement the approved West Newton Sector 2 (North Neighbourhood) NCP.

BACKGROUND

In June, 1993, Council approved the West Newton Local Area Plan. The Local Area Plan identifies general land uses and development policies for two new urban neighbourhoods (NCPs) in West Newton (north and south of 64 Avenue), as well as for other lands within the West Newton community. Both NCP areas are bounded by the B.C. Hydro right-of-way on the west and by 128 Street on the east. A copy of West Newton Local Area Plan (land use concept) and a map describing the boundaries of the NCP areas are attached as Appendix II.

The final Neighbourhood Concept Plan for the south neighbourhood of West Newton (Sector 3) was approved by City Council on June 11, 1996 and rezoning applications are in process. On July 29, 1996, Council approved the physical plan component (Stage I) for the north neighbourhood of West Newton (Sector 2) and authorized the NCP participants to commence Stage II based on the type, size, location and densities of the specified land uses, road hierarchy and, locations, subdivision concept and general servicing concepts. A copy of the approved Stage I land use and subdivision concept is attached in Appendix III.

DISCUSSION

Overview of the Stage I West Newton Sector 2 NCP (Physical Component)

This NCP contains approximately 43.3 hectares (107.2 acres) owned by approximately 56 owners. The plan identifies a subdivision concept, road alignments and open space locations for the neighbourhood. The NCP provides for approximately 890 dwelling units for a projected population of approximately 2,260.

The NCP is generally divided into two blocks: "cluster" housing at 10 units per acre, compact single family and single family lots in the northern block and areas designated for multiple residential uses at densities between 12 and 45 units per acre in the southern block.

The West Newton Local Are Plan proposed a 4 to 5 acre neighbourhood park for the northern block. However, following comments from the Parks & Recreation Department, the neighbourhood park was removed during the Stage I NCP process. In order to compensate for the removal of the neighbourhood park, an expanded park facility (an additional 6 acres) in the southern block have been incorporated into the plan. With this adjustment, the NCP has approximately 30.6 acres (12.4 ha) for a combined school and park area (16 acres school and 14.6 acres park). This combined 30.6 acres site will provide sufficient passive and active recreation opportunities for local residents.

With some minor refinements, the Neighbourhood Concept Plan conforms to the spirit and intent of the West Newton Local Area Plan and presents a detailed development pattern that is supported by a majority of property owners.

Density Clarification - Townhouse Site on 66 Avenue

A concern was raised at the last Public Open House regarding the density and form of development envisaged for the two-acre townhouse site on 66 Avenue (see map attached in Appendix IV). Toward clarifying this issue, the Stage II NCP indicates that the site will be developed for multi-family purposes, but the form will be that of ground-oriented duplex housing having a density of no more than 12 units per acre, which will be compatible with the cluster housing proposed for the area north of 66 Avenue.

Overview of Stage II NCP (Engineering, Financing and Amenities)

The Stage II NCP contains an evaluation of the engineering services for this neighbourhood, NCP infrastructure financing and funding arrangements, proposed development phasing and amenity/facility contribution proposals.

The servicing, infrastructure funding and phasing considerations are the subject of a report form the General Manager of Engineering, which will be considered concurrent with this report.

The Neighbourhood Concept Plan process has resulted in the identification of specific amenities/facilities that are required to adequately support this neighbourhood as it develops. These funding arrangements are intended to ensure that the City is not unduly burdened with the capital costs associated with providing needed amenities.

The amenity funding proposals are based upon a recent study of NCP amenities, undertaken by the Planning & Development Department, as well as on estimates for park development and amenity construction costs prepared by the Parks & Recreation Department. The proposed amenity funding arrangement is as follows:

1. Parkland Development

The NCP identifies a site approximately 11.7 hectares - 30.6 acres in the southern portion of the NCP which is to be developed as a combined school/park site. It is estimated that the park will cost approximately $1,750,000 to develop. However, it is intended to serve the recreation needs of the larger community, and therefore the costs are to be shared equally by those outside this NCP area, who will benefit from the park. Consequently, the per unit contribution of $599 (total budget of $533,100) is proposed which is similar to the contribution provided by the south neighbourhood (Sector 3) and adjacent infill areas.

2. Community Facility

In consultation with the Parks & Recreation Department, the Steering Committee proposes an amenity contribution amount of $161.50 per; unit toward the construction of a community facility to serve this neighbourhood. The location of the facility is under review, but it will be located to adequately serve this NCP area as well as the NCP area to the south. This contribution is similar to that provided in the approved West Newton Section 3 NCP (south of 64 Avenue).

3. Library Materials, Police and Fire Protection

The NCP proposes contributions towards the capital costs associated with library materials and police protection in this NCP area of $92 and $8.50 respectively. In terms of fire protection, the capital cost contribution is $150 for each single family unit and $249 for each multi-family unit. These figures are based upon the projected capital costs and estimated development yields determined in consultation with the affected City Department. Again, these contributions are similar to those implemented in the south NCP. Non-residential uses will contribute $266 per acre which represents contributions toward fire and police protection only.

4. Total Contribution

The total contribution toward the capital costs of amenities/facilities for this NCP will be $971 per single family unit and $1,070 per multi-family unit.

Property Owner and Public Consultation

There was extensive consultation with the property owners and the public throughout the NCP process, including three public meetings, on-going Steering Committee meetings and meetings with individual owners.

The latest Public Open House was held on September 11, 1996, at which the approved (Stage I) land use plan was again presented as well as the proposed Building Design Guidelines for single family and compact lot single family areas, general servicing concepts and the community amenity package. Approximately 25 residents attended this open house and there was general support for the NCP.

Implementation of the Neighbourhood Concept Plan

1. Preparation of the NCP By-law

Surrey's new Official Community Plan requires that Neighbourhood Concept Plans be adopted by by-law, and therefore, be the subject of a Public Hearing. If approved, a by-law for this NCP will be prepared and will be presented to Council in due course.

2. Amendment to Surrey's Zoning By-law

In accordance with Council's approved Zoning By-law approach (pursuant to Sections 963.1 and 378 of the Municipal Act) to implement the provision of amenities in NCP areas, the Zoning By-law will be amended to allow bonus densities in exchange for the specified amenities identified for this NCP area. The requisite by-law will be forwarded for consideration by City Council following approval of the final NCP.

3. Amendment to Surrey's Land Use and Development Application Fees Imposition By-law.

The total cost of preparing this NCP is approximately $50,000 and is shared by the property owners and the City. In order to recoup the City's share, non-participant property owners will be required to pay their share at the time of rezoning. This additional application fee will be approximately $56.00 per dwelling unit, and will be confirmed at the time when the amendment by-law is forwarded to City Council.

4. Building Design Guidelines

The Stage I NCP Report received by Council contained "Development Principles" which were used to develop detailed Building Design Guidelines for the NCP. These Building Design Guidelines are applicable to all single family and compact lot single family subdivisions within the NCP. The design guidelines were prepared by a registered architect in accordance with Council's policy. The Guidelines were also presented at the third Public Open House held on September 11, 1996.

Highlights of the Building Design Guidelines include:

- Restricted driveway widths (3.0 metre maximum).
- Uniform roofing materials consisting of fiberglass shingles in black or gray with "shadow effect.
- Uniform trim requirements.
- Minimum landscaping requirements of two Magnolia trees in the front yard and two coniferous trees in the rear yard.

The proposed Building Design Guidelines are contained in the NCP document.

5. Development Applications

There are a number of in-stream development applications which are now being processed in the context of the final NCP. It is envisioned that the amount of processing time will be greatly reduced for applications that conform with the NCP.

CONCLUSION

The Neighbourhood Concept Plan for the north neighbourhood of West Newton (Sector 2) generally conforms to the West Newton Local Area Plan. It is also consistent with Surrey's Official Community Plan. The servicing and funding components of the NCP have been developed to a stage which adequately support the land use, density and subdivision concept proposed.

The planning process associated with this NCP meets the original objectives of the NCP program. This NCP represents consensus among the property owners with respect to the overall development concept, including land uses, densities, subdivision and road patterns and funding and phasing proposals.

Should Council approve the recommendations of the General Manager of Engineering regarding servicing and funding, it is recommended that the attached Neighbourhood Concept Plan for the north neighbourhood of West Newton be approved along with the recommendations in this report.

Lehman O. Walker
General Manager
Planning & Development Department

JP/ln

Appendices

Appendix I West Newton Sector 2 (North Neighbourhood) Neighbourhood Concept Plan
Appendix II West Newton Local Area Plan Land Use Plan/NCP Boundaries
Appendix III Approved Stage I Subdivision and Development Concept Plan
Appendix IV Density Clarification - Townhouse Site on 66 Avenue

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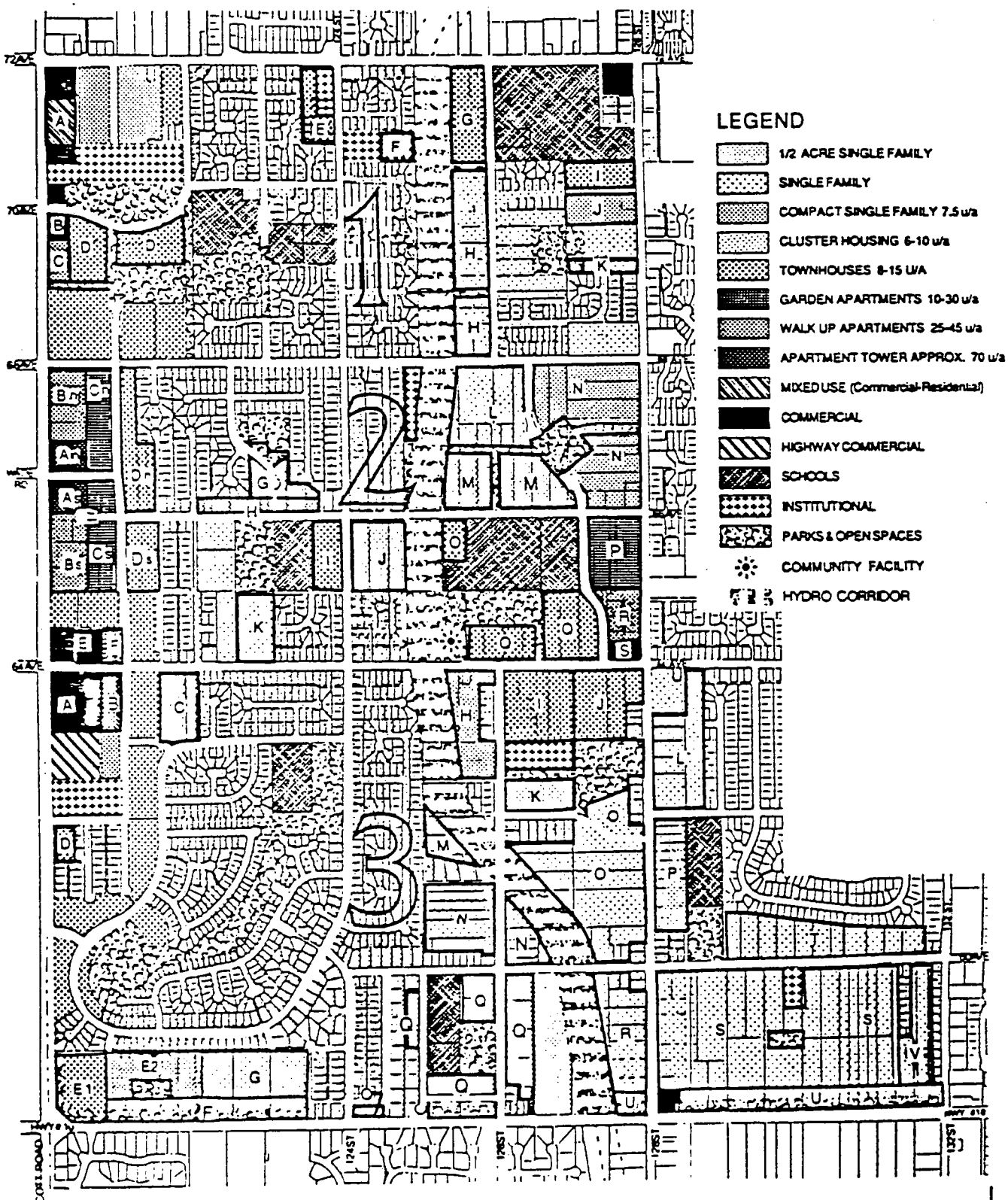
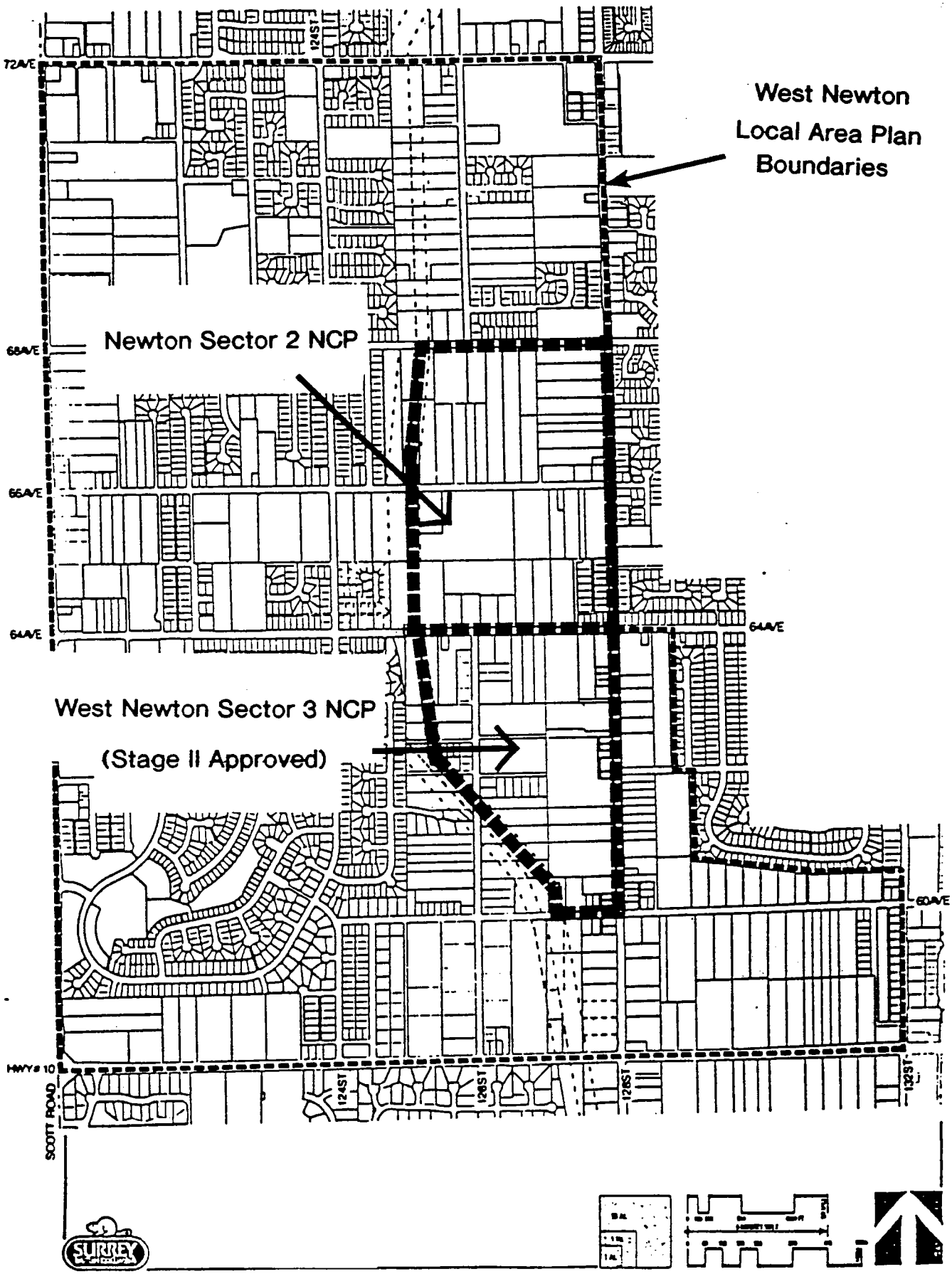
WEST NEWTON LOCAL AREA PLAN



MAP No. 3

SURREY LAND USE

WEST NEWTON NCP BOUNDARIES



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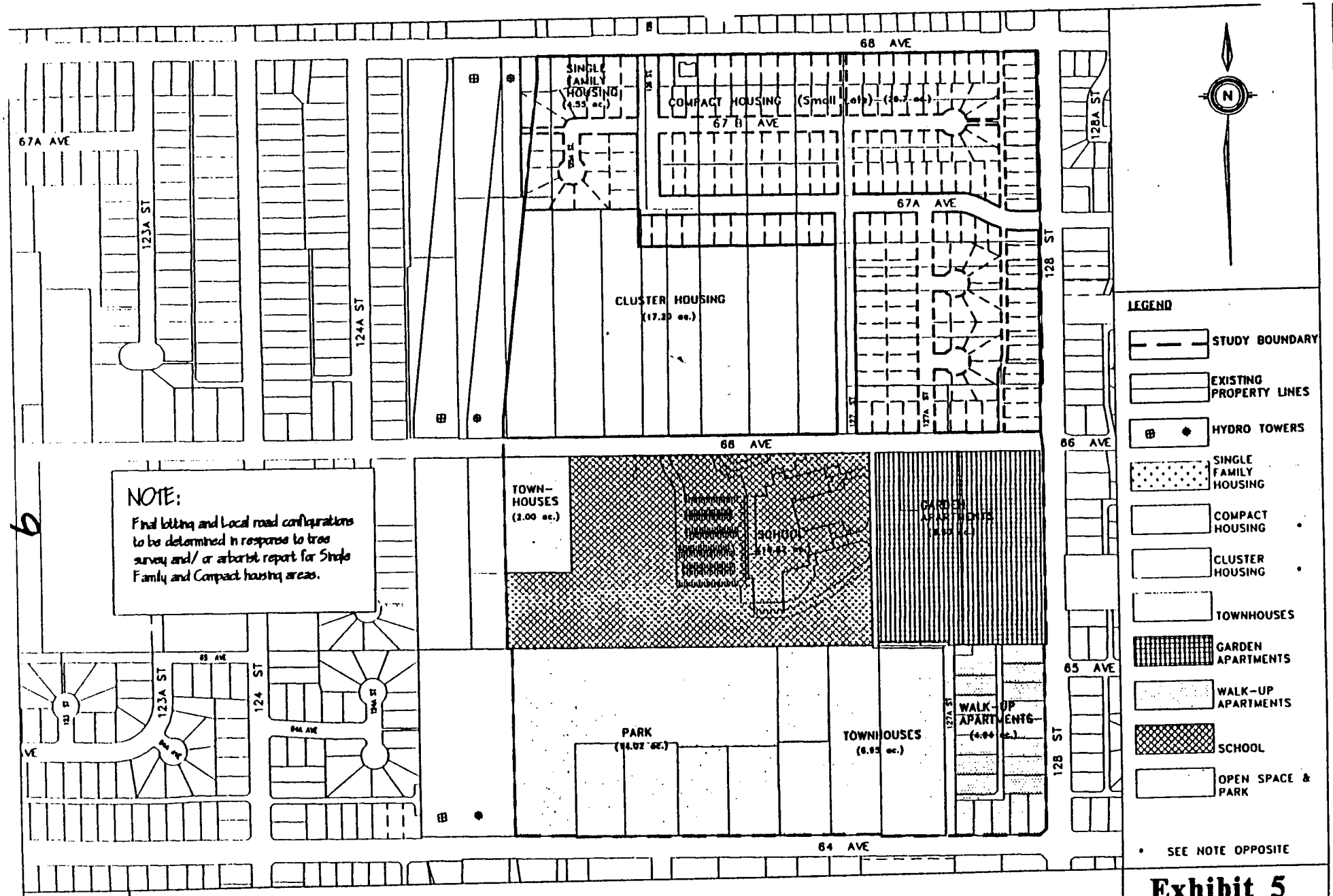


West Newton Sector 2, NCP

Land Use

IBI GROUP

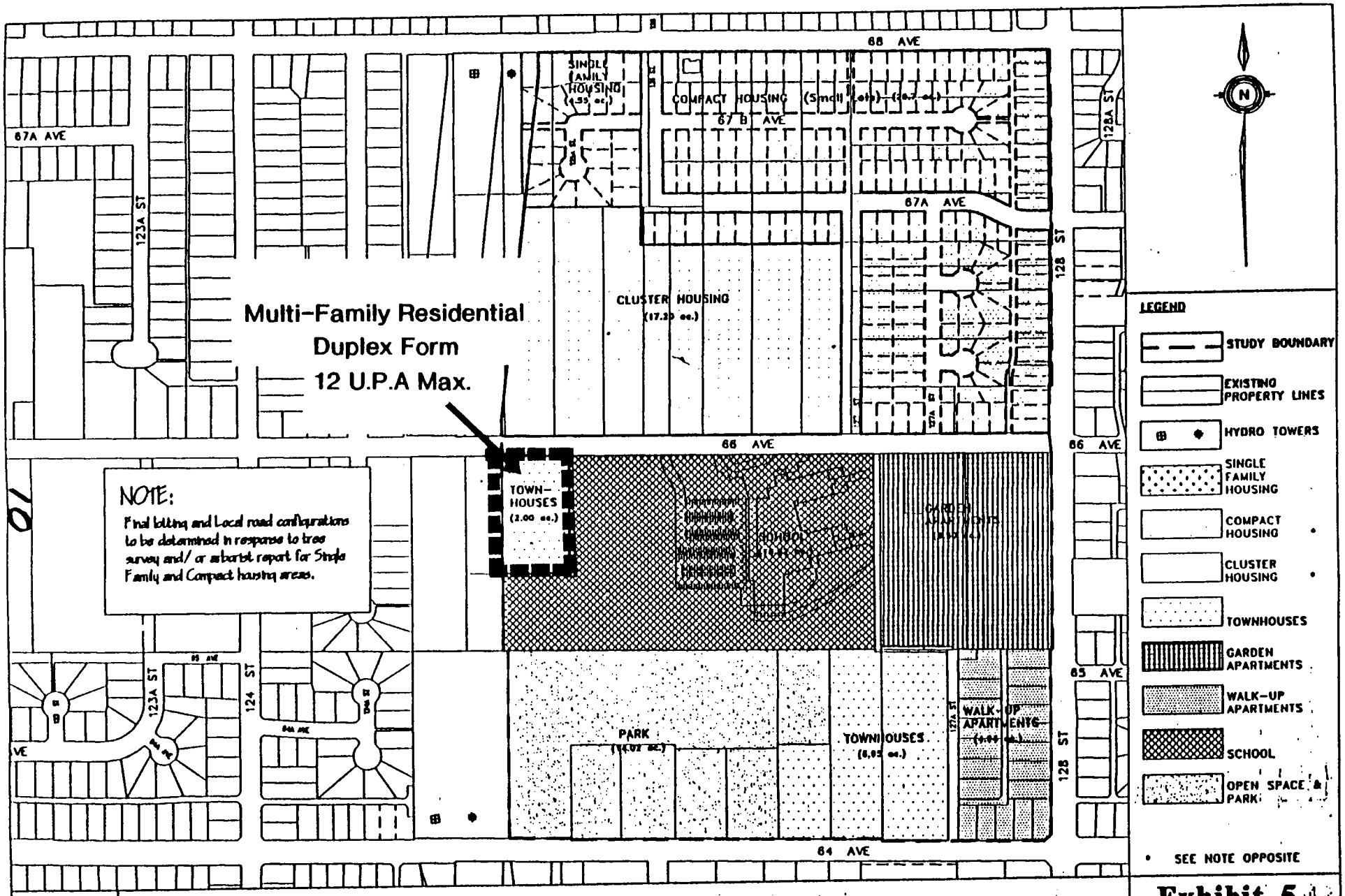
Exhibit 5

SCALE: NTS

DATE: JULY, 1996

STAGE I LAND USE CONCEPT

APPENDIX III



West Newton Sector 2, NCP

Land Use

IBI GROUP

Exhibit 5

SCALE: NTS

DATE: JULY, 1

PROPOSED DENSITY CLARIFICATION

APPENDIX IV

SURREY
CITY OF PARKS

WEST NEWTON SECTOR 2

NEIGHBOURHOOD CONCEPT PLAN

FINAL STAGE II REPORT

OCTOBER, 1996

IBI
GROUP

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Exhibits, Appendices and Tables

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1.0 INTRODUCTION

This document describes the proposed Neighbourhood Concept Plan (NCP) for the Sector 2, West Newton Neighbourhood. The plan has been prepared by the IBI Group on behalf of the area landowners with direction to the consultant given by the West Newton Sector 2 Neighbourhood Steering Committee. The report has been prepared in the context of the "NCP General Terms of Reference" prepared by the City of Surrey and approved by Council in June, 1993. The report has also been developed in the context of the "NCP Engineering Terms of Reference" prepared by the City of Surrey, dated November 28, 1994.

As shown in Exhibit 1, the NCP area is located in the West Newton area of Surrey. It is accessible from Scott Road via 64 Avenue or 68 Avenue, and from Highway 10 north along 128 Street. The plan area involves 107 acres of land, bounded by 64 Avenue to the south, 68 Avenue to the north, 128 Street to the east and the B.C. Hydro right-of-way to the west (Exhibit 2). The surrounding vicinity, for the most part, is already developed. The NCP area is well-served with an existing infrastructure of arterial and collector roads.

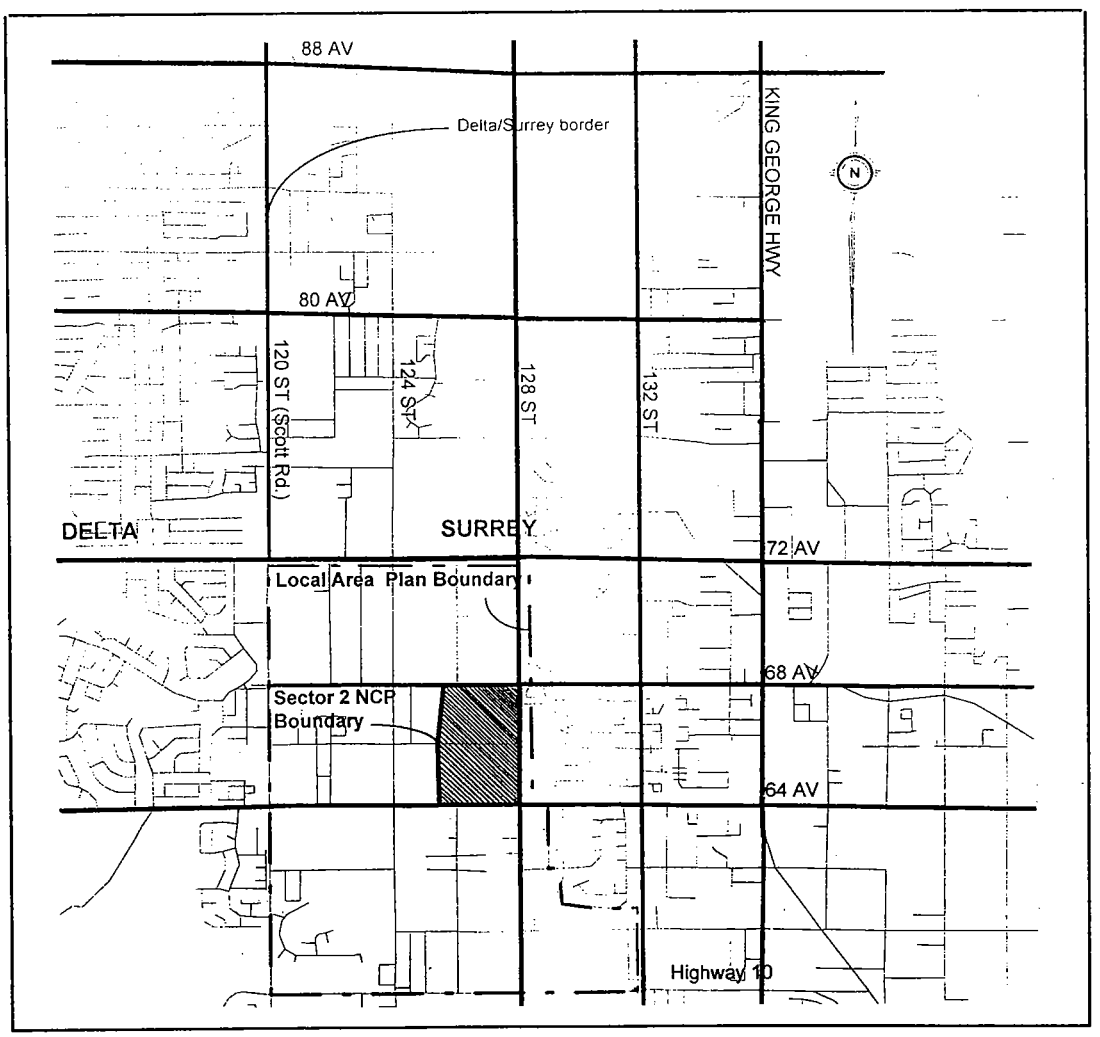
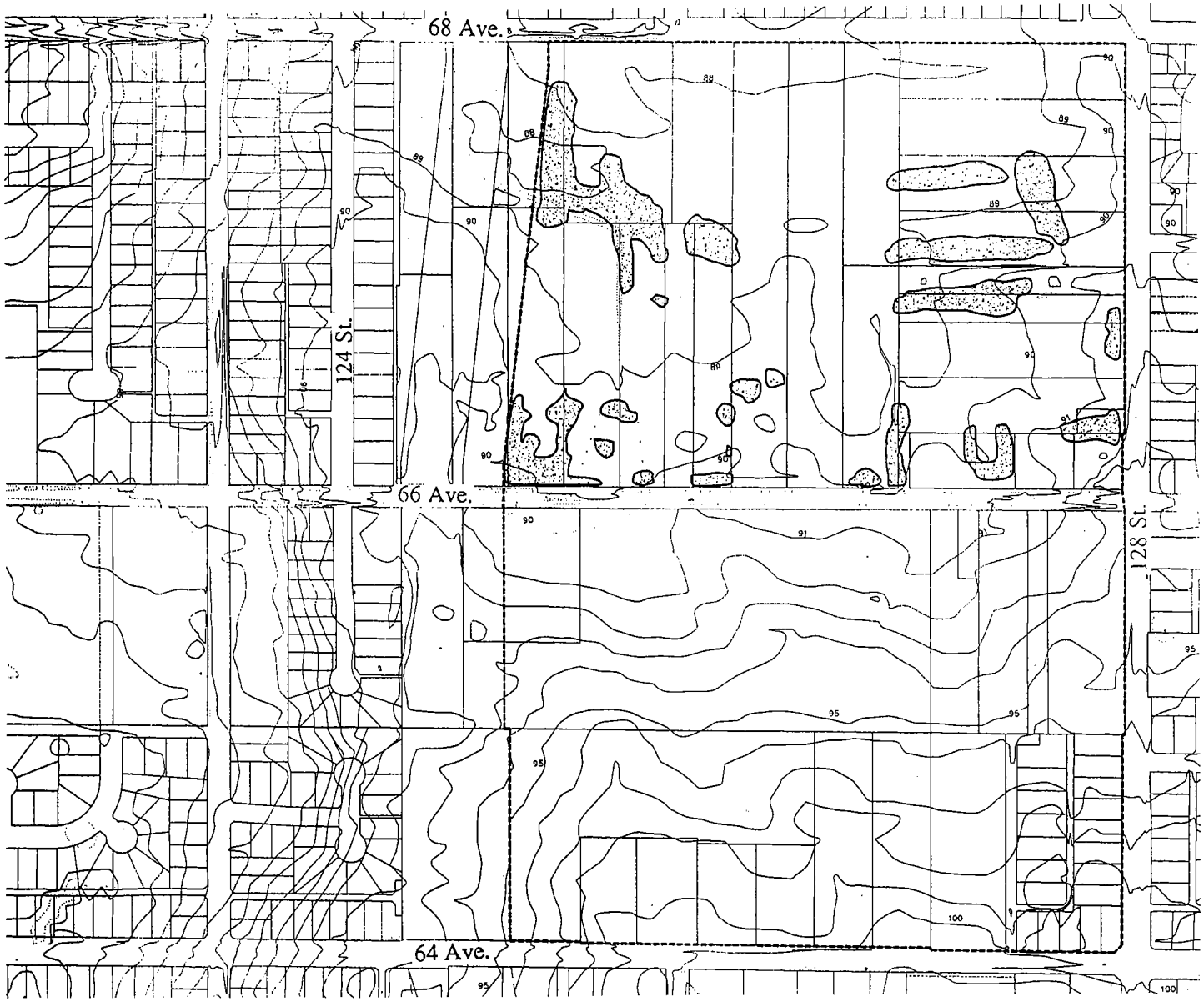


Exhibit 1 - Local Context (not to scale)



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West Newton Sector 2, NCP

Site Natural Features

Exhibit 2

SCALE: NTS

DATE: APRIL, 1996

2.0 BACKGROUND

As shown in Exhibit 2, the NCP area slopes gradually to the northwest. The areas south of 66 Avenue (Southern Block), is covered with relatively dense small caliper softwood trees. The Northern Block (north of 66 Avenue), contains some significant groups of trees as determined from a recent aerial photo. In accordance with Surrey's policies regarding tree preservation, a comprehensive tree survey and/or arborist report will be completed prior to the approval of the final lotting pattern. The existing suburban and rural areas surrounding the NCP area have good soil foundation conditions.

2.1 EXISTING LAND USES

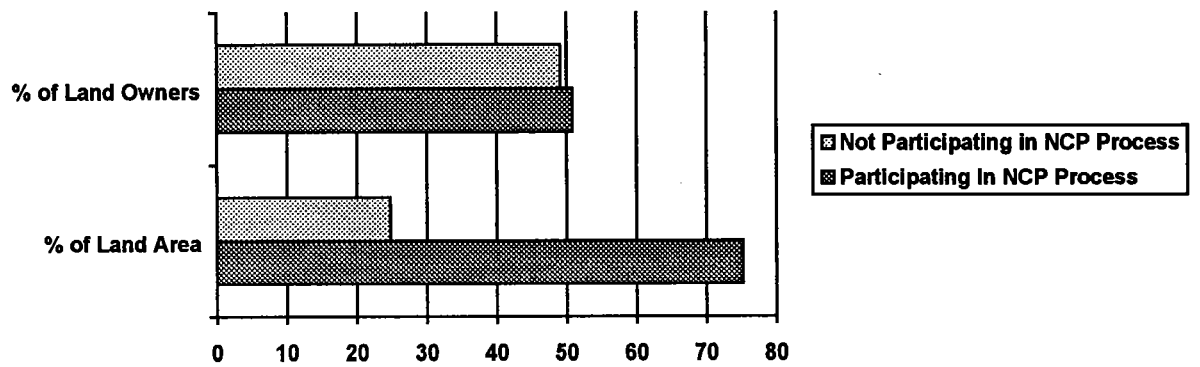
There are a number of existing single-family homes scattered throughout the study area. A pocket of small residential lots is located at the northwest corner of 128th Street and 64 Avenue. There is one non-conforming industrial use on the rear portion of 12595 - 64 Avenue. There are two new single-family residences in the study area; one is located on 68 Avenue east of 126 Street, and the second is adjacent to the Hydro Corridor on 68 Avenue. These owners have indicated that they would like to retain their buildings.

Tamanawis Secondary School was recently constructed within the NCP area on 66 Avenue, east of the B.C. Hydro lands. The City of Surrey has acquired a 14 acre park site which is located on 64 Avenue and backs on to the school site (Exhibit 5).

2.2 LAND OWNERSHIP

The Surrey School District and the City of Surrey own the largest properties within the plan area. There are a few consolidations but the majority of the lands are represented by individual owners. LAP procedure requires that the NCP be endorsed by a minimum of 50% of landowners, holding 70% of the land area. Currently, 51% of the landowners holding 75% of the land area are participating in the NCP process (see following chart). These participating landowners are identified in Exhibit 3.

Table 1 - Participating Land Owners



2.3 POLICY CONTEXT

The West Newton Sector 2 Neighbourhood Concept Plan has been prepared within the context of development policies governing the area. These plans and policies are identified below.

- ***Official Community Plan (OCP)*** - The Surrey Official Community Plan was approved in 1985 and has been amended a number of times. An amendment in 1994 designated the NCP area as "Urban" and "Multiple Residential."

- ***Local Area Plan (LAP)*** - The West Newton Local Area Plan was approved by Council in 1993 and amended in 1994. The LAP provides the specific policy basis for the Neighbourhood Concept Plans. Local Area Plan policies which have a direct impact on the West Newton Sector Two NCP area include:

  -To create a livable, attractive neighbourhood with small lot single and multi-family housing types to minimize the proliferation of unauthorized secondary suites, and to improve affordability through the efficient use of land while meeting the needs of persons of different ages and income levels.

  -To provide adequate recreational and other social support services on a neighbourhood scale with a focus on the school and proposed park facility. Creating a pedestrian and bicycle-friendly environment through the development of linkages from the school and park spaces to abutting streets and the hydro corridor.

  -To provide an efficient transportation system that will facilitate the flow of traffic but not have undue negative impact on neighbourhood integrity.

  -To address the servicing needs of the neighbourhood as it develops by designing and providing for the phasing and implementation of hard servicing systems.

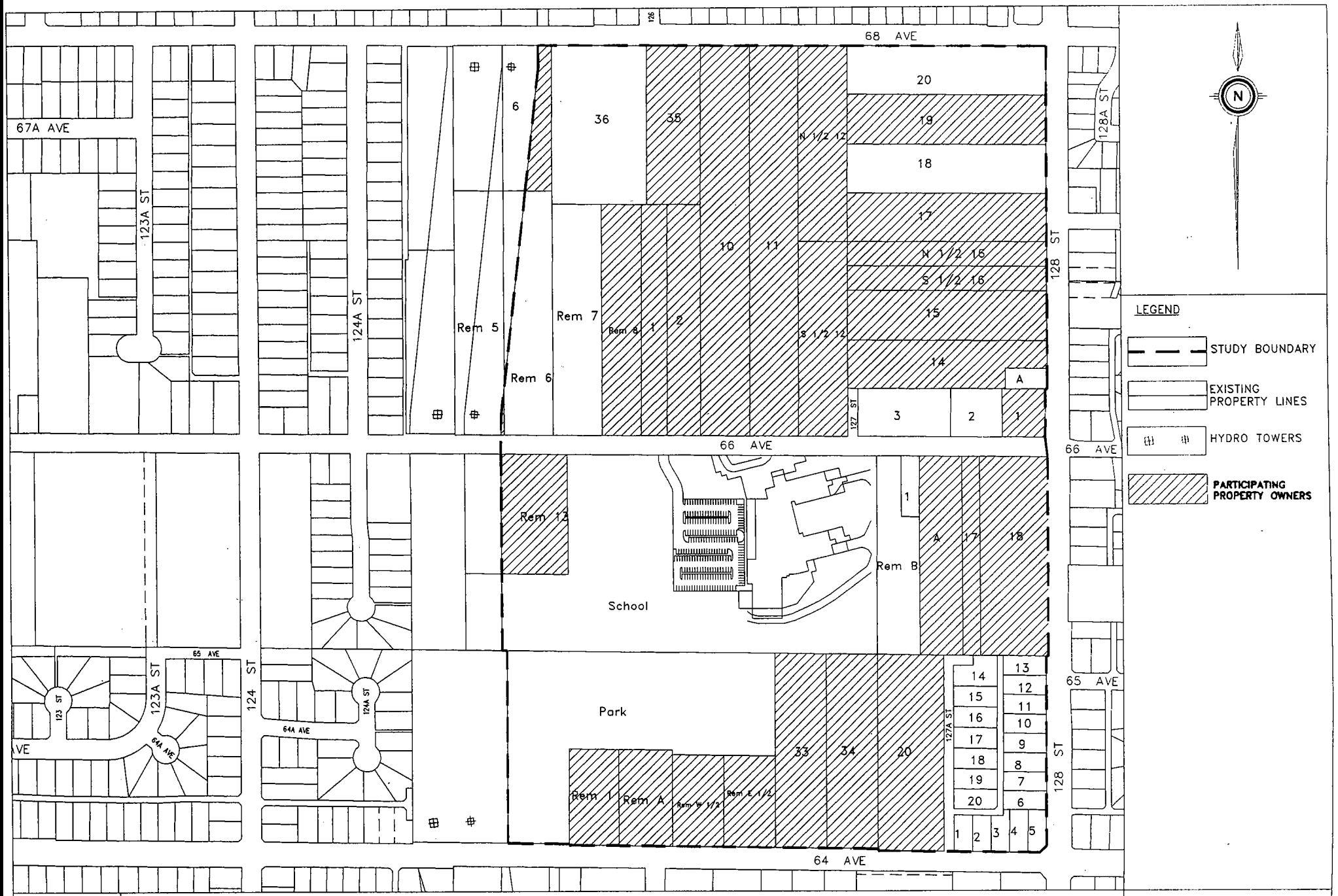
The approved LAP concept plan is shown in Exhibit 4.

- ***Surrey Zoning By-law*** - The By-law currently designates the lands within the NCP area as "RA" (Zoning Bylaw, 1993, No. 12000) and "RS" (Zoning Bylaw, 1989, No. 5942) which permit single-family development on one acre lots. These designations will require amendment as development proceeds.

- ***Other Surrey Policies*** - Other Surrey policies applicable to the NCP area include: *The Subdivision By-law*; *The Tree Replacement and Removal By-law and The Affordable Housing Strategy.*

2.4 PUBLIC CONSULTATION

The formulation of this Plan included extensive consultation with the City of Surrey, outside agencies and the public in accordance with the General Terms of Reference. Support for the Plan has been obtained from the majority of property owners. Three Public Open Houses have been held in the West Newton Community.



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West Newton Sector 2, NCP

Participating Land Owners

Exhibit 3

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DATE: APRIL, 1996

- Open House I - October 27,1994 (7:30 - 9:00 p.m.), Newton Athletic Pavilion;
- Open House II - March 14, 1995 (6:30 - 9:00 p.m.), Tamanawis Secondary School;
- Open House III - September 11, 1996 (6:30 - 8:30 p.m.), Newton Public Library.

All property owners in the NCP area, those within 100 m of its boundaries and all members of Council were directly notified by mail for the first and third Open Houses. The second Open House included a postal service mail drop to the area bounded by 120 Street, 72 Avenue, 132 Street and Highway 10. Approximately 3,500 residences were notified. No major opposition was voiced at any of the public meetings.

Open House I

Approximately 30 people attended.

This first public session involved the presentation of display materials outlining the NCP process, objectives and the land use rationale. The Open House format allowed participants to review display materials, ask questions, discuss individual objectives, and isolate issues they wanted to see addressed.

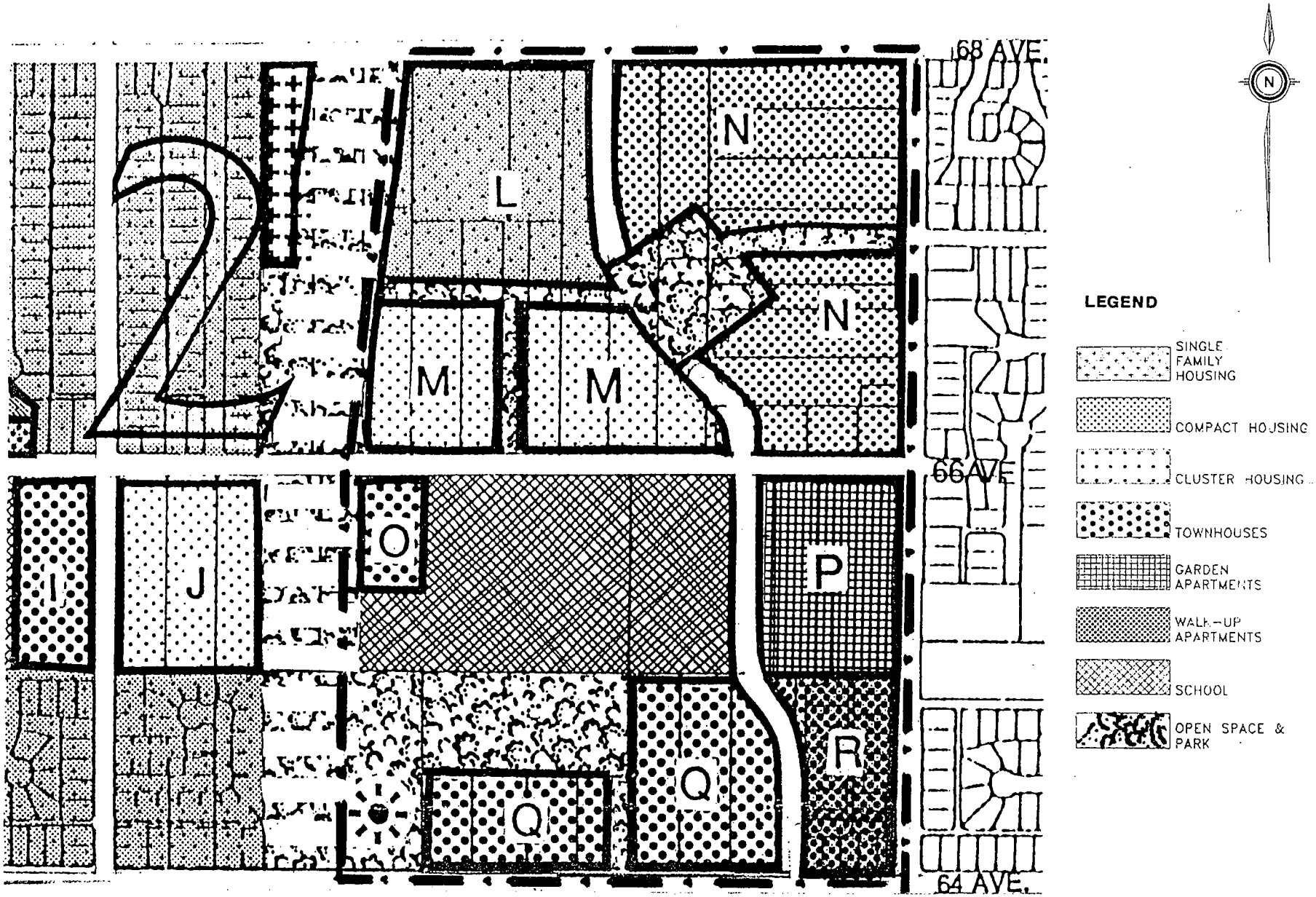
The overall public reaction was positive. Specific issues identified include:

- Opposition to the diamond-shaped park located in the 66 - 68 Avenue Block which is present in the LAP and had been proposed in the NCP. Owners were opposed to the park dedication given the large parcel already acquired for park purposes adjacent to the school in the Southern Block. There was concurrence that a pedestrian connection to the BC Hydro lands was appropriate.
- Concerns about safety, visibility and other defensible space issues with the development of the park/school site.
- Opposition to the through-road (127A) connecting 64 Avenue and 66 Avenue.
- Concerns about traffic flow near Tamanawis Secondary School.

Open House II

Approximately 60 people attended. IBI Group conducted a half hour presentation explaining the details of the proposed concept plan and the supporting planning rationale. Questionnaires were provided to obtain comments on the NCP. The initial draft concept plan received a high degree of support and consensus among the community. The following is a brief summary of the issues discussed:

- A small minority of local residents voiced their reservations with respect to the densities outlined in the LAP for the townhouses, walk-up and garden apartments. However, the majority of the property owners expressed the view that the higher densities and multi-family units would restrict the possibility of mega-houses and illegal suites.



IBI GROUP

West Newton Sector 2, NCP

Local Area Plan

Exhibit 4

DATE: APRIL, 1995

- The need to address the proliferation of illegal secondary suites was identified. There was support for the introduction of zoning which reduces the area designated for traditional single-family housing, and building design guidelines which reduce the ease of illegal conversions.

- There was support for the proposed greenspace in the Northern Block connecting the NCP area with the Hydro Corridor lands. The concept presented had a jog at the eastern end of the walkway. Suggestions were made that the walkway be re-aligned to provide for a more direct pedestrian connection.

- Support for the elimination of the 127A through road and the concept of private access roads service to the walk-up, garden apartments and townhouse sites.

- General support for the internal road network within the small lot (compact) and single-family areas. Suggestions were made that the layout be revised to better respect existing property boundaries.

Open House III

Approximately 25 people attended. This final Open House presented display materials outlining the approved land use plan, design guidelines, servicing concepts and the community amenity package.

Most of the participants were NCP property owners. Specific issues identified include:

- interest in the servicing concepts, and their impact on individual land parcels;
- the development approvals process;
- timing of the Stage II NCP approval.
- density of 2.0 acre townhouse site along 66 Avenue.

Suggestions made at these meetings and in the questionnaire have been incorporated into this NCP report. Specifically, the density of the 2.0 acre townhouse site on 66 Avenue has been adjusted to address concerns raised at the final Open House.

3.0 NEIGHBOURHOOD CONCEPT PLAN

3.1 DEVELOPMENT OBJECTIVES

This report has been prepared to achieve the following development objectives:

- To allocate and designate uses among the various landowners in conformity with the LAP while retaining flexibility for development and recognizing existing parcel configurations/ownerships.
- To be responsive to market demand within the context of established policies and different consolidations of land ownerships.
- To establish the phasing and organization of development consistent with existing and proposed servicing systems.
- To design a circulation system which will accommodate required traffic volumes yet protect the integrity of the neighbourhood and to encourage pedestrian and bicycle movements through the development of greenspace and walkway systems.
- To outline general design objectives which will create a cohesive new development and discourage the proliferation of secondary suites.
- To identify community amenity needs and the mechanisms for their funding and provision.

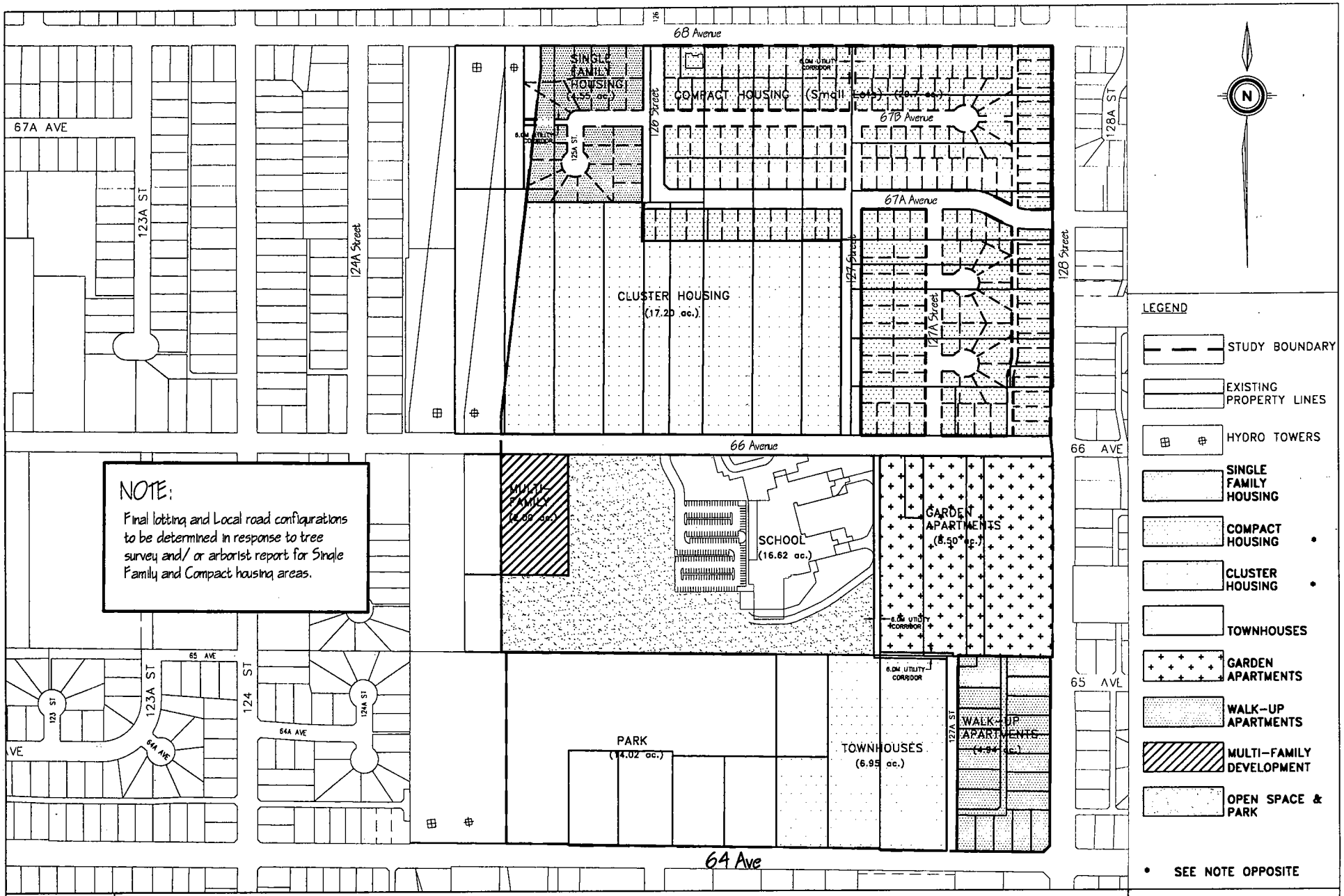
3.2 DEVELOPMENT CONCEPT

The NCP land use plan is presented in Exhibit 5. Population statistics for this plan are available in Appendix A. The primary land use is residential, comprising of low and medium density housing. The residential component of the Plan occupies approximately 74 gross acres, including internal streets and walkways. A school/park site is the other major component involving 30 acres. This development concept has been designed to best suit the sites constraints and opportunities, including the landscape, existing trees and ownership considerations.

3.2.1 Northern Block

Land uses within the northern half of the NCP area will be residential. A diamond-shaped park (4-5 acres) was originally proposed in the LAP. After discussions with the Parks & Recreation Department, this local park was deleted in favour of developing a large facility in the Southern Block. The residential components are:

- **Compact Housing** - Compact single-family lots are proposed between 66 Avenue and 68 Avenue, west of 128 Street. The approximate 28 acre area has been conceptually designed for 178 lots, with lots ranging in size from 370 m^2 to 510 m^2 (4000 - 5500 sq. ft.) . Through Local roads (127 Street, 67A Avenue and 126 Street) will provide connections to the Arterial/Collector road system and to the surrounding vicinity. Local roads will provide internal access. A lane parallel to 128 Street will provide rear vehicular access to the lots



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West Newton Sector 2, NCP

Land Use

Exhibit 5

SCALE: NTS

DATE: OCT., 1996

fronting on 128 Street. Layout of lots and Local roads including cul-de-sacs may be reconfigured at time of subdivision and/or rezoning in recognition of land ownership and tree retention considerations. The overall intent in this area is to create a cohesively planned compact lot precinct which is sensitive to tree retention/replanting and discourages oversized houses and/or secondary suites. Development will be implemented by means of specific Comprehensive Development (CD) by-laws developed in accordance with the principles outlined in Appendix D. Furthermore, the CD by-laws will be drafted to encourage narrower, deeper lots with areas ranging from 4000 to 5500 square feet. The density in this area is approximately 6 units per acre in order to achieve preservation of trees within the private lots, as all public open space is to be provided in the South Block.

- **Cluster Housing** - An approximate 17 acre area is designated adjacent to 66 Avenue for cluster housing in the form of small single, duplex or townhomes, to be developed comprehensively with internal, integrated greenspace, coordinated access and linkages to the Hydro Corridor and adjacent street system. Tree surveys/arborist reports will be prepared as design input for rezoning and/or subdivision applications. This form of development may involve the consolidation of lots. The density is 10 units per acre with a maximum yield of 172 units, however the final yield will be determined in response to site-specific considerations at the subdivision/rezoning stage.
- **Single-Family Housing** - This small 4.6 acre area is located in the northwest corner of the plan area adjacent to the Hydro Corridor. There are 24 lots proposed in the conceptual design with a resultant average lot size of 612 m^2 (6,592 sq. ft.). The final lotting will be developed following and in response to a comprehensive tree survey, with the intent of preserving trees and providing greenspace.

3.2.2 Southern Block

The South Block comprises approximately 54 acres of land. The proposed uses are:

- **School/Park Site** - The Parks & Recreation Department have requested that the combined school/park site be designed to act as both the stormwater drainage catchment area for Tamanawis Secondary School and as a joint community amenity. The existing school site is approximately 16 acres. The school site will be combined with the 8 acre parcel owned by Surrey Parks & Recreation, and an additional 6 acres immediately adjacent to the existing park. This combined 30 acre site is required to provide sufficient passive and active recreation opportunities for local residents. Main access to the new park facility will be from 64 Avenue. Pedestrian access can also be achieved through the school yard. The Parks and Recreation Department, in consultation with the Surrey School Board and the community, will develop a detailed concept plan for the park to meet the recreational needs of the NCP area residents and the community at large.
- **Walk-up Apartments** - A 5 acre area of Walk-up Apartments is proposed for the northwest corner of 64 Avenue and 128 Street. The western boundary of the apartments is the 127A Street servicing corridor which will also serve as a pedestrian/bicycle path. The housing forms will consist of medium-rise (4 - 5 storey), multiple unit residential buildings. The maximum density for this area is 45 units per acre (upa), however the anticipated housing yield is expected to be 196 units. Consolidation of the existing single-family lots will be required. The area will be serviced by private roads with access off of 128 Street and 64 Avenue.

- **Garden Apartments** - An 8.5 acre area of Garden Apartments is proposed on the south west corner of 66 Avenue and 128 Street. The maximum density for the area is 30 units per acre, however the anticipated housing yield is 213 units. The built form will consist of 3 - 4 storey multiple-unit buildings with related amenity space in a comprehensive design. Proposed access is off of 66 Avenue.
- **Townhouses** - A 7 acre site located on 64 Avenue between the proposed park and the walk-up apartments is designated for Townhouse Development. The maximum density for this area is 15 upa, however the anticipated housing yield is 83 units. The built form would consist of ground-oriented, multiple unit residential buildings with related amenity space in a comprehensive development. An all directional access off 64 Avenue is proposed, requiring the consolidation of lots or reciprocal access agreements. The location of the access must be approved by the City Transportation Engineer.
- **Multi-Family Development** - A 2 acre parcel on the west side of the school is designated as multi-family development, at a maximum density of 12 units per acre. The built form would consist of ground-oriented, duplex unit residential buildings in a comprehensive development.

At the time of completion, the West Newton Sector 2 area will contain approximately 889 housing units, yielding a projected population of 2,256 residents (Appendix A).

3.3 RELATIONSHIP WITH THE LOCAL AREA PLAN

The residential elements of the Plan have been distributed as set out in the Local Area Plan. The housing forms reflect the range of densities and housing types prescribed in the LAP. The lower-density residential sites offer a variety of lot sizes connected by a system of local roads and pedestrian walkways. The medium-density housing sites are located in close proximity of Tamanawis School and provide good transportation access for residents.

The projected total number of units for the NCP proposal is 889 compared with 927 in the LAP, a decrease of 38 units. The total projected population figure for the NCP proposal is 2,286 persons compared to the LAP proposal of 2,379, a decrease of 129 persons. Appendix A provides a statistical summary of the maximum anticipated number of units and population for the plan area. Appendix B contains a statistical comparison of the LAP, NCP First Draft and this NCP Final Report.

The number of compact single family units in the NCP area is estimated at 178 versus 156 in the LAP, in part due to the fact that the area has increased given the elimination of the diamond shaped park. A reduction in the number of townhouse units from 175 projected in the LAP to 107 in this NCP is the result of the increased park space along 64 Avenue.

3.3.1 Refinements to the NCP Report

Following a First Draft review by the City of Surrey Planning Department and the Steering Committee, some minor changes to the land use plan have occurred. The boundaries of the single-family, compact and cluster housing areas in the Northern Block have been modified to reflect changes to the location and design of the pedestrian walkway system; to incorporate the deletion of the diamond shaped and linear parks; and to better respect existing property boundaries while recognizing the overall principles and intent of the LAP. In the Northern Block, there has been a 7 acre reduction in the area assigned to large single-family homes.

The compact and cluster areas have increased by approximately 13 acres and a further 6 acres of open space has been relocated to the south.

The Stage I Land Use Concept designated a 2.0 acre parcel on 66 Avenue adjacent to the BC Hydro right-of-way for townhouse purposes in accordance with the West Newton Local Area Plan. During the preparation of the Stage II report, concerns were raised regarding the appropriateness of this description. In order to achieve a better density transition with the "cluster housing" uses envisioned to the north of the site, this 2.0 acre parcel shall be developed as multiple residential but the density shall be limited to 12 units per acre and the built form will be that of ground-oriented duplex housing.

3.3.2 Affordable Housing

Affordable housing is a provision identified in the Municipal Act.

In addition to the identified amenity contribution amounts, the City has an affordable housing strategy. This strategy applies to all rezoning projects, regardless of size. To address the issue of affordable housing, the strategy specifies that the developer provide either a minimum of 20% of the units or lots within the project to be set aside as affordable housing or, in lieu of actually providing the units, a contribution to the City's Affordable Housing Fund in the amount of $750.00 per unit. The smaller 2.0 acre multi-family development is identified as a suitable affordable housing location due to its close proximity to Tamanawis School. However, there is no affordable housing project proposed at this time.

3.3.3 Day Care

The West Newton Local Area Plan refers to the City's Child Care Policy and encourages child care centres throughout the community. The LAP suggests that the demand for child care spaces could reasonably be accommodated through one or two centrally-located centres and recommends that they be near parks, within the proposed community facility and in commercial centres. However, the Surrey Parks & Recreation Department has determined that a community facility is not required in the NCP area but rather at locations near town centres. The land required for a community facility has already been acquired by the City should the need arise in the future.

3.3.4 Secondary Suites

The proliferation of illegal secondary suites in Surrey and the West Newton Area has been identified both by the City and the public as a significant issue. School District #36 has indicated their strong opposition to any secondary suites in this area.

Secondary suites are not a permitted use within the zoning designations contemplated for the NCP, including the site specific CD zoning in the compact and cluster housing areas. To further discourage unauthorized suites or illegal suite conversions, a restrictive covenant prohibiting basement entry style homes or house designs which facilitate the conversion to include an illegal suite will be required as a condition of subdivision.

The rezoning/subdivision process will establish the housing character for the area. The housing character will provide a high quality of home design and construction that reflects the policies of the NCP and LAP including the discouragement of secondary suites.

4.0 ENGINEERING SERVICES

4.1 ROADS

The NCP area is well-served by arterial and collector roadways. The existing road system is comprised of:

- 64 Avenue: This arterial road has recently been widened to 18.4 m to accommodate 4 lanes and bicycle lanes, sidewalk and curb and gutter on both sides and streetlighting.
- 128 Street: This arterial road currently provides one lane south-bound and open ditches, and two lanes north-bound with curb and gutter.
- 66 Avenue: this minor collector road provides one lane in each direction, open ditch on the north side, gravel shoulder on the south side and sidewalk adjacent to the school.
- 68 Avenue: this major collector roadway provides sidewalk and curb and gutter on the north site, and open ditches on the south side east of 126 Street, and curb and gutter on the south side west of 126 Street.

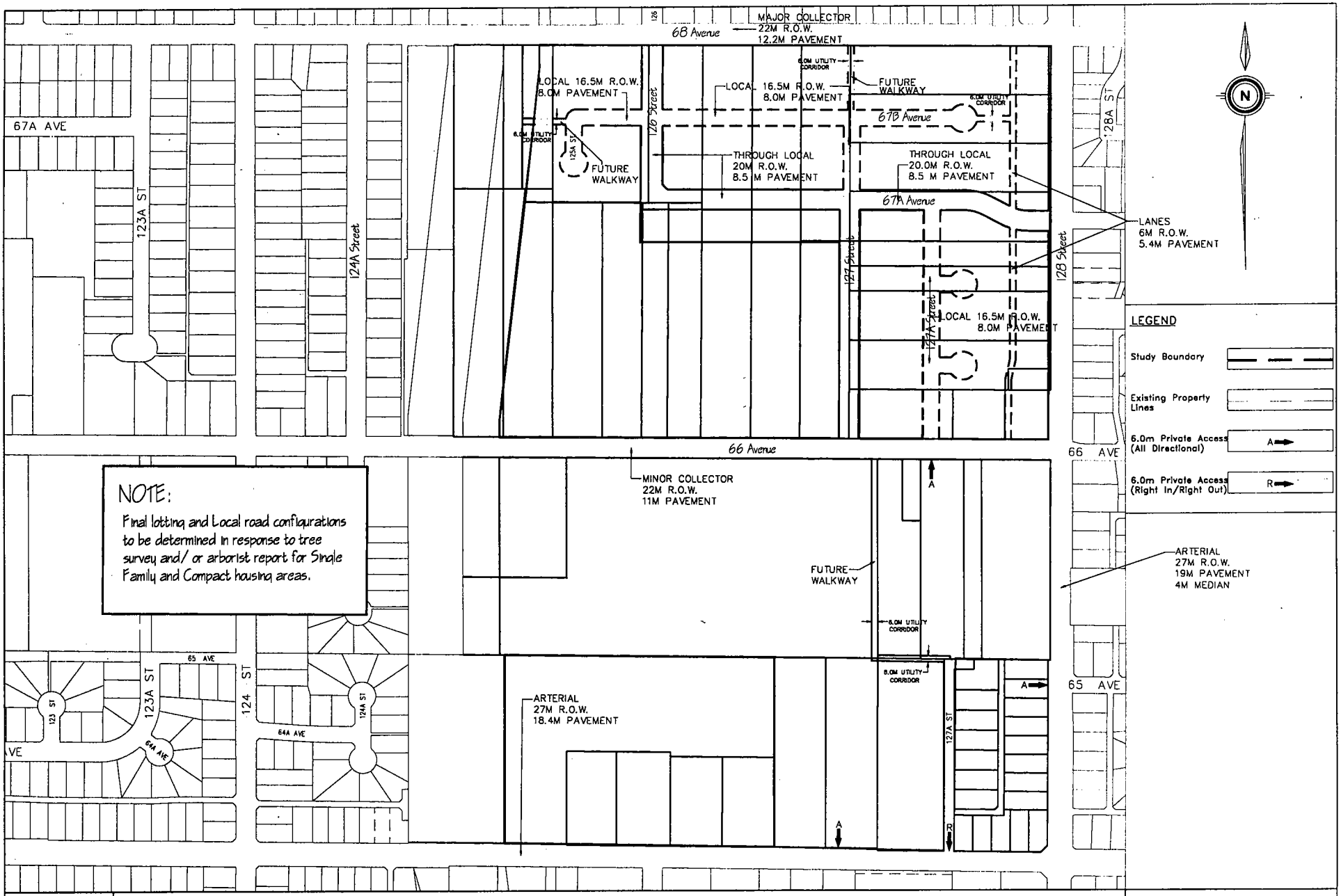
Existing traffic signals are located at 128 Street / 64 Avenue, 128 Street / 66 Avenue and 128 Street / 68 Avenue. The other intersections are "stop" controlled.

4.1.1 Traffic Impact Study

The consulting firm of UMA has carried out a Traffic Impact Study for the larger West Newton LAP area. The purpose of this study was to determine the effects of development of the Sectors 2 and 3 NCP areas, in-fill development occurring within West Newton but outside the NCP areas, and other major developments that would generate traffic impacts.

The report provides specific data on traffic impacts and required improvements to the roadways servicing this NCP area. The roadway improvements affecting Sector 2 recommended in the Report and currently contained in the City of Surrey 10-Year Servicing Plan include:

- 64 Avenue widening and reconstruction from 120 Street to 132 Street to a 19.0 metre arterial standard (27.0 m right-of-way). (Ref # 1392,1995)
- 128 Street widening and reconstruction from 64 Avenue to 72 Avenue to a 19.0 metre arterial standard required by 1999 (27.0 m right-of-way). (Ref #4141,2002)
- Construction of north/south left turn bays at the intersection of 128 Street and 68 Avenue. (Ref # 4537,2002)
- Installation of a new traffic signal at 128 Street and 68 Avenue. (Ref #4564,2002)
- Sidewalks along 66 Avenue and a new traffic signal installed at 66 Avenue and 128 Street
- Non-arterial interim 8.5 m widening of 68 Avenue, 124 St. - 126 St. (Ref#1442, 2002)



West Newton Sector 2, NCP

Road Classification / Access

IBI GROUP

Exhibit 6

SCALE: NTS

DATE: OCT., 1996

The Engineering Terms of Reference classify 68 Avenue as a major collector (22.0 m r.o.w. and 12.2 m pavement). This item is not currently contained in the 10 Year Plan. It is recommended that the item be included during the next review of the plan. However, should development wish to proceed prior to an inclusion in the plan, the developers would be responsible for the cost of upgrading the road without opportunity for a DCC rebate.

4.1.2 Proposed Road Service

A local road system consisting of limited and through local roads is proposed for the Northern Block. This proposed road system is designed to provide an efficient and equitable layout connecting to 128th Street, 66 and 68 Avenues. The alignments are circuitous to minimize through traffic impact on the adjacent and surrounding residential areas (Exhibit 6).

Access to the apartment site at the northwest corner of the 128 Street/64 Avenue intersection, the townhouse site on 64 Avenue and the garden apartment site on 66 Avenue are shown in Exhibit 6. Access to these sites will be provided as follows :

- There are two access points proposed for the Walk-up Apartments: an all directional 6 metre private access on 128 Street opposite 65 Avenue and a right in/right out private access to 64 Avenue located immediately east of the existing 10 metre right-of-way for 127A Street (future servicing corridor/walkway). It is recommended that the apartment site be consolidated and reciprocal access agreements be provided to service the entire site from these two points of access.

- For the Townhouse sites fronting on 64 Avenue, all directional, joint access will be provided. The proposed access is located approximately 180 -200 metres west of the 128 Street intersection and should provide a 35 m eastbound left turn bay. Surrey will require that the developers provide reciprocal access agreements amongst the townhouse sites so that access can be consolidated. Each developer will be granted temporary right-in/right-out access onto 64 Avenue with a restrictive covenant to close each at a later date when the access agreements are in place.

- The garden apartments will be accessed off 66 Avenue with a joint, all-directional access aligned opposite 127A Street to the north.

Variations to the internal road layout in the North Block may be necessary based on a detailed tree survey and ownership consolidations, but all intersections must be aligned. No direct access to single family residential lots will be permitted from 128th Street, requiring a lane at the back of the lots. Internal roads will be finished with street lights, curbs and include street trees in accordance with SSD-R9 standard. Sidewalks will be provided on one side of the through local roadways and on two sides on higher order roads.

The Local Area Plan proposed a new local road extending 127A Street between 64 Avenue and 66 Avenue. After consultation with the School Board, the Engineering Department and the property owners, a through road is not recommended for the following reasons:

- The close proximity of the new road to the existing 64 Avenue and 128 Street major intersection.

- The School Board has clearly indicated that a secondary means of access to the new school is not necessary.

- A new road at this location could compromise the integrity of the neighbourhood by encouraging through traffic flows between 64 and 66 Avenues.

All internal roads will be the responsibility of the developers to construct as required through the subdivision and rezoning approval process.

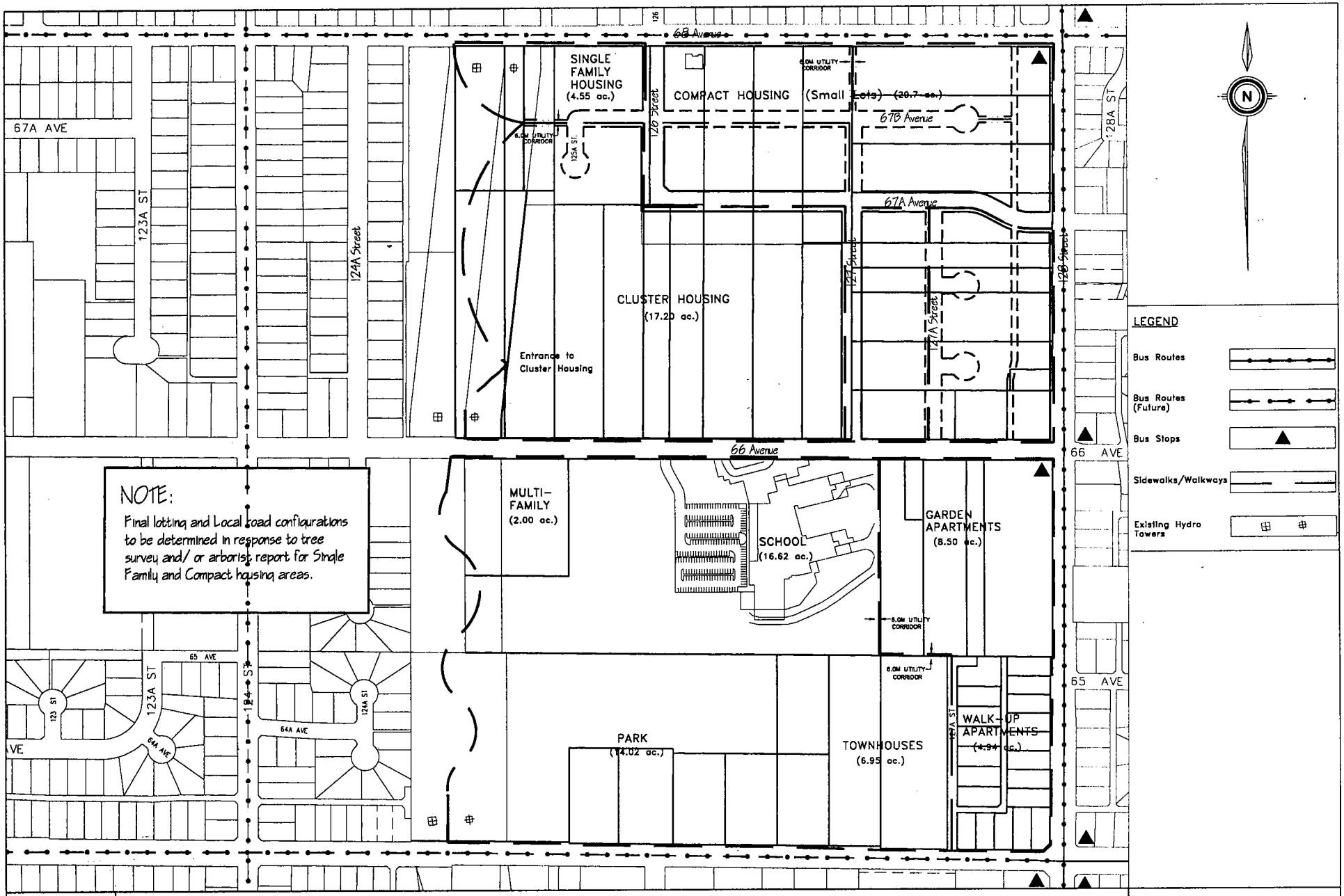
The 128 street half road improvements to the arterial standard will be constructed by the City of Surrey through the DCC program. It is recommended that the 10 year plan be amended to include the costs of widening 68 Avenue under the Major Collector road DCC program.

The summary of the roads, their classifications and requirements are presented in the following table.

Table 2: Road Classifications

Classification	Road	R.O.W.	Pavement	Bike Lanes	Notes
Arterials	128 Street	27.0 m	19.0 m	yes	Widening and reconstruction to divided roadway in 10 year plan (Ref#4141, start date 2002)
	64 Avenue	27.0 m	18.4 m	yes	Widening and reconstruction during 1995/96. Divided roadway with left land channelization at 128 Street (Ref#1392, start date 1997)
Major Collector	68 Avenue	22.0 m	12.2 m	yes	Widening to a major collector standard recommended for inclusion in the 10 year plan.
Minor Collector	66 Avenue	22.0 m	11.0 m	no	Ditch enclosure and sidewalk proposed on the north side. Parking to be prohibited on one side to provide for bicycle movements.
Through Local	127 Street 67A Avenue 126 Street	20.0 m	8.5 m	no	Proposed in NCP to service the singe-family areas. Roads will be developed in accordance with City of Surrey standards. Roads are aligned with existing intersections on 128 Street and 68 Avenue.
Limited Local	127A Street	16.5 m	8.0 m	no	Proposed in NCP to provide internal access.

The costs and sources of funds for these works are presented in Section 5.5.



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West Newton Sector 2, NCP

Transit and Sidewalk Network

Exhibit 7

SCALE: NTS

DATE: OCT., 1996

4.2 PEDESTRIAN AND BIKE ROUTES

A series of walkways/servicing corridors and public roadways will provide pedestrian and bicycle access to the school/park site, Hydro Corridor and all other portions of the NCP area.

Pedestrian and bicycle circulation are shown in Exhibits 7 and 8. The principle of this network is to provide connections to the major destinations within the plan area and public transit services. 68 Avenue is identified in the "Bicycle Blueprint" as one of the on-street elements in the City's network. With the proposed widening of 64 Avenue and 128 Street, wider curb lanes will be constructed to accommodate bicycle movements. To facilitate bicycle movements on 66 Avenue, parking will be restricted on one side. Formal walkways will be developed to facilitate the servicing corridors. The rights-of-way widths will be 6.0 metres. The walkways will be hard-surfaced and suitably fenced, consistent with City policies and guidelines.

The City's policy for the Hydro lands is to ultimately provide a continuous greenspace corridor for pedestrians and cyclists with strategically-located linkages to local neighbourhoods. Pedestrian and bicycle links are provided in the Northern Block via a walkway and in the Southern Block through the school/park site.

4.3 PUBLIC TRANSIT

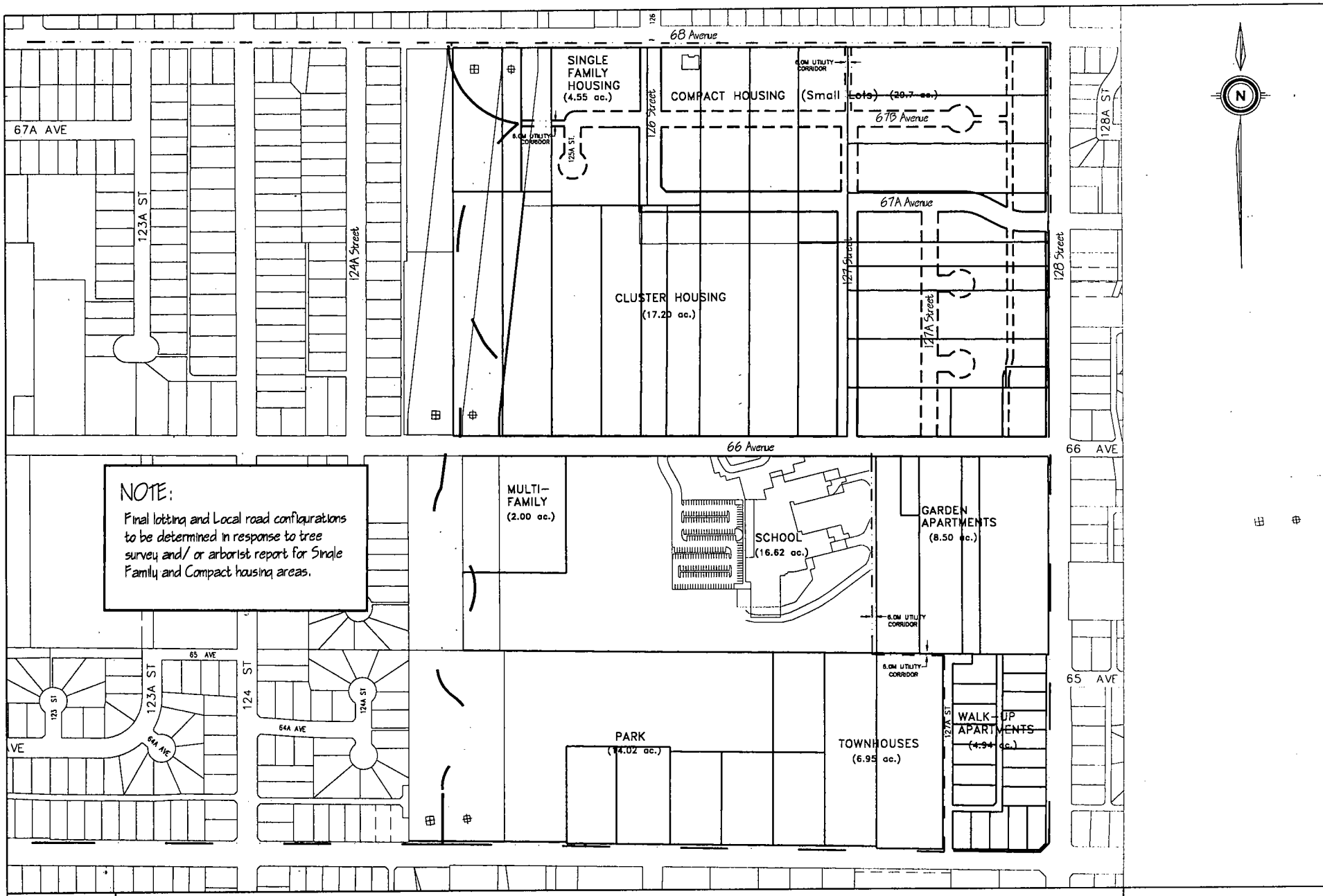
This NCP has been discussed with BC Transit with regards to their existing routes and future expansions. Exhibit 7 shows the existing and proposed transit services. Bus stops are located at approximately 400 m intervals and are past the intersection, in accordance with BC Transit operating procedures.

Existing Service

- The main bus route serving the plan area is north and southbound along 128 Street. Regular and peak hour services are provided.
- Service is also provided east along 64 Avenue.
- Transit stops are located where 64, 66 and 68 Avenues intersect with 128 Street.

Proposed Service

The West Newton Traffic Impact Study proposes that transit service be added to 64 Avenue and to 68 Avenue, supplementing the existing service on 128 Street. The frequency of these existing routes may also be increased to provide better service.



IBI GROUP

West Newton Sector 2, NCP

Bicycle Path Network

Exhibit 8

SCALE: N.T.S

DATE: OCT., 1996

4.4 WATER SERVICING

4.4.1 Existing Water Network

West Newton Sector 2 is served with existing watermains within and immediately adjacent to the area. As shown in Exhibit 9, the existing distribution and grid watermains in the neighbourhood are as follows:

- A 200 mm watermain on 128 Street;
- A 300 mm watermain on 64 Avenue;
- A 250 mm watermain on 66 Avenue;
- A 300 mm watermain on 68 Avenue;

There is a short section of 100 mm watermain on the west portion of 66 Avenue which will need to be replaced in order to provide continuous 250 mm watermain service in the west part of the NCP area.

4.4.2 Proposed Water Network

In order to best serve the area north of 66 Avenue, it is proposed to interconnect the existing mains on 66 Avenue and 68 Avenue with a 200 mm watermain along 127 Street (Exhibit 9). New 200 mm watermains would extend from these distribution mains and provide local service.

Points of service for the single-family lots will be from the watermains on the streets which they are located. Lots fronting onto 68 Avenue and 128 Street will connect to the existing 300 mm and 200 mm watermains, respectively.

Water services to the multi-family areas south of 66 Avenue will be to the existing watermains on 64 Avenue, 66 Avenue or 128 Street.

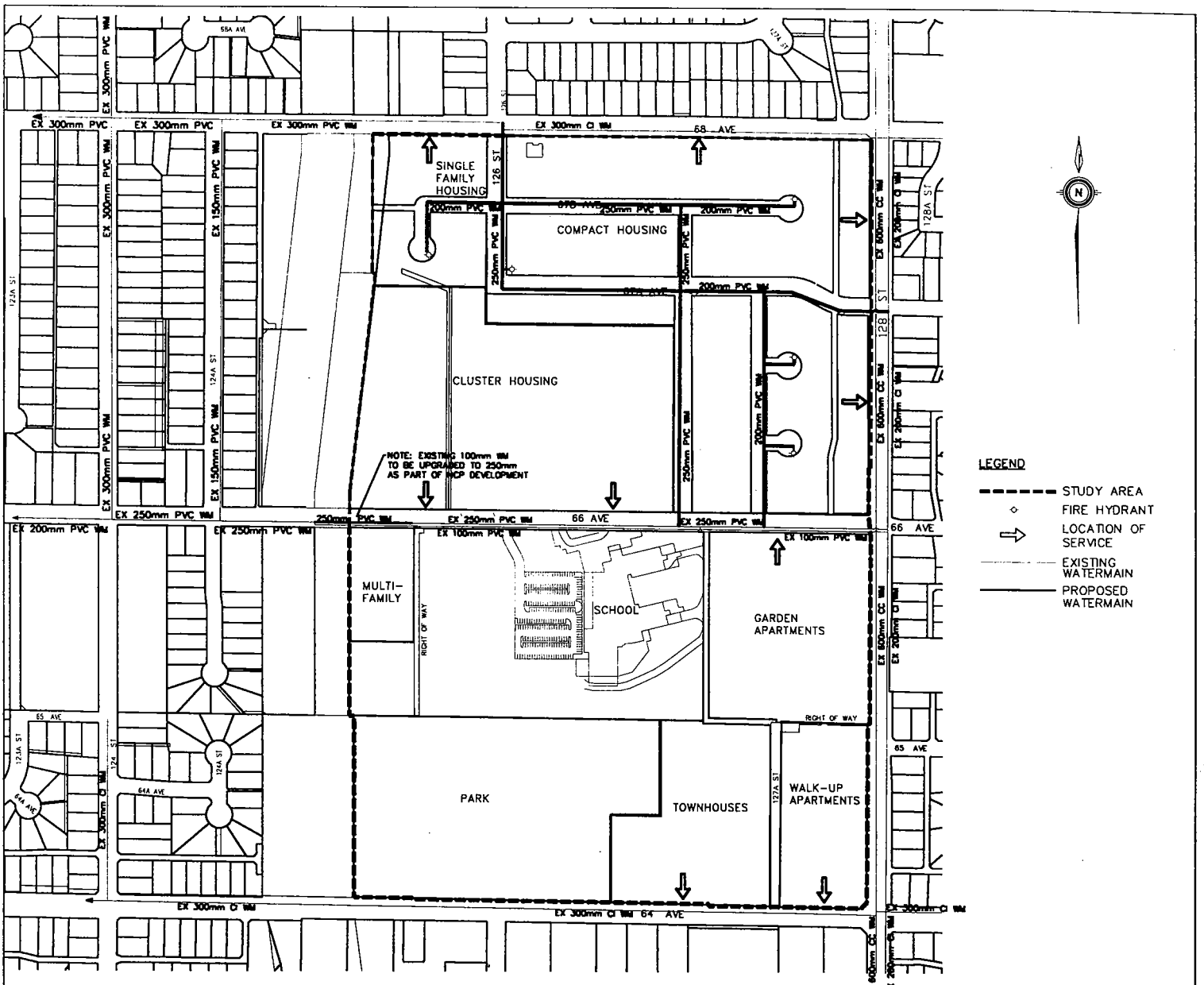
Consideration was given to providing 250 mm watermain on 127A Street along the east side of the school, connecting 64 Avenue and 66 Avenue. The water network analysis described below does not indicate a requirement for this watermain.

The 250 mm watermain on 66 Avenue will need to extend west of the school site and connect to the existing 250 mm watermain west of the NCP area, replacing the existing 100 mm pipe. This distance is approximately 80 m. This connection will be necessary when the adjacent cluster housing area on either side of 66 Avenue proceeds to development.

Neither the 200 mm or 250 mm watermains qualify for DCC rebates.

4.4.3 10-Year Servicing Plan, Water Network

Only one water network improvement project is identified in the 10 year servicing plan, a portion of which has already been constructed, as outlined below.



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2	OCT. 1996	REVISIONS AS PER SURREYS COMMENTS	JM	RAM
1	JULY 1996	REVISIONS AS PER SURREYS COMMENTS	JM	RAM

REVISIONS

IBI GROUP
PLANNERS ENGINEERS

DATE: OCT., 1996
DESIGNED BY: A.C.
DRAWN BY: M
CHECKED BY: R.A.M.
SCALE: N.T.S.

THE CITY OF SURREY

NEIGHBOURHOOD CONCEPT PLAN
WEST NEWTON, SECTOR 2

WATER SERVICING PLAN

APPROVED

FILE NO: 13-4656

DRAWING NO: 4656ENG

EXHIBIT 9

Table 3: 10 Year Water Servicing Plan

10 YEAR WATER SERVICING PLAN			
Description	Estimated Cost	Timing	Surrey Reference No.
Replace 100 mm sewer 66 Ave, 126 St. - 125A St.	$20,800	2002	1432

Construction of watermains within the single-family area will be the responsibility of the individual developers. Each developer will need to ensure that the water network meets the City's design requirements to provide security of service and adequate fireflows for each phase of development.

4.4.4 Hydraulic Analysis

A hydraulic analysis was carried out for the proposed water network. This analysis indicated that the proposed system will satisfy City of Surrey criteria for maximum day demand plus fire flow at critical locations under the fully completed network.

This analysis also indicated that the peak hour demand will be sufficiently met in all areas, except for a small portion in the South Block above the 95 meter contour. Since the area is within a close proximity of the Newton Water Pumping Station, it is anticipated that the static head losses during peak periods will not approach the assumed 20% condition at the source nodes. This explanation has been discussed with the Engineering Department staff and has been confirmed as acceptable.

The complete water network analysis is described in the attached Appendix E.

4.5 SANITARY SERVICING

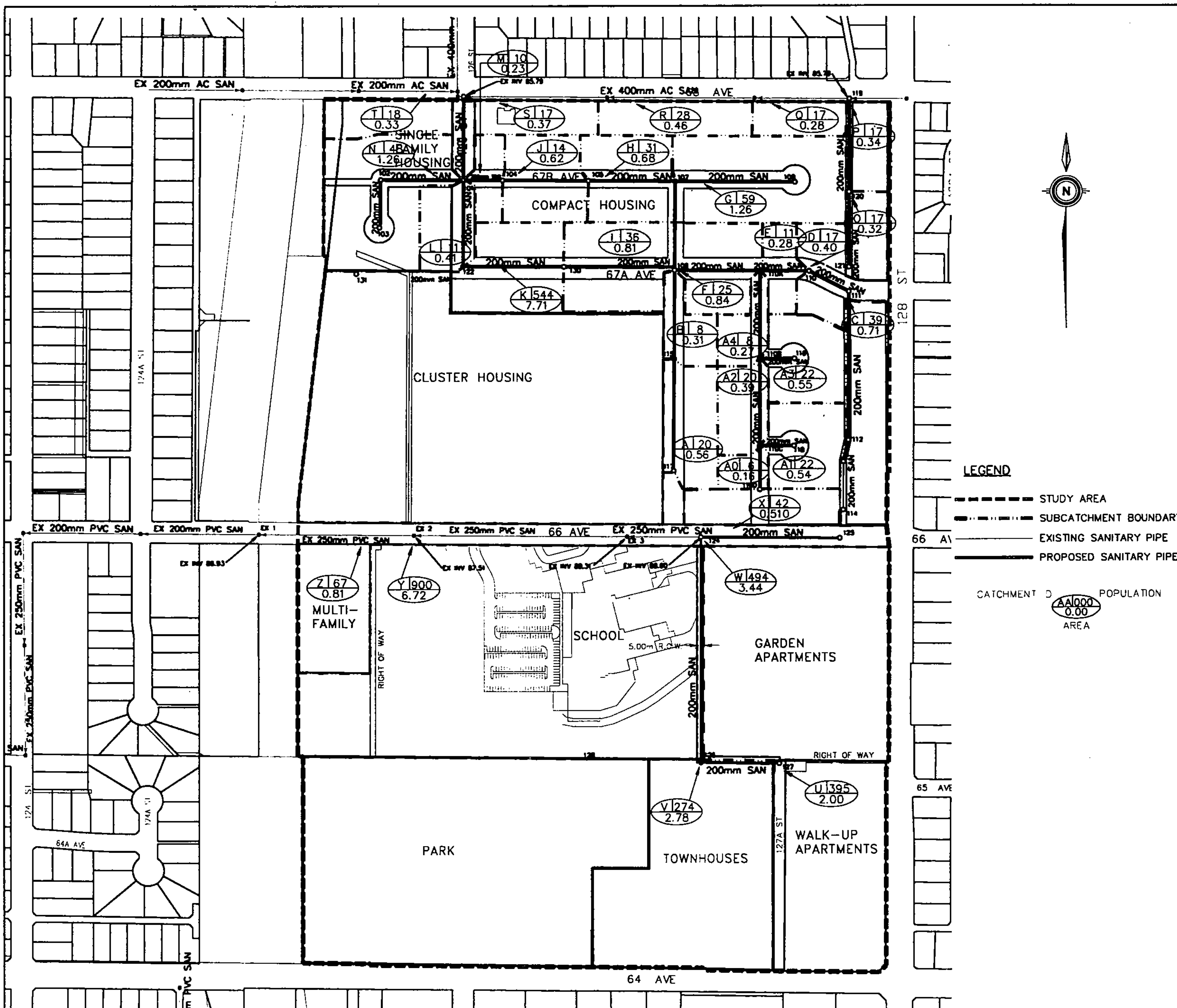
4.5.1 Existing Sanitary Services

As shown in Exhibit 10, there are two existing sewers that service the neighbourhood:

- A 400 mm trunk sanitary sewer on 68 Avenue, outfalling north on 126 Street;
- A 250 mm sanitary sewer on 66 Avenue which drains west from approximately 128 Street to 124 Street, and south on 124 Street.

4.5.2 Proposed Sanitary System

The NCP area slopes down to the north and west. Therefore, it is proposed that the lands north of 66 Avenue will be serviced to the 68 Avenue sewer, while lands south of 66 Avenue will drain north to the 66 Avenue sewer and west to the existing services on 124 Street. The City of Surrey has confirmed that the existing systems are capable of accommodating the proposed development.



IBI GROUP PLANNERS ENGINEERS	DATE: OCT. 1995
THE CITY OF SURREY	
NEIGHBOURHOOD CONCEPT PLAN — WEST NEWTON, SECTOR 2	
SANITARY SERVICING & CATCHMENT PLAN	EXHIBIT 10

The single-family area between 68 Avenue and 66 Avenue will be serviced via the extension of a 200 mm sanitary sewer south on 126 Street and east to 127 Street. This extension will pick up all of the single family area between 126 Street and 128 Street, and south to 66 Avenue. A 200 mm sanitary sewers will also be installed along the lane behind the lots fronting on 128 Street. Sanitary services to the cluster housing will be serviced by extending the proposed 200 mm sanitary sewer on 126 Street south to the development.

The area south of 66 Avenue will drain to the existing 250 mm sanitary sewer on 66 Avenue. This will require extension of a 200 mm sanitary sewer in a statutory right-of-way on the east of the school site, south to the townhouse and garden apartment sites fronting on 64 Avenue.

4.5.3 Surrey 10-Year Servicing Plan, Sanitary System

There are no improvements to the sanitary system scheduled in the 10 Year Servicing Plan.

All sewers will be constructed by the land owners as development occurs. These sewers do not qualify for DCC rebate. The City may wish to upsize these sewers and would contribute to upsizing cost, in accordance with city standards.

4.6 STORM SERVICING

4.6.1 Existing Storm Drainage System

The existing drainage system is comprised of the following components as shown in Exhibit 11:

- The lots fronting on 68 Avenue discharge to an existing 900 mm storm sewer in 68 Avenue, which flows north on 126 Street and outfalls to Cougar Creek;

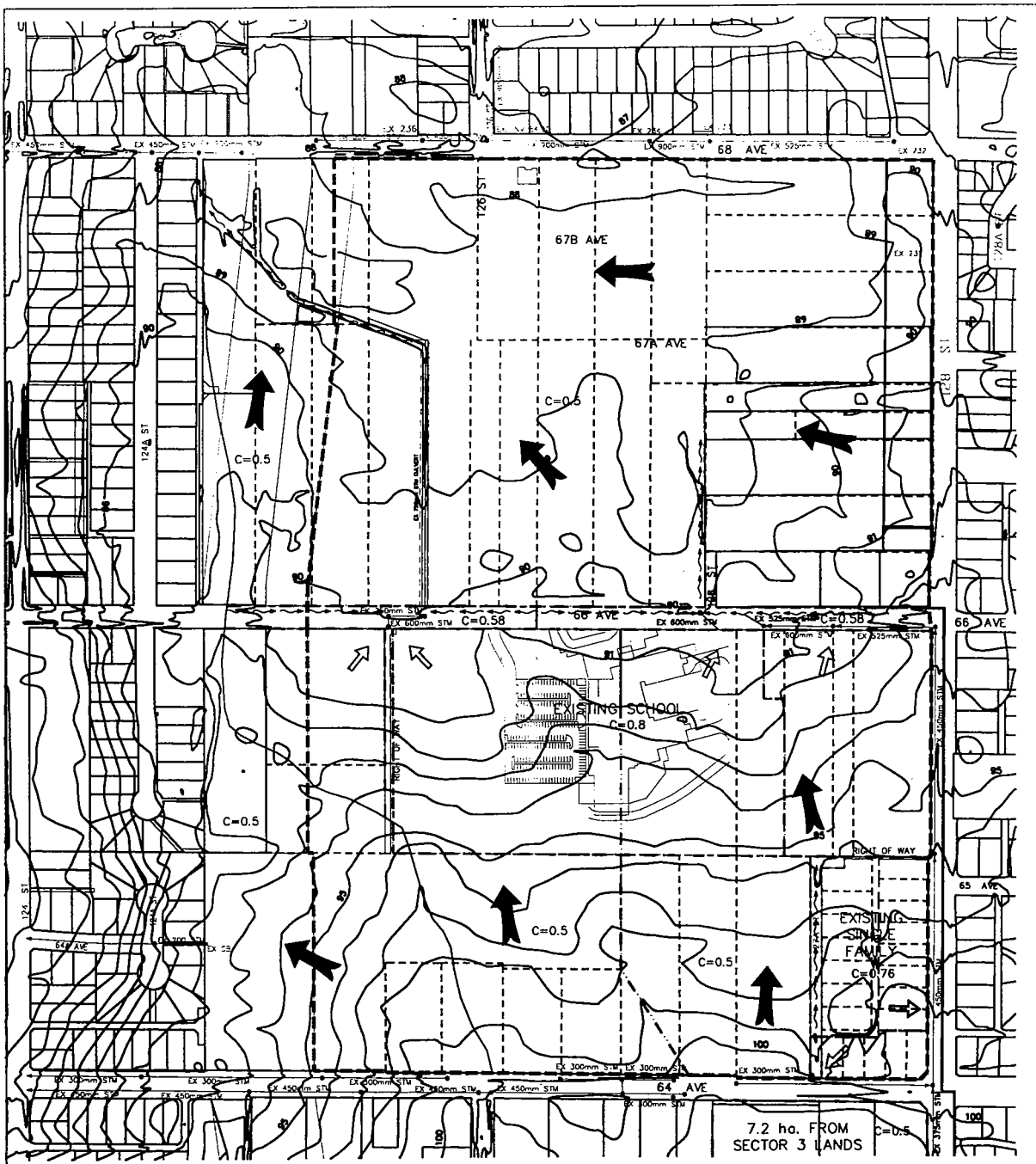
- The central portion of the plan area (including the existing school site), drains to existing storm sewers in 66 Avenue. This discharges to an existing 750 mm storm culvert draining north, and then to a drainage ditch heading northwest across the hydro right-of-way to 68 Avenue.

- The 64 Avenue right-of-way drains to existing 300 mm and 450 mm storm sewers running west along 64 Avenue.

4.6.2 Stormwater Detention Facility

In accordance with City policy, the storm drainage system has been designed such that the storm release rate for the post-development 2 year and 5 year flows are equal to or less than the pre-development flows. In order to achieve this control of run-off, some form of storm water detention is required.

At the beginning of the NCP planning process, the Surrey Engineering Department suggested an on-site stormwater detention facility, as the existing Cougar Park pond was not able to accommodate additional peak flows. Accordingly, a neighbourhood-scale detention pond of a size 0.5 ha-m was proposed on the BC Hydro right-of-way immediately south of 68 Avenue. Alternative outfalls to Cougar Creek were considered along 126 Street, along the BC Hydro



LEGEND

- STUDY AREA
- SUBCATCHMENT BOUNDARY
- CATCHMENT BOUNDARY
- LOT LINES
- OVERLAND FLOW DIRECTION
- EXISTING SWALE
- C=0.5 RUN-OFF COEFFICIENT
- SERVICE DIRECTION

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2	JULY 1996	REVISIONS AS PER SURREYS COMMENTS	JM	RAM
1	APRIL 1996	LAND USE PLAN UPDATE	JM	RAM

REVISIONS

IBI GROUP
PLANNERS ENGINEERS

DATE: OCT. 1996
DESIGNED BY: J.A.C.
DRAWN BY: M.J.R.
CHECKED BY: R.A.M.
SCALE: N.T.S.

THE CITY OF SURREY

NEIGHBOURHOOD CONCEPT PLAN
WEST NEWTON, SECTOR 2

EXISTING CATCHMENT BOUNDARIES

APPROVED

FILE NO. VO-4656

DRAWING NO. 4656ENG

EXHIBIT 11

right-of-way and along 123 Street. The 126 Street alignment was recommended as the most cost-efficient option.

The City Engineering Department has since initiated the Cougar Creek Master Drainage Plan. This plan outlines an overall stormwater control plan for the entire Cougar Creek basin, which extends south of 64 Avenue to north of 82 Avenue. The Master Drainage Plan recommends that larger, centralized ponds be developed. The study proposes a 1.1 ha-m detention pond adjacent to Cougar Creek near 125 Street and improvement of the watercourses, from 126 Street to the pond. This 125 Street pond would consolidate two existing ponds, expand to accommodate Sector 3, and service the lands north of 68 Avenue. This is the preferred storm servicing system for the neighbourhood.

However, since the proposed pond is located on private lands and since Cougar Creek between 126 Street and the proposed pond also crosses private lands, it is proposed to retain the initial 0.5 ha-m detention pond in the BC Hydro row south of 68 Avenue as an alternative should it be impossible to develop a pond in the preferred location. Accordingly, Exhibit 12 shows this alternative, involving a 1200 mm inlet pipe to the pond from 67B Avenue, and a 900 mm outlet pipe from the pond, east on 68 Avenue to the existing 900 mm pipe on 126 Street. This location for a pond has been tentatively approved by BC Hydro as well as the land owner, subject to detailed design and land price, respectively.

4.6.3 Proposed Storm Drainage System

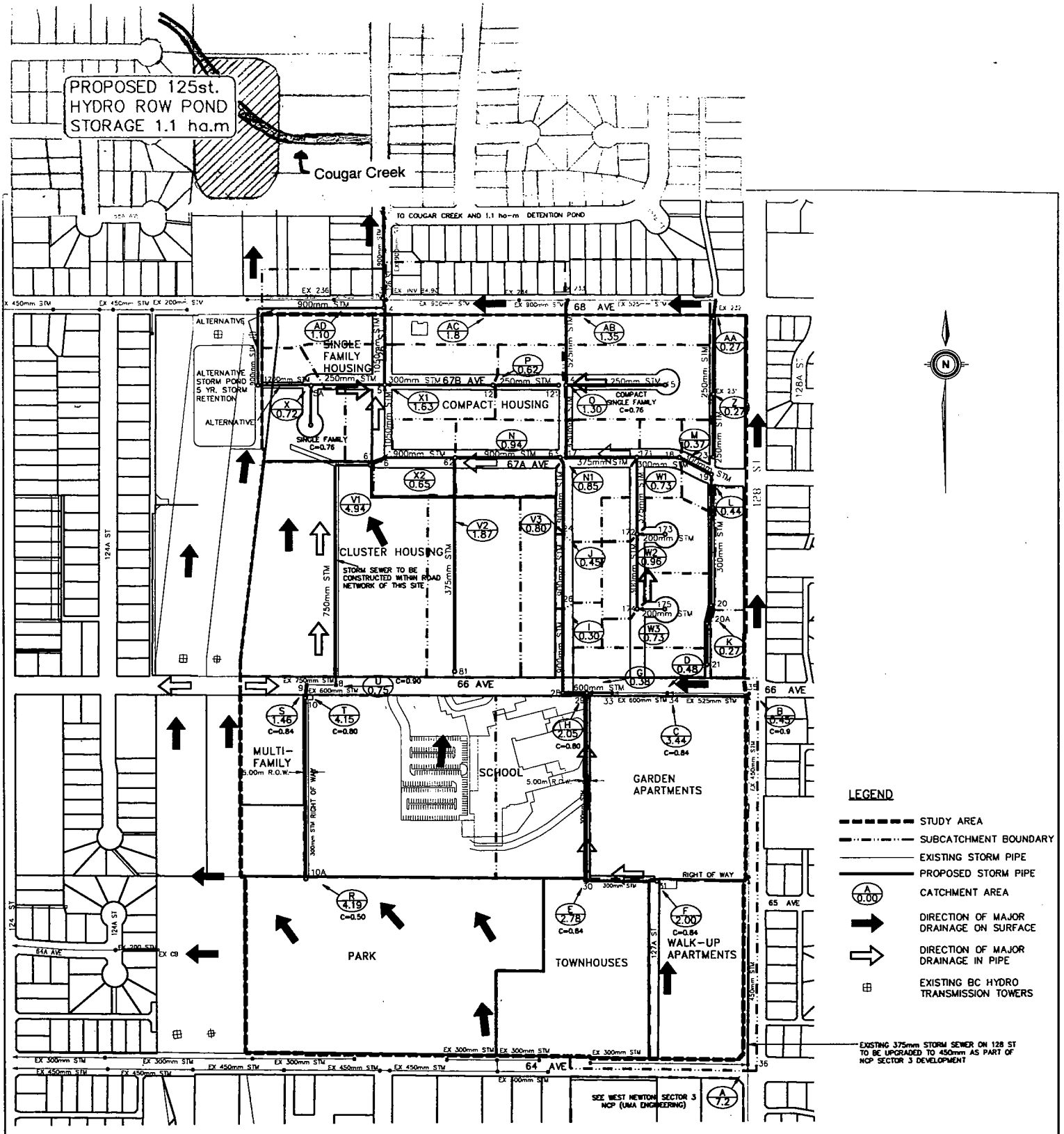
A storm servicing concept has been developed for the NCP area, which also accommodates drainage for 17.8 acres (7.2 ha) located in Sector 3 to the south. Storm drainage for the entire area is proposed to outfall to storm sewers in 126 Street and then to Cougar Creek and the detention pond. Major trunks will be required as follows (see Exhibit 12):

- 900 mm trunk on 126 Street from Cougar Creek to 68 Avenue, parallel to the existing 900 mm trunk.
- 1050 mm trunk on 126 Street, from 68 Avenue south to 67A Avenue.
- 900 mm trunk on 67A Avenue.
- 900mm and 750 mm trunks on 127 Street south of 67A Avenue, and in the easement through the townhouse area, on the 125A Street alignment.

In order to accommodate the storm flows from the West Newton Sector 3 area, comprising 7.2 ha south of 64 Avenue, the existing 375 mm pipe on 128 Street between 65 Avenue will need to be upgraded to 450 mm diameter, as well as a section of pipe in 66 Avenue will need to be upgraded from 525mm to 600mm.

The storm servicing system will accommodate the following three major catchment areas:

1. An area of approximately 6.5 hectares, east of 127 Street and north of 66 Avenue, which will drain north to the existing 900 mm storm sewer on 68 Avenue, then west to 126 Street and north to Cougar Creek.



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1	APRIL 1996	LAND USE PLAN UPDATE	JM	RAM

REVISIONS

IBI GROUP
PLANNERS ENGINEERS

DATE: OCT., 1996
DESIGNED BY: J.A.C.
DRAWN BY: M.J.R.
CHECKED BY: R.A.M.
SCALE: NTS

THE CITY OF SURREY
NEIGHBOURHOOD CONCEPT PLAN
WEST NEWTON, SECTOR 2
STORM WATER CONTROL PLAN

APPROVED
FILE NO. VO-4656
DRAWING NO. 4656ENG
EXHIBIT 12

2. A large, central area comprising of approximately 36 hectares located west of 127 Street and north of 66 Avenue, and between 128 Street and 126 Street south of 66 Avenue. This also includes an additional 7.2 hectares south of 64 Avenue. This area will drain to a new 1050 mm trunk sewer on 126 Street, then north through a splitter manhole to the existing 900 mm sewer on 126 Street and a parallel 900 mm sewer, which also outfalls to Cougar Creek.

3. A small, 1.8 hectare area of park in the southwest corner of the site, which will continue to drain overland to the Hydro corridor, north to 66 Avenue and then west along 66 Avenue.

4.6.4 Timing of Detention Pond

In order to determine the timing of development for the Cougar Creek detention pond, an analysis was carried out to determine the area that may be serviced by the existing 900 mm trunk on 126 Street, beyond which the pond would need to be constructed.

The existing 900 mm storm trunk on 126 Street has a capacity of approximately 1 cubic metre per second. It is estimated that this pipe will be able to accommodate approximately 37 hectares of development, including approximately 7.0 hectares north of 68 Avenue and 30.0 hectares south of 68 Avenue. Development beyond 37 hectares will require twinning of the 900 mm pipe on 126 Street, the development of the pond and creek improvements.

Prior to construction of the pond, each development phase will be required to construct interim detention ponds each servicing a minimum of 2.0 hectares of land, to restrict peak flows to predevelopment levels. The size, discharge rate and location of these temporary ponds will need to be determined at time of development.

4.6.5 100 Year Hydraulic Grade Line

The 100 year hydraulic grade line has also been calculated for the storm system. The 100 year storm will surcharge above the pipe for most of the area, and to the surface in the area adjacent to 127 St./66 Avenue.

Because of potential surcharging in the pipe system in the event of a 100 year storm, basements will not be allowed in areas where the surcharing occurs. The impact of increasing pipe size to reduce surcharging and thus permit basements will need to be examined in conjunction with each development application.

4.6.6 Surrey 10 Year Storm Servicing Plan

The 10 year servicing plan includes allowances for the following capital works in this area:

Table 4: 10 Year Storm Servicing Plan

Description	Estimated Cost	Timing	Surrey Reference No.
New sewer 68 Ave, 126 St. to 127 St.	$ 160,000	2002	3215
New trunk sewer 127 St., 66 Ave-68 Ave	$ 200,000	1997	4021
New trunk sewer 126 St., 68 Ave-69 Ave	$ 100,000	1997	4023
New trunk sewer 126 St., 66 Ave-68 Ave	$ 265,000	1997	317
TOTAL	$ 725,000		

The proposed storm system differs marginally from the Surrey 10 year servicing plan. The latter proposes new trunks along 127 Street to 68 Avenue and then west to 126 Street. This NCP proposes that the trunks be located internally, along 127 Street north to 67A Avenue, west to 126 Street and then north on 126 Street to Cougar Creek.

5.0 IMPLEMENTATION

5.1 ZONING

Development in this NCP area should proceed using Surrey's standard zones. Specific standards for development, including minimum lot dimensions, building setbacks, densities, and coverage are established in the City of Surrey Zoning and Subdivision by-laws and other applicable development controls. The design and siting of multi-family developments will be regulated by the Development Permit process. The ability to regulate single family development is limited through the zoning process, and as a consequence for the cluster and compact residential areas, specific CD zoning based on the RM-10 and RF-G zones, respectively, is proposed. The proposed CD zoning will respond to the design principles (Appendix D) and be sensitive to concerns such as oversized houses and tree preservation/replanting issues. A proposed zoning map for the residential areas is contained in Appendix C.

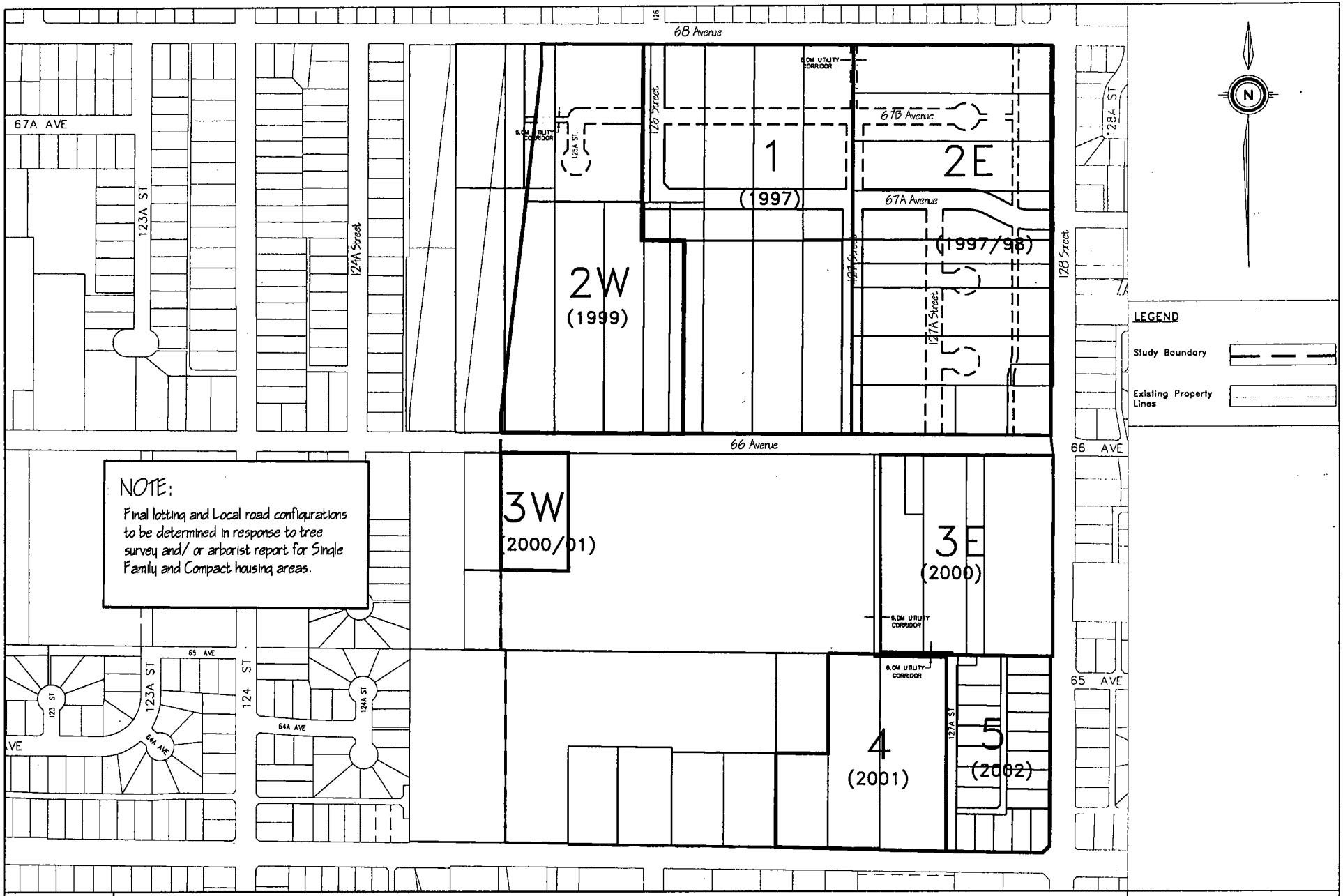
5.2 DEVELOPMENT GUIDELINES

Design issues will be regulated by design guidelines developed at the subdivision/rezoning stage. Considerations for the multiple family areas will include:

- Development Permit Area Guidelines
- Tree Preservation
- Street relationships with respect to scale and siting
- Built form density transitions
- Public access
- Integration of different housing types;

Appendix D outlines the principles for the design guidelines to be proposed at time of subdivision for Single Family and Compact lot single family projects. As a requirement of subdivision applications, the design guidelines should be registered on title as a "Statutory Building Scheme." These guidelines will assist developers, property owners and builders towards appropriate building forms and siting details by:

- prescribing architectural standards to address: specific housing design issues and details; discouraging the conversion of homes to illegal suites; and creating a unique neighbourhood theme or character;
- recommending siting and massing requirements to ensure the site's natural attributes are respected and that drainage, light and privacy issues are addressed;



West Newton Sector 2, NCP

Staging Plan

IBI GROUP

Exhibit 13

SCALE: N.T.S.

DATE: OCT., 1996

- requiring a basic level of landscaping to make the community more attractive and livable, addressing defensible space concerns and providing buffering and transitions between different built forms.

The intent of the design guidelines will be to:

- create aesthetically pleasing housing forms for the entire Northern Block.
- prohibit secondary suites
- achieve an appropriate relationship and scale between size of house and the size/ configuration of the lot, particularly in the Compact lot single family area.

Existing trees worthy of retention will be determined at time of rezoning/subdivision and preservation will be accomplished in accordance with the provisions of Surrey's Tree Removal and Replacement By-law, as amended. Ultimate lotting and road patterns prepared at the time of subdivision and/or rezoning will involve the surveying of trees and, where appropriate, their preservation within lots or road rights-of-way.

5.3 PHASING

In order to estimate DCC revenues and costs by year, assumptions were made regarding the phasing of development. After consultation with the developers, it is estimated that some 100 - 200 units may be developed each year. It is also assumed that 6 - 8 months will be required for zoning and development approvals.

Based on the availability of existing trunk services, it is expected that the Phase 1 development will be comprised of the lands in the centre of the North Block, as shown in Exhibit 13. Phase 2 will then comprise of the two remaining North Block areas, east and west of Phase 1. Development in the Southern Block will require the extension of services through Phase 2; the last phase will be the most southeastern portion of the NCP area.

The text below presents the estimated phasing of single-family and multi-family units by year, used as the basis of calculating DCC revenues in Section 5.5.

The following outlines the servicing requirements for each phase. The timing of each phase is based upon an initial sequencing and estimate of houses produced per year. This phasing may change as it is subject to the developers particular desires and market realities, which may, therefore, involve changes in the timing and/or sequencing of development.

Phase 1 (1997-8)

- Widening of 68 Avenue.
- Widening of 66 Avenue.
- Extension of water, sanitary and storm services through the lands from 68 Avenue to 66 Avenue.
- Construction of a temporary stormwater detention facility at 126 Street/68 Avenue.

Phase 2 East (1997-8)
- Widening of 68 Avenue.
- Widening of 66 Avenue.
- Extension of storm, sanitary and water systems through this phase to 66 Avenue and to 128 Street.
- Construction of on-site temporary stormwater detention facility at 127 Street/68 Avenue for the north portion of the development and at 127 Street/67A Avenue for the south portion of the development.

Phase 2 West (1999)
- Widening of 68 Avenue.
- Widening of 66 Avenue.
- Extend storm, sanitary and water services from 67A Avenue and 67B Avenue south to 66 Avenue.
- Upgrade watermain on 66 Avenue.

Phase 3 East (2000)
- Extension of sanitary and storm services from 66 Avenue through the development to 65 Avenue.
- Widening of 128 Street.
- Development of 125 Street pond, creek channel improvements and 126 Street storm sewer from 68 Avenue to creek.

Phase 3 West (2000-2001)
- Widening of 66 Avenue.
- Extension of storm service south from 66 Avenue to service the park.
- Upgrading of watermain on 66 Avenue (if not carried out as part of Phase 2 West).

Phase 4 (2001)
- Extension of services from 127 Street and 65 Avenue south to 64 Avenue, also providing service to Phase 5.

Phase 5 (2002)
- Widening of 128 Street.

The costs of these works are presented in Appendix F.

5.4 COMMUNITY AMENITIES

The NCP Terms of Reference require that community amenities be included for the neighbourhood requirements such as fire services, police services, library books, parks and recreation facilities, and affordable housing. The following amenities were reviewed and recommendations formulated for the West Newton, Sector 2 NCP. A summary of the projected costs is contained in Table 5.

Fire Protection

The Sector is presently served by Fire Hall No. 11, which is situated just north of 60 Avenue and east of 128 Street. The capacity costs of expanding existing services are used as the basis for calculating the fire protection needs attributable to each neighbourhood. The Fire Department has recommended that these costs be related to the portion of the NCP within a given fire response area. For the Sector 2 area, these costs will take the form of: $150.00 PER UNIT + $100.00 PER UNIT for multiple family units (aerial device charges applicable where the building height exceeds 30 feet). These costs per unit are consistent to those applied to other NCP areas. In order to reduce the demand for fire suppression the Surrey Fire Department will require that multi-unit residential buildings be fitted with sprinklers.

Police Protection

Police protection services are based on the capital costs of providing a sub-office to serve the community. The cost is then broken down to the degree to which the sub-office will service the NCP area. The following approach, provided by the RCMP, has also been applied to Sector 3. Proposed cost of a Police Substation - $65,000.00 (500 sq. ft. at $130.00 per sq. ft.). Based on a total West Newton population of 19,458 (provided by the City of Surrey) and utilizing a projected Sector 2 NCP population of 2,256, 11.6% of the total population, therefore, 11.6% of the cost ($7,540) is to be provided. This translates into $8.50 PER UNIT.

Library

The West Newton Sector 2 area is presently served by the Newton Library and by a satellite facility at Penreal (72 Street and Scott Road). The Surrey Public Library has provided neighbourhood costs based on a per capita contribution towards providing materials and books. The standard for providing these materials is 1.5 items per capita at $25.00 per item. Based on an average of 2.5 persons per unit, the estimated cost is $92.00 PER UNIT.

Affordable Housing

Surrey's Affordable Housing Implementation Strategy requires that 20% of the units be set aside for affordable housing or, alternatively, a contribution of $750 per unit be made to the Affordable Housing Strategy Statutory Reserve Fund.

Parks/Open Space

The large park in the Southern Block and Tamanawis Secondary School will provide a joint use amenity. In terms of additional park space within the NCP Area, this report proposes that other lands where actual land dedication for park purposes is not required given the existing park space within the Sector, will contribute an amount equivalent to 5% of the assessed market value of lands proposed for subdivision/development.

The Surrey Parks and Recreation Department have requested that a contribution of $599.00 per dwelling unit be provided to aid the development of park facilities in the Southern Block. These facilities will serve the NCP area residents and the community at large.

Community Facility

The Parks & Recreation Department have requested that this NCP include an amenity cost contribution for the Community Facility. The amount will be similar to the contribution established for the Sector 3 NCP area. This results in a per unit contribution of $161.50.

Table 5 - Community Amenity Costs

Service	Policy	Comments	Funding Source
Fire Protection	$150/single family unit $249/ multi family unit (where height exceeds 30 feet)	Capital costs of expanding existing Fire Hall No. 11	NCP
Police Protection	$8.50/ unit	Capital Costs of providing a police substation	NCP
Library	$92.00/ unit	Contribution for providing library books	NCP
Affordable Housing	$750.00/ unit or 20% of units as affordable	Towards the provision of affordable housing	NCP
Community Facility	$161.50 / unit	Capital costs of a community facility	NCP
Park Development	$559.00 / unit	Contribution to aid the development of park facilities in the Southern Block	NCP

5.5 SUMMARY OF COSTS

Appendix F presents a summary of the estimated costs of roads, walks, water, sanitary and storm sewers for each segment of the respective systems.

Streets and Lanes Costs

Appendix F presents the cost estimates for construction of all streets, sidewalks, walkways, streetlighting and lanes. As shown in the Appendix, the total construction cost is approximately $1.8 million.

It is estimated that $139,250 of this amount will qualify for an arterial road DCC rebate and another $189,000 would qualify for a collector road DCC rebate.

The Appendix also shows the estimated DCC revenue and costs as determined by Phase. These calculations estimate that the revenue exceeds the expenditures for arterial and collector roads for each year.

Sanitary Servicing Costs

The estimated cost of the sanitary servicing system is $630,000. This cost will be borne by the developers as development proceeds. All of these costs are associated with pipes 200 mm in

diameter. The flows in the pipes are all less than 40 litres per second and do not qualify for development cost charges.

As shown in Appendix F, the DCC revenues for sanitary sewers are approximately $700,000.

Water Network Oversizing Costs

The water mains in this sector are estimated to cost $434,000, as shown in Appendix F.

The proposed water network comprises 200 mm and 250 mm pipes. None of these require oversizing to 300 mm or greater at this time. Consequently, none qualify for development cost charges rebate. The short section of 250 mm pipe on 66 Avenue which is included in the 10 year plan, is estimated to cost $20,800 to install.

The estimated water DCC revenue is $0.8 million. The revenues exceed the expenditures in each year of development.

Storm Servicing Costs

As shown in Appendix F, the total storm system, exclusive of the Cougar Creek pond and Creek improvements, is estimated to cost $1.6 million. Approximately $500,000 of this cost estimate relates to storm trunks on 126 Street and 67A Avenue, serving areas greater than 20 ha. These are proposed to be included in the 10 year servicing plan.

In addition, the Cougar Creek Master Drainage Plan estimates that the 125 Street pond and creek improvements will cost $1.265 million. It is estimated that this NCP area is approximately 62% of the total catchment area of the pond, and should therefore carry 62%, or $780,000 of the cost of the pond. Thus, the proposed DCC expenditures in this area, including 62% of the cost of Cougar Creek pond, is approximately $1.28 million. As shown in Appendix F, the storm DCC revenue from the area (including a portion of Sector 3) is approximately $1.36 million. It is estimated that the major portion of the storm expenditure, the pond, will be required when 37 hectares of land are developed, estimated to be reached by the year 2000. The cash flow analysis indicates that the DCC account would be deficient for the period 2000 - 2002, by as much as $502,020, requiring that these amounts be front-ended by the City, or the development of the pond be phased over a longer period.

If the Sector 3 development is excluded from both costs and DCC revenues, the costs would be approximately $80,000 less, while the revenues would be approximately $280,000 less, resulting in a deficiency at the end of the period of $120,000.

APPENDIX A

LAND USE STATISTICS

LAND USE STATISTICS

Land Use	Approx. Land Area (acres)	% of Total Land Area	Approx. Number of Dwelling Units	% of Total No. of Units	Projected Population at Saturation
Single Family	4.6	4%	23	3%	81
Compact Single Family	29.7	28%	178	20%	499
Cluster Housing	17.2	16%	172	19%	516
Townhouses	6.9	6%	83	9%	233
Multi-Family Development	2.0	2%	24	3%	67
Garden Apartments	8.5	8%	213	24%	469
Walk-up Apartments	4.9	5%	196	22%	392
School/Park Site	30.6	29%			
Road (66 Avenue)	2.8	3%			
TOTAL	**107.2**	**100%**	**889**	**100%**	**2256**

*** [1] based on the following densities:**

Single-Family (S.F.) 5 u/a

Compact Single Family 6 u/a (NCP); 7.5 u/a (LAP)

Cluster Housing 10 u/a

Townhouses 12 u/a

Garden Apartments 25 u/a

Walk-up Apartments 40 u/a

Multi-Family Development 12 u/a

***[2] based on the LAP # persons per unit:**

Single-Family (S.F.) 3.5

Compact Single Family 2.8

Cluster Housing 3.0

Townhouses 2.8

Garden Apartments 2.2

Walk-up Apartments 2.0

Multi-Family Development 2.8

APPENDIX B

COMPARISON OF LAP AND NCP

COMPARISON OF L.A.P. & N.C.P. PROPOSAL
WEST NEWTON - SECTOR 2

SECTOR 2 - WEST	LAND AREA (acres)			NUMBER OF UNITS *[1]			PROJECTED POPULATION *[2]		
Land Use	LAP	NCP Proposal (May 1995)	Final NCP (Oct 1996)	LAP	NCP Proposal (May 1995)	Final NCP (Oct 1996)	LAP	NCP Proposal (May 1995)	Final NCP (Oct 1996)
Single Family	11.8	4.6	4.6	59	23	23	207	81	81
Compact Single Family	20.8	27.9	29.7	156	171	178	437	479	499
Cluster Housing	12.8	19.0	17.2	128	190	172	384	570	516
Townhouses	14.6	14.9	6.9	175	179	83	490	501	233
Multi-Family Development	n/a	n/a	2.0	n/a	n/a	24	n/a	n/a	67
Garden Apartments	8.5	8.5	8.5	213	213	213	469	469	469
Walk-up Apartments	4.9	4.9	4.9	196	196	196	392	392	392
School/Park Site(s)	31.0	24.6	30.6						
Road (66 Avenue)	2.8	2.8	2.8						
TOTAL	**107.2**	**107.2**	**107.2**	**927**	**972**	**889**	**2379**	**2492**	**2256**

***[1] based on the following densities:**

Single-Family (S.F.) 5 u/a

Compact Single Family 6 u/a (NCP); 7.5 u/a (LAP)

Cluster Housing 10 u/a

Townhouses 12 u/a

Multi-Family Development 12 u/a

Garden Apartments 25 u/a

Walk-up Apartments 40 u/a

***[2] based on the LAP # persons per unit:**

Single-Family (S.F.) 3.5

Compact Single Family 2.8

Cluster Housing 3.0

Townhouses 2.8

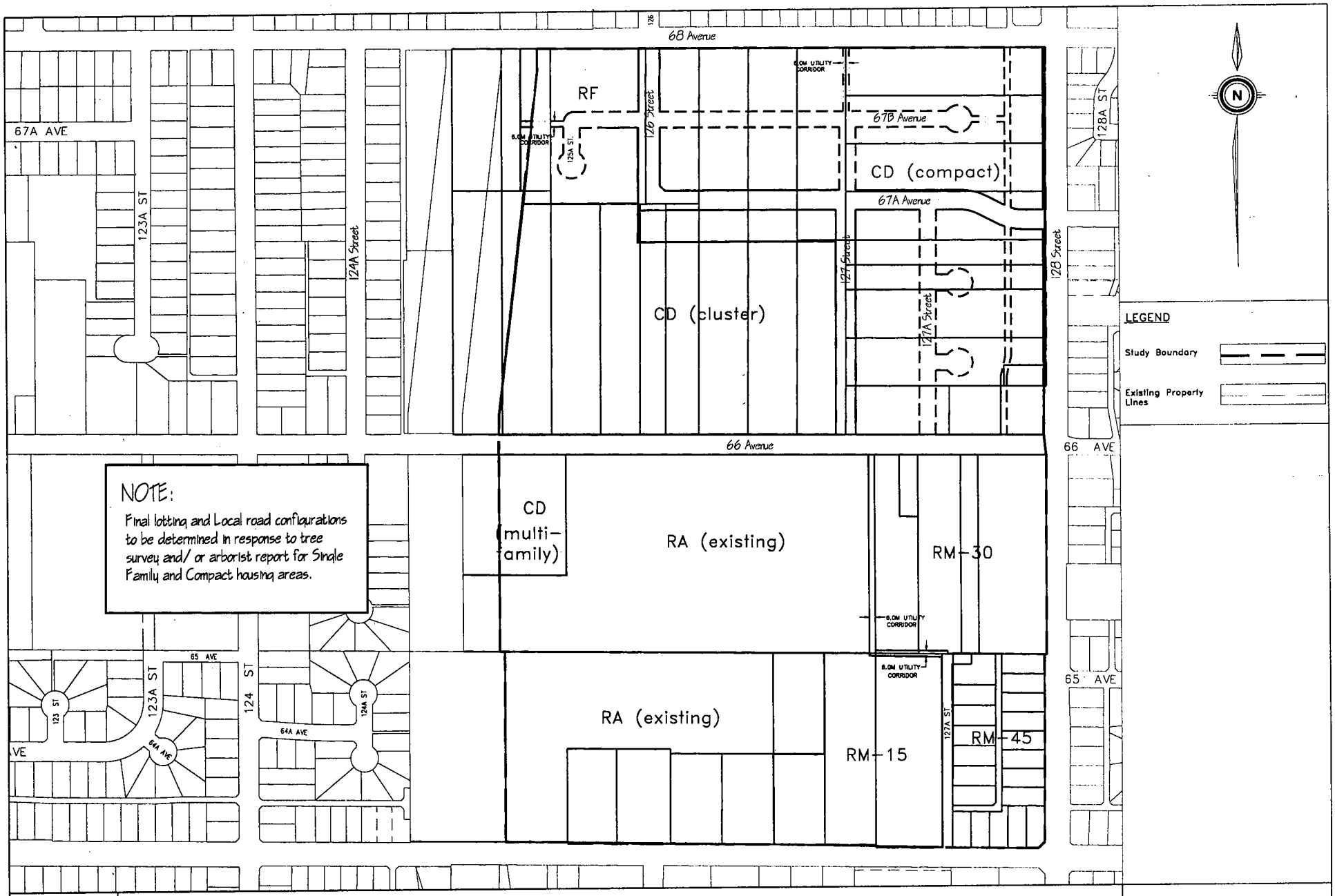
Multi-Family Development 2.8

Garden Apartments 2.2

Walk-up Apartments 2.0

APPENDIX C

PROPOSED ZONING PLAN



IBI GROUP

West Newton Sector 2, NCP

Proposed Zoning Plan

Appendix C

SCALE: N.T.S.

DATE: OCT., 1996

APPENDIX D

SUBDIVISION AND DESIGN PRINCIPLES

WEST NEWTON SECTOR 2
NEIGHBOURHOOD CONCEPT PLAN
DESIGN PRINCIPLES

Introduction

The intent of these principles is to create cohesively planned precincts which are sensitive to tree retention/replanting and to discourage secondary suites. The principles in this report are supplementary to the applicable CD Zoning by-law and do not supersede it.

NCP Area

These principles apply to the area located in the West Newton area of Surrey, bounded by 68 Avenue (north), 128 Street (east), 64 Avenue (south), and the BC Hydro right-of-way (west). The area consists of several pieces of property, as noted in the West Newton Sector 2 Neighbourhood Concept Plan (IBI Group, July 1996).

Overall Principles

The overall principles of these guidelines are:

- create aesthetically pleasing housing forms
- prohibit secondary suites
- encourage a design of somewhat longer and narrower lots, particularly in the compact housing area in order to preserve and/or replant trees
- consider decreased front yard setbacks and increased rear yard setbacks in order to create narrower, deeper lots in an effort to protect/replant trees in the rear yard.
- prepare an overall landscape concept for the front yards to form part of the subdivision guidelines
- discourage basement entry homes

Surrounding Neighbourhood Character Analysis

Several single family neighbourhoods surround the NCP area. Most of these houses are large, two-storey homes which have the maximum lot coverage as prescribed by current zoning. The design, scale and siting of these houses facilitates the addition of illegal secondary suites.

The resulting streetscape is characterized by large, dominant garages, extensive parking areas, and very small front yards. Double front doors, portico entrances, large scale front windows, pastel stucco exteriors and imitation clay roof tiles suggest a Californian-inspired character.

The surrounding developed areas do not represent a residential character suited to this NCP area. The following guidelines define a new neighbourhood character with a creative approach to design and planning.

Lot Size and Proportion

The proposed lots are narrower and deeper than the surrounding neighbourhoods. This type of lot allows for an efficient use of land without compromising individual needs for privacy and usable outdoor space, and encourages the preservation/ replanting of trees in the rear yard.

The target lot size in the Compact area is 370 to 510 sq.m. (4,000 to 5,500 sq.ft.), with a maximum lot size of 557 sq.m. (6,000 sq.ft.). A minimum lot width of 12.0 m and minimum lot depth of 34 m will be incorporated into the specific CD zoning for this neighbourhood.

Site Design and Lot Coverage

Houses will be sited to allow for usable back yards, and an increased side yard on the driveway side of the lot. Setbacks have been designed to reflect the smaller scale of development:

Front Yard Setback:	6.1 m (20 feet)
Rear Yard Setback:	10.0 m (33 feet)
Driveway Side Yard Setback:	3.75 m (12.3 feet)
Remaining Side Yard Setback:	1.2 m (4 feet)

Lot coverage will be reduced by increasing the size of the upper level relative to the main level (see 'House Design'), resulting in a relatively compact house form. A maximum floor area ratio which is reflective of the smaller lot sizes proposed will be established in the CD zoning, using the densities permitted under the RF-G and RF zones as guidelines. A maximum house size of 3,120 sq.ft will be incorporated into the specific CD zoning for this area.

Driveways and Garages

A single lane driveway shall be located at the side to provide off-street parking for 2 or more cars. Garages will be placed such that the house becomes the most dominant feature of the property. The maximum driveway width in the Compact area will be 4.5 m with front yard landscaping for non-asphalt areas.

House Design

Houses will be 2-storeys with a basement, with the main living areas located on the ground floor. Basement entry designs will not be permitted. The maximum building height will the 9 m, and upper floors will not exceed 42% of the homes total floor area.

Materials and Exterior Details

Issues such as materials and colours will be determined with the first rezoning/subdivision application. Front porches will be encouraged provided that they supply useable outdoor space and are incorporated into the house design. Front entrances will be limited to a single door (although up to 3 feet in width is permitted),

with or without sidelights. Stained or coloured glass in doors and windows will not be permitted. Clay tile and tar/gravel roof materials are prohibited.

Outdoor Open Space

Efficient site design will maximize the yard area available for landscaping and recreational activities. There will be a minimum standard for landscaping the front yard and a minimum 3.5 m landscaped buffer in the rear yard, which will facilitate the preservation/replanting of existing vegetation.

SURREY
CITY OF PARKS

WEST NEWTON SECTOR 2

DESIGN GUIDELINES

FINAL DRAFT

IBI
GROUP

WEST NEWTON COMPACT HOUSING

Design Guidelines

Table of Contents

1.0 PURPOSE

These Design Guidelines have been prepared to ensure the development of an attractive neighbourhood with high standards for residential design. The requirements in these Design Guidelines are supplementary to the Zoning By-Law and do not supersede it. The design requirements must be read in conjunction with all current and applicable City by-laws and other relevant regulations.

The objective of these Design Guidelines is to set a standard for the overall appearance and consistency of the neighbourhood with respect to:

- high quality home construction;
- creating a integrated streetscape;
-distinctive home designs that set a creative, positive precedent for future development within the neighbourhood;
- identifying opportunities to personalize each home and property;
- and the creation of an attractive, comfortable, and safe community environment for families.

The Design Guidelines will be implemented by IBI Group, Architects, a Registered Architectural firm who will act as the Design Consultant (unless stated otherwise.) The Design Consultant, will review the plans and approve the designs if they are in compliance with the requirements in these Design Guidelines. All plans must be checked and approved by the Consultant.

2.0 USING THE DESIGN GUIDELINES

These guidelines form part of the Design Guidelines registered under Section 216 of the Land Title Act. Before detailed plans are prepared, it is recommended that builders and lot purchasers read and understand the requirements in these Design Guidelines. **Preliminary sketches or design schemes, along with proposed exterior materials and colours, can be reviewed in a preliminary meeting with the Design Consultant** to ensure they are consistent with the design requirements.

There shall not be constructed, placed, erected or maintained on any lot any dwelling, building, or other improvements whatsoever unless and until plans and exterior finishing details thereof have been submitted to and approved by the appointed Design

Consultant. A Building Permit will not be issued until the security and/or covenant is provided to the City of Surrey.

The Developer shall undertake to provide purchasers of the lots with a copy of the registered Design Guidelines and Schedules.

Approval Procedures

Before applying for a building permit from the City of Surrey, builders and/or property owners must submit to the Design Consultant for preliminary approval:

- two sets of house plans which include site area, building area, site coverage and building height.
- all four elevations at 1:50 scale (1/4" = 1'0"), and a site plan showing the location of the house on the lot at 1:250 scale (1/16"=1"0").
- Drawings which show lot building grades, setbacks, and lot landscaping, including any existing trees that are to be retained.
- Samples of colours and materials of the exterior finishes.
- In care of new trees - tree location plan and R/C duly executed.

The lot purchaser is to follow the recommendations of the Consultant. In the case of major revisions or refusal of the design, the owner will have the opportunity to meet and discuss the proposed revisions with the Consultant before a formal request for changes or an outright refusal of the house design is issued.

Plans will only be accepted by the City of Surrey at the time of a building permit application if they display the Consultant's stamp and signature. The Consultant will review the plans to ensure compliance with these Design Guidelines and prepare a checklist for submission with building permit application drawings. Any subsequent changes must be approved by the Consultant.

The Developer will collect a compliance fee of **$3,000.00** from the builder or the lot purchaser and will be responsible for signing off the release of the compliance fee. Any design revisions by the builder or lot purchaser after the plans have been approved will be charged **$100.00** each.

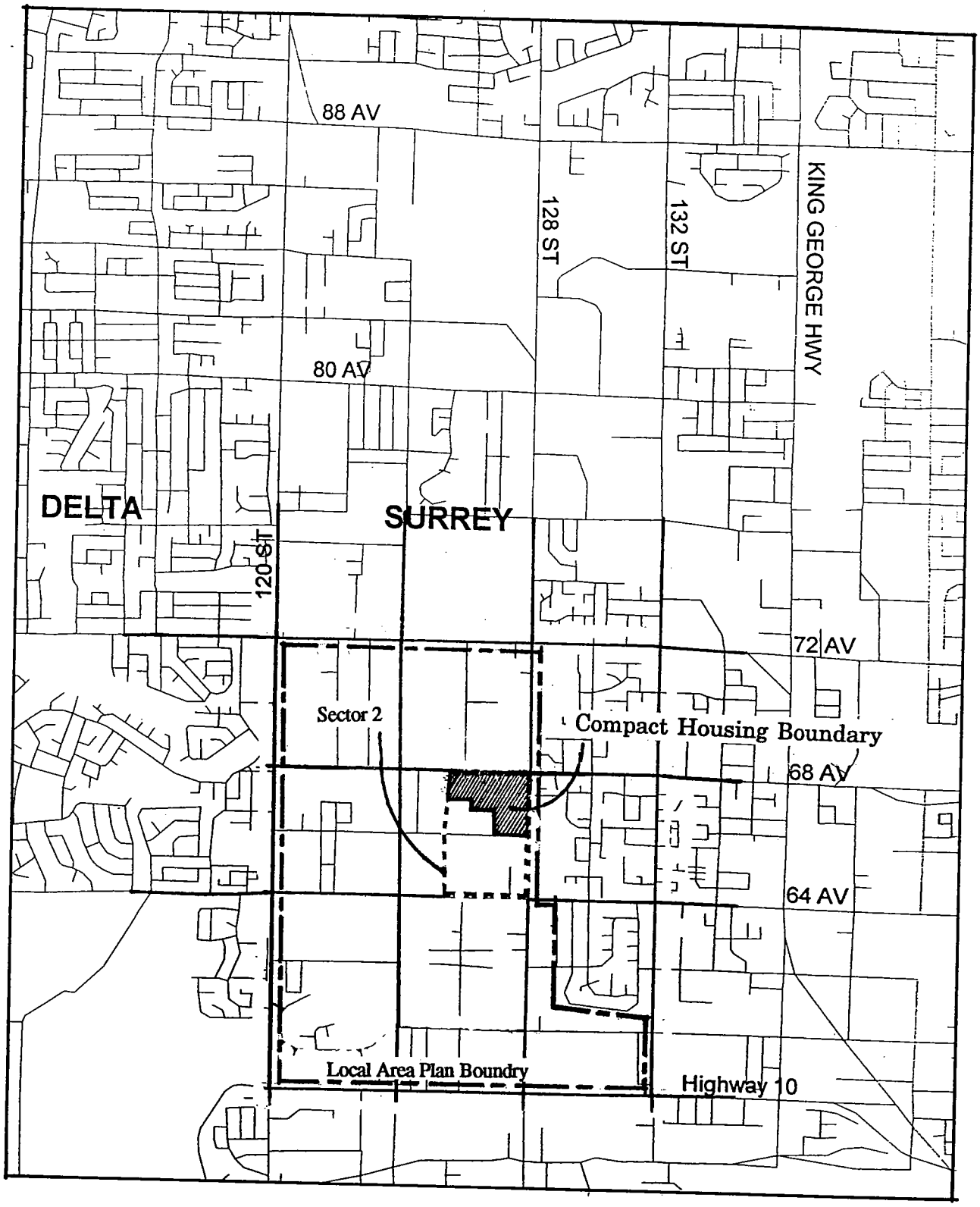


Figure 1 Context Plan

The plans will be reviewed on the basis of final fee of ? which if not paid at time of plan submission will be deducted from the compliance fee by the Developer. Plans which are refused and resubmitted will require a second fee to be paid.

After the house and front yard landscaping are completed, it will be inspected by the Consultant or his designate to recommend whether the requirements in these Design Guidelines have been followed. One thousand dollars (**$1000.00**) of the compliance fee may be retained after the final building approval has been issued by the City to ensure the proper installation and survival of landscape materials, following which these will be checked by the Consultant. If approved, the compliance fee will be returned by the Developer.

3.0 Siting and Lot Requirements

These lots have narrow frontages ranging from 12.5 m to 15.5 m, and depths from 32 m to 42.25 m. Houses shall be sited to allow for usable backyards, and generous sideyards. The orientation of the lot should be take into consideration sunlight, views, and prevailing winds or breezes (Figure 2).

The objective of the siting guidelines is to make the house, not the garage, the most dominant feature of the streetscape. There are two possible interpretations: a side driveway leading to a detached garage towards the back of the lot; or an attached garage located near the front, oriented so that the garage doors do not face the street.

The house shall be designed to minimize retaining walls. Any retaining walls shall not exceed a maximum height of 36" above finished grade, and shall be constructed of pisa stone or allen block. House elevation drawings will show final grades and elevations. The design is to be compatible with the approved lot grading plan requirements and the minimum basement elevations. The lot purchaser is responsible to finish the lot grading in accordance with the lot grading plan accepted by the City.

The lot purchaser is also responsible to ensure that excess soil is removed from the site to a site conforming to the City of Surrey Soil Depositing and Removal By-law, and that landscaping and other site changes do not disrupt the drainage pattern.

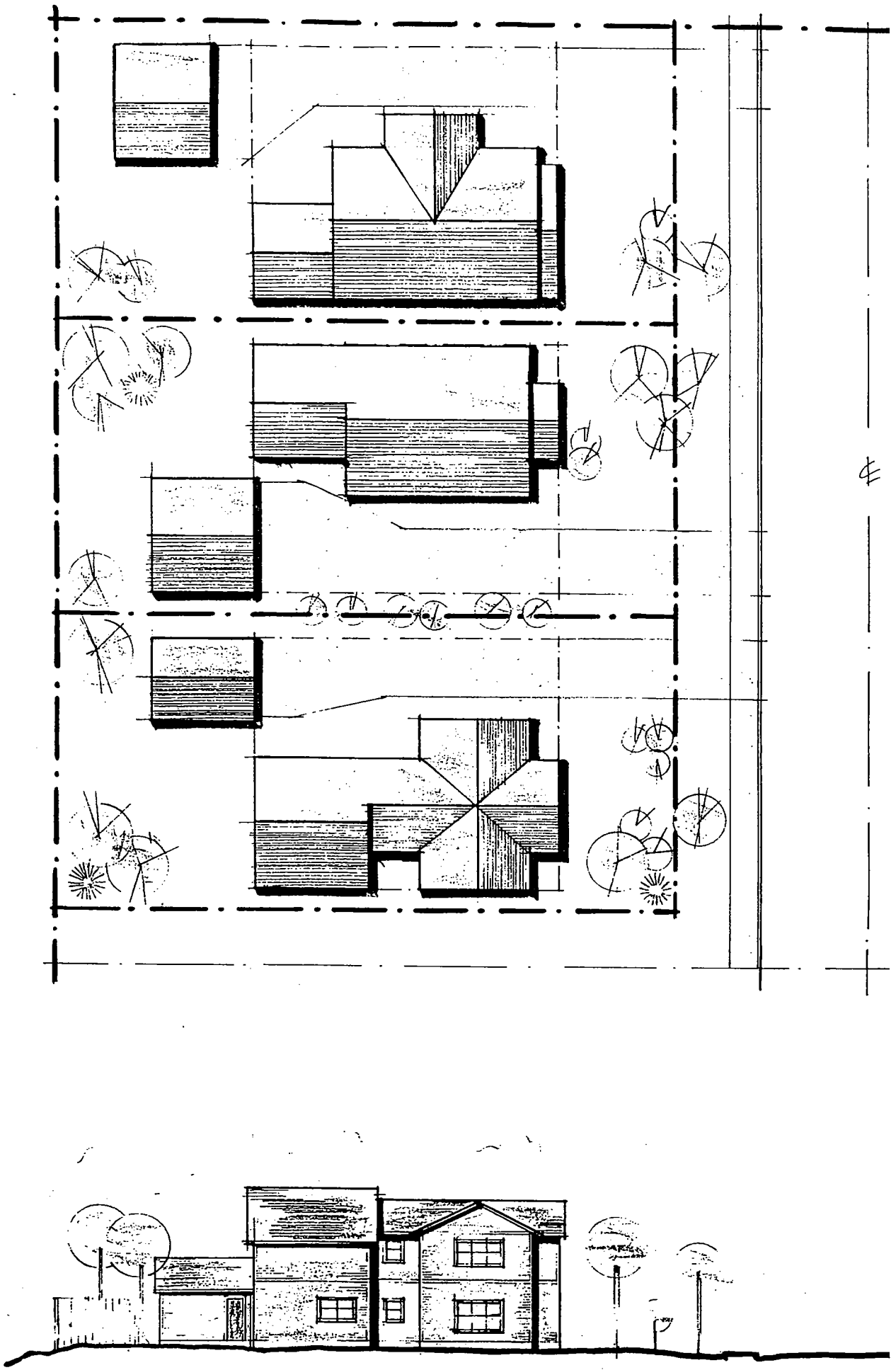


Figure 2 Typical House Siting

4.0 HOUSE DESIGN REQUIREMENTS

Houses will be 2-storey with or without a basement, but no basement-entry designs are permitted to eliminate easy conversion to unlawful secondary suites. For this reason, no second kitchen or food preparation area will be permitted, or house plans which could facilitate the conversion to include a second food preparation area. Main living areas are to be located on the ground floor, and bedrooms on the upper floor. A master bedroom may be located on the main floor under the following conditions:

- no exterior entrance is located within the master bedroom, although patio doors are permitted. The secondary entrance is to be located at the rear of the dwelling only.
- bathrooms in a main floor master suite must be located and organized so as to prevent the later addition of a kitchen and conversion to a secondary suite.
- The Design Consultant shall carefully inspect the design to ensure that it meets these requirements.

Porches shall be excluded from the FSR calculations. In lieu of a front or side porch, a ground-level patio or terrace may be built. No upper-floor balconies shall be built on the front of the house, or be visible from the street.

There must be good connectivity between all levels of the house and the internal layout of the house must allow the house to function as a single dwelling unit.

4.1 Architectural Principles

The guidelines are structured to suggest no single architectural style. Each house design is intended to reflect certain architectural principles as listed below. Adherence to the following principles will ensure that there is good design integration and a sense of continuity throughout the neighbourhood, with an emphasis on simplicity and sophistication of design.

- **variety** in house design;
- reduced **building massing**, especially at the street level;
- **roof** slopes within an accepted range;
- specified combinations of **exterior finishes**, in acceptable **colours**;
- specific **window styles**; and
- appropriate front **entrance** design and location.

4.1.1 Variety

To encourage individual expression and personalization within the context of the guidelines, the repetition of house plans shall be discouraged. Although interior layouts may be similar, the Design Consultant will ensure that no front elevation is repeated within a six house radius. Each home is to be designed for its own particular lot (Figure 3).

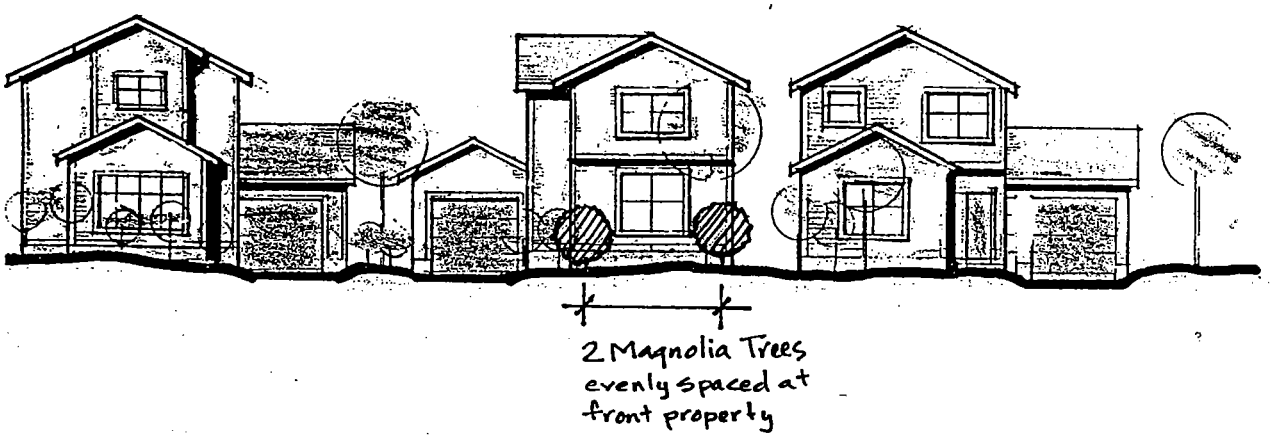


Figure 3: Typical Massing and Landscaping

4.1.2 Building Massing and House Size

Maximum allowable building height will be 8 m, as defined in the Surrey Zoning by-law. Minimum setbacks for principal buildings and accessory buildings, which includes detached garages or carports, will be based upon the City of Surrey's current requirements.

Lot coverage shall not exceed 42%, including the total floor area of the house and the garage. The area of the upper floor shall not exceed 42% of the house's total floor area. The main floor will therefore not be any less than 58% of the total floor area. For the purpose of floor area calculations, the floor area shall include all openings for stairs, foyers, and open ceilings over 12 feet in height.

4.1.3 Roof Design, Chimneys and Vents

Roof designs shall be kept simple, avoiding the use of dormers or elaborate designs. Slopes shall be within the range of 6:12 and 8:12 (Figure 4). Roof materials will be fiberglass shingles in black or grey, with a "shadow" detail. No chimneys will be permitted on the front of a house.

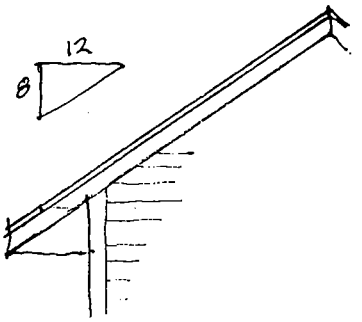


Figure 4(a)

All roof stacks and vents shall be pre-finished in a non-glare finish. Flashings are to be pre-finished or painted to match the roof colour. All gutters and down pipes are to match the trim colour, or painted white.

Soffits will be aluminum, in a colour matching or complementary to the main siding. Fascia boards will be wood, painted white or to complement the chosen siding colour.

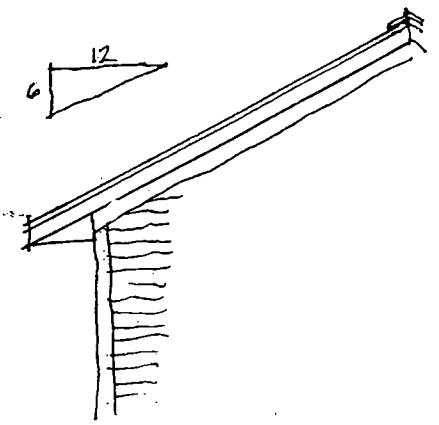


Figure 4(b)

4.1.4 Exterior Finishes and Colours

Exterior cladding shall be selected from one of the following combinations of materials:

- horizontal vinyl siding with wood fascia boards;
- horizontal vinyl siding and brick;
- acrylic stucco and brick.

The front of the house shall adhere to the following requirement: where one of the following combinations is used, 2/3 of the front elevation shall consist of one material, and the remaining 1/3 of the second material.

Main cladding colours shall be restricted to a range of pastels: accent or trim may be white, or an appropriate colour matching the main cladding material. Trim boards around windows and doors, and at corners shall be 4" wood, painted to complement the main house colour. **All colours and materials must be approved by the Design Consultant.**

4.1.5 Windows

Acceptable styles are casement, double-hung, and awning windows, and others approved by the Design Consultant. Skylights are also permitted. Windows may be wood, aluminum, or vinyl construction (Figure 5).

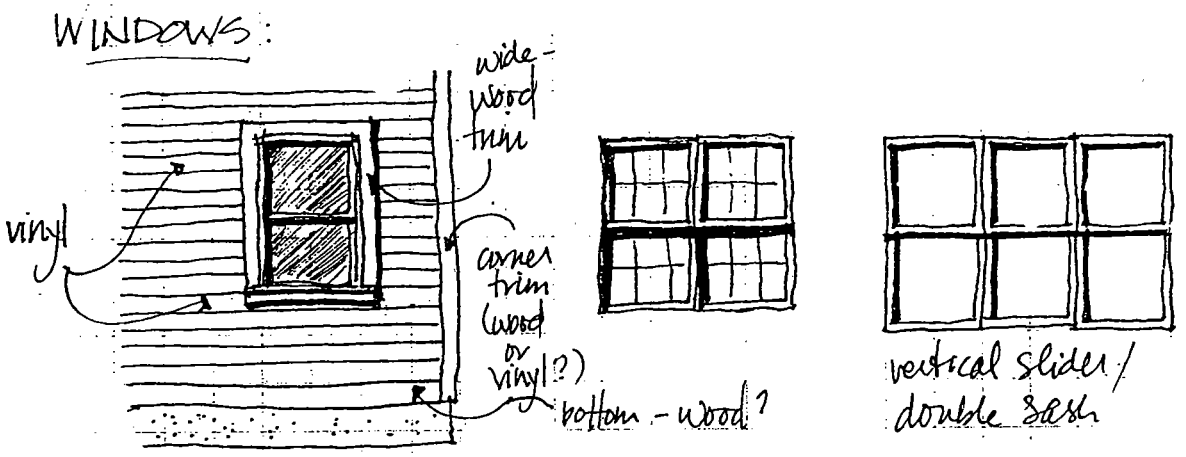


Figure 5: Typical Window Styles

4.1.6 Entrances

The front entrance must be clearly visible from the street, and accessed by a walkway which connects to either the sidewalk or driveway. Front entrances will be limited to a single door (although wider width may be approved by the Design Consultant), with or without sidelight(s). Coloured glass in doors and windows will not be permitted. The maximum allowable walkway width is 1.2 metres.

4.2 Driveways and Garages

Driveway locations for each lot will be shown on the lot plan. **The prescribed location of the driveway must be considered prior to purchasing a lot or commencing the design process.**

A single-lane driveway, not exceeding 3.0 m in width, will be located at the side of the lot to provide off-street parking for 2 or more cars (Figure 2), provided it does not interfere with the lot grading plan. An attached garage at the front of the house shall be oriented such that the doors do not face the street. Detached garages must be located towards the rear of the site (at least 18 m from the front lot line, or 7.5 m from the street side in the case of a corner lot). If the garage is located more than 18 m from the front property line, the doors may face the street.

Garages must be sited with respect to setbacks for accessory buildings, as defined by current City of Surrey requirements. The maximum height for a garage is 6 m, including the roof. Garage designs must complement the main house, using the same exterior and roofing materials.

Acceptable surfacing materials for driveways and walkways are concrete (may be tinted or stamped with the approval of the Design Consultant) or exposed aggregate. No asphalt is permitted.

5.0 LANDSCAPE REQUIREMENTS

5.1 Tree Preservation

Any existing trees which are to be maintained are indicated on an accompanying Tree Location Plan. Builders and owners must comply with the Surrey Tree Preservation By-law if any protected trees are located on their lots.

No tree identified on the Tree Location Plan shall be cut down or removed without first obtaining a written recommendation by an I.S.A. (International Society of Arborists) accredited arborist or other tree specialist approved by the City. This recommendation must state that the tree is diseased and/or hazardous and should be removed, and providing such certification to the City; or without first applying to the City for a Tree Cutting Permit. The City has the discretion to either grant or deny such permits.

It shall be the sole responsibility of the lot purchaser to employ the appropriate professional to assess the tree. Preserved trees shall be maintained in accordance with reasonable arborist practice.

5.2 New Trees

Where existing trees are not retained, the following requirements shall be met for new planting:

(i) **Front yards:** Two (2) Magnolia trees (variety to be approved by the City of Surrey Department of Parks and Recreation); minimum height 2.5 m.

The new trees shall be planted 3 m directly behind any existing boulevard trees located in front of the property. Where no boulevard trees have been planted, the property owner must locate the two new trees so that they are evenly spaced across the front of the property.

The trees shall be protected by restricted covenant in favour of the City of Surrey.

(ii) **Rear yards:** Two (2) conifer trees, of a species native to British Columbia (e.g. Douglas Fir, Cedar) and approved by the City of Surrey Department of Parks and Recreation; minimum height 3 m, minimum caliper 7cm. Trees are to be located within 3 m of the rear property line.

5.3 Landscaping

The lot purchaser shall complete front yard landscaping within six months of occupying the house. Side yards and rear yards shall be cleaned and graded prior to final inspection. If trees are spaded or balled and burlapped, they must be planted before the beginning of May or after the end of September. Container stock may be planted at any time of the year. The required landscaping must be completed prior to final inspection by the Consultant.

In addition to the requirements in Section 5.2 for front and rear yard trees, all street-fronting yard areas, including side yards, must be landscaped with lawns, shrubs, flower beds or other landscaping materials: lawn only is not adequate. Corner lots shall require twice the amount of planting listed in Section 5.2 and 5.4 for both the front yard and side yard along a flanking street.

5.4 Minimum Planting

The City of Surrey standards for minimum amount of plant material in front and side yards shall be followed. Not less than 40% of the front yard shall be covered with soft (green) landscaping; 10% of the front yard area shall be covered with ground cover(s) other than turf, such as low shrubs, perennials and/or annuals. Large shrubs must be 30 cm (1'0") tall or No. 5 pot size. Small shrubs must be a minimum No. 2 pot and ground cover must be in 10 cm (4") pots or larger.

Street boulevards will be covered with #1 or Superior Grade sod in sterilized soil by the Lot Purchaser at the same time as the front yard landscaping is carried out.

5.5 Landscaping Between Driveways

The area between adjacent driveways is not permitted to be paved or covered with any type of hard surfacing material. Adjacent property owners may agree on a shared fence, a row of shrubs, trees or other ground cover material.

5.6 Fences

Fences are mandatory in rear and side yards. A typical fence style is shown in Figure 6 below. Each property owner is required to build a fence across the rear of the property, and must reach an agreement with adjacent property owners regarding the construction of shared fences.

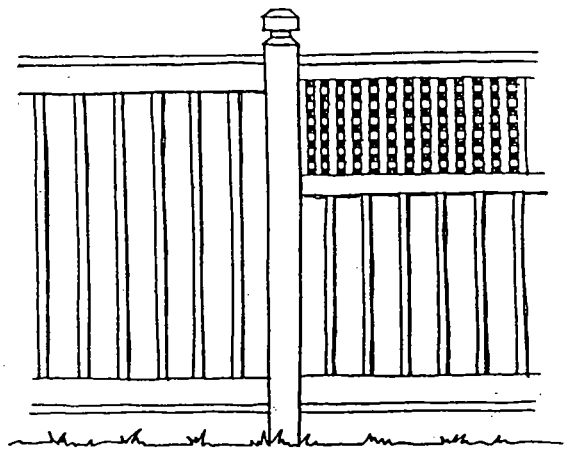


Figure 6: Typical Fence

APPENDIX E

WATER NETWORK ANALYSIS

West Newton Neighbourhood Sector 2
Concept Plan
Water Network Analysis

Introduction

The purpose of this analysis is to examine the water network requirements for the proposed West Newton Neighbourhood Concept Plan Sector 2 and to design a system which satisfies the requirements of the City of Surrey Engineering Department.

Existing Water Network

The subject site is well serviced by large watermains adjacent to the site boundaries. 300 mm grid mains run along 68 Avenue and 64 Avenue, while a 600 feed main and 200 mm distribution main run in 128 Street. A 250 main runs along 66 Avenue.

Proposed Water Network

The proposed water network consists of a 250 mm watermain (as shown on Exhibit 9) running along the through local north of 66 Avenue and a 200 mm main extending south from 66 Avenue to the existing 200 mm main on 127A Street.

Water Analysis Simulation

The network described above was entered into our database including the watermains adjacent to the site. The following source nodes were used based on pressure zone information in the Design Criteria Manual. The neighbourhood lies within the Newton pressure zone, with a static head of 135 m. Nodes 2, 22, and 24 were used as source nodes. 30% head loss was assumed for nodes 2 and 24, but only 20% head loss was assumed for node 22 because it is so close to the pump station.

Source Node	Location	Hydraulic Grade Lines	
		Static Head	Available Head
2	68 Ave. & 126 St.	135 m	120.90 m
22	64 Ave. & 128 St.	135 m	127.90 m
24	124 St. & 66 Ave.	135 m	120.15 m

The network is modelled as shown on Exhibit E1. There are a total of 25 nodes and 29 pipes. The demand for water consumption was assigned to each node based on lot proximity and zoning. Refer to to the following tables for node and pipe data.

The peak hour demand and maximum day demand were calculated using the City of Surrey per capita rates of 2000 l/day and 1000 l/day, respectively. Separate fire flow demands of 60 l/s and 120 l/s were respectively used at nodes 13 and 18.

Results

The following are the results obtained from our analysis.

Analysis	Lowest Pressure	Highest Flow Velocity
Peak hour	268.0 kPa @ Node 28	0.73 m/s in. Pipe 14
Maximum Day + 60 l/s @ Node 13	268.2 kPa @ Node 28	1.92 m/s in. Pipe 5
Maximum Day + 120 l/s @ Node 28	247.6 kPa @ Node 28	1.85 m/s in. Pipe 17

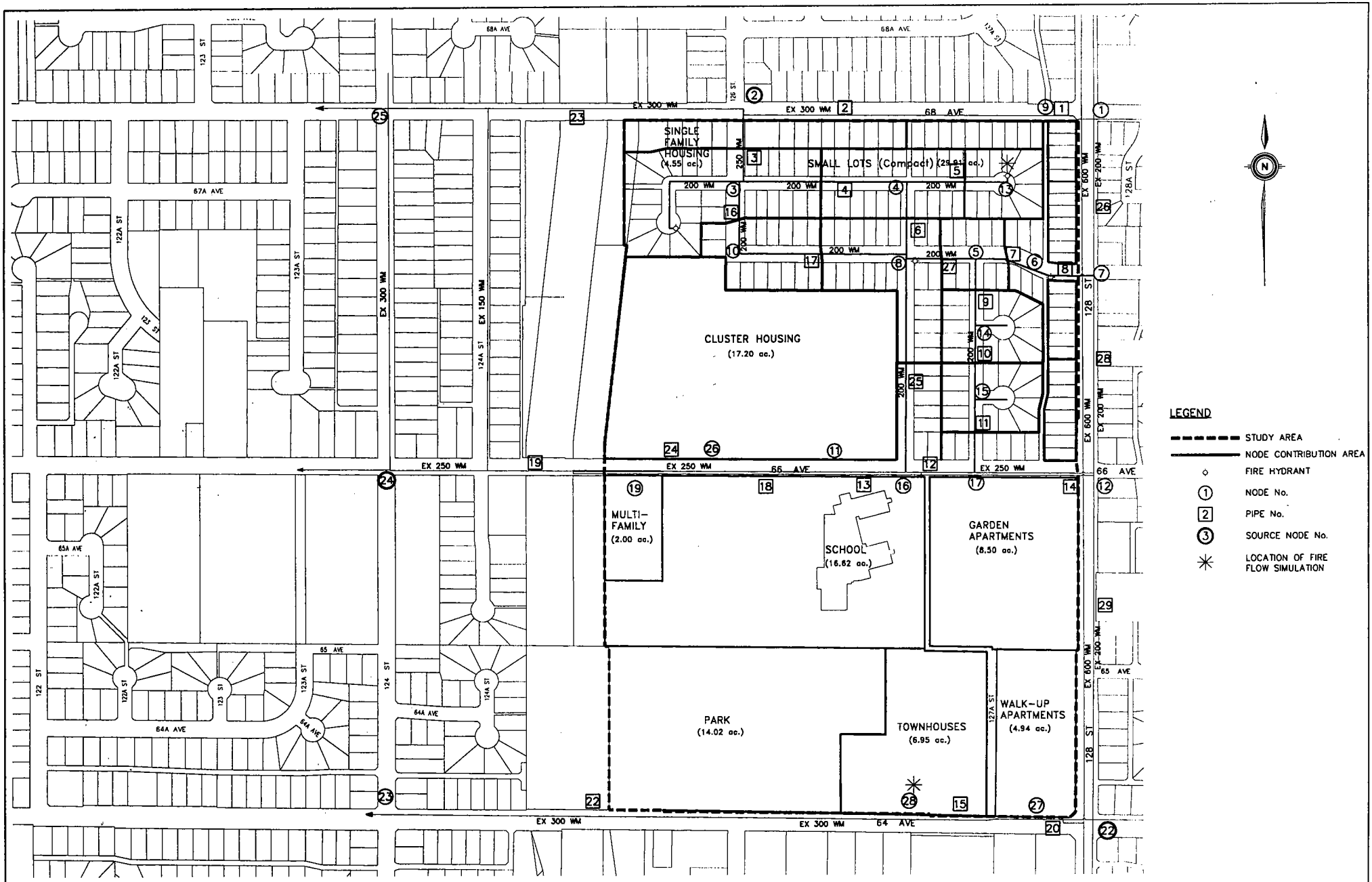
Summary

The residual pressures under the required demand conditions are above the minimum allowable pressures required for both maximum day demand plus fire flow situations.

Under Peak Hour demand, the minimum pressure exceeds City requirements of 280 kPa at all nodes, except nodes 27 and 28 in the high area at the southeast. These pressures are only marginally below City requirements (4%) and are therefore deemed acceptable.

The maximum flow velocities in all three analyses are below the maximum allowable of 2 m/s.

Therefore the system as proposed satisfies the City of Surrey requirements for residual pressure and flow velocity.



NO.	DESCRIPTION	DATE
5	AS BUILT	
4	APPROVED FOR CONSTRUCTION	
3	TENDERED	
2	APPROVED	
1	PRELIMINARY	

ISSUE: DATES

NO.	DATE	DESCRIPTION	BY	APPROVED
5				
4				
3				
2	OCT 1996	LAND USE PLAN UPDATE	JM	RAM
1	APRIL 1996	LAND USE PLAN UPDATE	RRS	RAM

REVISIONS

IBI GROUP
PLANNERS ENGINEERS

DATE: OCTOBER, 1996
DESIGNED BY: J.A.C
DRAWN BY: M.J.R.
CHECKED BY: R.A.M.
SCALE: N.T.S

THE CITY OF SURREY

NEIGHBOURHOOD CONCEPT PLAN
WEST NEWTON, SECTOR 2

WATER NETWORK ANALYSIS

APPROVED

FILE NO. VO-4656

DRAWING NO. 4656ENG

EXHIBIT E1

SURREY WEST NEWTON SECTOR 2 NCP PEAK HOUR DEMAND 10 sept 1996

Data file name : pkhr-3.dat

Hazen-Williams formula used

Iteration stops when max relative flow change is .00100 in any pipe

Multiplicative factor of each consumption is 1.00000

	Length	Diameter	Flow	Headloss	Height	Pressure	Velocity
Units:	METERS	MM	L./SEC	METERS	METERS	KILOPASC	M/SEC

There are 28 pipes and 25 nodes

List of pipe information including resistance factor K

Pipe no	Nodes		Length METERS	Diameter MM	Roughness coeff	K
1	1	9	56.00	300.00	125.00	.76970E-04
2	9	2	353.00	300.00	125.00	.48518E-03
3	2	3	77.00	250.00	125.00	.25719E-03
4	3	4	195.00	200.00	120.00	.20826E-02
5	4	13	119.00	200.00	100.00	.17813E-02
6	4	8	90.00	200.00	100.00	.13472E-02
7	5	6	84.00	200.00	100.00	.12574E-02
8	6	7	53.00	200.00	100.00	.79336E-03
9	5	14	75.00	200.00	100.00	.11227E-02
10	14	15	86.00	200.00	100.00	.12873E-02
11	15	17	86.00	200.00	100.00	.12873E-02
12	16	17	80.00	250.00	125.00	.26721E-03
13	11	16	83.00	250.00	125.00	.27723E-03
14	12	17	138.00	250.00	125.00	.46094E-03
15	28	27	146.00	300.00	125.00	.20067E-03
16	3	10	86.00	200.00	100.00	.12873E-02
17	10	8	195.00	200.00	100.00	.29190E-02
18	11	26	143.00	250.00	125.00	.47764E-03
19	19	24	285.00	250.00	125.00	.95194E-03
20	22	27	53.00	300.00	125.00	.72846E-04
22	23	28	630.00	300.00	125.00	.86591E-03
23	2	25	414.00	300.00	125.00	.56903E-03
24	19	26	90.00	250.00	125.00	.30061E-03
25	8	16	250.00	200.00	100.00	.37423E-02
26	1	7	183.00	200.00	100.00	.27393E-02
27	5	8	81.00	200.00	100.00	.12125E-02
28	12	7	230.00	200.00	100.00	.34429E-02
29	12	22	404.00	200.00	100.00	.60475E-02

Node	Demand L./SEC	Elevation METERS
1	.32000	89.00000
2	.91000	89.00000
3	2.16000	88.50000
4	1.30000	88.50000
5	.58000	89.00000
6	.39000	90.00000

7	.84000	91.00000
8	1.36000	89.00000
9	.65000	89.50000
10	.97000	88.50000
11	7.96000	90.50000
12	.52000	93.50000
13	.78000	89.00000
14	.84000	89.80000
15	.84000	90.00000
16	.64000	90.50000
17	15.74000	91.00000
19	2.11000	90.00000
22	.00000	99.50000
23	.00000	86.00000
24	.00000	87.00000
25	.00000	87.00000
26	7.96000	90.50000
27	13.72000	100.00000
28	7.34000	100.50000

For checking purposes, note that the last node # is 28

The total demand (to be met by water sources) is 67.93

Pump data for 3 pumps at source nodes
The number of data points for the pump curve is 2

Node No.	No. P Parl	Elev of Pump	Pump Flows and Related Heads	
			0.	0.
2	2	89.	32.	32.

The demand at this source node is not zero, but should be
The demand was .91 ; it has been set to zero

			0.	0.
22	2	100.	28.	28.
			0.	0.
24	2	87.	33.	33.

Net unbalanced flow in subnet 1 is -.00000
The number of pseudo loops is 2

Loop #	Pipes in loop								
1	-11	12	25	27	-9	-10			
2	-8	28	-14	11	10	9	-7		
3	19	-24	18	-13	25	17	16	3	
4	-2	-3	-4	-6	27	-7	-8	26	-1
5	29	-28	26	-1	-2				
6	4	-16	-17	6					

Bandwidth of matrix = 4

Number of loops = 6

Initial flows and corresponding HGLs at source nodes

Node	Flow	Pump HGL	Total HGL

2	-22.117	31.90	120.90
22	-22.117	28.40	127.90
24	-22.787	33.15	120.15

Iteration # 1 Max change in flow is 67.930 in loop # 6

Iteration # 2 Max change in flow is 25.689 in loop # 1

Iteration # 3 Max change in flow is 8.782 in loop # 1

Iteration # 4 Max change in flow is 7.265 in loop # 1

Iteration # 5 Max change in flow is 3.366 in loop # 6

Iteration # 6 Max change in flow is .284 in loop # 3

Iteration # 7 Max change in flow is .006 in loop # 1

Number of iterations = 7

Final flows and corresponding HGLs at source nodes

Node	Flow	Pump HGL	Total HGL
2	-14.630	31.90	120.90

Warning - Demand at this source node is outside of range of pump curve

22	-65.567	28.40	127.90

Warning - Demand at this source node is outside of range of pump curve

24	13.178	33.15	120.15

Warning - Demand at this source node is outside of range of pump curve

Pipe Dia MM	Up Node	Down Node	Pipe No.	Flow L./SEC	Head Loss METERS	Velocity M/SEC	Upstream HGL METERS	Downstre HGL METERS
300.00	1	9	1	-.908	.00	-.01	120.90	120.90
300.00	9	2	2	-1.558	-.00	-.02	120.90	120.90
250.00	2	3	3	13.072	.03	.27	120.90	120.87
200.00	3	4	4	5.755	.05	.18	120.87	120.82
200.00	4	13	5	.780	.00	.02	120.82	120.82
200.00	4	8	6	3.675	.02	.12	120.82	120.80
200.00	5	6	7	-7.741	-.06	-.25	120.80	120.86
200.00	6	7	8	-8.131	-.04	-.26	120.86	120.90
200.00	5	14	9	5.863	.03	.19	120.80	120.77
200.00	14	15	10	5.023	.03	.16	120.77	120.75
200.00	15	17	11	4.183	.02	.13	120.75	120.73
250.00	16	17	12	-24.047	-.10	-.49	120.63	120.73
250.00	11	16	13	-31.208	-.16	-.64	120.47	120.63
250.00	12	17	14	35.604	.34	.73	121.07	120.73
300.00	28	27	15	-7.340	-.01	-.10	127.87	127.88
200.00	3	10	16	5.157	.03	.16	120.87	120.84
200.00	10	8	17	4.187	.04	.13	120.84	120.80
250.00	11	26	18	23.248	.16	.47	120.47	120.31
250.00	19	24	19	13.178	.11	.27	120.26	120.15
300.00	22	27	20	21.060	.02	.30	127.90	127.88
300.00	23	28	22	.000	.00	.00	127.87	127.87
300.00	2	25	23	.000	.00	.00	120.90	120.90
250.00	19	26	24	-15.288	-.05	-.31	120.26	120.31
200.00	8	16	25	7.801	.17	.25	120.80	120.63
200.00	1	7	26	.588	.00	.02	120.90	120.90
200.00	5	8	27	1.299	.00	.04	120.80	120.80

200.00	12	7	28	8.383	.18	.27	121.07	120.90
200.00	12	22	29	-44.507	-6.83	-1.42	121.07	127.90

Node	Elevation METERS	Demand L./SEC	HGL METERS	Pressure KILOPASC
1	89.00	.32	120.90	312.34
2	89.00	-14.63	120.90	312.35
3	88.50	2.16	120.87	316.95
4	88.50	1.30	120.82	316.43
5	89.00	.58	120.80	311.41
6	90.00	.39	120.86	302.16
7	91.00	.84	120.90	292.74
8	89.00	1.36	120.80	311.39
9	89.50	.65	120.90	307.44
10	88.50	.97	120.84	316.69
11	90.50	7.96	120.47	293.46
12	93.50	.52	121.07	269.99
13	89.00	.78	120.82	311.52
14	89.80	.84	120.77	303.28
15	90.00	.84	120.75	301.07
16	90.50	.64	120.63	295.05
17	91.00	15.74	120.73	291.10
19	90.00	2.11	120.26	296.31
22	99.50	-65.57	127.90	278.07
23	86.00	.00	127.87	410.00
24	87.00	13.18	120.15	324.59
25	87.00	.00	120.90	331.93
26	90.50	7.96	120.31	291.88
27	100.00	13.72	127.88	272.97
28	100.50	7.34	127.87	267.99

Max unbalanced head in a pseudo-loop is .0000
associated with source node # 22

Maximum unbalanced head in any loop .0000 In loop # 1

SURREY WEST NEWTON SECTOR 2 NCP fire flow @ node 28 10 sept 1996

Data file name : ff28-3.dat

Hazen-Williams formula used

Iteration stops when max relative flow change is .00100 in any pipe

Multiplicative factor of each consumption is 1.00000

	Length	Diameter	Flow	Headloss	Height	Pressure	Velocity
Units:	METERS	MM	L./SEC	METERS	METERS	KILOPASC	M/SEC

There are 28 pipes and 25 nodes

List of pipe information including resistance factor K

Pipe no	Nodes		Length METERS	Diameter MM	Roughness coeff	K
1	1	9	56.00	300.00	125.00	.76970E-04
2	9	2	353.00	300.00	125.00	.48518E-03
3	2	3	77.00	250.00	125.00	.25719E-03
4	3	4	195.00	200.00	120.00	.20826E-02
5	4	13	119.00	200.00	100.00	.17813E-02
6	4	8	90.00	200.00	100.00	.13472E-02
7	5	6	84.00	200.00	100.00	.12574E-02
8	6	7	53.00	200.00	100.00	.79336E-03
9	5	14	75.00	200.00	100.00	.11227E-02
10	14	15	86.00	200.00	100.00	.12873E-02
11	15	17	86.00	200.00	100.00	.12873E-02
12	16	17	80.00	250.00	125.00	.26721E-03
13	11	16	83.00	250.00	125.00	.27723E-03
14	12	17	138.00	250.00	125.00	.46094E-03
15	28	27	146.00	300.00	125.00	.20067E-03
16	3	10	86.00	200.00	100.00	.12873E-02
17	10	8	195.00	200.00	100.00	.29190E-02
18	11	26	143.00	250.00	125.00	.47764E-03
19	19	24	285.00	250.00	125.00	.95194E-03
20	22	27	53.00	300.00	125.00	.72846E-04
22	23	28	630.00	300.00	125.00	.86591E-03
23	2	25	414.00	300.00	125.00	.56903E-03
24	19	26	90.00	250.00	125.00	.30061E-03
25	8	16	250.00	200.00	100.00	.37423E-02
26	1	7	183.00	200.00	100.00	.27393E-02
27	5	8	81.00	200.00	100.00	.12125E-02
28	12	7	230.00	200.00	100.00	.34429E-02
29	12	22	404.00	200.00	100.00	.60475E-02

Node	Demand L./SEC	Elevation METERS
1	.16000	89.00000
2	.45000	89.00000
3	1.08000	88.50000
4	.65000	88.50000
5	.29000	89.00000
6	.19000	90.00000

7	.42000	91.00000
8	.68000	89.00000
9	.32000	89.50000
10	.49000	88.50000
11	3.98000	90.50000
12	.26000	93.50000
13	.39000	89.00000
14	.42000	89.80000
15	.42000	90.00000
16	.64000	90.50000
17	7.87000	91.00000
19	1.06000	90.00000
22	.00000	99.50000
23	.00000	86.00000
24	.00000	87.00000
25	.00000	87.00000
26	3.98000	90.50000
27	6.86000	100.00000
28	123.67000	100.50000

For checking purposes, note that the last node # is 28

The total demand (to be met by water sources) is 154.28

Pump data for 3 pumps at source nodes
The number of data points for the pump curve is 2

Node No.	No. P Parl	Elev of Pump	Pump Flows and Related Heads	
			0.	0.
2	2	89.	32.	32.

The demand at this source node is not zero, but should be
The demand was .45 ; it has been set to zero

			0.	0.
22	2	100.	28.	28.
			0.	0.
24	2	87.	33.	33.

Net unbalanced flow in subnet 1 is -.00000
The number of pseudo loops is 2

Loop #	Pipes in loop								
1	-11	12	25	27	-9	-10			
2	-8	28	-14	11	10	9	-7		
3	19	-24	18	-13	25	17	16	3	
4	-2	-3	-4	-6	27	-7	-8	26	-1
5	29	-28	26	-1	-2				
6	4	-16	-17	6					

Bandwidth of matrix = 4

Number of loops = 6

Initial flows and corresponding HGLs at source nodes

Node	Flow	Pump HGL	Total HGL

2	-50.764	31.90	120.90
22	-50.764	28.40	127.90
24	-52.302	33.15	120.15

Iteration # 1 Max change in flow is 58.063 in loop # 5

Iteration # 2 Max change in flow is 52.286 in loop # 5

Iteration # 3 Max change in flow is 20.504 in loop # 2

Iteration # 4 Max change in flow is 5.076 in loop # 1

Iteration # 5 Max change in flow is 1.108 in loop # 6

Iteration # 6 Max change in flow is .036 in loop # 4

Number of iterations = 6

Final flows and corresponding HGLs at source nodes

Node	Flow	Pump HGL	Total HGL
2	.535	31.90	120.90

Warning - Demand at this source node is outside of range of pump curve

22	-174.521	28.40	127.90

Warning - Demand at this source node is outside of range of pump curve

24	20.155	33.15	120.15

Warning - Demand at this source node is outside of range of pump curve

Pipe Dia MM	Up Node	Down Node	Pipe No.	Flow L./SEC	Head Loss METERS	Velocity M/SEC	Upstream HGL METERS	Downstre HGL METERS
300.00	1	9	1	4.575	.00	.06	120.91	120.91
300.00	9	2	2	4.255	.01	.06	120.91	120.90
250.00	2	3	3	3.720	.00	.08	120.90	120.90
200.00	3	4	4	1.366	.00	.04	120.90	120.89
200.00	4	13	5	.390	.00	.01	120.89	120.89
200.00	4	8	6	.326	.00	.01	120.89	120.89
200.00	5	6	7	-5.056	-.03	-.16	120.91	120.94
200.00	6	7	8	-5.246	-.02	-.17	120.94	120.96
200.00	5	14	9	.030	.00	.00	120.91	120.91
200.00	14	15	10	-.390	.00	-.01	120.91	120.92
200.00	15	17	11	-.810	.00	-.03	120.92	120.92
250.00	16	17	12	-24.650	-.10	-.50	120.81	120.92
250.00	11	16	13	-29.175	-.14	-.59	120.67	120.81
250.00	12	17	14	33.329	.30	.68	121.22	120.92
300.00	28	27	15	-123.670	-1.50	-1.75	125.79	127.30
200.00	3	10	16	1.274	.00	.04	120.90	120.90
200.00	10	8	17	.784	.00	.02	120.90	120.89
250.00	11	26	18	25.195	.19	.51	120.67	120.48
250.00	19	24	19	20.155	.25	.41	120.40	120.15
300.00	22	27	20	130.530	.60	1.85	127.90	127.30
300.00	23	28	22	.000	.00	.00	125.79	125.79
300.00	2	25	23	.000	.00	.00	120.90	120.90
250.00	19	26	24	-21.215	-.09	-.43	120.40	120.48
200.00	8	16	25	5.166	.08	.16	120.89	120.81
200.00	1	7	26	-4.735	-.05	-.15	120.91	120.96
200.00	5	8	27	4.736	.02	.15	120.91	120.89
200.00	12	7	28	10.401	.26	.33	121.22	120.96
200.00	12	22	29	-43.991	-6.68	-1.40	121.22	127.90

Node	Elevation METERS	Demand L./SEC	HGL METERS	Pressure KILOPASC
1	89.00	.16	120.91	312.43
2	89.00	.54	120.90	312.35
3	88.50	1.08	120.90	317.22
4	88.50	.65	120.89	317.18
5	89.00	.29	120.91	312.49
6	90.00	.19	120.94	302.95
7	91.00	.42	120.96	293.32
8	89.00	.68	120.89	312.28
9	89.50	.32	120.91	307.52
10	88.50	.49	120.90	317.20
11	90.50	3.98	120.67	295.42
12	93.50	.26	121.22	271.42
13	89.00	.39	120.89	312.28
14	89.80	.42	120.91	304.66
15	90.00	.42	120.92	302.70
16	90.50	.64	120.81	296.82
17	91.00	7.87	120.92	292.92
19	90.00	1.06	120.40	297.64
22	99.50	-174.52	127.90	278.07
23	86.00	.00	125.79	389.66
24	87.00	20.16	120.15	324.59
25	87.00	.00	120.90	331.93
26	90.50	3.98	120.48	293.58
27	100.00	6.86	127.30	267.27
28	100.50	123.67	125.79	247.65

Max unbalanced head in a pseudo-loop is .0000
associated with source node # 22

Maximum unbalanced head in any loop .0000 In loop # 4

SURREY WEST NEWTON SECTOR 2 NCP w/ fire flow @ node 13 10 sept 1996

Data file name : ff13-3.dat

Hazen-Williams formula used

Iteration stops when max relative flow change is .00100 in any pipe

Multiplicative factor of each consumption is 1.00000

	Length	Diameter	Flow	Headloss	Height	Pressure	Velocity
Units:	METERS	MM	L./SEC	METERS	METERS	KILOPASC	M/SEC

There are 28 pipes and 25 nodes

List of pipe information including resistance factor K

Pipe no	Nodes		Length METERS	Diameter MM	Roughness coeff	K
1	1	9	56.00	300.00	125.00	.76970E-04
2	9	2	353.00	300.00	125.00	.48518E-03
3	2	3	77.00	250.00	125.00	.25719E-03
4	3	4	195.00	200.00	120.00	.20826E-02
5	4	13	119.00	200.00	100.00	.17813E-02
6	4	8	90.00	200.00	100.00	.13472E-02
7	5	6	84.00	200.00	100.00	.12574E-02
8	6	7	53.00	200.00	100.00	.79336E-03
9	5	14	75.00	200.00	100.00	.11227E-02
10	14	15	86.00	200.00	100.00	.12873E-02
11	15	17	86.00	200.00	100.00	.12873E-02
12	16	17	80.00	250.00	125.00	.26721E-03
13	11	16	83.00	250.00	125.00	.27723E-03
14	12	17	138.00	250.00	125.00	.46094E-03
15	28	27	146.00	300.00	125.00	.20067E-03
16	3	10	86.00	200.00	100.00	.12873E-02
17	10	8	195.00	200.00	100.00	.29190E-02
18	11	26	143.00	250.00	125.00	.47764E-03
19	19	24	285.00	250.00	125.00	.95194E-03
20	22	27	53.00	300.00	125.00	.72846E-04
22	23	28	630.00	300.00	125.00	.86591E-03
23	2	25	414.00	300.00	125.00	.56903E-03
24	19	26	90.00	250.00	125.00	.30061E-03
25	8	16	250.00	200.00	100.00	.37423E-02
26	1	7	183.00	200.00	100.00	.27393E-02
27	5	8	81.00	200.00	100.00	.12125E-02
28	12	7	230.00	200.00	100.00	.34429E-02
29	12	22	404.00	200.00	100.00	.60475E-02

Node	Demand L./SEC	Elevation METERS
1	.16000	89.00000
2	.45000	89.00000
3	1.08000	88.50000
4	.65000	88.50000
5	.29000	89.00000
6	.19000	90.00000

7	.42000	91.00000
8	.68000	89.00000
9	.32000	89.50000
10	.49000	88.50000
11	3.98000	90.50000
12	.26000	93.50000
13	60.39000	89.00000
14	.42000	89.80000
15	.42000	90.00000
16	.64000	90.50000
17	7.87000	91.00000
19	1.06000	90.00000
22	.00000	99.50000
23	.00000	86.00000
24	.00000	87.00000
25	.00000	87.00000
26	3.98000	90.50000
27	6.86000	100.00000
28	3.67000	100.50000

For checking purposes, note that the last node # is 28

The total demand (to be met by water sources) is 94.28

Pump data for 3 pumps at source nodes
The number of data points for the pump curve is 2

Node No.	No. P Parl	Elev of Pump	Pump Flows and Related Heads	
			0.	0.
2	2	89.	32.	32.

The demand at this source node is not zero, but should be
The demand was .45 ; it has been set to zero

			0.	0.
22	2	100.	28.	28.
			0.	0.
24	2	87.	33.	33.

Net unbalanced flow in subnet 1 is -.00001
The number of pseudo loops is 2

Loop #	Pipes in loop								
1	-11	12	25	27	-9	-10			
2	-8	28	-14	11	10	9	-7		
3	19	-24	18	-13	25	17	16	3	
4	-2	-3	-4	-6	27	-7	-8	26	-1
5	29	-28	26	-1	-2				
6	4	-16	-17	6					

Bandwidth of matrix = 4

Number of loops = 6

Initial flows and corresponding HGLs at source nodes

Node	Flow	Pump HGL	Total HGL

2	-30.964	31.90	120.90
22	-30.964	28.40	127.90
24	-31.902	33.15	120.15

Iteration # 1 Max change in flow is 36.720 in loop # 5

Iteration # 2 Max change in flow is 15.013 in loop # 1

Iteration # 3 Max change in flow is 9.888 in loop # 4

Iteration # 4 Max change in flow is 1.126 in loop # 4

Iteration # 5 Max change in flow is .039 in loop # 1

Iteration # 6 Max change in flow is .000 in loop # 1

Number of iterations = 6

Final flows and corresponding HGLs at source nodes

Node	Flow	Pump HGL	Total HGL
2	-49.267	31.90	120.90

Warning - Demand at this source node is outside of range of pump curve

22	-55.609	28.40	127.90

Warning - Demand at this source node is outside of range of pump curve

24	11.046	33.15	120.15

Warning - Demand at this source node is outside of range of pump curve

Pipe Dia MM	Up Node	Down Node	Pipe No.	Flow L./SEC	Head Loss METERS	Velocity M/SEC	Upstream HGL METERS	Downstre HGL METERS
300.00	1	9	1	-7.206	-.00	-.10	120.88	120.88
300.00	9	2	2	-7.526	-.02	-.11	120.88	120.90
250.00	2	3	3	41.741	.26	.85	120.90	120.64
200.00	3	4	4	29.799	1.12	.95	120.64	119.52
200.00	4	13	5	60.390	3.54	1.92	119.52	115.99
200.00	4	8	6	-31.241	-.79	-.99	119.52	120.31
200.00	5	6	7	-13.730	-.16	-.44	120.51	120.67
200.00	6	7	8	-13.920	-.10	-.44	120.67	120.77
200.00	5	14	9	-2.161	-.00	-.07	120.51	120.51
200.00	14	15	10	-2.581	-.01	-.08	120.51	120.52
200.00	15	17	11	-3.001	-.01	-.10	120.52	120.53
250.00	16	17	12	-26.654	-.12	-.54	120.42	120.53
250.00	11	16	13	-20.066	-.07	-.41	120.34	120.42
250.00	12	17	14	37.525	.38	.76	120.91	120.53
300.00	28	27	15	-3.670	-.00	-.05	127.89	127.89
200.00	3	10	16	10.862	.11	.35	120.64	120.54
200.00	10	8	17	10.372	.22	.33	120.54	120.31
250.00	11	26	18	16.086	.08	.33	120.34	120.26
250.00	19	24	19	11.046	.08	.23	120.23	120.15
300.00	22	27	20	10.530	.01	.15	127.90	127.89
300.00	23	28	22	.000	.00	.00	127.89	127.89
300.00	2	25	23	.000	.00	.00	120.90	120.90
250.00	19	26	24	-12.106	-.03	-.25	120.23	120.26
200.00	8	16	25	-5.949	-.10	-.19	120.31	120.42
200.00	1	7	26	7.046	.10	.22	120.88	120.77
200.00	5	8	27	15.601	.20	.50	120.51	120.31
200.00	12	7	28	7.294	.14	.23	120.91	120.77
200.00	12	22	29	-45.079	-6.99	-1.44	120.91	127.90

Node	Elevation METERS	Demand L./SEC	HGL METERS	Pressure KILOPASC
1	89.00	.16	120.88	312.12
2	89.00	-49.27	120.90	312.35
3	88.50	1.08	120.64	314.72
4	88.50	.65	119.52	303.77
5	89.00	.29	120.51	308.53
6	90.00	.19	120.67	300.31
7	91.00	.42	120.77	291.54
8	89.00	.68	120.31	306.61
9	89.50	.32	120.88	307.25
10	88.50	.49	120.54	313.68
11	90.50	3.98	120.34	292.21
12	93.50	.26	120.91	268.39
13	89.00	60.39	115.99	264.23
14	89.80	.42	120.51	300.74
15	90.00	.42	120.52	298.85
16	90.50	.64	120.42	292.91
17	91.00	7.87	120.53	289.16
19	90.00	1.06	120.23	296.01
22	99.50	-55.61	127.90	278.07
23	86.00	.00	127.89	410.20
24	87.00	11.05	120.15	324.59
25	87.00	.00	120.90	331.93
26	90.50	3.98	120.26	291.41
27	100.00	6.86	127.89	273.12
28	100.50	3.67	127.89	268.20

Max unbalanced head in a pseudo-loop is .0000
associated with source node # 22

Maximum unbalanced head in any loop .0000 In loop # 4

APPENDIX F

COST ESTIMATE

Surrey West Newton Neighbourhood No. 2
Preliminary Cost Estimate

TOTAL DCC EXPENDITURES

	SANITARY SEWERS	STORM SEWERS	WATER	ARTERIAL ROADS	COLLECTOR ROADS	TOTAL
North Sector						
68 AVE		$ -	$ -	$ -	$ 188,740	$ 188,740
67B AVE		$ -	$ -	$ -	$ -	$ -
67A AVE		$ 176,700	$ -	$ -	$ -	$ 176,700
66 AVE		$ -	$ 20,800	$ -	$ -	$ 20,800
64 AVE	$ -	$ -	$ -	$ -	$ -	$ -
128 ST		$ -	$ -	$ 139,250	$ -	$ 139,250
LANE 128 ST		$ -	$ -	$ -	$ -	$ -
127A ST		$ -	$ -	$ -	$ -	$ -
127 ST		$ -	$ -	$ -	$ -	$ -
126 ST		$ 323,700	$ -	$ -	$ -	$ 323,700
125A ST		$ -	$ -	$ -	$ -	$ -
127 ST WALK	$ -	$ -	$ -	$ -	$ -	$ -
125 ST/ CREEK POND	$ -	$ 780,000	$ -	$ -	$ -	$ 780,000
Total	$ -	$ 1,280,400	$ 20,800	$ 139,250	$ 188,740	$ 1,629,190

Year	Phase	Single Family Units	Multi Family Units	Total Units	Total DCC Revenues	Total DCC Expenditures	Cumulative DCC Surplus/Deficiency
1997	1	59	30	149	$ 1,473,960	$ 445,970	$ 1,027,990
	2E	60					
1998	1		47	106	$ 1,017,030	$ 129,183	$ 1,915,838
	2E	59					
1999	2W	23	95	118	$ 1,079,670	$ 55,613	$ 2,939,895
2000	3E		113	137	$ 1,220,670	$ 963,613	$ 3,196,953
	3W		24				
2001	3W		100	183	$ 1,630,530	$ 34,813	$ 4,792,670
	4		83				
2002	5		100	196	$ 1,164,240	$ -	$ 5,956,910
			96				
2003	West Newton	80	100	180	$ 283,600		$ 6,240,510
	Sector Three						
Totals		281	788	1069	$ 7,869,700	$ 1,629,190	

West Newton Sector 2

Streets and Lanes

1. Detailed Cost Estimate

IDENT.	CLASS	LENGTH l.m.	LOCAL STREETS(9.5M) l.m.	LOCAL STREETS(9.5M) COST	THRU LOCAL/MINOR COLLECTOR (11 M) l.m.	THRU LOCAL/MINOR COLLECTOR (11 M) COST	MAJOR COLLECTOR AND ARTERIAL ROADS ASPHALT 6.1m WIDTH l.m.	ASPHALT 6.1m WIDTH COST	ASPHALT 12.2m WIDTH l.m.	ASPHALT 12.2m WIDTH COST	CURB & GUTTER l.m.	CURB & GUTTER COST	SIDEWALKS l.m.	SIDEWALKS COST	LANES l.m.	LANES COST	STREETLIGHTS l.m.	TOTAL COST	ARTERIAL DCC	COLLECTOR DCC	YEAR OF WORKS
68 AVE	MAJOR COLLECTOR	WIDEN		$ -		$ -	530	$ 96,990		$ -	530	$ 13,250	510	$ 25,500		$ -	530	$ 53,000	$ 188,740		$ 188,740	1997 /98
67B AVE	LOCAL	NEW	400	$ 102,000		$ -		$ -		$ -	800	$ 20,000	360	$ 18,000		$ -	400	$ 40,000	$ 180,000			
67A AVE	THRU LOCAL	NEW		$ -	400	$ 132,000		$ -		$ -	800	$ 20,000	720	$ 36,000		$ -	400	$ 40,000	$ 228,000			
66 AVE	MINOR COLLECTOR	NEW		$ -		$ -	540	$ 98,820		$ -	1080	$ 27,000	500	$ 25,000		$ -	540	$ 54,000	$ 204,820			
64 AVE	ARTERIAL	TURN LANE		$ -		$ -	480	$ 87,840		$ -	280	$ 7,000	0	$ -		$ -	0	$ -	$ 94,840			
128 ST	ARTERIAL	WIDEN		$ -		$ -	610	$ 148,230		$ -	810	$ 20,250	760	$ 38,000		$ -	810	$ 81,000	$ 287,480	$ 139,250		1997 - 2002
LANE 128 ST		NEW		$ -		$ -		$ -		$ -	0	$ -	0	$ -	400	$ 72,000	400	$ 40,000	$ 112,000			
127A ST	LOCAL	NEW	80	$ 20,400	230	$ 75,900		$ -		$ -	620	$ 15,500	230	$ 11,500		$ -	310	$ 31,000	$ 154,300			
127 ST	THRU LOCAL	NEW		$ -	330	$ 108,900		$ -		$ -	660	$ 16,500	330	$ 16,500		$ -	330	$ 33,000	$ 174,900			
126 ST	THRU LOCAL	NEW		$ -		$ -		$ -	150	$ 54,900	300	$ 7,500	300	$ 15,000		$ -	150	$ 15,000	$ 92,400			
125A ST	LOCAL	NEW	60	$ 15,300		$ -		$ -		$ -	120	$ 3,000	0	$ -		$ -	60	$ 6,000	$ 24,300			
127 ST WALK		NEW		$ -		$ -		$ -		$ -	0	$ -	200	$ 10,000		$ -	200	$ 20,000	$ 30,000			
				$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -	$ -	
Total		0	540	$ 137,700	960	$ 316,800	1630	$ 431,880	150	$ 54,900	5470	$ 150,000	3400	$ 195,500	400	$ 72,000	3600	$ 413,000	$ 1,771,780	$ 139,250	$ 188,740	
UNIT PRICES				$ 255		$ 330		$ 183		$ 366		$ 25		$ 50		$ 180		$ 100				

2. Source of Funds for DCC Qualifying Roads

LOCATION	TYPE OF WORKS	CURRENT OR ADDITION	ID # 10 YEAR PLAN	AMOUNT CURRENT PROGRAM ($)	ADDITIONS TO PROGRAM ($)	ELIGIBLE FOR DCC ROGRAM (Y/N)	REFINEMENT OF DCC PROGRAM	ADDITION TO DCC PROGRAM	TYPE OF FUNDING EXISTING METHOD 1	TYPE OF FUNDING PROPOSE METHOD	CONST. ESPON	YEAR REQUESTED
68 AVE	COLLECTOR WIDENING	CURRENT	1442	$ 61,000		YES	$ 188,740		DCCR		DEVELOPE	1997/8
67B AVE						NO						
67A AVE						NO						
66 AVE						NO						
64 AVE						NO						
128 ST	ARTERIAL WIDENING	CURRENT	4141	$ 2,880,000		YES	$ 287,480		DCCR		CITY	1999
LANE 128 ST						NO						
127A ST						NO						
127 ST						NO						
126 ST						NO						
125A ST						NO						
127 ST WALK						NO						
					$ -							
Totals				$ 2,941,000	$ -		$ 476,220					

3. DCC Revenues/Expenditures Cost Flow

Year	Phase	Single Family Units	Multi Family Units	Total Units	Arterial DCC Revenues	Arterial DCC Expenditures	Arterial DCC Surplus/Deficiency	Collector DCC Revenues	Collector DCC Expenditures	Collector DCC Surplus/Deficiency
1997	1 2E	59 60	30	149	$ 715,200		$ 715,200	$ 181,780	$ 94,370	$ 87,410
1998	1 2E	59	47	106	$ 508,800	$ 34,813	$ 1,189,188	$ 129,320	$ 94,370	$ 122,360
1999	2W	23	95	118	$ 566,400	$ 34,813	$ 1,720,775	$ 143,960		$ 266,320
2000	3E 3W		113 24	137	$ 657,600	$ 34,813	$ 2,343,563	$ 167,140		$ 433,460
2001	3W 4		100 83	183	$ 878,400	$ 34,813	$ 3,187,150	$ 223,260		$ 656,720
2002	5		196	196	$ 658,560		$ 3,845,710	$ 168,560		$ 825,280
Totals		701	693	894	$ 3,984,960	$ 139,250	$ 3,845,710	$ 1,014,020	$ 188,740	

DCC Charges Used:

Arterial Roadways:	
Single Family	$ 4,800
Multi Family(RM15,30)	$ 4,800
Multi Family(RM45)	$ 3,360
Collector Roadways:	
Single Family	$ 1,220
Multi Family(RM15,30)	$ 1,220
Multi Family(RM45)	$ 860

West Newton Sector 2
Watermains

1. Detailed Cost Estimate

	WATERMAIN										TOTAL COST	WATER DCC	YEAR OF WORKS
	100mm		150mm		200mm		250mm		300mm				
	Lm.	COST	Lm.	COST	Lm.	COST	Lm.	COST	Lm.	COST	BY ST / AREA		
68 AVE		$ -		$ -		$ -		$ -		$ -	$ -		
67B AVE		$ -		$ -	400	$ 100,000		$ -		$ -	$ 100,000		
67A AVE		$ -		$ -	400	$ 100,000		$ -		$ -	$ 100,000		
66 AVE		$ -		$ -		$ -	80	$ 20,800		$ -	$ 20,800	$ 20,800.00	1999
64 AVE		$ -		$ -		$ -		$ -		$ -	$ -		
128 ST		$ -		$ -		$ -		$ -		$ -	$ -		
LANE 128 ST		$ -		$ -		$ -		$ -		$ -	$ -		
127A ST		$ -		$ -	310	$ 77,500		$ -		$ -	$ 77,500		
127 ST		$ -		$ -	330	$ 82,500		$ -		$ -	$ 82,500		
126 ST		$ -		$ -	70	$ 17,500	80	$ 20,800		$ -	$ 38,300		
125A ST		$ -		$ -	60	$ 15,000		$ -		$ -	$ 15,000		
127 ST WALK		$ -		$ -		$ -		$ -		$ -	$ -		
		$ -		$ -		$ -		$ -		$ -	$ -		
Total		$ -	-	$ -	1570	$ 392,500	160	$ 41,600		$ -	$ 434,100	$ 20,800	
UNIT PRICES		$ 150.00		$ 200		$ 250		$ 260		$ 280			

2. Source of Funds for DCC Qualifying Watermain

LOCATION	TYPE OF WORKS	CURRENT OR ADDITION	ID # 10 YEAR PLAN	AMOUNT CURRENT PROGRAM ($)	ADDITIONS TO PROGRAM	ELIGIBLE FOR DCC PROGRAM	REFINEMENT OF DCC PROGRAM	TYPE OF FUNDING EXISTING METHOD 1	TYPE OF FUNDING PROPOSED METHOD	CONSTRUCT BY CITY/DEVEL.	YEAR REQUESTED
66 AVE	250mm WATERMAIN	CURRENT	1432	$ 253,000		YES	$ 20,800	DCCR		DEVELOPER	1999
Totals				$ 253,000	$ -		$ 20,800				

3. DCC Revenues/Expenditures Cash Flow

Year	Phase	Single Family Units	Multi Family Units	Total Units	Water DCC Revenues	Water DCC Expenses	Cumulative Surplus/Deficiency
1997	1	59	30	149	$ 155,530		$ 155,530
	2E	60					
1998	1		47	106	$ 107,310		$ 262,840
	2E	59					
1999	2W	23	95	118	$ 113,910	$ 20,800	$ 355,950
2000	3E		113	137	$ 128,780		$ 484,730
	3W		24				
2001	3W		100	183	$ 172,020		$ 656,750
	4		83				
2002	5		100	196	$ 131,320		$ 788,070
			96				
Totals		201	688	889	$ 808,870	$ 20,800	

DCC Charges Used:
Single Family - $ 1,070
Multi Family(RM15,30) $ 940
Multi Family(RM45) $ 670

1. Detailed Cost Estimate

	STORM														TOTAL	STORM	YEAR
	250mm		300mm		450mm		525mm		750mm		900mm		1650mm		STORM	DCC	
	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	BY ST/AREA	PORTION	

West Newton Sector 2
Storm Sewers
DCC Excludes Contribution From Sector 3

1. Detailed Cost Estimate

	STORM														TOTAL	STORM	YEAR
	250mm		300mm		450mm		525mm		750mm		900mm		1650mm		STORM	DCC	
	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	Lin.	COST	BY ST/AREA	PORTION	
68 AVE		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -	
67B AVE	170	$ 61,200	200	$ 75,000		$ -		$ -		$ -		$ -		$ -	$ 136,200	$ -	
67A AVE		$ -	80	$ 30,000		$ -		$ -		$ -	190	$ 176,700		$ -	$ 241,500	$ 176,700	1997
66 AVE		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -	
64 AVE		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -	
128 ST		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -	
LANE 128 ST	350	$ 126,000		$ -		$ -		$ -		$ -		$ -		$ -	$ 126,000	$ -	
127A ST	60	$ 21,600		$ -		$ -		$ -		$ -		$ -		$ -	$ 88,850	$ -	
127 ST		$ -		$ -	80	$ 38,400	80	$ 40,800	250	$ 191,250		$ -		$ -	$ 270,450		2000
126 ST		$ -		$ -		$ -		$ -	270	$ 206,550	160	$ 148,800	165	$ 178,200	$ 533,550	$ 323,700	1997
125A ST	60	$ 21,600	200	$ 75,000		$ -		$ -		$ -		$ -		$ -	$ 96,600	$ -	
127 ST WALK		$ -	200	$ 75,000		$ -		$ -		$ -		$ -		$ -	$ 75,000	$ -	
125ST/CREEK POND		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 699,381	$ 699,381	2000
Total	640	$ 230,400	680	$ 255,000	80	$ 38,400	80	$ 40,800	520	$ 397,800	350	$ 325,500	165	$ 178,200	$ 2,265,531	$ 1,199,781	
UNIT PRICES		$ 360		$ 375		$ 480		$ 510		$ 765		$ 930		$ 1,080	$ 2,265,531	$ 1,199,781	

2. Source of Funds for DCC Qualifying Work

LOCATION		TYPE OF WORKS	CURRENT OR ADDITION TO DCC	ID # 10 YEAR PLAN	ELIGIBLE FOR DCC PROGRAM	REFINEMENT OF DCC PROGRAM	ADDITION TO DCC PROGRAM	TYPE OF FUNDING EXISTING METHOD 1	TYPE OF FUNDING PROPOSED METHOD	CONSTRUCTION RESPONSIBILITY	YEAR REQUESTED
67B AVE	128 ST - 127 ST	250 - 300 SEWER			NO					DEVELOPER	1997
67A AVE	128 ST-127 ST	900 mm SEWER	CURRENT	3215	YES	$ 176,700		DCCR		DEVELOPER	1997
67A AVE	127ST-128 ST	300-375 mm SEWER			NO					DEVELOPER	1998
LANE 128 ST	68 AV-67A AV	250 mm SEWER			NO					DEVELOPER	1998
127A ST	67A AV-68 AV	250-375 mm SEWER			NO					DEVELOPER	1998
127 ST	67A AV-68 AV	750 mm SEWER	CURRENT	4021	NO	$ -				DEVELOPER	1998
127 ST	68 AV-67A AV	450-525 mm SEWER			NO					DEVELOPER	1999
126 ST	68 AV-CREEK	900 mm SEWER	CURRENT	4023	YES	$ 148,800		DCCR		DEVELOPER	2000
126 ST	68 AV-67A AV	1050 mm SEWER	CURRENT	317	YES	$ 174,900		DCCR		DEVELOPER	1997
126 ST	67A AV-66 AV	750 mm SEWER			NO					DEVELOPER	1999
125A ST	67B AV-67A AV	250 mm SEWER			NO					DEVELOPER	1999
125A ST	66AV-65 AV	300 mm SEWER			NO					DEVELOPER	2001
127 ST WALK	66AV-65 AV	300 mm SEWER			NO					DEVELOPER	2001
125ST/CREEK POND			ADDITION		YES		$ 780,000	CAPITAL		SURREY	1999+
Totals						$ 500,400	$ 780,000				

3. DCC Revenues/Expenditures Cash Flow

Year	Phase	Single Family Units	Multi Family Units	Total Units	Storm DCC Revenues	Storm DCC Expenses	Cumulative Surplus/Deficiency
1997	1	59	30	149	$ 286,480	$ 351,600	$ (65,120)
	2E	60					
1998	1		47	106	$ 178,660	$ -	$ 113,540
	2E	59					
1999	2W	23	95	118	$ 157,060		$ 270,600
2000	3E		113	137	$ 156,180	$ 848,181	$ (421,401)
	3W		24				
2001	3W		100	183	$ 208,620		$ (212,781)
	4		83				
2002	5		100	196	$ 92,120		$ (120,661)
			96				
2003					$ -		$ (120,661)
Totals		201	688	889	$ 1,079,120	$ 1,199,781	$ (120,661)

Storm DCC Rates:

Single Family Units	$	2,120
Multi Family Units(RM15,30)	$	1,140
Multi Family Units(RM45)	$	470

West Newton Sector 2
Storm Sewers
DCC Assume Contribution From Sector 3

1. Detailed Cost Estimate

	STORM																TOTAL STORM BY ST/AREA	STORM DCC PORTION	YEAR
	250mm		300mm		450mm		525mm		675mm		900mm		1050mm						
	Lm.	COST	Lm.	COST	Lm.	COST	Lm.	COST	Lm.	COST	Lm.	COST	Lm.	COST					
68 AVE		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -			
67B AVE	170	$ 61,200	200	$ 75,000		$ -		$ -		$ -	190	$ 176,700		$ -	$ 136,200	$ -			
67A AVE		$ -	80	$ 30,000		$ -		$ -		$ -		$ -		$ -	$ 241,500	$ 176,700	1997		
66 AVE		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -			
64 AVE		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -			
128 ST		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 126,000	$ -			
LANE 128 ST	350	$ 126,000		$ -		$ -		$ -		$ -		$ -		$ -	$ 86,850	$ -			
127A ST	60	$ 21,600		$ -		$ -		$ -		$ -		$ -		$ -	$ 270,450		2000		
127 ST		$ -		$ -	80	$ 36,400	80	$ 40,800	250	$ 191,250		$ -		$ -	$ 533,550	$ 323,700	1997		
126 ST		$ -		$ -		$ -		$ -	270	$ 206,550	160	$ 148,800	165	$ 178,200	$ 96,600	$ -			
125A ST	60	$ 21,600	200	$ 75,000		$ -		$ -		$ -		$ -		$ -	$ 75,000	$ -			
127 ST WALK		$ -	200	$ 75,000		$ -		$ -		$ -		$ -		$ -	$ 780,000	$ 780,000	2000		
125ST/CREEK POND		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 2,346,150	$ 1,280,400			
Total	640	$ 230,400	680	$ 255,000	80	$ 36,400	80	$ 40,800	520	$ 397,800	350	$ 325,500	165	$ 178,200					
UNIT PRICES		$ 360		$ 375		$ 460		$ 510		$ 765		$ 930		$ 1,080	$ 2,346,150	$ 1,280,400			

2. Source of Funds for DCC Qualifying Work

LOCATION		TYPE OF WORKS	CURRENT Q ADDITION T DCC	ID # 10 YEAR PLAN	ELIGIBLE FOR DCC PROGRAM	REFINEMENT OF DCC PROGRAM	ADDITION TO DCC PROGRAM	TYPE OF FUNDING EXISTING METHOD 1	TYPE OF FUNDING PROPOSED METHOD	CONSTRUCTION RESPONSIBILITY	YEAR REQUESTED
67B AVE	126 ST - 127 ST	250 - 300 SEWER			NO					DEVELOPER	1997
67A AVE	126 ST-127 ST	900 mm SEWER	CURRENT	3215	YES	$ 176,700		DCCR		DEVELOPER	1997
67A AVE	127ST-128 ST	300-375 mm SEWER			NO					DEVELOPER	1998
LANE 128 ST	68 AV-67A AV	250 mm SEWER			NO					DEVELOPER	1998
127A ST	67A AV-66 AV	250-375 mm SEWER			NO					DEVELOPER	1998
127 ST	67A AV-66 AV	750 mm SEWER	CURRENT	4021	NO	$ -				DEVELOPER	1998
127 ST	68 AV-67A AV	450-525 mm SEWER			NO					DEVELOPER	1999
126 ST	68 AV-CREEK	900 mm SEWER	CURRENT	4023	YES	$ 148,800		DCCR		DEVELOPER	2000
126 ST	68 AV-67A AV	1050 mm SEWER	CURRENT	317	YES	$ 174,900		DCCR		DEVELOPER	1997
126 ST	67A AV-66 AV	750 mm SEWER			NO					DEVELOPER	1999
125A ST	67B AV-67A AV	250 mm SEWER			NO					DEVELOPER	1999
125A ST	66AV-65 AV	300 mm SEWER			NO					DEVELOPER	2001
127 ST WALK	66AV-65 AV	300 mm SEWER			NO					DEVELOPER	2001
125ST/CREEK POND			ADDITION		YES		$ 780,000	CAPITAL		SURREY	1999+
Totals						$ 500,400	$ 780,000				

3. DCC Revenues/Expenditures Cash Flow

Year	Phase	Single Family Units	Multi Family Units	Total Units	Storm DCC Revenues	Storm DCC Expenses	Cumulative Surplus/Deficiency
1997	1	59	30	149	$ 286,480	$ 351,600	$ (65,120)
	2E	60					
1998	1		47	108	$ 178,660	$ -	$ 113,540
	2E	59					
1999	2W	23	95	118	$ 157,060		$ 270,600
2000	3E		113	137	$ 156,180	$ 928,800	$ (502,020)
	3W		24				
2001	3W		100	183	$ 208,620		$ (293,400)
	4		83				
2002	5		100	196	$ 92,120		$ (201,280)
			96				
2003	Sector 3	80	100		$ 283,600		$ 82,320
Totals		281	798	880	$ 1,362,720	$ 1,280,400	$ 82,320

Storm DCC Rates:

Single Family Units	$	2,120
Multi Family Units(RM15,30)	$	1,140
Multi Family Units(RM45)	$	470

West Newton Sector 2
Sanitary Sewers

1. Detailed Cost Estimate

	SAN 200 mm		SAN 250mm		SAN 300mm		SAN TOTAL
	l.m.	COST	l.m.	COST	l.m.	COST	COST
68 AVE		$ -		$ -	0	$ -	$ -
67B AVE	390	$ 132,600		$ -		$ -	$ 132,600
67A AVE	370	$ 125,800		$ -		$ -	$ 125,800
66 AVE		$ -		$ -		$ -	$ -
64 AVE		$ -		$ -		$ -	$ -
128 ST		$ -		$ -		$ -	$ -
LANE 128 ST	380	$ 129,200		$ -		$ -	$ 129,200
127A ST	290	$ 98,600		$ -		$ -	$ 98,600
127 ST	200	$ 68,000		$ -		$ -	$ 68,000
126 ST	165	$ 56,100		$ -		$ -	$ 56,100
125A ST	60	$ 20,400		$ -		$ -	$ 20,400
127 ST WALK		$ -		$ -		$ -	$ -
125ST/CREEK POND		$ -		$ -		$ -	$ -
Total	-	$ 630,700	-	$ -		$ -	$ 630,700
UNIT PRICES		$ 340		$ 360		$ 375	

2. Source of Funds for DCC Qualifying Sewers

LOCATION	TYPE OF WORKS	CURRENT OR ADDITION	ID # 10 YEAR PLAN	AMOUNT CURRENT PROGRAM ($)	ADDITIONS TO PROGRAM ($)	ELIGIBLE FOR DCC PROGRAM (Y/N)	REFINEMENT OF DCC PROGRAM	ADDITION TO DCC PROGRAM	TYPE OF FUNDING EXISTING METHOD 1	TYPE OF FUNDING PROPOSED METHOD	CONSTRUCTION BY CITY/DEVEL.	YEAR REQUESTED
Note: No Sanitary Sewers Qualify for DCC Rebate												

3. DCC Revenues/Expenditures Cash Flow

Year	Phase	Single Family Units	Multi Family Units	Total Units	Sanitary DCC Revenues	Sanitary DCC Expend	Cumulative Surplus/Deficiency
1997	1	59	30	149	$ 134,970		$ 134,970
	2E	60					
1998	1		47	106	$ 92,940		$ 227,910
	2E	59					
1999	2W	23	95	118	$ 98,340		$ 326,250
2000	3E		113	137	$ 110,970		$ 437,220
	3W		24				
2001	3W		100	183	$ 148,230		$ 585,450
	4		83				
2002	5		100	196	$ 113,680		$ 699,130
			96				
Totals		201	688	889	$ 699,130	0	$ 699,130

Sanitary DCC Rates:

Single Family Units	$	930
Multi Family(RM15,30)	$	810
Multi Family(RM45)	$	580

APPENDIX G

SEWER COMPUTATIONS

IBI GROUP

08-Oct-96

STORM SEWER COMPUTATION FORM
PIPES ARE SIZED TO ACCOMMODATE 100 YR FLOWS

Project: WEST NEWTON SECTOR 2 Computed By: JAC

Job No: VO-4656 Checked By: RAM "n" = 0.013 Rainfall Curve: 5 YR STORM
100 YR STORM
SURREY MUNICIPAL HALL IDF CURVES

CATCH-MENT	LOCATION	MANHOLE FROM	MANHOLE TO	TRIBUTARY AREA (A)	RUNOFF COEFF. R	A x R	TOTAL A x R	TIME of Concentration (Min) Inlet	Pipe	Total	I5	Q5	I100	Q100	SEWER DESIGN Slope	Diam.	Cap.	Vel.	Length	Invert Upper	Invert Lower	Rim Upper	Rim Lower	100 YRHGL AT U/S MH	100 YRHGL AT U/S MH
				ha							mm/hr	m3/sec	mm/hr	m3/sec	%	mm	m3/sec	m/sec	m						
A	PICKUP FROM S OF 64 AVE	36	35	7.220	0.580	4.188	4.188	15.64	4.50	20.14	31.4	0.365	60.7	0.706	1.70	600	0.801	1.50	405.000	97.53	90.64	99.320	93.390	IN PIPE	98.13
B	AND 128 ST W SIDE S OF 66 A	35	34	0.450	0.590	0.266	4.453	20.14	0.33	20.47	26.9	0.333	51.8	0.641	2.00	600	0.868	3.07	61.000	90.62	89.40	93.390	91.200	IN PIPE	91.22
C	GARDEN APTS			3.440	0.590	2.030																			
D	SF SERVICED FROM 66 AVE			0.480	0.570	0.274																			
	TOTAL	34	33			2.303	6.756	20.47	0.37	20.85	26.8	0.502	51.4	0.965	2.00	750	1.574	3.56	80.000	89.38	87.78	91.200	90.400	IN PIPE	90.13
		33	29	0.000		0.000	6.756	20.85	0.25	21.10	26.6	0.499	51.0	0.957	0.40	1050	1.727	1.99	30.000	87.76	87.64	90.400	90.500	IN PIPE	88.81
		31	30	0.000		0.000	6.756	20.85	0.25	21.10	26.6	0.499	51.0	0.957	3.00	450	0.494	3.10	78.000	94.20	91.86	95.800	95.500	IN PIPE	94.65
F	WALK-UP APTS	30	29	2.000	0.588	1.176	1.176	15.00	0.42	15.42	32.0	0.105	62.0	0.203	2.00	525	0.608	2.81	210.000	91.84	87.64	95.500	90.500	IN PIPE	92.37
E	TOWNHOUSES	29	28	2.760	0.588	1.635	2.811	15.42	1.25	16.66	31.6	0.247	61.2	0.478	0.40	1050	1.727	1.99	26.000	87.62	87.52	90.500	90.250	IN PIPE	88.67
G	66 AVE DRAINAGE(E OF 127 ST	28	28	0.380	0.900	0.342	9.909	21.10	0.22	21.31	26.5	0.728	50.7	1.395	0.40	1050	1.727	1.99	90.000	87.50	87.14	90.250	89.000	IN PIPE	88.55
H	SCHOOL - EAST SIDE	28	26	2.050	0.584	1.197	11.106	21.31	0.75	22.07	26.3	0.813	50.4	1.556	0.40	1050	1.727	1.99	82.000	87.12	86.71	89.000	88.750	IN PIPE	88.17
I		26	24	0.300	0.570	0.171	11.277	22.07	0.61	22.68	26.0	0.813	49.5	1.551	0.50	1050	1.931	2.23	82.000	87.12	86.71	89.000	88.750	IN PIPE	87.89
J&V3		24	63	1.250	0.570	0.713	11.990	22.68	0.65	23.33	25.7	0.855	48.8	1.625	0.40	1200	2.466	2.18	95.000	86.69	86.35	88.750	88.750	IN PIPE	
K		20	19	0.270	0.570	0.154	0.154	15.00	2.70	17.70	32.0	0.014	62.0	0.027	0.40	300	0.061	0.87	140.000	88.14	87.58	90.900	90.100	IN PIPE	88.44
L		19	18	0.440	0.570	0.251	0.405	17.70	0.85	18.54	29.3	0.033	56.8	0.064	0.40	300	0.061	0.87	44.000	87.56	87.38	90.100	89.500	IN PIPE	87.86
M		18	171	0.370	0.570	0.211	0.616	18.54	0.77	19.31	28.5	0.048	54.9	0.094	0.40	300	0.061	0.87	40.000	87.38	87.20	89.500	89.100	IN PIPE	87.66
W3		174	172	0.730	0.570	0.416	0.416	15.00	1.19	16.19	32.0	0.037	62.0	0.072	0.40	450	0.190	1.13	81.000	87.18	86.86	90.000	89.500	IN PIPE	87.63
W2		172	171	0.960	0.570	0.547	0.963	16.19	1.02	17.21	30.8	0.082	59.6	0.160	0.40	525	0.272	1.26	77.000	86.84	86.53	89.500	89.100	IN PIPE	87.37
W1		171	17	0.730	0.570	0.416	1.379	17.21	0.97	18.18	29.8	0.114	57.6	0.221	0.41	600	0.393	1.39	81.000	86.51	86.18	89.000	89.000	IN PIPE	87.11
N1		17	14	0.850	0.570	0.485	1.864	19.31	0.97	20.28	27.7	0.143	53.4	0.276	0.30	750	0.610	1.38	80.000	86.16	85.92	89.000	88.500	IN PIPE	86.91
		15	14	0.000	0.570	0.000	0.000	15.00	2.22	17.22	32.0	0.000	62.0	0.000	0.40	300	0.061	0.87	115.000	86.38	85.92	88.900	88.500	IN PIPE	86.68
O		14	233	1.300	0.570	0.741	2.605	20.28	0.73	21.01	26.9	0.194	51.7	0.374	0.66	750	0.904	2.05	90.000	85.90	85.31	88.500	87.810	IN PIPE	86.65
R	PARK N OF 64 AVE	10A	10	4.190	0.425	1.781	1.781	20.00	2.17	22.17	27.0	0.134	52.0	0.257	0.50	600	0.434	1.54	200.000	89.43	88.43	95.750	90.100	IN PIPE	90.03
S	TOWNHOUSES ON 66 AVE			1.460	0.588	0.858																			
T	SCHOOL			4.150	0.584	2.424																			
	TOTAL	10	9			3.282	5.063	22.17	0.18	22.35	25.9	0.364	49.4	0.695	0.44	750	0.738	1.67	18.000	88.41	88.33	90.100	90.000	IN PIPE	89.16
		9	8	0.000	0.570	0.000	5.063	22.35	0.27	22.62	25.8	0.363	49.2	0.692	0.44	750	0.738	1.67	27.400	88.31	88.19	90.000	90.000	IN PIPE	89.06
		8	61	0.750	0.900	0.675	5.738	22.62	2.82	25.45	25.7	0.409	48.9	0.779	0.40	750	0.704	1.59	270.000	88.17	87.09	90.000	88.750	IN PIPE	88.92
U	66 AVE W OF 127 ST																								
V2	TOWNHOUSE	61	62	1.870	0.588	1.100	1.100	20.00	2.88	22.88	27.0	0.082	52.0	0.159	0.45	525	0.298	1.33	230.000	87.07	86.03	90.500	88.500	IN PIPE	87.80
		63	62	0.000	0.000	0.000	11.990	23.33	0.88	24.21	25.3	0.844	48.0	1.599	0.30	1200	2.135	1.89	100.000	86.33	86.03	88.750	88.500	IN PIPE	87.53
N1		62	6	0.940	0.588	0.553	13.642	24.21	0.66	24.87	24.9	0.943	46.9	1.779	0.30	1200	2.135	1.89	75.000	86.01	85.78	88.500	88.300	IN PIPE	87.21
V1		61	6	4.940	0.588	2.905	8.643	24.21	0.09	24.30	24.9	0.598	46.9	1.127	0.30	1200	2.135	1.89	10.000	85.81	85.78	88.750	88.300	IN PIPE	87.01
X2		6	5	0.650	0.570	0.371	22.655	24.87	1.14	26.01	24.6	1.546	46.2	2.904	0.55	1200	2.891	1.20	82.000	85.76	85.31	88.300	88.000	IN PIPE	86.96
X2	SINGLE FAMILY	5A	5	0.720	0.570	0.410	0.410	15.00	0.67	15.67	32.0	0.036	62.0	0.071	0.90	525	0.408	1.88	76.000	85.99	85.31	88.300	88.000	IN PIPE	86.52
		121	12	0.000	0.000	0.000	0.000	15.00	0.86	15.86	32.0	0.000	62.0	0.000	0.66	450	0.232	1.46	75.000	86.62	86.12	88.500	88.300	IN PIPE	87.07
		12	5	0.620	0.570	0.353	0.353	15.00	1.37	16.37	32.0	0.031	62.0	0.061	0.66	450	0.232	1.46	120.000	86.10	85.31	88.300	88.000	IN PIPE	86.55
P		5	4	1.630	0.588	0.958	24.377	24.87	0.51	25.38	24.6	1.663	46.2	3.125	0.66	1200	3.167	2.80	85.000	85.29	84.73	88.000	87.500	IN PIPE	86.49
X1		4	3	0.000		0.000	24.377	25.38	0.08	25.46	24.3	1.648	45.5	3.084	0.38	1200	2.403	2.13	10.000	84.71	84.67	87.500	87.290	IN PIPE	85.91
		23	231	0.000		0.000	0.000	15.00	1.41	16.41	32.0	0.000	62.0	0.000	0.40	250	0.038	0.77	65.000	87.16	86.90	89.500	89.000	IN PIPE	87.41
Z	SINGLE FAMILY 128 ST	231	EX232	0.270	0.570	0.154	0.154	15.00	2.18	17.18	32.0	0.014	62.0	0.027	0.40	250	0.038	0.77	100.000	86.88	86.48	89.000	89.000	ABOVE PIPE	87.20
AA	SINGLE FAMILY 128 ST	EX232	EX233	0.270	0.570	0.154	0.308	17.18	1.73	18.90	29.8	0.026	57.6	0.049	0.59	525	0.330	1.53	158.000	86.48	85.55	89.000	87.810	IN PIPE	87.01
AB	SINGLE FAMILY 68 AV	EX233	EX234	1.350	0.570	0.770	3.682	21.01	0.65	21.67	26.5	0.271	50.8	0.519	0.26	900	0.923	1.45	57.000	85.29	85.14	87.810	87.640	IN PIPE	86.19
AC	SINGLE FAMILY 68 AV	EX234	EX235	1.800	0.570	1.026	4.708	21.67	2.05	23.71	26.2	0.342	50.0	0.654	0.17	900	0.746	1.17	144.000	85.04	84.80	87.640	87.400	IN PIPE	85.94
AD	SINGLE FAMILY 68 AV WEST	EX236	EX235	1.120	0.570	0.638	0.638	15.00	1.35	16.35	32.0	0.057	62.0	0.110	0.17	450	0.118	0.74	60.000	84.81	84.71	87.400	87.750	ABOVE PIPE	85.68
		EX235	3			0.000	5.347	23.71	0.78	24.49	25.1	0.373	47.5	0.553	0.20	900	0.810	1.27	10.000	84.69	84.67	87.750	87.290	IN PIPE	85.59
****	EX STM ON 126 ST N TO 68A AV	3	2			0.000	29.724	24.49	0.52	25.01	24.8	2.044	46.6	3.848	0.31	900	2.016	3.17	99.000	84.65	84.34	87.290	86.110	IN PIPE	85.55
****	EX STM ON 126 ST N 68A AVE	2	1	7.360	0.570	4.195	33.919	25.01	0.40	25.41	24.5	2.308	46.0	4.332	0.39	900	2.261	3.55	84.500	84.32	83.99	86.110	85.750	IN PIPE	85.22
****	OUTFALL TO CREEK	1	OUTFALL	0.000	0.570	0.000	33.919	25.41	0.04	25.45	24.3	2.289	45.5	4.288	1.00	900	3.621	5.69	12.000	83.97	83.85	85.750	85.200	IN PIPE	84.87

**** = TWINNING OF 900mm STORM ON 126 STREET-CAPACITY=2x900 CAPACITY

IBI GROUP

SANITARY SEWER COMPUTATION FORM

Project: SURREY WEST NEWTON N 2 NCP Computed By: JAC

Job No: VO-4656 Checked By:

Gross Developable Area: 38.17 ha. Date: 09-Oct-96
Total Population 2378
per cap flow rate: 0.35 m3/Person/Day
infiltration: 0.1l/s/ha.
Mannings n: 0.013

CATCH-MENT	LOCATION	MANHOLE FROM	MANHOLE TO	A ha	# of Units	Density	POPULATION	TOTAL POPULATION	PEAK FLOW FACTOR	DESIGN Q m3/sec	INFILT. & INFLOW m3/sec	TOTAL DESIGN Q m3/sec	Slope %	Diam. mm	SEWER DESIGN Cap. m3/sec	SEWER DESIGN Pipe Full Vel m/s
	68 AVE SERVICING (WEST)															
A0	COMPACT S FAMILY	110D	110C	0.160	2.0	2.800	6	6	4.43	0.0001	0.0000	0.0001	0.40	200	0.021	0.66
A1	COMPACT S FAMILY	118	110C	0.540	8.0	2.800	22	22	4.37	0.0004	0.0001	0.0004	0.40	200	0.021	0.66
A2	COMPACT S FAMILY	110C	110B	0.390	7.0	2.800	20	48	4.32	0.0008	0.0000	0.0009	0.40	200	0.021	0.66
A3	COMPACT S FAMILY	116	110B	0.550	8.0	2.800	22	22	4.37	0.0004	0.0001	0.0004	0.40	200	0.021	0.66
A4	COMPACT S FAMILY	110B	110A	0.270	3.0	2.800	8	78	4.27	0.0013	0.0000	0.0014	0.40	200	0.021	0.66
									4.50	0.0000	0.0000	0.0000	0.40	200	0.021	0.66
A	COMPACT S FAMILY	117	115	0.560	7.0	2.800	20	20	4.38	0.0004	0.0001	0.0004	0.40	200	0.021	0.66
B	COMPACT S FAMILY	115	109	0.310	3.0	2.800	8	28	4.36	0.0005	0.0003	0.0008	0.40	200	0.021	0.66
C	COMPACT S FAMILY	112	111	0.710	14.0	2.800	39	39	4.34	0.0007	0.0001	0.0008	0.40	200	0.021	0.66
D	COMPACT S FAMILY	111	110	0.400	6.0	2.800	17	56	4.30	0.0010	0.0001	0.0011	0.40	200	0.021	0.66
E	COMPACT S FAMILY	110	110A	0.280	4.0	2.800	11	67	4.29	0.0012	0.0001	0.0013	0.40	200	0.021	0.66
F	COMPACT S FAMILY	110A	109	0.640	9.0	2.800	25	170	4.17	0.0029	0.0002	0.0031	0.40	200	0.021	0.66
		109	107				0	198	4.15	0.0033	0.0004	0.0037	0.40	200	0.021	0.66
H	COMPACT S FAMILY	107	105	0.680	11.0	2.800	31	229	4.13	0.0038	0.0005	0.0043	0.40	200	0.021	0.66
J	COMPACT S FAMILY	105	104	0.620	5.0	2.800	14	243	4.12	0.0041	0.0005	0.0046	0.40	200	0.021	0.66
M	COMPACT S FAMILY	104	101	0.230	4.0	2.800	11	254	4.11	0.0042	0.0005	0.0047	0.40	200	0.021	0.66
I	COMPACT S FAMILY	109	130	0.810	13.0	2.800	36	36	4.34	0.0006	0.0001	0.0007	0.40	200	0.021	0.66
K	CLUSTER HOUSING	130	122	7.710			544	580	3.94	0.0093	0.0008	0.0100	0.40	200	0.021	0.66
L	COMPACT S FAMILY	122	101	0.410	4.0	2.800	11	591	3.94	0.0094	0.0000	0.0095	0.40	200	0.021	0.66
N1	SINGLE FAMILY	103	102	0.960	9.0	3.000	27	27	4.36	0.0005	0.0001	0.0006	0.40	200	0.021	0.66
N2	SINGLE FAMILY	102	101	0.300	6.0	3.000	19	46	4.32	0.0008	0.0001	0.0009	0.40	200	0.021	0.66
		101	EX	0.000	0.0			891	3.83	0.0138	0.0001	0.0140	0.40	200	0.021	0.66
	68 AVE SERVICING (EAST)															
O	SINGLE FAMILY	121	120	0.320	6.0	2.800	17	17	4.39	0.0003	0.0000	0.0003	0.40	200	0.021	0.66
P	SINGLE FAMILY	120	119	0.340	6.0	2.800	17	34	4.35	0.0006	0.0001	0.0007	0.40	200	0.021	0.66
Q	SINGLE FAMILY	119	EX	0.280	6.0	2.800	17	51	4.31	0.0009	0.0001	0.0010	0.35	400	0.123	0.98
R	SINGLE FAMILY ON 68 AVE		EX	0.460	10.0	2.800	28	79	4.27	0.0014	0.0001	0.0015	0.35	400	0.123	0.98
S	SINGLE FAMILY ON 68 A	EX	EX	0.370	6.0	2.800	17	96	4.25	0.0017	0.0002	0.0018	0.35	400	0.123	0.98
T	SINGLE FAMILY ON 68 A	EX	EX	0.330	6.0	3.000	18	18	4.39	0.0003	0.0000	0.0004	0.32	200	0.019	0.59
	FLOWS TO 126 ST SEW	EX	EX					1005	3.80	0.0155	0.0003	0.0158	0.85	400	0.192	1.53
	66 AVE SERVICING															
U	WALK-UP APARTMENTS	127	126	2.000			395	395	4.02	0.0064	0.0002	0.0066	0.40	200	0.021	0.66
V	TOWNHOUSES	126	124	2.780			274	669	3.91	0.0106	0.0005	0.0111	0.40	200	0.021	0.66
W	GARDEN APARTMENTS	125	124	3.440			494				0.0003					
X	COMPACT S FAMILY			0.510	9.0	2.800	25				0.0001					
	TOTAL	125	124				519	519	3.97	0.0083	0.0004	0.0087	0.40	200	0.021	0.66
Y	SCHOOL	124	EX 3	6.720			1100	2288	3.54	0.0328	0.0015	0.0344	0.40	250	0.038	0.77
Z	TOWNHOUSES	EX 3	EX 2	0.810			67	2355	3.53	0.0337	0.0016	0.0353	0.40	250	0.038	0.77

SAN (REVD 10 APR 96)